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Vol. XX. No. 515

Saturday, April 23, 1932

The A.W. "SIMPLE SUPER"

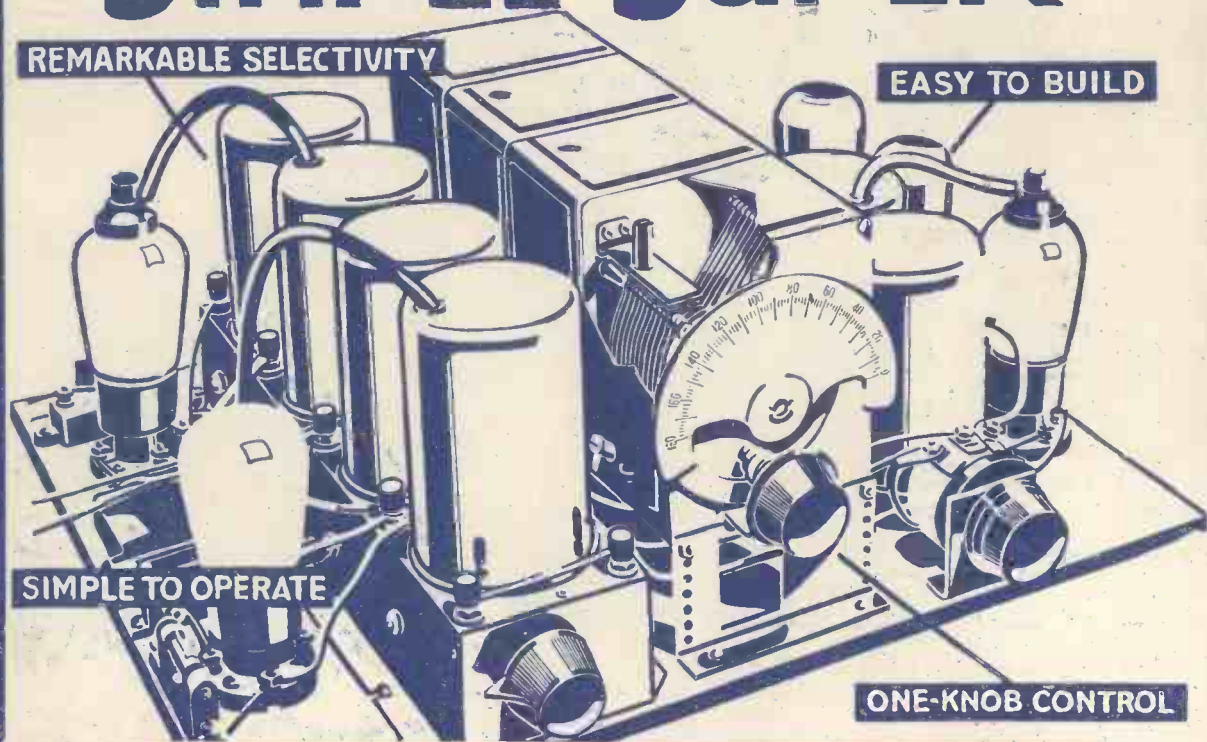
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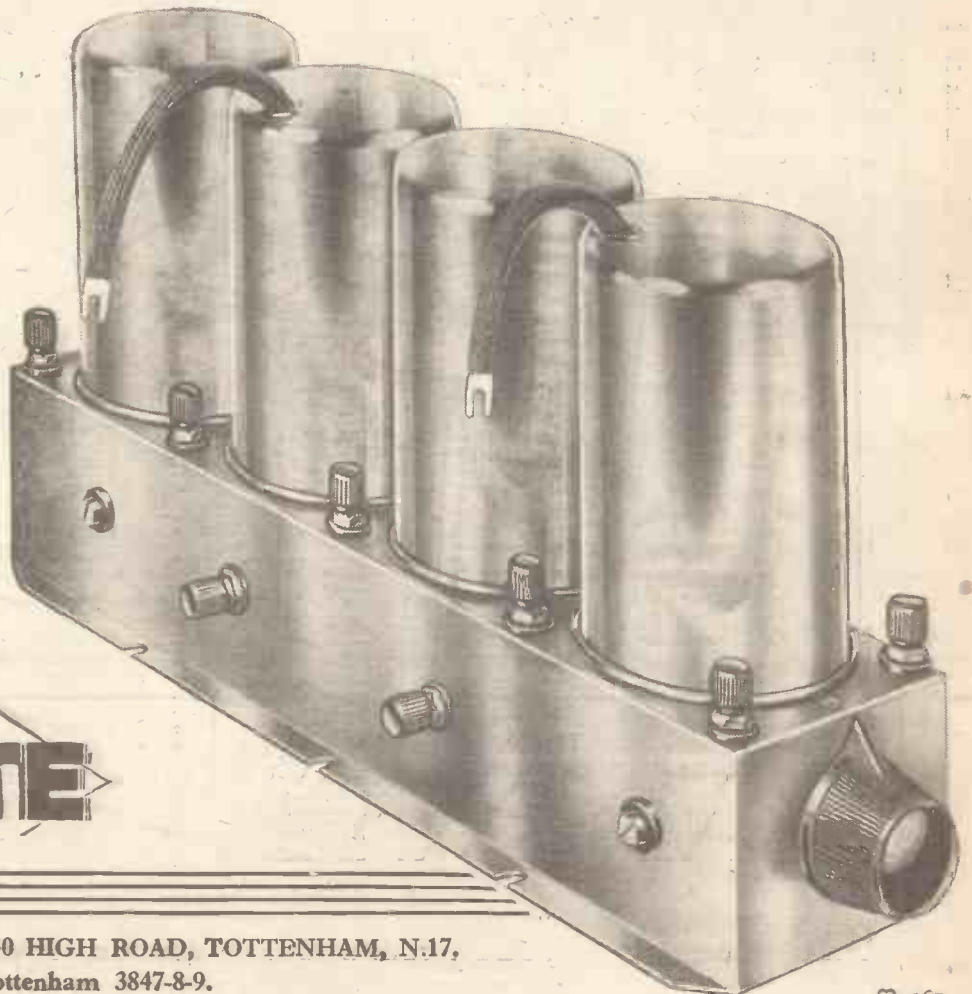
58/6

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	£	s.	d.
1 Peto Scott baseboard, 16 in. by 12 1/2 in.	2	0	0
1 J.B. four-gang variable condenser, .0005 mfd.	1	17	0
1 Wearite type GL32 Four coil super-het unit and	3	19	6
2 Wearite super-het coils, one OT1 and one OT2, complete with chassis and switch			
7 four-pin valveholders	3	6	0
1 T.C.C. 1-mfd. fixed condenser	2	10	0
2 Dubilier 1-mfd. fixed condensers	5	0	0
1 Peto-Scott super-het H.F. choke	4	6	0
1 Lissen Hypernik L.F. transformer	12	6	0
1 Sovereign .0003-mfd. pre-set condenser	1	3	0
1 Read-Rad grid-leak holder	6	6	0
2 Dubilier 1-meg. grid leaks	3	6	0
1 Lissen .0002-mfd. fixed condenser	1	0	0
1 Lissen .0003-mfd. fixed condenser	1	0	0
1 Lissen .0005-mfd. fixed condenser	1	0	0
1 Lewcos 15,000-ohm spaghetti resistance and one 30,000-ohm	3	0	0
2 Sovereign terminal mounts	1	0	0
4 Belling-Lee marked terminals	1	0	0
2 Belling-Lee marked spade terminals	4	0	0
5 Belling-Lee marked wander plugs	10	0	0
Connecting wire and sleeving; five yards thin flex	1	6	0
1 Colvern 50,000-ohm potentiometer	5	6	0

KIT "A" CASH or C.O.D. £8 8 0

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J.B. four-gang .0005-mfd. variable condenser	£	s.	d.
Wearite four-coil super-het unit (G.L.32) and two super-het coils with chassis and switch	1	17	0
Set of specified valves	3	19	6
Specified Peto-Scott Cabinet	3	8	9

MASCOT PILOT AUTHOR KIT

2 Lissen .0005-mfd. variable condensers, with slow-motion dials	£	s.	d.
1 Pair Peto-Scott "Mascot" coils	18	0	0
3 Mullard valves: P.M.H.L., P.M.L.P., P.M.2.1	10	6	0
1 Peto-Scott cabinet, as specified	1	2	9
	19	6	0

MASCOT PILOT ECONOMY KIT

1 Peto-Scott black ebony panel, 18 in. by 7 1/2 in., ready drilled	£	s.	d.
2 Ormond .0005-mfd. slow-motion condensers	4	6	0
2 Peto-Scott "Mascot" coils	18	0	0
1 Ferranti or Loken L.F. transformer	10	6	0
1 Peto-Scott cabinet in oak, as specified	5	6	0
1 Sheet aluminium foil, 8 in. by 8 in.	19	6	0
	6	0	0

HOME-LOVER'S ALL-ELECTRIC 3

2 Lissen dual-range coils	£	s.	d.
Wearite combined three-point switch and 25,000-ohm resistance	13	0	0
Specified valves	6	0	0
Specified cabinet	3	0	0
	1	0	0

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KIT B Pilot Economy Kit with Valves, less Cabinet CASH or C.O.D. **£3.19.3**
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**BRITAIN'S LEADING RADIO WEEKLY
FOR CONSTRUCTOR, LISTENER & EXPERIMENTER**

EDITOR:
BERNARD E. JONES.

TECHNICAL EDITOR:
J. H. REYNER. B.Sc. A.M.I.E.E.

RESEARCH CONSULTANT:
W. JAMES.

ASSISTANT EDITOR:
H. CORBISHLEY.

NEWS & GOSSIP OF THE WEEK

COMPLETING THE "SUPER"

HAVE you started building your "Simple Super"? There is no need for us to reiterate the information given in last week's issue about this remarkable new one-knob super-het. W. James, the well-known set designer, gives further details in the middle pages this week, and these will be of interest to all constructors.

NEEDING A NEW SET?

DON'T forget that, whether you are deciding on the "Simple Super," or any other type of set in the "A.W." range, now is really the time to consider scrapping old equipment and getting a new set which will stand up to summer-time conditions. The long, light evenings will soon be here, and unless you have a powerful set, foreign stations will fade away, leaving only the "high spots" audible. Why not start now on the construction of a really modern set?

A NEW LONG-WAVER

"A.W." IS informed that a new 1,100-metre station is being built at Kalundborg, and will be a

100-kilowatt. The Danish Government has arranged with the Standard Telephones and Cables concern, which is building the new B.B.C. Daventry short-wavers, for the new Kalundborg to be built in London. It will be tested on a "dummy" aerial within a few miles of Brookmans Park, and then sent off to Denmark!

THE "CUP"

MAKE a note of April 23, when you will hear the broadcast commentary on the Cup Final at Wembley. George Allison is again "commentating" before the microphone and the band of the Welsh Guards provides the accompaniment to the community singing, a little of which will be broadcast before the match.

THE OLDEST TUNE!

A HYMN to Apollo, composed nearly three centuries B.C., is to be broadcast in May. It will be the oldest piece of music ever transmitted by wireless. Its discovery was due to a French archaeologist during excavations at Delphi in 1893. He

unearthed a slab of marble and upon this the musical symbols were found inscribed. The hymn is to be used by the B.B.C. as a theme in a radio play by Peter Creswell.

THE PRINCE AGAIN

THE Prince of Wales is becoming a frequent broadcaster these days. You will hear him again on May 16, when he goes over to unveil the Thiepval Memorial, and the ceremony will be relayed from France to National listeners.

NEW RELAY WAVELENGTHS

WE are able to tell readers the wavelengths to be allotted to Newcastle and Aberdeen next September, when the 288.5-metre wavelength on which these and other stations are now working will be required for Scottish National. Newcastle will be on 211 metres and Aberdeen on 214 metres. These are international wavelengths.

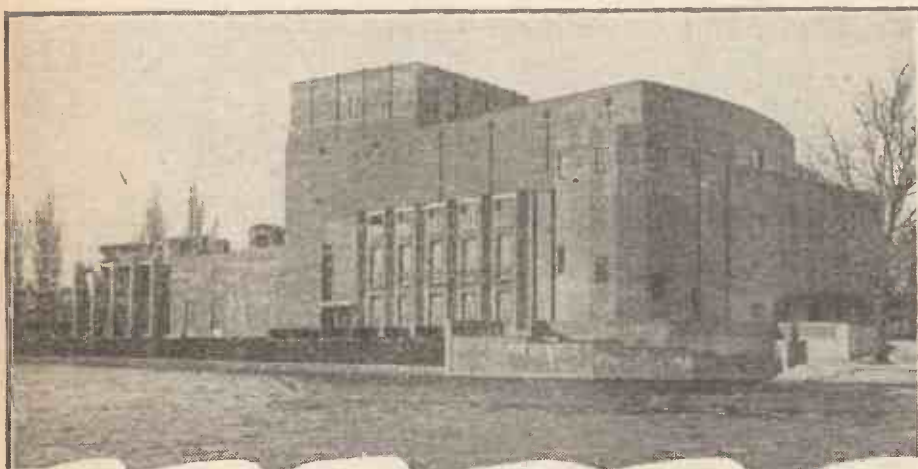
CRITICISM IN NEWCASTLE

ALREADY there is a certain amount of antagonism in Newcastle regarding the B.B.C.'s proposals for putting the Newcastle station on an international wave, but the B.B.C. is really making the best of a bad job. It is certain that a better service area will be obtained on the proposed 211-metre channel than would be possible with Newcastle synchronised with Scottish National, which is near enough to set up considerable mush around Tyneside.

ADVANTAGES OVERLOOKED

WHILE there may be some justification for fearing that sets now tuned to 288.5 metres will not necessarily tune down to 211 metres, the B.B.C. is meeting this with a pamphlet, to be issued in July, showing how simple alterations can be made to lower the wavelength of the tuning circuits. Of course, one of the main advantages of the change will be the ability to radiate original programmes from Newcastle and Aberdeen, both centres of individual culture.

THE SCENE OF A NEW "O.B."



An Outside Broadcast is to be made of the opening ceremony of the new Shakespeare Memorial Theatre on Saturday, April 23, at Stratford-on-Avon. The Prince of Wales will broadcast

NEWS & GOSSIP OF THE WEEK —Continued

GERMAN "O.B." IDEAS

"O.B." ENGINEERS in North Germany many have fitted out a travelling van with short-wave gear linking up with the Hamburg control room. There is a portable gramophone recording equipment, too, so that if it is impossible to maintain the radio communication, the outside broadcasts can be recorded on ordinary wax discs and given later from the station itself.

A REMARKABLE "SUPER"

The "A.W. Simple Super" is proving one of the most successful "A.W." sets. It is even better than the famous "Century Super." If you did not see the first details in last week's issue, turn to the middle pages this week.

CONTROL ROOM DEFECT

DID you notice the background noise during the First News Bulletin on a recent Sunday? Apparently a defect developed in the control apparatus at Broadcasting House, but this was quickly remedied. By the way, nearly all the talks are now broadcast from the special Talks Studios at Broadcasting House.

BROADCASTING THE ZOO

ON May 3 all the Children's Hours of the B.B.C. will be linked for an exciting broadcast from the Zoological Gardens in Regent's Park. Mr. Will Owen, the famous artist, will make a rapid tour of the Zoo, visiting microphones placed near the most impressive "exhibits" and he will then give the children his impressions. "Winnie the Pooh," a nineteen-year-old black bear, is expected to make comical noises when shown a tin of condensed milk! Make sure your kiddies hear this.

ARTHUR BURROWS

THE erstwhile "Uncle Arthur," Mr. Arthur Burrows, whose work with the International Broadcasting Union is so valuable, was in London the other day for a short holiday, and he was naturally tackled on the subject of Madrid. By the way, amateur transmitters, particularly in America, are apprehensive over this conference, for it is feared that the present short waves given to the amateurs at Washington may be appropriated for commercial uses. Madrid is likely to see an extension of the short-wave gamut, for since Washington, which dealt with nothing lower than 10 metres, the great value of 7-metre transmissions for local sound and possibly picture broadcasting has been realised. It looks as though the poor amateur may be relegated to the centimetres!

SCHOOL SETS

A PAMPHLET is being issued by a sub-committee of the Central Council for School Broadcasting dealing with sets suitable for use in the schoolroom. Manufacturers are invited to submit sets for test, particular attention being paid to ease of control, ability to lock up the apparatus, and, most important of all, quality of speech reproduction. It is proposed to issue in July a list of approved sets for the guidance of directors of education and schools. The set tests will be conducted under classroom conditions, and will therefore be of an entirely practical nature.

"LEICESTER SQUARE"

FOR this characteristic broadcast, which, as mentioned last week, will be relayed to America under the new programme-exchange plan, John Watt will prepare a "Songs from the Shows" type of entertainment, partly historical, to include the old-time favourites, and partly "red-hot"

numbers from the latest shows. The date is May 20.

FALKIRK TESTING!

HAVE you heard the engineers' tests of the new Scottish Regional station at Falkirk? It came "on the air" on April 13 (evidently they aren't superstitious), fairly early in the morning, gramophone records and speech being broadcast. But don't rush in to judgment. These are only preliminary engineering tests, and subject to much alteration before the final O.K. is given.

TUNING NOTE TO CONTINUE

IN spite of appeals by listeners that the ear-splitting introduction to B.B.C. transmissions—that awful tuning note—



A new midget wireless set, invented by a London man, for fitting inside a police helmet

A radio romance! Val Rosing, the vocalist of the new B.B.C. Dance Orchestra, was married recently to Mrs. Meriel Carrington



should now be abandoned, the B.B.C. proposes to go on with it. The reason given to us is that this note has always served a double purpose, helping the listener to tune in accurately before the programme begins, and helping the engineers to adjust the modulation. It is admitted that listeners probably do not use the signal nearly as much as in the early days of "cat's whisker" crystal sets, but the engineers still need and use the note. We should have thought minor modulation adjustments could be made at the beginning of the programmes without noticeable effect at the receiving end.

THE NIGHTINGALES

IN the spring the listener's fancy lightly turns to thoughts of nightingales—so the B.B.C. will attempt to relay the Pangbourne birds during the last week in May. Should these songsters go on strike there is an alternative spot at Horley from which the B.B.C. would make the relay.

"WATCHING" THE PROGRAMMES

While a programme is being broadcast the control engineers have to watch meters which show the varying volume so that the amplifiers are not overloaded. The apparatus used is described here.

flicker, the actual electrical overloading has occurred.

I asked the B.B.C. engineer why an ordinary grid-circuit galvanometer or a milliammeter in the anode lead of one of the amplifiers would not be sufficient, and he explained that both these methods of indication show the degree of overloading and not the steady volume.

For this reason, it is not possible for the B.B.C. engineers to put a plate milliammeter in circuit as an amateur would do in his high-quality receiver. In receiver work, violent flicking of the milliammeter needle means that one must reduce the volume or alter the grid bias to prevent overloading, but in a transmitter amplifier the indication would not be reliable enough. The former Chief Engineer developed a volume indicator known as the slide-back galvo.

Some of the control desks at Savoy Hill are still fitted with these slide-back indicators, but they have been superseded by the new programme meters. The slide-back galvo has a variable control which has to be turned until the

needle of the slide-back is at a certain position.

The amount by which the slide-back knob is to be turned indicates the volume, and it is this "sliding back" of the control which gives the meter its name.

An Elaborate Amplifier

Without going too far into technicalities, the snag of the slide-back is that although it is ideal for certain engineering purposes it is not a ready indicator of programme volume. The balance and control people, who are chiefly musicians and not engineers, demanded something more effective.

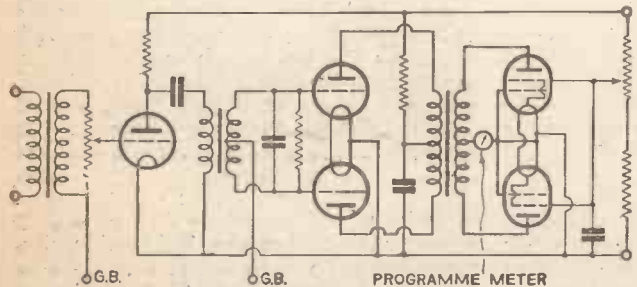
A very elaborate valve amplifier with pentodes in push-pull is used in connection with the new

programme meters, and in the amplifier rack connected to each desk with a volume control meter is one of these five-valve amplifiers.

The first stage of the amplifier is transformer coupled to the microphone line. This is choke-capacity coupled to a stage of push-pull amplification and this is followed by two pentodes in push-pull. The programme meter is connected to this push-pull circuit.

There are a number of variable controls on this volume indicator amplifier, but these are all pre-set so that once the meter is calibrated they do not need re-adjustment. Six-volt valves are used in the amplifier, and 300-volts high-tension is taken from accumulators. The meter used is an ordinary milliammeter giving a full-scale deflection of 1 milliampere, but it is shunted by a resistance in order to get a more dead-beat arrangement.

The meter is calibrated in decibels from
(Continued at foot of next page)



This is the circuit, published by permission of the B.B.C., of the amplifier used in conjunction with the programme meter. It will be seen that pentodes used in push-pull are in circuit with the meter

for some time at Savoy Hill and Brookmans Park and they are also being fitted up at provincial stations.

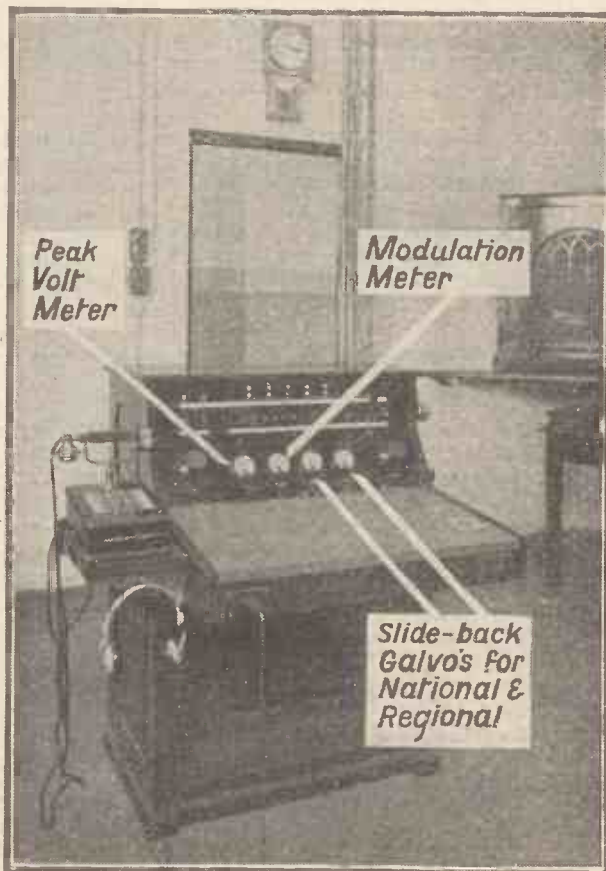
They are the outcome of a great deal of work by the research engineers.

Further details on page 772 of the new "A.W." "Simple Super." TRUE TO ITS NAME—A SIMPLE SUPER-HET. EASY TO BUILD AND ONLY ONE-KNOB CONTROL

Ever since the start of broadcasting it was realised that in order to avoid overloading the low-frequency amplifiers and upsetting the transmitter characteristics, it is necessary to have some means of controlling the volume of the programme being handled.

Indicating Volume

An indicator of overloading is not enough because it means that before the needle of such an instrument has time to



One of the B.B.C. control desks carrying programme meters, peak voltmeters and slide-back galvanometers—all instruments used for checking the programmes



MY "MASCOT" MAIL BAG

In this article Percy W. Harris deals with some interesting points in the operation of the "Mascot" receiver which was described in the issues No. 509 and 510.

THE success of the "Mascot" receiver (described in Nos. 509 and 510) has naturally added very considerably to the AMATEUR WIRELESS mail-bag and I want to take this opportunity of thanking the numerous correspondents who have written to me telling me of the results they have obtained and making very flattering comments on the design. I am delighted to find that so many refer to the admirable quality given them by this set; many readers indeed, tell me that they have never before heard such quality on any receiver. In the varied conditions in which the "Mascot" is now being used all over the country, and even abroad, the selectivity of the "Mascot" has proved to be all that was claimed and even more, while the range of reception both on the band-pass side and the single-circuit tapping, has been a surprise to many who had thought such reception could only be obtainable with at least one screen-grid valve.

Naturally, when so many thousands are being built, a few readers have had their troubles, and the Editor has very kindly given me the opportunity of examining all "Mascot" queries sent in. From these I have gathered that some readers have managed, when making their coils, to reverse the reaction winding. This is evident by the description of the results they obtained which are as follows.

Obtaining Correct Reaction Effects

When the set is switched on and used on the single circuit (with the aerial clip connected to the second coil), the local stations and perhaps one or two distant ones are picked up with perfect quality and quite

good strength, but on going over to the band-pass arrangement, even with the most careful re-tuning, the local stations are very weak and distant stations unobtainable. When the reaction control is used, the set is found to oscillate, but as the dial is turned there is no increase in the strength till the set goes into oscillation with a "plop," after which numerous carriers can be heard by their chirping as the dial is turned. The fact that the set will go into oscillation has led many readers to think that the reaction winding must be the right way round, but actually, and particularly if the number of reaction turns has been exceeded, such a circuit can be made to go into oscillation by a capacity reaction between windings.

Making a Test

To check whether your reaction is the right way round, put the clip on the second coil and see whether the set goes smoothly into oscillation as the dial is turned. This test should not be performed on the local station, the strength of which will probably be much too great but should be done on the most distant station you can pick up. Actually, of course, the "Mascot" is so sensitive that locals will come in very loud indeed on a single circuit adjustment without any reaction at all. If you are in the London area, try the Northern Regional, if you are in the Northern area, try the London Regional, and after you have tuned it there should be a steady building up in strength as you turn the reaction dial up to a point where the set goes into oscillation. If you do not get a steady increase in

strength with smooth reaction, then something is wrong.

Band-pass Tuning

A point I have gathered from letters is that readers do not seem to realise that the set is primarily designed to work on the band-pass side and when used in such a condition there is no aerial connection to the second coil, therefore the tuning position is different for a given station from that obtainable when the single-circuit arrangement is used. Calibrate the set on the second condenser as recommended, using the band-pass arrangement and this calibration will always be correct for the second condenser. If, however, you change over from the band-pass to the single-circuit arrangement, the stations will come in at quite different positions on the second dial, always with lower reading for the condenser.

Motor-boating

One or two readers have had trouble with motor-boating when using certain types of mains unit. Troubles of this kind can be immediately remedied, either by using a separate tapping for the detector, or by fitting a choke output—that is to say, instead of the loud-speaker being connected directly to the plate of the output valve a good L.F. choke should be connected across the loud-speaker terminals and a two-microfarad condenser connected to the terminals of the choke, which is connected to the plate of the valve, the other side of this condenser being connected to one loud-speaker terminal. The other loud-speaker terminal should now be connected to L.T. negative.

"WATCHING" THE PROGRAMMES!

(Continued from preceding page)

1 to 7. All the new meters have black dials with white figures as it is considered that these are less trying to watch. A meter on the amplifier rack switches on the programme meter for each desk. The needle idly wanders up and down, giving the control man time to move the big volume-control knobs before the actual peak points are reached.

During talks and late-night dance music the meters are switched out of circuit, but they are used for all serious musical items. Owing to the expense of the B.B.C. arrangement it would not be practicable for

use in an amateur receiver. The pentodes are used as push-pull diode detectors and the meter is connected between the centre point and the secondary of the push-pull transformer and the negative side of the filament wiring. The screening voltage is adjusted by a potentiometer and is set for each valve combination.

The amplifiers used in connection with the meters are screened to prevent interference and are placed alongside the first-stage amplifiers on the microphone lines across which the volume controls are connected. At the side of each programme meter is a large knob with an ivorine scale, and this controls a balanced type of poten-

tiometer, capable of fading out the volume to absolute zero.

Underneath the programme meter on each desk is a row of keys by which any studio being controlled can be flashed with an indicator light and the announcer on duty in that studio can be told whether the volume is too great or too little. These new programme meters have been used down at Brookmans Park for checking up the input volume on the amplifier lines from London.

They have also been used in the control room at Manchester and are the means of regulating all the chief programmes on the North Regional circuit.

SIMPLE TESTING FOR THE AMATEUR—I

WHEN THE WIRELESS SET GOES WRONG

This is the first of a series of articles by our popular contributor "Hotspot," dealing with the location and cure of the many little faults that develop from time to time in all wireless sets.

In this introductory article the various faults are classified.

NO set, however well it may have been designed and constructed, will go on working for an indefinite period. Of course, the better the design the more reliable the performance, but in the end every set-user is faced with the question: "What has gone wrong?"

This and succeeding articles will attempt to help you to answer that question. Right now I may as well make it clear that set faults cover an enormously wide field, and it is possible to indicate only the general lines of attack in locating the fault.

dead, and no sound or clicks whatever are heard when the power switch is operated, or else the usual clicks are heard but still no signals.

Clicks give valuable clues sometimes. Remember, though, that a battery click is produced when the circuit is broken, and not when it is made. Thus, in a battery set you get a click when switching off the filament supply, but no click when switching on.

Assuming there is no sign of a click, it points to something being wrong with one of the battery circuits, either the high- or low-tension. One of these batteries may be run down, or one of the valves may have "given up the ghost." Simple systematic tests will prove which, if any, of these points is at fault.

Even these tests may be outside the scope of the average set-builder unless he is equipped with the necessary instruments. One of the most important among these must be the milliammeter, which measures the anode current of the valves. A good high-resistance voltmeter is also useful, or if desired, a combination meter giving volts and milliamperes by means of shunts can

be used advantageously.

With such a meter it is possible to gain some idea of the state of the batteries and of the valves. When seeking to locate faults dead-beat accuracy is not essential, but it is necessary to point out that some very misleading results can be obtained unless certain facts about the measuring instruments are borne in mind.

Take the testing of a high-tension battery, for example. If a poor sort of voltmeter is connected across the battery the voltage reading may be quite inaccurate owing to the fact that the meter will be drawing off considerable current from the battery and so lowering its voltage. But sometimes it happens that a low-resistance meter imposes a load on the battery equivalent to the set load, and then the indication is fairly reliable, since the voltage that matters is the *load* voltage, or voltage under working, or equivalent working, conditions.

In general, a high-resistance voltmeter should be used, and this should be connected *across the battery when the set is in action*. But suppose the set is not in action, and the battery is suspected of old

age—what then? Well, probably the easiest way is to try the battery on a friend's set, and to measure the voltage during the tryout.

Another cause of complete deadness, coming under our A heading, is a run-down accumulator. Beware of taking too much for granted if a voltmeter test is made, because an accumulator, owing to its very low internal resistance, will show practically the full voltage even when the cells are almost completely discharged.

Assuming that the batteries have been found in order, complete absence of any sort of sound when switching on and off may be due to one of the valves, or to one of the valve circuits. System will win every time, so try each valve stage in turn. For this testing the milliammeter is invaluable, as it will show whether each valve is working under correct conditions.

The insertion of the meter in each valve anode circuit may not be very easy with some sets, and here a gadget such as the Bulgin valve-holder adaptor will be useful. This enables the meter to be inserted in the anode circuit without upsetting the anode-circuit components. The valve is removed from its holder; put in the adaptor, and this

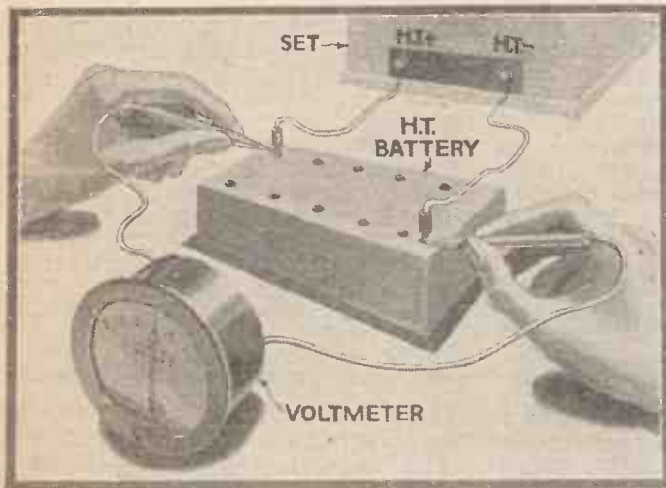


Fig. 1. The only really satisfactory voltmeter test of a battery is to measure the voltage when the battery is delivering current, as shown by this pictorial diagram. Note that the voltmeter is in parallel with the battery

We will assume that you know little about the technicalities of wireless, but that you have been sufficient of a handyman to build up one of the many AMATEUR WIRELESS sets. This has been giving the excellent results claimed in the article describing it, but now something has gone wrong—the question is what?

Here and now you must decide under which definite heading the fault comes, so I will divide up the most commonly found set faults into the following categories:—

(A) Complete absence of signals when the set is switched on.

(B) Weakness in reception of all signals received.

(C) Loss of quality in the reproduction.

(D) Extraneous noises not usually heard during reception.

These four headings by no means exhaust the possible faults in a set, but they include most of those the amateur is competent to tackle. Let us consider them in turn.

Probably the most disconcerting of all faults is that horrible dead silence when the battery or mains switch is put to the "on" position. There are two sorts of indications here; either the set is entirely

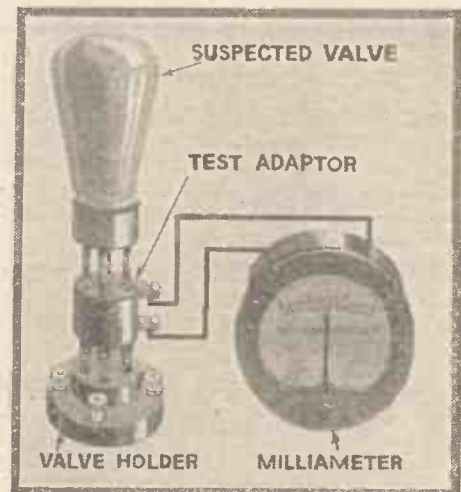


Fig. 2. With an adaptor such as that shown by the diagram the anode current of a valve can be measured without disturbing the anode circuit components. Note that the milliammeter is in series with the anode-circuit components

is then plugged into the holder. The break in the anode-pin connection is then utilised for the connection of the meter.

Spare valves are very useful in these tests, as they help to tell whether it is the valve itself which is at fault or the valve components. Absence of any anode current with the milliammeter test just

(Continued at foot of next page)

WHAT WE MAY GAIN FROM MADRID

ALAN HUNTER outlines the possible improvements to broadcast reception that may result from the forthcoming World Conference at Madrid

NEXT September broadcasting will be in the melting pot. On the fifteenth of that month the International Radio Telegraphic Convention assembles at Madrid. All phases of radio will be dealt with by Government delegates from all countries in the world. This is not merely a European affair, though our interest will naturally be centred mainly around what is decided with reference to broadcasting in Europe.

At this stage, it is not possible to do much more than forecast how far broadcasting in general will gain at the Madrid Conference. Obviously, the plea will be made that broadcasting must have more wavelengths, though this plea may not pass unchallenged by the radio services which would have to sacrifice wavelengths to make more room for broadcasting.

It is now generally agreed that no material extension of the medium waveband can be hoped for, but there is more than a possibility in the suggestion that two or three long wavelengths may be given over to broadcasting.

Shall We Benefit?

The question arises as to how far Great Britain might benefit from this extension. At once we can rule out the possibility that one of the newly acquired wavelengths would be given to the B.B.C. We already

have a good long wave for Daventry, while several countries in Europe have nothing on the long waves.

But if two or three new long waves were released for broadcasting, the countries finally obtaining them would probably have to give up good medium waves in exchange. Here the B.B.C. might benefit, for among the exclusive ten allocated at the present time to this country are two definitely poor medium waves, namely, 261 metres, the London National wave, and 288.5 metres, the future Scottish National wave.

Before any changeover from existing waves could be adopted, the International Broadcasting Union would have to revise the present Prague Plan. For it must be remembered that the Madrid Conference will concern itself only with waveband allocation, and not with the distribution of stations within any waveband.

If, therefore, the much hoped for extension of the long waveband were achieved at Madrid, a meeting of the Union at Geneva would inevitably follow. After that we might get our very poor medium waves changed for waves above, say, 300 metres.

Problems to Solve

Various Government departments have been busy since May, 1931, collecting data

on many of the pressing problems connected with broadcasting, and their reports are to be submitted to the Madrid Conference.

We may gain something from these reports if suitable legislation follows their publication. For example, the report of the Danish Government on electrical interference to broadcast reception, collected in consultation with other Governments' departments, must surely reveal many possible remedies for what is fast becoming the biggest bug-bear of city dwellers' reception—all those horrible background noises set up by electrical apparatus.

The British Administration has been given the task of preparing a report on the wavelength situation. This will shortly be submitted to the Berne Bureau, and should provide a striking commentary on the chaos resulting from high-power stations working on inadequate frequency separation.

This wavelength report is being prepared by the Post Office in consultation with the Post Offices of other European countries, all of whom are in touch with the International Broadcasting Union.

Meanwhile, the Union has plenty to consider at its meeting at Lausanne in June, when the final case for broadcasting will be drawn up ready to be presented to Madrid in September.

"WHEN THE SET GOES WRONG"

(Continued from preceding page)

mentioned might be due to a "dud" valve, or it might be due to a faulty anode component. If the meter still shows no reading when a known good valve is inserted, the anode impedance has probably broken down.

The guiding rule in all fault finding is to look first for the simple faults—and do this by meter tests of anode current and component substitution.

Possibly, the set is giving all the usual indications of being alive so far as the battery connections are concerned, and yet there may be an entire absence of signals. Such symptoms point to a fault in the aerial and associated components.

More than once I have made a lightning correction of a so-called fault by looking out of the window and finding that the lead-in wire had come adrift from the terminal on the lead-in tube. So make sure the aerial is connected, and, if it is, make sure that it is not shorting to earth at any point. If in doubt, you might erect a

short indoor aerial and connect this in place of the normal aerial. If weak signals were then heard it would prove that something was wrong with the aerial—probably a break or a short.

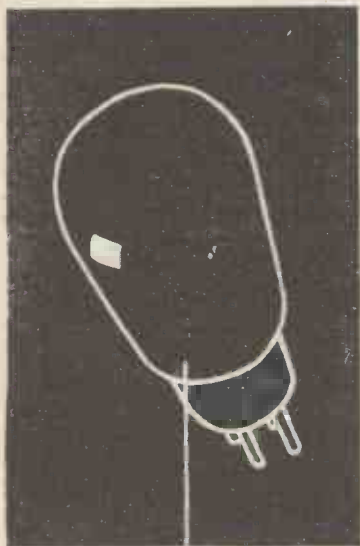
A rough-and-ready test is to tap the bulb of the detector valve. Should this cause a "pong" in the loud-speaker you may take it that everything after the detector is O.K., including the detector.

Next week I will continue this fault-finding series with a consideration of faults under the second heading mentioned.

HOTSPOT.

PERSONALITIES IN THE WEEK'S PROGRAMMES





1932 MULLARD 2-VOLT VALVES

It is not so many years since 2-volt valves were used only for portable receivers—and then only because they required small and light low tension batteries. Today, progress and research have resulted in Mullard 2-volt valves being employed as standard in battery-operated sets of every type.

BETTER THAN EVER.

This season's Mullard 2-volt valves embody further improvements. A new, rigid-unit construction has been adopted which eliminates the risk of microphony, even in sets having powerful built-in speakers. Moreover, the characteristics of many types have been very considerably improved to render them still more sensitive and worthy of a place in receivers of the most advanced design.

CHOOSE FROM THESE TYPES.

P.M.12	Screened grid valve for use as high frequency amplifier in 3-valve or 4-valve sets.	Reduced Price	16/6
P.M.1HL	High efficiency detector for all battery receivers.	Reduced Price	7/-
P.M.2A	A power valve which will make the most of the very weakest signals in small 2-valve sets.	Reduced Price	8/9
P.M.202	Super-power valve for 3-valve and 4-valve sets.	Reduced Price	12/-
P.M.22	Pentode output valve for large volume from 2-valve and 3-valve sets.	Reduced Price	17/6

FULL TECHNICAL DATA.

Type	Filament Voltage	Filament Current	Max. Anode Voltage	Anode Impedance	Amplification Factor	Mutual Conductance
P.M.12	2.0	0.15	150	180,000	200	1.1
P.M.1HL	2.0	0.1	150	14,000	28	2.0
P.M.2A	2.0	0.2	150	3,600	12.5	3.5
P.M.202	2.0	0.2	150	2,000	7	3.5
P.M.22	2.0	0.3	150	—	—	1.3

The correct Mullard valves for the "Simple Super" described in this issue are:— 2-P.M.12; 1-P.M.1HL; 1-P.M.1DG; 1-P.M.2A.

Mullard

THE MASTER VALVE

MADE IN ENGLAND



again!



J.B.
"R" 4
GANG
37/-

As far ahead of last year's famous Century Super as the Century Super was ahead of all its predecessors! That is what Mr. James says about his latest achievement, the Simple Super. And in obtaining this remarkable result he has used exclusively the J.B. R.4 Gang Condenser—a typical Precision Instrument.

SPECIFIED IN THE "SIMPLE SUPER"

Advertisement of Jackson Brothers, 72, St. Thomas' Street, London, S.E.1.

Telephone : 1837

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

On Your Wavelength!

THE WEAK SPOT

IF you had to put your finger on the weak spot of foreign station reception, I wonder what aspect of this fascinating pastime you would choose? This question is prompted by the complaint made to me recently by a literary-minded friend about his inability to pick up the "Pasdeloup" concerts from Bordeaux. This friend, I should explain, is definitely non-technical. All he wants is this "Pasdeloup" concert; why cannot he have it? At present he is using a well-known four-valve portable, which gives ample volume from most of the better-known foreigners, but it refuses to render the much-wanted concert from Bordeaux every Saturday afternoon. I am asked to suggest a much more powerful portable.

PRE-SELECTION

UNWITTINGLY, my friend has put his finger on the weak spot of this foreign-station business. For while it is true that you can, on any evening, with this or any other good portable, get at least twenty stations by turning the dial, you cannot say which of these stations you will get at good strength *before* turning the dial. I mean, apart from the giants, such as Prague and Beromuenster, you cannot say before turning the dial which will be worth hearing—there is no real pre-selection.

Nor will there be for a long time to come, with present indications as to increased power and consequently increased interference. But it is a fact that the more powerful the stations, the more chance there is of getting a worth-hearing programme. Bordeaux has a power of only 13 kilowatts, and is not particularly good at the present time in this country. At least, not in my part of it, and nor apparently is it much better down in Sussex, where my "Pasdeloup"-hunting friend lives. Knowing well that Bordeaux is, at the moment, not capable of being heard above "mush level," I could not recommend a more powerful portable for the required concert.

MUSH LEVEL EXPLAINED

THOUSANDS of listeners are still ignorant of the elementary fact that unless a station is above mush level it can never be brought in at good strength without appreciable background. The belief is still widely held that if only you have enough amplification available, you can get *any* station at concert strength. So you can—but not at concert pitch, by which I mean that a weak field strength can be turned into a good loud-speaker strength only by amplifying a hundred and one noises of the ether.

There is a certain minimum field strength below which it is not worth considering a signal. If it falls below this point, the amplification needed to bring it up to loud-speaker strength will be so great that mush

will be raised to an unbearable level. The ratio of signal to interference gives us the real clue as to whether a station is worth worrying over. The only way to raise the ratio of signal to interference, under which I include all sorts of noises, not forgetting valve noises in the amplifier, is to increase the power of the transmitter—and that seems to be the order of the day all over Europe at the present time.

FOREIGNERS LIKE LOCALS

IN these stirring times of 150-kilowatts, it does not need a big set to get full loud-speaker strength from certain foreign stations. Recent measurements by the International Broadcasting Union clearly show that at night some of the foreign stations are producing tremendous peak field strengths in this country—in some cases the strength of the foreigner exceeding the strength of the nearest local. It has been stated recently by a B.B.C. engineer that in the course of an evening during the present winter, at least thirty foreign stations have averaged a field strength of between 2 and 3 millivolts per metre. This may not mean anything to you until I explain that 3 millivolts per metre was a few years ago considered to represent a C service area, and 10 millivolts per metre was an A service.

In any so-called service area, it is assumed that only simple apparatus is to be used—a two- or three-valver at the most. So we have now arrived at the very interesting stage where a relatively simple set can, after dark anyway, get as good reception from twenty or thirty foreigners as was previously obtained from the local under C service conditions. Is it any wonder that in these days we are all foreign-station fans?

WET OR DRY?

THERE is quite a battle proceeding at the moment between the wet and the dry types of electrolytic condenser. The general principle of both types is much the same. The electrodes are of aluminium, and the insulation is a very thin film of gas, which is formed during the manufacture of the condenser. This insulation is so thin that the capacity of the condenser is considerable and large numbers of microfarads can be made in a small space. The strength of the layer of insulation, however, depends entirely on the voltage at which the condenser is formed during manufacture. Actually, the voltage across the condenser must not exceed that at which the condenser was formed, otherwise the insulating film will break down or puncture, and the condenser will develop a leak. Consequently, it is necessary to form the condenser at a voltage higher than the maximum voltage which will have to be handled in practice. On the other hand, one does not wish to exceed the normal working voltage by more than is necessary, because

the lower the forming voltage the higher the capacity of the condenser. The same condenser formed at 200 volts would have considerably more than twice the capacity than if formed at 400 volts.

HOW A CONDENSER IS "FORMED"

NOW manufacturers of wet electrolytic condensers claim that they can form their condensers at a voltage just above the working voltage. If due to the removal of the load in the circuit, the voltage rises, then the condenser will break down. But the very process of forming a condenser simply consists of the application of voltage across the electrodes, and a very large current flows, which gradually gets less and less as the insulating film forms on the plate. Therefore, if the voltage exceeds the normal voltage, the condenser will break down and will actually proceed to re-form the insulating film. During the process of doing so it will take, at any rate at the outset, an increased leakage current, and this in itself will automatically tend to drop the voltage on the circuit, so that to some extent the device acts as a limiter, and prevents the voltage from rising seriously.

As soon as conditions return to normal, the forming process ceases and the condenser operates quite satisfactorily without any deleterious effects whatever. That, at any rate, is the claim of the manufacturers of the wet type of condenser, namely, that it automatically limits the voltage and under an excess voltage it will simply bubble for a time and re-form itself as soon as the voltage returns to normal.

DRY CONDENSERS

THE manufacturers of the dry condenser do not like the presence of liquids inside, and they therefore form the plates first in a liquid and then mount them up in a jelly or some similar material, which serves to make the necessary electrical connection, but is not subject to the disadvantages of an actual liquid. On the other hand, if the voltage *does* rise above the forming voltage, the insulating film is punctured and, due to the fact that there is no liquid present, it is not possible for the damaged portion to re-form or re-seal, as it is sometimes called. It will, therefore, have a permanent leak, and is, in fact, damaged irretrievably.

Whether this defect will be overcome in the future remains to be seen. At present there is a distinct battle waging between the two schools of thought, the "wets" claiming that theirs is the only satisfactory method, and that the fact that they have liquid inside the condenser makes no difference whatever in actual use. The "drys" reply to this by saying that their condensers can be mounted in any position, and that you should be able to prevent your voltage from rising above the safe limit.

On Your Wavelength! (continued)

OVERDOING IT?

FOR years past I have urged that the Wireless Exhibition at Olympia should be held at an earlier date. Ever since it started the date has been towards the fag end of September. One of my chief reasons for begging for an earlier exhibition was that, as matters were, the majority of schoolboys and schoolgirls could not attend, since at that time they had pressing appointments elsewhere. The youngsters play a very important part in wireless, and it has been pretty hard lines on them that the exhibition became automatically out of bounds. This year the Exhibition is to take place from August 19 to 27, and I must say that I am surprised and not a little sorry to see what, to my mind, is an absurdly early opening date. August is the holiday month when all the world is at the seaside or in the country and London is at its very emptiest. I may be wrong—I hope I am—but I cannot see how an exhibition held at this time can be a thorough success.

REASONS WHY

I CANNOT help thinking that the policy of our manufacturers, taken as a whole, is subject to criticism. I believe that the real reason why the Exhibition has now been fixed for such an early date is just this: manufacturers do not like to commit themselves to a big output programme for the season, and in past years some of the new season's models shown at Olympia have been the only ones in existence. Sets were not actually put into production until the exhibition had indicated the extent of the demand. We saw a result of this policy last autumn. People wanted British sets, but could not obtain delivery, simply because the sets were not in full production. Fortunately not all British manufacturers adopt this policy of waiting and seeing. The Americans, who have no such timorous policy, shipped boat loads of sets over to this country and filled the shops with them. You could walk into a shop, plank down your money, and walk out with a foreign set. But rarely could you do so with a British one! I am afraid that the early opening of the exhibition foreshadows a continuance of timidity on the part of our makers, and that they want time, to discover what to put into production.

PRETTY HARD LINES

ACTUALLY this early date for the opening of the Exhibition is going to be pretty hard lines on a great many people connected with wireless. It will mean, for instance, that heaps of them, if they get holidays at all this year, will have to take them either very early in the summer or quite late in the autumn. This is a real hardship, which ought to have been considered when the date was fixed. I have always maintained, and I still hold, that the proper opening date for the Exhibition is the Monday of the first whole

week in September. If that idea were adopted the Exhibition this year would be from the 5th to the 13th of September, a period which would suit most people vastly better than the one actually selected.

PICK-UP POINTS

I HAVE had a very interesting time lately trying out a number of pick-ups. All of them were of first-rate make and, taken all round, their performances have been something of a revelation. It is particularly interesting to notice the way in which makers arrange their instruments in order to obtain a level response when music is being reproduced from records. You probably know that there are mechanical difficulties in the way of putting the full amount of bass on to the record itself. I believe I am right in saying that if a pick-up were arranged to have a straight-line response to all frequencies the grooves recording deep bass notes would have to be more than an eighth of an inch in width to give the needle sufficient movement to bring out the notes properly.

A COMPROMISE

THE record, then, contains the bass frequencies, but, since the groove must be kept of small width, the amplitude is actually much too small. To correct this the pick-up is made to have a much bigger response to bass frequencies than to the treble. By careful design the balance can be made so extraordinarily good that a close approach to perfection in reproduction is possible. Since each designer tackles the job in a different way, the result is that there are pick-ups to suit practically all tastes. Some people like a very large ration of bass, others a moderate one, and others very little. It is also, of course, possible to adjust the response from a pick-up by shunting it with resistances of various values. The effect of these is to weaken the high notes, with the result that the low ones are more strongly brought out.

A CONDENSER DETAIL

When wiring up to a screened condenser, make sure that there is no short-circuit between the metal screen and the



terminal of the other set of plates, indicated by the arrow. See that the soldering tag on this terminal is not bent down so that it is near the screen.

THE PUBLICITY PROBLEM

ADVERTISING by British firms from French stations has now assumed considerable proportions and the signs are that it is still on the increase. The stations used mostly belong to private concerns and, no doubt, they find it a most profitable business. I am afraid, though, that the use of stations for publicity purposes may lead to a certain amount of trouble. The advertiser naturally wants to make his voice heard, and the only way to do this is to shout loudly and to make sure that you use a wavelength on which there is no interference. The tendency of the publicity stations is thus to put up their power—temporarily, at any rate—and to indulge in wavelength wandering in search of a clear spot. I don't know what power one of them (which I will not name) was using the other Sunday night, but it must have been something pretty terrific. I happened to be using a set containing no reaction and deliberately made to have low overall magnification. It is actually designed for the reception of the two London stations only, and in the ordinary way it will not bring in a whistle of any foreign station. But on that evening publicity was coming through on this set with terrific strength, except when fading occurred.

SWITCHCRAFT

IF you use (and if you don't already, you will some time) variable-mu valves, you must, of course, fit a volume control consisting of a grid-biasing battery and a potentiometer. Not a few constructors forget that if they don't provide a switch to cut out the potentiometer windings the battery is continually under load, which is distinctly bad for its health. The drain isn't large—only a fraction of a milliamp—but even this is quite enough to make a grid-biasing battery very short-lived. You can buy, nowadays, special potentiometers incorporating a switch which comes into action when the knob is turned as far clockwise as it will go. These are excellent. Another method is to alter your low tension switch in such a way that it performs the double purpose of cutting out both L.T. and G.B. batteries.

RECORDS AND BRAKES

LIKE the correspondent who wrote a week or two ago, I have had a certain amount of trouble myself with automatic radiogram brakes, owing to the varying diameter of the "run off" circle of records of different makes. It seems a pity that record makers cannot get together and make a standard size for this ring. Or possibly two standard sizes might be needed, one for 10 inch and one for 12 inch records. I haven't yet come across the "non set" brake of which one correspondent wrote, but as soon as I get time I hope to make inquiries about it.

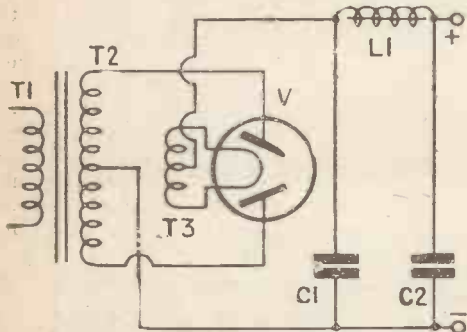
THERMION.

TAPPING YOUR H.T. MAINS UNIT

Some Useful Advice to Mains Users
By Percy W. Harris, M.Inst.Rad.E.

IN preceding notes we have seen how the rectified current is taken from the valve or other device, smoothed and delivered to the output condenser which acts as a kind of reservoir. We must next ask ourselves what will be the output voltage and how can we vary it to suit the various valves and tapings on our set.

It is unfortunate that accurate voltage readings on a mains unit are only obtainable with relatively expensive instruments, ordinary voltmeters of low resistance being useless. Many a wireless experimenter on applying his ordinary voltmeter to the output terminals of a mains unit has obtained a reading quite different from that which is actually obtainable on the set with which the unit is being used. The reason can be found by examining our good



A simple voltage-dropping circuit

old friend Ohm's law with its relation between voltage, current and resistance.

Let us imagine that we start with 220 volts alternating current from our mains, and we pass this through a step-up transformer, giving, say, 250 volts across each side of the centre tap, or 500 volts in all. A simple circuit arrangement is shown in the accompanying diagram, and from this we can estimate certain voltages and losses. The two ends of the transformer winding c2 are applied to the two plates of a full-wave rectifying valve and as each plate becomes positive, so current flows from this plate through the filament and along to the positive high-tension terminal of the filter condenser c1.

Rectifier Resistance

While the current passes freely across the space between the plates and the filament of the rectifying valve V, the space, nevertheless, has a certain resistance in which there are voltage losses. This resistance varies with the type and make of valve and the amount of current it is designed to carry. There is also, of course, a resistance in the transformer windings themselves and even if we short circuit the condenser c1, the current will not rise above a certain figure, which will depend mainly on the internal resistance of the valve.

Similarly, the choke L1 has a certain resistance so that when we apply a load to the output terminals, the total voltage

available across these terminals will depend not only on the resistance of the load, but also on the resistance of this choke L1. Put another way, we can say there is a voltage loss in L1 and the voltage loss may be big. The importance of this loss depends on the requirements of our set. If, for example, we are drawing 20 milliamperes and the resistance of the choke L1 is 1,000 ohms, 20 volts will be lost in it; if we take a 40 milliamperes, then we shall lose 40 volts, and so on. This is why, in a mains unit giving, say 200 volts H.T., with one particular make of output valve it may give perhaps only 150 with another.

Voltage Variations

The lower the resistance of the choke and other parts of the mains-unit circuit the less variation of voltage there will be with load. As it is more expensive to make a low-resistance choke for a given inductance than a high, the voltage of a cheap mains unit is often very susceptible to changes of load. A mains unit which varies comparatively little in its voltage with a change of load within reasonable limits is said to have good "regulation," and it is in such things as this that the more expensive mains unit shines.

I mentioned above that erroneous readings are obtainable on mains units with cheap voltmeters, the reason for this being that such voltmeters are often of low resistance and take a great deal of current to operate — considerably more than the total current of the set itself. Thus, when the voltmeter is applied to the output terminals of a mains unit, it may take so much current as to bring down the voltage considerably, owing to the losses in the circuit itself. To get readings which are approximately accurate, or at any rate sufficiently indicative of the working voltage of a mains unit, you should use a voltmeter which has a resistance of sufficiently high figure for the purpose. It is customary to use a voltmeter rated as having a resistance of 1,000 ohms per volt for this purpose, and many of these are now obtainable at quite reasonable prices.

Another point about voltage measurement is that you should measure the voltage while the unit is actually connected to the set and the set is running, as otherwise the drop in voltage, due to the load, will not be taken into account.

One of the popular vaudeville turns heard in the North Regional programmes is that by Professor Zweistein and Mr. Griffith-Griffiths. These artistes will appear on April 22.

Arthur Bliss is visiting Belfast on April 30 to conduct the Belfast Wireless Chorus and Symphony Orchestra in a performance of his choral symphony of war, "Morning Heroes."

Continuing his series of feature programmes, Herbert Westerby, who gives an organ recital from Belfast each Friday morning, is to play music by Belgian composers on April 29.

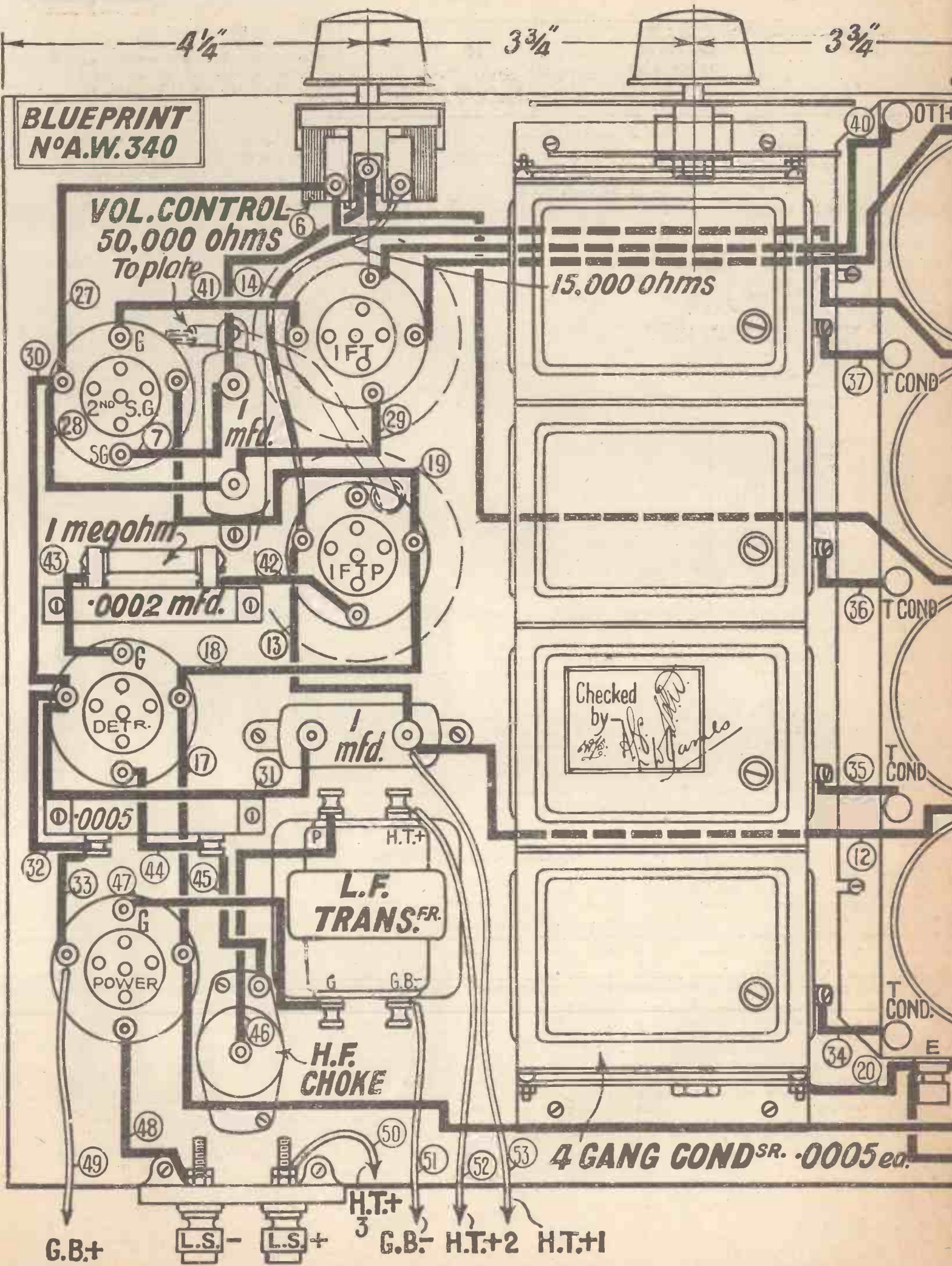
Tom Pickering will be the vocalist in a programme of spring music from the Cardiff studio on April 28. The Western Studio Orchestra will play.

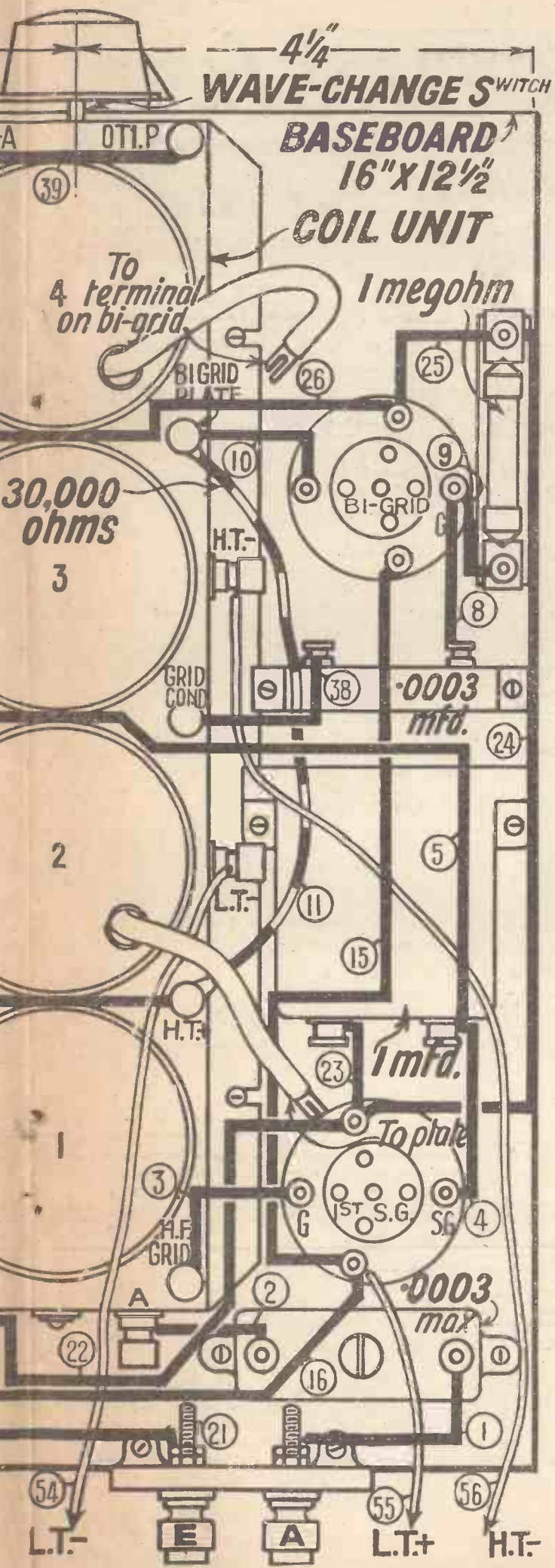
The new Radio Palace at Rome will be officially inaugurated on April 21 with a special broadcast programme. The building contains eight underground studios with one specially equipped for television transmissions.

A GOOD "TALKIE" TEST



As announced recently in "A.W.," cinema engineers are experimenting with radio-gram reproduction of cinema organ records to replace the organ in the theatre. Here are representatives listening to organ recitals given from the organ and then from records reproduced through speakers behind the pipes.

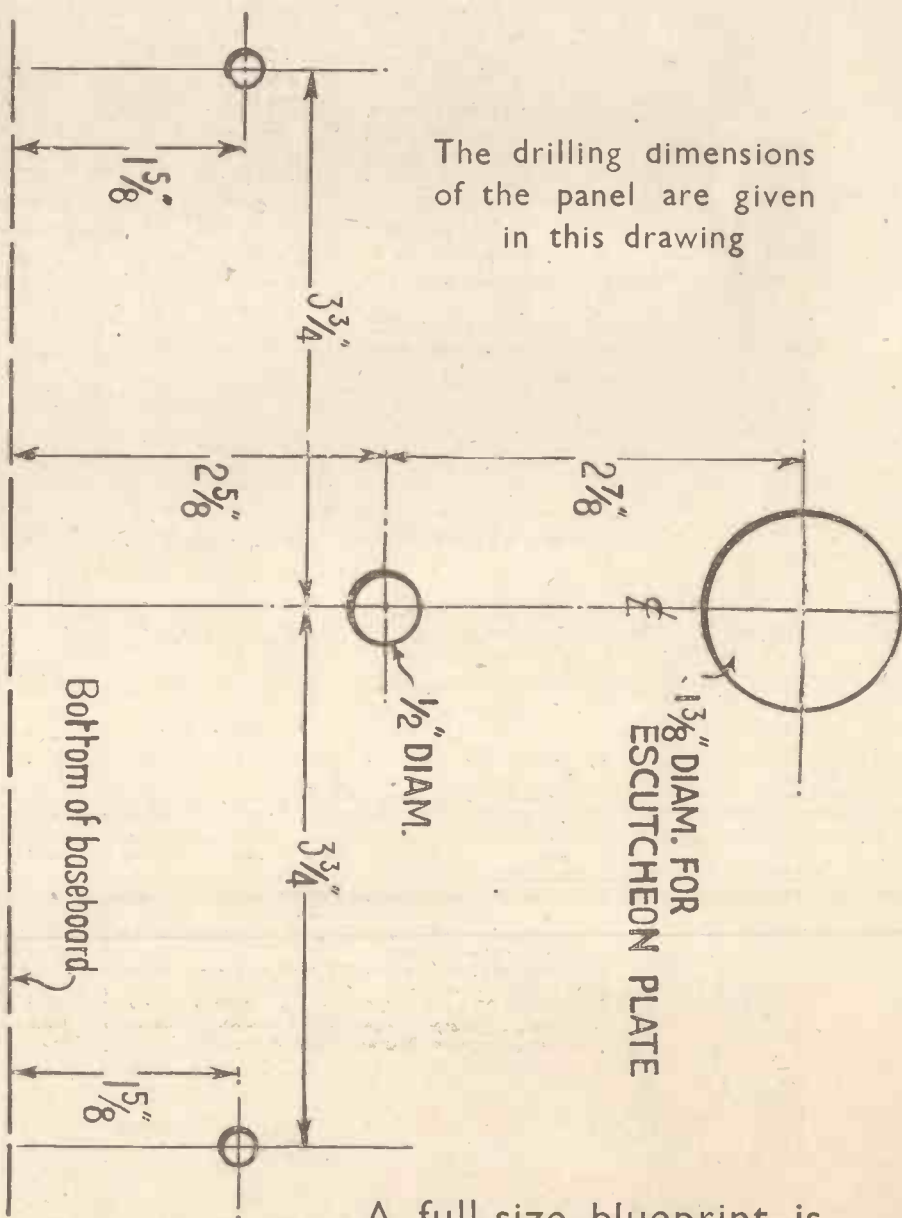




THE "A.W." "SIMPLE SUPER"

LARGE-SCALE LAYOUT AND WIRING DIAGRAM

This wiring diagram is approximately three-quarters full size. All the necessary dimensions are clearly indicated in inches



The drilling dimensions of the panel are given in this drawing

A full-size blueprint is available, price 1/6

THE work of assembly of the "Simple Super" is particularly straightforward. All parts are placed in just the positions where you expect to find them. It is natural that the four-gang tuning condenser should be in the centre and as the four-coil unit is joined to it, this is placed alongside it.

Be careful not to twist the tuning condenser when screwing it down. You can do this by screwing the fixing screws hard down when the baseboard is not flat. Something must give, and clearly the condenser will twist. So examine the baseboard and see that it is flat. Then mark the positions of the holes through the feet. Take the condenser away, make small holes with a bradawl, and screw down the feet.

Now you can take them off, fit them to the tuning condenser and place the whole component in position. If the baseboard is not flat you may find it necessary to use thin washers as packing below one of the corners of a foot. There is no need to force the screws home very tightly.

Some Assembly Points

You will observe that the scale must lie back a little from the edge of the baseboard in order that it shall clear the escutcheon when this is fitted.

The coil unit is the next component to be fixed, but before doing this attach short wires to the connecting screws of the tuning condenser. Then arrange the two valve holders between the edge of the baseboard and the four-coil unit, with the 1-microfarad condenser, which lies flat upon the baseboard, the .0003-microfarad grid condenser and the grid-leak fitting.

At the back is the aerial circuit pre-set condenser and the small aerial-earth terminal block. On the right-hand side is a metal bracket which is used to carry the volume control, the spindle being of the same height as the spindle of the switch fitted to the four-coil unit.

COMPLETING THE A.W.

Further constructional details of the remarkable new Super-Het, first details of which were given in last week's issue.

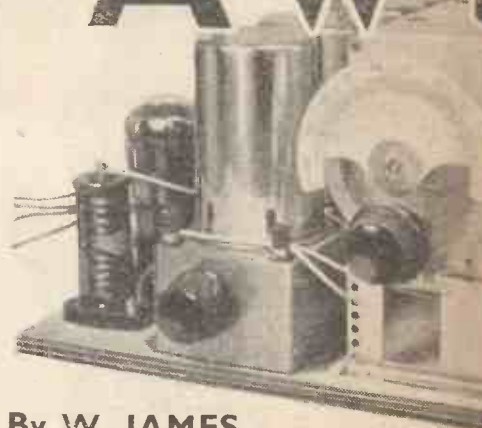
Just behind it is the first intermediate-frequency filter coil—that is, the one joined to the anode circuit of the bi-grid valve and the grid circuit of the screen-grid intermediate-frequency amplifying valve. The rest of the parts are clearly to be seen in the illustrations and diagram.

Be sure and fix the valve holders in the right positions and directions. There must be clearance between the two coil pots, so see that they do not touch. Test for this before screwing the valve holders down.

Wiring Hints

The wiring of the set can be commenced in various ways, but it is better to follow the lines laid down in the diagram and blueprint; as you will see, the wiring is extraordinarily easy.

There are so many short wires. Be careful of the four wires from the tuning condenser, using enough systoflex to cover the full length of the wires as you do not want the wires to touch the chassis and to short circuit one of the coils. Be careful, too, of the wiring to the valve holders. These are not arranged to lie in the same direction with the result that the grids and



By W. JAMES

plates should be looked for as a check up on the assembly.

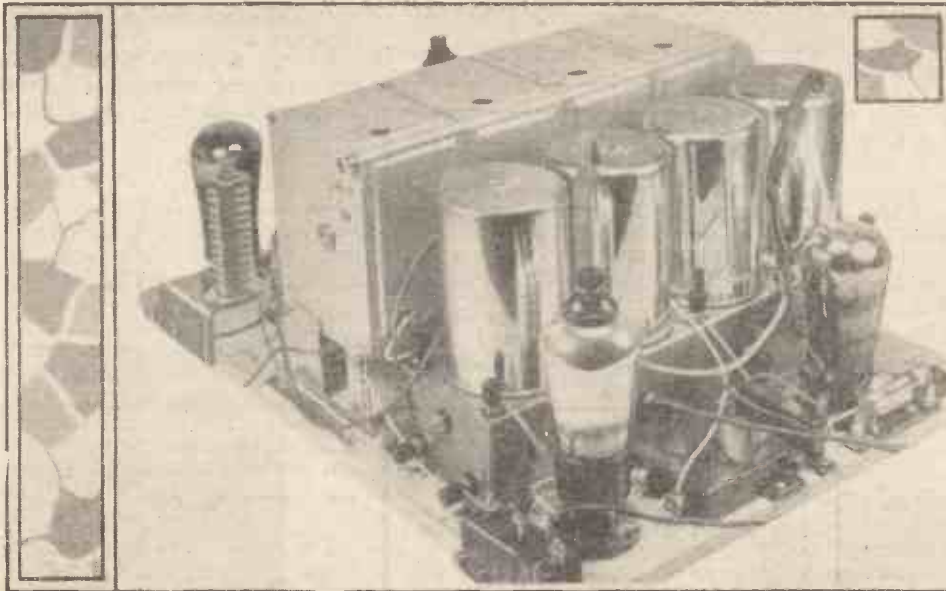
The two flexible resistances were, I found, long enough to pass between the terminals shown. Do not mix them, the 30,000-ohm resistance being the one connected on the four-coil unit.

Where flexible wires are used, make a

First Screen Grid	Detector Oscillator	Second
Mullard PM12	Mullard PM1DG	Mulla
Marconi S22	Marconi DG2	Marc
Osram S22	Osram DG2	Osra
Mazda S215B	Cossor 210DG	Mazd
Cossor 220SG		Cosso

loop which will just pass over the stem of the terminal. This avoids loose strands which might be troublesome. It is just as well to fit the correct plugs and spade contacts to the ends of the battery wires at the time the wires are cut. This will avoid your making a mistake when you come to connect the batteries.

There are a few long wires passing from the



These three photographs of the "A.W. Simple Super" show the chief features and illustrate clearly how the construction of this efficient receiver, it is one of the simplest s

SIMPLE SUPER



four-coil unit to the other side of the tuning condenser. These can be run between the pots of the coils and pass below the tuning condenser, to the parts on the other side.

An earth wire goes to the tuning con-

Screen Grid	Detector	Power
ard PM12	Mullard PM1HL	Mullard PM2A
coni S22	Marconi HL2	Marconi LP2
am S22	Osram HL2	Osram LP2
la S215B	Mazda HL2	Mazda P220
220SG	Cossor 210HF	Cossor 220 Pa

denser, and it is as well to make sure the connection is a good one if the wire is taken to a screw instead of to the terminal provided. One side of the coil chassis is joined to the negative through the switch included in the unit.

Final Connections

The negative low-tension and negative high-tension wires from the batteries are joined to the two terminals fitted on the

It is easy to build, simple to operate and costs little

side of the chassis. When the switch is in the off position the two battery circuits are disconnected. By turning the switch to the medium or long wavelength the batteries are connected and the coils are joined in the circuit.

The flexible wire from the second pot in the coil unit, coming from the back or aerial end, goes to the anode of the first screen-grid valve. The wire from the fourth pot is joined to the terminal fitted to the base of the four-electrode or bi-grid valve. In cases where the valve is fitted with an extra leg in the base and not a side terminal, it is necessary to use a five-hole valve holder and to take the flexible wire to the spare terminal, the rest of the holder being wired as before.

There is another flexible wire to be connected, that from the intermediate-frequency transformer, and this goes to the anode of the screen-grid valve next it.

H. T. Supply

A high-tension battery of 120 volts is needed; of course, if you can manage more high tension so much the better, as the actual power output to be obtained from the last valve depends upon the high tension applied to it. An increase in the voltage, which also means an increase in the current, improves the volume by more than a proportionate amount, and is therefore

desirable, especially when a small power valve is fitted.

Those with a mains unit have an advantage over battery users, as the high tension usually exceeds 120 volts when the set takes only a small current.

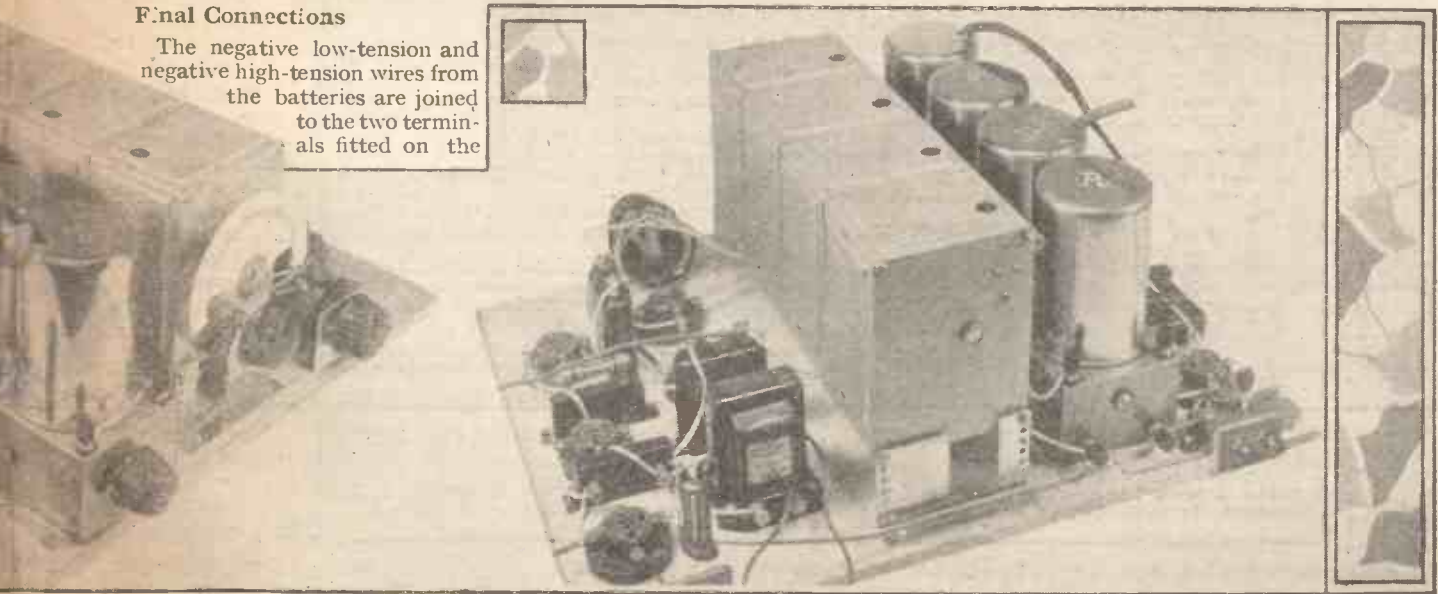
Suitable Valves

For the power valve a grid-bias battery of 9 volts will usually be suitable. There are many valves to choose from and the table shows a number of suitable ones. On test, I have found the following combination excellent: Marconi S22, Mullard PM1DG, Marconi S22, Mullard PM1HL, and Mazda P220.

There are two screen grids, and valves having the biggest slopes should be used. A good detector valve will have a moderate impedance and the highest amplification factor, and the list shows satisfactory types. There is, of course, a large number of power valves of all sizes. The small types are listed, but if you can afford the high tension then a larger power valve should be selected. Always use the biggest power valve that you can supply from the high tension that will be used.

If you normally use the ordinary type of dry battery a super-power valve is quite out of the question unless you are prepared to fit a new battery at fairly frequent intervals. The whole question of the power stage is one for you to decide, the point being that the bigger the valve the more it costs to run, but the greater the volume from most stations the better the quality.

This set is capable of giving excellent quality, but the volume control is such that the strength of the signals applied to the last valve can be varied over a wide range. No output filter or transformer is provided in the set because none is needed with the small power valve that will normally be used. If you fit a large valve a coupling to the loud-speaker may be needed, and this had better be arranged as part of the loud-speaker.



is simplified by the use of the complete coil units and four-gang condenser. The "Simple Super" is not only an extremely sets which has ever been described in "A.W."

Our Broadcast Critic

TALKS ABOUT

HIGHBROW VAUDEVILLE



John Watt, producer of the "Songs from the Shows" series

THE new type of programme, called a *Miscellany*, no doubt attracted many listeners, unless the item "The XV Idyll of Theocritus" frightened some of them at the very outset

By virtue of its general make-up I think this programme might reasonably be labelled Highbrow Vaudeville. At all events, it proved to be something of the kind.

Whether or not it was generally appreciated I have, of course, no means of knowing; whether or not the idea is good enough to stand repetition is a question a little difficult to answer.

I am all in favour of the idea provided the quality is really high; the first effort was, I thought, rather patchy.

The Theocritus item attracted me greatly, but I strongly disapproved of "Ma Parker" which I thought morbid. I am perfectly certain that any listener switching into the last part of that sketch by accident would immediately switch off again. I enjoyed Anne Thursfield's singing of "Madame Noy" more than anything, and "The Jackdaw and the Pigeons" least; it was not too well delivered.

Looking over the whole production I am definitely of opinion that Highbrow Vaudeville as an addition to, but not an alternative to ordinary vaudeville might well be a line of development in broadcasting. I am inclined to say: "go easy; don't make it too highbrow to begin with," but I am convinced that the idea is a good one.

There was a splendid vaudeville, of the other kind, earlier in the week. For one thing, it contained some very good impersonations, a form of art I happen to appreciate very much.

Florence Desmond was more than merely clever in her imitations of Gracie Fields and Alice Delysia; she succeeded in broadcasting their personalities so closely that I think it true to say that those who heard her could say they had heard her "victims." I should like to congratulate Miss Desmond and to express a sincere wish to hear her again soon.

The type of imitation given by Rita Brunstrom equally interested me; she evidently has the power to create fleeting

microphone characters. One day perhaps she will have a brain-wave and bring to life a character that will live. If so, she will do something definite for vaudeville.

The Western Brothers might be heard more often because they know how to handle topical songs—another style in vaudeville that might be developed much more than it has been. Good satires, cleverly written and rendered, make excellent entertainment.

Another virtue in this particular vaudeville was the linking-up by the Wireless Singers; the thought occurs to me at this moment that they might appear in some future Highbrow Vaudeville, singing madrigals.

One night, finding that I had already heard the two chief items, I stretched out and found an excellent vaudeville in progress on the Midland Regional.

At least two items ought "to come to London." Aerbut and Gaertie, in their very amusing interlude "Gaertie learns to Drive," which they delivered in perfect Birmingham dialect, would amuse London listeners, I feel sure.

I also enjoyed Vera Ashe and Gerald Lennan in a really clever little sketch called "What Women Want." I make the suggestion that these two items be heard from London, whether the artistes actually come up to town for the purpose or not.

Leonard Henry, in "April Foolishness" was, of course, funny; all the same, I think

I have heard him funnier. I am ashamed to grumble at him, though; he is inimitable.

One of the best broadcasts of the extravaganza type I have ever heard was that entitled "The Path of Glory." It appealed to me as being a very enjoyable satire, and was thoroughly-well produced. I hope Mr. du Garde Peach will develop a definite line in satirical writing for the microphone; the harder he hits the better we shall enjoy it.

I listened to part of "Songs from the Shows" this week. To be candid, I thought the so-called theme songs very poor fare. Not even John Watt could interest me in them. They were definitely bad, musically, in many instances; as for the words, "tripe" is the only term I can think of that suits some of them.

That seems to be about all the light shows I have heard this week; the rest of my page must be devoted to more serious thoughts.

The outstanding broadcast of the week was, of course, the greatest work of all time—the colossal Mass in B Minor of "John S. Bach," as I saw him designated in an American paper recently!

Considering its unwieldy proportions and the difficulties that must ever attend a performance of it, everything went off splendidly. The chorus sagged a little here and there, but there was some very good singing.

Of the soloists, Keith Faulkener was easily the most impressive. All the soloists were good—definitely so—but Faulkener created a deep impression on me for which I offer him my sincere thanks.

I should like to congratulate Dr. Boulton on his share; if I add that I thought the pace of the Sanctus a little too slow I am sure he will not mind. What it gained in dignity it lost in continuity.

Thinking of choral singing, I hope you all heard the Glasgow Orpheus Choir on the Saturday evening. I can think of no choir that approaches it in tone and precision. The National Chorus can learn much from such singing, in my opinion, and yet I say that with a deep respect for the National Chorus.

I enjoyed Albert Sammons and William Murdoch whom I heard play Cesar Franck's adorable piano and violin sonata. Sammons's tone amazed me throughout; he is certainly the best of our English violinists.
WHITAKER-WILSON.

PROGRAMME POINTERS

I have listened on every available occasion recently to the Wireless Singers, because I enjoy their singing. It has been in my mind for some weeks past to point out what I am convinced is a blemish in their make-up. They need the addition of another soprano. I do not want the present sopranos to be angry because I have made the suggestion; there is nothing wrong with them. It is merely a case of expediency for broadcasting. Their balance is not absolutely perfect. To say to the present sopranos "you must sing up more" is going to spoil everything; what is wanted is the addition of another soprano with a soft, round voice who will help to broaden and deepen the tone of the top part. Most choirs need a little extra weight at the top; this one is no exception. I offer the suggestion to Mr. Stanford Robinson as a mark of my keen appreciation of the Wireless Singers.

"COMPLETING THE 'A.W.' 'SIMPLE SUPER'" —Continued from previous page

An ordinary aerial and earth system may be used with the set. The selectivity is such that nothing is gained by using a small aerial, as is often arranged with small sets that are in themselves not very selective. With a good outdoor aerial the strength of the signal collected is, of course, greater than when a short or indoor aerial is used. Do not try using a frame aerial, and I mention this simply in order to avoid being asked the question.

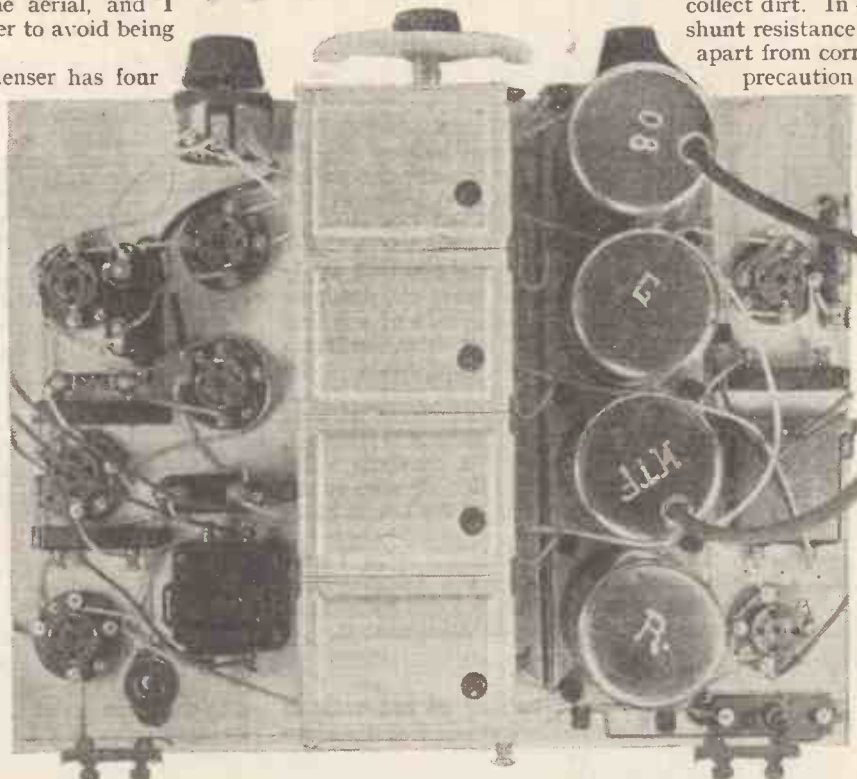
Now, the four gang condenser has four trimmers. The trimmer in the oscillator circuit is not used, so remove the trimmer adjusting piece from the fourth unit of the condenser, counting from the back of the set. You could unscrew this and leave it, but as it would be loose it is better to take it away.

Then unscrew the three remaining trimming condensers so that we start with the trimming condensers at their least capacities. Now switch the set to the medium waves, and having assured yourself that the set is all right by listening to the local station, turn to a station at about 40 degrees. Then, with the aerial pre-set condenser set at its maximum capacity; that is, with the screw turned downwards, try adjusting the trimmer of the third condenser. Move it very slowly and leave it at the point where the signal seems the loudest.

If necessary, use the volume control to weaken the signal in order that a slight change in the tuning may be detected. Then try the second trimmer and finally the first. Now the setting of the first trimmer depends upon the size of the aerial and upon the setting of the pre-set condenser. You must, therefore, now turn to a station at about 160 degrees. Go over the trimmers once again, and you may find that the trimmer of the first condenser needs adjusting.

To avoid this, lower the capacity of the pre-set aerial condenser by unscrewing the knob a little. Try the set again at about

40 degrees and you will probably find that the tuning is correct. You could avoid this in the first place by setting the pre-set condenser at a low value to start with, but this involves a reduction in the signal strength. The thing to do, therefore, is to use as much capacity in the pre-set condenser as possible and this can best be



This plan view of the "Simple Super" makes many of the constructional details obvious and gives a good idea of the general layout

determined by trying the set at two points, one low on the scale, the other at the top.

Super" in the radio department of Selfridge's.

YOUR ACCUMULATOR

ALWAYS keep the top surface of your accumulator clean. During charging, acid sprays up from the vents and is deposited as a surface layer, which tends to collect dirt. In course of time this forms a shunt resistance across the terminals, quite apart from corroding them. Another wise precaution is to keep an eye on the sludge thrown down from the plates. A certain amount does no harm, but after a time it will bridge the plates unless it is cleaned out. This may be one reason why an accumulator will not hold its charge for the proper length of time, though a second and more likely cause is sulphation. M. B.

COLD-CONTACT RECTIFIERS

IN spite of its apparent simplicity, the real action of the ordinary catswhisker-crystal contact is still largely wrapped in mystery. There are, of course, various theories of operation, all highly complicated and none wholly satisfactory. The same applies to the dry-contact (copper-copper-oxide) rectifier used in connection with mains-driven sets. The problem is made more puzzling by the recent discovery that this type of rectifier is also photo-sensitive. M. B.

M. B.

A further contributor to the series of talks, called "Hazard," which are to be given on Saturdays, is Mr. G. W. T. Garrod, who will describe his experiences when he crashed in the jungle in Central Africa and was lost for several days.

Val Vaux will appear in a concert by the Studio Orchestra on May 7.

THE COMPONENTS REQUIRED FOR BUILDING THE "SIMPLE SUPER"

Baseboard, 16 in. by 12½ in. (Cameo, Peto-Scott, Read-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, Igranie, 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, Lewcos, Lissen, Wearite, Goltone, Dubilier).
 Low-frequency transformer (Lissen Hypernik, Telsen, Lotus, Ferranti, Varley, Goltone, Lewcos, Igranie, R.I.).
 .0003-mfd. maximum pre-set condenser (Sovereign, Formo, Telsen, Igranie, R.I., Lissen, Polar, Goltone).
 Grid-leak holder (Read-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).

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, Ealex).

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

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

Connecting wire and sleeving (Lewcos, Jiffilux, 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).

The trimming holds good over both wave ranges and is completed in a few minutes, although it takes longer to describe. Next week I will give operating hints.

London readers should avail themselves of the opportunity of seeing the "Simple

Percy Harris "Mascot"

In connection with the Percy Harris "Mascot," it should be noted that either WD₂ or HD₂ Triotroa valves are suitable in the detector stage.



IN MY WIRELESS DEN

Weekly Hints—
CONSTRUCTIONAL & THEORETICAL
BY
W. JAMES

INSIDE "SPAGHETTI'S"

FLEXIBLE type wire-wound resistances are composed of a core over which is wrapped the resistance wire. The diameter of the core is not the same for resistance units of different values and produced by various makers. Sometimes it is quite thin.

Then the unit is usually fairly fragile. The wire used is very fine in high-resistance units and were it not for the protecting cover of systoflex or similar tubing, would be troublesome in practice. As the units have a stout covering, however, they are strong enough to withstand ordinary handling.

The ends are fastened in various ways. Sometimes the ends of the resistance units are bound with copper wire and a metal sleeve is fitted over an end and fastened by pressing the sleeve. This joint is satisfactory enough provided the work is properly done. In other cases the joint is welded, so making sure of a good contact which is also a sound mechanical job.

From these notes you will gather that the unit must not be stretched for the purpose of making it reach between two points. Neither must the ends be fastened in such a way that the core is bent at too acute an angle. With care, these resistance units will be satisfactory.

Some are poorly made and the ends should be tightened before they are joined in the circuit. I have had some with ends which were quite loose and to use them in this state is to ask for trouble.

It is advisable to let the resistances lie straight or in a gentle curve. If they are twisted or bent they may give trouble. The best makes stand rough handling, I know, but some of the others do not, and it is a wise precaution, therefore, to examine the end connections and to handle the units with care.

Incidentally, I have found more than once that the unit was marked a resistance value different from that on the box. You can check resistance values if you have a milliammeter. One volt will send 1 milli-ampere through 1,000 ohms. You can, therefore, choose a voltage that will send a current within the range of the instrument through the unit and so check its value.

FITTING A PICK-UP

There are many ways of connecting a pick-up to a circuit, sometimes using a switch to alter the circuit.

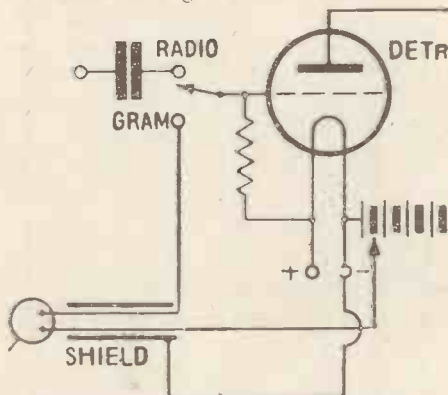
It is safe to leave the grid lead in the detector grid circuit in many instances,

especially in mains sets, a further precaution is to employ a shielded pick-up flex.

The accompanying diagram shows these points. A simple switch is used and the pick-up may be left connected as shown. The grid of the detector valve is not opened at all during switching and this is an advantage. For one thing, loud clicks are avoided and secondly the valve is properly used.

The shielded covering is earthed at a convenient point. Sometimes the metal part of the pick-up must be earthed as well and this is easily arranged. It is better to earth the shielding and not to connect it to the grid-bias side of the pick-up circuit.

This will avoid the necessity for finding out which wire goes to the bias. When



This is the method of gramophone pick-up connection referred to by W. James

a metal chassis is used, the shielding can be joined to this. Hum is often greatly reduced by shielding and a tendency to whistling that sometimes is a difficulty is removed.

IS THE INSULATION POOR?

It needs a little rain to find out some aerials. If the insulation is poor, the results may be fair during dry weather. But when rain has wetted the parts, leaks occur and the results are below standard. Too many people are careless in this matter. They take the aerial and the earth for granted.

Hours are spent in trying to improve the set when in many instances I am sure that a half-hour spent on the aerial and earth system will greatly improve the results. Good aerial insulators should be used. Use long ones if possible. Do not have any twisted joints. They soon get dirty and lower the signal strength.

If joints are necessary, see that they are properly soldered. Do not bring the aerial near the gutter or other pipes. A good aerial-earth switch is a necessity. A cheap one is

likely to give trouble and leaks may occur. Perhaps earths are more neglected than aerials.

The all too common practice of driving a small tube into the ground and forgetting about it is responsible for many cases of poor results and such faults as slight hum and instability. The aerial and earth should be gone over at regular intervals and any necessary work be carried out.

USING A "MAINS" AERIAL

Mains aerials are satisfactory in some instances and not in others. There is no accounting for the great differences in the results. The length of the flex from the mains set to the power point may affect matters and it is well known that reversing the power plug may alter the results.

A short indoor aerial is sometimes much more effective than a mains aerial and the reverse is often true. If you cannot manage an outdoor aerial, therefore, try an indoor aerial as well as a mains aerial.

TWO SPEAKERS?

Two speakers may well sound better than a single instrument. Even when two loud-speakers of the same pattern are used, the results may be much better than when only one is used.

You can experiment in two ways. The first is in the method of connecting the speakers, which can be joined in series or parallel. One may be coupled through a transformer and the other through a choke condenser filter depending upon the instruments themselves.

Then the positions of the speakers can be varied and noticeable difference in the quality be detected merely by changing their relative positions in the room.

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

WONDERFUL QUALITY



says Mr. James

THE LISSEN HYPERNIK 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 m/A. or more. Its step-up ratio is 4 to 1, and a stage amplification of more than 100 is obtained.

PRICE **12/6**

USE ALSO LISSEN FIXED CONDENSERS, LISSEN GRID LEAKS, LISSEN H.T. BATTERIES, LISSEN GRID BIAS BATTERY AND LISSEN ACCUMULATOR AS SPECIFIED

"THE quality is remarkable . . . you could not build a better battery set," says Mr. James in his introductory article on the "Simple Super" in Amateur Wireless, April 9.

The reason is not far to seek! The Lissen Hypernik Transformer, Lissen Fixed Condensers and Resistances, Lissen H.T. and G.B. Batteries and Lissen Accumulator—these are all used in the original set. No wonder the output is wonderfully pure, the frequency response particularly well-balanced and pleasing to the ear.

Build the "Simple Super" with Lissen parts and make sure of that fine tone and volume which Mr. James has planned to give you.

LISSEN

THE PARTS THAT PULL TOGETHER

LISSEN LIMITED . WORPLE ROAD . ISLEWORTH . MIDDLESEX

Don't Forget to Say That You Saw it in "A.W."

SETS OF DISTINCTION



THE CLIMAX ALL-ELECTRIC RADIO-GRAMPHONE

Makers: Climax Radio Electric Ltd.
Price 22 guineas

THIS week my test report deals with what must surely be the most inexpensive table radio-gramophone on the market—the Climax. Having had this on test at my home in south-west London for two consecutive evenings, I am now able to award it my heartiest recommendation. Let me say at once that the gramophone reproduction is first-rate, and that the radio performance is well up to the standard to be expected from a three-valver.

As the illustrations clearly show, the Climax radio-gramophone is fitted into a table cabinet of distinctive design. The front of the cabinet is taken up by the moving-coil loud-speaker, and on lifting the lid we find one of the latest electric gramophone turntables working in conjunction with a Climax pick-up.

Accessible Valves

On removing the back of the set we find accessible holders for the screen-grid, detector and pentode valves, and also a holder for the mains rectifier valve—for this radio-gramophone works from A.C. mains.

A terminal strip at the back carries sockets for the connection of an additional loud-speaker. There are also sockets for the aerial and earth leads and for the insertion of the mains plug. Coming from the mains flex is a lead giving a mains-aerial connection when plugged into the aerial socket.

The mains on-off switch and the gramophone switch are also mounted at the back. The gramophone switch is pulled out when records are required to be reproduced, and pushed in when radio is wanted.

The unusual layout of the controls is more than justified in practice, as my tests conclusively proved. A flexible degree of selectivity is obtained by the two tuning circuits, which are operated by a large knob having a super-imposed trimmer knob. This tuning device gives the facility of one-knob control without loss of sensitivity.

The flexibility of the selectivity is provided by a stud switch control mounted below the main tuning device. There are eight positions for this knob, and on the third position from the minimum volume

point, which is, of course, the maximum selectivity point, the performance with my 60-foot aerial was extremely good.

It is interesting to record that this performance was approximately as good when using the mains-aerial connection. That is to say, volume with adequate selectivity was obtained.

The selectivity is such that London National and Regional stations were confined to a 20-metre spread on the stud position already mentioned. I was glad to find that sensitivity is well maintained at the top of the medium waveband, Budapest coming through at good strength.

Long-wave Performance

On the long waves Radio Paris was brought in at remarkable strength and quality, absolutely clear of Daventry. Altogether five stations were logged at good strength on the long waves. There were others suffering from heterodyne interference. The tuning on the long waves goes down to 800 metres, so it is possible to get the A.A. weather reports sent out eight times daily on a wavelength of 830 metres. You can also listen to some of the interesting telephony traffic on the air-liner channel of 900 metres.

During these tests I appreciated the fact that the tuning dial is calibrated in wavelengths. These are quite accurate when the trimmer is properly adjusted. In fact any great discrepancy between the wavelength calibration and the corresponding wavelength of a wanted station may be taken as some indication that the trimmer has been incorrectly set. The dial, by the way, is illuminated when the set is switched on.

The two subsidiary controls take the form of a wave-change switch knob on the left and the reaction knob on the right.

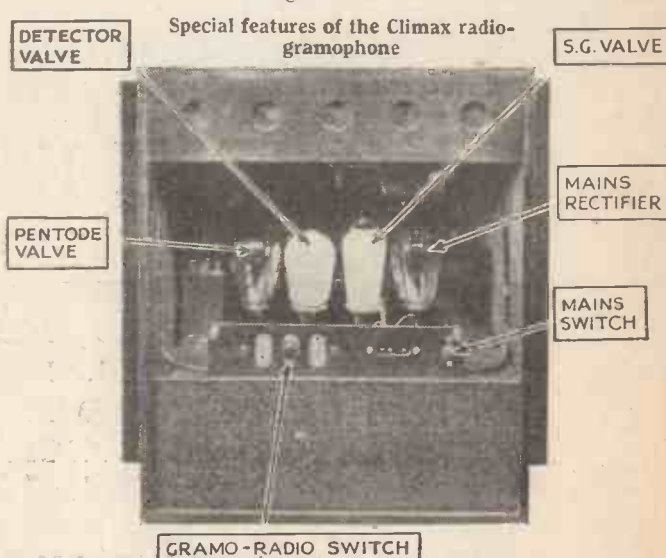
Good Quality

The quality is notable for the clean-cut bass and for the absence of needle scratch. The neat automatic stop and the speed control lever are features of the gramophone motor. The lid can be closed down during the playing of 10-inch records but for 12-inch records the lid must be kept open.

Further tests on the radio side clearly demonstrated the value of the combined selectivity and volume control. As my test was carried out only twenty miles from Brookmans Park the maximum sensitivity stud of this control could not be utilised when receiving stations on wavelengths close to the wavelengths of the two London stations.

But during the reception of such stations as Budapest at the top of the medium waveband and Cologne near the bottom of this band, considerable volume was obtained by decreasing the selectivity. The outstanding feature of the radio performance is the ability to suit all conditions.

Altogether the Climax All-electric Radio-



gramophone is fine value for money. It should command a wide appeal among listeners wanting the best of two worlds—first-class radio programmes and good-quality record reproduction.

SET TESTER.



THE BASIS OF EXCEPTIONAL SETS

12¹/₆

5¹/₆

The Mighty Lissen Power Pentode and the Lively Lissen Detector

You can use these valves in any set with one stage of L.F. amplification and get better results from your set than ever the original designer dreamed of. The lively Lissen Detector Valve brings in the foreigners like magic. It adds amazingly to the range of any receiver. The Lissen Power Pentode, whose magnification factor is more than 90, gives volume such as you have never heard before. Many more stations, and all loud and clear, crisp and enjoyable to listen to—that is what these two valves give you.

LISSEN P.T. 225

The Lissen Power Pentode Valve—P.T.225—converts any set with one stage of L.F. amplification into a fine, full-volume "Pentode-output" receiver. This valve puts new power into your loud-speaker, and new brilliance of tone, too. Use it instead of a power valve and at once you get an amazing step-up in volume. And it takes no more current than the power valve it replaces—its H.T. consumption is only 7 m/A.

Ask for Lissen P.T.225. Price

12¹/₆

LISSEN H.L.210

The Lissen Detector Valve—H.L.210—liven up your tuning, gives you extra range, greater sensitivity. It is so responsive that it brings the foreign stations in like magic. Not only this, but it passes a crisper, more powerful signal on to the L.F. stage of your receiver, and you get louder, clearer radio altogether.

Ask for Lissen H.L.210. Price

5¹/₆

LISSEN VALVES

A Brilliant British Best!

LISSEN LIMITED

WORPLE ROAD

ISLEWORTH

MIDDLESEX

Advertisers Appreciate Mention of "A.W." with Your Order



"Ten-Station Two"

SIR,—I want to tell you how much I appreciate the "Ten-station Two" circuit in the current issue of your journal.

I have tried many circuits, but never with such results as this one.

My great difficulty in the first place was to buy the special tuner, the Autokoil, but I was able to purchase one direct.

The results certainly justify your remarks as to ease of operation and tuning, but why have you called it the "Ten-station Two"? I was able to receive over twenty stations on my speaker and I have only an indoor aerial tucked away in the roof.

Both long- and short-wave stations seem to roll in and I even received Croydon talking to an aeroplane.

Radio Paris and Rome were very loud indeed, and for the first time I was able to get Northern Regional perfectly.

The set is so easy to make, that I feel sure there must be thousands of others who would like to build it if they only knew how jolly good it is.

H. S. P. (London), N.4.

Valves and H.T. Supply

SIR,—I have made up for use with A.C. mains, a receiver which was originally designed to have a mains pentode output valve. As I do not care for pentodes, I replaced the latter valve with two A.C. mains power valves in push-pull. Although I have altered the biasing resistances and other aspects of the circuit correctly I find that results from the speaker are very poor. Surely the use of two valves in push-pull

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.

should give me more power than a single pentode?

G. W. (London).

It is to be expected that two ordinary A.C. mains valves would give more output power than a single pentode, but this, of course, depends entirely upon the type of valves in question. You seem to have overlooked the fact, however, that your two mains type power valves may be consuming far more anode current than the single pentode. If the H.T. supply portion of your receiver has only been designed to give just the right output for the pentode and other valves of the original design of receiver, you have not sufficient current supply available for the satisfactory working of your present arrangement of valves. You are advised to look into this matter and, if necessary, use a more powerful H.T. supply system for your receiver.—Ed.

L.F. Whistling

SIR,—I have just installed a moving-coil speaker in place of a cone type speaker. Previously, I used a choke-filter output with the cone speaker, but as the moving-coil speaker has its own output transformer I have dispensed with the choke and condenser of the filter. I now find I get L.F. whistling all the time the receiver is working and I cannot eliminate this trouble. Can you suggest what may be causing the trouble? F. M. (Hulme).

It seems that you are using speaker extension leads between your set and the speaker. As the speaker has its output transformer incorporated at its base, it follows that the extension leads come between the output or anode circuit of the last valve and the primary of the speaker transformer. This sets up L.F. instability and interaction which gives rise to the whistling. You should put the input transformer by the side of the receiver and arrange the extension wires from the secondary terminals of the transformer to the speaker or you will need to keep your speaker close to the receiver.—Ed.

Modulation Heterodyning

SIR,—On certain settings of the tuning of my set I get programmes from stations which appear to be mixed up with a lisp kind of noise. On some stations, like London Regional and also Midland Regional, it is impossible to eliminate this lisp without losing the stations signals altogether. Can you explain the cause and, if possible, a remedy?

H. Y. (Guildford).

The lisp noise is due to modulation heterodyning between two stations and cannot readily be eliminated. It is a somewhat different form of interference from that known as carrier-wave heterodyning. With the latter, a continuous whistle is experienced. Where modulation heterodyning is experienced, perhaps the only possible remedy would be to use a variable- μ screen-grid H.F. valve and to sharpen up the tuning of the various circuits as well. A definite cure cannot be guaranteed.—Ed.



(Inset.) The dotted lines in this aerial photograph show the proposed extensions to the Ekco factory, and (above) a busy scene in one of the assembly shops

NEW EKCO FACTORY

HUGE factory extensions and the installation of new plant which will have a far-reaching effect on the radio section of British industry are being undertaken by E. K. Cole, Ltd., the manufacturers of Ekco sets and mains units.

The extent of the new factory is indicated by the dotted lines in the aerial view of the existing Ekco factory at Southend-on-Sea, and a busy scene in one of the assembly departments is shown by the top photograph.

Giant bakelite presses are being installed for mouldings used in the manufacture of set cabinets and mains units. It is understood that the largest presses at present operating in this country are of six hundred tons. The new Ekco plant comprises three 1,000-ton hydraulic high-speed presses!

A 35-ton crane runs the whole length of the building to handle the moulding dies. A further extension of the existing factory building is necessitated by the bakelite factory, and the office space will be expanded.

To enable the maximum benefit to be derived from the new factory and bakelite presses, three shifts a day will be employed, so that the machines will run 24 hours each day and will, virtually, never cease working! The Ekco factory is rapidly growing, and the new plant and factory equipment will make for greatly increased production.

PILOT BAND-PASS UNIT

**INSTANTLY
CONVERTS
ANY SET TO
BAND-PASS
TUNING**



The only Unit that adds needle-point selectivity without decreasing Signal strength!

NOT A WAVETRAP
Connected in One
Second
No Circuit alterations
No extra Valve
No additional Batteries
Long and Medium
Waves
No Coil-changing
Slow Motion Control
Effectively Screened



UNDER modern Broadcasting conditions your Set must be equipped with this New and amazing selectivity Unit. Then—and only then—will your selectivity problems be completely solved once and for all. Whether your set is Mains or Battery operated, the PILOT BAND-PASS UNIT cuts out programme interference effectively and sharpens tuning to needle-point selectivity.

No longer need you tolerate indifferent Radio caused by flat tuning and inefficient tuning circuits. Fit this Unit to your Set and immediately enter a new world of clear, sharp programme reception. It is simple to attach and can be operated by anyone without technical knowledge. Your dealers should have it in stock. If not, send direct by posting the coupon to-day.

ORDER NOW—IMMEDIATE DELIVERY

PETO-SCOTT CO. LTD.
77 CITY ROAD, LONDON, E.C.1 (TELEPHONE 1 CLERKENWELL 9406)

25/-

CASH OR C.O.D. POST FREE
Nothing More to Buy

Dear Sirs—Please despatch to me at once CASH/C.O.D. 1 PILOT BAND-PASS UNIT complete with simple operating instructions for which I enclose 25/-

NAME.....
ADDRESS.....

NW, 23/4/32

Don't Forget to Say That You Saw it in "A.W."

WE TEST FOR YOU

A weekly review of new components



and tests of apparatus

Conducted by J. H. REYNER, B.Sc., A.M.I.E.E.

NEW LISSEN COIL

WE have received for test this week one of the Lissen 1932 dual-range shielded coils. This coil has been designed for universal application and it can be used in any of the tuned circuits of a receiver. The construction of the coil is very simple, the short-wave grid coil and reaction windings are wound on a small paxolin former, 1 in. in diameter. The long-wave winding is accommodated in a built-up slotted former, mounted at the bottom-end of the short-wave section. The circuit employed is quite normal, the aerial being tapped approximately a quarter of the way up the short-wave winding, this connection holding for both short- and long-wave reception. It should be noted that the makers state that a condenser having a maximum value of .0001 microfarad must be connected in series with the aerial. For wave-changing a two-point shorting switch is required. The reaction coil is entirely separate from the other windings, thus making it possible to employ different types of reaction circuit as may be desired by the user.

The coil is mounted on a moulded bakelite base provided with terminals for the external connections. A 2½-in. shielding can, with a circular metal base to act as an undershield, are also provided.

On test, about six miles from Bookmans Park with a full outdoor aerial, it was found possible by employing a variable condenser of .0001 maximum in the aerial circuit, to separate the two Brookmans Park



The new Lissen dual-range coil with the shield removed to show the winding arrangement

stations. At this short distance from Brookmans Park there was some breakthrough of the short-wave stations on to the long waveband, but this could be minimised by the use of the variable aerial condenser.

A high-frequency test was conducted on the coil and at 400 metres the effective resistance was just under 9 ohms. On the long waveband at 1,600 metres the value obtained was 56 ohms.

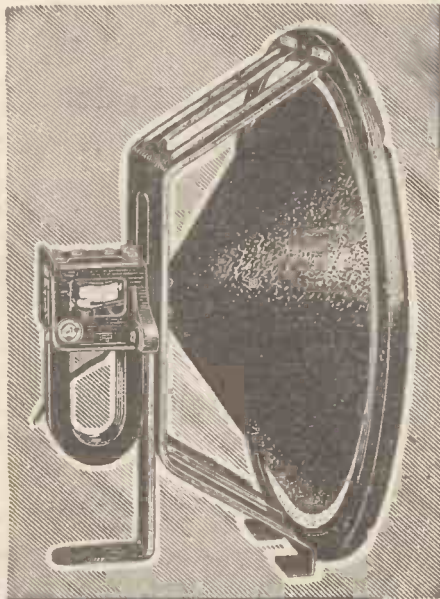
Considering the small size of the coil, these figures are good. This coil is neatly made, and at the price of 6s. 6d. complete with shield, is good value.

LOTUS SLOW-MOTION DIAL

THE Lotus slow-motion dial which we are reviewing this week is a neat and simply made piece of apparatus. The metal frame which carries the dial and slow-motion mechanism is of ample proportions thus ensuring the rigidity which is essential for the smooth working of a slow-motion dial. This frame is arranged for screwing or bolting to the baseboard, thus allowing the dial to be mounted independently of its associated condenser. The frame also carries a socket for an ordinary flash-lamp type bulb, which is wired to the filament circuit and used to illuminate the dial from the rear.

The dial itself is made of ivory, and is set at an angle so that it can conveniently be seen through the metal window provided. Two 100-division scales are engraved on the dial, one above the numbering and one below, this latter being in red.

(Continued on page 784)



As good as the dearest MOVING-COIL SPEAKER

The amazing performance of BLUE SPOT Inductor Type 100U is difficult to credit—until you hear it for yourself.

It has all the sensitiveness of a good Moving-Coil Speaker. It has the same ability to reproduce the bass notes to perfection; but it goes one better, for it does not develop the lower notes at the expense of the higher. The whole musical scale is reproduced as clearly and crisply and correctly as in the original.

Hear it for yourself. Test it with speech and song and music and you will be completely convinced.

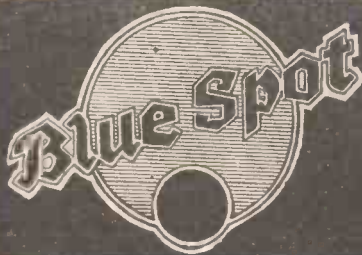
Write for illustrated Catalogue No. A.W. 33.U

100D, an attractively designed Cabinet Speaker in fine quality oak, 63/-. COMPLETE MOUNTED TO CHASSIS

100U

39/6

BRITISH MADE



THE BRITISH BLUE SPOT COMPANY LTD.

BLUE SPOT HOUSE, 94/96 ROSOMAN ST., ROSEBERY AV., LONDON, E.C.1
Telephone: Clerkenwell 3570. Telegrams: "Bluospot, 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

HL2

METALISED



LOOK FOR
"EDDY" IN
YOUR DEALER'S
WINDOW



Further evidence of the supremacy of the new range of 2-volt Mazda valves is here in the metalised H.L.2. Extreme sensitivity joins with absolute stability, and its high amplification coupled with a comparatively low impedance renders it particularly efficient as a leaky grid detector or intermediate L.F. amplifier. The steep slope of the H.L.2 also makes it suitable for use as an anode bend detector.

Mazda valves are 100% British made and designed by British engineers.

THE AMAZING

MAZDA

THE
BRITISH
VALVES

EDISWAN RADIO

ANOTHER
BIG
ACHIEVEMENT
IN THE NEW
MAZDA
2-VOLT
RANGE

MAZDA 2-VOLT RANGE

H.210	- 7/0	P.240	- 12/0
HL.210	- 7/0	PEN.230	17/6
*HL.2	- 7/0	PEN.220	17/6
*L.2	- 7/0	PEN.220A	17/6
P.220	- 8/9	S.G.215	- 16/6
P.220A	- 12/0	*S.215A	- 16/6
		*S.215B	- 16/6

★ METALISED

THE EDISON SWAN ELECTRIC CO. LTD.
RADIO DIVISION:
155 CHANCING CROSS ROAD, LONDON, W.C.2

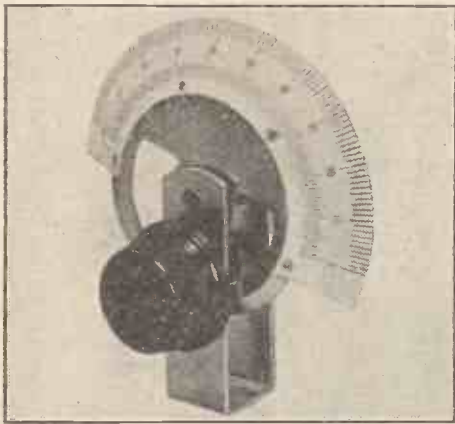


V.144

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

"WE TEST FOR YOU"
(Continued from page 782)

The slow-motion mechanism is of the friction type and is free from backlash, but at the same time the action is



One of the new Lotus slow-motion dials quite smooth. The reduction ratio is approximately 8-1.

The dial retails at 5s. complete with a driving knob, metal window, and template for fixing.

CUTTING OUT INTERFERENCE

VISITORS to the *Daily Mail* Ideal Home Exhibition can see in the Post Office exhibit the latest methods of cutting out radio interference.

Two new sets are demonstrated, an R.I. Madrigal and a G.E.C. radio-gramophone, and the reception on both of these

is utterly spoilt by violet-ray apparatus, traffic control signals and vacuum cleaners worked close to them for demonstration purposes. The Post Office engineers show how this interference can be entirely cut out by closing a switch which brings into action a number of filter circuits which bypass the H.F. interference. Circuit diagrams and other information are given free, and the technical representatives of the Post Office are available to give every assistance in cutting out interference with radio reception.

An "A.W." representative spent an interesting hour investigating the methods adopted by the Post Office for cutting out the most difficult interference—such as that caused by violet-ray apparatus—and readers should take advantage of the opportunity to talk, at the Exhibition, with the Post Office engineers about any local interference.

CHOOSING A CABINET

WE are informed by the Carrington Manufacturing Co., Ltd., that re-decoration and several alterations have been carried out at the Camco showrooms, 24 Hatton Garden, London, E.C.1, which facilitate the inspection of the whole range of cabinets on show. Readers are invited to see the new Camco cabinets, and those who cannot conveniently call should write for a copy of the new illustrated catalogue, free on mention of "A.W."

BUILD THE "SIMPLE SUPER"

A GOOD GRAMOPHONE MOTOR

GRAMO-RADIO users will be interested in a good triple-spring gramophone motor marketed by the Cabaret Electric Co., 170 Vauxhall Bridge Road, S.W.1. This motor, which is supplied



The triple-spring gramophone motor of the Cabaret Electric Co.

complete with a plated metal baseplate and a 12-inch turntable, is capable of playing three twelve-inch records. It is made up on a solid cast frame, with enclosed wheelwork and efficient wick oiling, lubricant being contained in a reservoir below the gearing. An automatic stop and long detachable handle are provided, making it very suitable for mounting in a radio-gram console-type cabinet.

Charles Brewer is to produce one of the most successful of his Midland Regional radio musical comedies for National listeners on May 3 and Regional listeners on May 4.

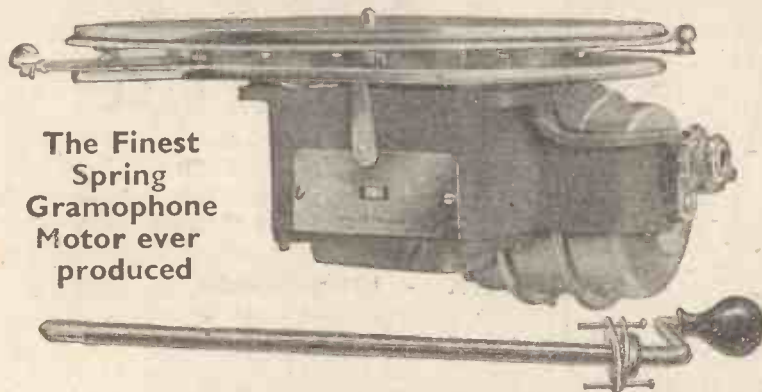
These Motors were made especially for one of the world's leading gramophone manufacturers, exclusively for use in models priced from £25 upwards.

Unprecedented Offer

OF BRAND NEW

35/-

GARRARD SUPER TRIPLE SPRING GRAMOPHONE MOTORS



The Finest Spring Gramophone Motor ever produced

An unusual circumstance—the opportunity of a lifetime—enabled us to secure from a world-famous firm of gramophone makers these Garrard Super Motors at a price much below actual cost. The Garrard Super Triple Spring Model is the finest spring gramophone motor ever made. It combines exceptionally long running with perfect regularity, strength, silence, and a silent wind.

This Garrard Super Motor embodies three distinct spring drive units and is thus three times as powerful and long running as the ordinary single spring motor. All working parts are totally enclosed.

Fitted with motor plate, speed regulating lever, safety friction clutch, velvet-covered 12-inch turntable, winding handle, and automatic brake. All bright parts heavily nickel-plated.

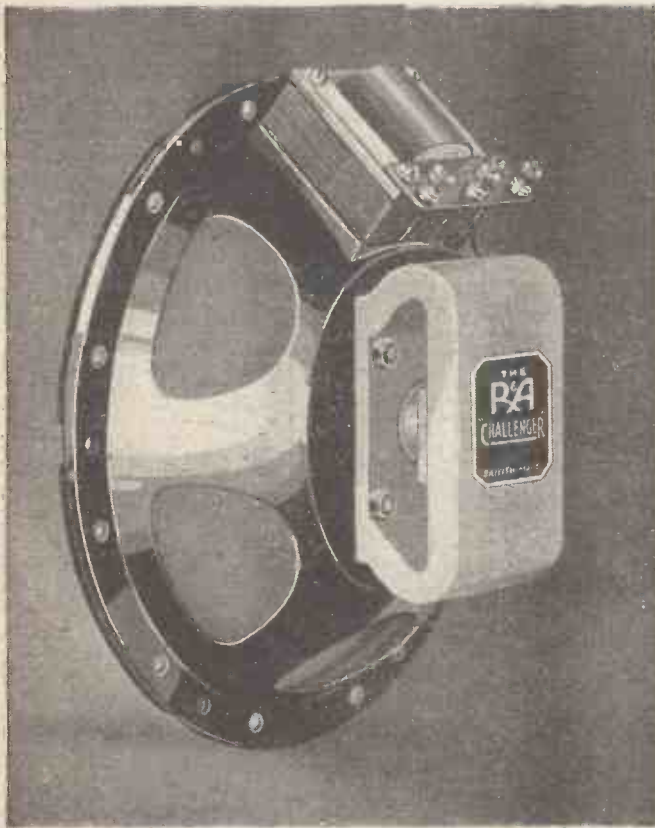
List price £4:1:3 Offered at **35/-** Carriage Paid

Secure yours while the offer lasts!

Fits into all Cabinet Gramophones & Radio-Grams
Will play 3-12" or 4-10" Records at one winding

A limited number in Gilt, 5/- Extra.

Postal Orders and Money Orders should be crossed, and Treasury Notes sent by registered post
CABARET ELECTRIC Co., 170 Vauxhall Bridge Road., London, S.W.1 and 238 High Street, Lewisham, London, S.E.13



The R. & A. 'Challenger' notwithstanding its phenomenally low price, will, given an undistorted input, reproduce speech and music with absolute fidelity. Its sensitivity is such that it gives satisfactory results when used with the average power valve, and it will accept 3 watts undistorted A.C. without distress, thus providing a volume of reproduction more than sufficient for normal requirements.

35/-
INCLUDING
MULTI-RATIO
FERRANTI
TRANSFORMER
 (TO R & A SPECIFICATION)

BRIEF SPECIFICATION :-

- CHASSIS ... 8 1/2-in. diameter, pressed steel, stove enamelled black, fitted with felt facing sectors.
- DIAPHRAGM ... 6 1/2-in. diameter, moulded in one piece with surround.
- COIL ... 1-in. diameter, 0.7 ohms impedance at 1,000 cycles.
- MAGNET ... Forged 15 per cent. cobalt steel, cadmium plated. Flux density 6,800 lines per square centimetre.
- TRANSFORMER Bolted to chassis. Ratios 10, 33, and 44 to 1. Large core, sectional primary winding. Made by Ferranti Ltd., to R. & A. specification.

Your Dealer will gladly demonstrate. Write to us for Descriptive Literature.



PERMANENT MAGNET MOVING COIL REPRODUCER

Reproducers & Amplifiers Ltd., Frederick St., Wolverhampton

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

A
PERTRIX
 TRADE MARK

BATTERY FOR EVERY PURPOSE AND PRICE

High Tension or Low Tension—inexpensive or Super Capacity Batteries—every need for wireless power can be met from the Pertrix range.

The extraordinary long life qualities of Pertrix Batteries are the result of over forty years of battery manufacture.

Plug into Pertrix and forget all your Battery troubles!

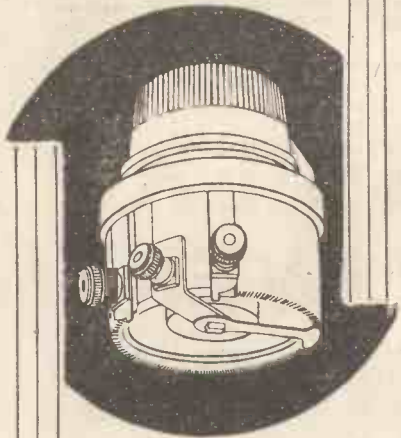
PERTRIX
 TRADE MARK

HIGH TENSION BATTERIES AND ACCUMULATORS

- PERTRIX H.T. BATTERIES
 60 volt—5/6 100 volt—9/- 120 volt—11/-
- PERTRIX STANDARD CAPACITY H.T. BATTERIES
 60 volt—8/- 100 volt—13/- 120 volt 15/6
- PERTRIX WIRELESS ACCUMULATORS
 from 4/6

Advt. of Britannia Batteries, 283, Shaftesbury Avenue, London, W.C. 2.
 Works: Redditch (Worcs.)
 Telephone: Temple Bar 7971 (3 lines).

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 setting.

For all voltage regulation
and volume control.

COLVERN LIMITED
MAWNEYS RD., ROMFORD
ESSEX

ARKS

YOUR TUNING GUIDE

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 (G5SW)	16.0	327.4	916.4 Poste Parisien	85.0	240.2	1,249.2 Stavanger	0.5
242.3	1,238 Belfast	1.0	327.5	916 Grenoble (PTT)	2.0	241.9	1,249 Bergen	1.0
261.0	1,147 London Nat.	50.0	345.2	869 Strasbourg (PTT)	11.5	387.6	816 Frederikstad	0.7
288.5	1,040 Newcastle	1.2	384.4	812.4 Radio LL (Paris)	0.5	405.9	605 Trondheim	1.2
288.5	1,040 Swansea	0.12	450	779 Radio Toulouse	8.0	1,083	277 Oslo	60.0
288.5	1,040 Plymouth	0.12		666.7 Paris (PTT)	0.7	POLAND		
288.5	1,040 Edinburgh	0.3	406	644 Lyons (PTT)	1.5	214.2	1,400 Warsaw (2)	1.9
288.5	1,040 Dundee	0.12	1,445.7	207.5 Eiffel Tower	13.5	234.9	1,243 Lodz	2.2
288.5	1,040 Bournemouth	1.0	1,725	174 Radio Paris	75.0	312.8	959 Cracow	1.5
288.5	1,040 Aberdeen	1.0	232.2	1,292 Radio Paris	0.25	334.4	897 Poznan	1.9
301.5	995 North National	50.0	GRAND DUCHY of LUXEMBURG			380.7	788 Lvov	16.0
309.9	968 Cardiff	1.0	1.50	240 Luxemburg	1.0	409.8	732 Katowice	12.0
356.9	843 London Regional	50.0	GERMANY			506.5	529.6 Wilno	16.0
376.4	797 Glasgow	1.0	31.38	9,560 Zeesen	15.0	1,411.8	212.5 Warsaw	120.0
398.9	759 Midland Regional	25.0	217	1,382 Königsberg	0.75	PORTUGAL		
480	625 North Regional	50.0	218.5	1,373 Flensburg	0.5	282.2	1,063 Lisbon (CTIAA)	2.0
1,554.4	193 Daventry (Nat.)	30.0	219.9	1,364 Cassel	0.25	also on 42.9 m. (Fri.)		
AUSTRIA								
218.7	1,375 Salzburg	0.5	232.2	1,292 Nürnberg	2.0	ROMANIA		
245.9	1,220 Linz	0.5	245.9	1,220 Cassel	0.25	394	761 Bucharest	12.0
285.2	1,052 Innsbruck	0.5	253.1	1,185 Gleiwitz	5.0	RUSSIA		
352.1	852 Graz	7.0	259.3	1,157 Leipzig	2.0	349	860 Leningrad RV70	10.0
453.2	666 Klagenfurt	0.5	269.8	1,112 Bremen	0.2	358	838 Moscow (Exp.)	15.0
617	582 Vienna	15.0	276.5	1,085 Heilsberg	60.0	368.1	845 Kharkov	10.0
also testing on 1,237 m. from 7.0 p.m. (Mon., Wed., Sat.)								
BELGIUM								
206	1,456 Antwerp	0.25	283	1,060 Magdeburg	0.5	378	792.5 Moscow Regional	20.0
210.2	1,429 Liege	0.15	283	1,060 Berlin (E)	0.5	385	779 Stalingrad	10.0
215.3	1,393 Chatelineau	0.2	283	1,060 Stettin	0.5	424.3	707 Moscow-Stalin	100.0
215.6	1,391 Bruxelles	0.2	318.8	947 Dresden	0.25	411	729.2 Pokrovsk-Volgo	20.0
Conference 0.2								
216	1,389 Liege	0.1	325	923 Breslau	1.5	449	417 Odessa RV13	10.0
221.4	1,355 Binche	0.1	300.6	832 Mühlacker	60.0	473.2	637.5 Sebastopol	10.0
240.8	1,245.8 Liege (Exp.)	0.1	372	806 Hamburg	1.5	502.4	597 Nijni Novgorod	10.0
268.3	1,118.1 Liege (Cointe)	0.4	389.6	770 Frankfurt	1.5	720	416.6 Moscow (PTT)	20.0
283.6	1,058 Brussels (SBR)	0.5	419.9	716 Berlin	1.5	824.2	364 Sverdlovsk RV5	50.0
337.8	888 Brussels (No. 2)	15.0	453.2	662 Danzig	0.5	849	353 Rostov (Don)	4.0
509.3	589 Brussels (No. 1)	15.0	472.4	635 Langenberg	60.0	937.5	320 Kharkov (RV20)	25.0
BULGARIA								
318.8	947 Sofia (Rodno Radio)	0.5	532.9	563 Munich	1.5	968	300 Alma-Ata	10.0
CZECHO-SLOVAKIA								
249.6	1,201.8 Prague (2)	5.0	559.7	536 Kaiserslautern	1.5	1,000	300 Leningrad	100.0
263.8	1,137 Moravska-Ostrava	10.0	559.7	536 Augsburg	0.3	1,071.4	280 Tiflis	10.0
279.3	1,074 Bratislava	13.0	556	530 Hanover	0.3	1,111	276 Moscow Popoff	75.0
293	1,022 Kosice	2.5	569.3	527 Freiburg	0.25	1,170	250 Taschkent	25.0
341.7	878 Brunn (Brno)	32.0	1,634.9	183.5 Norddeich	10.0	1,260.5	238 Novosibirsk	10.0
488.6	614 Prague	120.0	1,634.9	183.5 Zeesen	75.0	1,304	270 Moscow (Trades Unions)	165.0
also on 50 m. (6,000 Kcs.)								
DENMARK								
281.2	1,067 Copenhagen	0.75	2,525	119.3 Königswusterhausen (press)	15.0	1,380	217.5 Novosibirsk	100.0
1,153	260 Kalundborg	7.5	2,900	103.5 ditto	4,000	1,482	203 Moscow	100.0
also on 31.51 m. (9,520 Kcs.)								
ESTONIA								
298.8	1,004 Tallinn	11.0	2,900	103.5 ditto	4,000	1,600	187.5 Irkutsk	15.0
453.2	662 Tartu	0.5	2,900	103.5 ditto	4,000	1,715.5	175 Bakou	40.0
FINLAND								
291	1,031 Viipuri	13.0	HOLLAND					
368.1	815 Helsinki	12.0	296.1	1,013 Hilversum	8.5	1,380	217.5 Novosibirsk	100.0
434.6	690 Pori	1.5	1,071.4	280 Scheveningen	10.0	1,482	203 Moscow	100.0
540	556 Tampere	1.0	1,875	160 Haven	10.0	1,600	187.5 Irkutsk	15.0
1,796	167 Lahti	54.0	HUNGARY					
FRANCE								
219.9	1,364.1 Béziers	0.5	210	1,429 Budapest (2)	3.0	SPAIN		
222	1,351 Fécamp	5.0	550	545 Budapest (1)	18.5	252.9	1,186 Barcelona (EAJ15)	1.0
236.7	1,267.3 Bordeaux-Sud-Ouest	2.0	ICELAND					
245.9	1,220 Strasbourg 8GF	1.0	1,200	250 Reykjavik	16.0	289	1,115 Valencia	20.0
251.1	1,195 Juan-les-Pins	0.5	IRISH FREE STATE					
255.1	1,176 Toulouse (PTT)	1.0	224.4	1,337 Cork (8CK)	1.2	348.9	860 Barcelona (EAJ1)	8.0
265.4	1,130 Lille (PTT)	1.3	413	725 Dublin (2RN)	1.2	388.1	815 Seville (EAJ5)	1.5
271.5	1,105 Rennes	1.2	ITALY					
285.4	1,051 Montpellier	0.8	25.41	1,810 Rome (2RO)	15.0	424	707 Madrid (EAJ7)	2.0
286	1,049 Radio Lyons	10.0	247.7	1,211 Trieste	10.0	427.3	702 Madrid (España)	2.0
294.7	1,017.7 Limoges (PTT)	0.5	273.2	1,098 Turin (Torino)	7.0	456.8	557 San Sebastian (EAJ8)	0.6
304.9	984 Bordeaux (PTT)	13.0	280	1,071 Bari	20.0	SWEDEN		
308.8	971.4 Radio Vitus	1.0	312.2	961 Genoa (Genova)	10.0	230.6	1,301 Malmö	1.25
also on 43.75 m. (6,865 Kcs.)								
315	050 Marseilles	1.6	318.8	941 Naples (Napoli)	1.5	257	1,167 Hörby	10.0
NORWAY								
and 32.26 m. (9,300 Kcs.)								
293.5	1,074 Kristiansand	0.5	331.5	945 Milan	7.0	305.8	921 Falun	0.5
NORTH AFRICA								
368.4 825.3 Algiers (PTT) ... 16.0								
416 721 Radio Maroc (Rabat) 6.0								
NORTH AFRICA								
368.4 825.3 Algiers (PTT) ... 16.0								
416 721 Radio Maroc (Rabat) 6.0								
NORWAY								
293.5 1,074 Kristiansand ... 0.5								

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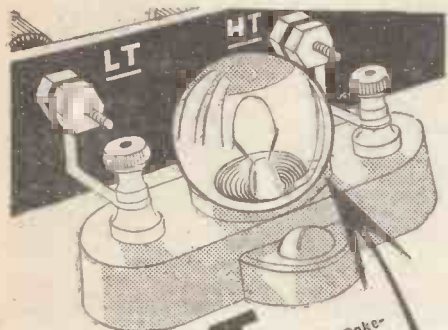
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ALUMINIUM Sheet, for home constructors, 1/2 in., 1/8; 3/4 in., 3/4 per square foot, carriage paid. Screens and Chassis supplied. Estimates free.—Minns, 19 Woodthorpe Road, King's Heath, Birmingham.

BANKRUPT BARGAINS.—List free with 3-valve diagram. Three-valve kit with cabinets, 32/6. Mascot Kit, 45/-; ST300, 45/-; Cosmic, 45/-; Century Super, 76/- Trans-formers from 2/11. Wavemaster .0005, 2/6. Dual Coils, Base, and Switch, 4/-. All parts. P.M. and mains M.C. Speakers very cheap. Graham-Farish Kits, 27/6. Second-hand parts to clear as new. S.G. Valves, 2 v., 0/- Set 3 Trio'ron, 8/- Watmel Dual Coil, 4/- S.G. 3 Set with valves, Coscor, 25/- Super-het Coils, cheap. Part exchange. Quotes per return.—Butlin, 1438 Preston Road, Brighton.

A.W. "SIMPLE SUPER" KITS.—Specified components, £8/5/-. Kits for "Mascot 3," "S.T.-300" and "Cosmic 3," £2/4/- each. We quote keenest prices for anything wireless. Old sets taken in part exchange for 1932 models.—Servwell Wireless Supplies, 74 Gough Street, London, E.14.

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WE supply all good quality Radio Receivers, Components and accessories on deferred terms. We carry adequate stocks and can give PROMPT DELIVERY.

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LONDON RADIO SUPPLY CO., (ESTABLISHED 1925), 11, OAT LANE, NOBLE ST., LONDON, E.C.2 TELEPHONE: National 1977

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Advertisement for BUSBY & CO., LTD. featuring a 'BUSCO' SWITCH. The ad includes an illustration of the switch and text describing its benefits: 'FIT THE "/>

FULL-SIZE BLUEPRINTS

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Table listing various radio components and kits with prices. Includes sections for CRYSTAL SET (6d.), ONE-VALVE SET (1s.), TWO-VALVE SETS (1s. each), THREE-VALVE SETS (1s. each), and FOUR-VALVE SETS (1s. 6d. each).

Large advertisement for BELLING-LEE ACCUMULATOR CONNECTORS. Features the slogan 'YOU CAN'T GO WRONG!' and includes illustrations of the connectors. Text describes them as the most efficient and safest device for connecting accumulators and radio sets. Includes contact information for Belling & Lee Ltd. and an Amateur Wireless coupon for information.



**THE HEART
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The vital component in an A.C. eliminator is the rectifier. So much depends on its proper functioning. Will its output be maintained? . . . Can it break, burn, or wear out? . . . What is its efficiency? . . . questions every purchaser of an A.C. eliminator should ask of the rectifier incorporated therein. Long life, high efficiency, and freedom from deterioration or breakdown form a combination only possessed by—

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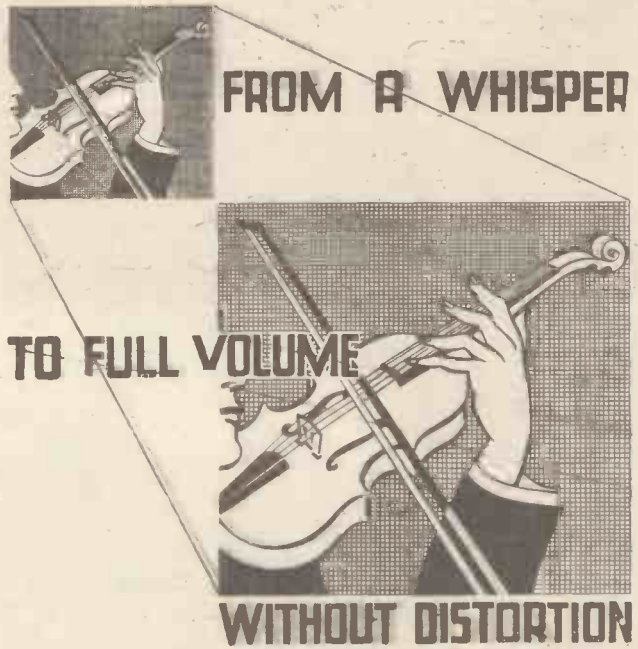
See that it is incorporated in the A.C. eliminator YOU buy; or, if you prefer to build your own, send for details of our constructors' range. A 3d. stamp will bring you a copy of "The All Metal Way."
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**16
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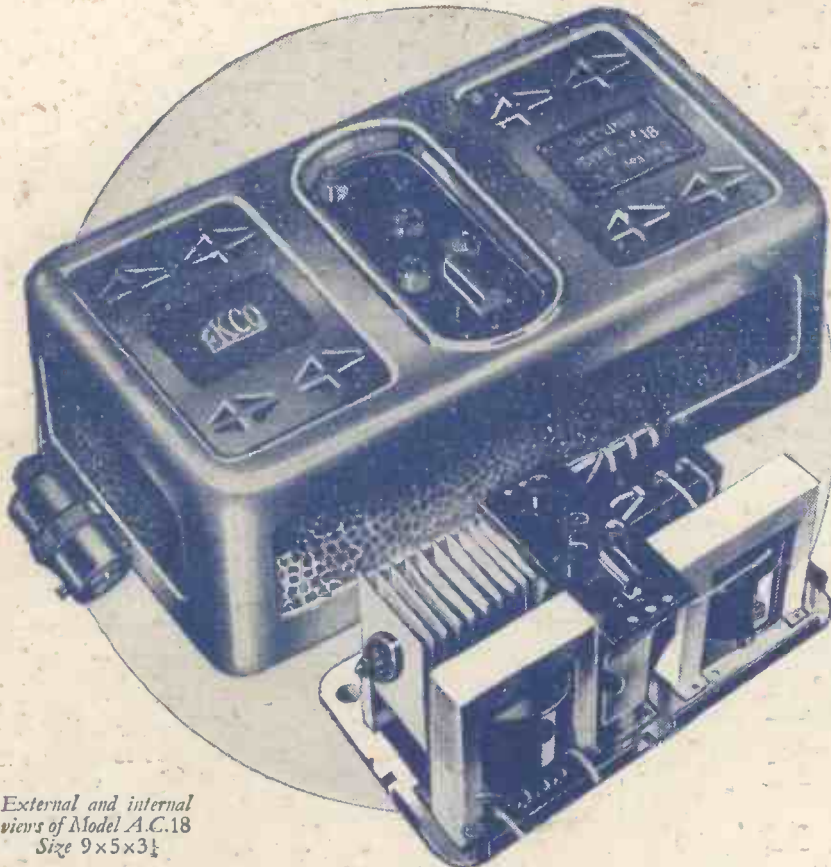
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