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April 16, 1932

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Vol. XX. No. 514

Saturday, April 16, 1932

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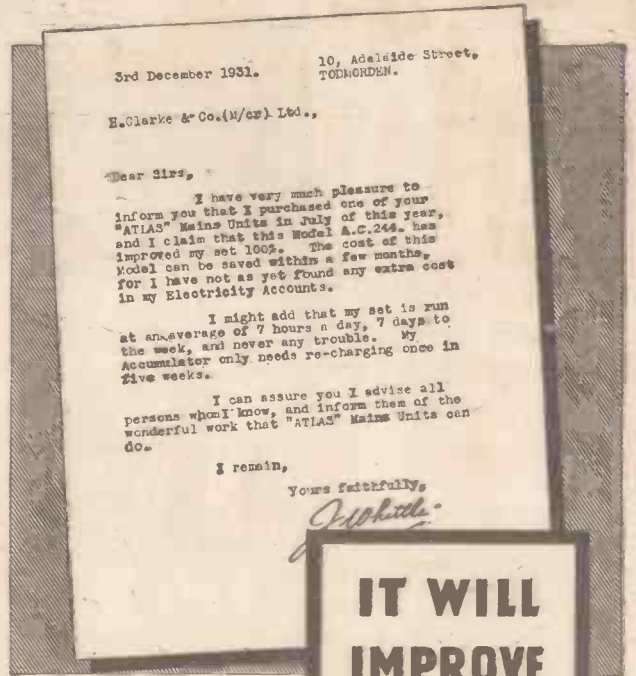
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2 Wearite super-het coils, one OT1 and one OT2, complete with chassis and switch	3	19	6
7 four-pin valveholders	3	6	
1 T.C.C. 1-mfd. fixed condenser	2	10	
2 Dubilier 1-mfd. fixed condensers	5	0	
1 Peto-Scott super-het H.F. choke	4	6	
1 Lissen Hypernik L.F. transformer	12	6	
1 Sovereign .0003-mfd. pre-set condenser	1	3	
1 Readi-Rad grid-leak holder	3	6	
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1 Lissen .0003-mfd. fixed condenser	1	0	
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1 Sheet aluminium foil, 8 in. by 8 in.	8		

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Experts are hard to please. But one and all are loud in their praise of the new “His Master’s Voice” three-valve radio set Model 435. “It would be difficult to overdo praise for this excellent table console set,” says *Amateur Wireless*; whilst the *Wireless Magazine* adds, “This is one of the best sets we have tried this season. Its many technical points will interest the enthusiast and its wonderful performance will thrill the ordinary listener.”

Examine the “His Master’s Voice” radio for yourself and you will at once see why everybody — expert and

amateur alike—is so enthusiastic about this set. It is so compact that you can have it on any small table or side-board, and it is entirely self-contained. The powerful three-valve receiver brings in a wide range of stations—the built-in loudspeaker is of the latest “His Master’s Voice” permanent magnet moving-coil type. The Band Pass Tuning ensures extreme selectivity. Whatever the station you are listening to, the sensitivity is equally good.

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BRITAIN'S LEADING RADIO WEEKLY
FOR CONSTRUCTOR, LISTENER & EXPERIMENTER

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NEWS & GOSSIP OF THE WEEK

PRESENTING THE "SUPER"

THE new "A.W. Simple Super" is described in this issue. First constructional details are given in the centre pages—there is a special article on how it works and a large pictorial diagram shows the chief features of the new super-het. Constructors, you mustn't miss this!

RETURN OF OLD FAVOURITES

UNDER new arrangements in the B.B.C.'s Productions Department the choice of broadcast artistes will in future be left to the individual producers. A number of artistes who have not been heard for some time will shortly be featured again. Rex Evans made a welcome return to the studio on April 12 after nearly a year's absence.

BRIGHTER DANCE MUSIC

TO assist Henry Hall's efforts to put over bright and better dance music, the B.B.C. has recently introduced several well-known vaudeville artistes during the

dance music broadcasts. Anona Wynn was recently heard and several others will assist in the near future, especially during the early evening shows.

FOR AND AGAINST

IN view of the controversy over Jack Payne and Henry Hall, it is interesting to learn that after the first week the B.B.C. found, on analysing its correspondence, that the number of letters saying good-bye to Jack Payne almost exactly balanced those welcoming Henry Hall. So far a negligible percentage of adverse criticism has been received at Savoy Hill.

AMERICAN PROGRAMMES

FOLLOWING the agreement between the Columbia Broadcasting System and the B.B.C. to exchange programmes, an American talk on school life in America will be broadcast by the B.B.C. on April 14. From this date onwards programmes will be exchanged once a week. On May 20 the B.B.C. is sending to America a character-

istic programme entitled "Leicester Square." On June 3 America will return the compliment with a programme entitled "Broadway." These programmes will be given at 11 o'clock at night over the transatlantic telephone service.

NOT SO VOCAL

LISTENERS may have noticed that Henry Hall has cut down the percentage of vocal effort in his dance music. At first nearly all the tunes he broadcast were scored for vocal chorus, but as the repertoire increases, a larger number of tunes will be played without any assistance from the vocalist.

"THICK" ORCHESTRATION

A DANCE expert has pointed out to us that Henry Hall's band is distinct from other bands that frequently broadcast in its exclusion of heavy brass, sousaphone and drums. This expert suggests that, after hearing Henry Hall's band for two or three months, listeners will reject "thick" dance-band orchestrations featuring these instruments, which, he says, are really unsuitable for a broadcast dance band.

GRACIE IS ENTERTAINED



Whilst making-up in her dressing-room in a London theatre, Gracie Fields listens-in and puts some of her own records on an H.M.V. radio-gramophone which she has had installed

DETECTION VANS BUSY

THE Post Office detection vans are having a busy time in the counties of Berkshire, Buckinghamshire, Hampshire and the outlying parts of Surrey and Middlesex. A rich harvest of new licences is expected to result from the latest "drive."

CLOSING DOWN RELAYS

LANGENBERG listeners, being deprived of the Cologne and Münster relays, have agitated that the studios at Münster should not be closed down. The relay transmitters have been temporarily closed down because it is believed that the high-power Langenberg station is powerful enough to give about the same service area as Brookmans Park and Slaithwaite. The Münster studios will be kept open and used for programmes through Langenberg. If the scheme works, it should mean a little

NEXT WEEK: A SPECIAL LARGE-SCALE WORKING DIAGRAM OF THE "SIMPLE SUPER"

NEWS · & · GOSSIP · OF THE · WEEK — Continued

less German interference on our programmes.

DR. BOULT

WHEN a broadcast is made from Chelmsford at the end of this month, at a festival concert of the Essex Musical Association, it will be Dr. Adrian Boulton, the B.B.C. Musical Director, who will conduct the large combined choirs and orchestra. The doctor is very interested in this musical progress and a Regional broadcast has been arranged.

THE SHAKESPEARE THEATRE BROADCAST

DETAILS have already been given of the opening by the Prince of Wales of the Shakespeare Memorial Theatre at Stratford-on-Avon on April 23. On the following day, Sunday, April 24, a matinee concert from the new theatre will be given by the City of Birmingham Orchestra, conducted by Leslie Howard. This will be heard by National listeners.

A FILMED BROADCAST

THE comedy *Mr. Smith Wakes Up*, which was given last week, was written by a well-known Fleet Street journalist and was one of the first sketches to be made into a British talkie. It has also been broadcast in America.

NEW TALKS

AMONG the new series of talks starting at the end of this month, several are exceptionally promising on the score of human interest. On Mondays a series of reminiscences will be broadcast by Lord Beaverbrook, Lord Ashfield, the Poet

Laureate, Mr. C. B. Cochran, Mr. W. H. Davies, Mr. J. H. Thomas and others. The title of this series is "The Rungs of the Ladder" and the contributors will describe some of their early adventures and experiences.

THE "HAZARD" SERIES

"ENCOUNTERS," a Wednesday talks feature, will be a further experiment in broadcast dialogue, following on the recent "Conversations in the Train." On Saturdays, the series called "Hazard" will be given. They will comprise adventures of a risky and exciting nature, including the experiences of "U"-boat and "Q"-boat men, British and German airmen, escaped prisoners of war, etc. Among those contributing are Admiral Gordon Campbell, Commander Ernst Hashagen and Admiral E. R. G. R. Evans.

THE LAST PROGRAMME

INCLUDED in the "last programme" broadcast from Savoy Hill on May 14 will be a reproduction of one of the very early Children's Hours, featuring Uncles Jeff, Rex and Peter, not forgetting Aunt Sophie. Others included in the reproduction programme will be Harold Nicolson, A. J. Alan, Gerald Barry, Marion Cran and Jack Payne—in person.

THREE VOICES

ONE of the most interesting features of this last programme will be the broadcasting of three voices taken from different parts of the programme. These voices are so alike that it will be very hard to tell that one speaker is not responsible for the remarks of all three. The owners of the voices are at present anonymous.

A POLITICAL BROADCAST



Herr Hitler at the microphone in the grounds of the big Sport Palace in Berlin. The German outside broadcast engineers use condenser microphones for this kind of work

PREPARING FOR MADRID

VARIOUS Government departments, including our Post Office, have had the task of preparing technical data for the Madrid Conference to be held on September 15 to discuss all phases of radio, including, of course, broadcasting. Great Britain has had the job of preparing a report on the wavelength situation, and Germany has been studying the harmonics of transmitters, while the Danish Government has had the job of collecting data on electrical interference to broadcast reception.

INDUSTRIAL INTERFERENCE

ONE of the problems of broadcasting to be thrashed out at Madrid is the interference caused by electrical apparatus. It

"A.W.'s" NEW SUPER-HET

In this issue we give first constructional details of the new super-het designed specially for "A.W." by the famous set designer Mr. W. James. On account of its one-knob control and easy construction, it is appropriately called the "Simple Super."

Only one knob brings in all the European stations you can want!

The construction is described in the centre pages of this issue, there is a special article on how it works, and a large pictorial diagram, showing all the salient features.

The simple construction is strikingly obvious.

Turn to pages 736-738 for first constructional details.

is not expected that any general legislation will emerge on this subject from Madrid, but it is expected that the various governments will be asked to take independent action.

B.B.C.'s WAVELENGTH REPORT

THE report on the wavelength separation prepared by the B.B.C. for Madrid has to be submitted to the Berne Bureau during the next month, so that all countries can study it before the conference in September. The contents of the report are not known, but the B.B.C.'s attitude regarding interference would seem to indicate that a plea will be made for more adequate frequency separation between adjacent high-power stations.

A DIRECTOR TALKS

MR. E. R. APPLETON, West Regional Director, gives his monthly talk on Regional affairs on April 27. There is still a great deal of misapprehension in the minds of many people in the region about the future of the new station which is being erected at Washford Cross. In Wales especially, it is feared that the new transmitter will involve the closing of the Cardiff studios, and in these talks Mr. Appleton hopes to make it clear that higher power will not interfere with the programme activities.



IS THERE TOO MUCH DANCE MUSIC?

- asks Jack Payne

AS a result of four years' experience at Savoy Hill, certain opinions have crystallised in my mind, and I think "A.W." readers will be interested to hear them; indeed, one or two of them will probably cause some surprise.

Let us start with that part of the Dance Music programmes which occur between half-past ten and midnight. For six nights a week there is a band on the air for approximately an hour and a half, and, frankly, I do not think enough listeners stay up to justify it. Perhaps they do once or twice, but I feel sure that the majority of people retire long before midnight.

Whenever I have been on a theatrical tour with my band I have always made a point of looking at the windows of the houses I have passed on my way home

because they do not like to shut off so long as there is more to come.

Next, let me deal with Vaudeville programmes. I do not think a band like mine is wanted here at all. There are several reasons why I say this. In the first place, a B.B.C. Dance Orchestra cannot be "variety" to a listener because he hears it more often than anything else. If anyone argues that a band such as mine is the biggest draw on the music halls to-day it shows that the public want it in wireless vaudeville programmes, then I reply that they are confusing two utterly different kinds of entertainment.

Music for Vaudeville

In the music halls the accompaniment is provided by what we call a "theatre orchestra," and, therefore, a dance band is definitely new to the audience; it is variety in every sense of the word. Furthermore, if the management engages a dance band for one week it will not do so for the next. If you will study the bills of your local halls you will find that the engagements of bands such as mine are arranged with just the right intervals between to make you want to see and hear them.

My opinion, then, is that my band is out of place in a vaudeville programme as a "turn." The next point to consider is whether it should provide the accompaniment. I do not think it should, because by its very nature such music should be as anonymous as possible, as it is in a theatre. The ideal, to my way of thinking, is a small, theatre-type orchestra.

Moreover, I think such an orchestra would be well advised to avoid all dance numbers. To play them would be setting up against the well-known bands which specialise in dance music, and inviting criticism.

Programmes and Programme Times

The same remark applies to the singers. It is practically impossible to select a dance number which is popular without it having been also chosen by one or more of the regular broadcasting bands and featured as a solo. Apart from the fact that the variety value of a number which has already been featured in the past and will undoubtedly be featured in the future, perhaps later the same night, cannot be very high, there is again, the inevitable comparison. Singers who do this must be prepared for criticism.

One of the most important things in

programme building is to know which are the most popular times of the day. Or, to use a phrase borrowed from the traffic authorities, which are the "peak" hours. Well, I think the first one comes between four and six, when the average housewife is beginning to think about putting on the kettle for a cup of tea. Most of the work for the day is done, and she is in the mood to enjoy a little relaxation.

"Peak" Hours

There was an unexpected and rather humorous development regarding my own teatime music. It was originally put on for the grown-ups, as an alternative to the Children's Hour, but we found that the children were as enthusiastic about it as anyone else. I received hundreds of letters from them, and my wife had even more, asking for certain numbers to be repeated. Nearly all of these letters were undoubtedly genuine kiddies' efforts.

EVEN BETTER THAN THE
"CENTURY SUPER"
The New "A.W." "SIMPLE SUPER"

The second "peak" hour in the day's programmes is, in my opinion, from seven o'clock until about half past eight or nine. The men folk arrive home from business, generally speaking, around six or half past and finish their evening meal by 7.30. Almost the first thing they do then is to turn round in their chair and to switch on to see what is on the air. This is the ideal time for variety. Not only is a man in his best humour with the day's work behind him but, the meal over, he is not in the least anxious to move for an hour or so.

Of course, you could not hope to put on a vaudeville programme at this time every night. For one thing there are not enough first-class turns to meet such a colossal demand, and for another, the very idea of vaudeville would be defeated by trying to make a daily affair of it.

Although this "peak" hour is primarily the business man's, I do not think he would suggest that he and he alone must be catered for every night of the week.

In order to try to cater for as many people as possible we introduced an hour's dance music one evening a week between eight and nine, or thereabouts. Our reason for this was that quite a number of people

(Continued at foot of next page)



Jack Payne contends that too much dance music is broadcast and also that it should not feature in the variety programmes

about eleven o'clock. To see a light in a window, or to hear a loud-speaker as I passed by, was the exception rather than the rule. From these observations I feel it is no exaggeration to say that, outside the West End of London practically every wireless set is switched off round about eleven o'clock.

Of course, there must be some listeners who hear the programmes right through, but I believe a lot of these only do so

WHAT IT IS FOR

THE SERIES AERIAL CONDENSER

IN most modern sets a fixed or semi-variable type of condenser is connected in series between the aerial lead and the grid end of the first tuning circuit. The function of this condenser is most easily understood when you know that the aerial and earth constitute a capacity in parallel with the aerial tuning circuit. The insertion of a fixed or semi-variable condenser between the aerial lead and the tuning coil is, in effect, a means of reducing the existing parallel capacity formed by the aerial and earth.

This is because when two condensers are connected in series the total effective capacity is less than the capacity of the individual condensers.

One of the most obvious effects of introducing a series aerial condenser is to increase the wavelength range of a given tuning coil and condenser. The reason for this is quite easy to see, for since the insertion of the aerial condenser has the effect of reducing the aerial-earth capacity it follows that the minimum parallel capacity across the tuning coil will be lower with the series aerial condenser in circuit than without it.

As a rule, the series aerial condenser is inserted to sharpen up the aerial-circuit tuning. This increased selectivity is obtained by virtue of the fact that when the series aerial condenser is used, providing its capacity is sufficiently low, the signal current passed on to the tuning circuit is cut down, and so the

tendency for a strong signal to spread over the tuning dial is reduced.

The aerial-to-earth capacity always exerts quite a considerable damping effect on the tuning circuit. It is the reduction of this damping, by the effective reduction in the parallel capacity, that results in greater selectivity being obtained with a series aerial condenser.

As the capacity of the series aerial condenser is reduced so is the amount of signal energy handed on to the tuning

This variation, with the average aerial, will provide quite an effective control of volume.

Another important use of the series aerial condenser, especially in modern screen-grid sets, is for aerial compensation. With modern sets it is necessary to adjust the aerial lead so that it is approximately the same as the load of subsequent tuning circuits ganged to the aerial-tuning circuit.

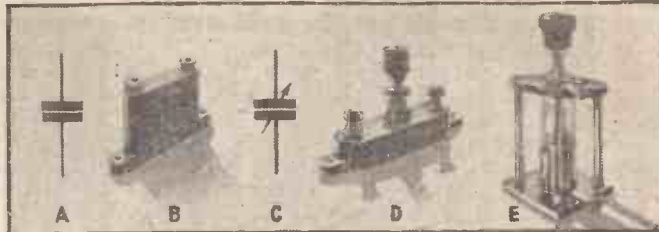
For this, a pre-set is very valuable, but it should be noted that there is only one correct setting in the pre-set when used for aerial compensation. Increase or decrease in capacity with respect to this critical setting would upset the ganging.

If fixed condensers are to be used for the series aerial capacity, values between .0001-microfarad and .0005 microfarad can be tried. A larger capacity may be necessary for long-wave tuning than for medium waves.

For short-wave reception below 100 metres it is necessary to use a very much

smaller capacity in the aerial lead. As a rule the neutralising type of condenser is very suitable. It should be air-spaced and should have a minimum capacity as low as 2 microfarads, in order to ensure a sufficient reduction in aerial damping to enable oscillation to be obtained down to the lowest of the short wavelengths.

A. S. H.



At A is shown the symbol for a fixed condenser, as used, for example, in series with the aerial lead and aerial-tuning circuit. At B is shown a typical fixed condenser, corresponding to the symbol at A. At C is shown the symbol for a variable condenser, as inserted, for example, in series in the aerial lead. At D is shown a typical pre-set type of condenser corresponding to the symbol shown at C. At E is a neutralising type of condenser, having a very low minimum capacity, as often used in the aerial lead for short-wave tuning

circuit. This is because as the capacity is reduced the impedance is increased and so a greater proportion of incoming signal voltage is dropped across the condenser.

Because of this action, it is possible to use a semi-variable series-aerial condenser, commonly known as a pre-set, as a form of volume control. The best value is .0003-microfarad pre-set, having a minimum capacity of .000025 microfarad.

"IS THERE TOO MUCH DANCE MUSIC?"

(Continued from preceding page)

give a party in the middle of the week. This hour was arranged to start when we thought they would want to dance and to end in time to leave them a couple of hours in which to play cards. We decided from our correspondence and general enquiries that Thursday evening was the most suitable, and, having done so, kept to that day so that everyone concerned would know that they could rely upon an hour's dancing, and safely arrange a party.

But, although this dance music was only for an hour once a week we tried to make it enjoyable for those who were not dancing. I dare say you will remember that at certain intervals I used to announce that "for those listeners who are not dancing" we were going to play some kind of novelty such as a transcription, and we did put over a number which was not in dance rhythm. You see, although we were setting out to please the younger generation who wanted to dance, we realised that they were not the only pebbles on the beach.

My policy was to introduce as much variety as I could into my programmes.

Trying out the drums — Jack Payne is on the right



For this reason I developed my transcriptions, in which I took a dance number and altered it so that I got right away from its original rhythm. In other words, I made an ordinary tune of it without sacrificing the popularity of the composer's melody.

It would be quite wrong for a B.B.C. dance band leader to imagine that he is playing to dancers all the time.

Furthermore, few houses have sufficient room for proper dancing. It is all very well to talk of pushing back the tables and chairs, but it is not always as easy as it sounds. Dancing in the home is usually either impromptu or just an interlude in a social evening



SCRAPPING *the* GRID BIAS BATTERY

ALAN HUNTER shows how simple battery-operated sets can be modified to eliminate the grid-bias battery, the great advantage being an automatic reduction of the negative bias as the high-tension battery drops in voltage

IN mains-operated sets the grid-bias voltage is obtained from the high-tension supply—why not adopt the same method with battery sets? I have been trying out the idea with simple battery sets, and I find two advantages. The first is, of course, the scrapping of the grid battery, with its attendant connections.

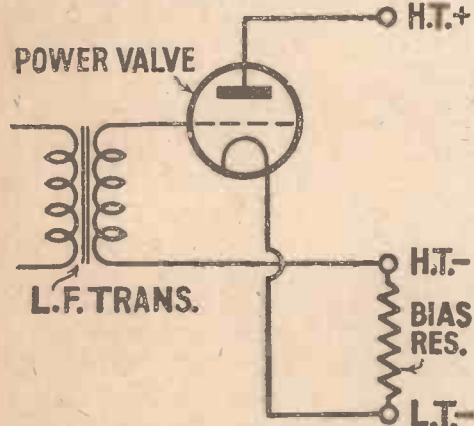


Fig. 1.—The simple circuit principle of automatic grid bias is shown here. The grid-bias voltage is obtained at the expense of high-tension voltage through a voltage-dropping resistance in the high-tension negative lead

The second and more important advantage is that an automatic compensation effect is obtained, the grid bias dropping as the battery loses voltage with age.

Automatic Bias

If you will study Fig. 1, the method of obtaining this automatic bias can easily be understood. Here we have a power valve preceded by the usual low-frequency transformer. Normally the lower end of the secondary would go to grid-bias negative, the positive side of the grid battery going to low-tension negative.

In the Fig. 1 circuit the secondary connection is taken to high-tension negative. In spite of this unorthodox connection the grid is actually biased negatively, and the reason lies in the insertion of the bias resistance between high- and low-tension negative.

To understand the system, you will do well to consider the lowest point of potential as being the high-tension negative

end of the high-tension battery. And to consider the highest point of potential as being the high-tension positive end of the high-tension battery. Very well, then, there must be a progressive voltage drop between the point of highest potential, which is high-tension positive, and the point of lowest potential, which is high-tension negative.

We can consider the path of high-tension current as being from high-tension positive, through the valve, through the bias resistance, and so to high-tension negative.

A certain amount of current will be flowing through the bias resistance, the number of milliamperes depending on the type of valve used. There will, of course, be a certain voltage drop across the resistance. The important point to note is that the low-tension negative end of the bias resistance is more negative than the high-tension negative end.

Now it will be seen that the filament is connected to the end of the bias resistance that is at a lower potential than the end of the resistance connected to the grid via the transformer. In other words, the filament is positive with respect to the grid, or, what amounts to the same thing, the grid is negative with respect to the filament.

Which is all quite simple if you think about it. But do not overlook the fact that the filament being something positive with respect to the high-tension negative end of the battery means that the anode is less positive with respect to the filament. In other words, the voltage gained for grid-bias by the use of a resistance in series with the high- and low-tension negative points is so much voltage lost for the anode, which has its

voltage measured with respect to the negative end of the filament.

So much for the theory of getting the grid-bias from the high-tension battery supply. Now for some practical points, based on recent experience. The first point that occurs to me is that this automatic bias system is most applicable to sets with small power valves and pentodes, since quite a small grid-bias voltage is wanted for these valves, say between 6 and 9 volts.

High-tension Voltage

As this is deducted from the total voltage available, the power valve will then get whatever the maximum voltage may be, minus 6 or 9 volts. With a 120-volt high-tension battery, and a valve of the PM2 power type, or the Pen220 pentode type, ample high-tension voltage would be left for the anode supply.

With a large power valve, presumably run from super-power batteries, and

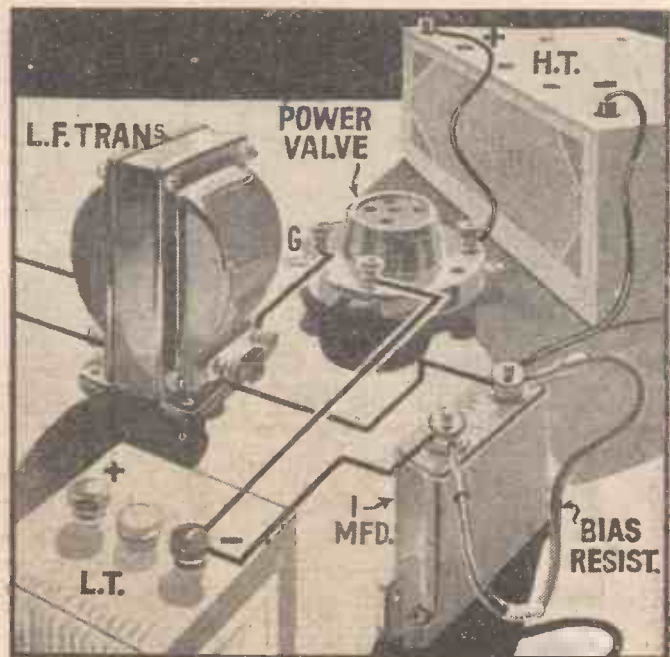


Fig. 2.—A pictorial diagram showing the essential connections for automatic grid bias. Note that the bias resistance has to be shunted by a large fixed condenser

A SPECIAL LARGE-SCALE LAYOUT OF THE "SIMPLE SUPER" NEXT WEEK

"SCRAPPING THE GRID BIAS BATTERY"

(Continued from preceding page)
 needing perhaps 20 volts or more grid bias, this automatic idea is not so attractive, since it is rather a waste to use an appreciable part of big batteries for a job that is normally done by a small-cell bias battery.

As an experiment, I converted a simple two-valver equipped with a PM2A power valve and the usual 9-volt bias battery into the auto-bias arrangement. It worked so well, and the loss of high-tension voltage was so small, that this particular set will never again be troubled with an extra battery for bias.

Applying Ohm's Law

Here the point arises as to how we find the right value of resistance for the bias. It is just a simple application of Ohm's

Law. Use the equation $R \text{ equals } \frac{E}{I}$

when R is the required resistance in ohms, E is the voltage drop across the resistance, and I is the current in amperes flowing through the resistance. As we shall be dealing with milliamperes, i.e. thousandths of an ampere, it will be necessary to multiply the answer by 1,000.

We want to find R. Well, we know E, for this is the grid-bias voltage we want to drop across the resistance; and we know I, for this is the total anode current. So R is found by dividing one known quantity by another known quantity, and multiplying the answer by 1,000.

Let us take the PM2A power valve as an example, and then you can work out R for your own conditions. The valve table shows that this PM2A takes an anode current of 5 milliamperes with a grid bias of 3 volts, when the anode voltage is 100.

Suppose we are using a 108-volt battery, the figures above will be near enough to utilise in finding the required resistance.

Thus R will be $(\frac{3}{5} \times 1,000)$ ohms, that is 600 ohms. If this value of resistance is inserted between high- and low-tension negative, as shown by the pictorial diagram Fig. 2, the PM2A will be working under correct conditions—only without a separate bias battery.

Even if you haven't any meters available, the valve tables will enable you to determine with quite sufficient accuracy the

value of resistance wanted for any given grid-bias, anode-voltage, and anode-current conditions. Remember, the procedure is to apply Ohm's Law by finding the unknown factor, the resistance, from the two known factors, the grid bias and the anode current.

About this anode current—it is the total anode current, so you must take into account the anode current of any valves preceding the power stage. In the simple two-valver mentioned, the preceding detector took only .5 milliampere current, so this could be neglected.

As shown by the Fig. 2 circuit layout, a large fixed condenser must be connected across the bias resistance, otherwise

As mentioned, there is a progressive drop of voltage across the bias resistance.

At the half-way point along the resistance shown by Fig. 2 for the PM2A conditions, the potential is 1.5 volts negative with respect to the low-tension negative end of the resistance. This is just about the bias value wanted for a first low-frequency stage, so we could use two bias resistances of 300 ohms each, in series between high- and low-tension negative, as shown by Fig. 3. Note the additional shunt condenser.

Good de-coupling will be needed with this arrangement, which, by the way, is ideal for portable sets.

For the small power valves the spaghetti type of resistance is quite suitable, and these are made in nearly all resistances from 100 ohms upwards.

As indicated at the beginning of this article, the great advantage of this system is that the usual trouble of an over-biased valve, which follows from a running-down high-tension battery used with a grid-bias battery that is still up to full voltage, is avoided. As the high-tension supply runs down, the anode current through the power valve, and consequently through the bias resistance, decreases, thus decreasing the voltage drop, and so cutting down the grid bias.

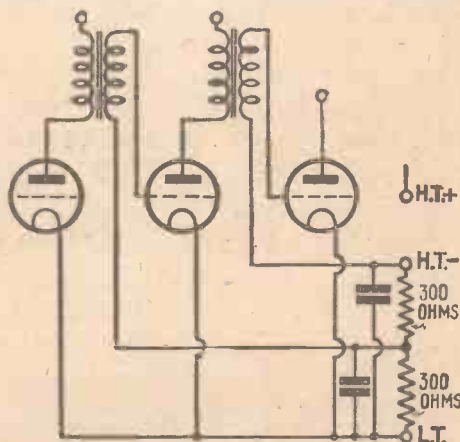


Fig. 3.—Skeleton circuit arrangement for getting automatic bias in a set with two low-frequency stages. A tapped bias resistance is wanted, or two resistances in series, with two separate shunt condensers

instability is certain. A 1- or 2-microfarad condenser is suitable.

When using this automatic-bias system it is also important to de-couple the preceding amplifier stages, as the insertion of the bias resistance will emphasise any instability in the earlier stages.

Two Stages of Bias

It is quite possible automatically to bias two stages of low-frequency amplification, as I later proved with a three-valve set.

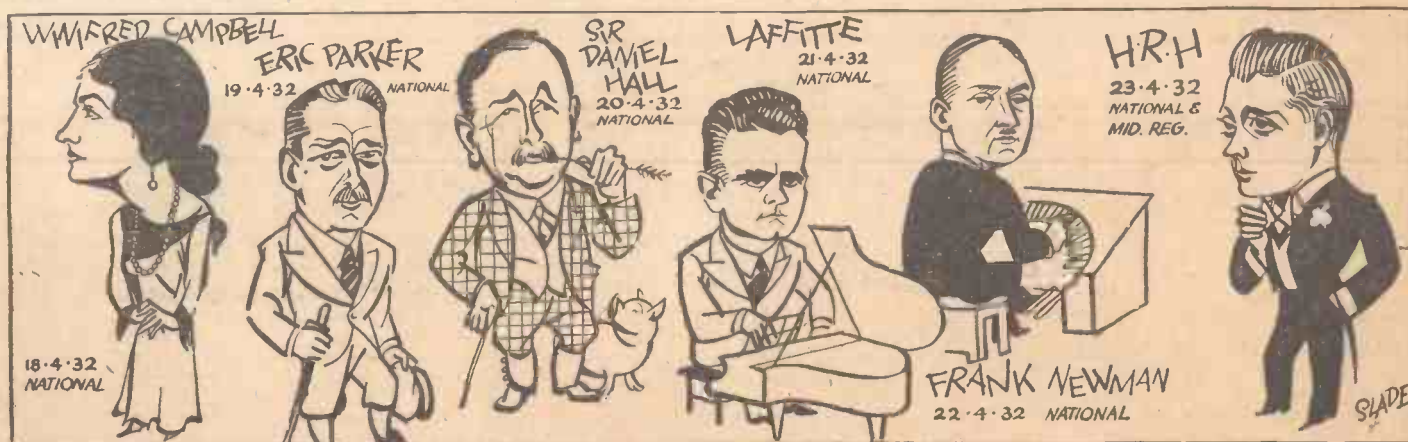
Usually the first low-frequency stage requires only a very small bias, and this can be obtained by a tapping on the main bias resistance in the power stage.

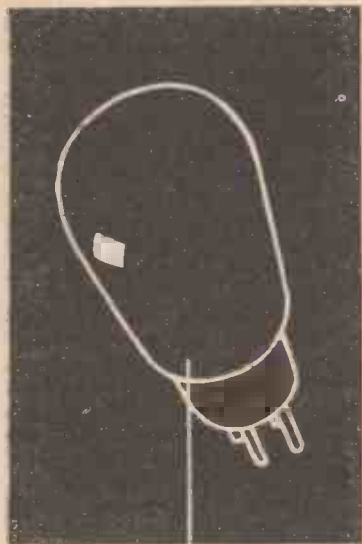
FOREIGN LISTENERS' PRIVILEGES

IN Germany the law recognises more forcibly than it does over here the right of its citizens to receive broadcast programmes free from avoidable interference. A German listener who is subjected to persistent disturbance from neighbouring electrical machinery can apply to the nearest Court for an injunction compelling the owner of the offending plant either to take such steps as will render it unobjectionable, or else to put it out of action altogether. The listener's position is greatly strengthened if he can prove that he had his wireless set installed before the cause of the disturbance came into operation. Having once enjoyed quiet reception, he is, in law, entitled to prevent anyone from trespassing on that privilege. M. A. L.

The Carroll Sisters, in syncopated songs at the piano, are to take part in the vaudeville programme from Belfast on April 30.

PERSONALITIES IN THE WEEK'S PROGRAMMES





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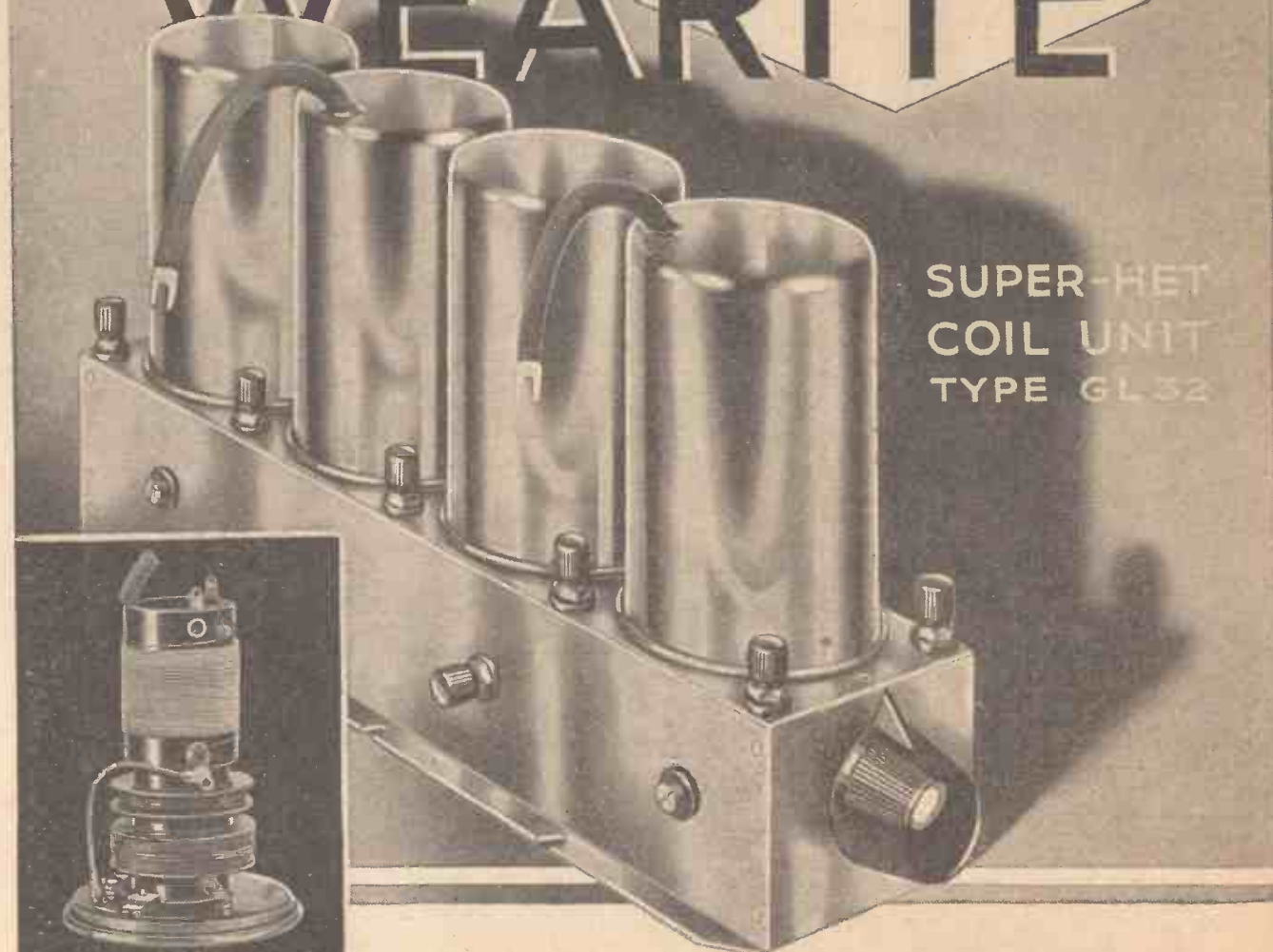
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The "Super 60" and the "Century Super" designed by Mr. W. James in 1931 were a sensational success. Never before had such selectivity been available. Never before had it been possible to receive so many stations at so little cost. The tremendous enthusiasm now being shown for the Super-het really dates from these two magnificent Receivers—the coils for which were produced entirely by Wright & Weaire, Ltd. And now—

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Oh Your Wavelench!

WONDERFUL LASTERS

WHEN you are choosing grid batteries, particularly if you are building them into a set whose interior is somewhat inaccessible, it is as well to select types which last well. The average life of the ordinary grid battery may be taken as eight or nine months. If you remember at the end of that time to change the batteries, well and good. On the other hand, if you forget to do so you may place an altogether unfair drain upon your high-tension supply as well as doing your valves damage by passing too much high-tension current through them. Further, it must not be forgotten that run-down grid batteries inevitably lead to horrible distortion. I have just been fishing out a series of grid batteries which I built into a big set 10 less than fifteen months ago. There are four nine-volt units, and when tried out with a good voltmeter each and every one showed the full reading of nine volts. The voltage reading by itself, however, is apt to be misleading, for if the meter has a high resistance it gives no indication of the internal resistance of the batteries themselves.



CAN YOU DO IT?

I AM rather particular about the look of my battery leads. Some people have them trailing all over the place, but, personally, I like to make them up into a neat kind of bell-rope made of different coloured flex wires. Previously I have always twisted them, but the other day it occurred to me that they would look very much better if they were plaited. In this case there were four leads to be dealt with, and since plaiting seems to be rather a feminine accomplishment, I went to consult Mrs. Thermion. "Oh, that's quite easy," she said, "you just go ahead as if you were plaiting three and work in the fourth." I gave her four pieces of coloured flex and asked her to demonstrate. But at the end of several minutes she had produced something which looked like a cross between a storm-swept bird's nest and a cat's cradle. When I consulted various lady friends, all of whom said that they could do it, they proved very quickly that they could not. No book of reference that I possess gave me any help at all on the point. Even the "Encyclopaedia Britannica" merely gave the Latin derivation of the word to plait! As I had nothing much to do during the morning I set myself the task of discovering just how four things could be plaited. In the end I discovered that there were two ways of doing it. You can make either a flat plait or a solid one. The solid one is rather better looking for battery leads, though the flat one is quite serviceable. I wonder just how many readers—or their better halves—can make a solid plait of four leads.

GIVING THEM A CHANCE

IN former years very many moving-coil loud-speakers were sold without built-in transformers. The result was that people tried to employ them with all kinds of unsuitable output valves, including pentodes, and were disappointed with the results obtained. It is not always realised that the impedance of the windings of the moving-coil loud-speaker is generally very low indeed. The impedance of any loud-speaker depends, of course, upon the frequency. At 100 cycles that of the average moving-coil loud-speaker is in the neighbourhood of 12 ohms. The impedance of the average balanced-armature loud-speaker at the same frequency is something like 2,000 ohms. To enable a moving-coil loud-speaker to be at its best with an ordinary low-impedance output valve a step-down transformer with a ratio of about 20 to 1 is required. Quite respectable results, though, can be obtained by connecting a balanced-armature loud-speaker directly into the plate circuit of the valve. Not a few people, failing to realise that an output transformer was necessary, have purchased moving-coil loud-speakers and have connected them into the plate circuits of their output valves without any intervening transformer. They have been very much disappointed with the volume and quality in consequence.



A GOOD IDEA

I SEE that many makers of moderately priced moving-coil speakers are now sending out their instruments with built-in transformers of suitable step-down ratios for the output valves that are generally in use. These speakers can also be obtained with special pentode transformers built in at no extra charge. I don't know of any greater disappointment than that which sometimes comes the way of a beginner who has heard that the pentode valve gives enormously greater magnification at low frequency than a triode; he purchases a pentode at much greater expense, puts it into his set, and then switches on. To his dismay, the loud-speaker produces not more, but possibly even less volume than it did before. Neither the pentode nor the speaker can possibly do itself justice unless there is a suitable transformer between the two. Nor, again, can you hope to obtain good volume and good quality from a moving-coil speaker with a triode output valve unless a suitable output transformer is used. With the pentode valve the choke and filter output circuit does not, as a rule, solve the problem by itself. In addition to this, an output transformer is required. It is a great boon nowadays to be able to buy moving-coil loud-speakers at moderate prices which include suitable transformers. Don't forget when ordering a transformer to state what kind of output valve you employ.

THE STRAIGHT PATH

QUITE a lot of trouble might be avoided if valves would always work "on the straight" as and when required. Of course, the detector valve stands in a class by itself, in this respect, since it must go crooked to earn its keep! But problems of cross-modulation and volume-control would practically disappear from the high-frequency side if there were no bends in the valve characteristic, whilst on the low-frequency side half the battle against distortion lies in keeping the amplifiers "off the curve."



PROS AND CONS

OF course, the valve is not the only offender in this respect. Low-frequency transformers, for instance, often display a hump in the frequency-response curve, and accentuate one band of notes more than the rest, though this tendency can be cured in the hands of the modern designer. And, generally speaking, most of the other circuit components, particularly coils and condensers, refuse to behave alike to all frequencies, thereby creating special difficulties as between the short waves and the long.

On the other hand, we should be hard put to it to select one programme from another if it were not for this very fact. The whole art of tuning lies in using a circuit which responds to one set of frequencies and rejects the rest—in other words one which has a pronounced resonance curve—so that on the whole perhaps we are better off as things are.



THE DUDELL MEDAL

PROFESSOR C. T. R. WILSON, of Cambridge University, has been presented by the Physical Society with the Duddell Medal for his researches into atmospheric electricity, which is, of course, the source of ordinary static interference. Broadcast listeners are more troubled with man-made static in this country than with the natural variety, though atmospherics can be a real bugbear to long-distance workers, especially in the summer months. Professor Wilson holds that a continual stream of positive ions reaches us from interstellar space, and that the positive earth potential so built up is periodically relieved by the action of thunder and rain, which bring down negative charges to restore the balance.



A WONDERFUL TIME

THOUGH winter has now given place to spring officially, there is no noticeable falling off in the number of stations that can be received on the wireless set or in the volume of those that are far away. By all indications, we are in for a record wireless summer, and I earnestly hope that those who in former years put

:: :: *On Your Wavelength!* :: ::

their wireless sets away—or left them to languish unused—will not do so this year. A large number of foreign stations are now receivable in the broadest of broad daylight, and by all the signs we should continue to have a big number of programmes from stations on the Continent all through the coming summer. We have indeed now a very wonderful wireless time before us.

LONG-PLAYING RECORDS

I WONDER what the playing limit of the standard gramophone record will be a few years hence. With the new system of "constant-speed" recording, a 12-inch record will now run for eighteen minutes instead of the usual four. The secret lies in keeping the speed of the needle relative to the disc constant from beginning to end. In the ordinary gramophone the needle traverses the outside track at roughly 50 inches a second, but slows up to under 16 inches a second at the end of the run, near the centre of the record. Now a surface speed of anything from 10 to 15 inches is sufficient to give good reproduction, and by keeping to this figure all the time more than four times the ordinary amount of speech or music can be stored up on a 12-inch record. Of course, the difficulty is that the speed of the motor must be gradually increased as the playing proceeds. In practice this is done by a special governor which is controlled by the position of the tone arm as it steadily moves inwards towards the centre of the disc.

A GAY AFTERNOON

I DON'T think that I am more than usually unlucky with my wireless sets and it isn't really often that they play up at all. Any trouble usually occurs when I am inspired to alter one of them so as to effect what I believe will be vast improvements in its sensitiveness or in the quality of its reproduction. The other day I felt an urge to tackle my big super-het. I felt that a few alterations, quite small ones, here and there, might have wonderful results. They did, but the results were not quite those that I anticipated when I undertook the work! The first thing that happened was that, in delving into one of the small screened compartments of which it is composed, I got the father and mother of a shock. There are people who can put their fingers across the terminals of 220-volt mains and just be conscious of the fact that current is flowing. Though I earn my daily bread by practical work with electricity, I am unluckily not one of these. I am peculiarly sensitive to electric shocks and 150 volts are quite enough to make me leap several feet into the air.

MORE TROUBLE

NEXT I tried to extract a screen-grid valve from a rather tightly fitting holder, and though I took what I thought were all reasonable precautions, the thing simply came to pieces in

my hand. The bulb had parted company with the cap. Another S.G. was fished out from the drawer and put into the holder. Owing to its having thin pins, of which I have had something to say before, it proved to be a loose and very chancy fit. With a penknife I endeavoured to open out the pins. They were opened out right enough, but in the process I broke one of the very thin filament leads which run down them. Valve number two gone west! Next a soldered joint, which looked perfectly good, suddenly came unstuck and gave me a solid hour's work in tracking down the source of the trouble. Lastly, I had a short-circuit, fortunately not a very extensive one, caused by a defect in the insulation of a wire that passed through a metal screen. Altogether a pretty hectic and worrying afternoon.

BUTTONHOLE MICROPHONES

I SEE the B.B.C. has denied any knowledge of a buttonhole type of microphone, which a prominent daily paper recently stated would be used when broadcasting public speakers. Although, perhaps, new to this country, the buttonhole or lapel microphone is well known in America, where the indefatigable Bell Laboratories have developed a diminutive affair that can be worn unobtrusively on the coat lapel.

The obvious advantage of such a microphone is that when the speaker moves his head or moves bodily from one place to another on the platform, the mike goes with him and the control engineer is saved the trouble of boosting up the weak sounds that would reach the ordinary stationary microphone at such times as the speaker might turn away.

The lapel microphone I am referring to is only one inch in diameter, and weighs

little over an ounce. It is said to have a remarkably good frequency response. The only peculiarity is that, as it worn on the lapel, it picks up not only sound vibrations but body vibrations. The speaker's chest seems to act as a sort of resonator, with the result that low-frequency sounds tend to be accentuated. This is overcome by suitable attenuation in response of the microphone transformer.

THE SHORT-WAVE CONTROVERSY

IN the B.B.C.'s official technical organ there has been a very interesting discussion during the last few weeks between those who maintain that short-wave reception is a fascinating pastime and those who deny that the short waves have any entertainment value.

We have done much to foster interest in short waves, and thousands of short-wave sets and gadgets have been assembled by enthusiastic AMATEUR WIRELESS readers. What have they to say on the subject? I imagine most readers will agree that short waves are very interesting, without of necessity being entertaining. By which I mean that the exploration of the short-wave band, no matter what time of the day or night you may be listening, always yields a crop of signals from all parts of the world.

Contrast this with an exploration of the medium-wave band on, say, a simple two-valver in the morning or very late at night. Yet this same two-valver will very likely give you better programme entertainment under suitable conditions. Really, it is not possible to compare short-wave reception with ordinary broadcast reception, for the simple reason that the two bands are complementary rather than competitive.

GOOD AND BAD CONDITIONS

NO one who has listened regularly during the past winter can deny that the short waves have been "below par," and it is equally undeniable that the medium-wave band has been exceptionally good. Perhaps the same factor is responsible for the bad state of affairs on the short waves as for the good conditions on the normal broadcasting channels.

But all the weak signals that used to be strong can be attributed to general conditions. Certain American relays that used to come in at fine strength over here are permanently weakened because their signals have been "beamed" to South America, where there is more chance of selling American short-wave sets!

Talking of short waves, you might listen during the next week or so to Nairobi and Melbourne rather carefully, for I am told that the first of the recorded studio programmes distributed from London by Mr. Malcom Frost are likely to be heard in the near future from these and suchlike stations.

METAL SET WIRING

Terminals fitted to a metal chassis set must, of course, be bushed, but the battery leads can be brought out direct



as shown here. This method of chassis arrangement is convenient as the leads can be very short and direct to the parts underneath the metal plate.

By W. JAMES

HOW THE "A.W." SIMPLE SUPER WORKS

IN the "Simple Super" there are at least five separate circuits coupled together.

We have first the circuit which selects and magnifies the incoming signal. This consists of the tuned aerial transformer, screen-grid valve and two-circuit filter, accounting for the coil units marked 1, 2, and 3 in the diagram.

The next part is that associated with the bi-grid valve, including the oscillator unit, coil No. 4, and the first intermediate-frequency transformer. Then comes the screen-grid stage with the second intermediate-frequency filter.

selective arrangement. They gang together very nicely and easily, of course, as the three coils are adjusted to have the right inductive values and the tuning condensers are alike and trimmed up. The coils are adjusted by the makers and the constructor merely sets the trimming condensers.

It will be understood that for super-heterodyne action the oscillator must tune 126 kilocycles away from the above three-ganged circuits, because the frequency of the intermediate band filters is 126 kilocycles. Coil unit No. 4 cannot, therefore, have the same inductive values as the other coils.

over the whole of both wavebands. Part of the oscillator coil unit is joined to the grid of the bi-grid valve and part to the anode circuit. You will notice that a resistance feed is used, the resistance being joined between the high-tension positive at terminal *b* in the diagram and terminal *d*. The other two terminals, marked F1 and F2 are joined to the intermediate-frequency filter.

There is a volume control connected to the screens of the two screen-grid valves which works smoothly and is effective. After the second screen-grid valve is a further intermediate-frequency band filter which is followed by the second detector. The high-frequency choke and by-pass condenser take care of the high-frequency currents in the anode circuit of the detector, which is followed by the normal transformer coupling to the power valve.

Chief interest will no doubt centre in the four-coil unit and the circuit of this part. It is quite straightforward and has in it the filament and high-tension circuit switches. The three tuned circuits before the mixing valve (bi-grid) ensure fine

THEORETICALLY—THE MOST PERFECT SET YET DESIGNED

This is followed by the second detector and finally the power valve. The diagram shows the connections of the coil unit and of the rest of the circuit.

The terminals marked C1, C2, C3, and C4 are insulated from the chassis which carries the four coils and the ganged switches. They are joined to the tops of the four coils and are connected to the tuning condenser. The bottoms of the coils eventually reach the chassis earth, which is joined to the earth side of the gang tuning condenser.

Coil unit No. 1 is actually the aerial circuit transformer. There are two pairs of windings for the medium- and long-wavelength aerial and grid circuits, the switch being below the coil and therefore at the underside of the chassis.

If the inductance is reduced to bring the circuits into tune at one point, then the tuning will be out at other points. But it has been calculated, and shown to be true in the laboratory, that if condensers of the right capacity are used with the oscillator coil, the tuning will be correct

PRACTICALLY—IT IS THE BEST SET YOU CAN BUILD

at all points. The makers of the coil unit therefore provide the necessary parts in the unit and adjust them to the right values. The result is that the four circuits, comprising the four-coil unit and the four-gang condenser tune properly

selectivity and an absence of interferences. They really do stop interference troubles, and are, therefore, worth having. Two tuned circuits are fairly good, but the benefits obtained from the extra circuit are well worth having, considering the

slight additional cost. The coil units are very well shielded and so are the intermediate-frequency band filters. These are of the same type as those used in the "Century Super" and similar sets.

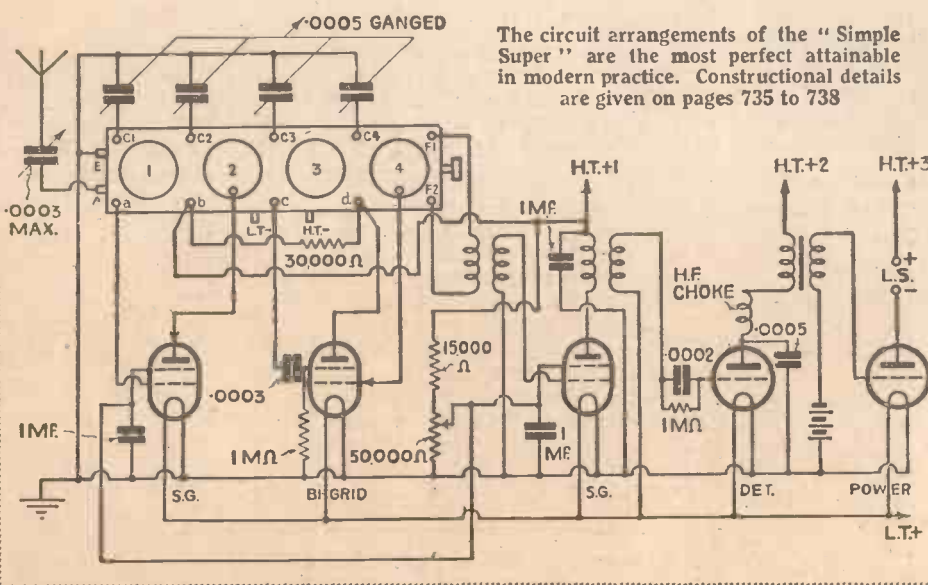
There is no doubt about the high amplification obtained from the arrangement employed. The signals are first magnified by the first screen-grid valve and are applied to one of the grids of the bi-grid valve. This bi-grid valve has its second grid connected to the oscillator

(Continued at foot of next page)

Super-hot Action

Terminal marked *a* is joined to the grid of the first screen-grid valve. In the anode circuit is coil unit No. 2, connected by a flexible wire. Units 2 and 3, forming the band-pass filter, are coupled to the desired extent by the makers. Coil No. 3 is joined to the grid of the bi-grid valve from terminal *c*.

The three coil units, 1, 2, and 3, and the first three sections of the four-gang tuning condenser, form a very



The circuit arrangements of the "Simple Super" are the most perfect attainable in modern practice. Constructional details are given on pages 735 to 738

BUILDERS of the NEW "A.W." "SIMPLE SUPER" SHOULD ORDER NEXT WEEK'S ISSUE NOW

TELEPHONING FROM AN AIR-TAXI

A description by our Special Commissioner of a novel portable transmitter and receiver carried by a light 'plane doing air-taxi work over London

AN air-taxi fitted with telephone equipment which enables the pilot to keep in touch with the ground is the latest addition to London's transport facilities.

This is the Puss Moth aircraft flown by Captain Laurence Hope, of Air Taxis, Ltd., which is fitted out with Marconi light-aeroplane apparatus. Incorporating a special transmitter as well as a receiver,

the gear enables the pilot not only to receive weather reports from ground stations, but also at any time to speak to the aerodromes himself and ask for any information.

Should he encounter during flight a bank of fog or thick cloud he can call up the nearest ground station, confirm his position by wireless, learn whether the

Lympne, and Pulham, and they are also available to the owners of private 'planes fitted with suitable transmitters and receivers.

Captain Hope uses his Puss Moth air-taxi very largely for newspaper work, where speed is of first importance, and he realises that on many occasions such information would be very valuable to him, enabling him to decide, while still in the air, the quickest and safest means of delivering his press matter. At the same time his waiting colleagues can obtain information of his movements so that unexpected delays are reduced to the minimum.

The gear adopted by Captain Hope is the Marconi type AD22, a light-weight apparatus designed on the same lines as, but of smaller power than the aircraft transmitters and receivers which are standard equipment on all the passenger-carrying aircraft of Imperial Airways, Ltd., and other air companies.

It is normally arranged for speech transmission on 850-950 metres—the international aircraft waveband—but a quick-change switch is provided to enable transmission to be made on the 600-metre wavelength used by all ships, in case of emergency during cross-Channel or over-sea flights.

The transmitter and receiver are fitted in a single box which is installed in a convenient position in the aircraft, arrangements being made for the operation of the set by remote control. Power is supplied from a generator driven by a constant speed windmill fitted in the slip stream; this generator can be arranged not only to supply power for wireless purposes, but—by means of a simple switching device—to feed a 12-volt accumulator which can be used as a common source of power for both wireless and navigation lights, thereby effecting a large saving in weight.



Operating the portable wireless 'phone gear in the air-taxi by means of remote controls, and (inset) the set at the back of the passengers' compartment

conditions of bad visibility are local or general and judge whether it is possible to carry on. Such services are regularly performed for the pilots of passenger-carrying aircraft on the regular air routes by such stations as those at Croydon,

A light programme entitled "New Brooms"—a West Regional spring clean—has been organised by Dorothy Worsley and supervised by Francis Worsley and will be given on April 30.

"HOW THE 'SIMPLE SUPER' WORKS"

(Continued from preceding page)

unit, with the reaction winding in the anode circuit.

The "Mixer"

Thus the valve oscillates and rectifies. The frequency of the oscillations is 126 kilocycles above that of the signal, and the mixer valve has its anode circuit in the new signal of 126 kilocycles, which is magnified by the second screen-grid stage. Full use is made of all the valves, and in this circuit there is not the slightest trouble with the bi-grid valve, which is connected in such a way that the fullest use is made of it.

Then, again, the arrangement of the first

screen-grid stage is such that the strongest signals are applied to the grid of the valve. Afterwards the signals are well filtered by the two-stage band filter. This follows the best practice, although very often the two-circuit filter is put first, that is, between the aerial and the grid. The arrangement used has the undoubted advantage that the strongest signal is applied to the valve, and the ratio of signal strength to noise is increased by so doing. The resistance feed to the bi-grid is interesting and is used partly

because of the necessity for stabilising the circuit.

No Tricky Adjustments

The whole set is particularly stable and easy to handle because there is an entire absence of tricky adjustments. One gets the impression of reserve power, which means that the circuits do not have to be adjusted to the oscillating point before weak stations can be received. In fact, the set cannot be made to oscillate and will not cause the slightest interference to others, which is more than can be said of most super-heterodynes.

**One of The SIMPLEST SETS YET
—W. JAMES' "SIMPLE SUPER"
DESCRIBED IN THIS ISSUE**

Wolverhampton is the tenth town to broadcast a programme in the "Midland Towns and Cities" series on April 30.

THE HOW AND WHY OF TUNING—XXXI

SIMPLE CIRCUITS FOR SHORT-WAVE TUNING

This is the concluding article by "Hotspot" in the series of articles written to cover all the important aspects of the theory and practice of tuning. Below are given some very practical circuit details for short-wave tuning

THE first thing to be decided about short-wave tuning is how to couple the aerial to the grid-tuning circuit. There are two alternatives. Firstly, what is known as the aperiodic aerial coil can be used. This consists of a few turns of wire in series with the aerial and earth, loosely coupled to the grid-tuning winding.

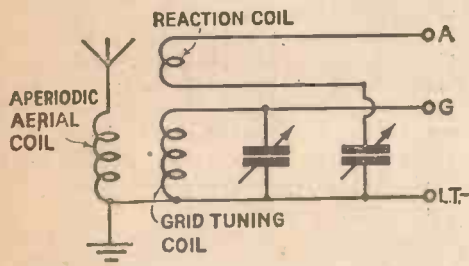


Fig. 1.—Standard connections for short-wave tuning, employing aperiodic aerial coil, tuned-grid coil, and reaction coil

Fig. 1 shows what is probably the standard short-wave tuning arrangement when the first valve is the detector. Here we have an aperiodic aerial coil, which is an untuned inductance in series with the aerial and earth, coupled to the grid-tuning winding, to which is also coupled the reaction coil.

Tuning Condenser Value

Tuning is done with a short-wave variable condenser of the type recently described. The maximum capacity should not exceed .0002 microfarad. The sizes of the aperiodic aerial, grid-tuning and reaction coils will depend upon the wavelength range it is desired to cover. Taking a typical make of short-wave plug-in coil, the Atlas, we find that to cover a wavelength of approximately 15 to 20 metres the aperiodic coil should have two turns, the grid coil two turns and reaction coil four turns.

In the more interesting wavelength range of 20 to 45 metres a four-turn grid tuning coil is needed, with a four- or six-turn reaction coil. The aperiodic coil should be either a two- or four-turn coil.

To extend the range up to about 70 metres a six-turn grid coil will be required, and it may be necessary to use slightly larger aperiodic and reaction coils.

Looking at the Fig 1 circuit, it is important to note that the moving plates of the tuning and reaction variable condensers are connected to earth. This earthing rule is very important on short waves, where stability of operation largely influences efficiency.

Condenser Coupling

Fig. 2 shows an alternative method of coupling the aerial to the grid-tuning coil. Instead of an aperiodic winding a small variable condenser is connected in series with the aerial and the grid end of the tuning coil. This method is very satisfactory, provided that a sufficiently low minimum of capacity can be obtained on the aerial coupling condenser. One with a minimum of 2 micro-microfarads is recommended.

This aerial coupling system tends to eliminate what are known as blind spots over the tuning range. Sometimes with the aperiodic aerial coupling system it is difficult to obtain oscillation over certain portions of the tuning condenser's scale. This is probably due to the aerial circuit coming into tune, either directly or through a harmonic, with the incoming short-wave signal.

With either the Fig. 1 or the Fig. 2 aerial coupling systems the main idea is to cut down the aerial damping so that smooth oscillation is obtained over whatever wavelength range is covered by the tuning coil condenser. Unless due attention is paid to this part of the circuit no amount of

reaction application, either by the use of a larger reaction coil or a larger reaction condenser, will produce oscillation. In general, a .0002-microfarad reaction condenser should give ample oscillation on the short waves.

Fig. 3 is a pictorial diagram showing a complete one-valve short-wave set with

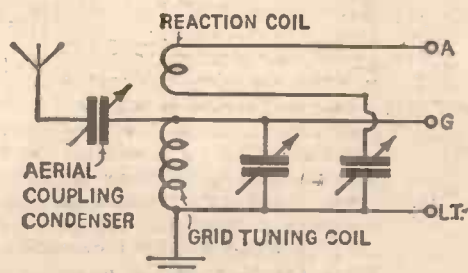


Fig. 2.—How a small variable condenser can be used to couple the aerial to the grid-tuning circuit of a short-waver

the tuning arrangements given by the Fig. 1 circuit. Here we have a two- four- or six-turn aperiodic aerial coil coupled to a two-, four- or six-turn grid coil, which is tuned by a .0002-microfarad variable condenser of the short-wave type. Coupled to this circuit is the reaction coil, also of four or six turns, and this is connected in series with a .0002-microfarad reaction condenser between the anode of the detector valve and earth.

In passing, note that a .0003-microfarad grid condenser is used with a 3- or 5-megohm grid leak. Although these values are not now considered suitable for medium and long-wave tuning, they are the most efficient for short-waves, where we are dealing with very high frequencies.

Short-wave Chokes

Intimately connected with the ability to obtain smooth reaction on short waves is the high-frequency choke in series with the anode of the detector valve and the phones or loud-speaker. For preference a choke specially designed for short waves should be used. Here the need is for very low self-capacity and a quite moderate inductance. Of course, there is no reason why the aerial coupling arrangements of the Fig. 2 circuit should not be used in the one-valver shown by the Fig. 3 diagram.

Other modifications of the Fig. 3 one-valver have been described from time to time in these pages. I would particularly emphasise the utility of the super-het converter function of the circuit. All that is needed is a long-wave choke and a .0002-microfarad coupling condenser. The long-wave choke is connected in series with a normal short-wave choke, as shown by Fig. 4, and one side of the coupling condenser is connected to the junction of

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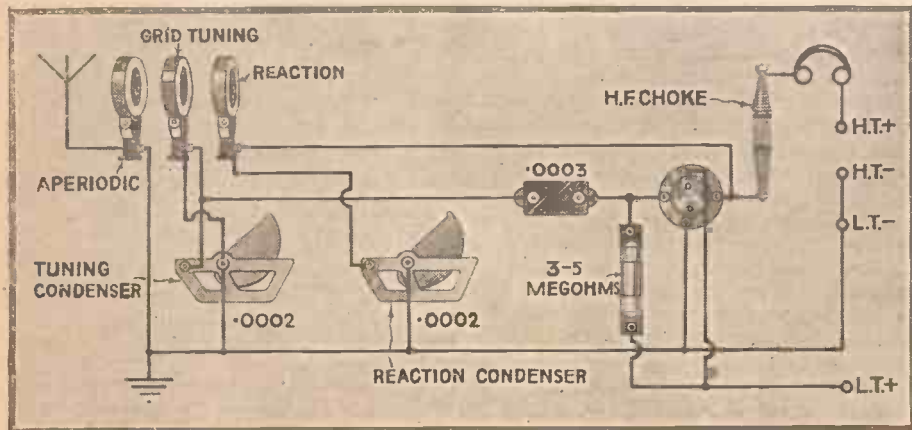


Fig. 3.—Pictorial diagram showing all the connections of a complete one-valve short-waver for headphoné reception

SCOTTISH REGIONAL TESTING

Authentic details of the Falkirk twin Regional stations, now undergoing engineering tests at Westerglen, near Falkirk, revealed in this exclusive article by the "Amateur Wireless" Special Commissioner

ANY night from now onwards you may chance to pick up test signals from the new station at Falkirk, recently completed to give Scottish listeners alternative programmes. During the month of April these test signals will concern only the B.B.C. engineers, but early in May listeners will no doubt be asked to stand by for the gradual "fading in" of the high-power station designed to take over the programme service now done by the low-power Glasgow station.

Modulation and Radiation Tests

I am writing during the first week in April, while the B.B.C. is waiting for the arrival of certain insulators to complete the task of linking up the stations to the two umbrella aerials. As soon as this is done the engineers' modulation and radiation tests will begin. Listeners are asked not to judge the final capabilities of Scottish Regional by the reception of these preliminary signals.

The first of the two Westerglen stations to take the air will be the Scottish Regional, which will radiate on the wavelength now being used by Glasgow, namely 376.4 metres. The dial setting will therefore be just below that of Toulouse.

As at other regional centres, such as Brookmans Park, the stations erected at Westerglen will each have a power rating of 50 kilowatts, so the voice of Scotland should travel well across the Continent, and many of us Southern listeners will get strong reception from the Scottish Regional, if not from the Scottish National station.

When Scottish Regional is in full swing, the Glasgow station will be closed down, and so will the relays at Edinburgh and Dundee. The Aberdeen relay will be retained, but it will have to go on an international common wavelength, as the B.B.C. has found it impracticable to work the relays near Falkirk on the same wavelength as the high-power Scottish National.

By the way, Newcastle will also have to find an international common wavelength when Scottish National is introduced, as the mush would be too great to permit Newcastle to work on 288.5 metres—the proposed wavelength of the National station at Falkirk.

Although Glasgow will be closed down so far as radiation is concerned, the studios will remain to feed Scottish Regional as required. The key point in Scottish broadcasting is to be Edinburgh, and from this point lines will radiate to the high-power transmitter, to Aberdeen via Dundee, to Glasgow, and down South via the Leeds repeater station.

Programme of Scottish Interest

Due to its central position, Westerglen is ideal for the radiation of a programme of Scottish interest. It is almost exactly midway between Glasgow and Edinburgh, so listeners in these cities will be well served. Aberdeen, on the fringe of the service area, will, on its international common wavelength, be able to take either the Scottish Regional programme, the National programme, or its own programmes.

Naturally the Regional on 376.4 metres

will have a better range than the National on 288.5 metres, but there is another reason why the National may give an inferior service. It will be recalled that, owing to the need for one of the B.B.C.'s ten exclusive wavelengths for the Belfast station, the five centres of regional radiation are one wavelength short, meaning that two of the centres must make do with only three wavelengths.

When West Regional starts up next year the West National will have to go on 288.5 metres with Scottish National, and this is where the snag may arise. At present it is impossible to say how two high-power stations will synchronise, and the B.B.C. rather implies that any deficiencies in the National programme service as radiated by medium-wave stations will have to be made good by the new high-power Daventry.

Speaking as a prophet, I should say that Scottish Regional on Glasgow's wavelength will be a great success, and that Scottish National will do very well on 288.5 metres until West National gets going—and then the fun will begin.

On April 23, two very good light programmes are promised for North Regional listeners. There will be an hour's relay from the Argyle Theatre, Birkenhead at 6.45 p.m. and at 8.30 p.m. a new concert party, "Micro-pierrots," will give its first broadcast.

Bird in Hand, a West Country comedy in three acts, by John Drinkwater, has been adapted for broadcasting by Cyril Wood and will be heard on April 26.

On April 21 the Manchester School Children's Choir will appear in a concert with the Northern Studio Orchestra.

The West Riding Brass Band Society is holding a festival on April 16 and it has been arranged that the winning band shall give a short concert for North Regional listeners on April 21.

"SIMPLE CIRCUITS FOR SHORT-WAVE TUNING"

(Continued from preceding page)

these two chokes. The remaining side of the coupling condenser goes to the aerial terminal of an existing broadcast set, which is thereby converted into a short-wave super-het. A very full des-

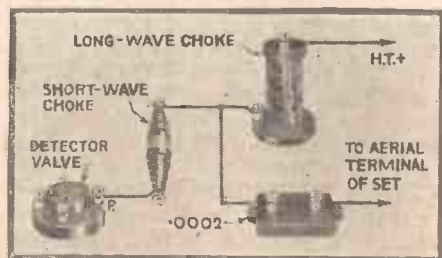


Fig. 4.—Two high-frequency chokes in series in the anode circuit of a one-valve short-waver will enable a broadcast set to be converted into a short-wave super-het.

Note the coupling condenser

cription of this arrangement was described on page 38 in the January 9, 1932, issue of *Amateur Wireless*.

Still another use of the Fig. 3 one-valver is as a short-wave adaptor, of special value with sets having no high-frequency amplification. The idea is to use the short-wave one-valver, with its associated tuning and reaction circuits, to replace the normal tuning circuit of the existing set's detector valve.

An adaptor plug is needed, and as shown by Fig. 5, this makes connection with the short-wave detector valve filament and anode circuits. The grid pin is left blank so that when the adaptor plug is inserted in the broadcast set the normal tuning is cut out of the circuit. This connection was fully explained and illustrated on page 37 in the January 9 issue.

In this article I have covered only the elementary aspects of short-wave tuning. There are, of course, many more elaborate circuits that can be used, including short-wave super-hets and sets with a stage or more of screen-grid amplification before detection. Still, enough has been said to give the absolute beginner an incentive to take up what is undoubtedly a very fascinating branch of tuning.

As stated elsewhere, this concludes the series of articles on tuning I have

been contributing to *Amateur Wireless* since last September. I must confess that when I started the series I hardly realised how wide the scope of the subject would prove to be. Even now, after thirty-one

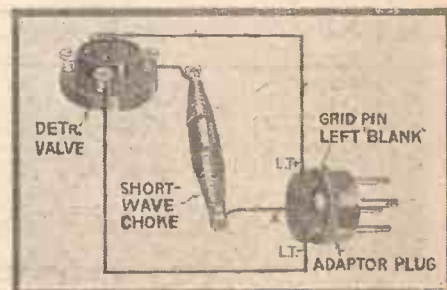


Fig. 5.—Adaptor plug arrangement to enable a one-valve short-waver to be used with a broadcast set's low-frequency amplifier circuit

articles, there is much that I have left unsaid about tuning. Perhaps that is the greatest attraction of radio—you never can claim to have exhausted any one of its many interesting departments.

HOTSPOT.

PERCY HARRIS EXPLAINS

HOW CURRENT IS SMOOTHED IN MAINS UNITS

LAST week in our chat on the rectifier which forms the first part of any high-tension A.C. mains unit, we saw that the purpose of any form of rectifier is to change the alternating current which normally rises to a maximum in one direction, falls to

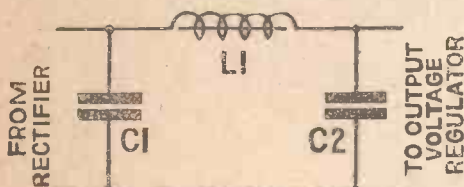


Fig. 1. A simple filter circuit

zero, and rises to a maximum in the other direction—and so on indefinitely—into a series of pulses of current all in one direction. In the simplest or single-wave rectifier, we use one half of the alternation only, the other half being, so to speak, wasted. What happens actually is that the current from the rectifier rises to a maximum and falls to zero, and then there is an interval of time equal to that occupied by the pulse just received, when once again the current rises to a maximum and falls to zero. In a

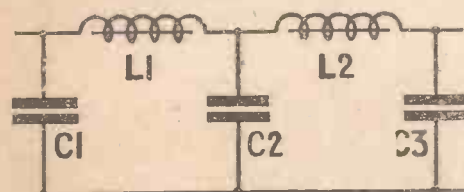


Fig. 2. A rather more elaborate filter circuit

full-wave rectifier an arrangement is made by which the otherwise wasted half-wave is, so to speak, turned round and made to face

in the same direction, so that we get no gap between pulses.

Before considering the various methods of smoothing it is interesting to think for a moment what would happen if we inserted a telephone or loud-speaker in series with the rectified current from a full-wave rectifier operating on a fifty-cycle current. The result would be a sound or rather musical note of pitch of *one hundred*, not fifty, and you must remember that when we speak about fifty cycles per second, we mean fifty completed cycles operations, that is to say, fifty rises and falls in one direction together with fifty rises and falls in the other. The sound heard in a loud-speaker connected with the output from a full-wave rectifier of the kind we have described would, therefore, be the same as that coming from the speaker if the unrectified current were connected directly to it. This is because a loud-speaker responds to currents in either direction.

In smoothing the currents received from the rectifier we utilise properties of both fixed condensers and inductances. We have problems with both of them, but the problems vary in importance according to circumstances. Take, for instance, fixed condensers. The amount of energy a condenser will hold depends on its capacity and the voltage to which it is charged. In Fig. 1 we see a simple filter circuit with two condensers C1 and C2 and an inductance or iron-core choke L1. When we get a sudden pulse applied to the left-hand end of the circuit, the condenser C1 admits it willingly and becomes charged up, while at the same time the inductance L1 resists any change of current and, so to speak, chokes the impulse imported in the condenser. When the condenser is charged, however, it will begin to

discharge through L1 and, as you may know, the current flowing through an inductance tends to be maintained, for energy is stored in the field which resists the tendency for the current to increase and tries to retard its fall. But the charged condenser C1 begins to discharge through L1, charging C2 in the

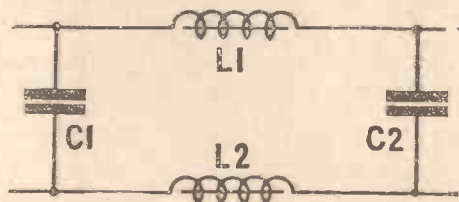


Fig. 3. A modification of the Fig. 2 circuit

process. The effect is roughly that pulsation fills up C1 which starts to discharge regularly and smoothly through L1, which in itself does a good deal of smoothing by resisting any change. The result is that C2 becomes charged with a regular supply of energy, pulsation having been to a large extent smoothed down.

The amount of smoothing given by a single circuit in Fig. 1 will depend on the capacities of the condensers and the efficiency of the choke. The ideal choke has a

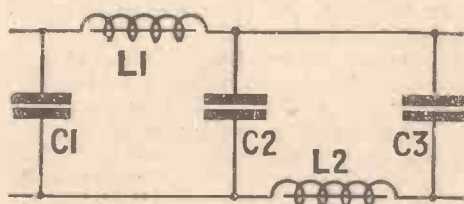


Fig. 4. Notice the similarity between this and the Fig. 2 circuit

large inductance with a negligible direct current of resistance, for if its resistance is high, then there is a loss which often cannot well be afforded. Actually we aim at a compromise in these cases, as we can get a good choke which has a high inductance with a low enough resistance not to cause too high losses.

In Fig. 2 we have a slightly more elaborate circuit with further smoothing by the choke L2 and the condenser C3. A modification is seen in Fig. 3 and a further modification in Fig. 4.

The amount of smoothing required depends on many factors. If the current is small, smoothing is much simpler than with a heavy current and when considerable magnification is given after detection (that is to say when there are two stages of low-frequency magnification) the smoothing has to be much more perfect. The tendency in many modern receivers is to get as much as possible of the magnification before detection, using only one low-frequency stage. There are several advantages in this scheme, one being that a cheaper and simpler smoothing circuit can be used in the mains unit. With a simple receiver, a good filter can be made up with C1 and C2 of 4 microfarads and L1 any good 20-henry choke, the resistance of which is not too high, say, at

(Continued on page 742)

AN OUTSIZE IN LOUD-SPEAKERS

This is one of the giant instruments being used at the Ideal Home Exhibition



Our Broadcast Critic

TALKS ABOUT

DANCE MUSIC



HERBERT HEYNER

THERE are so many dance-bands broadcasting during the course of a week that it is impossible to attempt to listen to all of them. Having listened to some, I have concluded that we are sacrificing melody and general beauty to mere rhythm. When I switched into "On with the Dance" on Thursday evening and listened attentively to the good John Watt (whose commentaries I found extraordinarily interesting), I became as enthusiastic as he appeared to be.

He rather saddened me, though; I came to the conclusion that we have lost the real art of writing dance music. How much the American style has influenced us is more than I care to conjecture, but I thought Archibald Joyce, for example, a giant compared with present-day writers.

When I listened to "Destiny," "The Merry Widow," "Live, Laugh, and Love," and other waltzes, it was with one thought in my mind; the dignity of these things puts the "new numbers" to shame.

When John Watt remarked that "The Blue Danube" had been revived with success, I thought I knew why; it has melody and rhythm, not rhythm only.

It may be heresy in the eyes of some of my readers, but I frankly deplore the tone of the saxophone. It is an instrument whose birth and breeding I take leave to doubt.

When the Gershom Parkington Quintet played dance music recently, I began comparing the personnel of that orchestra with the average modern dance orchestra. My candid opinion is that we have tried this jazz type of band; we have weighed it in the balance, and found it wanting. It seems to me that we can afford to be reactionary for once in our modern lives; we can go back to older and better instruments and refine our lighter forms of music.

While on the subject of dance bands, I certainly did appreciate Jack Payne's broadcast, despite the tone of instruments I really dislike. I found him a little difficult to swallow, so to speak, in his more serious efforts; I began to wonder whether he was going to try his hand at chamber music. All the same, I thoroughly enjoyed "Dick Turpin's Ride to York." Very amusing.

This has not been a week of outstanding broadcasts by any means; I do not remember a duller set of programmes.

I was particularly pleased with the Cattrell String Quartet in their playing of Mozart on the Tuesday evening; also I liked John Armstrong in the Hugo Wolf songs. That was a very good chamber music concert.

The Victor Olof Sextet was a surprise to me. I fear I must confess I have hitherto regarded this excellent little orchestra—and others of the same ilk—as being part of the routine of the B.B.C. programmes. Consequently I have somewhat neglected them for the more outstanding broadcasts.

As there were very few outstanding items this week I was forced to spend part of my time with what I have called the routine of the programmes.

I feel I ought to say that I thoroughly appreciated the Olof recital. I use that term because I found, to my great pleasure, that their playing approaches chamber music standard; there was a finish and a delicacy that appealed to me musically. I shall listen to them more often in future.

Perhaps the most attractive broadcast of the week—which has had no symphony concert and only one vaudeville—was the rendering of *The Gypsy Baron*. I agreed with the compère (Frederick Lloyd) that it was not particularly intelligible, but I came to

the conclusion that it did not matter very much; it was a good entertainment.

I did not hear her actually announced, but I thought I recognised Odette de Foras as *Saffi*; she was very pleasing. Hers is a fine voice; I wonder we do not hear her more often.

I think I should add a word for Marie Wilson, who makes a splendid leader in these broadcasts. I have meant to say so before; her tone has always attracted me, both in Queen's Hall and in the studio.

A work by Leslie Bridgewater, a suite from incidental music to *Punchinello*, pleased me greatly. I understand that it is a first performance by wireless. I sincerely hope it will not be the last, for it contained some beautiful writing.

Later in the week I heard *To Any Husband*, which I thought one of the most attractive plays to which I have recently listened. Apart from the actual play (which was good enough to hold most people, I imagine), I thought the manner of rendering it good. The whole thing sounded perfectly natural and in no way forced. Harold Warrender and Dorothy Tetley (as Martin Beamish and his wife) played their parts with a restraint that was at once dignified and powerful. There was none of that melodramatic shrieking which has so often marred studio plays; Mr. Warrender and Miss Tetley used their voices in a sane and sensible manner and scored their points with perfect ease. I consider their playing a model of microphone acting.

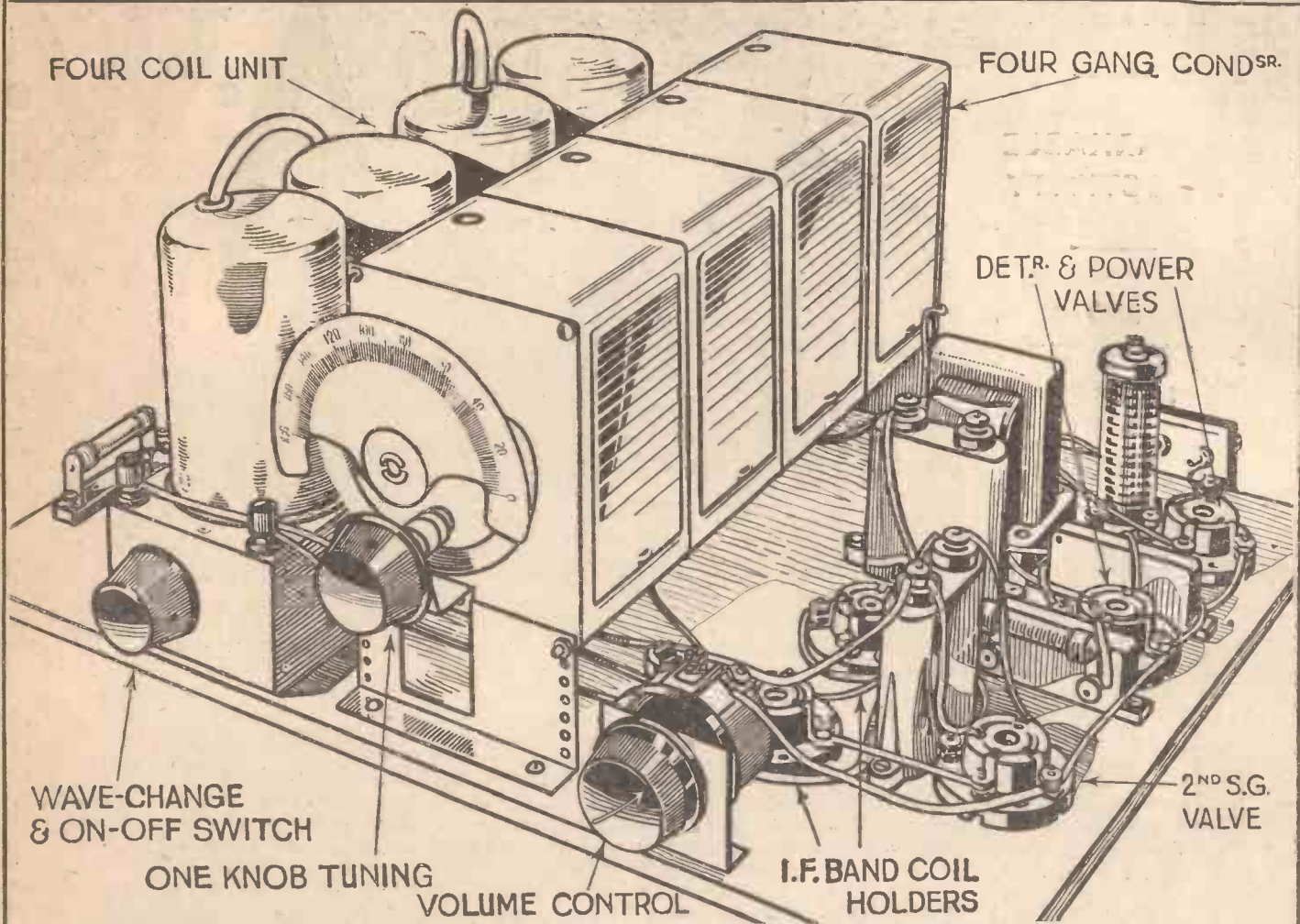
I heard two singers who pleased me considerably on the Sunday afternoon. The first was Edward Leer, whose voice seemed to suit the songs he sang. That is more than one can say for a good many tenors, unfortunately. The other was Herbert Heyner, a baritone. I was interested in the fact that he sang Schumann's *Dichterliebe* to a translation by Robert Whistler, evidently a first performance of the songs to these words. I liked the translation which I thought imaginative and yet a good reflection of the original German. I also liked the broad way in which the singer phrased.

I wonder whether many of you listened to the Haydn concert? Haydn is certainly a composer for the beginners in musical appreciation, but whether musicians can be expected to take an hour and a half of him at a stretch is another matter. On the other hand, the musicians *don't* matter! I derived much pleasure from listening to Thelma Reiss-Smith's playing of the first 'cello concerto. WHITAKER-WILSON.

PROGRAMME POINTERS

Percy Scholes has recently pointed out the value of improvised performances on the piano and organ. He said he would like to hear players deal musically with themes submitted by listeners, being allowed to dip his hand into a bowler hat and take three or four, improvising upon them there and then. That sort of thing, in my opinion—with all due respect to his—is best relegated to vaudeville. Mr. Scholes is right in thinking that improvisation is becoming a lost art, but I do not think he is going the right way to revive it successfully. I should like to modify his suggestion. Why not ask players who are able to improvise intellectually to prepare their own themes? I know from experience that the best improvisations are those in which the improvisateur has complete freedom to work out his own thoughts, not other people's. The other way of doing it is very like asking a priest to preach a sermon on texts provided by his congregation. Most good preachers could do it, but it does not strain the imagination to realise that a man must spin a better yarn—musical or otherwise—from his own thoughts.

A PICTORIAL DIAGRAM OF THE "SIMPLE SUPER"



GUARANTEED TO BE THE BEST 'SUPER' YET DESIGNED FOR THE CONSTRUCTOR

IT is a great pity that the various European states which annually adopt the Summer Time system cannot come to some agreement by which the alteration in the clocks is made on one and the same day. It would do much to avoid confusion. As it is, France and Belgium changed over on April 3, Great Britain and Ireland carry out a similar alteration on April 16-17, but Holland does not increase by an hour before May 21-22. Until April 17, therefore, we must bear in mind that midday in these isles is 1 p.m. in France and Belgium, as well as in all countries working on Central European time; after that date we are again level with them. With Holland the matter is more complicated, inasmuch as until April 17 the Dutchman will be 20 minutes ahead of us, then during the period April 17-May 22 he will be 40 minutes behind us, and after the latter date again 20 minutes in advance of British Summer Time. Spain throughout the year will continue to work on G.M.T., as will Algeria and Morocco; Tunis is one hour ahead in the ordinary way, and consequently tallies with B.S.T. The Central European states (Scandinavia, Germany, Austria, Italy, Switzerland, etc.) do not make any change in the summer months, but I understand that the Soviet Union may do so at a later date. Bear in mind, however, that from April 17, if you wish to listen to Reykjavik, Icelandic local time will be two hours behind B.S.T.

My previous reference to Holland prompts me to add that, with a view to avoiding mutual

OUR LISTENING POST

By JAY COOTE

interference with our North Regional transmitter, Hilversum has exchanged wavelengths with Tallinn, the former working on 296.1 metres and the latter on 298.8 metres. This reduction in the Dutchman's wavelength may give us a better reception of his programmes in the British Isles. It is difficult to realise that a country may possess a high-power transmitter without a wavelength—all dressed up and nowhere to go! This, however, is the case with Germany and her new Leipzig station. The plant is now ready for testing and although it had been originally decided to take over the Frankfurt-am-Main channel and to give to the latter the wavelength now used by Leipzig, such a step cannot be taken until the 25-kilowatt destined to Frankfurt is ready for operation. Possibly some drastic rearrangement of wavelengths may have to be made, as Germany is already using channels lent to her by other countries, and both Portugal and Bulgaria are now claiming their own. The closing down of the Cologne, Aachen, and Munster relays will set one German channel free, but it is hardly likely that it will be adopted for Leipzig, as it is not a favourable one.

In the meantime, congestion of the broad-

casting band has been intensified by the appearance of three new Soviet stations, each of a power of not less than 10 kilowatts, namely, Nijni-Novgorod (502.4 metres), Khar'kov (368.1 metres), and Stalino (385 metres); and by the end of this month we may hear something from Bari (Italy), another 20-kilowatt, on 280 metres. These are a few of the problems with which the U.I.R. (Union Internationale de Radiodiffusion) will have to cope at Lausanne in June, prior to presenting its final and definite proposals to the Madrid convention in September next.

In the South

Since Nice-Juan-les-Pins increased its power to 1½ kilowatts, I have been able to hear its programmes in London. When on the South Coast during the Easter holidays, this was an easy task, as Nice, Toulouse, Marseilles, and Radio Lyons were picked up nightly.

Ecole Supérieure, Paris, which also seems to be using more energy, has deviated from its wavelength in a most irregular manner; on two occasions Paris PTT crept down sufficiently to interfere with Rome. Have you heard G6RX? It is the London Radio telephone terminal of Rugby. Tests have been carried out recently on various short wavelengths, such as 73 metres, and so on, but the power is so great that listeners in and around the Midlands pick up the transmissions on the lower end of the medium wave band coil and over several degrees of the dial readings.

ONE-KNOB
CONTROL

REMARKABLE
SELECTIVITY

NO
BACKGROUND
NOISES

EASY TO
BUILD



The A.W.S.
GETS EVERY

A SET-
ON CUR
SUPER"
TWELVE

THE explanatory diagram printed on another page shows the chief features of the "Simple Super." There is first what is really the heart of the set, namely, a four-coil unit.

This consists of a pressed metal base and upon this are the four coil units. These are fixed and the wiring is below with the ganged switches. There are also various other parts fitted on the underside.

The Four-coil Unit

These are all tried by the makers of the switches and the coils. The result is that the four-coil unit is a complete job. It has connecting terminals arranged in the most convenient positions. Do not attempt to

interfere with the unit. It is a carefully matched and tested chassis assembly. All coils are tested for inductance and they may be relied upon to remain quite accurate for a very long time.

If you could see the coils themselves I am sure you would be impressed with the general design and construction. Such good coils give one the greatest confidence, for it is obvious that, with good accurate coils, the work of the amateur is easy.

The coils are wound upon accurately made tubes and the wires are fixed in position, so that they cannot shift. Each coil is tested during manufacture and afterwards the whole assembly is checked and tested with a suitable gang condenser.

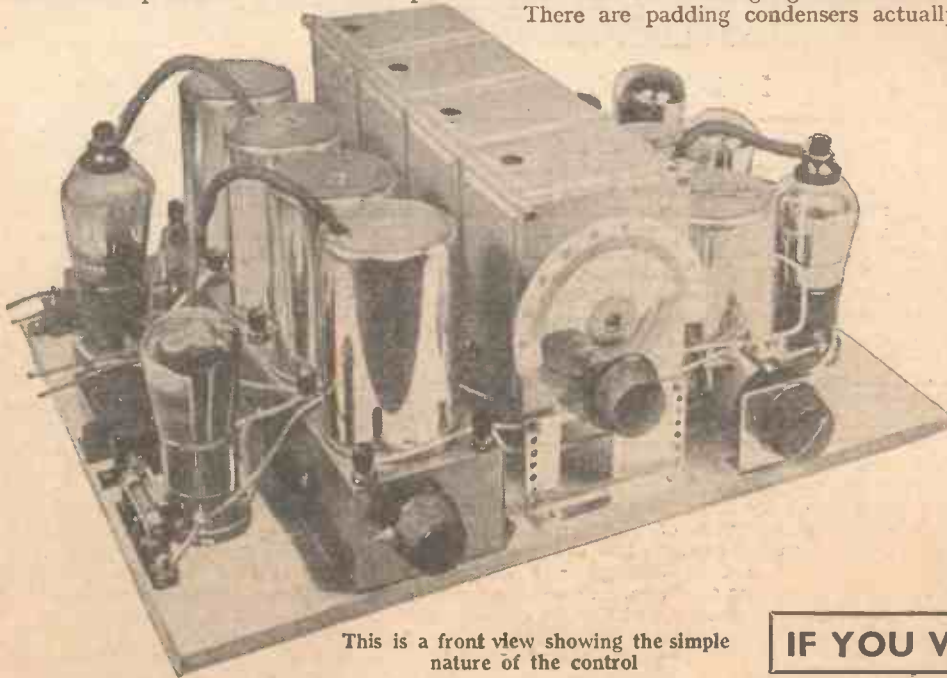
There are padding condensers actually

built into the oscillator coil unit which are adjusted to make the tuning of the unit correct. This work is, of course, carried out by the makers and the amateur must not interfere with the coils in any way.

The Condenser

The four-gang tuning condenser is fitted in the centre of the baseboard. It must be carefully handled. Do not twist the condenser or force it in any way. First mark out the position of the holes for the fixing screws which pass through the two brackets. Then screw down the brackets only, having taken them off the tuning condenser.

Afterwards take the brackets off the baseboard and fit them to the tuning condenser which is arranged to be well above



This is a front view showing the simple nature of the control

THE COMPLETE SET OF COMPONENTS

Baseboard, 16 in. by 12½ in. (Cameco, Peto-Scott, Readi-Rad).

Four-gang .0005-mfd. variable condenser (J.B.).

Four-coil super-het unit (Wearite type GL32).

Two super-het coils (Wearite, one OT1 and one OT2).

Seven 4-pin valve holders (Telsen, Lotus, Lissen, W.B., Goltone, Wearite, Junit, Igranic, Benjamin).

One 1-mfd. fixed condenser (T.C.C., Lissen, Dubilier, Telsen, Goltone, Ferranti).

Two 1-mfd. fixed condensers (Dubilier, Lissen, Telsen, T.C.C., Goltone, Ferranti).

High-frequency choke (Peto-Scott, Lewecs, Lissen, Wearite, Goltone, Dubilier).

Low-frequency transformer (Lissen Hypernik, Telsen, Lotus, Ferranti, Varley, Goltone, Lewecs, Igranic, R.I.).

.0003-mfd. maximum pre-set condenser (Sovereign, Formo, Telsen, Igranic, R.I., Lissen, Polar, Goltone).

Grid-leak holder (Readi-Rad, Lissen, Goltone, Bulgin, Telsen, Dubilier).

Two 1-megohm grid leaks (Dubilier, Lissen, Telsen, Sovereign, Goltone).

One .0003-, one .0005-, and one .0002-mfd. fixed condensers (Lissen, Telsen, T.C.C., Goltone, Dubilier, Sovereign, Formo, Ormond, Graham-Farish).

IF YOU WISH FOR OUTSTANDING RESULTS

SIMPLE SUPER

STATION WORTH GETTING

WHICH IS AS GREAT AN ADVANCE
CURRENT DESIGN AS WAS THE "CENTURY"
WHICH CREATED SUCH A SENSATION
E MONTHS AGO—Designed by W. JAMES

USES FIVE
VALVES ONLY

SIMPLE TO
OPERATE

WORKS ON
OUTSIDE
AERIAL

COSTS LITTLE
TO MAKE

the baseboard. Examine the condenser to make certain it is right. See that the drive is satisfactory and not bent. You do not want a slipping drive nor one that binds.

Some Important Points

Look at the fit of the covers and, if necessary, carefully make any slight adjustment to ensure that they will not spring off at a future date. Above all, do not tamper with the tuning condensers themselves, but see that the short rods which are used as connections are tight and do not touch the covers where they pass through.

This unit should be handled and dealt with with care, as it is easy enough to spoil

the results by twisting the condenser and so throwing it out of tune. Quite near the gang condenser and by its left-hand side, looking at the front of the baseboard, is the four-gang coil unit. The position is important, as this unit is one of the vital components.

Assembly

This also applies in the case of the tuning condenser which must be far enough back from the edge of the baseboard in order that the dial shall clear the escutcheon, which is fitted to the panel. Attention to these small points is well worth while.

The four-coil chassis is fixed with round head screws, but first mark the positions for

the holes, then make small holes with a bradawl, and afterwards screw the component down. On the right-hand side is the volume control resistance.

This unit is mounted upon a small bracket in order that the height of the spindle above the baseboard shall equal that of the switch spindle of the coil unit. With these parts fitted you can arrange the fitting of the set into the cabinet. See that the parts fit satisfactorily. You do not want any of the spindles to bind in the holes and, as mentioned before, the scale of the tuning condenser must clear the escutcheon.

On the left-hand side of the baseboard

COMPONENTS IS NOT EXPENSIVE

One 15,000-ohm, one 30,000-ohm spaghetti resistances (Lewcos, Lissen, Telsen, Sovereign, Varley, Goltone, Graham-Farish).

Two terminal mounts (Sovereign, Junit, Belling-Lee).

Four terminals marked Aerial, Earth, L.S.+, L.S.— (Belling-Lee, Clix, Bulgin, Eelex).

Two spade terminals, marked L.T.+, L.T.— (Belling-Lee, Clix, Eelex).

Six wander plugs, marked G.B.+, G.B.—, H.T.—, H.T.+1, H.T.+2, and H.T.+3 (Belling-Lee, Clix, Eelex).

Connecting wire and sleeving (Lewcos, Jiffilix, Quickwyre).

Five yards thin flex (Lewcoflex).
50,000-ohm potentiometer (Colvern).

ACCESSORIES

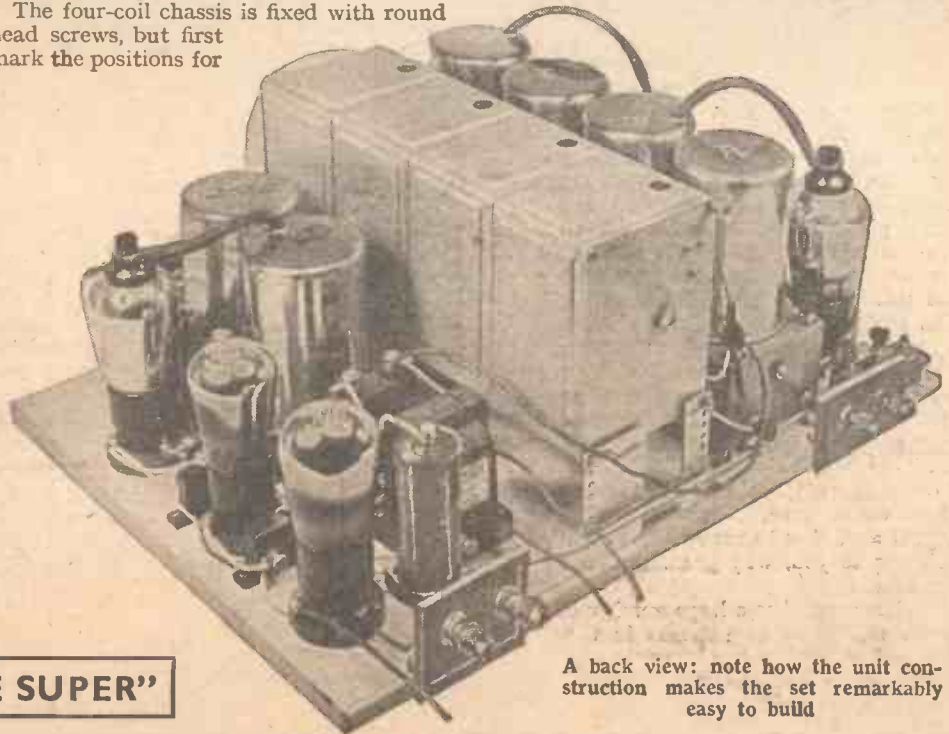
120-volt H.T. battery (Lissen, Pertrix, Drydex, Fuller, Ever-Ready, C.A.V.).

Accumulator (Lissen, Pertrix, Drydex, Fuller, Ever-Ready, C.A.V.).

9-volt grid bias battery (Lissen, Pertrix, Drydex, Fuller, Ever Ready, C.A.V.).

Cabinet (Peto-Scott).

Loud-speaker (Ultra, Ormond, Lissen, R. & A., H.M.V., Tekade, Sovereign, Blue Spot, Goodman).



A back view: note how the unit construction makes the set remarkably easy to build

RESULTS, BUILD THE "SIMPLE SUPER"

"THE 'A.W.' SIMPLE SUPER" (Continued from preceding page)

are two valve holders. The first, which is the one towards the back of the set, is for the first screen-grid valve. By it is the 1 microfarad by-pass condenser. Towards the front on the left-hand side is the holder for the bi-grid valve and associated with it are a grid condenser and leak resistance holder.

Note the exact positions of the holders and the way round (relative to the four-coil unit) in which they are placed. There is a pre-set condenser. This is fitted at the back of the set near the coil unit, on the right-hand side but at the front are valve holders for the first intermediate-frequency band filter coil and the screen-grid valve.

Behind it are the holders for the second band filter coil, the detector valve and the power valve. Notice the positions of these

holders; you do not want the covers of the two intermediate-frequency coils to touch.

A SPECIAL LARGE-SCALE LAYOUT AND WIRING DIAGRAM PRESENTED NEXT WEEK

These valve holders must be placed round the right way. The grid condenser has the leak attached to it. There is a

high-frequency choke, the low-frequency transformer and by-pass condensers. These parts are arranged for easy and satisfactory wiring.

Having assembled the parts and made sure that the coils and wires fit in the space available, take a good look at the wiring diagram and note the general arrangement of the wires. There are four very short wires joining the main tuning condenser and the four-coil unit.

I placed these wires on the tuning condenser connections before finally fitting the coil unit and it is as well to do this. There is a flexible resistance running between two points, as will be seen from the circuit, and the resistance that I used was long enough to reach between the two terminals on the four-coil unit.

WHAT DO WE WANT IN THE PROGRAMMES?

By ANTHONY LEVER

FOR some twelve hours daily we can receive B.B.C. programmes. Light music, classical music, dance music, chamber music, talks, plays, cookery recipes, variety, religious services, opera, market reports, news . . . for three-quarters of our waking hours the B.B.C. is transmitting. Perhaps we, as individuals, listen to less than a quarter of the whole transmissions. But some of us grumble mightily even at that, complaining that the programmes are rarely as we want them.

That, in short, is the position. Not too satisfactory, you say. Not too easy to alter. Look at it from another point of view. Do you read *all* your daily paper. Of course you don't. You go first for certain features which you know will be found in a definite place in the paper or magazine. Then you glance at a number of other features more or less in accordance with habit. Why, then, expect *all* the broadcast programmes, or even all of those at the hours at which you want to listen, to be in accordance with your own personal tastes? You may, for instance, be bored by an opera relay from Covent Garden, whereas your next door neighbour may delight in it.

Again, many people still use a wireless set to provide a sort of musical background for their conversation. Schoolboys, too, have declared before now that the B.B.C. dance orchestra helps them when doing their homework. But, if you listen in this way, if radio has become so commonplace a thing to you, why grumble about programmes?

I think, however, that a large number of the twelve million or so listeners in this country still enjoy and are sometimes thrilled by radio entertainment, but of course, they have preferences for certain

programme items, just as in any other form of entertainment.

The Cheapest Form of Entertainment

Incidentally, have you ever realised how cheap, how economical, is radio as a form of entertainment? It is probably because it is so cheap that some people treat it as commonplace. If many of us had our sets switched on less, but listened more, then we should appreciate radio much more.

What constitutes radio entertainment? Many of us lead hard lives. Our work is hard, our surroundings hard, and our

outlook on life is hard. Unconsciously we long, therefore, for something which, even though for only a short time, takes us away from reality into another world. That is what we expect from any kind of entertainment, and radio entertainment is no exception.

But how can the preferences for programme items be discovered? How can the public taste in radio entertainment be gauged? Admittedly, the B.B.C. will never satisfy everybody all the time. The human race being what it is, there are necessarily individual differences. How, then, can the B.B.C. find out what the greatest number of people enjoy?

Radio "Showmen"

First, by employing "showmen" in the programme department. Men who have, as it were, an almost unerring judgment as to how the public want to be entertained. Men who have, for instance, made their mark in some branch of the entertainment world, and are in course of developing a definite radio showmanship technique.

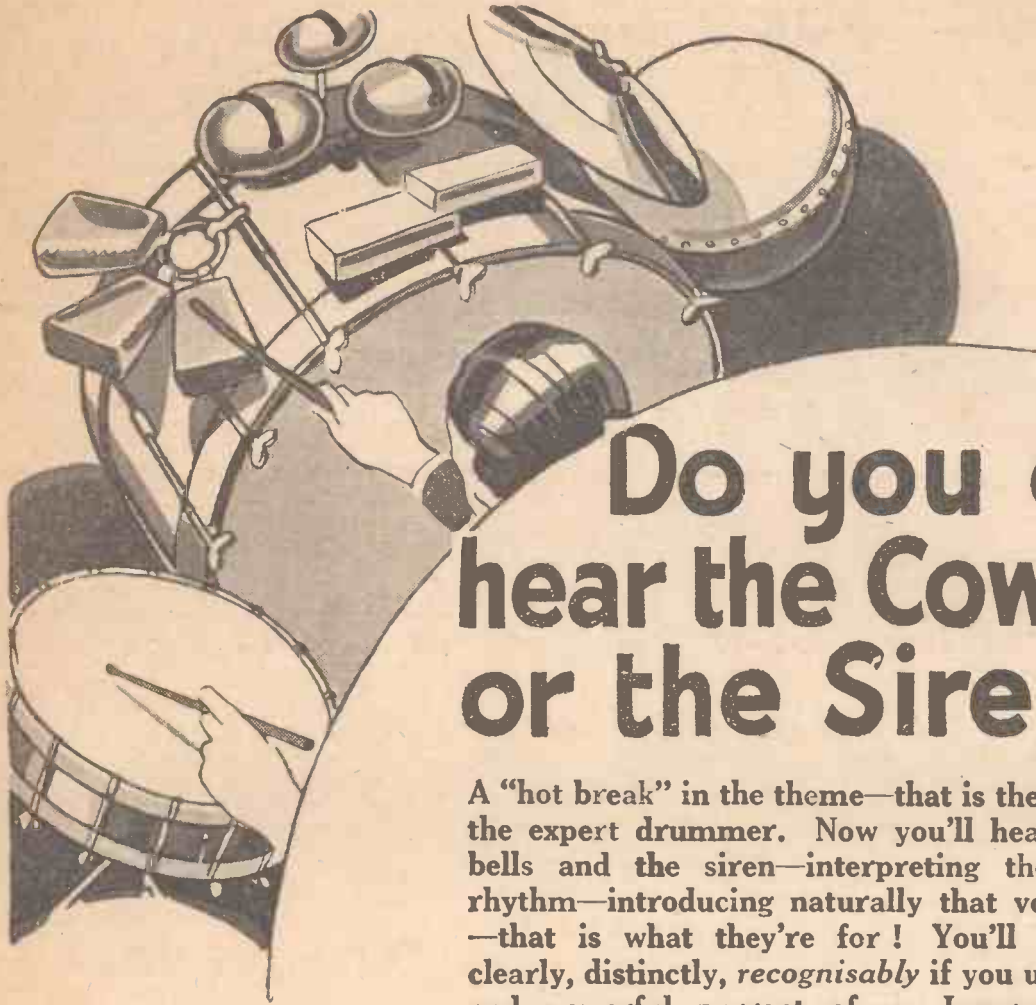
Then the B.B.C. has what might be termed a continuous test of opinion in its daily correspondence, which is far from all being applause. It hears a good deal about the sentiments, dislikes and prejudices of its correspondents. But, of course, the number of people who take the trouble to write to the B.B.C. is infinitesimal compared with the total number of listeners, although it cannot be assumed that those who do not write have no complaints.

Somebody has said that civilisation is a process of turning necessities into pleasures. Well, radio—once a luxury or just a scientific hobby—is now almost a necessity to hundreds of thousands. It is worth our while to try to make it more of a pleasure by using a little thought, by using radio thoughtfully and by thinking what we would like to hear. Then, and only then can we hope really to enjoy radio entertainment. A good receiver, less than the price of a daily paper for a licence, and a little thought—that is all you want to enjoy the theatre of the air.



An impression of Max Miller

MORE ABOUT THE "SIMPLE SUPER" NEXT WEEK—Order Your Copy Now



Do you ever hear the Cowbells or the Siren ?

A "hot break" in the theme—that is the chance for the expert drummer. Now you'll hear the cowbells and the siren—interpreting the "falling" rhythm—introducing naturally that vocal chorus—that is what they're for! You'll hear them clearly, distinctly, *recognisably* if you use the pure and powerful current of an Improved Lissen Battery. The extraordinary power output of this battery makes noticeably true the performance of your loud-speaker.

Ask by name for an Improved Lissen Battery. Obtainable at every radio dealer's.



THE SECRET OF THE TEST TUBES

There is a Process used in the Lissen Battery which not only produces power of remarkable purity, but which gives the battery very long life. So much so, that a **PRINTED LIFE GUARANTEE** is given with every Improved Lissen H.T. Battery sold. See this guarantee on the side of the battery when you buy—it means extra useful battery life in your set.

60 VOLT
 WAS ~~7 1/4~~ NOW **5'6**
 100 VOLT
 WAS ~~12 1/4~~ NOW **9'3**
 120 VOLT
 WAS ~~15 1/4~~ NOW **11'4**



Please Mention "A.W." When Corresponding with Advertisers



IN MY WIRELESS DEN

Weekly Hints — THEORETICAL
CONSTRUCTIONAL & BY
W. JAMES

DIFFICULTY IN MATCHING

It is curious that when ganging troubles are experienced, one usually suspects the coils. Sometimes, of course, the coils are at fault or the coils may themselves be satisfactory enough.

But it is as well to remember that the tuning may be affected because the sections of the gang condenser are not identical. The cheaper condensers cannot be accurately matched and the construction of some is so poor that it is easy to see that close matching is impossible.

Fortunately, tuned circuits have, as a rule, enough losses to render really accurate matching not necessary. You would, for example, have difficulty in gang tuning a pair of Touchstone coils, which have very low losses. These coils were well made of litzendraht wire and are relatively efficient coils.

With smaller coils, having much greater losses, ganging is easier and naturally becomes more easy as the losses are increased. At the same time, the signal strength and the selectivity fall off as the losses are increased and so it is necessary to strike the happy medium. The coils generally sold for gang circuits are on the whole quite suitable and there are good condensers.

THESE MULTI-MU'S

Screen-grid valves of the multi-mu type are likely to be used by manufacturers during the coming season strictly on their merits. They cost no more and no less than ordinary screen-grid valves and they simplify the old problem of controlling the volume.

Prior to the introduction of these valves, volume controls were usually far from satisfactory. Usually when the control was adjusted the tuning was affected or some other disadvantage became apparent. Now that the valves are available in the A.C. series, the volume control problem is practically solved.

The grid of the valve is joined to a variable bias. Increasing the amount of the negative bias reduces the amplification produced and so cuts down the strength.

The parts needed for a satisfactory volume control are very few, comprising a potentiometer and by-pass condenser and a circuit has been given in these notes. A smooth control is obtained when the circuit is suitably arranged to provide the grid bias needed.

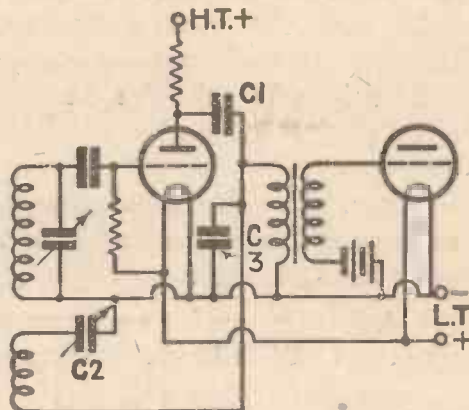
In some circuits special values are essential, but in battery sets the potentiometer

may be joined across the grid battery with a switch for disconnecting it when the set is turned off.

A SPECIAL-COUPLING ADVANTAGE

An advantage of the resistance-coupled transformer arrangement in the detector circuit is that the reaction condenser and the by-pass condenser when one is used can be joined in such a way that there is no high tension on them.

The accompanying circuit shows this. Condenser c_1 is the usual coupling condenser of from .1 to 1 microfarad; c_2 is the reaction condenser, and c_3 the by-pass. The high tension is fed to the valve through the resistance, but as the condensers c_2 and



This is the resistance-fed arrangement described by W. James

c_3 are joined on the transformer side of condenser c_1 , they are removed from the high tension. High-frequency currents flow through c_1 and pass to earth via c_2 or c_3 according to their respective capacities.

In many sets c_2 and c_3 are joined to the anode and therefore have the high tension connected to one set of their plates. By using the scheme shown here, the condenser c_1 , which must in any case have good electrical properties, is made to serve two purposes. It is the low-frequency coupling condenser and also serves to remove high tension from the reaction and by-pass circuits

Full details on page 736 of the new "A.W." "Simple Super."
TRUE TO ITS NAME—A SIMPLE SUPER-HET. EASY TO BUILD AND ONLY ONE-KNOB CONTROL

WITH THE VALVES OUT!

It is an interesting experiment to take out the valves from a battery set, leaving only the power valve in circuit. Very often a noise will be heard.

This vanishes when the detector valve is connected again. You can also stop the noise by joining a grid leak across the secondary. Sometimes a half-megohm will stop the noise, but usually about .1 megohm is needed.

If you join a resistance across the primary circuit instead, you will find that a much lower value is needed, such as 20,000 ohms. The explanation is that the circuit is oscillating and the resistance stops the oscillation by loading the transformer to the point where the circuit does not oscillate.

If the transformer had a ratio of 1 to 1, you would find that a resistance could be joined to the primary or the secondary as before, but the values found by test would be equal or nearly so.

When the ratio is 3 to 1, however, very different values of resistance are needed. The detector valve stops the oscillations because it loads the transformer as a resistance. A high-impedance valve may not stop the oscillations, but one of lower impedance will.

IN THE FUTURE

I wonder whether moving-coil speakers will be exclusively used in manufactured sets shortly.

The prices of the electro-magnet type moving coil are relatively so low that they deserve to be used in all but the cheapest and smallest mains sets.

With battery sets, the case is different. There is usually not much output power. Permanent magnet types of speakers are more expensive than the electro-magnet type for equal sensitivity. So it happens that with battery sets the moving-coil pattern is relatively not as suitable as with mains sets.

In mains sets the field winding of the speaker may be used as the smoothing choke or in another part of the circuit where the supply for the loud-speaker is obtained at no extra cost. The hum question often crops up with these loud-speakers, but with sets having a good layout and satisfactory smoothing, hum is negligible.

The Egyptian Government is considering the erection of a station at Abu Zabal, near Cairo.



LISSEN in the new "James Simple Super"

LISSEN HYPERNIK L.F. TRANSFORMER

Mr. James has used this transformer in the "Simple Super". You cannot get such a good response curve—such fine quality of reproduction—from any other transformer at anything like this price. With a primary inductance of fully 100 henries, it yet operates perfectly when passing currents up to 5 mA. or more. Its step-up ratio is 4 to 1, and a stage amplification of more than 100 is obtained.

12/6

PRICE

LISSEN FIXED CONDENSER

These Lissen Mica Fixed Condensers are leak-proof. They never vary. They deliver all their stored-up energy. Guaranteed accurate within 5 per cent. of marked capacity. Can be mounted upright or flat. Grid-leak clips included free with each condenser. .0002 to .0000, 1/6. .0001 to .001, 1/2

1/2

PRICE, each

LISSEN FIXED GRID LEAKS

It is of utmost importance that resistances should be unvarying in value and free from defects which may cause parasitic noises. Lissen Resistances have been tested by exposure to rain and sun, and they remain constant and silent in use always. All values, 1/2

1/2

PRICE

THE "James Simple Super" is acclaimed as an amazing one-dial receiver. It is more! It gives you not only distance and extreme selectivity but a reproduction pure and powerful. LISSEN parts are largely used for this fine receiver—the LISSEN Hypernik Transformer, LISSEN Fixed Condensers and Grid Leaks, LISSEN H.T. and G.B. Batteries, and LISSEN Accumulator.

Build with Lissen parts and make sure of that fine tone and volume which Mr. James has aimed for in his receiver.

Lissen parts are obtainable from any radio dealer.

LISSEN

THE PARTS THAT PULL TOGETHER

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX.

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

BROADCAST ARTISTES in PICTURE



JOHNSON CLARK.—
A ventriloquist and one of the recent additions to the B.B.C. entertainers

HAROLD CASEY (below) was an early assistant director of the Birmingham Station, where also he was "Uncle Pat" of the Children's Hour. He has given many recitals from other stations



ELSA TOOKEY, a brilliant cellist. Recently she has made the Tookey Trio, broadcasts from the London Regional



NEWTON LEES, a well-known Midland baritone. He has been heard recently with the B.B.C. Orchestra (National) under Walton O'Donnell

REBECCA CLARKE (left).—One of the best known of lady viola players, and composer of many works for that instrument

"HOW CURRENT IS SMOOTHED IN MAINS UNITS"

(Continued from page 733)

a hundred or two hundred ohms (circuit Fig. 1).

The circuit Fig. 2, using three condensers and two chokes, will be found to be perfectly satisfactory for receivers using considerable amplification and a number of valves. A favourite arrangement of mine is 2 microfarads each for C_1 and C_2 , 8 for C_3 , with L_1 and L_2 20-henry chokes of good quality. There is a close similarity between the circuit Fig. 2 and Fig. 4, the difference being, as you will notice, merely that in Fig. 4 the choke L_2 is not in the same lead as L_1 . In a few circumstances better smoothing is obtained in the circuit Fig. 2. In Fig. 3 the advantage of two chokes is obtained with only two condensers, but often in cheap units high resistance in these chokes leads to too great a loss in voltage.

Where cost is an important factor, resistances are sometimes used in place of chokes, but the voltage has to be put up to compensate for this. Filters are also sometimes designed with the values of the capacity and the inductance so arranged as to give a tuning effect and economy can be obtained in this way by careful design.

Usually, however, simple arrangements such as that in Fig. 1 and Fig. 2 are used, the condenser C_2 in the first case and C_3 in the second being a kind of reservoir from which the supply of high-tension direct current for the receiver is taken. In the case of a set with super-power valves in the output with a big current swing, it is essential that the condenser at the output end should be large, otherwise the current drain on it may be too great and distortion may result.

When a receiver is designed complete with its mains unit, that is to say when a particular mains unit is always to be used in one set condition, the designer's problems are largely simplified, for his chokes and condensers can be so arranged to give no more than a necessary smoothing to that particular circuit and the output condenser can be just big enough to allow the maximum current swings that are likely to be taken from it.

THE SIMPLEST SUPER-HET

Full details of a new super-het by W. James, easy to build and having one-knob control, are given on page 736.

TONE CORRECTION

WITH a highly selective input the higher musical notes which lie farthest away from the carrier frequency are cut off by the sharply tuned circuits, whilst the lower musical notes pass through more or less unaffected. The result is to give a more high-pitched response in the loud-speaker than is natural. One of the first to realise this, and to provide what is now called tone compensation in order to restore the proper musical balance, was Mr. P. W. Willans. He inserted an inductance, in series with a resistance, across the output circuit of the detector valve, or, what amounts to the same thing, across the input to the first L.F. amplifier. An inductance reacts more strongly to high frequencies than low, and by strengthening what is left of the high notes, makes up for what was lost in the H.F. stages.

B. A. R.

The Winners' Concert from the Midland Competition Festival will be broadcast from the Town Hall, Birmingham, on April 29, when successful candidates in each competition will be heard.

Build your SIMPLE SUPER with a READY RADIO MATCHED KIT

To get the best results from the "Simple Super" it is absolutely essential to build with a matched kit of components. Buy a matched kit from the Super-het Experts—Ready Radio—and you are certain of success!

THE SIMPLE SUPER

	£	s.	d.
1 Cabinet with baseboard as specified	1	1	0
1 J.B. four-gang condenser, .0005-mfd., with dial	1	17	0
1 Wearite four-coil super-het unit	3	10	6
2 Wearite super-het coils			
7 four-pin valve holders	3	6	
3 T.C.C. 1-mfd. fixed condenser, type 50	8	6	
1 Readirad super-het choke	5	6	
1 R.L. Dux transformer	6	9	
1 Formo .0003-mfd. maximum pre-set condenser	1	6	
1 Readirad grid-leak holder	1	6	
2 Readirad 1-megohm grid leaks	1	8	
1 T.C.C. .0003-mfd. fixed condenser, type 34	1	6	
1 T.C.C. .0002-mfd. fixed condenser, type 34	1	6	
1 Lewcos 15,000-ohm resistance	1	6	
1 Lewcos 30,000-ohm resistance	1	6	
2 Sovereign terminal mounts	1	0	
4 Belling-Lee terminals, type R	1	0	
1 T.C.C. .0005-mfd. fixed condenser	1	6	
2 Spade terminals			3
5 Belling-Lee wander plugs			10
1 Packet of Jiffilinx for wiring			2
1 Colvern 50,000-ohm potentiometer			6
5 Valves as specified (2 PM12, 1 PM1DG, PM1HL, PM2A)	3	8	9
Flex, screws, etc.			2
1 Aluminium bracket			3
	£12	15	6

Kit "A" (Less Valves and Cabinet) **£8.5.9**

OR BY EASY PAYMENTS **15s. 3d.** And 11 monthly payments of 15s. 3d.

Kit "B" (With Valves, less Cabinet) **£11.14.6**

OR BY EASY PAYMENTS **21s. 6d.** And 11 monthly payments of 21s. 6d.

Kit "C" (With Valves and Cabinet) **£12.15.6**

OR BY EASY PAYMENTS **23s. 6d.** And 11 monthly payments of 23s. 6d.



FOR CASH OR BY EASY PAYMENTS

LOUD-SPEAKERS

R. & A. Permanent Magnet Moving Coil Reproducer, with multi-ratio matching transformer. Cash Price, £2/17/6. Or **8/-** Down and 7 monthly payments of 8/-.

Rola Permanent Magnet Moving-Coil Speaker Chassis with Transformer. Cash Price, £2/9/6. Or **10/-** Down and 5 monthly payments of 9/-.

Blue Spot 66/R. Unit and Major Chassis. Cash Price, £2/10/0. Or **7/6** Down and 6 monthly payments of 8/-.

RADIO-GRAM EQUIPMENT

Readirad Pick-up ... £1 7 6
 Readirad Volume Control ... 5 9
 Collaro B.30 Double-spring Gramophone Motor with Automatic Stop ... 1 13 0
£3 6 3

Or **10/-** Down and 7 monthly payments of 9/-.

Head Offices: EASTNOR HOUSE, BLACKHEATH, S.E.3.
 'Phone: Lee Green 5678.
 'Grams: Readirad, Blackvit.

Showrooms: 159 Borough High Street, London Bridge, S.E.3.
 'Phone: Hop 3000.

ALL YOUR RADIO FROM READY RADIO

ELIMINATOR

Readirad B.S. H.T. 150 volts 30 m/A., 4 tappings, including 1 variable and trickle charger. Cash Price £5/17/6. Or **10/9** Down and 11 monthly payments of 10/9.

H.T. BATTERY

Pertrix Super Capacity, Type 301. Cash Price £1/11/- Or **6/-** Down and 5 monthly payments of 6/-.

H.T. ACCUMULATOR

Fuller, Type D.M.H.G. 120 volts, 6,500 m/A./hour capacity. Price £4/1/- Or **7/6** Down and 11 monthly payments of 7/6.

RADIO-GRAM CABINET

Overall size 3 ft. 3 in. by 22 in. by 17 in. Suitable for any receiver having a panel not exceeding 12 in. by 7 in. and a baseboard 16 in. by 10 in. Cash Price, £3/7/6. Or **15/-** Down and 6 monthly payments of 10/-.

TO INLAND CUSTOMERS.—Your goods are dispatched post free or carriage paid.

TO OVERSEAS CUSTOMERS.—Everything Radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our Agent upon delivery of the goods. All goods are very carefully packed for export and insured, all charges forward.

CASH or C.O.D. ORDER FORM

Please dispatch to me at once the following goods

for which (a) I enclose (b) I will pay on delivery (Cross out line not applicable) £

NAME

ADDRESS

A.W. 16/4/32

To: Ready Radio, Ltd.
 Eastnor House,
 Blackheath, S.E.3.

To: Ready Radio Ltd.,
 Eastnor House,
 Blackheath, S.E.3.

EASY PAYMENT ORDER FORM

Please dispatch to me the following goods

for which I enclose first deposit of £

NAME

ADDRESS

A.W. 16/4/32

You will Help Yourself and Help Us By Mentioning "A.W." to Advertisers

SETS OF DISTINCTION



H.M.V. TABLE RADIO-GRAMOPHONE

(D.C. Model)

Makers—THE GRAMOPHONE CO., LTD.

Price—29 Guineas.

ALTHOUGH we hear much of the grid system of distributing electricity throughout the country, there are still dozens of localities on D.C. supplies. And many set users tell me that their local supply authorities hold out no immediate promise of a change-over to A.C. It may be five or ten years before every house with electricity is on A.C. For this reason I welcome any D.C. versions of well-known A.C. sets.

New D.C. Mains Valves

Prominent among the successes of the season must surely be the H.M.V. Table Radio-Gramophone, with which I was so favourably impressed some months ago. Lately I have been trying out the D.C. model, which incorporates the new indirectly-heated valves for D.C. mains operation. I am delighted with the performance of this D.C. radio-gramophone, and I hasten to recommend it to the many listeners who know they are likely to remain on D.C. mains supply for some time to come.

Let me briefly describe the instrument, which is illustrated on this page. Firstly, it is a marvel of compact design. Inside the table cabinet are all the essentials for first-class reproduction of radio programmes and gramophone records. There is a permanent-magnet moving-coil loud-speaker, a three-valve band-pass chassis of the latest design, and the necessary apparatus for obtaining high- and low-tension current from D.C. mains.

Simple Controls

On lifting the lid we find a gramophone turntable and the familiar H.M.V. pick-up. In addition to these gramophone accessories

are most of the controls needed to work the instrument. On the left is a knob working the three-gang tuning condenser, and this also actuates the wavelength-calibrated tuning scale mounted behind the escutcheon at the centre of the motor board.

On the right is the combination switch knob, providing medium- and long-wave tuning, gramophone reproduction and switching the mains off. Let into the right-hand side of the cabinet is the dual volume control. This works equally well during the reception of programmes as in the reproduction of records. A similar knob is let into the left-hand side of the cabinet, and this acts as a tuning auxiliary.

the gramophone motor is in use are 90 watts to 110 watts.

While on the subject of power I should mention that the undistorted output of the pentode valve is 1 watt, and as this is fed into a very sensitive permanent-magnet moving-coil loud-speaker you may take it that the volume is very considerable—certainly enough for dancing in a large room or a small hall.

As a matter of interest, I have heard this machine installed in an up-to-date country inn in the south of England, and the pleasant little dance annexe was more than filled with recorded dance music; even with the volume control turned down a little.

This H.M.V. Table Radio-Gramophone was, in fact, tried out at Dorking, some twenty-five miles south of London and therefore about forty miles from Brookman's Park. The first thing I noticed when the set was fixed up was the entire absence of mains hum.

In spite of the confined cabinet space the moving-coil loud-speaker gives really fine quality. I consider this is a tribute to the very careful disposition of the chassis inside the cabinet. The bass is definitely brought out, and yet, curiously enough, there is an almost entire absence of boom.

On the radio side control is as simple as you could wish for. The auxiliary knob on the left-hand side of the cabinet makes a great difference and imparts a high degree of selectivity. The main tuning control, operating the three-gang condenser and the wavelength calibrated scale is not at all critical in its setting and unless you work the auxiliary control on the side you might at first imagine the set was unselective. Actually, as tests quickly proved, the band-pass tuning system works admirably, confining the home stations to a small wavelength range, and enabling a large selection of foreign stations to be tuned in clear of local-station interference.

Down at Dorking, away from the screening influences of tall city buildings, this H.M.V. Radio-Gramophone was master of the ether. During the evening, on a length of aerial certainly not more than 30-feet total length, slung haphazardly into a nearby oak tree, I compiled a log of forty-three stations at full loud-speaker strength.

SET TESTER.



This lettered photograph shows the controls of the H.M.V. Table Radio-Gramophone

As this is a D.C. mains operated instrument there is no valve for mains rectification. Due to the use of special D.C.-mains valves the power consumption is economically low. It varies, of course, with the actual voltage of supply. The power is only 50 watts at 195 volts and this rises to only 65 watts at 250 volts, which is the highest supply voltage in this country. These power figures refer to the operation of the radio-gramophone on radio. The corresponding figures when

SCREENED GRID RADIO



essential for selectivity
and long range

**WITH
COSSOR
VALVES**

YOU cannot obtain full enjoyment from Radio unless you use a Screened Grid Set. No other is sufficiently powerful or selective. No other will bring you crisp, clear and free from interference—the splendid programmes broadcast by the main European Stations.

For as little as £6.8.6 you can own an up-to-date Screened Grid Receiver—the Cossor Empire Melody Maker Model 234 (All Electric Model 235, £9.9.6). In spite of its exceptional efficiency—its range—its selectivity—its rich, full-toned volume the Cossor Empire Melody Maker is so simple that you can easily assemble it at home. Fill in the coupon and get full particulars.

**BATTERY
MODEL 234**

KIT OF PARTS complete, including latest types of Cossor Metallised Screened Grid, Detector and Power Valves, handsome oak cabinet and every component necessary for home assembly of the complete Receiver as illustrated.

Price **£6:8:6**

Hire Purchase Terms: 15/- deposit and 8 monthly payments of 16/-

**ALL-ELECTRIC
MODEL 235**

(For A. C Mains)
KIT OF PARTS complete including handsome oak cabinet, Cossor Metallised Mains Screened Grid and Detector, Power and Rectifier Valves, Heavy-Duty Mains Transformer and every component necessary for home assembly of the complete Receiver. Price

£9:9:6

Hire Purchase Terms: 20/- deposit and 9 monthly payments of 21/-

COSSOR EMPIRE Melody Maker

Models 234 & 235
BRITISH MADE

A. C. Cossor Ltd., Highbury Grove, London, N.5. Depots at Birmingham, Bristol, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Dublin.

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Melody Dept., Highbury
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Please send me free of charge
Full-Size Constructional
Chart which tells me how to
assemble the Cossor
Melody Maker.

(Fill in type required, viz, Battery
or All-Electric.)

Name

Address

My usual Radio Retailer is:—

Name

Address

A.W. 16-4-32.



A Speaker Hint

SIR,—I recently fitted a new unit to my linen diaphragm loud-speaker which I constructed to your specification about two years ago. After fitting the new unit I was troubled with extraneous noises on some notes. These noises I finally traced to the whipping of the extension rod of the unit. After many unsuccessful experiments I finally quite banished this noise by pressing a thin layer of plastic wood on the extension rod for its entire length, so that in effect the rod was stiffened-up by a thin wooden tube. The speaker is again restored to its position as the standard of good quality among my friends. I hand this tip on to any other owners of this form of speaker as well worth trying if they are troubled with an unexplained hiss which they have failed to cure.

F. S. W. (Richmond).

Praise for the "Mascot"

SIR,—Having built up the "Mascot 3," I feel I must write and congratulate you. Last Sunday evening I logged nearly thirty foreign stations at excellent quality on the loud-speaker, the best being Prague, Langenberg, Beromuenster, Rome, Toulouse, Mühlacker, Strasbourg, Hilversum, Heilsberg, Turin, Trieste, and Nurnberg. These were received while the crocodile clip was attached to the second coil. When "Reg." and "Nat." are working I can receive about six foreign stations at worth-while strength. D. T. (Watford).

"Mascot" Selectivity

SIR,—Referring to Mr. P. Harris's "Mascot" in your issues of March 12 and 19, I have pleasure in sending you the details of how this set is behaving under the aerials of 5XX National and 5GB Midland Regional. The masts of these two stations can be seen from my bedroom window, distance about six miles. I made the coils as specified in last week's issue, costing me 1s. 6d.

Within half an hour of finishing the set on Saturday evening I had all the Regionals and Nationals and together with foreigners, fourteen in number, all at good loud-speaker strength. It is a *champion* set. Quality, sensitive and *very* selective. The volume is tremendous. In fact, with no reaction, the National 5XX and Midland 5GB are too loud to be pleasant.

Sunday, Radio Paris came through at most wonderful strength, no interference from National. London Regional and Nationals, North Regional, also very powerful. Mühlacker more powerful and no interference from anywhere.

"Experimenter for Nine Years,"
(Northampton).

The "Square Peak 3"

SIR,—Just before Christmas I built up the "Square Peak 3" from your blueprint and perhaps you may be interested to know the result.

I have logged seventy-three stations on medium waves and twelve on high waves, all identified and there are several others not yet identified.

I can pick up Cardiff and Glasgow quite clear of interference after dark and last week I picked up Rabat when other stations were working.

All the best foreign stations come through very strong and clear and there is no other set that I know of near here to touch it. A month or so ago I picked up four American stations, but lately they have disappeared.

W. W. (Ilford).

Short-wave Experiences

SIR,—You may be interested in my experiences with the Short-wave Plug-in Adaptor described in your issue of January 23. Until your short-wave guide appeared to arouse my interest I had never listened to a short-wave transmission. I immediately got results when I used the adaptor in conjunction with my standard 2-valve broadcast set and soon decided to keep a rough log, which I commenced to make on February 25. From that date I have been able to receive one or other of the American short-wave relays at readable strength *daily*. W3XAL (20 times), W2XAD (24 times), W8XK (twice), W1XAZ (twice), W2XAF (6 times), W2XAL (once), VE9DR or VR, Ottawa (once), also P.L.E. 31.86 metres, Java, at astonishing strength (3 times), and, of course, a host of other stations at nearer distance. On March 6, at about 6.45 p.m. G.M.T., I was lucky enough to get a somewhat thrilling result. (W2XAD) New York relayed a debate by several prominent American newspaper men attending the Disarmament Conference at Geneva. This I received perfectly readable after a double journey across the Atlantic. I thank your journal for putting into my hands the description of an instrument which at such low cost does really put the world at my elbow.

A. B. (Ashford, Kent).

The "Mascot"

SIR,—Accept my congratulations on the "Mascot," it is a wonderful set, and all you claim for it.

T. S. E. (Wolverton).

S.G. LEAD LEAKAGE

Beware of metal-braided wire for screen-grid anode leads where these



have to pass close to other metal parts, such as coil screens. A capacity leakage may be set up.

Grid-bias and H.T. Voltages

SIR,—A friend tells me that if I apply too much grid-bias voltage to the valves in my set I cause the H.T. battery to run down very speedily. I have always been under the impression that with too little bias the H.T. battery runs down and that an increase in bias voltage will reduce the drain on the H.T. Can you give me a definite ruling in this matter?

E. R. (Croydon).

You are quite correct, and your friend is at fault. By increasing the negative bias voltage you automatically reduce the current consumption of your valves and thus reduce the drain on the H.T. battery. If one of your valves has positive bias, and you increase the positive bias, the current consumption of the valve will certainly increase and this will cause a greater drain on the H.T. battery. There are very few receiving valves, however, that require a definite positive bias to be applied by means of a separate bias battery, so we rule out the possibility that your friend was referring to the application of positive bias to your valves.—Ed.

WHEN SUBMITTING QUERIES

Please write concisely, giving essential particulars. A Fee of One Shilling (postal order), a stamped addressed envelope, and the coupon on the last page must accompany all letters. The following points should be noted.

Not more than two questions should be sent with any one letter.

The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query. Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken.

Readers' sets and components cannot be tested at this office. Readers desiring specific information upon any problem should not ask for it to be published in a forthcoming issue, as only queries of general interest are published and these only at our discretion. Queries cannot be answered by telephone or personally.

Readers ordering blueprints and requiring technical information in addition, should address a separate letter to the Query Department and conform with the rules.

"Century Super" and Outdoor Aerial

SIR,—I have the "Century Super" in use and it is giving extremely satisfactory results. Living, as I do, in Ireland and away from a populated district, I would like to use the set with an outdoor aerial. Will you explain what alterations and connections should be made to effect the above?

P. G. (Ulster).

The receiver cannot be used with an outdoor aerial without making drastic alterations, which would affect the general efficiency of the receiver. It would be necessary to use either a bi-grid or a screen-grid valve as the first detector valve and also to change the present frame aerial for a band-pass arrangement. These alterations cannot be dealt with in the form of a query as they involve constructional alterations. On no account should the receiver be used with an outdoor aerial attached to the frame aerial, as such a proceeding would allow interference to be radiated to other listeners and is therefore illegal according to the terms of your wireless licence. If you want particularly to use a super-het with an outdoor aerial, we would refer you to the design of the "Simple Super" receiver.—Ed.

Gerald Nodin will be the vocalist in a concert of selections from musical plays to be broadcast from Manchester on April 16.

A DUBILIER CONDENSER

at

6d.



The Dubilier Condenser Type 665 is a highly efficient moulded mica condenser designed for use where lightness and compactness are of vital importance.

PRICES

- .0001 mfd. - - 6d.
- .0002 mfd. - - 6d.
- .0003 mfd. - - 6d.
- .0005 mfd. - - 9d.

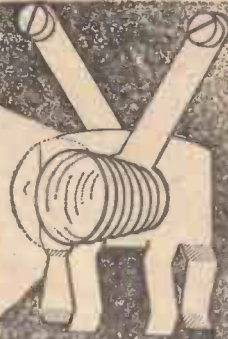
MEANS YOU NEED NEVER TAKE RISKS WITH YOUR CONDENSERS AGAIN!



CS

DUBILIER CONDENSER CO. (1925) LTD.
Ducon Works, Victoria Road, North Acton, W.3

Build your "SIMPLE SUPER" with the condenser SPECIFIED the J.B. "R"4 GANG



Not only will you have the most accurate and up-to-date of gang condensers, but you will be able to **ILLUMINATE** your Super for a few pence, in a few moments with the

PRICE **37/-**

NEW J.B. ILLUMINATOR

It just clips on to the condenser frame and throws a bright light from behind the ivory scale. Two screws only, to connect to filament supply. Supplied without lamp, complete with instructions. 6d. each,



The J.B. Illuminator on an "R" Type gang.

How to clip the Illuminator on to the J.B. Chassis-mount.



PRECISION INSTRUMENTS

Advt. of Jackson Brothers, 72 St. Thomas' Street, London, S.E.1
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To Ensure Speedy Delivery, Mention "A.W." to Advertisers



A weekly review of new components and tests of apparatus conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

ERIE FIXED RESISTANCES

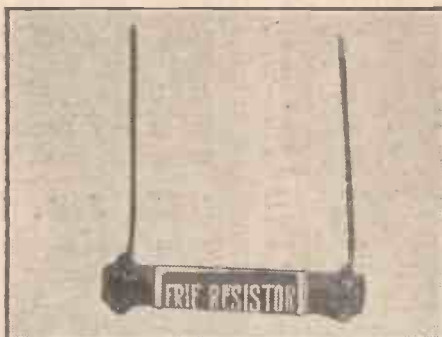
FIXED resistances are amongst the most important components in a modern receiver, and it is essential that these should be constant in value and unaffected by age or temperature. A type of resistance which is very popular in the U.S.A. and Canada is the Erie resistor. These resistances are now made in this country, and are well worth consideration when the design for the new receiver is being prepared. They are of the moulded carbon type and are available in all values from 80 ohms to 10 megohms, with power ratings of one-third, half, one, two and five watts. They are cylindrical in form, the actual size varying according to the power rating. Each resistance is supplied complete with approximately two inches of connecting wire, this being welded to the resistance element, ensuring that the connection is permanent. Loose connections and their usual attendant

troubles are thus absolutely avoided.

After the connections are fitted the resistance is impregnated with a moisture resisting compound to prevent absorption by the carbon of salts from the damp atmosphere of this country. They are then painted with an enamel to indicate their resistance value which is done in

terms of the colour code suggested by the R.M.A. of America. The body of the resistance is one colour while one end is marked with a second colour. These two colours determine the first two digits, and a dot on the middle of the resistor then determines the number of noughts, according to its colour. This method of identification is very handy.

We tested quite a number of these resistances having values varying from 200 to 50,000 ohms, and in all cases the results were quite satisfactory. These resistances can be well recommended and are being included in many commercial sets: they will soon be available for home constructors.



One of the range of Erie resistances

ORMOND CABINET SPEAKER

THIS speaker is housed in an artistically finished oak cabinet, the grill being of a very simple but effective design and backed with silk gauze.

(Continued on page 750)

a battery for every need



Careful discrimination in the choice of a Battery should extend not only to the make but also to the capacity. Decide first on one of unquestionable reputation, such as the C.A.V., and then give consideration to the type that will give the longest life and the most complete satisfaction.

The benefit of our experience may be valuable to you. Send us details of your receiver and we will assist you in the choice of one best suited to your requirements.

Have you tried the C.A.V. H.T. Dry Battery yet?

Free C.A.V. **WELL STREET, BIRMINGHAM.**

FREE. A USEFUL BOOK ON THE MAINTENANCE OF C.A.V. H.T. D.L.T. ACCUMULATORS AND HOW THESE CAN BE CHARGED AT HOME FROM D.C. MAINS. A POST-CARD WILL BRING YOU A COPY.

APPLY TO DEPT. C4



CLARION

ALL-BRITISH NON-MICROPHONIC RADIO VALVES

Clarion Valves are used in countless thousands of Radio Sets, bringing in the elusive Foreign Stations, and giving undistorted reproduction with amazing volume and purity. The best circuit is better still with Clarion Valves in each valve-holder. Test them and enjoy better Radio.

There's a type for every Stage

2 VOLT BATTERY VALVES	
H2. for H.F. Amplification or Detector Stage	5/6
HL2. Detector and L.F. Amplification	
LP2. Loudspeaker Power Valve	6/9
P2. Super-Power Valve	
PX2. Hyper-Power Valve	8/6
SG2. Screened Grid H.F. Valve	12/6

Also A.C. Mains Indirectly Heated Valves and Rectifying Valves.

Clarion Valves are designed to give the highest efficiency in each stage of your receiver, and current consumption is remarkably low.

Your dealer can supply. If any difficulty, write us.

**Highest Efficiency—
Low consumption—
Power with Purity.**

*Descriptive Literature
Free on request.*

CLARION RADIO VALVE CO.,
Works:—32 CHARLOTTE ST., BIRMINGHAM.
London Offices:—7 DUKE STREET, ADELPHI, LONDON, W.C.2.

Constructors!

*Save money on your
Valve bill, Use Clarion*

Holdens

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

100U
COMPLETE MOUNTED TO CHASSIS **39/6**
BRITISH MADE

MOVING-COIL PERFORMANCE for 39/6

A really good Moving-Coil Speaker is expensive. If, therefore, the price you want to pay for your speaker is round about 40/- you should buy BLUE SPOT 100U—which is the equal of the most expensive Moving-Coil Speakers you can buy.

The tone of 100U for both speech and music is vivid and natural. Every detail stands out like a ship in a searchlight. Like Moving-Coil Speakers, 100U excels on the bass notes, but unlike many of them it sacrifices nothing of the treble. 100U reproduces at good volume even from remarkably small inputs and is entirely free from rattle or distortion.

Hear it at your dealers and you will be glad you read this advertisement. Write for catalogue No. A.W.32U

100D, an attractively designed Cabinet Speaker in fine quality oak, 63/-

THE BRITISH BLUE SPOT COMPANY LTD
BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBERY AVENUE · LONDON · E.C1
Telephone: Clerkenwell 3570 Grams: "Bluspot, Isling, London."
Distributors for Northern England, Scotland and North Wales:—H. C. RAWSON (Sheffield and London), LTD., 100 London Road, Sheffield; 22, St. Mary's Parsonage, Manchester; 183 George Street, Glasgow.

Hutchinson

MOVING-COILS FOR THE MILLION



NEW "WB" MODEL P.M. 4

42!

PERMANENT MAGNET Moving Coil Speaker.

Complete with special output transformer mounted on top.

Written for leaflets (post free)

A triumph by Britain's most famous makers, after months of research. Glorious and true moving-coil reproduction of ANY 2-3- or multi-valve set. No mains needed. Sheffield-made cobalt steel magnet guaranteed for 5 years

WHITELEY ELECTRICAL RADIO CO., LTD.
Radio Works
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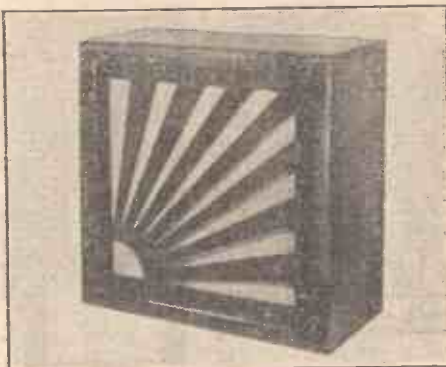


Irish Free State Distributors:
KELLY & SHIEL, LTD.
47, Fleet Street, Dublin.

"WE TEST FOR YOU"

(Continued from page 748)

The unit fitted is one of the well-known Ormond four-pole type. A large-size horse-shoe type permanent magnet is employed, and the pole pieces, armature, and operating coil are mounted between the poles, the steel parts being copper-plated to prevent rust.



Ormond cabinet four-pole speaker

As the movement is of the differential type, there is only one best position for the armature, and this is easily found by means of the adjusting screw. The whole of the mechanism is enclosed in a moulded bakelite housing, which gives the unit a very neatly finished appearance. The cone employed is of the paper type of a special construction, and is free at its outer edge. Considering the size and class of the speaker, the results were really very good.

The frequency response appeared good from 200 cycles up to 3,500 cycles, appreciable output being obtained as high as 4,500 cycles.

CHASSIS-MOUNTING VALVE HOLDER

CHASSIS-BUILT receivers have recently become very popular with manufacturers, and it would appear that the same is becoming true in the case of amateur constructors. The chassis type of construction in many cases requires special com-



One of the new Lectro-Linx chassis-mounting valve holders

ponents, and amongst these is the valve holder. We have received for test this week a chassis-mounting valve holder manufactured by Messrs. Lectro Linx, Ltd.

This valve holder consists of a circle of high-grade paxolin on which the brass sockets are mounted. These sockets are provided with terminals to facilitate wiring and give a good and firm contact on the valve pins.

This holder is well made and can be recommended. It is obtainable in four- or five-pin types, the retail prices being 8d. and 9d. respectively.

SOVEREIGN SPECIFIED

IN SIMPLE SUPER

PRE-SET CONDENSER

This Sovereign component has long been famous for its selectivity properties and is frequently specified in modern high-power circuits such as Mr. James's latest set. Its specification is your guarantee. .0005 mfd. as specified.

1/3

2 TERMINAL MOUNTS
2 Sovereign Terminal Mounts are also specified in this set. Of best moulded bakelite, each **6d.**

WIRE-WOUND VOLUME CONTROL

(POTENTIOMETER TYPE)

Use this wire-wound volume control for your Simple Super. Officially recommended, you will find it efficient, reliable and well up to Sovereign standard. It's cheaper, too. This 50,000 ohms model costs

4/6

Complete

Make your "Simple Super" a Sovereign set—use Sovereign wherever you can—send for Catalogue of full range.

SOVEREIGN PRODUCTS LTD.

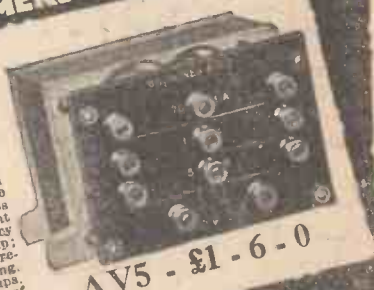
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London, E.C.1



S.F.B.

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When you make mains units or mains-driven sets use Godwinex Mains Transformers. There is no more certain way of guaranteeing satisfaction and lasting to highest standards from finest British materials. All types, for Valves or Westinghouse Metal Rectifiers. AV5 is for use with Marconi U.10. Philips 506 K. or other equivalent rectifying valve. Secondary voltages: 2.0-2 at 1 amp. 250-0-250 at 70 m/a. Centre-tapped A.C. L.T. winding giving 4 volts at 5 amps. Send to-day for full list of Mains Transformers and Chokes.



AV5 - £1-6-0

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That's the Camco "Melodee" Speaker Cabinet, which improves the performance of YOUR Speaker. Gives volume without distortion. Suitable for ALL well-known makes of Speakers and made in Oak, Mahogany and Walnut, in two sizes from 22/- Write for FREE copy of the new 1932 24-page Radio Cabinet Catalogue.

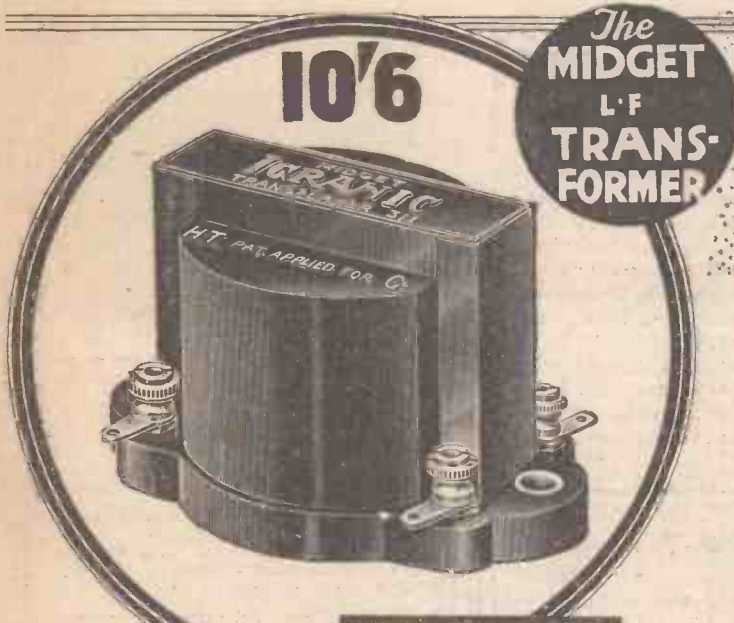
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NAME

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A.W.32

Every CAMCO Cabinet bears the CAMCO Seal



The MIDGET L.F. TRANSFORMER

10'6

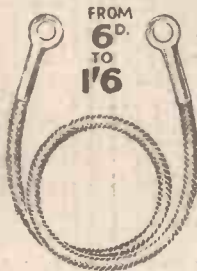
2 Components that turn "amateur" wireless into "professional" perfection!

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First—the MIDGET L.F. Transformer, the famous "miniature masterpiece" in which ultra-efficiency has been packed into convenient size. Reproduction reaches a brilliance never before possible at the price. Ratio 3 : 1 advised for valves of 10,000—20,000 ohms. Ratio 5 : 1 for valves from 5,000 to 10,000 ohms. Second—the Igranitic Spaghetti Resistance—wire wound and protected by insulated sleeving. Made in 13 sizes. Igranitic quality—at your price!

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The IGRANIC SPAGETTI Wire Wound RESISTANCE



IGRANIC ELECTRIC CO., LTD., 149 Queen Victoria Street, London

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For SHORT WAVES

British Made

Use THE RELIABLE BECOL EBONITE FORMER which has stood the TEST OF TIME and tested before despatch. Prices LOW.

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THE BRITISH EBONITE CO., LTD.

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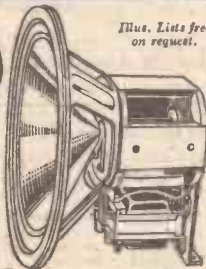
The LATEST ORMOND SPEAKER

MOVING COIL PERMANENT MAGNET

After years of patient research, the famous British firm of Ormond have evolved a Permanent Magnet Moving Coil Speaker worthy of their great name, and the well-known Mail Order House of E. J. Heraud is privileged to offer it on easy monthly terms. Remarkable fidelity, high sensitivity, and correct tone balance are outstanding features. It will handle heavy input without distress. The special Magnets are of Darwin Cobalt Steel, and a Speech Transformer is incorporated. The construction is very robust, the whole being mounted on a complete chassis. Size: width 10 1/2 ins., height 2 1/2 ins., depth 8 1/2 ins. Sent on 7 days' trial for only 2/6 deposit; if satisfied, pay further 2/6 at once, and complete purchase by 9 monthly payments of 7/6. (Cash Price, 65/-.) Send to-day and try this wonderful speaker.

ONLY 2/6 DOWN

Illus. Lists free on request.



THE ORMOND FOUR POLE ADJUSTABLE L.S. UNIT.

No. 1. Capable of handling great volume without chatter. Easily mounted in any cabinet or chassis by 2 screws. On 7 days' approval for 1/- deposit; if satisfied, pay further 3/- at once. Complete purchase by 4 monthly payments of 2/6. (Cash, 12/6.)

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Branches at Tottenham, Walthamstow and Enfield Wash. Estab'd 33 years.

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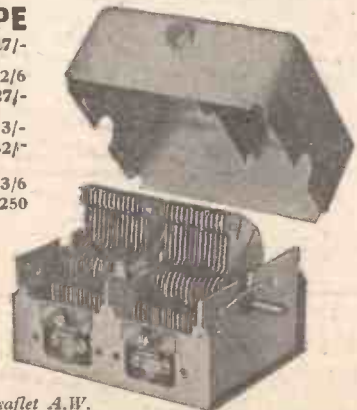
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- Q.M.B. switches 3 amps. 250 volts, now - 1/3 each.



THE BEST IS NOW THE CHEAPEST

Send for illustrated leaflet A.W.

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THE BRITISH RADIOPHONE LTD., Aldwych House, Aldwych, W.C.2

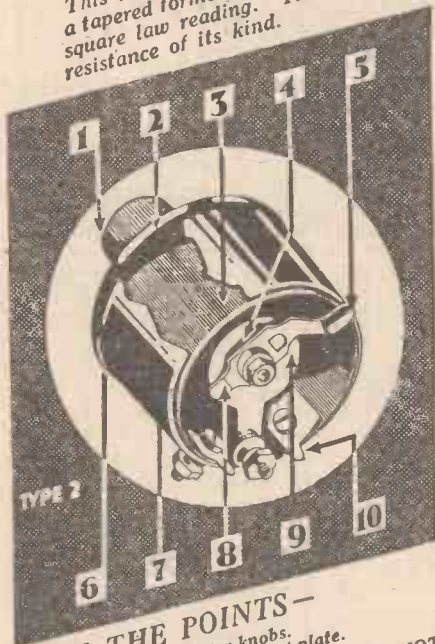
Watmel COMPONENTS

GET THE BEST OUT OF ANY SET

When you buy a Watmel component you are certain to obtain a product that is absolutely up-to-date—reliable—flawless and made from only the best British materials.

WATMEL SQUARE-LAW TAPERED RESISTANCE

This resistance is specially wound on a tapered former which gives a perfect square law reading. This is the first resistance of its kind.



NOTE THE POINTS—

1. Polished bakelite front plate.
2. Engraved former.
3. Wire wound resistance is WIRE; NOT N.B. The resistance is WIRE. It is compound with wire contacts. It is specially wound on a tapered former.
4. Insulating brush to insulate spindle from panel.
5. Contact finger. Phosphor Bronze.
6. One hole fixing—Brass bearing bush resulting in perfect bearing.
7. Bakelite case—protects winding.
8. Back self-cleaning contacts.
9. Large contact plate.
10. Stops at end of wiring.

Ask your dealer for full particulars or write direct to us.

SEND FOR OUR CATALOGUE AND FREE CIRCUIT DIAGRAMS.

WATMEL WIRELESS CO., LTD.,
Imperial Works, High St., Edgware.
Telephone: Edgware 6323. (M.C.63)

NEW SOVEREIGN PARTS

A NUMBER of components of interest to home constructors have been introduced by Sovereign Products, Ltd., and a selection of these is illustrated by the accompanying photograph. Most of the parts are provided with moulded bakelite casings of sturdy construction and of a pleasing mottle brown appearance.

The parts in the range include a 30-henry L.F. choke, selling at only 7s. 6d., two H.F. chokes, one super-type and one binocular, and a handy wall-plug and socket, selling at 1s. 3d. complete.

There is a wide range of midget wire-wound resistances, also in moulded bakelite containers, and fitted with terminal connections, in all sizes from 1,000-ohms to 100,000 ohms.



Some of the new Sovereign components, L.F. choke H.F. Super choke, plug connector and wire-wound resistance

Baseboard mounting fixed condensers are also available and as an instance of the value offered, it should be noted that a 750-volt test 2-mfd. condenser sells at only 2s.

NEW HIGH-TENSION SUPPLY

THOSE who have not an electric light supply, but who want a fairly large H.T. source for a set, of up to 40-milli-amperes per hour, should get details of the Milnes H.T. Supply Unit.

This is a bank of nickel-iron accumulator cells which are kept charged automatically from the L.T. battery. A series-parallel switch on the unit enables the H.T. source to be charged from the L.T. and the drain on the L.T. supply is not considerable. With this type of cell, sulphation is impossible and the cells cannot be damaged by any reasonable rate of charge or discharge.

This system has much to commend it, where a suitable mains supply is not available, but where L.T. battery charging facilities are satisfactory. The units are medium priced. A 90-volt supply costs only £2 18s., a 120-volt supply £3 16s., and a 150-volt unit £4 14s.

Full details can be obtained free on mention of "A.W." from Messrs. Milnes Radio Co., Aire Works, Cottingley Bridge, Bingley, Yorks.

IN THIS ISSUE—FIRST CONSTRUCTIONAL DETAILS OF A WONDERFUL NEW SET THE "A.W." "SIMPLE SUPER"



Mains Power —any hour!

HEAYBERD D.150 MAINS UNIT. Outputs:—120 or 150 volts at 25 ma. Alternative output panel switch. Tappings: 60/80v. Var. S.G., 120v. and 150v. fixed. Westinghouse metal Rectification. Neat mottled black steel case with bakelite panel. Complete and ready to plug-in **86/-**

Send this ad. with 3d. stamps for special li. ts. with diagrams, of Heayberd Mains products.



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One minute from Moorgate Und. Stn.

CLIX

NEW

Chassis Mounting VALVEHOLDER with Terminals



Prices:

4-Pin, 8d.

5-Pin, 9d.

A sturdily built, skeleton type valveholder for mounting on metal, wood or ebonite. Terminals allow for speedy, and secure connections. The Turned Resilient Sockets provide maximum surface contact with every type of valve pin, solid or otherwise. Insertion is easy, as the crescent shaped slots in the plate allow the sockets to move laterally and centre themselves to the valve pins. Centre socket of the 5-pin type is made $\frac{1}{4}$ " longer to facilitate connection.

LOW LOSS. HIGHEST EFFICIENCY.

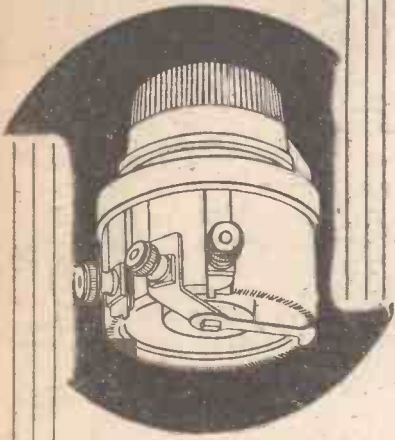
Technical press congratulates Clix on the design and efficiency of this new chassis type of valveholder

From all Dealers. Clix Folder "A" on request.

Cheapest PERFECT Contact

Lectro Linx Ltd., 254, Vauxhall Bridge Road, S.W.1

COLVERSTAT VARIABLE RESISTANCES



Type S.T.10

Rating 10 watts.
Values 500 to 50,000
ohms. 5/6

Specified for the
"SIMPLE SUPER"

Type S.T.5

Rating 5 watts.
Values 250 to 25,000
ohms. 5/3

Type M.T.

Rating 3 watts.
Values 25 to 10,000
ohms. 4/6

Wire wound, smooth in
movement, silent in action,
constant in selling.

For all voltage regulation
and volume control.

COLVERN LIMITED
MAWNEYS RD., ROMFORD
ESSEX

ARKS

RADIOGRAMS

ON May 1 the Military Sunday Service will be relayed from York Minster in the National programme. Famous military bands of northern regiments will take part.

In celebration of St. George's Day, Shakespeare's *Henry the Fifth* will be broadcast from the National transmitters on April 23. Although the play has been broadcast previously, on this occasion it is being arranged and produced by Peter Creswell.

Six discussions entitled "Artists at Work" start on April 19. Mr. Stanley Casson will have charge of the series, that is, he will act throughout as interlocutor and will "draw" the artists into talking about their work. His first "victim" will be Mr. Frank Dobson, the sculptor.

A special St. George's Day programme, entitled "St. George and Merrie England," will be given on April 23.

A recital of Chopin music has been arranged by Cissie Woodward for Midland Regional listeners on April 28.

The Roman Catholic Archbishop of St. Andrews and Edinburgh will broadcast for the first time on April 24.

An original and interesting programme is to be broadcast on April 30, which is entitled "Radio Blackouts," being the work of Mr. John Gough. This programme is an attempt to apply music-hall and revue technique to the microphone.

A "Sportsmen's Service," which is to be held on April 17, at Wrexham Parish Church, will be relayed in the North Regional programme. The organisation of this service is due to the efforts of the supporters of the Wrexham Football Club.

On April 19 Stanley Jepson will give a recital for the Northern Region of negro spirituals and will include most of those which are such favourites with listeners. This will be followed by a concert by the Besses-o'-th'-Barn Band.

For his recital from Midland Regional on April 24, Arthur Roberts has chosen music from Liszt's "Years of Pilgrimage in Italy" and "Years of Pilgrimage in Switzerland."

A band directed by Herman Darewski, the famous song writer, is to broadcast from the National Trades and Industrial Exhibition, Birmingham, on April 25, to Midland Regional listeners.

During a Midland Regional concert by the Leicester Imperial Band on April 27, Wortley Allen will be heard in "Scenes from Shakespeare" and "Characters from Dickens."

A new quartet of entertainers called "The Bogey Foursome" has been organised by Charles Brewer. They will make their first appearance before the Midland Regional microphone in "A Mixed Cocktail of Sophisticated Syncopation" on April 25.

The Welsh Interlude for Daventry listeners will be given by Mr. Robert Owen on April 30.

New Times Sales Co

EVERYTHING RADIO EASIEST TERMS

BLUE SPOT SPEAKER UNIT AND CHASSIS TYPE 100U.	With Cash Price £1/19/6.	5/5
Balance in 7 monthly payments of 5/5.		
R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer.	Cash Price £2/17/6	5/4
Balance in 11 monthly payments of 5/4.		
AMPLION M.C.6 MOVING-COIL SPEAKER, permanent magnet with output transformer. Complete.	Cash Price, £3/7/6.	6/2
Balance in 11 monthly payments of 6/2.		
★ W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3. Complete with 3-ratio input transformer.	Cash Price £2/12/6.	4/10
Balance in 11 monthly payments of 4/10.		
BLUE SPOT PICKUP AND TONE-ARM with Volume Control.	Cash Price £3/3/6.	5/9
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CELESTION P.P.M. PERMANENT MAGNET MOVING-COIL SPEAKER with impregnated diaphragm and dual-impedance input transformer.	Cash Price £2/7/6.	6/6
Balance in 7 monthly payments of 6/6.		
ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER, with input transformer.	Cash Price £2/15/0.	5/-
Balance in 11 monthly payments of 5/-.		
W.B. P.M.2 PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with output transformer.	Cash Price £4/5/0.	7/9
Balance in 11 monthly payments of 7/9.		
BLUE SPOT PERMANENT MAGNET MOVING-COIL SPEAKER, TYPE R100. With input transformer.	Cash Price £3/15/0.	6/11
Balance in 11 monthly payments of 6/11.		
★ ATLAS A.C. ELIMINATOR, TYPE A.C. 244. Three tappings, S.G., detector and power. Output 120 volts at 20 m.a.	Cash Price £2/19/6.	5/6
Balance in 11 monthly payments of 5/6.		
EKCO H.T. UNIT, Type A.C. 25. For multi-valve sets requiring up to 25 m.a. 3 tappings, S.G., detector and 120/150 volts. For A.C. Mains.	Cash Price £3/17/6.	7/1
Balance in 11 monthly payments of 7/1.		
REGENTONE H.T. ELIMINATOR for D.C. Mains, Type W.I.F. Tapped 60/70, S.G. and 120 v. at 12 m.a.	Cash Price £2/7/6.	4/4
Balance in 11 monthly payments of 4/4.		
ATLAS MODEL A.C. 290 SUPER ALL-MAINS UNIT for H.T., L.T., G.B. 3 tappings, 2 variable, 1 fixed, L.T. trickle charger for 2, 4 or 6 v. at 5 amp., and 4 G.B. tappings. Cash Price £6 10/0.		11/11
Balance in 11 monthly payments of 11/11.		
EKCO K.25 COMBINED H.T. AND L.T. CHARGER UNIT for A.C. mains. 3 tappings, L.T. trickle charger for 2, 4 or 6 v. at .5 amp.	Cash Price £5/7/6.	9/10
Balance in 11 monthly payments of 9/10.		
REGENTONE W.4.A. COMBINED H.T. AND L.T. UNIT for A.C. mains. 3 tappings, L.T. trickle charger for 2 and 6 v. at .5 amp.	Cash Price £5/5/0.	9/7
Balance in 11 monthly payments of 9/7.		
GARRARD MODEL 201 SENIOR INDUCTION GRAMOPHONE MOTOR for A.C. mains, complete with unit plate.	Cash Price £4/17/6	8/11
Balance in 11 monthly payments of 8/11.		

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56 Ludgate Hill, London, E.C.4

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(b).....for which I enclose

first payment of £.....s.....d.....

Name.....

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A.V. 16/4/32

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Broadcasting Stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is that of the carrier wave.

Kilo- Metres	Station and Call Sign	Power (Kw.)	Kilo- Metres	Station and Call Sign	Power (Kw.)	Kilo- Metres	Station and Call Sign	Power (Kw.)
GREAT BRITAIN								
25.53	11,751 Chelmsford		315	950 Marseilles	1.0	304	834 Bergen	1.0
	(G5SW) 16.0		327.2	917 Poste Parisien	85.0	307.6	816 Fredrikstad	0.7
242.3	1,238 Belfast	1.0	327.5	916 Grenoble (PTT)	2.0	495.9	605 Trondheim	1.2
261.0	1,147 London Nat.	50.0	345.2	869 Strasbourg (PTT)	11.5	1,083	277 Oslo	60.0
288.5	1,040 Newcastle	1.2	384.4	779 Radio Toulouse	8.0	POLAND		
288.5	1,040 Swansea	0.12	450	666.7 Paris (PTT)	0.7	214.2	1,400 Warsaw (2)	1.0
288.5	1,040 Plymouth	0.12	460	644 Lyons (PTT)	1.5	234.9	1,283 Lodz	2.2
288.5	1,040 Edinburgh	0.3	1,445.7	207.5 Eiffel Tower	13.5	312.8	959 Cracow	1.5
288.5	1,040 Dundee	0.12	1,725	174 Radio Paris	75.0	334.4	897 Poznan	1.9
288.5	1,040 Bournemouth	1.0	GERMANY			380.7	758 Lvov	16.0
288.5	1,040 Aberdeen	1.0	31.38	9,560 Zeesens	15.0	409.8	732 Katowice	12.0
301.5	905 North National	50.0	217	1,383 Königsberg	0.75	563	533 Wilno	16.0
309.9	968 Cardiff	1.0	218.5	1,373 Flensburg	0.5	1,411.8	212.5 Warsaw	120.0
355.0	843 London Regional	50.0	219.9	1,364 Cassel	0.25	PORTUGAL		
376.4	797 Glasgow	1.0	232.2	1,292 Kiel	0.25	282.2	1,063 Lisbon (CTIAA)	2.0
398.9	752 Midland Regional	25.0	239.4	1,253 Nürnberg	2.0	also on 42.9 m. (Fri.)		
480	625 North Regional	50.0	245.9	1,220 Cassel	0.25	ROMANIA		
1,554.4	193 Daventry (Nat.)	30.0	253.1	1,185 Gleiwitz	5.0	394	761 Bucharest	12.0
AUSTRIA								
218.7	1,375 Salzburg	0.5	259.3	1,157 Leipzig	2.0	RUSSIA		
245.9	1,220 Linz	0.5	269.8	1,112 Bremen	0.2	349	860 Leningrad RV70	10.0
285.2	1,052 Innsbruck	0.5	276.5	1,085 Heilsberg	60.0	358	838 Moscow (Exp.)	15.0
352.1	852 Graz	7.0	283	1,060 Magdeburg	0.5	368.1	815 Kharkov	10.0
453.2	666 Klagenfurt	0.5	283	1,060 Berlin (E)	0.5	378	792.5 Moscow Regional	20.0
517	582 Vienna	15.0	283	1,060 Stettin	0.5	385	779 Stalingrad	10.0
also testing on 1,237 m. from 7.0 p.m. (Mon., Wed., Sat.)								
BELGIUM								
206	1,456 Antwerp	0.25	318.8	941 Dresden	0.25	389.6	770 Archangel	10.0
210.2	1,429 Liege	0.15	325	923 Breslau	1.5	424.3	707 Moscow-Stalin	100.0
215.3	1,393 Chatelineau	0.2	360.6	832 Mühlacker	00.0	411	729.2 Pokrovsk-Volgo	20.0
215.0	1,391 Bruxelles		372	806 Hamburg	1.5	449.4	667.5 Odessa RV13	10.0
Conference								
216	1,389 Liege	0.1	389.0	770 Frankfurt	1.5	473.2	634 Sebastopol	10.0
221	1,355 Binche	0.1	419.9	716 Berlin	1.5	502.4	597 Nijni Novgorod	10.0
240.8	1,245.8 Liege (Exp.)	0.1	453.2	662 Danzig	0.5	720	476.6 Moscow (PTT)	20.0
268.3	1,058 Liege (Coinc.)	0.4	472.4	635 Langenberg	00.0	824.2	364 Sverdlovsk RV5	60.0
283.0	1,058 Brussels (SBR)	0.5	532.9	593 Munich	1.5	849	353 Rostov (Don)	4.0
387.8	888 Brussels (No. 2)	15.0	559.7	536 Kaiserslautern	1.5	937.5	320 Kharkov (RV20)	25.0
509.3	589 Brussels (No. 1)	15.0	559.7	536 Augsburg	0.3	968	370 Alma-Ata	10.0
BULGARIA								
318.8	941 Sofia (Rodno Radio)	0.5	556	530 Hanover	0.3	1,000	300 Leningrad	100.0
CZECHO-SLOVAKIA								
240.6	1,201.8 Prague (2)	5.0	569.3	527 Freiburg	0.25	1,071.4	280 Tiflis	10.0
263.8	1,137 Moravska		1,834.9	183.5 Norddeich	10.0	1,111	270 Moscow Popoff	75.0
Ostrava 10.0								
279.3	1,074 Bratislava	13.0	1,834.9	183.5 Zeesens	75.0	1,170	256.4 Taschkent	25.0
293	1,022 Kosice	2.5	2,825	119.3 Königswusterhausen (press)	15.0	1,260.5	238 Novosibirsk	10.0
341.7	878 Brunn (Brno)	32.0	2,900	103.5 ditto		1,304	230 Moscow (Trades Unions)	165.0
488.6	614 Prague	120.0	4,000	75 ditto		also on 50 m. (6,000 Kcs.)		
DENMARK								
281.2	1,067 Copenhagen	0.75	HOLLAND					
1,153	266 Kalundborg	7.5	296.1	1,013 Hilversum	8.5	1,380	217.5 Novosibirsk	100.0
also on 31.51 m. (9,520 Kcs.)								
ESTONIA								
208.8	1,004 Tallinn	11.0	1,071.4	280 Scheveningen-Haven	10.0	1,482	203 Moscow	100.0
453.2	662 Tartu	0.5	1,875	160 Huizen	8.5	1,900	187.5 Irkutsk	15.0
FINLAND								
201	1,031 Viipuri	13.0	HUNGARY					
368.1	815 Helsinki	12.0	210	1,429 Budapest (2)	3.0	252.9	1,186 Barcelona (EAJ15)	1.0
434.6	690 Pori	1.5	550	545 Budapest (1)	18.5	266.0	1,125.2 Valencia	2.0
540	556 Tampere	1.0	ICELAND					
1,796	767 Lahti	54.0	1,200	250 Reykjavik	10.0	348.9	860 Barcelona (EAJ1)	8.0
FRANCE								
219.9	1,364.1 Béziers	0.5	IRISH FREE STATE					
222.1	1,350.3 Fécamp	5.0	224.4	1,337 Cork (6CK)	1.2	368.1	815 Seville (EAJ5)	1.5
236.7	1,267.3 Bordeaux-Sud-Ouest	2.0	413	725 Dublin (2RN)	1.2	424	707 Madrid (EAJ7)	2.0
245.9	1,220 Strasbourg 8GF	1.0	ITALY					
251.1	1,195 Juan-les-Pins	0.5	25.41	1,810 Rome (2RO)	15.0	427.3	702 Madrid (España)	2.0
255.1	1,176 Toulouse (PTT)	1.0	247.7	1,211 Trieste	10.0	456.6	557 San Sebastian	0.6
265.4	1,130 Lille (PTT)	1.3	278.2	1,098 Turin (Torino)	7.0	SPAIN		
271.5	1,105 Rennes	1.2	280	1,071 Bari	20.0	252.9	1,186 Barcelona (EAJ15)	1.0
285.4	1,051 Montpellier	0.8	312.2	961 Genoa (Genova)	10.0	266.0	1,125.2 Valencia	2.0
286	1,049 Radio Lyons	10.0	318.8	941 Naples (Napoli)	1.5	348.9	860 Barcelona (EAJ1)	8.0
294.7	1,017.7 Limoges (PTT)	0.5	331.5	905 Milan	7.0	368.1	815 Seville (EAJ5)	1.5
304.9	984 Bordeaux (PTT)	13.0	368.1	815 Bolzano	1.0	424	707 Madrid (EAJ7)	2.0
307	977 Radio Vitus	1.0	441	680 Rome (Roma)	50.0	427.3	702 Madrid (España)	2.0
also on 43.75 m. (6,865 Kcs.)								
NORWAY								
235.5	1,274 Kristiansand	0.5	NETHERLANDS					
240.2	1,249.2 Stavanger	0.5	198.5	1,510 Riga (tests)	16.0	244.1	1,229 Basle	0.65
YUGOSLAVIA								
307	977 Zagreb (Angram)	0.75	625	572 Riga	15.0	245.9	1,220 Berne	0.5
430.4	697 Belgrade	2.5	LITHUANIA					
574.7	522 Ljubljana	2.5	1,935	155 Kaunas	7.0	405	743 Sötens	25.0
YUGOSLAVIA								
307	977 Zagreb (Angram)	0.75	NORTH AFRICA					
430.4	697 Belgrade	2.5	363.4	825.3 Algiers (PTT)	16.0	459.4	653 Beromünster	60.0
574.7	522 Ljubljana	2.5	416	721 Radio Maroc (Rabat)	0.0	700	395 Geneva	1.25
and 32.26 m. (9,300 Kcs.)								

Arrangements have been made for Scottish listeners to have a regular series of lunch-time transmissions throughout the week. They will join the Daventry National programme in listening to recitals of organ music, light orchestral music, and gramophone records.

An afternoon concert by the Western Studio Orchestra will be given on April 18. The soloist will be Garfield Phillips.

A new weekly broadcast on Tuesdays will be taken from the Park Hall Cinema, Cardiff, for West Regional listeners, when Mr. Garforth Mortimer's orchestra will play.

A contrast in the music of different

countries will be provided from Belfast on April 22. In the morning Herbert Westerby is to give an organ recital of Anglo-American music, and the Belfast Wireless Orchestra will provide an Italian programme in the evening.

The Hereford Choral Society is to give a performance of Coleridge Taylor's *A Tale of Old Japan* from the Shire Hall, Hereford, on April 19, in the Midland Regional programme.

One of the most important events in the history of broadcasting takes place on April 23, when the opening of the new Shakespeare Memorial Theatre at Stratford-on-Avon will be broadcast to all British stations and to America.

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Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58/61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire. Please write your name and address in block letters.

Ferranti Meters

THE new booklet WB526 is entirely devoted to Ferranti A.C. and D.C. meters. This is a fully descriptive publication giving dimensions, ranges, and prices of each meter, with a full description of its various uses. **740**

The Super Power 11

A folder which I have received, "Good Radio," is concerned mainly with the new Marconiphone Super Power 11, model 246. This is a two-valve set employing an efficient detector and pentode circuit. An undistorted output of approximately 1.2 watts (A.C.) is given. **741**

The Celestion PPM

Those on the look out for a new speaker should get the Celestion literature describing the new PPM speaker, which is fitted with a novel type of cone suspension. A cobalt content steel magnet is fitted and the overall dimensions of the chassis are 8 3/8 in. by 4 in. **742**

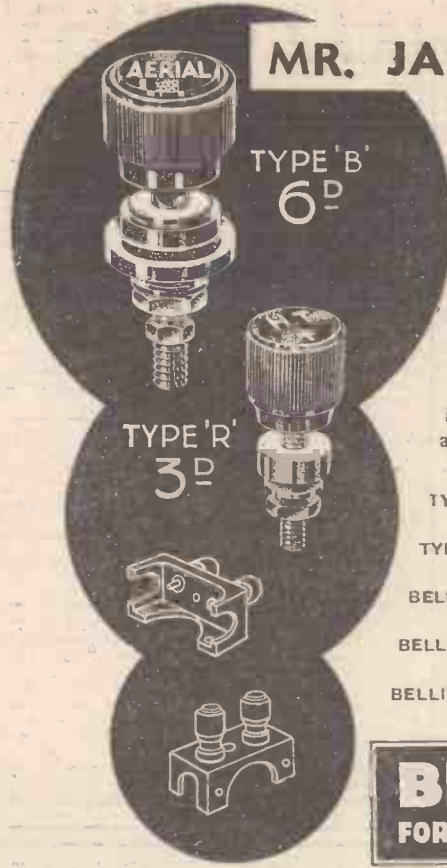
New Prices

If you have a Mullard loose-leaf catalogue, then drop a note for the new leaflet (ready punched to fit your folder), giving the reduced prices of many types. This is handy for reference because it gives for each valve type number, the corresponding leaflet number, and old and new prices. **OBSERVER. 743**

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