

Amateur Wireless,
April 9, 1932

W. JAMES ON SIMPLE SUPER-HETS

TRY THE SHORT-WAVES—A SIMPLE ADAPTOR

Amateur Wireless

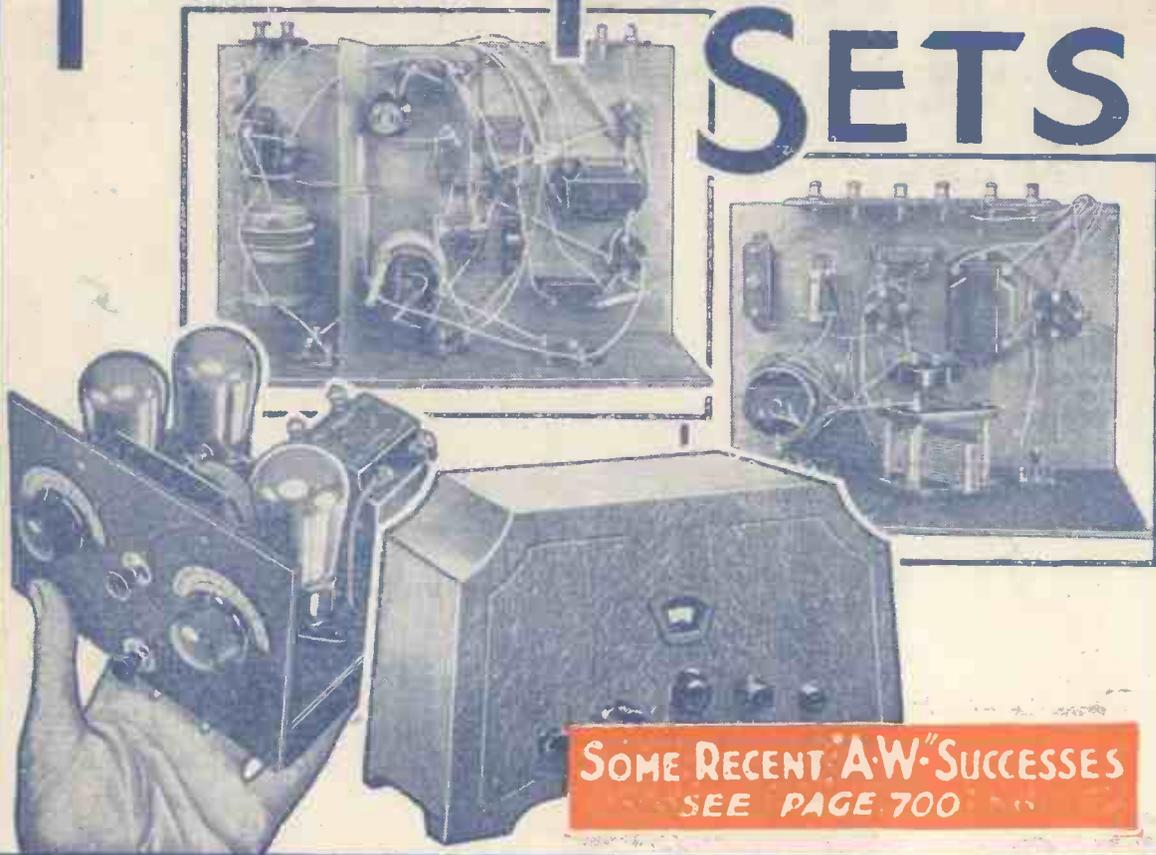
Every
Thursday 3^d

and
Radiovision

Vol. XX, No. 513

Saturday, April 9, 1932

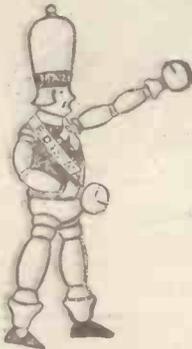
FOUR FINE SETS



SOME RECENT A.W. SUCCESSES
SEE PAGE 700

HL2

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LOOK FOR
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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.

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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.210	- 7.0	PEN.220A	17/6
*L.2	- 7.0	S.G.215	- 16/6
P.220	- 8.9	*S.215A	- 16/6
P.220A	- 12.0	*S.215B	- 16/6

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RADIO DIVISION:
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V.144

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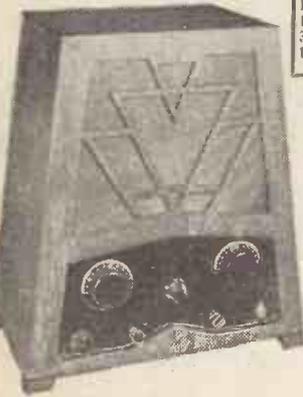
Any parts for kits advertised in this Page supplied separately. If orders value over 10/- sent carriage paid or C.O.D. Post charges paid.

HOME LOVER'S ALL-ELECTRIC 3

READ THIS TESTIMONIAL

"I feel I must write and congratulate you on the prompt delivery of the 'Home Lover's A.C. Three.' I think it is the most robust, sound and safe all-mains set that one could construct. It appealed to me from the first and I must say that I am highly delighted with the splendid results. There is no doubt that this must be attributed to following the author by the use of a Pilot Author Kit."
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This handsome Cabinet, especially designed by Peto-Scott himself at the request of "Amateur Wireless" is specified for the Home Lovers All-Electric Three. In Hand French Polished Oak, Cash or C.O.D.



20%

KIT "A" Author's Kit, less valves and Cabinet and Speaker Equipment. Panels and terminals strips ready drilled

CASH or C.O.D. **£6.10.0**

Or 12 monthly payments of 11/11

Set of Specified Valves £3,0,0 Specified Cabinet £1,0,0

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PILOT AUTHOR KIT

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Complete with a ready drilled panel to specification

CASH or C.O.D. **76/-**

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KIT 'C' Author's Kit Complete with Valves and Cabinet.

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KIT-BITS Selected C.O.D. lines. You pay the postman. We pay post charges on all orders over 10/-

- 1 Peto-Scott Ebonite Panel 18 by 7 in., ready drilled s. d. 4 6
- 1 Baseboard, 18 by 10 in. 1 0
- 2 Juno Terminal Mounts 1 4
- 2 1,500 .0005-mfd. Variable Condensers, with slow-motion dials 16 0
- 1 Pair Peto-Scott "Mascot" Coils 10 6
- 1 Climax H.F. Choke 6 6
- 3 Mullard Valves: PM1HL, PM1LF, PM2A 1 2 9
- 1 Peto-Scott Cabinet, as specified 19 6

For full List of Parts see "Amateur Wireless," pages 573 and 575, March 19, 1932. Any components supplied separately. If orders value over 10/-, sent carriage paid or C.O.D. Post charges paid.

"A.W." SHORT WAVE ADAPTOR KIT "A"

As described in this week's issue.

Author's Kit less Valve and Cabinet

CASH or C.O.D. **£3.1.8**

Or 12 monthly payments of 5/8

Specified Valve, Mazda 215SG, 16/6

1932 ETHER SEARCHER KIT "A" Author's Kit less Valves and Cabinet

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WITH FREE FULL-SIZE BLUEPRINT.

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KIT 'B' Pilot Economy Kit with Valves, less Cabinet.

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CASH Or C.O.D. **£4-18-9**

Or 12 monthly payments of 9/-

KIT-BITS Selected C.O.D. lines. You pay the postman, we pay post charges on all orders over 10/-

- 1 Peto-Scott black ebonite panel, 18 in. by 7 in., ready drilled s. d. 4 6
- 2 Ormond .0005-mfd. slow-motion condensers 12 0
- 2 Peto Scott "Mascot" Coils 10 6
- 1 Ashley 2-mfd. Mansbridge condenser 3 0
- 1 Climax Bijou H.F. choke 3 6
- 1 Ferranti or Lotus L.F. transformer 5 6
- 1 Set of valves 22 9
- 1 Peto-Scott cabinet in oak, and as specified by the author 19 6
- 1 Sheet Aluminium foil, 8 in. by 8 in. 6

MANUFACTURER'S KITS

V.3 RADIO FOR THE MILLION. With Send Valves, less Cabinet. **CASH PRICE £5 10 9. 10/-** only

Balance in 11 monthly payments of 10/1.

READI-RAD METEOR 3. Detector, L.F. and With Power for short, medium and long waves. Complete kit of parts, less valves and cabinet in sealed carton. **Cash Price, £3 15 0. 6/11** order

Balance in 11 monthly payments of 6/11.

FORMO TRIPLE-WAVE 3. Detector, L.F. and With Power. Less valves, but with chassis and switch operated three-wave coil. **Cash Price, £3 5 0. 5/11** order

Balance in 11 monthly payments of 5/11.

COSSOR EMPIRE MELODY MAKER 234. With Valves and cabinet. **CASH PRICE, £1 8 6. 10/-** order

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for which I enclose Cash/H.P. Deposit £ s.

Name

Address..... A.W. 9/4/32.

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

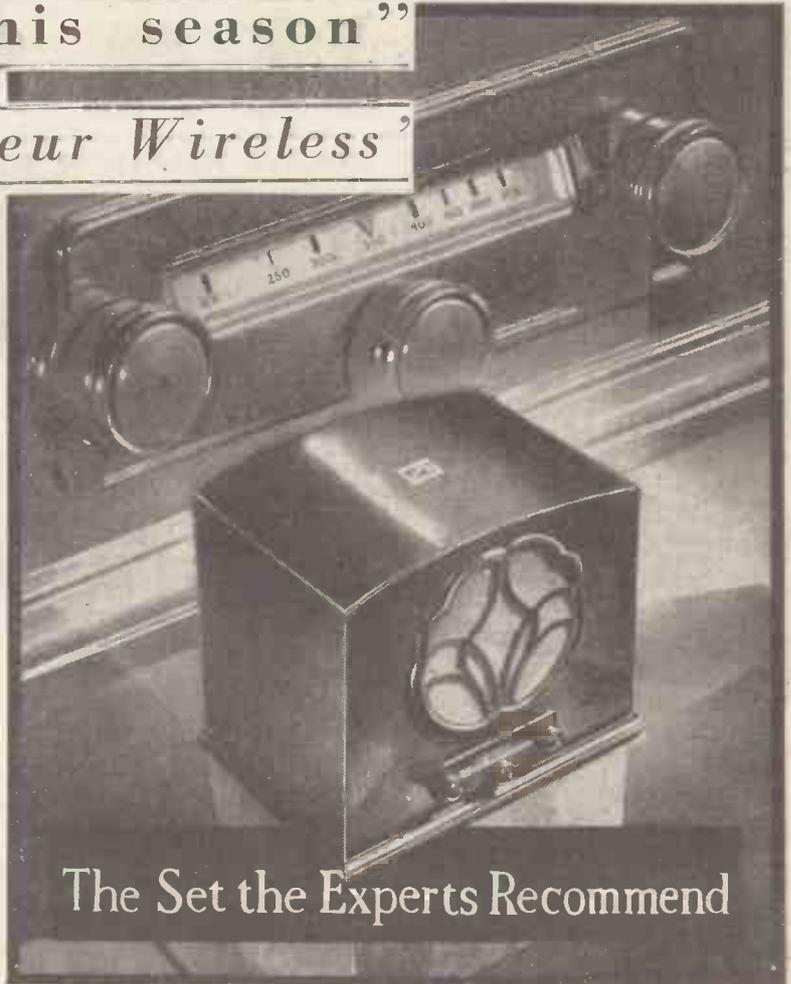
“One of the best sets we
have tried this season”
declares ‘Amateur Wireless’

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

While *Wireless World* reports: “The quality of reproduction is well up to the standard expected from an ‘His Master’s Voice’ product, with the output nicely balanced and the bass well in evidence without being overpowering, or obscuring the upper register, the reproduction of which is good.”

Now, consider its outstanding points for yourself. The set is completely self-contained in a single walnut cabinet of striking modern design, so compact that it will stand on any small table or sideboard. The powerful receiver is fitted with four Marconi valves (including rectifier) and brings in a wide range of stations. The built-in loudspeaker is of the latest “His Master’s Voice” permanent magnet moving-coil type. The band-pass tuning—unique in a set of this type—ensures extreme selectivity. The sensitivity is remarkably good whatever station you are listening to. To operate the set you simply plug into your ordinary electric supply. There are only three controls—the wave-changing switch, the tuning knob and the volume control. Separate illuminated scales are provided for the differing wave-length bands. The running cost is very low indeed—whilst the A.C. model requires no aerial for many of the leading stations.

Send coupon below for a free demonstration.



The Set the Experts Recommend

42/- down and the remainder in 12 monthly instalments or Cash Price 20 gns.

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His Master's Voice

RADIO “TRUE TO LIFE”



The Gramophone Co. Ltd., 363 Oxford Street, London, W.1

COUPON: Send me full particulars, also say where I can obtain a free demonstration of Model 435.

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A.W.3

To Ensure Speedy Delivery, Mention “A.W.” to Advertisers



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

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NEWS & GOSSIP OF THE WEEK

THE SIMPLEST SUPER

IN this issue, on page 691, you will find something of outstanding interest in radio technique—first details of a new super-het designed by W. James. It is called the "A.W. Simple Super," and it is in every sense a simple and straightforward set with an amazing performance.

ONE-KNOB CONTROL

"SUPER-HET" still conveys to some people the idea of a big set capable of bringing in the world, but with a multitude of controls. The new "Simple Super" dispels the idea. It is a one-knob super-het and is one of the most simple sets to build which has ever been described in any wireless journal.

JACK IN THE STUDIO

JACK PAYNE certainly fulfilled his promise of presenting a special programme, something different from the general run of items, when he came back to

the studio at the end of last month. Dance "fans" will be interested to know that Jack and his band will give another studio broadcast on April 18, when he is arranging a special programme for the period from 8 to 9 p.m.

JEANNE AGAIN

THE "Mrs. Feather" of the microphone, Jeanne de Casalis, is featuring in a new kind of programme called "Miscellany," which is being given next week. This will be a microphone adaptation of poetry, music, short plays and so forth, and it has been compiled by Mr. C. Denis Freeman, who has written several special programmes for the Savoy Hill Productions Department, and Miss M. H. Allen, who compiles feature programmes. "Miscellany" is an entirely new idea.

FAT STOCK VOICE TESTS

FAT stock price broadcasts are obviously of more importance in the States than

they are here, and at Washington announcers chosen from the Department of Agriculture are being put through their paces and given voice tests in connection with new broadcast bulletins and talks for farmers.

THE BLACK MARIA!

DURING the recent visit of the Post Office direction finding van to the north-west of England, the number of new licences taken out by listeners in Preston, Blackburn, Burnley and Bolton was 5,293 for the month of February, as compared with 2,384 in February, 1931. It is estimated that apart from the normal increase, 2,000 of the new licences, last February, were due directly to the Post Office van's campaign! 'Nuff said!

A BREEZY CRITIC

CEDRIC BELFRAGE will take over the job of Film Critic for the B.B.C. in May. Listeners can look forward to some very provocative remarks, especially with reference to film personalities. At the moment, Cedric Belfrage, accompanied by Holt Marvel, is on his way to Hollywood for a flying visit.

B.B.C. AT OTTAWA

MAJOR GLADSTONE MURRAY, the popular and energetic Director of Information and Publications of the B.B.C., is on his way to Ottawa, as spokesman of the B.B.C. at the Parliamentary Committee now deciding the future state of Canadian broadcasting. Although Major Murray is the sole spokesman of the B.B.C., the American system of broadcasting has at least half a dozen representatives. Our experience is that Major Murray will be more than a match for them!

MONDAY NIGHT TALKS

A NEW series of talks has been arranged for Monday nights under the general title, "The Rungs of the Ladder," in which prominent men who have had to make their own way in the world will tell listeners of their experiences,



A NEW CLOCK FOR BROADCASTING!

A new novelty is this talking clock invented by M. Nimler, a French scientist, which will tell the exact time every five seconds. A radio-gram type amplifier is used in conjunction with clock synchronising mechanism

NEXT WEEK: AN AMAZING NEW SUPER-HET—"THE SIMPLE SUPER"

NEWS & GOSSIP OF THE WEEK

—Continued

Included in the list are Lord Beaverbrook, Lord Ashfield, Mr. J. H. Thomas, Mr. C. B. Cochran, and the Poet Laureate.

MORE TREASURY THREATS

THE Treasury has again turned an envious eye on the B.B.C.'s great revenue from wireless licences. But as a high official of the B.B.C. remarked the other day, the B.B.C. is already committed to a capital expenditure of over one million pounds, for such developments as Scottish and West Regional stations, the Empire stations, the reconstruction of Daventry and 5GB and many minor works.

FALKIRK'S AERIALS

AS our readers know, only two masts will be used in the twin aerials of the Scottish Regional centre at Falkirk. We hear that umbrella type aerials are to be used, presumably one for each mast. Talking of masts, it is interesting to hear that the masts now used to support the 5XX and 5GB aerials at Daventry will remain, as they will be useful for the omni-directional aerials for the Empire stations.

MEET "J.K."

UNDER these initials hides the personality of John Kettelwell, an extremely versatile bachelor of forty years, who has taken over the very difficult task of running the Children's Hour at the London station. "J.K." recently appeared in a broadcast vaudeville show and he was also responsible for the Good Friday talk on Holy Week in Seville. He served in the R.N.R. during the War, and is a great yachtsman and sailor. We wish him luck

in a job that, we understand, two highly placed B.B.C. officials flatly refused to undertake.

NEW VAUDEVILLE STUDIO

THE first broadcast from the special Vaudeville Studio at Broadcasting House will be given on May 10. During the third week in May another music-hall show, on the lines of the recent successful No. 10 studio broadcast, will also be given from the new studio. Meanwhile, the changeover from Savoy Hill to Broadcasting House continues. One official has already changed his room three times. By the way, the imposing building can, if required, be floodlighted at night.

NOT SO ANONYMOUS!

THOSE who saw the recently released news film of the B.B.C. Dance Orchestra directed by Henry Hall will, no doubt, have been surprised to see and hear Stuart Hibberd, the chief London announcer. For once the B.B.C.'s strict rule of anonymity was broken, presumably to add to the value of the publicity given to the new dance band.

A ROMANTIC REQUEST

HENRY HALL tells us of a romantic request he received when leader of the Gleneagles Dance Band. One of the dancers asked him whether, on the following night, at about 11 o'clock, when he was broadcasting, he would play the tune "If You Were the Only Girl in the World." The idea was to furnish a suitable background to a proposal of marriage! Apparently the tune had the desired effect, and they lived happily ever afterwards.

ORCHESTRA ON HOLIDAY

DURING June and July the B.B.C. Symphony Orchestra will go on holiday, one half during each month. Fortunately, there will be a season of opera upon which the B.B.C. can draw during the absence of its musical mainstay. The B.B.C. is sending an official abroad to arrange relays from continental opera houses in Germany and Austria. If things go well these opera releases will be brought over the recently completed music-circuit land-lines.

MIKES AT "B.H."

FOR a start, the B.B.C. will use stand microphones in the studios at Broadcasting House, until ideal positions have been found by experience. Then suspended microphones will be installed, as is done, by the way, in No. 10 studio.

THE SET FOR YOU

Easy to build, most economical to work, and only one-knob control, the new "A.W." super-het, first details of which are given on page 691.

FALKIRK TESTS

PRELIMINARY tests from the regional transmitter at Falkirk will start in April on Glasgow's present wavelength. It is expected that public-participation tests will be in full swing during May.

STILL MORE HIGH POWER

HAVE you heard Poste Parisien on 328 metres? This 60-kilowatt station is now testing and B.B.C. measurements show that after dark as much as 15 millivolts per metre can be obtained in south London! Shortly Leipzig will come on the air with 150 kilowatts. But, fortunately, it will take over Frankfurt's wavelength of 390 metres, so that it will not be actually adjacent to any B.B.C. station.

B.B.C. LAND-LINES

A NEW map published by the B.B.C. shows that the only overhead lines now in use in the simultaneous broadcasting system are those on the London-to-Bournemouth circuit, from Birmingham to Gloucester and so to Plymouth, and from Gloucester to Cardiff and Swansea. All the rest are of the high-quality underground cable.

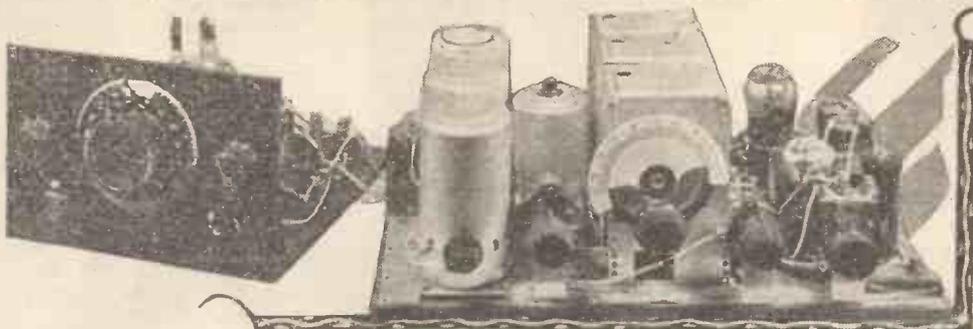
A typical Glasgow vaudeville programme is being arranged for April 21, when listeners in the west will hear artistes from the Pavilion Theatre, Glasgow.



"There must be a thriller on the wireless Mrs. Brown. Your husband looks quite scared."
"Oh no, it's only the Children's Hour, but he's listening in, and hasn't got a licence."

The 'AW' SHORT-WAVE ADAPTOR

If you want to try short-wave reception without building an entirely separate set then you will be interested in this simple adaptor which can be added to practically any type of outfit, enabling it to be used on the very short-wave-lengths. The picture shows the adaptor in use with the 1932 "Ether Searcher," for which it is conveniently suitable.



To sample the fun of short-wave reception, without building a special set for the job: that is the problem which is effectively answered by this little short-wave adaptor.

There is no need to build a special short-waver, needing a double set of valves and batteries. An adaptor of this kind enables you to use your ordinary broadcast set for short-wave reception in a very efficient manner. It utilises the tuning side of the existing circuit, to the extent that this tuning is used as the intermediate stage of a super-het.

There are several kinds of short-wave adaptors which you can make up to add to your set, enabling it to tune down to below 100-metres. One type consists of a single detector stage with short-wave coils in the tuning circuit. This entirely replaces the broadcast band tuning of the main set.

Then there is the super-het type of adaptor which consists, in the ordinary way, of one or more valves (generally a detector and an oscillator) which form the first stages of a super-het. The high-frequency amplification of the broadcast band set is used as the I.F. of a super-het. Generally a super-het. adaptor is

more efficient and more easily tuned than a plain detector stage.

A Sensitive Short-wave Outfit

This novel adaptor makes use of a screen grid valve in an autodyne type of oscillator-detector, and the H.F. stage of your set acts as the intermediate-frequency stage of the super-het layout. It is essential, therefore, that this adaptor be used only with a set which incorporates at least one stage of high-frequency amplification, preferably an S.G. stage. This adaptor, used with a modern S.G. set combines to form one of the most sensitive and easily-controlled short-wave outfits it is possible to have. It is, in fact, much more satisfactory than many home-designed complete short-wave sets.

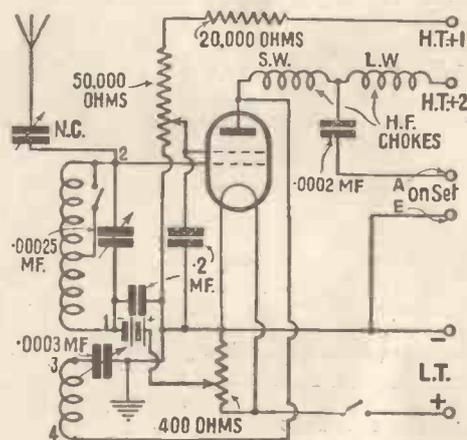
The photographs show that although there are a fair number of parts in the unit, the construction is extremely simple, there being no complicated screening. The full list of parts is given in an accompanying panel and these, in conjunction with the reproduction of the wiring plan (or the full-size blueprint, which can be obtained price one shilling, post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4, make the construction quite obvious.

The Circuit

The theoretical circuit diagram shows how the adaptor functions. It will be seen that the short-wave coil unit is connected in rather a special way to the grid and anode circuits of the screen-grid valve.

The coil is a dual-range short-waver covering approximately 18 to 30 and 30 to 60 metres at the turn of a switch. This avoids coil changing. The aerial is

connected to a tapping on the coil through a very small capacity variable condenser, so that the aerial loading can be varied. As the screen-grid valve is used in an autodyne circuit, and must be oscillating while it is receiving stations, it must be worked at a critical point and that is why in this adaptor there are several provisions



The circuit of the adaptor

for altering the voltages on the normal and screening grids.

The screening grid voltage is regulated by a potentiometer on the panel, this tapping being shunted by a condenser. A 4½-volt grid bias battery is clamped to the baseboard for biasing the normal grid. About 3-volts of this are used, critical adjustment of the voltage being obtained by the potentiometer across the filament wiring.

There is no special point to note about the construction, except perhaps that the



The Short-wave Adaptor is a most useful accessory to any broadcast set

COMPONENTS REQUIRED

- Eborite panel, 9 in. by 6 in. (Lissen, Becol, Peto-Scott, Readi-Rad).
- Baseboard, 9 in. by 9 in. (Peto-Scott, Readi-Rad, Camco).
- .00025-mfd. short-wave slow-motion variable condenser (J.B., Ormond).
- 50,000-ohm variable potentiometer (Colvern, Watmel, Sovereign, Lissen, Varley, Igranic).
- .0003-mfd. reaction condenser (Polar, "Compax").
- Filament switch (Bulgin, rotary type; Readi-Rad, Lissen, Sovereign, Telsen, W.B., Lotus, Graham-Farish).
- Dual-range, short-wave, screened coil (Colvern, type K.S.W.).
- Short-wave high-frequency choke (Wearite, Lissen, Igranic, Stratton).
- Long-wave high-frequency choke (Lissen, Lewcos, Readi-Rad, Wearite, Telsen, R.I.).
- Four-pin valve holder (W.B., Lissen, Igranic, Lotus, Junit, Benjamin, Clix).
- 400-ohm baseboard-mounting potentiometer (Lissen, Sovereign).
- Two .2-mfd. fixed condensers (Lissen Telsen, T.C.C., Ferranti, Dubilier).
- .0002-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish, Telsen).
- 20,000-ohm spaghetti resistance (Lewcos, Lissen, Telsen, Varley, Graham-Farish).
- Neutralising condenser (Peto-Scott, J.B.-Igranic).
- Two terminal blocks (Lissen).
- G.B. battery clip (Gripso, Bulgin).
- Three wander plugs, marked H.T.+ , G.B.-, G.B.+ (Belling-Lee, Clix, Ealex).
- Two spade terminals, marked L.T.+ , L.T.- (Belling-Lee, Clix, Ealex).
- S.G. anode connector (Belling-Lee, Clix).
- Two yards thin flex (Lewcoflex).
- Connecting wire and sleeving (Lewcos, Jiffilinx, Quickwyre).

ACCESSORIES

- Cabinet (Peto-Scott).
- 4½-volt G.B. battery (Lissen).

panel parts must be mounted and the panel fixed to the baseboard before the short-wave coil is screwed down and connected, otherwise the small condenser on the panel cannot be fitted.

The "pot" for the screening grid is on the panel and that for the normal grid on the baseboard. High-tension and low-tension are fed through flex leads, the aerial being connected to the unit and the unit to the set, via terminal blocks. The intermediary leads must be kept very short.

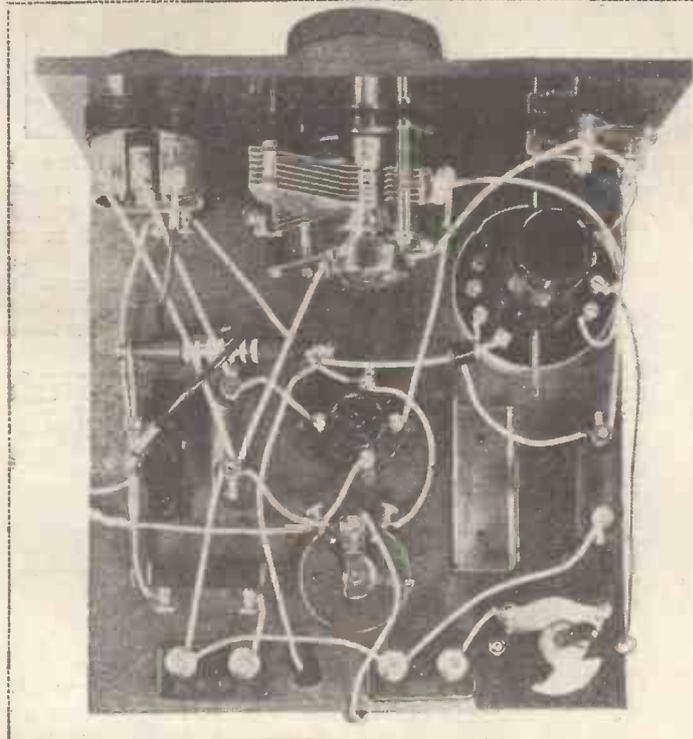
of the S.G. valve is given 100-120 volts, and the screening grid 70-90 volts.

Now we must adjust the S.G. valve voltages so that the adaptor oscillates gently over the entire tuning range—only a soft rustling noise being heard when it is actually oscillating.

The adaptor must oscillate all the time stations are being received, and unless it oscillates easily and without undue

can be corrected by slacking off the neutralising condenser on the baseboard, so reducing aerial loading. Or the reaction condenser can be readjusted.

For successful reception for this adaptor, it is most essential to find the proper position for the two potentiometer arms. The adaptor must oscillate gently whilst



Suitable Valves

The screening "can" on the short-wave coil prevents any direct pick-up. The neutralising type condenser in series with the aerial is at the back of the baseboard near the aerial connection. Any ordinary screen-grid valve is suitable for the adaptor, such as Mazda S.G.215, Marconi or Osram S21, Mullard P.M. 12, Cossor 215SG, Six Sixty 215SG, Lissen SG215, Eta BY6, Fotos BC150, Dario SG and Tunggram S210.

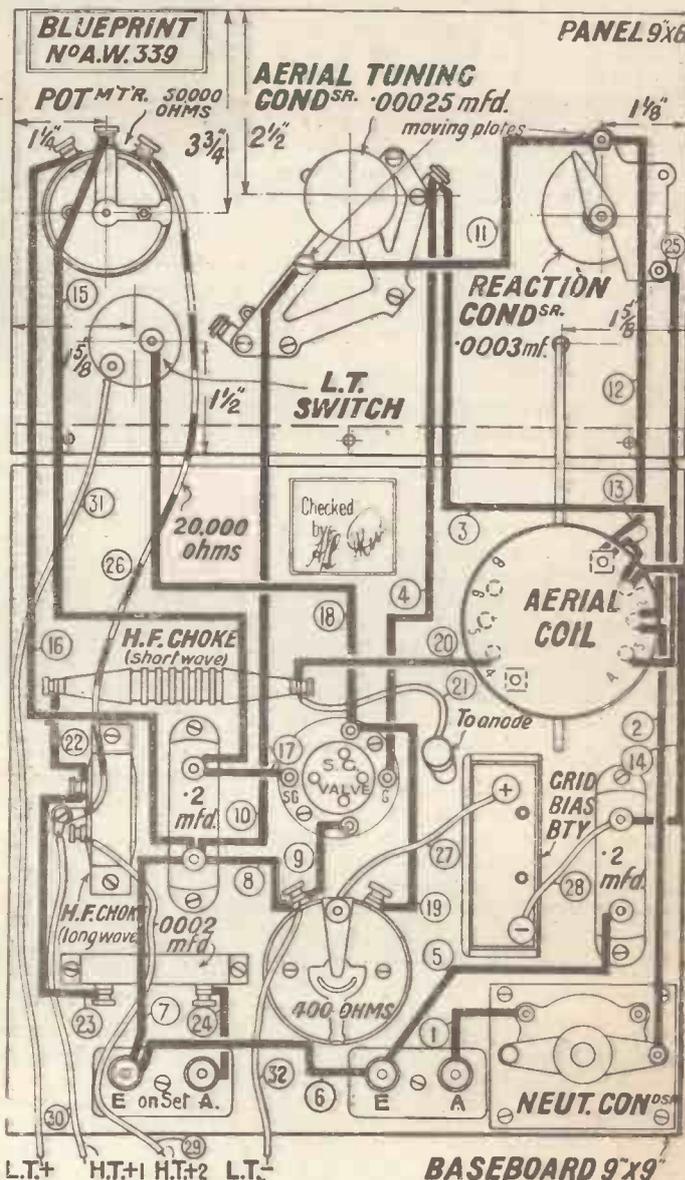
Now for setting up the adaptor, which demands special care.

First try to understand how the circuit operates. The screen-grid valve is being used as an anode-bend detector-oscillator in an autodyne type of circuit, and to get smooth oscillation and proper detection, critical control of screening and normal grid voltages is absolutely essential. The set is tuned to a long wavelength of 1,800 to 2,000 metres, the screen-grid stage being used as the I.F. amplification and the set's detector as the second detector of the super-het.

Operating

The first step, therefore, is to tune the set to just above Radio Paris. Get it critically tuned but, of course, without reaction. Disconnect the aerial equipment and connect up to the adaptor, plugging in the adaptor's battery leads. The anode

Above is a plan view which will be helpful in understanding the layout and wiring diagram on the right. A full-size blueprint of the latter is available, price 1/-



background noise, reception will obviously be poor. The plug should be inserted in the small bias battery on the baseboard, so that about 3 volts is applied to the grid. The potentiometer on the baseboard is then adjusted so that the arm is about two-thirds of the way round in one direction—the proper direction being found by trial.

stations are being received, but the reaction control of the broadcast band set should not be touched, unless it is desired to receive continuous-wave signals.

DON'T MISS NEXT WEEK'S ISSUE, GIVING FULL DETAILS OF THE AMAZING NEW ONE-KNOB SUPER-HET

The screening grid voltage is then regulated by the "pot" on the panel until smooth oscillation is obtained. Probably the adaptor will oscillate smoothly over part of the scale, but stops oscillating when the condenser is nearly all in. This

A HANDY FRAME AERIAL

A USEFUL "emergency" frame aerial can be made from a child's wooden hoop by fixing four or five staples or screw-hooks at equal distances around the inside of the rim, and threading a piece of insulated wire across from one to another, so as to form a square or pentagonal winding inside the hoop. When in use, it can conveniently be held in the upright position by a bull-dog fastener fixed to a small baseboard, so that the frame can be rotated to take advantage of the directional effect.

M. B.

AMAZING ADVANCE IN SUPER-HET DESIGN

WE INTRODUCE "The A.W. SIMPLE SUPER"

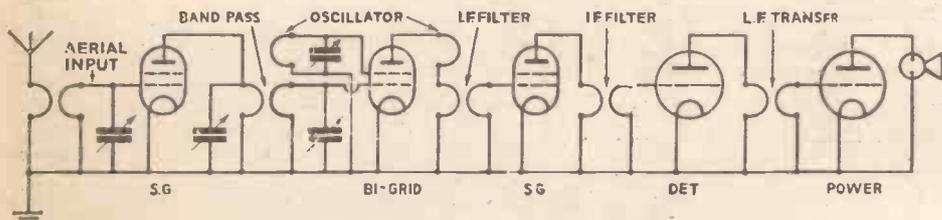
Designed by W. JAMES, this new super-het is a worthy successor to the "Century Super" which was such an astounding success in 1931

THE new single-tuning control super-heterodyne receiver, of which brief mention was made in the issue dated March 26, has thrilled those who have tried it.

There is no doubt but that this five-valve set is a great technical advance over previous practice. In fact, it is true to state that it represents a great step forward as did the "Century Super" twelve months ago.

accurately matched for ganging, are produced as a single tuning unit by the makers.

This unit has a pressed chassis carrying four separately shielded coil units. There is also a switch built into the chassis, which, besides connecting the medium or long wave-length circuits, joins the negative sides of the high and low-tension batteries. On the front of the set there are only three knobs. One controls the



This diagram shows schematically the arrangement of the various stages in the new "Simple Super"

I have written upon wireless matters for a sufficient time to know that it does not pay to overstate performance. That is why I prefer to make for my sets claims that I know are likely to be exceeded by experienced amateurs and that will easily be equalled by average people working under normal conditions.

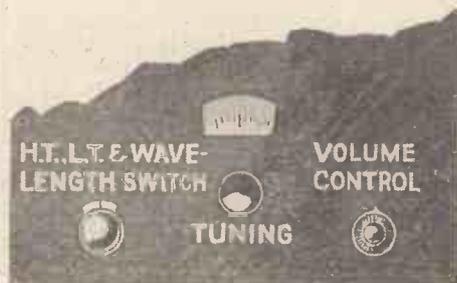
In the case of this set I know that all worth-while stations can be received, interference is the least that I have experienced, and the quality is remarkable.

You can build this set knowing that it will easily beat the "Century Super" which made such a name for itself. The quality is better, the set tunes more easily, and interference is reduced to the minimum.

All the stations you want are available. They are brought in at single tuning points only on the tuning condenser instead of two or more. In fact I doubt if there is any battery set having five valves capable of putting up so good a performance.

I think I am correct in stating that this receiver will be the most advanced design yet made available to amateurs, and, as is often the case, the remarkable characteristics are associated with simplicity. You get the better results with a more simple arrangement in this instance because the vital parts, which must be

tuning condenser, the second the volume, and the third is the switch knob. There are two screen-grid valves, a bi-grid, a detector, and a power valve. The aerial is connected to the primary of the input transformer which is joined to the grid of the first screen-grid valve. Then follows a band-pass circuit, which connects



Control has been reduced to the simplest possible as this sketch of the panel arrangement shows

to the bi-grid valve. To this valve is also joined the oscillator coils and the first intermediate frequency band-pass coil.

The signal picked up by the aerial is, therefore, applied to the first screen-grid valve and is magnified. It is filtered by the tuned aerial circuit and also by the

following band-pass circuit, and reaches the bi-grid valve. Thus the signal is magnified and filtered before it is applied to the detector oscillator.

Several advantages are gained by employing this arrangement instead of the circuits previously used. In the first place the range, especially the day-time range, is greatly increased.

Secondly, the selectivity is improved to such an extent by the three tuned circuits that interference is to all intents and purposes eliminated.

Thirdly, the local oscillations produced by the oscillator do not reach the aerial and so no interference whatever is produced.

Fourthly, with the gang-tuning condenser connected for tuning all circuits, a station is heard at one point only.

Finally, the circuit can be calibrated, and in a future issue I will give a wavelength chart which will be correct for all sets, subject to slight differences in trimming the circuits.

The circuits are, of course, perfectly stable, and the ganging holds good over the whole of both wavebands. The oscillator is connected to one of the grids of the bi-grid valve and to its anode. There is a resistance coupling, and the primary of the first intermediate-frequency band filter is also joined to the anode of the bi-grid valve. Then follows the screen-grid valve, which is coupled to the detector by a band filter circuit as is usual. After the detector is the power valve. The four-coil unit is connected to the four-gang tuning condenser.

A potentiometer volume control is used, being connected to both screen-grid valves. The advantage of this arrangement is that the input to the bi-grid valve is reduced at the same time as the intermediate-frequency amplification, and so distortion is avoided and the sensitivity of the set

(Continued in third column of next page)

THE HOW AND WHY OF TUNING—XXX

COILS FOR SHORT-WAVE TUNING

Another of the series of articles in which "Hotspot" will cover all the important points about short-wave tuning, providing valuable data for the amateur who is keen on exploring the great possibilities on wavelengths below 100 metres

COILS for short-wave tuning are so cheap, and many of them so efficient, that it is really not worth while making your own. But for the really keen amateur the short waves offer scope for plenty of experiments, and these can include the making of coils.

Probably the easiest way to make a good short-wave coil is to use a ribbed ebonite former, and to wind on this the required number of spaced turns. The guiding rules of short-wave coil construction must be understood if a really satisfactory coil is to be made. Low-loss construction is essential. By low loss we mean a minimum of self or distributed capacity, and a minimum of insulating material in actual contact with the turns.

Short-Wave Coil Construction

The Fig. 1 diagram shows how a simple short-wave coil may be wound for high efficiency. The gauge of wire should be as stout as possible, but if it is too thick it will be difficult to straighten out and to wind on the former. Eighteen-gauge tinned copper wire is easy to work, and is quite thick enough to produce a low-resistance coil.

The turns can be held in place by making small nicks in the coil former ribs, as shown. The two ends of the winding should be kept well apart, otherwise losses will result.

The constructor can use his own ingenuity about mounting the coil, bearing in mind that the rule of minimum insulating material is just as applicable to the coil mounting as to the coil. It is difficult to give exact wavelength ranges for a given number of turns, as so much depends on the

tuning condenser designed for short waves, as indicated in last week's article.

These wavelengths are covered when the coil is used in a grid-tuning circuit, with some form of loose-coupled aerial circuit, such as will be described next week. A similar coil will be needed for reaction, and

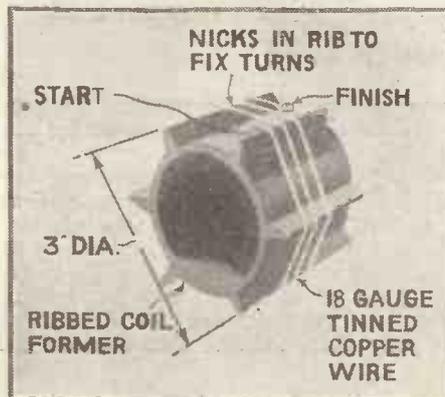


Fig. 1. A typical example of a simple home-made short-wave coil

if aperiodic aerial coupling is used, a two- or four-turn coil will be needed for that.

Low-Loss Mounting

Among commercial short-wave coils are several methods of mounting, but low-loss construction is common to all. The Fig. 2 picture shows three typical short-wave coils, with low-loss coil mounts. At A is the well-known Atlas coil, consisting of spaced turns of hard-drawn copper wire, the turns being held apart by two ebonite distance

coil mount the whole assembly is at once rigid and low loss.

A variation on this method is adopted in most of the commercial plug-in coils, though the Igranic range is notable for the use of celluloid for the turns separation and support. Igranic short-wave coils are wound with phosphor-bronze wire, and the coil mount provides for the widest possible separation between the coil ends.

At B in the Fig. 2 group is an Eddystone short-wave coil, and in this range all shapes and sizes are available to suit different short-wave set layouts. Enamelled copper wire is used, and the turns are spaced by means of ebonite distance pieces as before. Note the strong, though low-loss, coil mount.

The coils shown at A and B cannot be used alone in a short-wave set, as similar coils are needed for reaction, and possibly for aerial coupling. Where space is restricted, or a wide range of short wavelengths is to be covered, it is sometimes more convenient to have two or three separate windings mounted on a single former, with an appropriate number of pins plugging into a coil holder.

Such an arrangement is shown at C, where one of the well-known Eddystone short-wave tuners is mounted on a six-pin holder, having three entirely separate windings.

One of these windings is for tuning, another for reaction, and the third provides the aerial coupling. Such a coil can be incorporated in most of the straightforward short-wave designs, and this type of construction lends itself to high-frequency transformer design, in sets using a stage or more of high-frequency amplification.

HOTSPOT.

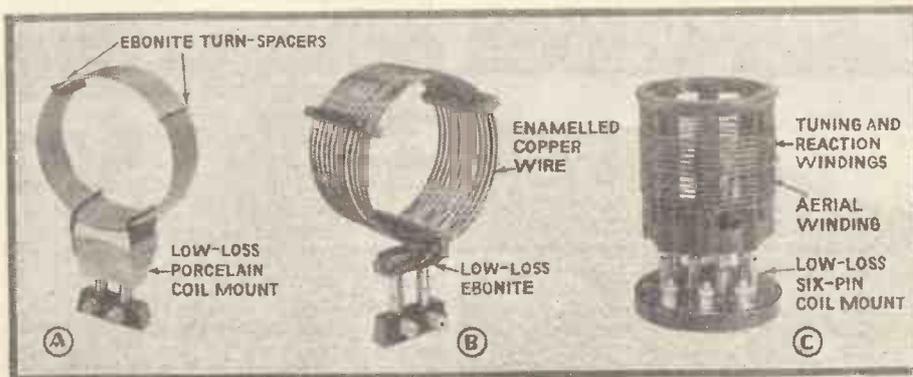


Fig. 2. Three examples of short-wave coils with low-loss mounts

tuning condenser used, and on the size of the coil former.

With a coil former having a total diameter, including the ribs, of 3 in., and using 18-gauge wire with the turns spaced at least by the width of the wire, four turns will cover the 20-to-50 metre range, and six turns will cover the 30-to-70 metre range. This assumes a .00025- or .0003-microfarad

pieces. This method of construction is extremely efficient, and with the porcelain

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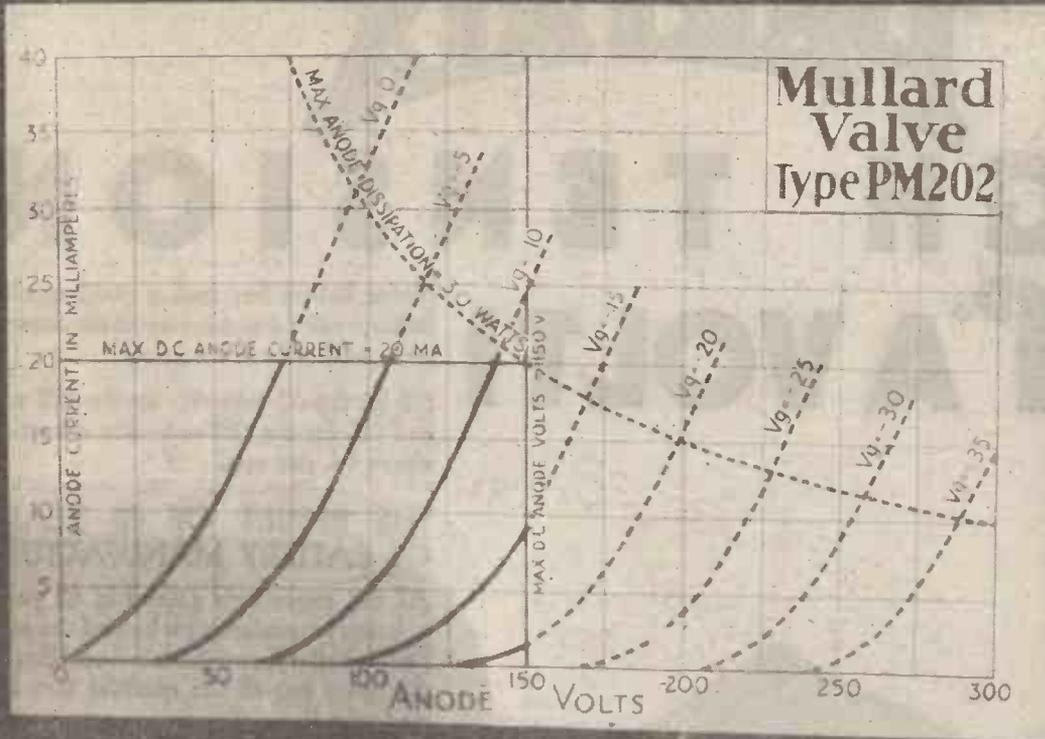
"THE 'A.W.' 'SIMPLE SUPER'"

(Continued from preceding page)

can be varied over the wide range necessary in practice. The parts used in the set are so arranged that a compact receiver is obtained, and yet the wires can easily be joined.

There is very little chance of a mistake occurring during the construction. The set is easier to build than the "Century Super" and that was considered a simple set. And a point that I consider of first importance is this, all parts are of reliable manufacture. The heart of the set is one complete unit. Freedom from troubles due to faulty parts is therefore assured. The cost is not high. The results from every point of view are remarkable. This is a set that will not go out of date. It is definitely extremely selective, and sensitive, but at the same time easy to build and straightforward to operate, and you could not build a better battery set for receiving clearly all the stations you want.

W. JAMES.



**P.M.
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with ECONOMICAL CONSUMPTION**

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 Max. Anode Voltage 150 volts

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 Amplification Factor ... 7.0
 Mutual Conductance 3.5 mA/v.

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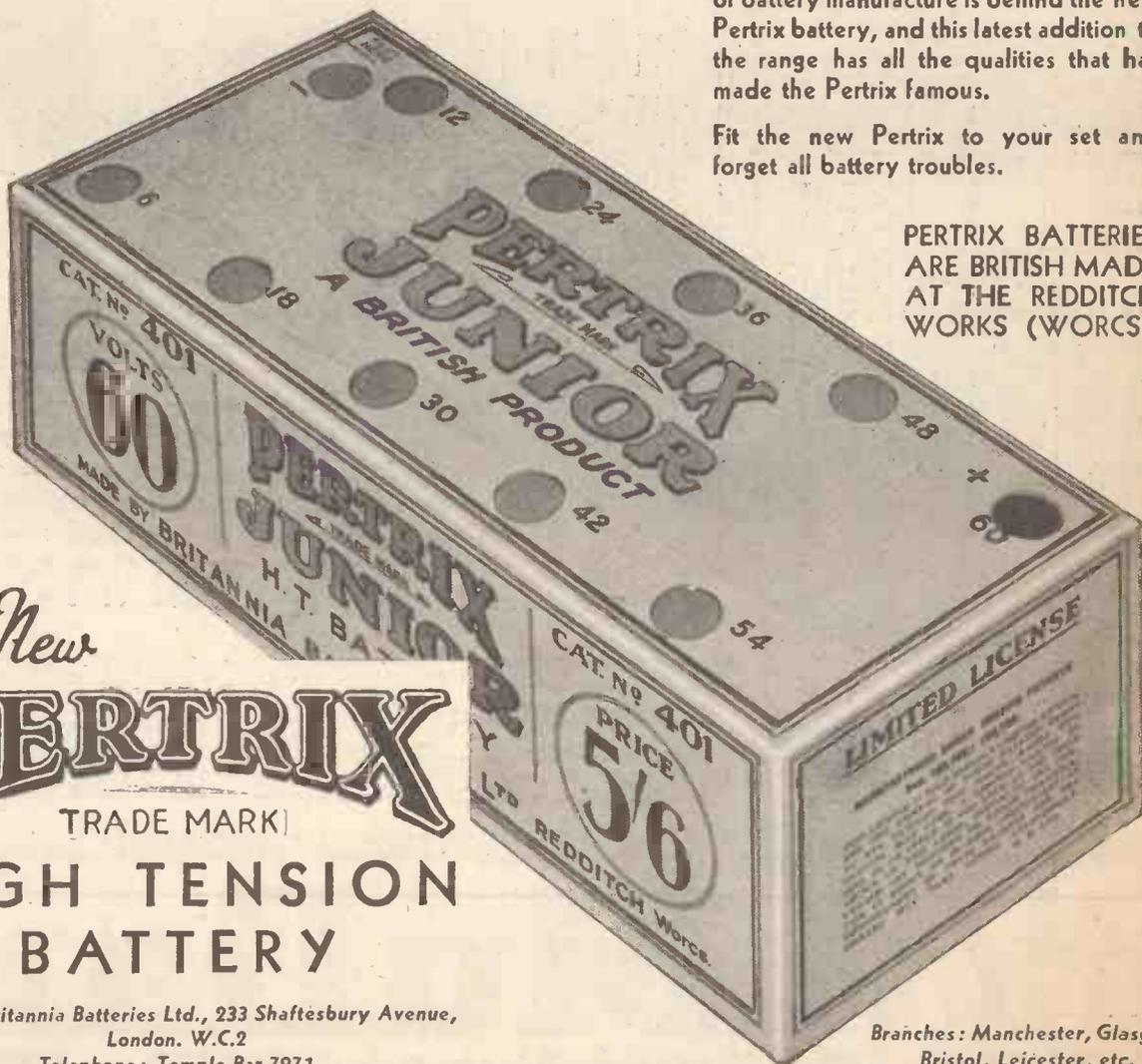
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On Your Wavelength!

A SUGGESTION

I AM wondering when some manufacturer will have the bright idea to have a ganged and fully screened variable condenser made up of solid dielectric units. The air dielectric ganged and screened variable condensers, of which so much use is made nowadays, are excellent; their one fault is that they are by far the bulkiest of all the components that we use. There is, so far as I can see, no reason whatever why really efficient ganged condensers should not be made up from solid-dielectric units. The tuning condenser, then, even if it contained three, four, or five units, could be of quite small size, and this would be a tremendous advantage in every way. Some people have an idea that the use of a solid-dielectric condenser in a tuned high-frequency circuit must inevitably mean inefficiency. As a matter of fact, I have tried out these condensers against air-dielectric condensers in a great many circuits, and though there is a certain loss in efficiency, it is very small indeed in most cases. With the very high stage gain obtainable from modern valves and modern coils, this simply does not matter; you can afford to lose a little, as you have so much to spare. The only drawback to the solid-dielectric condenser is its rather high minimum capacity.

A POINT ABOUT TUNING

YOU see, in the solid-dielectric condenser, bakelised paper is generally used for dielectric between vanes. Now, it is essential that the vanes should never be quite out of mesh in solid dielectric condensers of conventional design, for if the moving vanes are turned too far out they cannot be relied upon to find their way between their proper pieces of bakelised paper when you try to turn them in again. This, however, is only a matter of design, and I can see no reason why a solid-dielectric condenser of much smaller minimum capacity than those that we have at present should not be possible.

THE REAL LOSSES

SOMETIME ago there was a craze for low-loss condensers in which every possible scrap of dielectric matter was cut away. Users vowed that they obtained much better results with them, but serious tests have shown that there could not have been very much in it. In the old days, it was usual to conduct condenser efficiency tests at a frequency of about a thousand a second. Now, what the ordinary tuning condenser has to deal with in actual practice is frequencies ranging from about 150,000 up to many millions a second. It is found that dielectric losses become smaller and smaller as the frequency goes up. The thing that really does matter is the resistance losses—the higher the frequency, the more serious these are. Resistance losses in a variable con-

denser are caused by bad connections to the terminals, and particularly by poor connections between the moving vanes and the terminals belonging to them. Good design can set this right and produce condensers with either air or solid dielectric that are thoroughly efficient, at any rate, on the broadcast wavelengths.

FOREIGN STATIONS

WE really have had a wonderful time for the reception of foreign stations during the winter that is now over, and every indication points to its continuance during the spring and summer. Have you ever tried using your set for foreign-station reception on the medium waveband in broad daylight? If you haven't, just take a turn round the wavelengths between 200 and 550 metres on any morning or afternoon, and I think that you will probably have a surprise. Unless conditions are quite hopeless, there are several stations that can be heard on almost any set in broad daylight just now. Amongst these are Heilsberg, Hilversum, Toulouse, Rome, Beronmuenster, Langenberg, Prague, and the two Brussels stations, and these are by no means the only ones that you are likely to pick up during your morning or afternoon trip. Nurnberg, Trieste, Leipzig, Turin, Breslau, Strasbourg, Stuttgart, Hamburg, Sottens, Kattowitz, Gothenburg, Stockholm, are all possible, and I have once or twice had beautiful reception from Budapest during the daytime. All this seems to show that we are in for a wonderful time during the months of longer days and shorter nights.

SOME NEWCOMERS

HAVE you heard, during your searches over the long waveband, the Vienna experimental transmitter, which is now to be found at work? This station uses a wavelength of 1,237 metres, which is just between those of Kalundborg and Motala. The power is not stated, but it seems to be something pretty hefty, to judge by the strength with which he is received. If he is working at the time when you are making your attempt, you are pretty sure to pick him up. There is another station—not a new one, but one which does not seem to have been working at all regularly until recently—that I would like to recommend to your notice. This is Poznan, whose wavelength is 335 metres. He shares this with Cadiz—on paper, at any rate. His power rating is given as 1.9 kilowatts, but he must be using a good deal more than that.

THOSE VALVE PINS

DO you remember that I aired, some time ago, a grievance felt by many readers and by myself. This concerned the poor fit of many kinds of modern valves into the valve holders of the

ordinary receiving set. On several occasions I have made up a set with brand new valve holders of good make, and have subsequently had a good deal of trouble because valves of certain types were such a loose fit. Correspondents tell me, too, that if they rock valves about in the holders appalling noises are emitted by the loud-speaker owing to the disconnections that occur.

STANDARDISATION WANTED

MATTERS being so, it occurred to me that valve makers must, for some reason or other, have reduced the size of their pins. I wrote to one or two firms on the subject, and they wrote back to tell me that not the slightest difference had been made in their valve-pin sizes; they were exactly as they had been. Not only this, but it appears that the Valve Makers' Association have a standard size for valve pins; measurements taken by means of a micrometer of a dozen valves chosen at random from stock showed that the variations from the standard size were almost negligible. Is the trouble, then, to be found in the valve holders that we use to-day? I think it quite possible that some makers of valve holders still have in mind that the old-fashioned prong valve pins which you could expand to almost any size you liked by the simple use of a knife blade, and they have not reduced the sockets of the valve holders to suit the modern valve with its slim banana pins. Whatever the truth may be, I do know one thing, and that is that it is a horrid nuisance to make up a set and then to have to pull out the valve holders because they are a bad fit for certain types of valve.

"SLIMMING" IN COMPONENTS

THIS is the era of midget components, and a blessing indeed they are to the designer and constructor of wireless sets, to say nothing of the user thereof. The first component to suffer—or, rather, to be improved by a reduction in size—was the low-frequency transformer. A few years ago any L.F. transformer worthy of the name was of huge size and might weigh anything up to a pound and a half or a couple of pounds. Then came the discovery of the nickel alloy core, which at once enabled the size to be reduced.

With the coming of the "canning" process it was possible to reduce the size of tuning coils and to make them occupy far less space in the interior of the set owing to each being automatically screened by its pot. Now the slimming process has been applied to condensers, grid-leaks, and resistances of all kinds; variable condensers of certain types have also been made much smaller by the use of mica or bakelised paper as dielectric. All this means that we can pack into far smaller space, without any kind of overcrowding, all the components needed for the wireless set. It means, too, that the packing can be done without any

On Your Wavelength! (continued)

fear of interaction between circuits. In the old days, interaction between both H.F. and L.F. circuits was, perhaps, the greatest bugbear of the set maker. I can remember the days when we used to place our H.F. coils about eight inches apart in order to prevent the set from going right up into the air when we tried to receive a distant station. Now they stand side by side in a neat orderly row and a single ganged switch enables you to change over from medium to long waves with all three, all four, or even all five at once.

A GREAT ADVANTAGE

BUT, to my mind, one of the biggest boons that size reduction has brought to us is to be found in the postage-stamp condenser and the tiny grid-leak provided with wires at either end. Everyone, or almost everyone, realises the enormous importance of keeping the grid connections not only on the high-frequency but also on the low-frequency side of the set as short as possible. With postage-stamp condensers, you don't have any wires at all, if your design is carefully laid out, for the condenser itself, by means of its tags, serves as the connection between the grid and the coil. The grid-leak, again, can simply be taken by means of loops made in its wires straight from the grid terminal to the L.T. plus terminal of the valve holder.

HÖRERRECHT

HÖRERRECHT may look and even sound rather horrible as a word, but it stands in Germany for something which many listeners over here would be very glad to possess—and that is, a legal right to enjoy the broadcast programmes, free from preventable interference. One cannot, of course, stay the course of a thunderstorm by appealing to the High Court, but there is a lot to be said in favour of giving the listener a legal right to enjoy broadcast reception with as much peace and quietness as possible. Of course, other people have rights too, and

it is when these come into conflict that the trouble begins.

A typical case is that recently fought out in the German courts between the owner of a "noisy" electric motor and an unfortunate neighbour who found himself jammed whenever he tried to listen-in. The defendant claimed that he was working his motor before broadcasting started—a very strong plea—but he was told by the Court that he must either fit "silencers" or else cease from using the plant during broadcasting hours.

A NATIONAL SERVICE

ANOTHER and even stronger defence was put up by a doctor when sued by a neighbouring listener on account of the "interference" created by giving "high-frequency" treatment to patients. The medical man argued that his electrical apparatus gave relief to those who were suffering from painful ailments, also that he gained a large portion of his income by its use, and finally that it was inconceivable that he should be hampered in any way on account of the broadcast programmes which, after all, were a mere luxury. The Court, however, took the view that broadcasting, which in Germany is largely composed of political and educational speeches, was not a luxury, but an institution of national importance, and as such was entitled to every possible consideration. Broadly speaking, the German courts insist that all high-frequency apparatus liable to interfere with broadcast reception must be fitted with efficient "silencers."

NOT TOO GOOD

ONE realises, of course, that the B.B.C. people, like everybody else, need a rest at times, but it is rather the fate of those who provide entertainment for the public to have to work overtime at Christmas, Easter, Whitsun, and August Bank Holidaytide. Though I don't want to seem unduly critical, I do think that we might have had rather more

broadcasting over the Easter Holiday period, particularly on the Saturday and the Monday. Gramophone records are very popular nowadays, and it would have involved neither great expense nor much labour to fill up the many gaps that occurred in the mornings and afternoons with these. I think that it is a pity, too, that on more than one occasion the London National and London Regional sent out the same programmes. As I have said before, there cannot be anyone whose set is capable of bringing in the London National who cannot also hear the Regional transmissions at will. The main idea of the twin stations scheme was the simultaneous transmission of completely different programmes on the two wavelengths.

WANTED, A BIG FELLOW

PUSH-PULL has been fitted to my radiogram and to certain other sets. But it is not every set which has room in its interior economy for the bits and pieces necessary for a push-pull stage; and here I find myself in something of a quandary. I have a big seven-valve super-heterodyne which, with six-volt valves, can bring in stations almost innumerable with large volume and with good quality. I can't fit this with push-pull, because there is no room within the cabinet. No two-volt output valve appears capable of handling the volume that I want from it without distortion. I am sure that there is a big opening for a two-volt valve of really low impedance which can handle a big output, and I hope before long that some enterprising valve manufacturer will give us something of the kind. THERMION.

Excerpts from Rossini's comic opera, *The Barber of Seville*, will be broadcast from Belfast on April 19.

The second of the orchestral concerts to be held in the Concert Studio of Scottish Broadcasting House will take place on April 19. The public is admitted to these concerts and half of each concert is broadcast.

PERSONALITIES IN THE WEEK'S PROGRAMMES



CHANGING OVER *to the* VARIABLE - MU VALVE



Before the full advantages of the variable-mu type of screen-grid valve can be enjoyed, certain alterations to the receiver are needed, as explained in this practical article by ALAN HUNTER

BY now most amateurs know something about the advantages of the variable-mu type of screen-grid valve, but many are in doubt as to what circuit alterations are necessary before this valve can be used. I will assume that you have a set with an ordinary type of screen-grid valve, either for battery or mains operation. With such a valve it is almost certain that you are obtaining volume control by varying the voltage on the screening grid.

On changing over to the variable-mu

While this negative grid-bias is varied, the screen-grid voltage is fixed. Under these conditions the variable-mu will give a fine variation in volume, by varying the sensitivity of the valve, and with the important advantage that the quality will not be impaired at moderate volume, due to the peculiar action obtained with a variable-mu characteristic.

Briefly, the variable-mu type of valve deals faithfully with weak and strong signals. When, say, the local station is tuned in, the grid is biased negatively by a considerable voltage, and then the valve, due to careful spacing between the grid turns, has a straight characteristic, but the "slope" is small. In simpler language, the valve is not distorting, but also it is not giving much amplification. On the other hand, when receiving a weaker signal, the grid-bias is reduced, and the valve acts more like an ordinary screen-grid, giving much more amplification.

There are now available variable-mu's for mains and battery operation. Curiously enough, the mains type is easier to fit than the battery type. This is because the required variable grid-bias can easily be obtained by inserting a variable resistance in the cathode lead, as shown by the Fig. 1 pictorial diagram.

A suitable value for the cathode variable resistance is 25,000 ohms, but this should be shunted by a .1-microfarad fixed condenser. The effect of the resistance is to make the cathode positive with respect to the grid, which comes to the same thing as making the grid negative with respect to the cathode. Remember, though, that the volts gained for grid-bias in this way are volts lost for the anode, since the increase in cathode potential means a decrease in the voltage of the

total voltage available and the type of screen-grid valve.

In general, resistances of 40,000 and 50,000 ohms, arranged as shown, will give the right voltage on the screening grid, which is connected to the junction of the two resistances. A .1-microfarad fixed

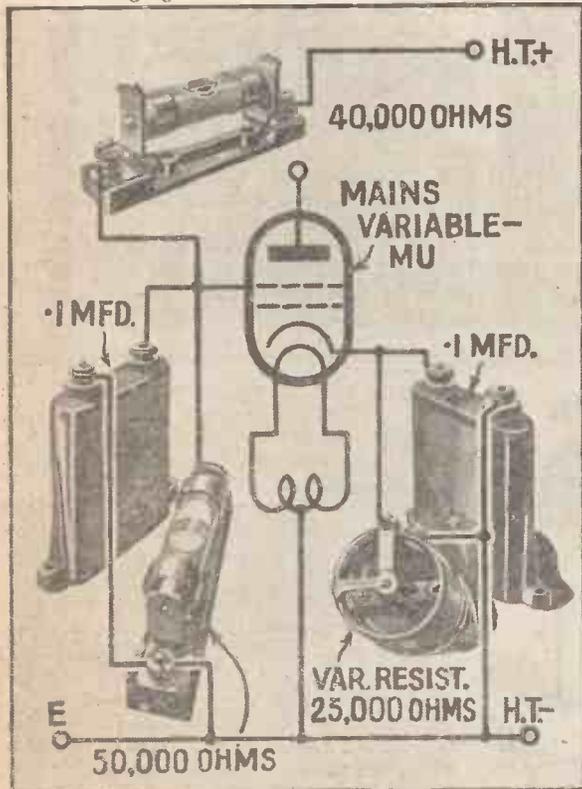


Fig. 1.—This pictorial diagram shows how simple are the connections for a mains variable-mu. The variable negative bias is applied to the grid by inserting a 25,000-ohm variable resistance in the cathode lead. A fixed screen-grid voltage is applied by means of two fixed resistances in series across the high-tension supply. Note the .1-microfarad fixed condensers across the variable resistance and the screen-grid resistance

type of screen-grid valve the old form of volume control will have to be scrapped. For the main point about the variable-mu is the control of volume by varying, not the screen-grid volts, but the negative bias on the control grid.

anode with respect to the cathode.

The Fig. 1 arrangement shows how to apply the fixed voltage to the screen-grid of the variable-mu. Two fixed resistances are connected in series across the high-tension supply, the values depending on the

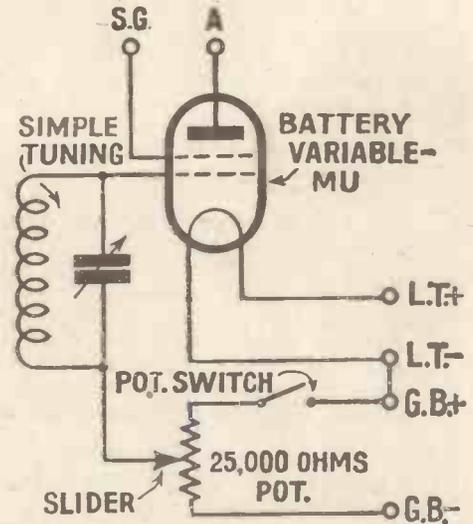


Fig. 2.—When using a battery variable-mu valve the variable negative grid bias is applied by means of a high-resistance potential across the grid-bias battery. Here a simple tuning circuit precedes the valve, and it is possible to take the grid return to the slider of the pot

condenser should be shunted across the resistance coming between the screen grid and earth.

To use a battery type of variable-mu is not quite so easy, as we have to provide the grid-bias from a separate battery. This should have a maximum voltage of 27 volts. The 1½-volt tapings on this battery will not give a sufficiently fine variation of volume, so it is necessary to arrange a potentiometer across it.

The circuit shown by Fig. 2 gives the bare outline of the arrangement suggested for battery variable-mu operation. A potentiometer of not less than 25,000 ohms resistance is needed, otherwise there will be considerable current wastage, and the bias battery will be run down in a very short time. The slider of the potentiometer forms the grid-return connection, so that

(Continued at foot of next page)



Val Rosing, the vocalist of the new B.B.C. Dance Orchestra, singing into one of the baffle-board microphones

REISZ carbon-type microphones are not now exclusively used in the studios, and the engineers are making renewed tests with condenser microphones.

The Western Electric microphone is now being used, with a baffleboard to make it entirely non-directional. Two types of condenser "mike" can be used, one being simply connected across a transformer-coupled circuit in connection with the grid of the first "mike" amplifier, while the other is a high-frequency job.

A high-frequency condenser microphone is connected up to an oscillating valve, which it modulates. In both types the actual microphone consists of a very thin diaphragm, generally of stretched duralumin, placed close up to a solid metal back-plate, the two forming the electrodes of the condenser. As the diaphragm vibrates, the air

HOW IT IS DONE

The New Condenser Microphones

gap is changed and the capacity varied.

The ordinary condenser "mike," not high-frequency, needs a polarising potential of 150 volts or so across the plates, and the variations produced are passed through a transformer and filter circuit to the amplifier.

Resistance coupling is generally used, and in both types of "mike" the actual voltage output is extremely minute. The amplifier must be mounted right up to the plates of the condenser so that there is no induction. A high-frequency microphone needs tuning in the oscillator and balancer circuits, and the oscillator usually works at an H.F. carrier frequency of about 500 K.C.

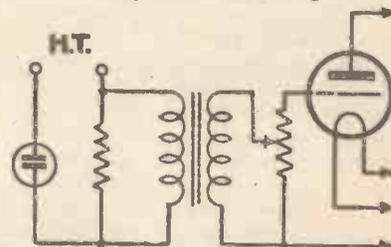
Ordinary condenser "mikes" are preferred by the B.B.C. engineers, as there is less associated apparatus and so less chance of a breakdown. Both types have a disadvantage in comparison with the Reisz microphones in that they need amplifier gear up in the studios. The Technical Section of the B.B.C. uses self-contained amplifier gear, with "mixed" coupling, which is wired up direct to the condenser microphones.

The new condenser microphone will not generally be used out of doors as they are difficult to weatherproof, but they will be used for orchestral broadcasts where a greater degree of brilliancy is needed than is obtained with carbon microphones.

It is possible in the condenser jobs to cut down the background hiss which, so far, has limited carbon

microphone performance. This hiss is caused, of course, by the passage of the polarising current.

Film studio and gramophone recording engineers have used condenser microphones for quite a long while, and in film work they are often fitted with baffles as is now the case with the new B.B.C. microphones. The instruments used for this work have a single stage of resistance-coupled amplification in the same case as the plates of the microphone itself, and so the leads are only 1-in. or so long.



This shows how a condenser microphone is coupled to the first amplifier stage

A multiple battery flex provides the H.T., L.T. and G.B. needed for this first stage amplifier and for the polarising supply to the "mike."

No switching is done at the studio end, the control of input volume and the switching of the battery and polarising current circuits being done from the control room.

This is the case with the new B.B.C. "mikes", and special leads will be made in the Broadcasting House conduits for the microphone battery cables.

"CHANGING OVER TO THE VARIABLE-MU VALVE"

(Continued from preceding page)

the end of the tuning-coil normally going to low-tension negative goes to the slider instead.

To avoid wasting the bias battery when the set is not in action it is advisable to fit a filament type of switch in one of the potentiometer leads, as shown. To make sure of this you can use one of those neat combination switches fitted with a potentiometer, such as the Bulgin model.

From the Fig. 2 circuit you will see that the negative bias from the 27-volt battery is applied through the tuning-coil. But in some of the latest sets the simple tuning shown here is replaced by some form of band-passing.

The Fig. 3 circuit shows how to apply the required negative bias without interfering with the preceding tuning connections. Here the usual mixed band-pass filter precedes the valve, which obtains its negative bias by means of a grid-leak and condenser connected as shown.

A .001-microfarad fixed condenser is inserted in the grid circuit and a 1-megohm leak connected between the grid and the

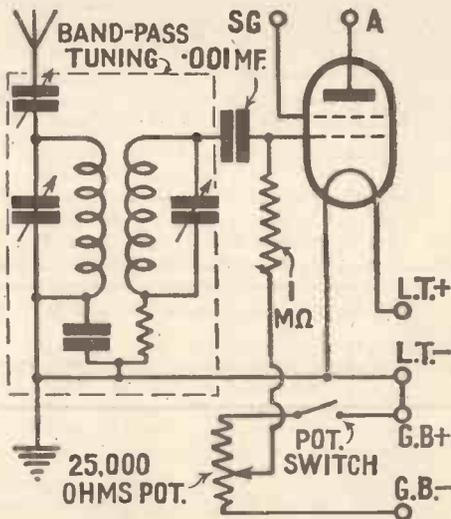


Fig. 3.—When it is desired to use a battery variable-mu after a band-pass input tuning circuit, the variable grid bias should not be applied through the tuning system, as this may upset the working of the band-pass. Instead, use a .001-microfarad condenser to isolate the grid of the variable-mu from the filament battery and apply the bias through a 1-megohm grid leak connected to the slider of the "pot" as shown

slider of the potentiometer. The bias is then applied not through the tuning coil, but through the grid-leak. This method avoids upsetting the balance of the band-pass tuning.

With the Fig. 2 and Fig. 3 circuits the usual screen-grid voltage would be applied by taking the screen grid to a suitable point on the high-tension battery, with the usual 1-microfarad by-pass condenser connected between the screen grid and earth.

With some sets it may be advisable to connect a by-pass condenser between the slider of the potentiometer and earth. A .01-microfarad condenser will be suitable.

By next season the variable-mu type of valve will probably be the standard screen-grid valve, at least in sets with more than one stage of high-frequency amplification. But even where only one stage is used the variable-mu is a great aid to good-quality volume control, especially if the set is being worked fairly close to a broadcasting station.

ALL ABOUT THE "A.W."
"SIMPLE SUPER" IN NEXT
WEEK'S ISSUE

Our Broadcast Critic

TALKS ABOUT

MICROPHONE CHARACTERS



OLGA HALEY

ELSIE and Doris Waters excelled themselves the other evening. Their imitations of both Stainless Stephen and Clapham and Dwyer were high above anything I have recently heard in the burlesque line. The safest way to success in vaudeville, in my opinion, is to create a microphone character. Within reason, we can do with any number of them.

The Buggins family—Grandma Buggins especially—must be very nearly world famous by now. I think I like "Gert" and "Daisy" as well as any microphone characters I can call to mind at the moment. After all, microphone characters are the fiction of wireless, which probably accounts for their popularity.

I am not in agreement with the vaudeville critic who said he could not see the sense of having ventriloquial turns in the vaudevilles. I listened again to Arthur Prince and his "Jim" with an increasing feeling that it does not matter that we cannot see Mr. Prince's cleverness—I mean his lips not moving when Jim is talking—because we can hear and appreciate the difference in the two voices, the natural and the ventriloquial. As a matter of fact, in the original turn, Mr. Prince used to drink a glass of stout while Jim made sarcastic observations; that, of course, we cannot expect to have until radiovision is established.

I imagine that I discovered a potential microphone character in an amusing little sketch played by Dora Gregory and Gladys Young. It was called "Mrs. Cadby attends a Political Meeting." Mrs. Cadby's view of the Bolsheviks was entertaining. I think, so long as she steers a clear course and does not in any way resemble Grandma Buggins, Mrs. Cadby is a new microphone character right enough.

Early in the week I listened to an exceptionally good broadcast by the Wireless Singers. I never enjoyed their singing more than when they sang William Byrd's superb Mass for five voices.

Byrd was organist of Lincoln Cathedral in the time of James I; music that is bound up with the history of this England of ours should most certainly find a frequent place in our broadcast programmes, if only on the

grounds that it was written in days when our choral singing was at its highest. That thought reminds me that I should like to offer my congratulations to the Singers and their conductor, Stanford Robinson. It was a beautiful rendering.

Dr. Haden Guest gave an absorbing talk on "Life in Up country South Africa." He painted an alluring picture of smiling natives and happy conditions, ending with a description of the African night of stars that made me want to go there. His gramophone illustrations of native music left me rather puzzled, they sounded very ordinary to me. I wish he had said something about their origin.

A good type of broadcast was the concert given by Section E of the B.B.C. Orchestra. The programme was one that should have appealed to thousands simply because it was devoted to classical music of the light type. Schubert's *Rosamunde* ballet-music, played as it was that night, should have been widely enjoyed.

Cecil Dixon contributed to the programme by playing Schumann's piano concerto in A minor really beautifully. Apart from her playing of it, surely its melodious character could not fail to have appealed? Let us have more of the concerts.

I listened to Greta Keller's short recital of English and German songs with considerable pleasure. I am going to make a suggestion to her.

PROGRAMME POINTERS—

Hitherto it has been the practice of dance bands to employ singers who know very little of their art. In no department of broadcasting has more incompetence been shown. The voices are wrongly produced in many instances, the singers displaying almost every vocal fault.

The so-called style has been copied from America. There is no need to copy anything from America in the vocal line; we sing English in this country.

I appeal to the B.B.C. in the general sense, and more particularly to Mr. Henry Hall. I ask him to give definite recitals of the best of our dance music, employing singers up to grand opera standard to sing the refrains. I appeal to those singers, if approached, to accept engagements in order to establish a school of English dance music and to set a standard of vocalisation once and for all. Mr. Hall has declared his intention of doing something definite for dance music; he will never do anything for it if he approves the adenoidal style. The B.B.C. loves experiments; here is one!

I want her to try the experiment of having the accompaniments of her songs scored for a string quartet in quite a simple fashion. The effect of two pianos—why *two*, by the way?—does not suit her voice or her type of broadcast. Unless I am very much mistaken, she gets her effects largely by "murmuring" to the microphone. Pianos will never murmur with her, but strings, often muted, will transform her songs into something more appealing than they are already.

Vernon Bartlett gave a very clear exposition of the points of view of China, Japan, and the Great Powers in the recent trouble. I think many listeners must have been grateful to him for the clear way in which he presented his facts.

My next item was the viola and piano recital by Bernard Shore and Angus Morrison. I was disappointed when I saw that they were playing the Clarinet Sonata of Brahms arranged for viola—which it does not suit. I think that work is the dulllest in classical literature.

I took more notice as soon as they began the Sonatina by Walter Leigh. I fell to wondering what our friends Bernard and Angus thought they were doing for broadcasting in general and chamber music in particular by letting that work go through. I fear they must have lost many listeners. I admit that I was one. I switched back to the other programme and found the Roosters singing "Auld Lang Syne." There was nothing to be done but to wait for Ashley Sterne.

Again I was disappointed; he had nothing constructive to say. His best criticism seemed to be of himself; he said he was no critic. Perhaps he felt out of his element? Anyhow, I prefer to read his amusing articles. We want serious reviews. *Has nobody anything constructive to say?*

The Hymn of Praise was surely the right work for Easter Sunday evening, but I was a trifle disturbed at the pace of some of the movements. Why take the *Allegretto* in the symphony at the pace of an *Andante*? I enjoyed Frank Titterton, but I felt him straining to get into the right tempo in "The Sorrows of Death"; he was obviously held back. Isobel Baillie was splendid; so was the chorus.

Parsifal also seemed the right thing for Good Friday evening. Owing to duties elsewhere, I was not able to hear all of it, but I enjoyed what I did hear.

WHITAKER-WILSON.

THE "BABY" 3

THIS little set is one of the smallest and most efficient outfits which has ever been produced for home-construction. The overall dimensions are 6 in. by 4½ in. by 4½ in. As the circuit shows, it is a straightforward "three" with R.C. and transformer coupling.

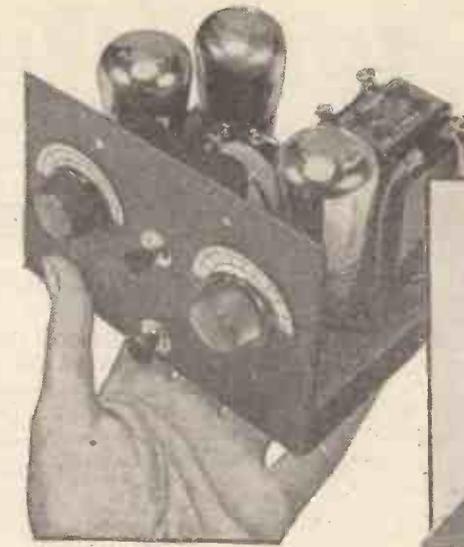
The small size is achieved by using a compact tuning coil (home-made) and a midget L.F. transformer. The layout is extraordinarily neat and if an ordinary power valve is used sufficient output is given to fill a large room.

It is most important to follow the layout exactly, as any deviation will not only make it difficult to keep the set down to the overall dimensions stated, but may make it unstable. It is entirely stable, selective, and capable of giving good tone if made up as shown.

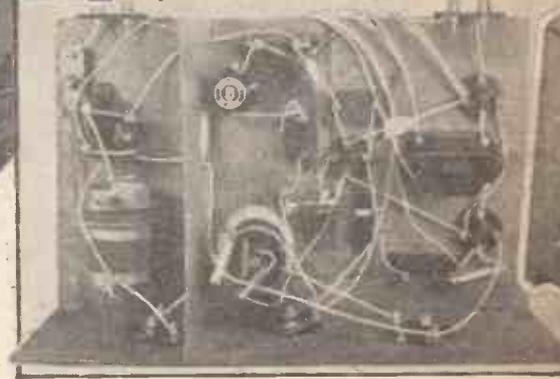
The set was described in AMATEUR WIRELESS Nos. 500 and 501 and a full-size blueprint, No. A.W.323 is available, price one shilling, post free.

The coils can be purchased ready wound, but they can be made up according to the description given in AMATEUR WIRELESS No. 500.

The approximate cost of all the parts needed is only £1 18s., so that you see the set is very cheap, as well as being compact. The dimensions of the woodwork needed for the baseboard "box" (underneath which most of the small parts are mounted) and



FOUR



any wires at all, the soldering tags being simply joined together.

The following parts will be needed for construction.

Three-ply panel, 4½ in. by 6 in. Seven-ply base, 4½ in. by 6 in., and piece of seven-ply, 14 in. by 4 in. .0005-mfd. and .0003-mfd. variable condensers. Three sub-baseboard valve holders. Two push-pull switches. .005, .0003 and .0001 fixed condensers. 2-megohm grid leak. H.F. choke. 50,000-ohm spaghetti resistance and 500,000-ohm resistance with wire ends. L.F. transformer. .0003-mf.l. pre-set. Four miniature terminals, spade terminals, wander plugs, etc. Ebonite tube for coil, 2½ in. long, 1½ in. diameter. Piece of ribbed former 1-in. diameter with 4BA hole down the centre. (Becol, type No. 5 choke). 1-oz. 36 d.s.c. wire.

radio reproduction and is fitted with a change-over device. The neat layout can be seen from the accompanying photograph and the simple circuit arrangement is obvious. The coil can be wound at home or bought ready-made.

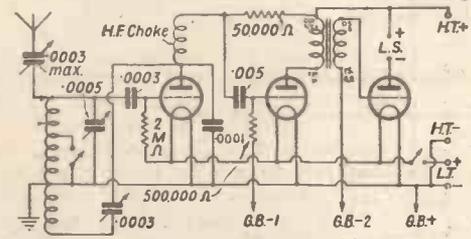
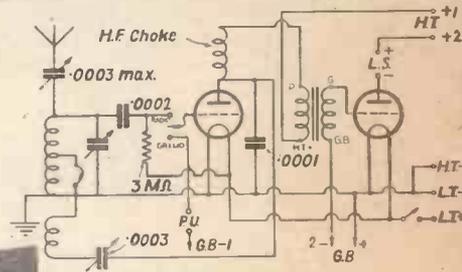
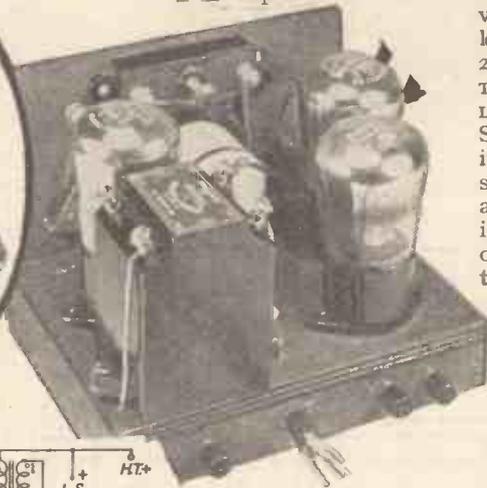
Simple Switching

There is no complicated switching. Wave changing is effected by a simple plug and socket device. No ebonite is used in the construction of the set and the whole outfit can be built up in two or three hours.

Terminals are used for the aerial, earth, speaker, and pick-up connections, at the back of the baseboard, but an economy is effected by having plain flex leads for the batteries. The rest of the

THE "25s. TWO"

ALTHOUGH you might think it is impossible to make a really good two-valver for so low a price as 25s., the AMATEUR WIRELESS Technical Staff has done it and enthusiastic readers are still sending in long reports of the stations they get on



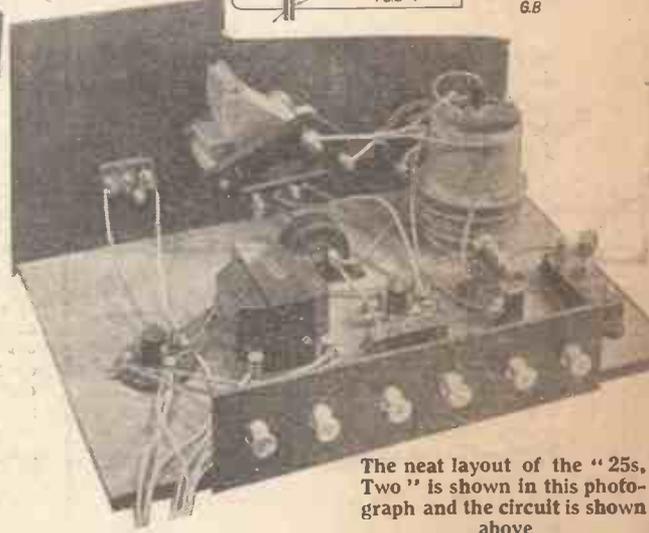
(Left) Two views and the circuit diagram of the "Baby" 3. The circuit is quite straightforward

the plywood panel, are given on the full-size blueprint.

The wiring is done with tinned copper wire enclosed in insulated sleeving. Several of the parts are connected together without

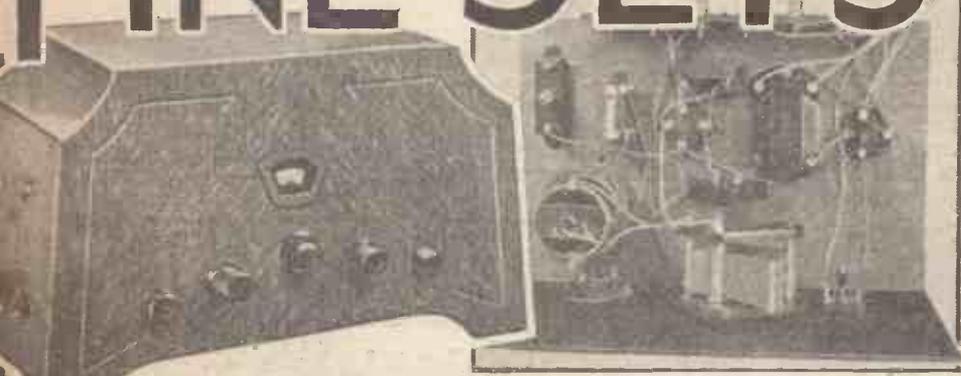
the "25s. Two," described in AMATEUR WIRELESS No. 503.

This is a dual-range two-valve set, economical and very selective. It can even be used for gramo-



The neat layout of the "25s. Two" is shown in this photograph and the circuit is shown above

FINE SETS



Brief descriptions of four selected receivers, full details of which have been given in recent issues of "A.W."

efficient components are used throughout.

The following parts are needed for building the "50s. Four."

Three-ply panel, 16 in. by 6 in. Three-ply strip, 4 in. by 2 in. and baseboard 16 in. by 10 in. Aluminium screen 10 in. by 5 1/2 in. Aerial and anode coils or material as described in "A.W." No. 504. Two .0005-mfd. variable condensers, three valve holders and one horizontal valve holder. .0001, .0002, .0003 and .005 fixed condensers. One-megohm and 2-megohm grid leaks. L.F. transformer. Two H.F. chokes. Two 2-mfd. fixed condensers. .0003-mfd. pre-set condenser and .0003-mfd. reaction condenser. Filament switch. 20,000-ohm non-inductive resistance. 10,000 and 50,000-ohm spaghetti resistances. Wander plugs, spade tags, terminals, etc.

The baseboard and panel are of plywood so there is no complicated ebonite drilling to be done. The coils, which can be bought ready wound if you do not want to go to the slight trouble of winding them yourself, are screwed direct to the baseboard and the panel carries only parts such as the two main tuning condensers, reaction condenser and on-off switch.

The use of battery flexes simplifies the

wiring is done with bare wire and sleeving.

A piece of 5- or 7-plywood is used for the baseboard, and thinner plywood, 3-ply is sufficient for the panel and terminal strip at the back. The panel does not need to be very stout as it carries only the main tuning condenser, reaction condenser, on-off switch and radio-gram plugs.

The layout is clearly shown by the full-size print, No. A.W.330. This gives all the wiring and the dimensions of the woodwork. You will need these parts for construction.

Three-ply panel, 12 in. by 6 in. Plywood base 12 in. by 8 in. Three-ply terminal strip 8 in. by 2 in. .0005-mfd. variable condenser and .0003 reaction condenser. Filament switch, dual-range coil (or the materials as described in "A.W." No. 503), two valve holders, H.F. choke, L.F. transformer, .0002-mfd. and .0003-mfd. fixed condensers. 2-megohm grid leak. .0003-mfd. pre-set condenser. Wander plugs, spade terminals, etc. Two sockets and six terminals.

THE "50s. FOUR"

JUST as the "25s. Two" leads in the field of inexpensive two-valvers, so the "50s. Four" is a really top-hole, inexpensive big set.

It has a modern circuit, a screen-grid detector, R.C. and transformer-coupling. Selectivity is of a very high order and stability and pure tone are assured by the

provision of five separate high-tension tappings, so that each valve can be worked at the most sensitive point.

The general layout can be seen from the accompanying photograph and the neat appearance of the complete set is obvious from the view below.

Control is extremely easy and as the tuning condensers are not ganged there is no trimming adjustment. The low cost is achieved by the use of home-made coils (one of them being of the same type as used in the "25s. Two") and the construction of these coils is given, together with a complete description of the set in AMATEUR WIRELESS No. 504.

Wave-changing

Wave-changing is effected by a plug-and-socket device in each coil, the coils being mounted with their axes at right angles to prevent mutual interference. The layout is neat and there is one

vertical metal screen separating the aerial tuning and detector sides. Spaghetti resistances are used for voltage dropping and R.C. coupling, and low-priced but

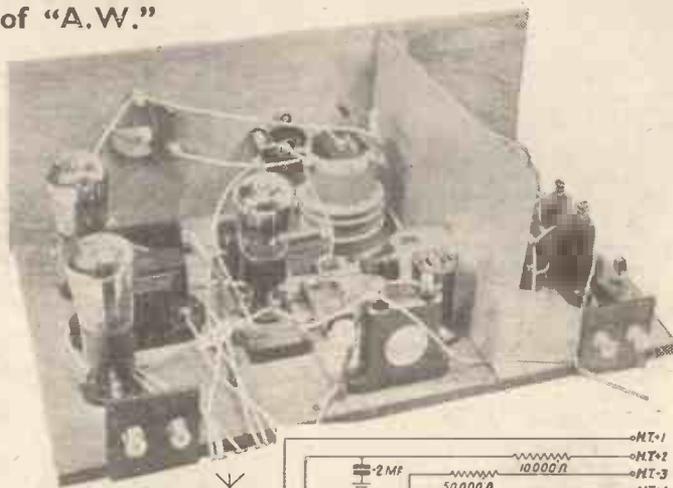
construction. There are only four terminals for aerial, earth, and speaker.

The use of an S.G. valve in an efficient non-ganged circuit results in useful selectivity, and there is, in addition, a .0003-microfarad pre-set condenser in the aerial lead to reduce loading and still further sharpen up the tuning.

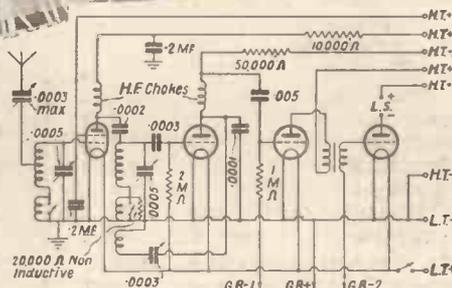
Further technical details can be gauged from the circuit diagram.

The two tuning condensers work approximately in step, except at the extreme ends of the tuning scales, so that the tuning is just as simple as though there were only the aerial circuit to control. The H.F. tuning (right-hand condenser) is more critical, in fact.

Further constructional details can be obtained from the full-size blueprint, No. A.W.331, which shows all the wiring and the battery connections and is of assistance in mounting the parts on the baseboard.



(Above) A rear view of the "50s. Four" and (right) a small reproduction of the theoretical circuit



The "50s. Four" ready for working, complete with batteries and speaker

“FOUR FINE SETS” (Continued from preceding page)

THE “1932 ETHER SEARCHER”

“A SET that is right up to date” is the slogan which was adopted for this strikingly modern three-valver introduced at the beginning of the year and described in AMATEUR WIRELESS Nos. 501 and 502.

It is a band-pass three-valver, amazingly selective and extremely simple to tune. A huge power output is ensured by a pentode and one of the many novel features of the circuit is the fitting of a tone-changer which

has a closed wooden front. There is no real panel to the set, many of the parts being stood on metal brackets so that the shafts project through to the front of the set.

At the front of the set are the wave-change switch, compensating condenser for the ganging, main-tuning condenser of the three-ganged bank, radio-gram switch and reaction condenser. A fuse is fitted so that there is no danger of burning out the valves accidentally.

Terminal blocks are provided for the

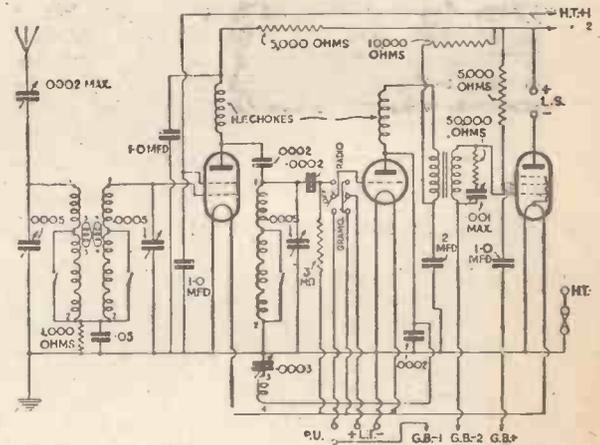
pick-up, speaker, and aerial and earth connections, while the batteries are connected by flexes. Negative and earth connections are made to the metal foil on the baseboard.

As the other parts are shielded there is no need for vertical screening and the pentode stage, being decoupled, is very stable.

The .0002-microfarad compensating condenser in series with the aerial assists in keeping the ganging constant over the tuning scale and is not only an adjustment for aerial selectivity.



(Left) A rear view of the “1932 Ether Searcher,” showing the detector and pentode end and the screening cans of the band-pass circuit. (Right) The circuit of this up-to-date set



can correct for any change of tone caused by using a normal speaker directly in the pentode anode circuit.

A gram-radio change-over switch is fitted and in AMATEUR WIRELESS No. 504 the use of the “1932 Ether Searcher,” as a complete radio-gram, was described. That the appearance of this set in a modern radio-gram cabinet is pleasing, can be seen from the accompanying photograph.

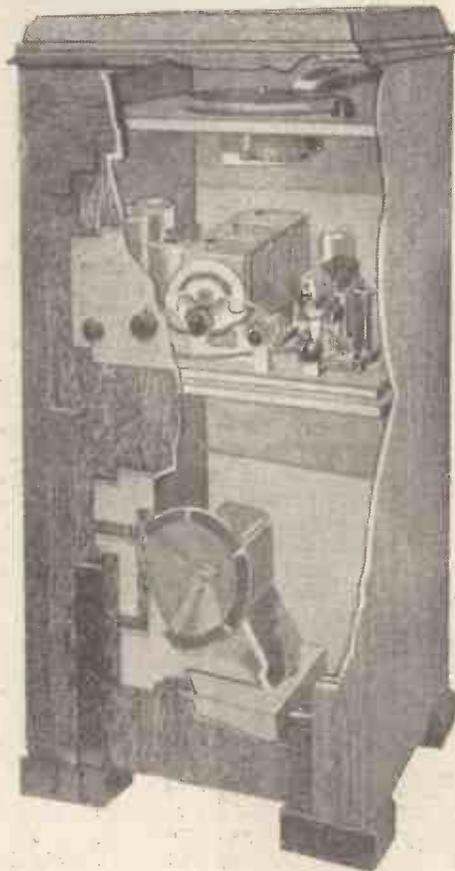
The “1932 Ether Searcher” is an extremely simple set to build because a complete three-gang condenser unit and a matched three-coil unit are used. The condensers, the three coils and the screen-grid valve are enclosed in aluminium “cans,” so that the set is very stable.

You will need the following parts to build the “1932 Ether Searcher.”

.0003-mfd. triple gang condenser. Three dual range coils, mounted and ganged (type K). Baseboard 16 in. by 10 in. Aluminium foil 15 1/2 in. by 9 1/2 in. One 5-pin valve-holder, two 4-pin valve-holders. Two .0002 fixed condensers. Three 1-mfd. and one 2-mfd. fixed condensers. Two H.F. chokes, L.F. transformer. .0002 and .0003-mfd. reaction type condensers. Double-pole change-over switch. .0002-.001-mfd. pre-set condenser. .65-mfd. non-inductive condenser. Valve screen. 50,000-ohm, 10,000-ohm, two 5,000- and one 1,000-ohm spaghetti resistances. 3-megohm leak. Fuse holder and fuse. Three terminal blocks. Three aluminium brackets. Two-foot length of shielded wire. Spade tags, terminals, flex, etc.

The set is not of all-metal construction in spite of its “metallic” appearance at first sight. Metal foil is used on the 16-in. by 10-in. baseboard. A full-size layout and wiring guide was given with AMATEUR WIRELESS No. 501, while this is available also as a separate blueprint No. A.W.325.

The wiring guide and the blueprint are, of course, both full-size and show all the wiring. The set is of the chassis type and is intended for inclusion in a cabinet which



Used as a radio-gramophone, the “1932 Ether Searcher” in a console type cabinet and complete with gramophone equipment

The gram-radio switch does not cut out the filament of the H.F. valve when in the gramophone position. This switch acts as an on-off switch and cuts off the whole L.T. supply when in the mid-position.

The trimmers of the three-gang condenser are accessible from the top, but after the preliminary adjustment for ganging has been made, the compensator at the front is the only control that need be touched to vary the inter-stage ganging.

The “1932 Ether Searcher” is one of the most successful sets which AMATEUR WIRELESS has ever produced and on account of its modern circuit it is not one which will easily go out of date.

Blueprints of all these sets can be obtained from the Blueprint Department of “A.W.,” 58-61, Fetter Lane, E.C.4. A full list of prints is on page 716.

The Little Ass, the Cornish comedy by Bernard Walke and Filson Young, is to be repeated in the National programme on April 21.

Jack Payne and his band will give another broadcast on April 18, when there is to be a special programme from 8 to 9 p.m.

A musical fantasy by Lance Sieveking, entitled *Arrest in Africa*, is to be added to the long list of programmes from this author. It will be broadcast on April 15 (National) and 16 (Regional) with the author as producer.

Sir Nigel Playfair has been heard “on the air” on several occasions both in Week’s Good Cause appeals, talks and relays from his theatre at Hammersmith. On April 14 he will make his debut in studio vaudeville.

The most successful commercial receiver ever produced is

BASED ON THESE VALVES

FOR two years the Lissen Popular 2-valve Receiver has more than held its own in a highly competitive market. No commercial receiver has ever before enjoyed such a success. Why? Chiefly because its circuit was designed around these two Lissen Valves and therefore its performance is the equal of any ordinary three-valve commercial set.

You can use these valves in any set with one stage of L.F. amplification and get better results than ever the original designer dreamed of. The lively Lissen Detector Valve brings in the foreigners like magic. The Lissen Power Pentode, whose magnification factor is more than 90, gives volume such as you 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.

Replace your ordinary detector valve with the Lively Lissen Detector, H.L.210.

Price **5/6**

Replace the power valve with a Lissen Power Pentode, P.T.225.

Price **12/6**

(The Lissen Power Pentode only takes 7 m/A of H.T. current and you can use it in any battery-driven set without adding to running costs.)

LISSEN VALVES

THE BASIS OF EXCEPTIONAL SETS!



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IN MY WIRELESS DEN

Weekly Hints — THEORETICAL
CONSTRUCTIONAL & BY
W. JAMES

A MATTER OF GANGING

IN many sets there are two tuning condensers, one is joined across the aerial coil and the other tunes the secondary coil of a filter or perhaps a screen-grid valve is used and the second condenser tunes the coil joined to its anode circuit.

Usually, the coils and condensers are alike, but the two condensers may not have the same dial readings when a station is tuned in. This is because, besides the tuning condensers in the circuits, there are other capacities. Then the valves have capacity and the aerial has capacity.

The two circuits will not keep in step, that is, the dial readings will not be equal when the circuits are in tune, unless these stray capacities are present in equal amounts in the two circuits.

A trimming condenser can be used to balance the circuits if one is fitted, but usually separate tuning condensers do not have them. So in order to correct the circuits, an adjustable condenser must be fitted. First try a pre-set condenser having the maximum value of .0003 microfarad in the aerial wire to the coil. You might find that the circuits can be brought into step by adjusting the pre-set condenser.

If this cannot be arranged it is clear that the stray capacity in the aerial circuit is not enough. This can be increased by connecting a pre-set condenser of .0001 microfarad across the aerial coil or one side from the pre-set can be taken to one of the terminals of the aerial tuning condenser and the other side to the second terminal. That is, the pre-set condenser is joined across the tuning condenser.

If, now, it is adjusted, the circuits will be brought into step. The tuning is much easier when both condenser dials read alike, but this nice state of affairs will only be obtained when the coils have equal values and the capacities of the circuits are balanced.

FAULTY CONDENSERS

One of the chief troubles that manufacturers of sets—and particularly mains sets—have to deal with is broken-down condensers in filter or by-pass circuits.

This is hardly the fault of the makers of condensers provided they clearly specify working voltages. The set-makers naturally try using the cheapest condensers, with the result that thousands of sets are returned faulty.

There is no need for the amateur to make such a costly mistake as to fit condensers of too low a working voltage in a

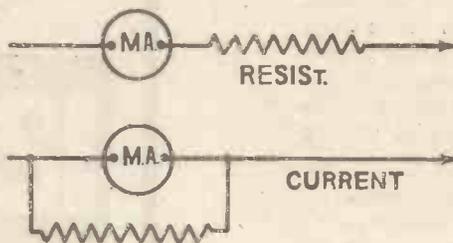
mains unit or mains set. The correct condensers may cost a little more than the cheapest types, but will last for years, and may, if necessary, be used again and again.

ADAPTING A METER

It is a very easy matter to adapt a milliammeter to read voltages and also larger currents.

Thus, suppose we have a meter reading 0.5 milliamperes. We know that when 5 milliamperes passes through the instrument it will show a full scale deflection.

If now we join to the meter a resistance of, say, 10,000 ohms, as shown in the accompanying diagram, a voltage of 50 will send a current of 5 milliamperes through the circuit and the meter will read 5. If the meter reads 1, the voltage applied would be 10; 20 volts would produce a reading of 2; 30 volts of 3, and so on.



Resistances connected as shown can be used to increase the range of a meter

If we connected a resistance of 20,000 ohms the instrument would read 5 for a voltage of 100, and so on, in proportion, and with a resistance of 30,000 ohms, the full-scale reading would be obtained with a voltage of 150.

You can, therefore, add a resistance of known value and use the meter to read volts, simply multiplying the actual readings shown by a number which is 10 for 10,000 ohms; 20 for 20,000 ohms; and 30 for 30,000 ohms. It is not necessary to take account of the resistance of the meter as it is relatively so small that the error is of no account.

To read larger currents a resistance of low value must be joined across the meter as shown. Thus, to read 0.10 milliamperes, first pass a current through the meter and note the reading.

**A NEW JAMES SET—THE
“A.W.” “SIMPLE SUPER”
ONE-KNOB CONTROL
NEXT WEEK**

Then join a resistance, such as a length of resistance wire to the two terminals and adjust it until the reading is exactly half of what it was. By doing this, the range of the meter has been doubled.

GLOWING FUSES!

A flashlamp bulb is often fitted in a set as a fuse, and readers are often puzzled by the fact that the lamp glows at the moment of switching on. Sometimes, in fact, the bulb burns out, and it is thought that a fault exists. This may not be so.

In a set are various fixed condensers and these take a relatively heavy current when switching on. A test shows that a bulb of 100 milliamperes capacity blows when 120 volts are applied to a 2-microfarad condenser. It is therefore necessary to use a fuse bulb of large enough capacity.

If the valves take a total filament current of .5 ampere, which is usual for a three-valve set, a fuse that will blow at .4 ampere will protect them and leave a factor of safety. There is no doubt that fuses of too small a capacity are often used and the fact that they blow worries readers quite unnecessarily.

CURING HUM—A SUGGESTION

Hum from a mains set may be due to many causes, and it is difficult sometimes to effect a cure without re-building.

But help is often obtained by using a potentiometer having an adjustable tap instead of a fixed tap in the heater circuits. If a centre-tapped transformer is used the potentiometer is connected in the circuit by taking the wire from the centre tap to the sliding contact of the potentiometer.

The ends of the potentiometer are joined one to each side of the heater transformer. A total resistance of about 90 is usual. Hum may be reduced or cut out by adjusting the tap.

NOTE Winding Mascot Coils +
A SMALL error in the drawings showing how to wind the Mascot coils has puzzled some readers. While the actual winding drawing is correct in every detail, the end view of the aerial former shows terminal 4 at the top and terminal 3 at the side. These two numbers should obviously be reversed, as is proved by the full-sized wiring diagram and blueprint.

George Gee, the comedian of *White Horse Inn*, broadcasts for the first time on April 14.





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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.

LISSEN PRE-SET CONDENSER

WE have tested, this week, one of the range of Lissen pre-set type condensers. These condensers are of the compression type, built up from small sheets of brass interleaved with mica, and mounted on a composition base.

Moulded bakelite casings are provided, these having lugs arranged so that the condensers can be mounted horizontally or vertically. The nominal maximum capacity of the sample tested was .001 microfarad, and we found, on test, that the actual capacity was variable between the limits of .00117 and .0013 microfarad.



Lissen pre-set condenser

The condenser is well made and is quite suitable for use in pre-tuned circuits. The high-frequency resistance is quite low, and efficient receiving circuits can be built up using these condensers as the tuning capacities. The overall dimensions are 2 in. by 2 1/4 in. by 3/8 in.

HEYBERD H.T. UNIT

A MOST impressive A.C. mains eliminator which we have tested recently is the Heyberd model D.250. This is an absolutely de luxe unit and is suitable for use with receivers employing up to six valves and requiring a maximum H.T. supply of 60 milliamperes at 250 volts. At the same time, going to the other extreme, it can satisfactorily be used with single-valve receivers requiring only a few milliamperes H.T. current.

Metal rectification is employed, a Westinghouse H.T.8 unit being used in a voltage doubler circuit. Four voltage outputs, three of which are variable over wide limits, are provided having the following ratings, H.T.1, variable and suitable for the screening grids of the high-frequency valves, 50 to 80 volts; H.T.2 variable 0-150 volts; H.T.3 variable, 100-200 volts; H.T.4 fixed 250 volts.

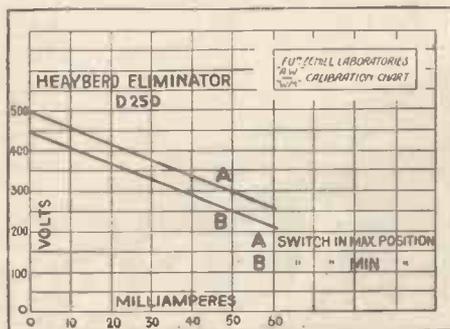
A switch is also provided to allow the

voltage input to the rectifying unit to be reduced, thus lowering the maximum voltage from 250 to 200 volts. The total output of the eliminator is 60 milliamperes, and it should be noted that the H.T.3 tap, as well as being variable, is rated to carry this full output. In addition to the above a 4-volt A.C. supply is provided for the filaments of the valves in the receiver, if these are of the A.C. types.

Up to date to the minute—the new
"A.W." Super-het
ONE-KNOB CONTROL

The smoothing circuits are well designed, a Heyberd double-cored choke being employed with large-capacity condensers. All outputs are well condensed, and no trouble from L.F. instability should develop. A fuse is included in the circuit to prevent serious damage in the event of any fault developing in the internal or external circuits of the eliminator. This fuse which is rated at 250 milliamperes, is a Microfuse gold film type, and is readily replaceable.

We found, on test, that the maximum output was approximately 260 volts at 60 milliamperes with the switch in the maximum position, and 210 volts at 60 milliamperes with the switch in the minimum position. If the total load is less than the above, the maximum output voltage will be correspondingly higher, the actual variation can be seen in the curve accompanying this report. It should be remembered also that all the outputs are interdependent to a certain extent.



Output curves of the Heyberd D250 H.T. unit

If we have any criticism of the eliminator, it is that the L.T. voltage is a trifle high, this being actually 4.3 volts at 6 amperes, this is, however, a small point.

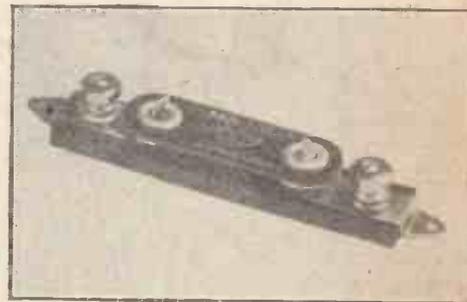
Some figures are quoted by the manufacturers to indicate the small cost of upkeep. On the assumption that the

eliminator is run at full load all the time it will cost 12s. 6d. for every 1,000 hours of use, assuming a supply at 3d. per unit.

This eliminator is a well-made job, and we have found it to give excellent results in use, and it can be confidently recommended to anyone requiring a high-power unit. The retail price is £8 10s. 0d.

MICROFUSES

A VERY interesting type of fuse which we have recently tested is that manufactured by Microfuse Ltd. These fuses consist essentially of a very thin film of gold deposited on a narrow strip of glass. This element is clamped on to a small piece of black fibrous material by means of



The Microfuse Gold-film fuse

brass washers and eyelets at each end, the overall length being 1 3/8 in.

A holder is also available for the fuse, this consisting of a small strip of ebonite, having at each end spring metal projections, located to coincide with the eyelets of the fuse element. Terminals and soldering tags for the external connections are included.

The fuses are rated to carry their normal current indefinitely and to blow on a two times overload. The makers state that on a three times overload the time taken to open the circuit is a tenth of a second, and this decreases to something of the order of a thousandth of a second on an eighth times overload. The fuses are obtainable with carrying capacities varying from 5 milliamperes to 750 milliamperes.

Several fuses with different ratings were tested and all were found to carry their normal current indefinitely, and to blow at approximately twice this value. The resistance of the fuse is negligible except in the very small current ranges where some appreciable resistance is inevitable. This can usually be tolerated, in view of the protection to the circuit. These components are well made, and appear to be fully up to the standard claimed by the maker. They can be recommended for use with all types of set.

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W.B. PERMANENT MAGNET MOVING-COIL SPEAKER. Type P.M.4. With special transformer. (Cash price £2 2s. 0d.) Balance: 7 monthly payments of 5/9.

B.T.H. MINOR PERMANENT MAGNET MOVING-COIL SPEAKER. (£2 10s. 0d. Cash or C.O.D.) Balance: 11 monthly payments of 4/5.

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EKCO H.T. UNIT. Type A.C.25. For multi-valve sets requiring up to 25 m/a. 3 tappings, S.G., detector and 120/150 volts. For A.C. mains. (Cash or C.O.D. Price £3 17s. 6d.) Balance: 11 monthly payments of 7/-.

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10/- Down

B.T.H. SENIOR PERMANENT MAGNET MOVING-COIL SPEAKER. (Valve. £5 12s. 6d. Cash or C.O.D.) And 11 monthly payments of 10/3.

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SETS OF DISTINCTION



LOTUS LANDMARK 3

---KIT SET---

Makers : Lotus Radio, Ltd.

Price : £1 19s. 6d.

THIS is a three-valve battery kit set with one of the "cleanest" layouts I have come across during the present season. You will appreciate the simplicity of the design from the illustrations.

The circuit used as the basis of the Landmark 3 is a well-tried sequence of three valves. The first valve is a leaky-grid detector. This is followed by a resistance-capacity-coupled valve amplifying at low frequency. Finally there is an output power valve, the coupling between the second and third valves being a transformer.

The detector arrangement follows modern practice. There is a very selective, inductively-coupled tuning circuit and differential reaction. My tests show that the Landmark 3 tuning coil is well designed,

ably because the 75,000-ohm anode resistance acts as a suitable barrier to high-frequency current going to earth through the differential reaction condenser.

The only other point about the circuit needing comment is the connection of a .25-megohm grid leak across the secondary of the transformer. This acts as a form of tone-corrector.

The loud-speaker quality is further improved by the inclusion of choke-capacity coupling in the output circuit of the power valve—a Lotus low-frequency choke in series with a 1-microfarad condenser between the anode and earth.

Easy Assembly

I was supplied with a completely assembled Landmark 3 kit, but from a study of the very clearly defined blueprint supplied with the kit of parts, I should say that construction is extremely simple. A point-to-point wiring chart is also provided, so there should be no difficulty in connecting together the various components, all of which, by the way, are provided with robust terminals—there is no soldering.

The practical interpretation of the circuit just described is very satisfying, as you can see from the illustrations. As usual, the controls are

mounted on a vertical, well-finished, metal panel, and the rest of the components are suitably arranged on a wooden baseboard.

The tuning control occupies the central position on the panel and to the left and right of this are the series aerial condenser and reaction condenser respectively. Below these controls are the wavechange switch on the left and battery on-off switch on the right.

The wavechange switch is fitted very close to the dual-range coil and is the familiar Lotus rotary type, admirably suited to this kit.

Apart from terminals for the aerial and earth and loud-speaker connections, all the battery connections are done by means of neat battery cord.

The Valves

The choice of valves for this kit is not really critical, but the makers suggest using a Mullard PM1A for the detector, Mullard PM1HL after the detector, and

Mullard PM2A in the power output. This batch works extremely well with the set, as my tests have proved.

I found the total anode-current consumption was 9 milliamperes of a 120-volt high-tension battery. With the power valve specified, and a sensitive loud-speaker of the balanced-armature or moving-coil type, the PM2A gives adequate undistorted output to fill the ordinary room.

Selectivity, as might be expected, depends on the setting of the series aerial condenser. I therefore tested the set under two conditions, firstly with this condenser "all in" for maximum volume, and secondly with the condenser half out, so as to gain greater selectivity, with, of course, some reduction in volume.

The Landmark 3 on Test

Under the first condition, London National came in at 30 degrees and London Regional at 58 degrees, clear of each other, but without any appreciable silent space between.

Under the second condition, London National at 32 degrees and London Regional at 58 degrees had only 10 degrees spread each. Moreover, the setting of the series condenser giving this very satisfactory local-station selectivity also enabled fair strength to be obtained on a number of foreigners in between the settings of the two locals.

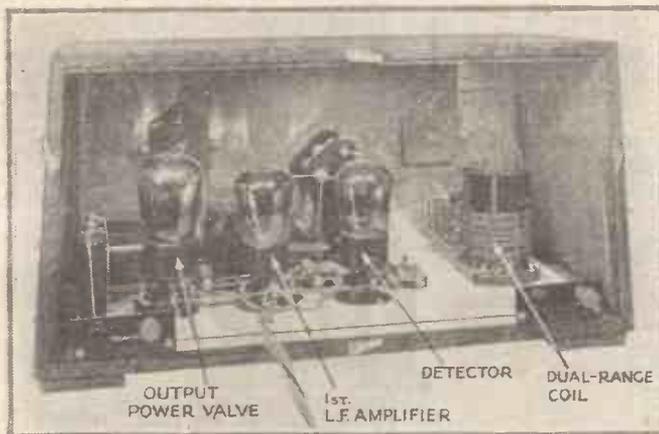
On the long waves Daventry was a good signal at 63 degrees. I was impressed with the entire absence of medium-wave "break-through," even at the lowest settings on the tuning dial on the long waves.

Two or three long-wave stations were tuned in at good loud-speaker strength and on the medium waves all the high-power stations came in well. It is interesting to note that Prague at 84 degrees and Langenberg at 78 degrees were clear of North Regional, which came in at 80 degrees. Midland Regional at 67 degrees was clear of London Regional.

I think I have said enough to show that the Lotus Landmark 3 is a first-rate battery kit set. It is easy to build and entirely satisfactory in operation. An attractive cabinet to house the kit has been specially made by Messrs. W. & T. Lock, Ltd., and the price in solid oak is 10s. 6d.

SET TESTER.

"Critic on the Ether" is the title of a musical entertainment to be produced by Victor Smythe in the North Regional programme on April 15. It will include sketches which have been specially written by wireless critics.



The simple construction of the Landmark 3 is evident from this rear view

combining good volume with the sharp tuning so essential these days.

There is a fixed amount of coupling between the aperiodic aerial coil and the grid-tuning coil, but a suitable variation in this aerial coupling is obtained by means of a .00015-microfarad variable condenser in the aerial lead, that is to say, in series with the aerial and the aperiodic aerial coil.

The coil is, of course, dual-range, a section of the aperiodic winding and the grid tuning winding being short-circuited for medium-wave tuning.

A single reaction winding serves to give smooth oscillation of both wavebands. A .00035-microfarad differential reaction is fitted, so that there is a constant anode by-pass of high-frequency current, irrespective of the amount of reaction being applied.

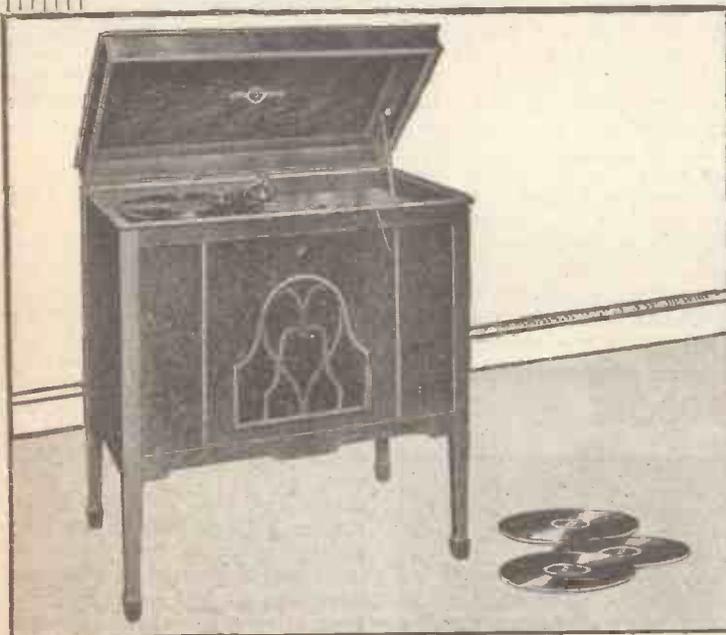
As resistance-capacity coupling follows the detector, no high-frequency choke is included in the anode circuit. Tests go to show that the omission of the choke does not affect medium-wave oscillation presum-

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PERCY W. HARRIS CHATS ABOUT MAINS UNITS

A FRIEND dropped in the other night to ask my advice on the purchase of a "high-tension eliminator." What he really wanted to do was to increase and not to "eliminate" his high tension supply! Thousands of people still refer to units designed to provide the high-tension current for wireless sets from the mains as "eliminators." This is due to the fact that they were first referred to as "high-tension battery-eliminators," the battery, and not the high-tension being eliminated!

The study of devices for obtaining high-tension from A.C. mains has always fascinated me, and while to many people they are elaborate and even fearsome devices, this is not really the case, and the general principles are easily understood. The whole purpose of such a unit, of course, is to take the alternating currents that rise and fall 50 or so times a second, and turn them into direct currents with whatever change of voltage is required at the same time. Means are also provided for adjusting the voltages of the output.

Rectifying and Smoothing

The first essential part of such an apparatus is, therefore, a rectifier or one-way device, so that the current, instead of rising and falling and then rising again in a reverse direction, shall rise and fall in one direction only. Next the uni-directional "bumps" must be flattened down into a continuous current and finally we must provide various tapings to give the differences in voltages required. There are thus three parts—rectifier, smoother, and voltage controller. Every high-tension mains unit for A.C. mains has these three parts, but there are

numerous variations possible in each of them. Take, for example, the rectifier. First we have the commutator rectifier which requires an electric motor to drive it and is so arranged that a reversal of the current direction of the mains is accompanied by a reversal of the rectifier connection so that we get a series of one-way pulses. These rectifiers, however, are very rarely used save in very big installations, and can be left out of consideration by the ordinary user. Secondly we have the vibrating rectifier which can, by careful design, be made to give good results, but is really impracticable for modern conditions. It has, however, certain uses in rectifying low-voltage currents for charging accumulators. Its chief disadvantage is its tendency to go wrong from sticking contacts, dirt, etc. Some years ago I used to charge all my accumulators (and in those days there were many!) by such a vibrating rectifier perfectly satisfactorily.

Valve Rectifiers

Thirdly we have the various types of valve rectifier based on the old Fleming two-electrode valve. Here a filament is heated and made to emit electrons which can be made to flow from the filament to a positively charged plate. As the whole of the current passed by such a rectifier is in the form of an electron stream, the filament must have a very copious emission. The tremendous improvements of the last few years in electron-emitting filaments make it possible to provide very efficient rectifiers of this type.

Next we have the filamentless type of rectifier which had a tremendous vogue in America a few years ago when it was

difficult to get a really high emission from the filament of the ordinary type of rectifier. The Raytheon tube was the best example of this form of rectifier, the bulb being filled with a mixture of certain rare gasses at low pressure and the electrodes consisting of two points and a plate. The mechanical arrangement of these parts was important, and I have not space here to describe the principles involved. It was, however, a double rectifier, that is to say both halves of the alternating current were rectified, and it really functioned by the heavy ionisation of the gas. While all the electrons leaving either point reach the plate, the tremendous difference in area between the plate and the points meant that only a negligible proportion of the electrons on leaving the plate reached these points, so the one-way effect was obtained in this fashion.

Next we have what are known as "dry" rectifiers; again a nasty name, for nothing can be drier than any of the types of valve rectifier from which the name must differentiate it! The name originally came from an attempt to differentiate them from "wet" rectifiers, these latter consisting of certain metal plates in particular chemical solutions. They were at one time very popular with amateur transmitters owing to the fact that they would handle a good deal of current and could be made cheaply.

The "dry" rectifier, however, is increasing in popularity, and I am glad to find that it is now generally known as the "metal" rectifier, although here, again, I could find fault with this name, for it is not the metal which rectifies, but its contact with an oxide, the metal itself having no rectifying powers whatever.

Metal Rectifiers

If you examine one of the modern metal rectifiers you will find that it is apparently made up of a large number of little "sandwiches." You may wonder why there are so many. In the make-up of a metal rectifier we are concerned with two important points of voltage and current. The units in a metal rectifier generally consist of discs or flat plates on which the special oxide is formed and rectification takes place at a junction between the oxide and the metal. The voltage, however, which each unit will carry, is relatively low, and therefore if we want to rectify a high voltage we must place a number in series.

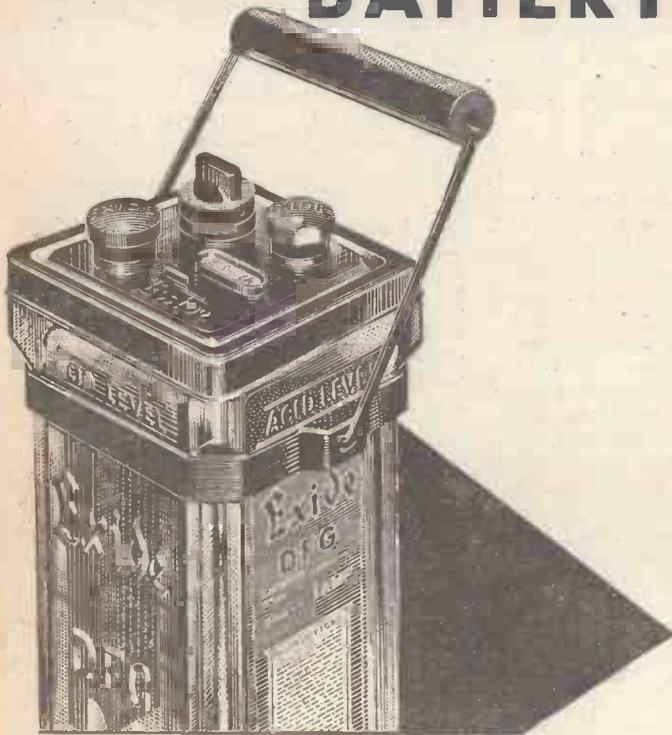
So far as current is concerned, heat is generated at the point of juncture, this heat being a function of current strength. The heat must be dissipated, and for this reason rectifying units are fixed to radiating discs, and the larger the current the larger we make the individual rectifying units with their discs. This is why the metal rectifiers for battery charging, which are needed to give a comparatively low voltage but a large current, have comparatively few units, but units which are individually large. When we are designing a high-tension unit with a small output of, say, ten or fifteen milliamps, at perhaps 120 volts, the rectifier assembly can be made very small for the heat dissipation required is low. This is why many H.T. units sold commercially have been made so compact.

MAKING THE RECORD ROBOTS



Special new plant has been installed in the H.M.V. factory for constructing the automatic record changing "robot" mechanism which is a feature of many of the new radio-gramophones. Note the overhead conveyors which carry the parts from one bench to the next.

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Exide

"D" TYPE FOR WIRELESS L.T.

The Exide "D" Type Low Tension Battery for slow discharge will save you in first cost and save you in recharging. Size for size it costs less to buy than any battery made.

PRICES PER 2-VOLT CELL • DTG - 20 amp. hours - 4/6
DFG - 45 amp. hours - 8/6 • DMG - 70 amp. hours 11/-
DHG - 100 amp. hours - 14/6. These prices do not apply in the Irish Free State.

From Exide Service Stations or any reputable dealer.
Exide Service Stations give service on every make of battery.

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Branches: London, Manchester, Birmingham, Bristol, Glasgow, Dublin, Belfast

N 80

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(REGISTERED)
"NEGROLAC"
SUPER INDOOR
AERIAL



42 Aerials in One

A marvellous Aerial giving outstanding results. No other will compare with the "Negrolac."
THE MOST EFFICIENT INDOOR AERIAL EVER OFFERED.

Pick-up 30-50 percent. superior to ordinary stranded aerials.

R33/30 15 ft. lengths, complete.	3/6
R33/180 18 ft. " " "	4/-
R33/240 24 ft. " " "	5/-
R33/30 30 ft. " " "	6/-

From all First-Class Radio Stores. Refuse Substitutes.

If any difficulty, write direct.

Illustrated Radio Catalogue on request.

USERS OF THE "NEGROLAC" INDOOR AERIALS ARE FINDING THAT THE OLD-FASHIONED OUTDOOR TYPE OF AERIAL IS QUITE UNNECESSARY WHERE A MODERN DESIGN OF RECEIVER IS EMPLOYED.

HOME AND FOREIGN STATIONS COME ROMPING IN WITH EASE.

"NEGROLAC" has improved thousands of sets. Why not yours?

WHAT USERS SAY

Mr. F. A. —, Southsea, Portsmouth, Hants, writes:—

"The results were surprising both for volume and selectivity; it has transformed my old set quite a modern one, and I must say I am very satisfied with it."

Mr. H. G. —, Scarsdale Road, Manchester, writes:—

"The 'Negrolac' was stretched across the Dining Room, and fifty-five Stations were logged, all at full loud-speaker strength, i.e., equal in strength to ordinary gramophone volume."

Ward & Goldstone
PENDLETON MANCHESTER LTD

UNIQUE VALUE and PERFORMANCE

— a permanent magnet
MOVING COIL
SPEAKER

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39/6

Including Multi-Ratio O.P. Transformer.

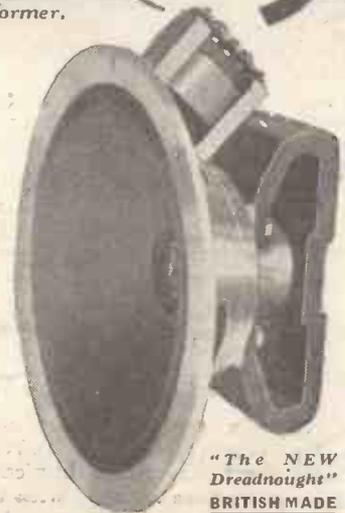
After seven years intensive research, Goodman's new "Dreadnought" permanent magnet moving-coil speaker has been evolved.

The exclusive heavy super-efficient magnet gives a powerful magnetic flux across the accurately machined gap, ensuring utmost sensitivity.

Careful matching of the multi-ratio transformer, the scientific cone and coil assembly and precision centring, ensure reproduction that is full, yet crystal clear and consistent over the whole range of audible frequencies.

Supplied complete with baffle board ready for fitting to your own cabinet or radiogram. British made and Fully Guaranteed. The ideal speaker for all kit sets.

Get one to-day—if unable to obtain from your radio shop, send 39/6 direct to makers; C.O.D. if desired (or write for full descriptive literature).



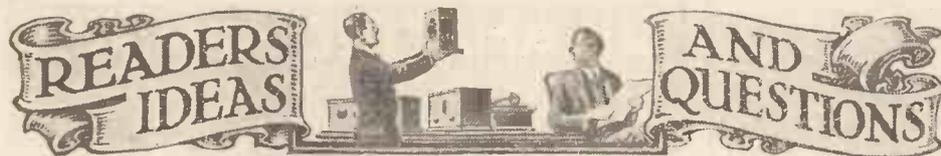
"The NEW
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BRITISH MADE

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Scientific

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



Praise for the "Mascot"

SIR,—It is just a week since I finished your latest set, "The Mascot," and I must admit it is the finest set of its class and type I have ever built or handled.

The tuning is remarkable even on the single circuit, and I can receive Prague with practically no interference from North Regional, a truly wonderful performance, and one which is impossible with many of the S.G.3's owned by my friends.

I am particularly delighted with the total absence of background noises, and the really good quality.

The beauty of the foreign-station reception is stability, which is so unusual in a Det.2-L.F. set.

I might add that my coils are home-wound with no particular care, which shows that the set is not in any way critical in what is generally the delicate part of the set.

J. R. (Manchester).

Bi-grid Valves

SIR,—I have been using your super-het short-wave adaptor, as described in the Short-wave Supplement, in conjunction with my "1931 Ether Searcher," battery model. The results are very satisfactory, but I have been told that I can get even better results if I use a bi-grid valve in the adaptor. Can you tell me if this is so?

K. J. (Hitchin).

It is possible to use a bi-grid valve in the super-het short-wave adaptor, but in our opinion it would not improve the results in any way. On the contrary, it would most probably spoil them to a certain extent by increasing the "mush," and we do not advise it.—Ed.

Output Transformers

SIR,—I have several different types of power and super-power valves I would like to experiment with in my output stage. I am doubtful, however, as to the correct ratio of output transformer to use with the different valves. Can you give me the formula? D. C. S. (Southampton). The approximate formulæ are:

1. For cone loud-speakers:

$$R = \sqrt{2} \times \frac{\text{speaker impedance}}{\text{valve impedance}}$$

2. For moving-coil loud-speakers:

$$R = \sqrt{2} \frac{1}{2} \times \frac{\text{speaker impedance}}{\text{valve impedance}}$$

—Ed.

The "World-Wide Short-Wave 3"

SIR,—In reply to your request for reports of stations received on "World-Wide Short-Wave 3," I am pleased to say I am more than satisfied with the results, the set works so smoothly, and very little hand capacity.

I had my greatest thrill yesterday between one and two o'clock, when I logged Bandoeng, Java, on 31.86 metres; the announcements were made in Dutch,

French and English, stating that it was the Dutch Station PLE, Dutch East Indies; this I got on the loud-speaker.

With the wave-change switch out I get Radio Murco, OXY Zeesen, SRI, EAQ, G5SW, Rome, and Moscow working on 25.16 metres; this station, I might mention, sends out a different programme to the 50-metre Moscow.

E. S. (London, W. 1).

The "Square Peak 3"

SIR,—For a considerable time I have used a straight three-valve set, and recently incorporated the Varley Square Peak coil with good results. However, a few weeks ago I obtained the blue-print and particulars of your "Square Peak 3" and have during this past week converted my set to this circuit completely. I want to say how delighted I am at the results. Although I am using the same loud-speaker (a home-constructed double-lined diaphragm type), the change in reproduction is most marked, and the bass is now well reproduced without any loss on the high notes, which is rather a puzzle to me, seeing that the speaker is the same.

J. H. (Liverpool).

OUR LISTENING POST

By JAY COOTE

SOME little time ago, Paris PTT, on the lookout for a distinctive interval, declared its intention of broadcasting between items the crowing of a "gallic" cockerel. If now, by chance you should listen to the Radio Vitus transmissions you will hear the call of another rooster, as this station has confirmed its claim to the bird through its close association with the Pathé Film Company. The signal is largely used as a preliminary standby, but on occasion the studio still broadcasts its original signal of two notes (F sharp, D sharp) to separate items in the programme. So Ecole Supérieure is now compelled to seek another means to identify itself to its listeners.

The New Paris

The new Poste Parisien (Paris) transmitter has not yet been officially launched, and, although testing at odd times during the day, leaves the broadcast of the programmes to the older and smaller station. At present, from the reports received from Paris considerable difficulty is being experienced with the wavelength on which the station is supposed to work, for the power of the new plant makes it impossible to use the same channel as Grenoble without causing mutual interference. Parisian listeners say that something drastic will have to be done, and doubtless that "something drastic" will mean a violent collision with another station in the waveband—but probably a more distant foreigner.

Since the power of Radio Maroc was raised to 6 kilowatts (aerial), the North African entertainments have been better received in the British Isles; in fact, I find Rabat a regular entry in my nightly log. As is customary with

The New 5XX

SIR,—Droitwich is about 30 miles from the Welsh border and about 120 miles from the east coast. We in Lincolnshire and north Norfolk will get no programmes worth mentioning when the Midland Regional goes another 40 miles further west. All we shall get is 5XX with its talks and other highbrow stuff. The B.B.C. used to suffer from a crystal complex, now it suffers from the idea that everyone has a four-valve set. I have protested to the B.B.C. about this shifting the Daventry's and all I had was a polite note saying we are in the Regional area of London. What sort of reception do you think we get at a place like Spalding, about 120 miles from London?

What is the *real* reason for shifting them?

J. B. (Peterborough).

Success with the "Mascot"

SIR,—Just a few lines to let you know my results with the "Mascot" receiver. I made the coils on Saturday and built the set to-day, Sunday. I switched on at 6 p.m. and stations came in like wildfire, with the tapping on No. 4 of the H.F. coil.

J. R. (Stoke-on-Trent.)

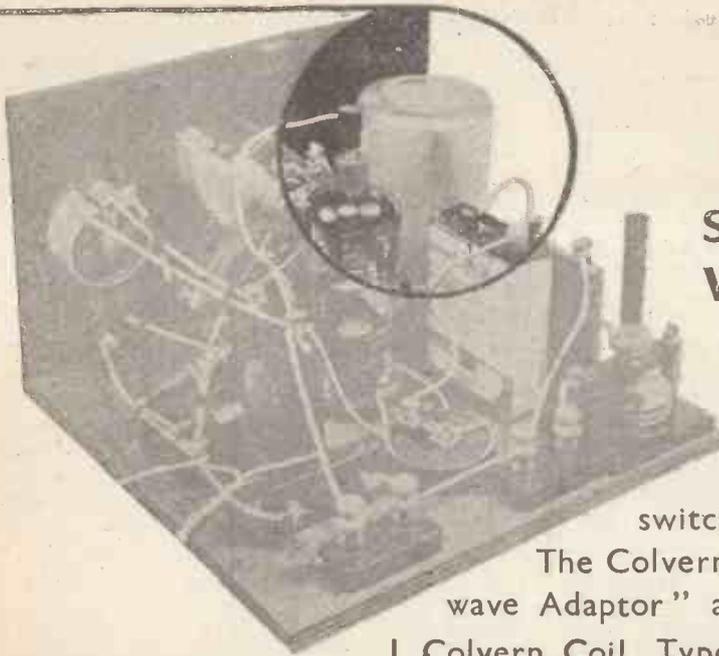
A concert by winners at the Welsh University Annual Inter-collegiate Eisteddfod, held in Cardiff this year, will be given in the West Regional programme on April 19.

most of the French-speaking studios, Radio Maroc largely relies on gramophone records to entertain its listeners, but from time to time you may pick up on that wavelength excellent concerts given by its local orchestra, as well as regular relays of foreign transmissions. The latter are usually carried out after 10 p.m. G.M.T., and, although the feature is not always advertised, they may be heard on most weekdays. As an interval signal the station still retains its old-fashioned metronome, which possesses a peculiar metallic sound, causing it to be different to those heard from other European studios. Announcements are only given out in French; it is only on very rare occasions that an Arabic translation of an item is broadcast.

From Lisbon

Further details regarding the Portuguese broadcasting scheme are now available, but from the information gathered, there is very little likelihood of Lisbon possessing a high-power transmitter before 1933, and in the meantime we must make the best of the weaker transmissions put out by CT1AA (Lisbon). In addition, however, to the station to be erected in the Portuguese capital, it is now proposed to install a 2-kilowatt relay at Oporto, where for some months an equally enthusiastic amateur experimenter has broadcast wireless entertainments on 244 metres. (CT1AA, Lisbon, by the way, has been on the air since 1929.) If the scheme matures, Greece will be the only country in Europe without a broadcasting station, as, notwithstanding many rumours to the contrary, no steps are being taken to erect one at Athens.

COLVERN DUAL RANGE SHORT - WAVE COIL



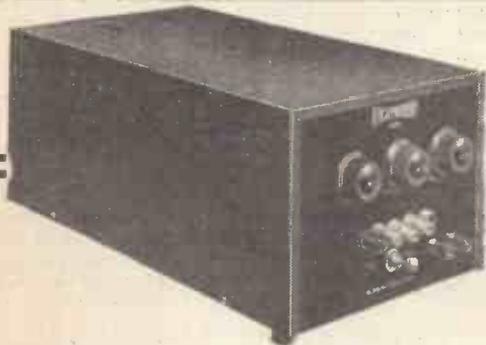
SPECIFIED FOR THE SHORT WAVE ADAPTOR

This coil, Type KSW, is totally screened, Dual Range. It is complete with self-contained wave-change switch which simplifies wiring. The switch is fitted with silver-gold alloy contacts.

The Colvern Components Specified for the "Short-wave Adaptor" are

- I Colvern Coil, Type KSW - - - - - 9/6
- I 50,000 ohms Variable Colverstat, Type ST10 - 5/6

COLVERN LTD., MAWNEYS RD., ROMFORD, ESSEX



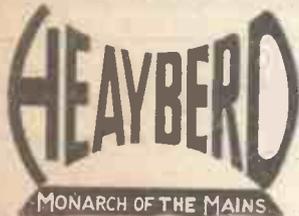
60 ma. at 250 v.

An ideal Mains Unit is the Heayberd D.250 model. It can be used with practically any Receiver marketed, from a cheap single-valver to a powerful six-valve super-het. Complete in mottled black steel case with bakelite panel. Westinghouse rectification. Alternative output switch.

HEAYBERD D.250 MAINS UNIT
 Outputs: 60 m/A. at 200 or 250 volts
 H.T.1.—Variable S.G., 60-80 volts.
 H.T.2.—Variable, 150 volts.
 H.T.3.—Variable, 100-200 volts.
 H.T.4.—Fixed, 250 volts.

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I enclose 3d. stamps for lists, with diagrams, of the full range of Heayberd Mains Units, Transformers, Chargers, etc.

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7/9 Post Free
A LIMITED QUANTITY ONLY.
Manufacturers of Transformers, Chokes and Coils. 'Phone 303.
ERIC COOKSON & CO., 173 Church St., BLACKPOOL

BROADCAST TELEPHONY

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 (G.S.W.)	16.0	315	950 Marseilles	1.0	240.2	1,249.2 Stavanger	0.5
242.3	1,238 Belfast	1.0	327.5	916 Grenoble (PTT)	2.0	364	824 Bergen	1.0
201.0	1,147 London Nat.	50.0	328.2	914 Poste Parisien	1.2	369	813.9 Frederikstad	0.7
288.5	1,040 Newcastle	1.2		(also testing on 85 Kw.)		495.8	605.1 Trondheim	1.2
288.5	1,040 Plymouth	0.12	345.2	869 Strasbourg (PTT)	11.5	1,083	277 Oslo	00.0
288.5	1,040 Plymouth	0.12	360.4	812.4 Radio LL (Paris)	0.5	POLAND		
288.5	1,040 Edinburgh	0.3	384.4	779 Radio Toulouse	8.0	214.2	1,400 Warsaw (2)	1.9
288.5	1,040 Dundee	0.12	450	666.7 Paris (PTT)	0.7	234.9	1,283 Lodz	2.2
288.5	1,040 Bourne-mouth	1.0	460	644 Lyons (PTT)	1.5	312.8	959 Cracow	1.5
288.5	1,040 Aberdeen	1.0	1,445.7	207.5 Eiffel Tower	13.5	334.4	897 Poznan	1.9
301.5	995 North National	50.0	1,725	174 Radio Paris	75.0	380.7	788 Lvov	16.0
309.9	968 Cardiff	1.0	GERMANY			409.8	732 Katowice	12.0
355.9	843 London Regional	50.0	31.38	9,560 Zeesen	15.0	503	533 Wilno	18.0
376.4	797 Glasgow	1.0	217	1,382 Königsberg	0.75	1,411.8	212.5 Warsaw	120.0
398.9	754 Midland Regional	25.0	218.5	1,373 Flensburg	0.5	PORTUGAL		
480	625 North Regional	50.0	210.0	1,364 Cassel	0.25	282.2	1,063 Lisbon (CTIAA)	2.0
1,554.4	193 Daventry (Nat.)	30.0	232.2	1,292 Kiel	0.25	also on 42.0 m. (Fri.)		
AUSTRIA								
218.7	1,375 Salzburg	0.5	239.4	1,253 Nürnberg	2.0	ROMANIA		
245.0	1,220 Linz	0.5	245.9	1,220 Cassel	0.25	391	761 Bucharest	12.0
285.2	1,058 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	15.0
517	581 Vienna	15.0	270.5	1,085 Heilsberg	00.0	378	792.5 Moscow Regional	20.0
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	389.6	770 Archangel	10.0
210.2	1,429 Liege	0.15	283	1,060 Berlin (E)	0.5	424.3	707 Moscow-Stalin	100.0
215.3	1,393 Chatelineau	0.2	283	1,060 Stettin	0.5	411	729.2 Pokrovsk-Volga	20.0
215.0	1,391 Bruxelles	0.2	318.8	941 Dresden	0.25	449.4	667.5 Odessa RV13	10.0
Conference								
216	1,389 Liege	0.1	325	923 Breslau	1.5	472.3	631 Sebastopol	10.0
221	1,355 Binche	0.1	372	806 Mühlacker	00.0	502.4	597 Astrakhan	10.0
240.8	1,245.8 Liege (Exp.)	0.1	389.0	832 Hamburg	1.5	720	416.6 Moscow (PTT)	50.0
268.3	1,118.1 Liege (Coinc.)	0.4	419.9	716 Frankfurt	1.5	824.2	364 Sverdlovsk RV5	50.0
283.6	1,058 Brussels (S.B.R.)	0.5	453.2	662 Berlin	1.5	849	353 Rostov (Don)	4.0
337.8	888 Brussels (No. 2)	15.0	472.4	635 Danzig	0.5	937.5	320 Khar'kov (1kv20)	25.0
509.3	589 Brussels (No. 1)	15.0	532.9	563 Langenberg	60.0	968	310 Alma-Ata	10.0
BULGARIA								
318.8	941 Sofia (Rodno Radio)	0.5	539.7	536 Munich	1.5	1,004	300 Leningrad	100.0
CZECHO-SLOVAKIA								
249.0	1,201.8 Prague (2)	5.0	550.7	536 Kaiserslautern	1.5	1,053	284.0 Tiflis	10.0
263.8	1,137 Moravska Ostrava	10.0	550.7	536 Augsburg	0.3	1,116	268.5 Moscow Popoff	75.0
279.3	1,074 Bratislava	13.0	550.7	536 Hanover	0.3	1,170	256.7 Tashkent	25.0
293	1,022 Kosice	2.5	560.3	527 Freiburg	0.25	1,260.5	238 Novosibirsk	10.0
341.7	878 Brunn (Brno)	32.0	1,034.9	183.5 Norddeich	10.0	1,304	230 Moscow (Trades Unions)	165.0
483.0	614 Prague	120.0	1,034.9	183.5 Zeesen	75.0	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	15.0	1,482	203 Moscow	100.0
also on 31.51 m. (9,520 Kcs.)								
ESTONIA								
290.1	1,013 Tallinn	11.0	4,000	75 HOLLAND		1,600	287.5 Irkutsk	15.0
443.8	676 Tartu	0.5	208.1	1,006.2 Hilversum	8.5	1,685.3	178 Nijori Novgorod	4.0
FINLAND								
201	1,031 Viipuri	13.0	1,071.4	280 Scheveningen-Haven	10.0	1,715.5	175 Bakou	40.0
368.1	815 Helsinki	12.0	1,875	260 Huizen	8.5	SPAIN		
434.6	690 Pori	1.5	210	1,429 Budapest (2)	3.0	250.9	1,196 Barcelona (EAJ15)	1.0
540	556 Tampere	1.0	550	545 Budapest (1)	18.5	266.6	1,125.2 Valencia	2.0
1,798	167 Lahti	54.0	HUNGARY			348.9	860 Barcelona (EAJ1)	8.0
FRANCE								
219.0	1,364.1 Béziers	0.5	210	1,429 Budapest (2)	3.0	368.1	815 Seville (EAJ5)	1.5
222.1	1,350.3 Fécamp	5.0	550	545 Budapest (1)	18.5	428	709 Madrid (España)	2.0
236.7	1,267.3 Bordeaux	2.0	ICELAND			424	707 Madrid (EAJ7)	2.0
	Sud-Ouest	2.0	1,200	250 Reykjavik	16.0	456.0	557 San Sebastian (EAJ8)	0.6
245.0	1,220 Strasbourg BGF	1.0	IRISH FREE STATE			SWEDEN		
250.1	1,199.5 Juan-les-Pins	0.5	224.4	1,337 Cork (O.C.K.)	1.2	230.6	1,301 Malmö	1.25
255.1	1,176 Toulouse (PTT)	1.0	413	725 Dublin (2RN)	1.2	257	1,167 Hörby	10.0
265.4	1,130 Lille (PTT)	1.3	ITALY			305.3	981 Falun	0.5
271.4	1,105.1 Rennes	1.2	25.4	11,810 Rome (2RO)	15.0	321.9	932 Göteborg	10.0
285.4	1,051 Montpellier	0.8	247.7	1,211 Trieste	10.0	435.4	689 Stockholm	55.0
386	1,049 Radio Lyons	10.0	273.2	1,098 Turin (Torino)	7.0	541.5	554 Stacksvall	10.0
204.7	1,017.7 Limoges (PTT)	0.5	312.2	961 Genoa (Genova)	10.0	777.5	386 Östersund	0.6
295.5	1,015 Radio Vitus	1.0	331.5	905 Naples (Napoli)	7.0	1,241.6	241.6 Boden	0.6
also on 43.75 m. (6,865 Kcs.)								
304.9	084 Bordeaux (PTT)	13.0	368.1	815 Milan	1.0	1,348.3	222.5 Motala	30.0
GERMANY								
315	950 Marseilles	1.0	441	680 Rome (Roma)	50.0	SWITZERLAND		
327.5	916 Grenoble (PTT)	2.0	500.8	599 Florence (Firenze)	20.0	244.1	1,229 Basle	0.65
328.2	914 Poste Parisien	1.2	524.5	572 Palermo	3.0	245.9	1,220 Berne	0.5
(also testing on 85 Kw.)								
345.2	869 Strasbourg (PTT)	11.5	LATVIA			403	743 Sötlens	25.0
360.4	812.4 Radio LL (Paris)	0.5	198.5	1,510 Riga (tests)	10.0	459.4	653 Beromünster	60.0
384.4	779 Radio Toulouse	8.0	625	572 Riga	15.0	760	395 Geneva	1.25
450	666.7 Paris (PTT)	0.7	LITHUANIA			TURKEY		
460	644 Lyons (PTT)	1.5	1,935	155 Kaunas	7.0	1,204.8	249 Istanbul	5.0
1,445.7	207.5 Eiffel Tower	13.5	NORTH AFRICA			1,538	295 Ankara	7.0
1,725	174 Radio Paris	75.0	363.4	825.3 Algiers (PTT)	16.0	* Delete unwanted words.		
and 32.26 m. (9,300 Kcs.)								
NORWAY								
245.9	1,220 Cassel	0.25	416	721 Radio Maroc (Rabat)	0.0	307	977 Zagreb (Agram)	0.75
253.1	1,185 Gleiwitz	5.0	NORWAY			430.4	697 Belgrade	2.5
259.3	1,157 Leipzig	2.0	235.5	1,274 Kristiansand	0.5	574.7	522 Ljubljana	2.5
269.8	1,112 Bremen	0.2	YUGOSLAVIA			2,450	1,224 Skopje (tests)	20.0
270.5	1,085 Heilsberg	00.0						
283	1,060 Magdeburg	0.5						
283	1,060 Berlin (E)	0.5						
283	1,060 Stettin	0.5						
318.8	941 Dresden	0.25						
325	923 Breslau	1.5						
372	806 Mühlacker	00.0						
389.0	832 Hamburg	1.5						
419.9	716 Frankfurt	1.5						
453.2	662 Berlin	1.5						
472.4	635 Danzig	0.5						
532.9	563 Langenberg	60.0						
550.7	536 Munich	1.5						
550.7	536 Kaiserslautern	1.5						
550.7	536 Augsburg	0.3						
560.3	527 Freiburg	0.25						
1,034.9	183.5 Norddeich	10.0						
1,034.9	183.5 Zeesen	75.0						
2,525	119.3 Königswusterhausen (press)	15.0						
2,900	103.5 ditto	15.0						
4,000	75 ditto	15.0						
208.1	1,006.2 Hilversum	8.5						
1,071.4	280 Scheveningen-Haven	10.0						
1,875	260 Huizen	8.5						
210	1,429 Budapest (2)	3.0						
550	545 Budapest (1)	18.5						
1,200	250							

Postcard Radio Literature

GET THESE CATALOGUES FREE

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

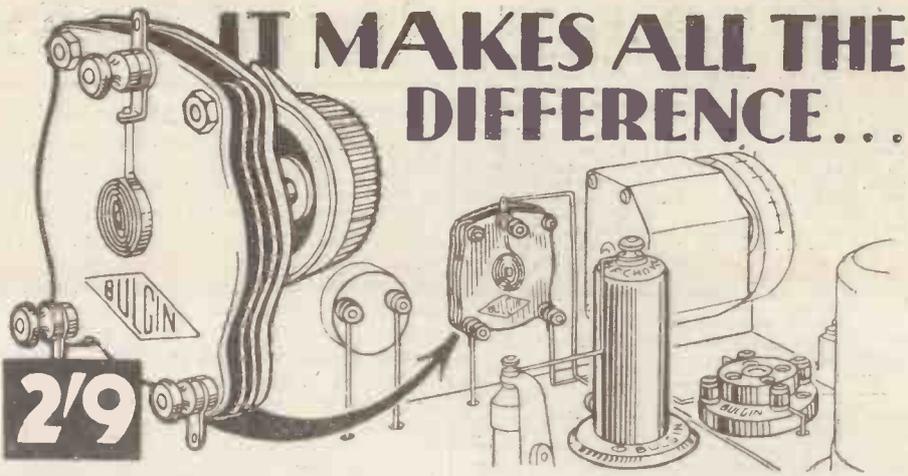
Good, Cheap Cabinets
FOR that new set you will need a good-looking cabinet, and in a booklet I have received from Messrs. W. F. Wilkins, there are many really good-class "boxes," at very low prices. I like the £2 15s. radiogram cabinet, of solid oak, with an impressive fret front and convenient removable back; also a number of table and pedestal models. The booklet (copies free) gives full details and dimensions. **736**

Igranic Permanent Magnet Speaker
 The new Igranic sheet 6746 deals with the permanent-magnet moving-coil speaker. Two types are available, one with an integral input transformer. The magnet system is of exceptional proportions, and a 10-in. diameter cone is mounted with the magnet in a cast aluminium frame. **737**

Cheaper Ferranti Condensers
 A number of price reductions have been made in connection with some Ferranti fixed condensers, and you should get the free literature giving details of the whole range. **738**

Mains Transformers
 Chelmer mains transformers, made by E. Edwards & Co., of Chelmsford, are made for practically every type of Westinghouse metal rectifier and for popular valve rectifier circuits. I have just been reading through a lengthy list giving the outputs of each type, and I recommend a copy of this to set builders. **739**
OBSERVER.

Mr. R. Buckby, Nash's Club, 7 Savile Row, London, W.1, will be obliged if any reader can supply him with issues Nos. 464 and 467 of **AMATEUR WIRELESS**. Payment and cost of postage will be remitted.



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BLUE SPOT 66R AND CHASSIS	£2/2/6	5/6	9 of 4/6
BLUE SPOT 100U	39/6	5/8	7 of 5/4
AMPLION M.C.6	67/6	7/5	9 of 7/5
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EKCO Eliminator A.C.18	67/-	7/5	9 of 7/5

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TRANSFORMER STAMPINGS, instrument Wire, etc. Cheap. Lists free.—Lumen Electric Company, 9 Scarisbrick Avenue, Litherland, Seaforth, Lancs.

WIRELESS AS A CAREER.—Those already engaged in the radio industry and those who would like to obtain employment in this interesting profession should write for a copy of our booklet, sent post free without obligation.—Northern Counties Wireless School, 55-57 Guildhall Street, Preston.

CHARGE YOUR H.T. FROM YOUR L.T. AT HOME.—Combination trickle. Charges efficiently 1 to 12. H.T. 10-volt accumulators, 10/6. Postage 6d. Diagram only, 1/0.—R. Fox, 188 Camberwell Grove, S.E.5.

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AS NEW.—Super 60 with valves, less cabinet, £5/10/-.—Box 7, "Amateur Wireless," 58-61 Fetter Lane, E.C.4.

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WIRELESS IN PARLIAMENT

MR. HANLEY asked the Postmaster-General if he could state the number of cases of electrical interference with broadcast receivers by tramways and trolley-omnibuses, by oscillation, and by other electrical devices investigated by his department during the last year, and the number of remedies effected in each case.

The Postmaster-General said that statistics in regard to cases of interference with broadcast reception were not readily available for the last year, but the following analysis of the complaints received during the six months ended February 29, 1932, might be taken as fairly representative.

Cause of interference	Total number of complaints received	Number of cases in which remedies were effected
Tramways and Trolley Buses	150	90
Oscillation	1,930	1,540
Other electric devices	4,150	3,110
Totals for six months	6,230	4,740

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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.

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Ten-Station Two (D, Trans) .. AW338
Big-Power Melody 2 (D, Trans) .. WM225
Brookman's A.C. Two (D, Trans) .. WM241
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Ether Marshal (SG, D, Trans) .. WM247
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A.C. Super 60 Radio Gramophone (Super-het) .. WM239
A.C. Super 60 (Table Model) .. WM245
Super 60 (with Wearite base) .. WM249
Super 60 (with Lewcos base) .. WM251
1932 Super 60 (Super-het) .. WM269
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D.C. H.T. Unit .. AW312
Output Unit for Pentode Sets .. AW316
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Short-wave Super-het Adaptor .. AW329
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Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 2d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine". Address letters:

Amateur Wireless Blueprints Dept., 58-61 Fetter Lane London, E.C.4

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A NEW "AMATEUR WIRELESS" HANDBOOK
**The HOW & WHY OF
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This book has been expressly written for beginners. It provides a clear conception of the general theory and practice of wireless reception in simple non-technical terms. It has been mainly compiled from the series of articles in "Amateur Wireless"—"The How and Why of Radio"—which proved so popular during the past twelve months.

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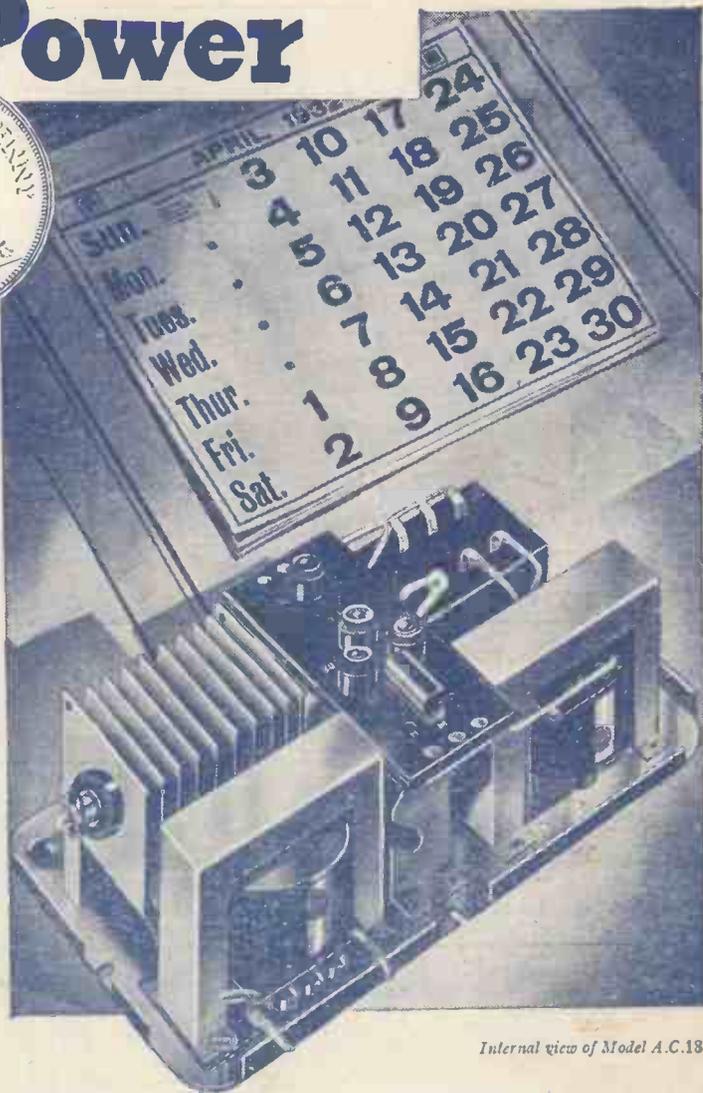


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Prices from 39/6
Or by Easy payments
from 3/8 per month



Internal view of Model A.C.18

INPUT

A.C. supplies of 200/250 volts, 40/80 cycles and 100/125 volts, 40/80 cycles. Also 25-cycle models.

D.C. supplies of 200/250 volts.

OUTPUT

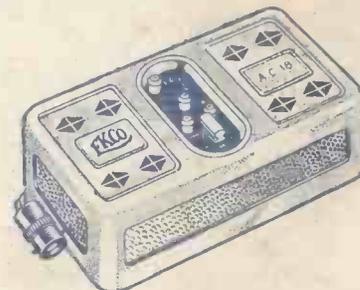
H.T. units (A.C.) 12, 18 or 25 milliamps with alternative voltage tappings up to 120/150.

(D.C. Unit 15/25 m/A.)

Combined H.T. and L.T. Charger Units (A.C.)

H.T. : 12, 18 or 25 milliamps, with alternative voltage tappings up to 120/150.

L.T. : Charges 2, 4 or 6 volt accumulators at .5 amp.



External view : all models are similar in appearance. Housed in solid drawn steel case, oxidised copper finish. Connecting plugs recessed below surface of case.

Size, 9 in. by 5 in. by 3 1/4 in. (K.25 and 25-cycle models, 9 1/2 in. by 5 1/2 in. by 3 3/4 in.)



Woburn

To E. K. COLE, LTD., Dept. K.7, Ekco Works, Southend-on-Sea.
Please send me particulars of EKCO Units.

Name

Address