A B.B.C. SELECTIVE TWO-VALVER

DAYLIGHT TELEVISION—A NEW DEVELOPMENT

Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVIII. No. 467 Saturday, May 23, 1931

The B.B.C. SELECTIVE TWO

Full Details

USING A CIRCUIT RECOMMENDED BY THE B.B.C. FOR INTERFERENCE TROUBLES

Registered at the G.P.O. as a Newspaper

VALVES FOR D.C. MAINS

THREE NEW AMAZING MAZDA VALVES

Mazda Engineers are again first in the field, this time with Valves specially designed for operation from D.C. Mains. The characteristics are approximately the same as those of the well-known Mazda A.C. Valves, and the efficiency of the Valves is equally good in all other respects.

Economical working is ensured by the very low current consumption, which is only half that of other mains valves.

These valves are fully described in an article in the "Wireless World," issued January 7th, 1931, giving full data and suitable circuits, a reprint of which will be gladly sent on application.

The three types at present available are :—

D.C./S.G. (25/-) D.C./H.L. (15/-) D.C./PEN. (17/6)

and are in stock at all good radio dealers.

D.C./S.G.
A.C. resistance 600,000 ohms. Amplification factor 1,200. Mutual conductance 2mA/volt. Max. anode voltage (E_a) 200. Screen voltage (E_s) 80. Filament volts 6. Filament current 0.5 amp.

D.C./H.L.
A.C. resistance, 12,000 ohms. Amplification factor 3.0. Mutual conductance 2.5 mA/volt. Maximum anode voltage (E_a) 200. Filament volts 6. Filament current 0.5 amp.

D.C./PEN.
Mutual conductance 2.5 mA/volt. Maximum anode potential 250. Maximum auxiliary grid volts 200. Filament volts 8. Filament current 0.5 amp.

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BRITISH
VALVES

V.120

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Incorporating the Wiring Supplies, Lighting Engineering and Radio Business of the British Thomson-Houston Co. Ltd.
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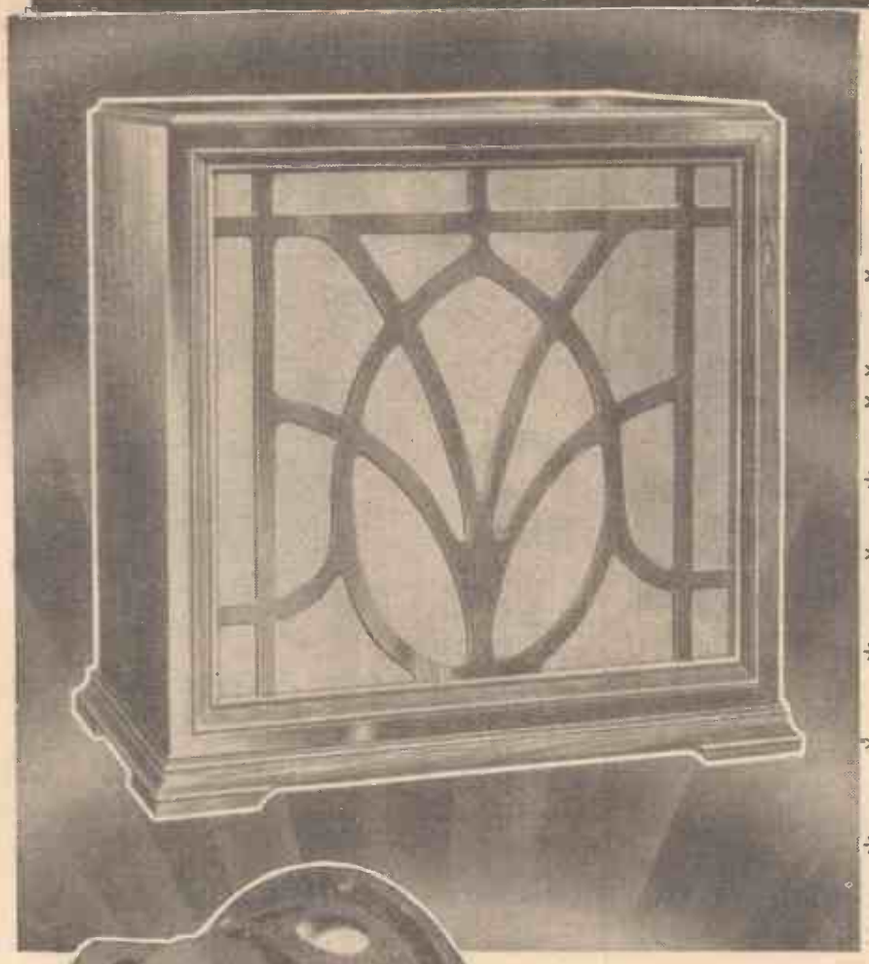
EDISWAN

Study its Points



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* A permanent magnet moving coil speaker of the low resistance type, **incorporating its own universal input transformer.**
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* Powerful permanent magnet of cobalt steel, giving high flux density and **retaining its magnetism indefinitely.**
* Amazingly high sensitivity, owing to the minute air gap, minimum damping and generous magnet system.
* Sensitive enough to **operate satisfactorily from a two-valve set,** yet will also handle very large inputs for long periods without strain or deterioration.
* Cabinet specially designed for finest results and freedom from resonance. The rear apertures are practically and mathematically of the ideal size.
* One-piece duplex woven diaphragm, giving even frequency response and freedom from resonance with **permanent centring adjustment.**
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* Costing nothing to run, requiring no valves, batteries or mains; replacing any cone speaker, generally without the slightest alteration to the receiver.

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or £1 . 3 . 0 down and 12 monthly payments of 16/8.

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THIS MODEL CARRIES THE USUAL MARCONIPHONE GUARANTEE.

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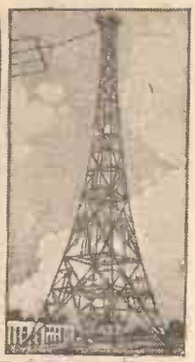
Don't Forget to Say That You Saw it in "A.W."

No. 457. Vol. XVIII. MAY 23, 1931

Amateur Wireless and Radiovision



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THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

100-STATION REPORTS, PLEASE

HOW are you getting on with your "Century Super"? We want to have reception reports from readers, so get busy at the dials. Don't bother about the long, light evenings. The "Century" is pulling in the stations with winter-time thoroughness.

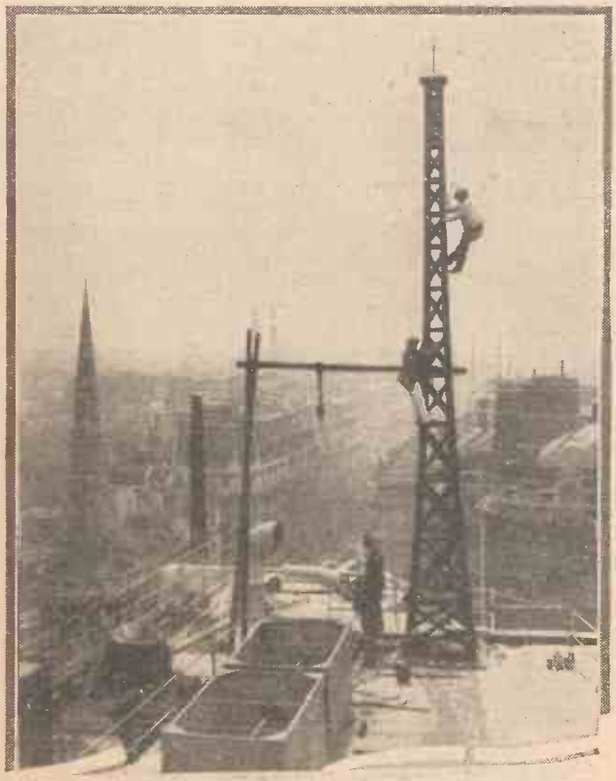
MORE STATIONS TO HEAR

IT is expected that Königswusterhausen will be operating on its new power of 75 kilowatts within the next week or so. Langenberg, also, is shortly to work on 75 kilowatts. At Rotsurben, near Breslau, a new transmitter is being built which will use the wavelength of 325 metres now in use by the Breslau station. The new Leipzig transmitter will take the Frankfort wavelength of 389.6 metres, while the *new* Frankfort station will use Leipzig's wave. It is expected that these new transmitters will be "on the air" probably before the end of the year.

"G.B.S." TO BROADCAST

SAYS the B.B.C.:—"A speech by George Bernard Shaw is to be heard by National listeners on May 30. His subject will be Saint Joan, and the occasion is the five-hundredth anniversary of her martyrdom." And very good news, too. "G.B.S." is so much a man in the news, and so infrequent a broadcaster, that this is sure to be a popular item.

ON BROADCASTING HOUSE



On the top of Broadcasting House, overlooking Regent Street and Oxford Street, the engineers are putting the finishing touches to the aerial masts and ventilation apparatus. The aerial masts are for the check receivers, and there will be no transmitter at Broadcasting House

SCHWEIZERISCHE RUNDSPRUCH-GESELLSCHAFT!

THIS is the new title adopted by the "Union Radiophonique Suisse" (Swiss Broadcasting Association), as they considered a more coherent description was needed. Can you pronounce it? There are no prizes for those who are successful.

IN TIBET

ALBERT ANDRE, the famous explorer, is organising an expedition to Tibet in an endeavour to prove that the former inhabitants of this country were the racial forerunners of the American redskins. The expedition will be accompanied by an amateur transmitter, who, besides keeping in touch with home, will introduce the Tibetans to the wonders of wireless!

A RADIO FLYING SQUAD

WGY has a "flying squad" of three radio engineers who each carry a suitcase. Suitcase number one contains three microphones, batteries and spare valves. Suitcase number two contains the microphone stands, some lengths of cable and more batteries. The third suitcase carries the microphone amplifier. The three engineers, who are also commentators and announcers, have a roaming commission. The moment they see or hear anything worth broadcasting, they hook up to the nearest telephone line.

TRACKING PIRATES

TO detect unlicensed transmitters operating in the Paris district, three specially equipped direction-finding stations have been brought into use by the authorities. Cross bearings enable any station to be identified immediately. The same system is used for dealing with complaints of oscillation emanating from faulty receivers. To amplify the service, police equipped with portable receivers make unexpected raids on *arrondisements* where unlicensed listeners are suspected.

PRINCIPAL CONTENTS

NEXT WEEK: "THE SQUARE-PEAK THREE," USING THE NEW SELECTIVITY SYSTEM

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

A ROYAL COMMAND

JUST when the Northern B.B.C. engineers were having lunch the other day, the Chief Inspector of the Manchester Police dashed in to say that the Prince of Wales wanted his speech to the Manchester Chamber of Commerce broadcast. In response to this royal command the engineers leapt into the "O.B." van, hurried to the Free Trade Hall and there erected suitable microphones. Connecting wires had also to be made ready between the Hall and Moorside Edge. By 2.30 p.m. everything was ready for the Prince and for the first time in its life North Regional transmitted simultaneously with the relays. Considering how little time the B.B.C. engineers had at their disposal we consider they put over a very smart piece of work.

BUCKINGHAM PALACE PHONES

IN connection with the Prince of Wales' broadcast speech from the Free Trade hall at Manchester, we hear that the B.B.C. received a telephone enquiry from Buckingham Palace as to what wavelength the royal set should be tuned to in order to pick up the Prince. Judging by our experience in the reception of North Regional during the daytime, we imagine the King and other interested members of the royal household had no difficulty in picking up the Prince when the set at Buckingham Palace was tuned to 479 metres.

"PLAYING BACK"

THIS is a new phrase derived from what happens when broadcast artistes have their items recorded on the Blattner machine installed in one of the listening rooms at Savoy Hill. "When I called in to hear the Blattnerphone in action," writes our special correspondent, "I was amused to hear how peculiar the talkers' voices sounded when played backwards." As soon as the magnetised metal reel has been re-wound on its correct spool it is ready to deliver the broadcasters' voices through the loud-speaker in the studio.

GOOD QUALITY

WE were surprised during a recent audition to note how good was the quality obtained from this process. Of course, the B.B.C. uses a very fine resistance-capacity-coupled amplifier, so that the system is demonstrated at its best. We heard a preliminary chat between Lady Muir and Evelyn Wrench just before their broadcast discussion on Bulgaria. It certainly enabled the participants in the discussion to polish up any weak points.

SIR JOHN REITH

THE news that Sir John Reith left for America with Lady Reith on Saturday, May 16, reminds us that he is on a mission of considerable interest to American listeners. For he has been invited to tell Americans how broadcast education works under the monopoly system of broadcasting practised in England. While it is one thing to stipulate that a certain amount of broadcast time shall be devoted to educating a public that is paying for a monopoly system, it may be an entirely different thing to attempt broadcast education under the competitive American conditions. Where is the "sales value" of broadcast education?

ALEXANDER AND MOSE

WE are informed by the B.B.C. that those very successful back-chat comedians, Alexander and Mose, have secured a further long contract with the B.B.C. Six broadcasts at intervals covering the rest of the year have been arranged. This looks as though the B.B.C. is determined not to overdo the best vaudeville turn it has so far discovered. Certainly, the average B.B.C. funny man is hard put to it to keep on being funny.

ELECTRICAL INTERFERENCE

A NEW source of electrical interference to broadcast reception has been brought to light by one or two correspondents seeking assistance from the B.B.C. It appears that flashing red lights on the islands erected at cross-roads can produce quite an appreciable amount of background in the reception done by sets located near the islands. Fortunately, there are not usually many houses near the islands, which are situated at fairly desolate points. Mercury-arc rectifiers are also giving trouble to some B.B.C. listeners.

NO "GRID" INTERFERENCE

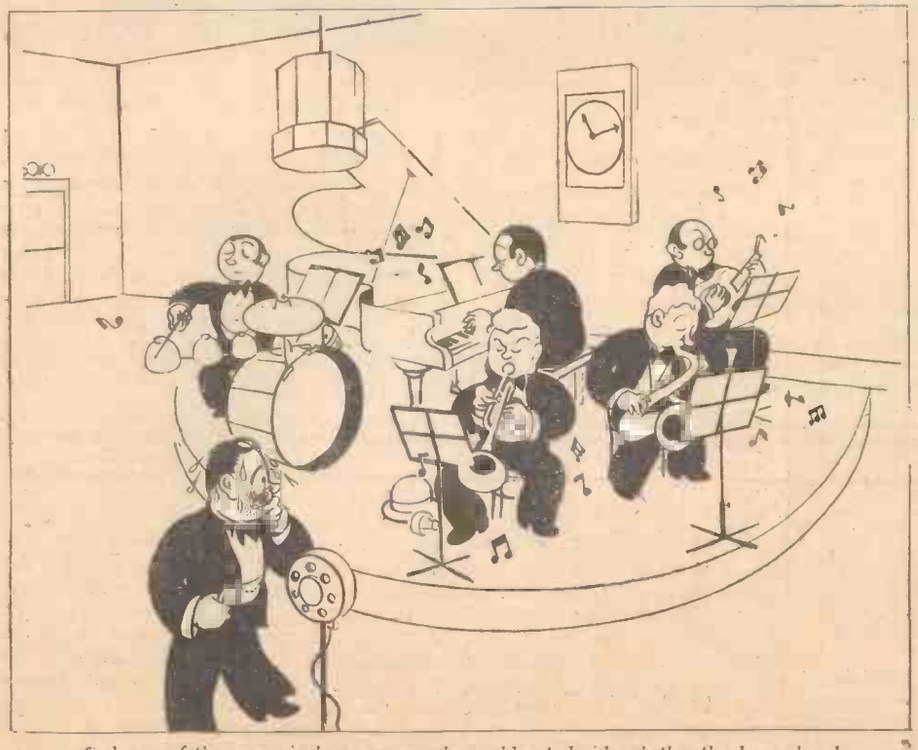
SO far, there does not appear to be any appreciable interference to broadcast reception from the high-voltage power lines now being erected all over the country to complete the grid system of electricity distribution. This is rather surprising to those who know the trouble power lines cause in Canada and in some parts of America. Apparently the vibration on the lines causes dislocation in the insulators, which often results in intermittent electrical interference that is difficult to trace. Because of this difficulty a system of detection vans stretches right across Canada. The van draws up to a suspected part of the line, an engineer strikes the pole and another engineer listens on a frame-aerial set to see whether the vibration thus caused is producing electrical interference.

NIGHTINGALES BY DAY

B.B.C. ENGINEERS are now busy in the neighbourhood of Pangbourne, in Berkshire, testing for the proposed nightingale broadcasts during the dance-band period. If tests are as successful as is hoped, the Children's Hour on May 23 will be enlivened by the relay of the song of the *day* nightingales. For ourselves, we rather feel the novelty of the nightingale has worn off, but no doubt the Children's Hour is a worthy enough cause for the "O.B." engineers.

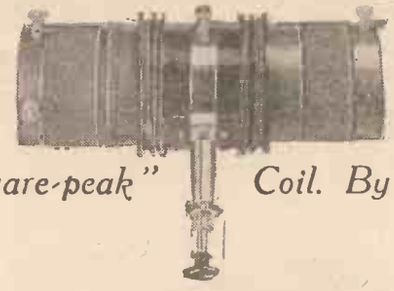
Apart from the relay taken by the Lahti high-power transmitter, the Helsinki (Finland) broadcasts are now available through Viipuri, where a new 13.2-kilowatt (aerial) transmitter, working on 291 metres, has been installed. Finland's radio system is being completely reorganised at a cost of some 15 million Finnish marks.

NOT JACK PAYNE, OF COURSE!



Sad case of the unmusical announcer who could not decide whether the dance band had started playing, or was still just tuning up!

A NEW SELECTIVITY DEVICE



Some Notes on the New "Square-peak" Coil. By J. H. Reyner, B.Sc., A.M.I.E.E.

THE use of single tuning circuits has almost disappeared in commercial practice, and it looks as if broadcast technique will follow in the same way in due course. Anyone who has tried a good band-pass filter, particularly if he is situated close to a Regional transmission, cannot fail to be impressed with the efficacy of this arrangement.

The band-pass filter, however, as usually employed suffers from a woeful lack of constancy. If the coupling is adjusted to give the right band width at one part of the scale it is either too great or too little at other parts. The whole principle of the band-pass filter is that it shall, as far as

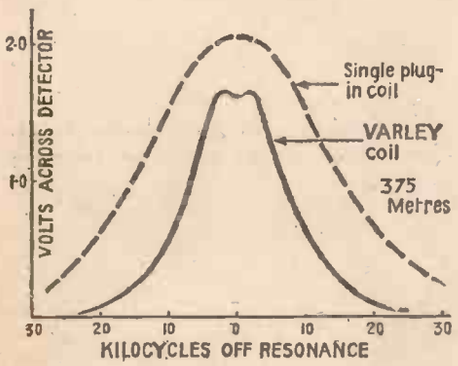


Fig. 1. Response curve of new coil on a wavelength of 375 metres

possible, accept frequencies within a certain limited band which includes the station to be received, and should exclude all other frequencies. The narrower one can make this band the more selective the receiver becomes down to the limit where we begin to cut into the frequencies immediately adjacent to the carrier wave (within +5,000 cycles). Within this area are "side-bands" produced by the modulation and these must be received in satisfactory proportion for good quality.

The band-pass filter achieves this result by using two circuits coupled together and tuned with a two-gang condenser. The use of the two tuning circuits obviously increases the selectivity, while by adjusting the coupling, the sharp peak of the resonance curve may be flattened slightly or even caused to "double-hump" giving an equivalent to the square-top wave which is the ideal. Unfortunately, as has been stated, this coupling varies with the frequency, so that if we adjust it correctly at one part of the scale we are quite wrong at another part, and altogether out when we change from the short to the long waves and vice versa.

Improved Filter Design

A notable advance in filter construction is to be found in the new Varley "Square-peak" coil. There are two possible ways of coupling the two circuits together. One is by the use of an inductive coupling and the other by the use of a capacity coupling. With the one the coupling increases with the frequency, and with the other it decreases. In the Varley coil the coupling between the circuits is obtained by mixture of these two methods, the relative proportions being so adjusted that as one increases, the other decreases, giving a constant effective coupling. The advantage of this will immediately be obvious. If the coupling can be adjusted to give just the right tuning properties at one part of the scale, then it will remain adjusted not only throughout the remainder of the scale, but even if we change over from short to long waves, so that we can obtain real band-pass tuning on the long wavelength, which has not been the case with the ordinary forms of circuit used hitherto.

Three Good Qualities

We carried out a number of tests at the Furzehill Laboratories on this new coil in order to determine the suitability of this coil for use in practice. The laboratory standard oscillator was used in a manner somewhat similar to that described in my article on the Regional Suppressor ("A.W." No. 465). By this means a constant voltage is generated and introduced into a dummy aerial circuit, and the response from the coil was observed under various conditions. A series of curves were obtained which demonstrated three important things.

Firstly the sensitivity of the coil was very good. The voltage developed was not actually as great as that obtained from a simple plug-in coil, but it was reasonably comparable with it. This removed one doubt, for it is possible to construct a very selective arrangement at the sacrifice of signal strength, only to find that when the signal strength is restored to normal the selectivity is nothing unusual.

Secondly the selectivity was very markedly better than with an ordinary coil. This, of course, is what one would expect with a band-pass filter.

NEXT WEEK:
THE SQUARE-PEAK THREE

Thirdly, the width of the resonance curve or the band width of the filter as we call it, was reasonably constant over the whole of the scale covering 250 to 2,000 metres.

A large number of measurements were taken, which need not be reproduced in full. As examples, two sets of curves only are shown. The first of these (Fig. 1) shows the response at a wavelength of 375 metres. It will be seen that the curve is steep-sided with a flat top, and that 10 kilocycles on either side of the resonance point the voltage is reduced to one-third of its resonant value. Moreover the falling off is continued, and 20 kilocycles away the voltage is only about one-thirtieth.

It must be remembered that this is plotted to a rather open scale, for a 10-kilocycle difference is a very small amount on the dial. To illustrate this point, the dotted

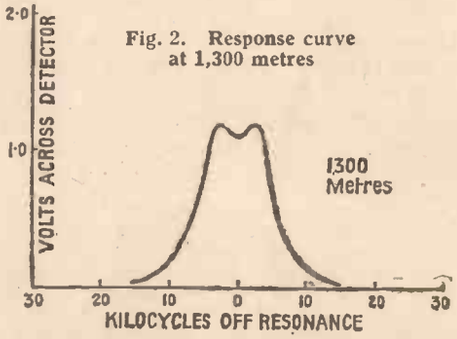


Fig. 2. Response curve at 1,300 metres

curve in Fig. 1 shows the response obtained from a single plug-in coil. This was tuned in the usual manner to the same frequency. It will be observed that the actual voltage at resonance is only a little higher than that of the Varley coil, the latter, in fact, developing 75 per cent. of the voltage of the single circuit. The difference is barely audible, and in any case can be made up with a slight amount of extra reaction. The tuning properties, however, are quite different, for we see that at 20 kilocycles away the voltage has only been reduced to one-third instead of one-thirtieth.

Fig. 2 shows the response curve taken at 1,300 metres. The actual value of the response is slightly lower, being about 1.2 volts instead of 1.6 volts, but a variation of this order is to be found in almost every coil. More interesting is the bandwidth of the resonance curve, which is, if anything, rather sharper than on the short waves. At 10 kilocycles off resonance the strength is reduced to one-sixth of the full value, and yet the resonance curve is steep-sided and flat-topped, so that all the side bands which are so necessary for quality are still retained.

(*Continued at foot of page* 812)

THE "1931 ETHER SEARCHER" CONTINUES

IMMENSE public interest was aroused when, at the beginning of this year the AMATEUR WIRELESS Technical Staff introduced the "1931 Ether Searcher." For the first time for any three-valve set the claim was made of fifty-station reception.

Naturally, this aroused great interest and a certain amount of controversy in keen amateur circles, because even four or five months ago, before band-pass tuning and the super-het. principle had been developed, it was impossible to separate stations to a sufficient degree in order to bring in each one clear of the other. All radio experts now agree that at the present stage of radio development there are two main ways of increasing selectivity without introducing distortion; either one can use an ordinary set with band-pass tuning or one can have a modern super-het., such as the "Century Super."

The "Ether Searcher" ready for working

An Economical Set

For the man who must keep the number of valves down to the very minimum in order to lower the cost of construction and running expense, a straight three-valver with band-pass tuning is the best solution. The "1931 Ether Searcher" was produced with its great feature of super selectivity, and with this set you really do get knife-edge tuning, so necessary when station hunting. With band-pass tuning there is the advantage of tuning two separate circuits simultaneously.

"The 1931 Ether Searcher" has been so designed that the whole of the transmission is tuned in with the sidebands, **resulting in better quality of reproduction than would be obtained from two ordinary tuned circuits. This means that more stations can be separated than if an ordinary two-circuit were employed.**

The "Searcher" is a one-knob set, the three tuning coils being ganged. We claimed, when the set was first introduced, that over fifty stations could be tuned in on the one dial and the "1931 Ether Searcher" competition results have proved that this is no exaggeration.

OUR SUCCESSFUL COMPETITION

AWARE of the large number of home constructors throughout the country who were building up the Searcher, the happy idea was conceived of inviting them to compete and valuable cash prizes were offered. The test reports were scrutinised and a number of listeners were invited to send their sets in for a performance test.

The results were amazing. Not only was the average performance figure very high, but, owing to the extraordinarily simple construction, every competitor had made a successful job of making up the circuit.

This is one of the big advantages of this simple set. There are no constructional snags.

A selection of the reception reports we have received from readers has been published in our correspondence columns and these enthusiastic tributes to the Searcher are proving that **in spite of summer conditions and the supposed greater difficulty in tuning in stations, even novices are managing to get twenty or thirty foreign stations at full loud-speaker strength and a total of well over fifty.**

Purity and Tuning

With normal means of sharpening up the tuning of a set there is only too often a bad result. The tuning is sharpened but the sidebands are cut off and the resulting reproduction is not so good as that obtained with a bandpass set or with a super-heterodyne.

It is true to say that with the "1931 Ether Searcher" system of band-passing, the selectivity factor is as high as can possibly be obtained with any straight three-valver and because of the special arrangement of coupling between the band-pass circuits, the resulting purity is every bit as good as that of a broadly tuned set working on a local signal.

The Searcher is essentially a *live* set—stations seem to come in at practically every degree on the dial.

Cuts out the Local

The first prize-winner in our competition works his set only five miles from Brookmans Park and he is most enthusiastic about the way in which it cuts out the local transmitters and brings in foreign stations.

"My decision to undertake the construction of the 1931 Ether Searcher was arrived at after careful consideration of numerous circumstances. I live about five miles from Brookmans Park and I wanted a set which would be able entirely to separate the two transmissions.

"After studying numerous details . . . I came to the conclusion that if my aim was selectivity, together with quality, the only solution appeared to be in a circuit using band-pass tuning. I also wanted to be able to get a few foreign stations, which indicated the need for a screen-grid valve, and I considered that a three-valve receiver introduced as much complication as I cared to handle. The deciding factor came when I saw the full-size prints published in AMATEUR WIRELESS. For the first time all the controls were on the panel and it looked so simple that I determined to try it.

A rear view of the set out of its cabinet. The neat construction is strikingly apparent

HERE ARE THE COMPONENTS REQUIRED TO BUILD THE "ETHER SEARCHER"

Ebonite panel, 8 in. by 6 in. (Becol, Trelleborg).

3-gang .0005-mfd. variable condenser with drum dial (J.B. "Chassimount").

.0003-mfd. variable series aerial condenser (Readi-Rad, Brookmans type; Lotus).

.0001-mfd. variable reaction condenser (Readi-Rad, Brookmans type; Bulgin, Lissen, Lotus, Burton).

Set of three matched coils with ganging switch (two Colvern type TGSC, and one type TGSR).

Low-frequency transformer (Telsen, 5-1 Ace, Lissen, Varley, Ferranti, R.I., Burton).

On-off filament switch (Bulgin, junior, Lissen, H. & B., Benjamin, Readi-Rad).

.01-mfd. fixed condenser (T.C.C. flat type, Lissen, Dubilier, Watmel, Atlas).

.0002-mfd. fixed condenser (T.C.C. SP type, Lissen, Dubilier, Watmel, Atlas).

Three valve holders (Telsen, Lotus, Benjamin, W.B., Clix).

.0002-mfd. fixed condenser (Lissen, T.C.C., Dubilier, Watmel, Atlas).

.0003-mfd. fixed condenser (Lissen, T.C.C., Dubilier, Watmel, Atlas).

1-mfd. fixed condenser (Lissen, T.C.C., Dubilier, Filta).

Two 2-megohm grid leaks (Lissen, Dubilier, Watmel, Ferranti).

Grid-leak clips (Bulgin, Wearite, Ferranti).

Three coil screens (H. & B., Readi-Rad).

S.G. valve screen (H. & B.).

High-frequency choke (Telsen, Varley, Readi-Rad, Lissen, Bulgin, Sovereign, Tunewell, Lewcos, Burton).

Aluminium foil sheet, 15¾ in. by 9¾ in. (Readi-Rad, H. & B., Parex).

Two terminal blocks (Junit).

Four terminals, marked L.S.+, L.S.—, A., E. (Belling-Lee, junior, Clix, Eelex, Burton).

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

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

Insulated sleeving (Lewcos, H. & B.).

Cabinet (Clarion, Camco, H. & B., Readi-Rad).

2-volt accumulator (C.A.V. 2AG11).

120-volt high-tension battery (Fuller, "Sparta").

16-volt grid-bias battery (Fuller, "Sparta").

ITS AMAZING SUCCESS

PULLING IN THE STATIONS DESPITE SUMMER CONDITIONS

"The actual time of construction occupied a Friday evening and a Saturday afternoon—construction was ridiculously easy with the clear diagrams to follow. After connecting up the leads I switched on. The National programme came in at deafening strength and without a sign of the Regional. Indeed, when I had roughly adjusted the trimming condensers, I found I could get five stations all at good loud-speaker strength in between these two.

"My full list of stations is as follows: National, Berlin, Lyons, Turin, Huizen, Bordeaux, Regional, Mühlacker, Hamburg, Toulouse, Frankfurt, Glasgow, Katowice, Dublin, Belgrade, Stockholm, Rome, Langenberg, Midland, Milan, Munich, Göteborg, Breslau, Naples, Leningrad, Oslo, Kalundborg, Moscow, Motala, Eiffel Tower, Midland Regional, Zeesen, Radio Paris, Lahti, Hilversum, and Kaunas."

Simple Control

The second prize-winner lives on the south side of London, at Streatham Hill, and is greatly impressed by the range of the Ether Searcher on an indoor aerial.

"I assembled my Peto-Scott kit, using the full-size diagram as a template. Right-angle wiring was used, this system of making connections having been taught me by AMATEUR WIRELESS some long time ago . . . On using a 12-ft. indoor aerial as advised, the settings became approximately those given, reaction was smooth and the aerial series condenser was found to be almost constant for all wavelengths. It is also a wonderful volume control.

"Lack of time prevented me from logging all those stations which I know the set is capable of getting, but I proved its worth by logging in daylight the relays on 288 metres, Strasburg, Langenberg clear of 5GB and Brussels.

Control is easy, reaction is smooth and the aerial series condenser not at all critical. There is also a marked decrease in background noise compared with the previous sets I have handled."

33 Loud-speaker Stations

An enthusiastic report comes from the third prize-winner in our competition.

"As I have been away I have had the opportunity of tuning in stations on only one evening. I then dialled thirty-seven medium and long-wave stations, thirty-three of which were at full loud-speaker strength. Undoubtedly a considerable number of extra stations can be obtained and I shall record these as soon as possible. **The tone of the set is excellent. The selectivity is exceedingly good**—several stations being logged although only from a half to one degree apart on the dial and each is clear and distinct. I have already made three sets for friends but the Ether Searcher certainly excels in every way."

It is an extraordinary thing that not one serious criticism of the original design has been made by any of the thousands of readers.

It will be recalled that the original battery model was provided with no plug for a gramophone pick-up, as it was decided to have this first set as simple as possible. In the alternating- and direct-current editions of the Ether Searcher produced later, provision was made for the use of a gramophone pick-up if desired.

Unfortunately there is not space here to reproduce more of these glowing tributes to the success of the Ether Searcher design and of the novel bandpass means of getting selectivity which it incorporates. It is opportune, though, to inpress upon owners of old-fashioned sets the necessity for having equipment which really is capable of cutting out the local stations and bringing in foreign transmissions. **With the advent of a growing army of high-power broadcasters on the Continent and with the furtherance of the B.B.C.'s regional scheme, it is of vital importance to have a receiver which can cope with the increasing tendency to swamp the dials. It is not too late for you to make up the 1931 Ether Searcher and so simple is it to build that the veriest tyro need have no fear that he will not be able to finish the constructional work and get good results.**

Construction is Easy!

For the benefit of readers who did not keep on hand the various issues describing successive stages in the construction of the Searcher, two photographs are reproduced here, together with a list of the components and a layout and wiring diagram.

From these, the man with a slight knowledge of set construction will have no difficulty in making up the Searcher, while those who prefer to work from a full-size blueprint will be pleased to hear that a print is available and can be obtained, price 1s., post free, from Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4

All the parts needed for construction are given in the panel here and it is advisable to point out that a number of radio concerns specialise in supplying these parts in kits. Ready-made cabinets and sets of specially chosen valves are also available, but the detailed list of parts is given here so that if you have any old apparatus which you wish to include in the Searcher, you will be able to tell if it is suitable or not.

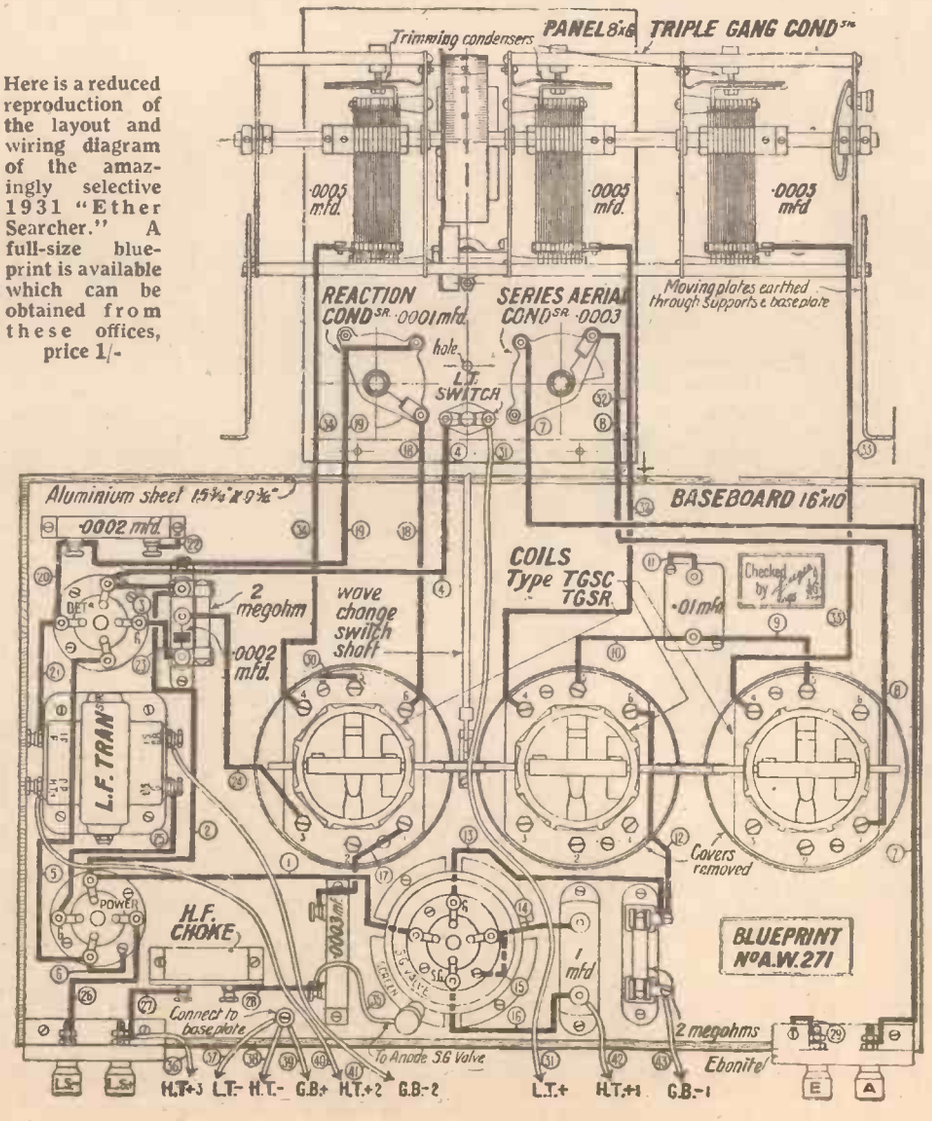
There is very little panel drilling to be done and the only point which presents any difficulty is the cutting of the hole for the condenser drum. The full-size blueprint gives the exact size of this and either a fretsaw can be used or else a number of small holes can be drilled around the edge of the drum dial opening, the centre piece of ebonite being knocked out.

The main tuning condenser control is the middle knob on the panel, the knob on the left is for the aerial series condenser and that on the right is the reaction condenser. Just below the tuning knob is the wavechange switch and below this, in the case of the battery model, is the on-off switch. This is in the low-tension circuit and is, of course, not needed in either the A.C. or D.C. mains models.

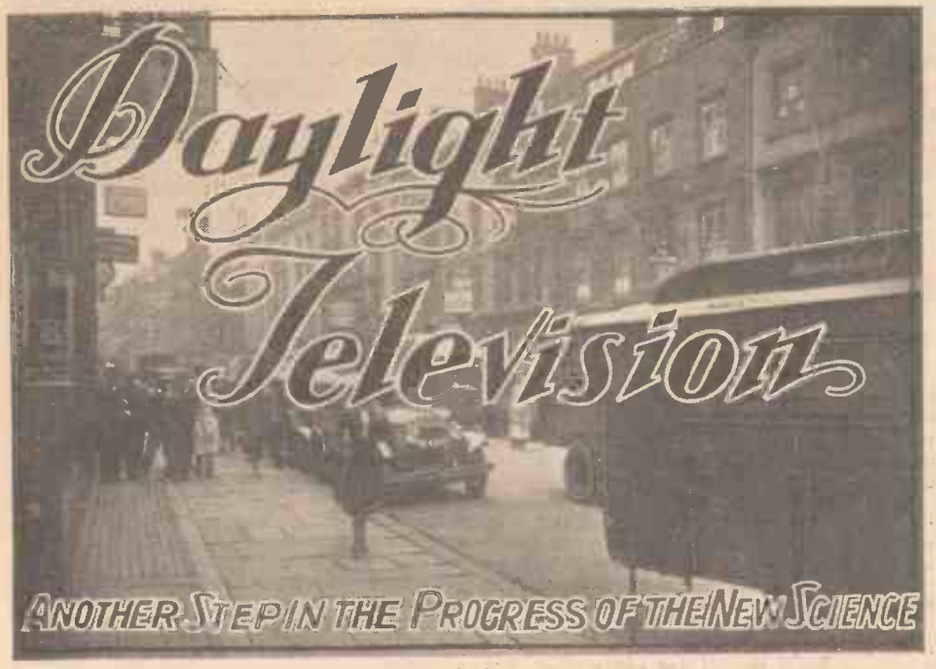
Be careful when placing the coils on the foil-covered baseboard. One of the coils has four sections of windings on the long-wave part instead of three, this extra winding being for reaction.

The wavechange switches of all three coils

(*Continued on page* 828)



Here is a reduced reproduction of the layout and wiring diagram of the amazingly selective 1931 "Ether Searcher." A full-size blueprint is available which can be obtained from these offices, price 1/-



A recent scene in Long Acre outside the Baird premises. The van on the right contains the transmitting apparatus which is televising a part of the view shown

AS a laboratory experiment with the head and shoulders of the individual as the subject, daylight television was demonstrated by the Baird Co. over two years ago, but developments have now been made which enable certain scenes from everyday life within a restricted area to be transmitted with daylight as the only illumination.

Within the last few days an inconspicuous grey van could be seen drawn up outside that company's offices in Long Acre and passers-by, together with vehicular traffic, were "picked up" and sent along a short length of cable to reappear as images in a Televisor in the demonstration room.

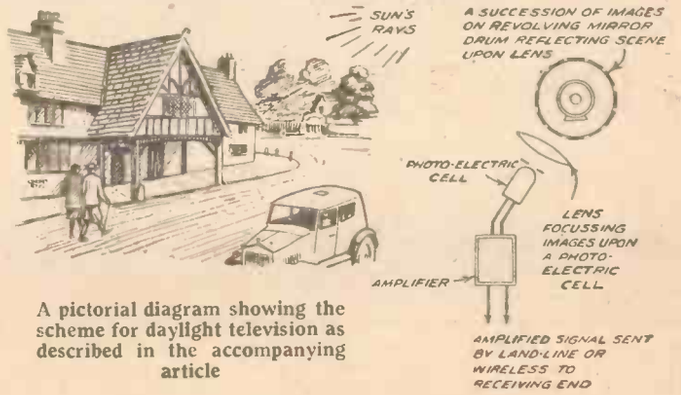
The van and the local scene being televised are shown in the accompanying illustration. On one of the occasions when I was a privileged spectator I saw on the screen a policeman who had evidently crossed over to see what was going on. One noticed that the quality of the image varied according to the strength or weakness of the sun's rays. As this is only the beginning of an entirely new feature, however, conditions of this nature are only to be expected. Another difficulty which has to be overcome is the restriction of the field available for immediate transmission—the narrowness of the "televista," as I heard someone aptly describe it—but if the apparatus can be moved or rotated in a manner somewhat similar to the portable transmitter then the scene will, of course, be enlarged.

Apparatus Details

The apparatus employed differs from that employed in the studio. A travelling light spot is not used, but in place of this a large drum with mirrors fixed round its circumference revolves at a high speed and projects a succession of images of the scene on to a photo-electric cell. This converts the images from terms of light into terms of current which varying quantity is amplified and sent along to the receiving end by line or wireless. A pictorial representation of the transmitting scheme is indicated in the accompanying diagram. A standard Televisor is used at the receiving end where the varying electrical current is translated back into images in the normal manner.

A few days ago an experimental transmission was made through the B.B.C. of a scene on the roof of Long Acre. With a singularly striking background of chimney pots, bricks and mortar, various members of the staff could be seen walking about and dancing while one young lady busied herself sweeping. According to reports, this impromptu broadcast was well received in various parts of the country and arrangements are now being made whereby ordinary outdoor scenes will be included in the programmes sent out by the Baird Co. through the B.B.C.

W. J. BARTON CHAPPLE.



A pictorial diagram showing the scheme for daylight television as described in the accompanying article

"A NEW SELECTIVITY DEVICE"

(*Continued from page* 809)

These curves will serve to illustrate the manner in which this new coil works. The only question is whether these results are easily obtained. Fortunately, the answer is in the affirmative. All the critical couplings are adjusted in the coil itself before it is dispatched from the works. It is only necessary to connect up a .04 coupling condenser externally and, of course, to tune the system with an ordinary two-gang .0005 condenser. In the majority of cases this condenser does not require trimming in any shape or form, and a number of tests made on an actual aerial indicated that a trimmer was definitely unnecessary. Therefore, the system can be considered simple, and well within the capabilities of the average constructor.

When this coil is used in the high-frequency stage of a standard three-valve screen-grid receiver the results are assisted by the further tuning properties of the ordinary H.F. transformer, and a really good set is the result. Such a set is at present undergoing its final tests in the Laboratories, and complete details of its construction will be given next week.

OUR LISTENING POST

By Jay Coote

FROM Leipzig and Dresden during intervals in the programme you will now pick up the dulcet tones of a vibraphone. It consists of a short musical phrase in D major composed of the following groups of notes: D, F sharp, A, D, E, G, B (pause), E; E, G, A, C sharp; D, A, F sharp, D. It is a distinctive signal and will help considerably in identifying the transmitter. The melody, as you see, is entirely different from those heard from Oslo, Budapest and Munich and consequently easy to memorise. Writing about interval signals prompts me to add that when listening to Katowice the other night I noticed that the studio uses a peculiar kind of metronome; its note is metallic—it sounds something like a hammer striking a small anvil. It is symbolical of the industrial nature of the district.

From recent broadcasts made by Radio Normandie I gather several items of news. The little Fécamp station having permanently established a studio at Rouen it has decided to relay the fêtes given in that city in celebration of the five-hundredth anniversary of the martyrdom of Joan of Arc. Moreover, the daily broadcasts are to be extended and from June 1 will be made twice daily. The time-signals at midday and at 9 p.m. are relayed from the old Benedictine Monastery and consist of chimes; on most evenings Radio Normandie opens its transmissions with the siren call—a deep-voiced hooter reminiscent of that adopted by Munich. For the present the transmissions are on the weak side, but every effort is being made to raise sufficient money to defray the cost of a 25-kilowatt station which, if the scheme succeeds, would be installed at Breau-té-Beuzeville. With that power in the aerial the enterprising Norman promises concerts of interest to its numerous listeners in the United Kingdom.

On Your Wavelength!

LIFTING THE SHADOW

I HAVE often thought that one day something might be done to meet the special case of listeners who live immediately under the shadow of the local transmitter. Generally speaking this means a handicap of at least two stages of H.F. amplification, so far as selective reception is concerned. I am glad to see that the problem is now being tackled from the transmitting end. The idea is to use an aerial system in which the greater part of the radiated energy is directed upwards, so as to skip over the heads of those in the close vicinity of the station. After reflection from the heaviside layer, this "space" wave comes down again to the more distant listeners, by which time, of course, the field-strength has been toned down considerably. The transmitting aerial also radiates an "earthbound" component, of less initial strength, which travels out horizontally so as to fill the intervening area or skip distance.

HOW IT IS DONE

THE transmitter consists of a number of aerials arranged in circular formation and spaced apart by definite fractions of a wavelength. The aerials are energised from separate feed-lines, and by adjusting the phase of the currents in each feeder, the bulk of the radiation can be thrown upwards to any desired extent. Experiments have already been carried out along these lines in America with promising results. Set designers have been doing their best for some time to overcome the peculiar difficulties of the "blanketed" listener, and I am glad to know that the transmitting engineers are also lending a hand. It looks as if sooner or later the present handicap of living in the shadow of the local transmitter will disappear.

ENTERTAINING THE VISITOR

SUNDAY night, after the Epilogue, is a particularly good time for showing off what the set can do. The ether is full of "foreigners" and it is generally possible to pick up one or two that are hopelessly masked by the home stations on ordinary nights. Some of the programmes, too, come as a pleasant change to the B.B.C.'s idea of Sunday recreation. A couple of Sundays ago I happened to have a visitor over from the Emerald Isle, and proceeded to give him a "demonstration" after the B.B.C. had closed down. I picked out half a dozen stations in fairly rapid succession, and then suddenly struck the well-known "Londonderry Air" coming in at excellent volume just about where Gleiwitz ought to be.

The effect on my visitor was quite startling. The ordinary expression of polite boredom—which most people assume when listening to another fellow's set—changed in a twinkling to one of real interest. When it was over, there were words of warm commendation both for the set and its owner. In the circumstances I must say the programme came as a happy coincidence, although it was "made in Germany."

MAINS AND FUSES

I CAME across a friend the other day who was having trouble with his mains set. He told me that the trouble was in his fuses. In order to be on the safe side he had incorporated some small cartridge-type fuses in the leads to the power transformer, and he complained that there was apparently some fault in his set because sometimes everything was all right, and sometimes the fuses blew as he switched on. Yet he had tested all over the set and could not find anything which was out of order, or which should take an abnormally high current.

I had some suspicion what the trouble was, and I inspected first of all his fuses and then the rest of his set. I found that the fuses were rated to carry 250 milliamps. I asked him why he had chosen such a low value, and he seemed rather surprised. He pointed out that the matter had been worked out very scientifically. He estimated that his set took about 40 watts.

WHAT SURGE CAN DO

AS his mains voltage was 200 volts, his current would be 200 milliamps to give this wattage, and he therefore was well within the 250 milliamps which the fuse would carry. I pointed out to him, however, that this was not a sufficient factor of safety due to the current surge which can occur when switching on a transformer. The alternating voltage is, of course, continually rising to a maximum and falling to zero again, and the switch may be closed at any part of the cycle. It is pure luck as to which point is chosen. If one switches on when the voltage is low or passing through zero there is no rush of current, but if we happen to choose a moment when the voltage is at maximum there is a very considerable momentary current rush, rising to three or four times the normal current. This will at once cause the fuse to blow, which was the effect my friend had experienced; sometimes he switched on perfectly satisfactorily, but at others he happened to hit a peak value, and bang went the fuses. I told him that he would do better to substitute ½-amp. or 1-amp. fuses, which would afford him just as much protection in the event of a serious breakdown, and which would not give him this constant annoyance.

PUBLIC-ADDRESS WORK

A LITTLE practical experience in radio is, as I have often had occasion to remark, worth a good deal of mere textbook lore. This truism was once again illustrated to me when a few days ago a young niece of mine asked me to provide "electric music" during the intervals of a school play.

At first I confess I jibbed, having visions of erecting amplifying equipment capable of handing on 5, 10, or even 20 watts of undistorted power to a bank of moving-coil loud-speakers. But a preliminary skirmish showed me that this vision was unnecessarily elaborate, because the school hall was not much more than twice the size of the AMATEUR WIRELESS laboratory. Now, in that laboratory I have often heard perfectly wonderful quality at seemingly tremendous volume delivered by nothing more pretentious than a two-valve amplifier, a good pick-up, and a sensitive moving-coil loud-speaker.

COMPARATIVELY LOW POWER

SO I rigged up one of the latest permanent-magnet moving-coil loud-speakers at a suitable point in the gallery of the hall. This I fed with the output from the low-frequency side of a well-known commercial A.C. four-valver, into which I had plugged a sensitive gramophone pick-up. To my surprise and delight, I found that this gear, on "half-throttle," simply filled the whole hall with an adequate volume of sound.

Allowing for the fact that the hall was empty, I still considered this comparatively simple gear would serve. And it did; for even when the hall was filled with chattering schoolgirls I was able, by turning up the volume control on the pick-up, to more than compete with their chatter.

THE CRUX OF THE MATTER

THE output valve of this set is a standard type with a four-volt 1-amp. filament, providing at 200 volts on the anode an undistorted output of just over 1 watt. This may seem an incredibly small output power to fill a hall occupied by 200 to 300 people. To me, it seems that the deciding factor in undistorted loud-speaker output is the efficiency of the loud-speaker, and not the power required to work the loud-speaker. In this experiment at public-address work on a small scale I admit I used an exceptionally sensitive moving-coil loud-speaker. Why not? If you can get the required volume of sound with a loud-speaker supplied with 1-watt output from the amplifier it seems a sheer waste to install a 10-watt amplifier and relatively insensitive loud-speakers.

FINDING FAULTS

LIKE many of my readers, I am often called in to act as radio doctor when friends' sets develop unaccountable ills. I always seem to be called in to cure the most obscure faults. Perhaps this is a compliment; even so, I have my worried moments. The other day a neighbour implored me to diagnose a fault in his radio gramophone, a commercial product that had simply "gone dead."

I switched on the A.C. mains and waited a minute or two before carefully feeling each valve in turn. This is, of course, an old dodge, but it is surprising how often one can put a set right in a few seconds by the simple expedient of discovering that one of the valves has conked out and is therefore cold to the touch. On this occasion all the

On Your Wavelength! (continued)

valves were warm, and I had to look hard at the works.

THE CLUE

WITH visions of broken-down bias resistances and other horrors capable of being conjured up only by the real fan, I settled down to an evening of patient searching. Quite by chance, I was saved all further trouble by a remark on the part of the junior member of the household. He said he had noticed that when the gramophone pick-up was swivelled round to insert a new needle it occasionally produced a click in the loud-speaker. To cut a long story short, I found that one of the leads inside the pick-up arm had been poorly soldered and had been disconnected by the constant swivelling of the pick-up. The grid circuit was not broken entirely, owing to the pick-up volume control being left in circuit.

INDOOR OR OUTDOOR?

THE other day I was chatting with two leading lights amongst wireless manufacturers on the subject of the receiving set of the future. We agreed that the super-heterodyne in one form or another would be much more widely used, but I was surprised to find a diversity of opinion on the aerial question. One man held that there would be the biggest demand for super-hets suitable for use with outdoor aerials, whilst the other plumped for the set intended only for frame-aerial working. Myself, I agree whole-heartedly with the latter, for to my mind the frame, if you yoke the right set to it, scores in many different ways over the outdoor wire. I can only tell you that I have uprooted my aerial mast; I am certainly not going to re-erect it. Many thousands of readers who have constructed the "Century Super" will have gone over to the frame, and I expect that most of them will agree with me about its merits as a collector.

FRAME POINTS

QUITE apart from its directional properties, which are scarcely needed with a set of knife-edge selectivity nowadays, the frame has heaps of strong points to recommend it. It undoubtedly leads to far less interference from both atmospherics and spark signals. Both Dame Nature and spark stations produce trains of heavily damped waves which find full scope for their activities in the efficient outdoor aerial system. In fact, the more efficient your outdoor aerial, the more likely are you to be troubled by such interference. The frame is not nearly so liable to shock excitation and great use can be made of its directional qualities when either of these kinds of interference are about.

AS A VOLUME CONTROL

ANOTHER way in which the frame scores is that it gives you automatically an exceedingly delicate volume control. As you know, signal strength is at its minimum when the frame is turned, so that it is at right angles to an imaginary line stretching from it to the transmitting station. The point of greatest strength is not, as a rule, quite so clearly defined, but there is a very definite growth in volume as the frame is turned slowly from the position of minimum strength towards that of maximum. If, therefore, you tune in a station with the frame turned towards it you can reduce its volume to exactly the right amount by rotating the frame.

A VALVE ROBOT—

WHEN you are going round museums, picture galleries, and so on you often come to an exhibit about which you would like to know more than you can discover from the catalogue—or perhaps you haven't got a catalogue. Usually in such circumstances there is nobody within hail who can tell you what you want, and you pass on to the next thing with your curiosity unsatisfied. In the near future all this is likely to be altered with the help of our wonderful friend the wireless valve. The H.M.V. people have just developed a kind of exhibition robot which has been installed in the Science Museum at South Kensington. You will find it in operation if you visit the top floor of the main building. Arrived in front of a showcase which particularly interests you, you observe an ordinary press-button in a prominent position. Push this gently and see what happens. A loud-speaker immediately comes into operation and gives an interesting little talk on the contents of the case. This is, of course, done by means of a gramophone record and a valve amplifier. As soon as it has said its little piece the instrument automatically switches itself off.

—AND ANOTHER ONE

AND there is another kind of valve robot which has just been brought into use in France. If you want to know the exact time you lift off the receiver of the household telephone and merely say, "Time, please!" when the operator at the exchange answers you. Next instant you hear a voice saying "Eleven-fifteen . . . (pause). Eleven-fifteen-five . . . (pause). Eleven-fifteen ten," and so on. As long as you are connected the voice goes on calling out the exact time every five seconds. This again is done by means of gramophone records and valve amplifiers. The service is worked from the famous observatory in Paris, and the records are operated by a master clock which is guaranteed always to be absolutely correct. If you want to know the time in France, don't ask a policeman; ask the telephone.

AN AMUSING EXPERIMENT

IF you want to amuse yourself during your leisure time you can have a great deal of fun with an ordinary carbon microphone, such as you can buy very cheaply, and a low-frequency amplifier. I made up such an instrument not long ago, which astonished friends by amplifying the footfalls of a house fly until they sounded like those of an iron-shod cart horse clumping over a cobbled road. The kind of microphone I mean is one of the carbon-granule type, which must, of course, be arranged vertically. On to the diaphragm you stick a horizontal paper platform on which your subjects can walk. The microphone, with a single dry cell in series, is connected to the primary of a low-frequency transformer with a big step-up ratio. Low-frequency valves of the ordinary sort then follow, and the output is taken to the loud-speaker.

A SENSITIVE DEVICE

THE amount of noise that you can obtain depends, of course, upon the number and efficiency of your low-frequency stages. If your set is arranged for a pick-up you can connect the microphone straight to the pick-up terminals, and you will get a very fair amount of loud-speaker response. Summer is a very good time to make the experiment, since you have all sorts of insects handy. Electrify your friends by letting them hear the gnashing of a caterpillar's jaws as he devours a juicy leaf. A similar contrivance, by the way, is used by the B.B.C. for reproducing the report of a pistol in the noises department. You just drop a small shot or a grain of sand on to the paper platform fixed to the microphone.

STATIONS AND VALVES

THE man who does not intend to use more than two or three valves should receive one indirect benefit from the increasing number of larger stations. Valve sales are bound to go up, which should mean lower production costs and therefore reduced prices all round. Valves are, I think, still rather too dear, and I don't think that the time can be very far away when a lowering in prices will take place. In my humble opinion, it would pay manufacturers to make a reduction at once, for by doing so it would encourage the production and use of bigger sets.

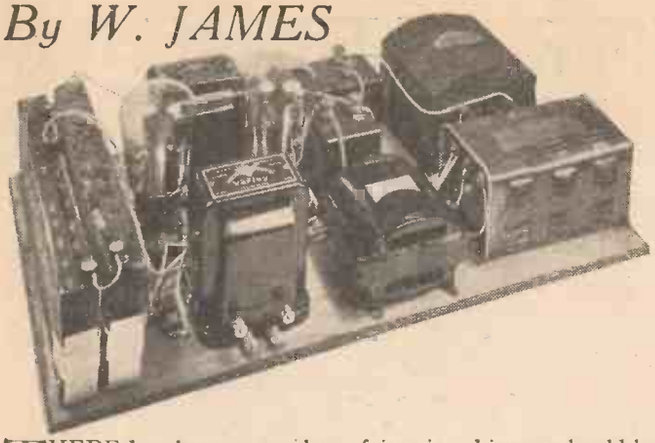
THERMION.

WHEN SOLDERING

When wiring up a set avoid, if possible, making soldered connections direct to the ends of parts such as

grid leaks. When the iron is applied to the end of the leak, as is here being done, the heat may harm the inside connections and a bad contact will result.

By W. JAMES



AN A.C. PUSH-PULL POWER AMPLIFIER

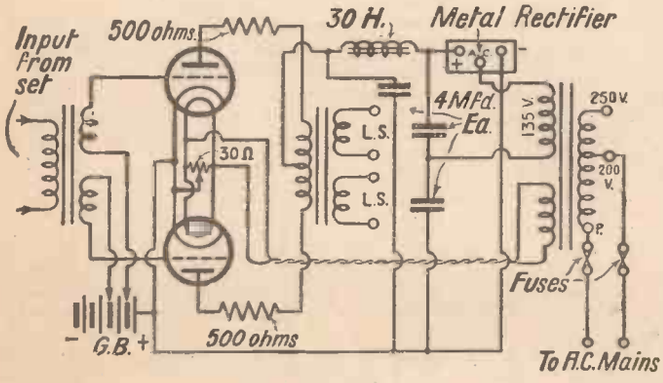
This amplifier is of particular interest to those who have built the "Century Super," although it is quite suitable for use with any type of receiver where maximum volume is desired.

THERE has been a number of inquiries for a power amplifier for addition to the "Century Super." Those who use a moving-coil loud-speaker and others who appreciate a large volume of sound want a larger power stage than the one provided in the "Century Super" receiver.

This set has an ordinary two-volt battery power valve and the volume from it is quite sufficient for the majority of users having dry batteries.

A much larger valve cannot be fitted when the current is obtained from a dry-cell high-tension battery, as it would discharge too quickly. A number of amateurs have mains, however, and want to use a good power stage.

We could arrange this by fitting a larger power valve and a choke-condenser output filter or an output transformer and obtain the high tension from a mains unit. This arrangement is quite satisfactory, but I have been specially asked for a separate power stage and have, therefore, made up a push-pull power amplifier with a mains unit for A.C. mains.



The circuit of the push-pull power amplifier

The filament and high-tension currents are taken from the mains, but a separate grid battery is used. Grid batteries are cheap and reliable enough not to cause any bother and we can easily adjust the bias to suit the particular valves used. The valves used in my power amplifier are Mazda P1, rated at 200 volts for the anodes. With a grid bias of —30 volts, the anode current passed by each valve is about 15 milliamperes. Therefore the direct current output from a Westinghouse metal rectifier type HT7 working as a voltage doubler is just right.

If we had used so called automatic grid bias we should have had less anode voltage by the amount of the bias and I am afraid that some readers might have experienced a little difficulty in getting the bias just right for their particular valves.

Circuit Arrangements

The output valves, too, are not always alike and it is an advantage on occasions to use a little different bias for the two valves. This has been arranged for the special push-pull input transformer used. It has a single primary or input winding which should be connected in the place of the loud-speaker which is joined to the "Century Super" set.

There are two secondary windings, an end from both going direct to the grids of the two power valves and the remaining ends being taken to the grid-bias battery which is made up of two 16½-volt dry cells, joined in series. These Mazda P1 valves are of the indirectly-heated type and have heaters taking 4 volts 1 ampere each.

A transformer giving this output must, therefore, be used.

It is usual to connect grid leaks of about 100,000 ohms in the grid leads to push-pull valves for the purpose of stopping spurious oscillations. In this instance I have not done this as there is an advantage in attending to the anode circuits instead of the grid circuits. Included in the anode circuits, between each anode and the anode terminals of the output transformer, are a pair of 500-ohm flexible type resistances. These resistances drop the anode voltages slightly and not by a material amount, that is, by 7.5 volts for a current of 15 milliamperes, and they do stop spurious oscillations quite as effectively as resistances connected in the grid circuits.

On the mains side we have a power transformer giving suitable outputs, and the rectifier itself. For smoothing there is a choke and there are three 4-microfarad fixed condensers.

No voltage dropping resistances or other filters are needed for the push-pull stage, with the result that the smoothing equipment is of the simplest. With push-pull circuits, using carefully balanced valves and transformers, the minimum smoothing is needed.

There is a potentiometer in the heater circuit. This has its ends taken to the heater terminals of one of the valve holders and the adjustable contact is connected with the cathodes and to negative high-tension.

COMPONENTS REQUIRED FOR THE A.C. PUSH-PULL POWER AMPLIFIER

Baseboard, 18 in. by 10 in. (Camco, Clarion).
Two valve holders (Junit, Telsen, Benjamin, Lotus).
Three 4-mfd. condensers (T.C.C., Dubilier, Formo, Ferranti).
Westinghouse metal rectifier, type H.T.7.
Push-pull input and output transformers (Varley, types DP6 and DP7).
Smoothing choke (Heayberd, Varley, Regentone, Bulgin, R.I., Lissen, Ferranti).
Mains transformer, 135 volts H.T., plus 4 volts L.T. (Regentone, Heayberd).
Two spaghetti resistances, 500 ohms (Lewcos, Turner, Lissen, Sovereign, Bulgin, Graham-Farish).
One 15-ohm humdinger (Claude Lyons).
Three wander plugs, marked G.B.+, G.B.—1, G.B.—2 (Belling-Lee, Clix, Eelex).
Two spades, marked H.T.+, H.T.— (Belling-Lee, Clix, Eelex).
Three yards of thin flex (Lewcoflex).
Two pairs of grid-bias battery clips (Bulgin)
Connecting wire (Lewcos).
Sleeving (Lewcos).

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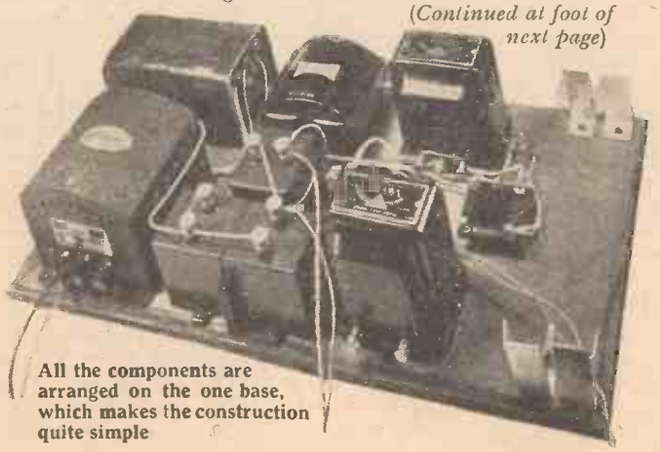


All the components are arranged on the one base, which makes the construction quite simple

USING THE "CENTURY SUPER" ON THE MAINS

THE "Century Super" may be run from a mains unit with perfectly satisfactory results. It is naturally necessary to connect the circuits correctly or instability may be experienced.

The ordinary mains unit has three output tappings, one is called the power tap and the other two provide different voltages. One may have a fixed resistance in circuit and

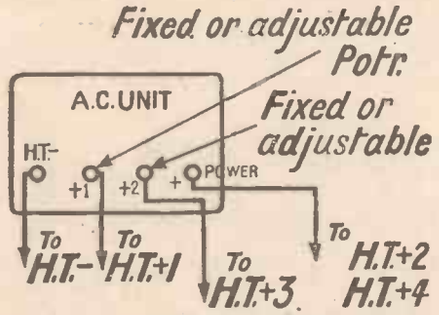


Fig. 1. H.T. connections for the "Century Super" using an ordinary mains unit

be what is called a fixed tap, and the third tap may be one arranged for a screen-grid valve, having an adjustable output or perhaps a fixed potentiometer in the circuit.

This potentiometer circuit, whether fixed or adjustable, should be taken to tapping H.T.+1 for the supply to the first detector, which is an anode-bend detector (Fig. 1).

If the output is adjustable you will be able to regulate the value of the high tension to suit the grid bias used, but if not, the bias must be adjusted, this being carried out during reception.

The second output, whether adjustable or fixed, should be taken to the second detector, tapping H.T.+3. All the other high-tension circuits should be taken to the power tapping of the mains unit.

Thus the full voltage of the unit is applied to the power valve and to the two screen-grid valves and also to the oscillator circuit. No doubt the grid bias will have to be altered from the values given for a battery supply. With a good mains unit a larger power valve than the small battery valve recommended may well be used, as more volume will be obtained from many stations.

If difficulty is experienced in working the set from a mains unit it is possible that a one- or two-microfarad condenser connected between the H.T.+ terminal of the low-frequency transformer and negative will help. There is not one in the set and I believe that in a few mains units of the cheaper types no by-pass condenser is used across a fixed tap.

I have tried a number of mains units with the set built exactly as described and have found the results satisfactory in every way, and because of the greater output available than can usefully be taken from dry batteries, the volume is greater.

The diagrams Figs. 1 and 2 show the essential points. I should prefer to use a mains unit having at least one adjustable output, but with fixed outputs good results can be obtained.

Connecting a mains unit seems not to affect the behaviour of the frame aerial. It is just as directional as with batteries. When a direct-current mains unit is used, however, and an earth is employed, there is likely to be a slight effect. The earth is not connected directly to the set, of course,

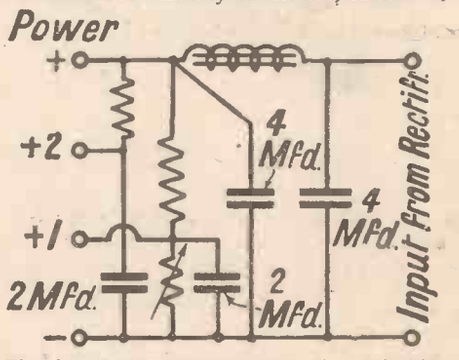


Fig. 2. Circuit arrangements of a suitable mains unit

but through a fixed condenser or to the earthing terminal provided in the mains unit.

It is seldom necessary to earth an alternating-current unit for the avoidance of hum. Some units have an earthing terminal and you might try connecting an earth wire.

"AN A.C. PUSH-PULL POWER AMPLIFIER"

(Continued from preceding page)

To set up the amplifier you should really have a milliammeter for showing the current passed by the push-pull valves. Join it first to one anode circuit and then to the other, adjusting the grid bias of the valves so that the valves pass about 15 milliamperes each. According to the valve makers' curves the valves ought to pass about 15 milliamperes each when the high-tension voltage is 200 and the grid bias is negative 30 volts.

If you have no milliammeter it would be as well to assume that the valves are alike and to apply a bias of 30 volts to both.

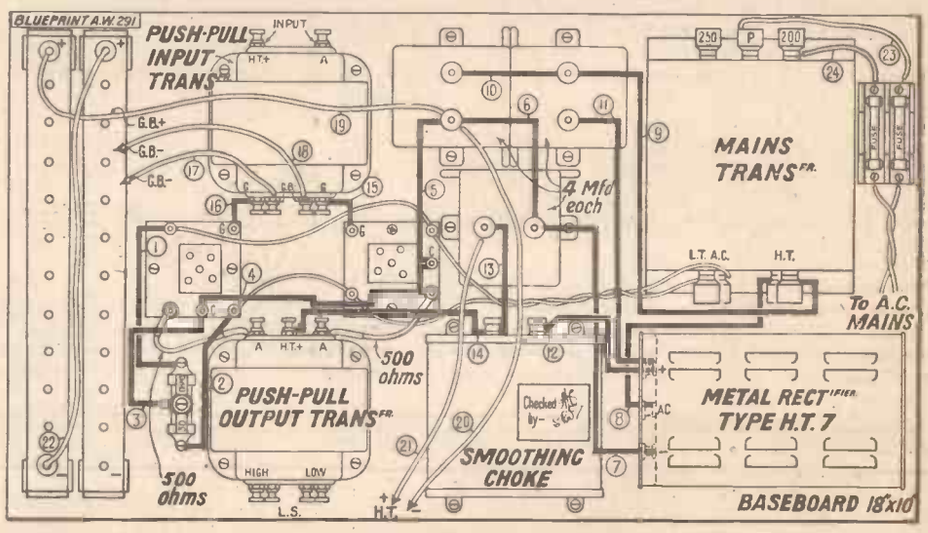
Do not connect the milliammeter in the common high-tension lead and note the current passed by both valves and then with only one of the valves in circuit. For one thing the high-tension voltage will increase when one of the valves is pulled out and so the remaining valve will pass more than its normal current. Secondly, the voltage applied to the heater of the valve will rise and once again cause a false reading to be obtained.

The valves used have impedances of 2,000 ohms and amplification factors of 5. They are, therefore, sensitive and provide a good output when fully loaded.

The amplifier will easily be fully loaded by the output from a "Century Super" receiver. With the battery valves used, the bias is about —9 volts. A signal of this voltage will, therefore, be of about 50 volts in the anode circuit when the valve has a magnification factor of 6.

A low-frequency volume control might be useful in order to cut down the strength of the stronger stations and could take the form of an adjustable high-resistance of, say, 50,000 ohms connected across the primary winding of the transformer connected to the detector.

A high- or low-resistance loud-speaker may be used with the amplifier as there are two suitable output windings. The power output will be sufficient for most normal purposes. Long leads from the input side of the amplifier to the set should be avoided.



The layout and wiring diagram of the A.C. Push-pull Amplifier. A full-size blueprint is available, price 1/-

This amplifier may, of course, be added to any type of set, as it is quite self-contained, the input terminals of the transformer being joined to the output terminals of the set.

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

THE FAVOURITE PROGRAMME

OPERA

A REFRESHING and, at the same time, illuminating talk on novels was that by Clemence Dane. In fact, it was one of the best talks I have heard on literary criticism. Sensible, clear, although much of it was on generalised lines. At the same time, she gave us some thumb-nail reviews which should be useful to those seeking advice on what books to read. Indeed, altogether it was a model talk of its kind.

◆ ◆ ◆

Many friends think they embarrass me when they ask what I now think of newspaper ballots. The answer is that until everybody records one vote such methods of gauging public tastes cannot be regarded as conclusive. Apparently, vaudeville is favourite, with symphony concerts creeping up, and with talks losing place, not because listeners disapprove of them generally, but because of the kind we have been having lately.

◆ ◆ ◆

The last symphony concert was an enthusiastic affair, and when the audience becomes wildly enthusiastic your highbrow-critic becomes reserved in his judgment. Nevertheless, although the programme was rather mixed, the reception accorded to Dr. Adrian Boult was every whit deserved. He has done great things with this remarkable orchestra.

◆ ◆ ◆

The B.B.C. seems to be employing professional journalists to "down" critics who have ventured to write about the B.B.C. These effusions appear in their own publication, which is silly.

◆ ◆ ◆

It was pleasant to hear the voice of our old friend, Sir Walford Davies, again. Although he sounded a wee bit tired, it was certainly and unmistakably *his* talk. His human note in sending a message to Mountain Ash was typical of the man. That is what makes him one of our most popular broadcasters.

◆ ◆ ◆

Another popular broadcaster, Vernon Bartlett, tells me he is quite fit again, and I am sure listeners will be interested to know that. But, despite illness and worry, V.B. has kept up a remarkably fine form in his broadcasts on foreign affairs.

◆ ◆ ◆

Mrs. Snowden was telling me the other day of her ambition regarding opera for the masses. I am wondering how listeners have enjoyed *The Ring*. I went again to *see* as well as *hear* the opera, because I really do think that opera is incomplete without vision.

◆ ◆ ◆

Siegfried, I should imagine, is not the ideal opera to broadcast, but *Die Fleidermaus* is. There is a lot of what is called *parlando* in the Wagnerian operas, which can easily become tiresome, but the music in Strauss' light opera scintillates. You remember we used to have Act 2 only, and I pointed out that the best run of music occurred at the opening. I was glad, therefore, that both Acts 1 and 2 were broadcast.

◆ ◆ ◆

I confess I was not altogether satisfied with *Mary Celeste*. The flash-backs made it difficult to understand exactly where we were. Although I agree with producers who endeavour to do without narrators, I think some explanation was occasionally needed. Dr. Peach's method of treating the mystery was certainly ingenious, although it is well for him that he didn't pursue it to the bitter end! On the whole, I rather fancy we were led up the garden.

An impression of Eda Kersey

BROADCASTING LIMITATIONS

A MATTER OF TASTE

◆ ◆ ◆

Cortot at the Queen's Hall avoided Chopin, except when he was compelled by the prolonged applause to play an encore. As he is an expert on Chopin, I wondered why he didn't include him in the programme. The answer was apparent when he came to the studio next day and played the whole of the twenty-four preludes (Opus 28). That certainly made up for it.

◆ ◆ ◆

I see the names of new orchestras in the programmes, and frankly they sound much of a muchness. The idea of giving everybody a turn, however, is to be commended. I would like to warn the Modern Chamber Orchestra, however, that we have heard the composer Bach before—although in this case it was Bach junior.

◆ ◆ ◆

I thought Jeanne de Casalis nearly got well away with her "Mrs. Feather" episode. Some of her lines wanted cutting, however. Her reference to babies, for instance, may be all right over the footlights, but over the microphone—no.

◆ ◆ ◆

The Hulbert Brothers had feeble material, and it won't do. They are two nice boys, who always raise a cheer when they appear on the boards, and that is no doubt why the studio claque guffawed, as usual, when, so far as we listeners were concerned, there was nothing on earth to raise a smile at. I, too, like to *see* them. Jack's funny face and Claude's funny feet. Unfortunately, listeners *can't* see them. That is what so many of these stage artistes appear to forget.

◆ ◆ ◆

Flotsam and Jetsam were in good form again. After listening to them I put on a record by Mr. Jetsam—of church music. But, needless to say, it was under Jetsam's real name.

◆ ◆ ◆

Sir James Sexton, when he appeared at Savoy Hill, was not allowed to say "blast" and another naughty word. But apparently the B.B.C.'s own authors are permitted to say "blasted."

◆ ◆ ◆

I heard some hymn singing in the latest Joan and Betty Bible story. Mr. Appleton must not spoil his series by making it sound too much like a church service.

The B.B.C. SELECT

Constructional details of an ultr cording to a B.B.C.-recommended in Regional areas where select

SO many people want a two-valver, not wishing to incur any great expense in making up a set or in running it, that AMATEUR WIRELESS set out to produce a two-valve set which really is capable of enough selectivity to justify its use in Regional areas.

If you already have an old two-valve set then you will know how difficult such a task is. With the average tuning arrangement the local National and Regional programmes spread over so much of the dial that while B.B.C. broadcasting is on, it is in some cases hopeless to attempt foreign-station reception. Some listeners are so badly affected by the selectivity problem that it is difficult to prevent even mutual interference between the local programmes.

Here is "A.W."'s solution to the problem. This new "B.B.C. Selective Two" embodies a novel idea for getting extremely sharp tuning which is specially recommended by the B.B.C., and which is equally useful on either the medium or long waves.

The "Tuning Sharpener"

Look for a moment at the photographs of this novel "two" and see how the "tuning sharpener" is arranged.

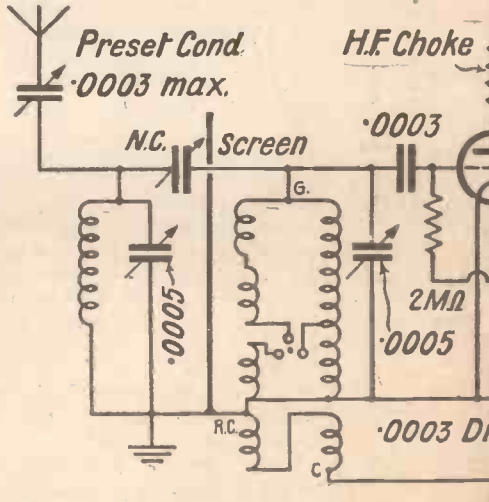
You will see that there are two tuning condensers in place of the usual one, this additional condenser being used to tune an additional coil in a filter circuit which precedes the main tuning arrangement. Briefly, then, the parts on the larger side of the screen are those of an ordinary dual-range two-valver, the small screening compartment housing the filter which sharpens up the tuning.

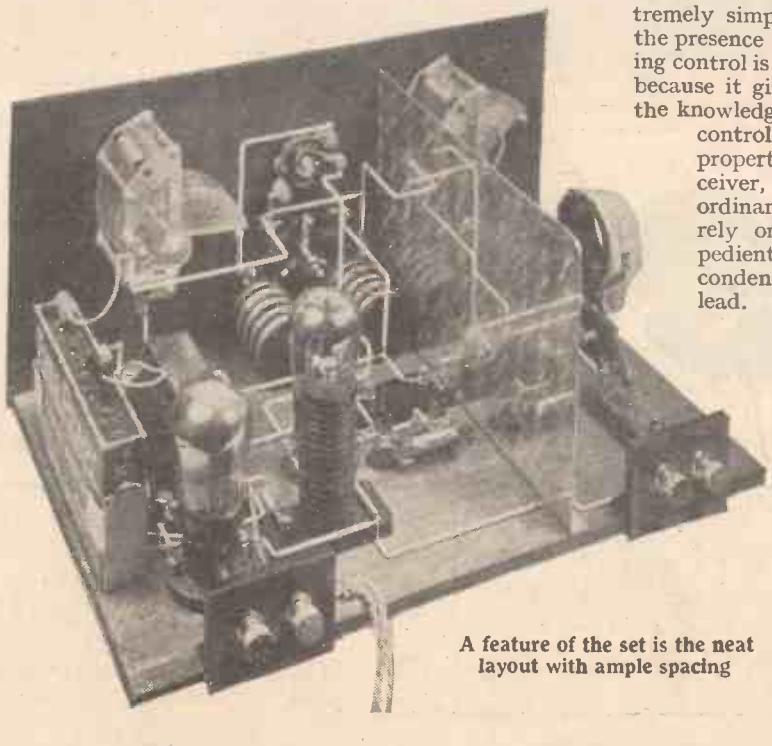
Despite the fact that this set is ultra selective it is extremely simple to work and the presence of the extra tuning control is a real advantage because it gives the operator the knowledge that he has full control of the selective properties of the receiver, whereas in the ordinary set one has to rely only on such expedients as a pre-set condenser in the aerial lead.

A pre-set condenser is incorporated in this set, but it is only an additional aid to selectivity and is not a bit so important as it is in the average outfit with a plain circuit.

Anybody can make up the "B.B.C. Selective Two," and the job of mounting and wiring the parts can easily be accomplished in one evening. All the parts you will need are listed in an accompanying panel.

As a further aid to construction, a full-size blueprint has been prepared and copies





A feature of the set is the neat layout with ample spacing

COMPONENTS REQUIRED FOR THE "

Ebonite panel, 14 in. by 7 in. (Becol, Trelleborg, Peto-Scott).

Baseboard, 14 in. by 9 in. (Camco, Clarion).

Two .0005-mfd. variable condensers (Lotus, J.B., Cyldon, Readi-Rad, Lissen, Ormond).

Dual-range tuning coil (Wearite "Talisman").

.0003-mfd. differential reaction condenser (Telsen, Lissen, Readi-Rad, J.B.).

Neutralising condenser (J.B., Peto-Scott).

Single coil holder (Lissen, Lotus).

.0003-max. pre-set condenser (Sovereign, Formo, R.I., Ormond, Lewcos).

Partition screen, 9 in. by 6 i Rad, Parex, Peto-Scott).

Two valve holders (Telsen, Ju Benjamin, Wearite, Burton).

.0003-mfd. fixed condenser Dubilier, T.C.C., Graham-Faris eign).

2-megohm grid leak (Lissen, Telsen, Graham-Farish, Sovereig

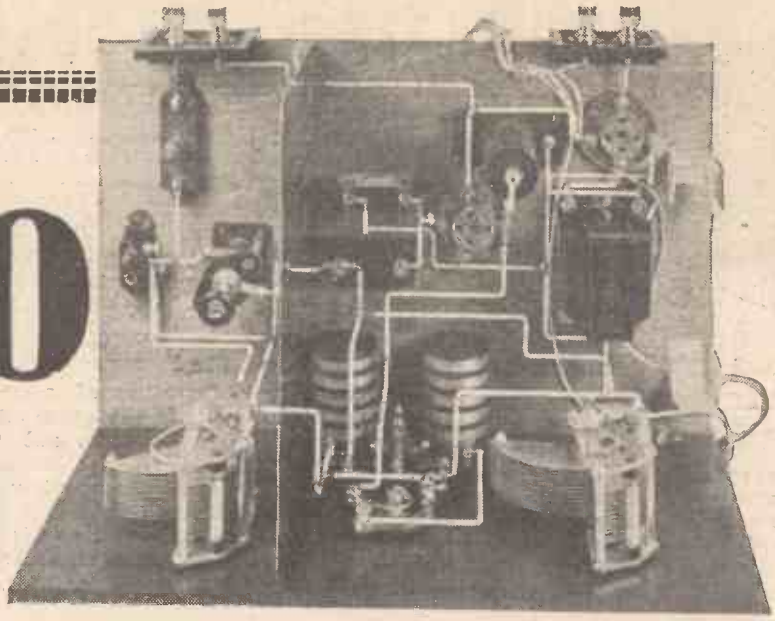
Grid-leak holder (Lissen, Wea gin, Dubilier).

High-frequency choke (Lewc Varley, Wearite, R.I., Burton, Sovereign).

Low-frequency transformer type A.F.8 : Telsen, Lissen, Va cos, R.I., Burton, Voltron).

C.
IVE TWO

a-selective two-valver, made up ac-
circuit, and which is ideal for working
tivity is of paramount importance

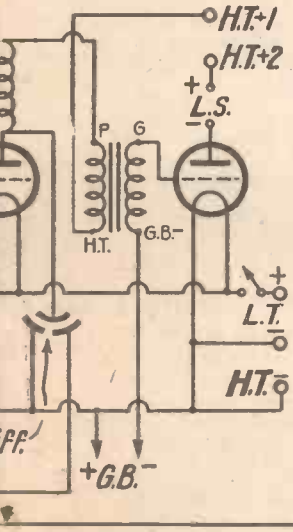


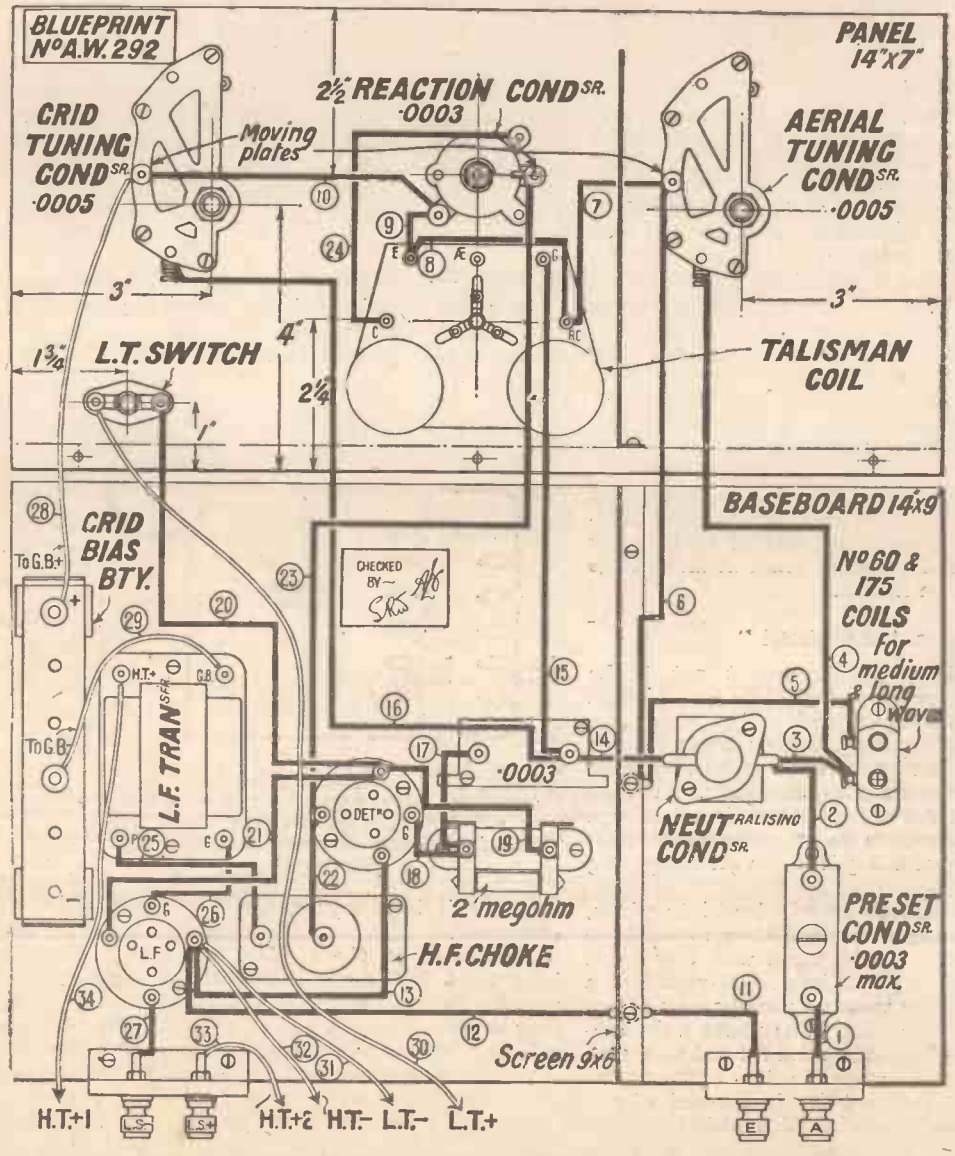
can be obtained, price 1s., from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. It is not possible to publish a full-size print of this set in AMATEUR WIRELESS and it is well worth while ordering a copy of the print when you purchase the parts for the set. It shows each component in its exact position and gives all the wiring. A small reproduction of it is given here.

The first step in the constructional work is the panel drilling and nobody need shirk this job because all the parts have one-hole fixing. It is possible to use a plywood panel but ebonite is to be preferred in a set of this description. Even the tuning coil is clamped to the panel by means of a large nut.

The vertical screen should be screwed to the baseboard when the other parts

(*Continued on next page*)





The layout and wiring diagram. A full-size blueprint can be supplied, price 1/-

B.B.C. SELECTIVE TWO"

. (Readi-
, W.B.,
(Lissen,
h, Sover-
Dubilier,
n).
rite, Bul-
s, Telsen,
Watmel,
(Ferranti
ley, Lew-

Two terminal blocks (Junit, Sovereign, Lissen, Belling-Lee).
Filament switch (Readi-Rad, Junit, Bulgin, Lissen, Benjamin, W.B.).
Two slow-motion dials (Astra, Lissen, Ormond, Brownie, Lotus, Formo).
Four terminals marked Aerial, Earth, L.S.+, L.S.— (Clix, Eelex, Burton, Belling-Lee).
Five wander plugs marked H.T.—, H.T.+1, H.T.+2, G.B.+, G.B.— (Clix, Belling-Lee, Eelex).
Two spade terminals marked L.T.+, L.T.— (Clix, Belling-Lee, Eelex).
Connecting wire (Glazite).
Grid-bias battery clips (Bulgin).
Three yards of thin flex (Lewcoflex).

IN MY WIRELESS DEN

WEEKLY TIPS—
CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Where is the H.T. Accumulator ?

HIGH-TENSION accumulators seem not to be used so much now as formerly. So many people find dry batteries reliable, or use mains units, that only a few careful experimenters use accumulators.

With care, of course, a battery of high-tension cells will give good service. I used at one time to employ them for all high-tension purposes. Now I find a mains unit more convenient, and use dry batteries for finally testing sets that will be used with them in most cases.

Bad Tuning

A number of amateurs are not able to tune a set correctly. They jump about all over the dials of the receiver instead of taking things steadily.

Having heard a station and logged it, the right thing to do when searching is to advance the wavelength tuning dials just a little and then to adjust the reaction, when it is employed, so as to maintain the set in a really sensitive condition.

Tuning should be proceeded with by advancing the tuning dials a step at a time. It is practically useless to tune quickly, going first one way and then the other. Only the more powerful stations will be received by tuning in this fashion. The weaker ones will certainly be missed. They can usually be brought up to good loud-speaker strength by careful tuning, but would not have been heard at all had the tuning been hurried.

Twisting a "Spaghetti"

Flexible resistances ought not to be twisted about too much, I find, or a break is likely to be produced.

Do not, therefore, pull or try to stretch these resistances so as to make their ends reach between two terminals. If the length of the resistance unit is not enough for a connection to be made easily, it is better to use a length of wire for completing the circuit.

The resistances may be bent into a loop, but it is dangerous to pull them round sharp corners or to twist them with any force. These resistance units are composed of a very fine wire wrapped round a core of soft insulating material. They have a protecting cover of systoflex and the end pieces are welded or pinched to the ends of the resistance unit previously covered with a little copper braid. The resistances are really quite strong, but obviously from this description should not be treated too roughly.

Those Fixed Condensers

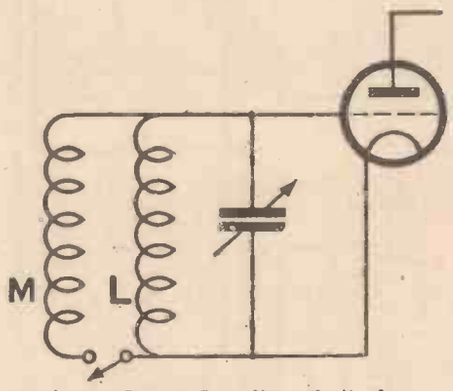
With a loud-speaker of 2,000 ohms connected directly in the anode circuit of a valve and a current of 10 milliamperes, the voltage drop is 20.

This may be a serious amount and would often mean that the output is noticeably less than when the full voltage is applied to the anode. A good choke has a low resistance and for that matter so has the primary coil of an output transformer.

With some arrangements, therefore, it is worth while fitting an output filter or transformer, and in addition to the advantage of less loss in the high-tension supply to the valve, there are several others. The loud-speaker windings are protected, matching is possible, and the circuit may be much more stable. Some loud-speakers have a resistance of less than 2,000 ohms, I know, and every case should be considered on its merits.

A Switching Hint

Coils and frame aerials for tuning over two wave ranges are often arranged as shown in the figure where the long wave-



Owing to "Century Super" popularity, frame aerials are all the vogue. Here is the frame or coil switching arrangement which W. James describes in the accompanying paragraph

length coil is always across the tuning condenser.

To receive on the medium wavelength band the switch is closed and the medium wavelength coil is connected across the long wavelength part. Thus we have two coils in parallel and the question naturally arises as to whether the efficiency of the short wavelength coil, taken by itself, is impaired by having the other coil joined across it.

In some cases there can be no doubt about the losses introduced. It depends upon the design of the long wavelength coil and also upon how the two coils are arranged. When the long wave part has considerable losses the efficiency of the arrangement will be poor regardless of how well the medium wavelength part is made.

"THE B.B.C. SELECTIVE TWO"

(*Continued from preceding page*)

have been mounted. Positions can be located at once if you use the full-size blueprint.

Some suitable two-volt valves for the detector are the Mazda L210, Mullard PM2DX, Cossor 210 Det, Marconi L210, Osram L210, Fotos BC18, or Eta BY2010.

You can choose a power valve from the following: Mazda P220, Mullard PM2A, Fotos BD9, Eta BW303, Cossor 215P, Marconi LP2/C, or Osram P215.

These valves are all two-volters but the four- or six-volt equivalents can, of course be used.

As there is a separate high-tension tapping for the detector valve you should make use of this. With most valves about 60 or 80 volts will be found best and the full 100, 120 or 150 volts should be used on the anode of the power valve. Use from 4½ to 9 volts grid bias, according to the type of power valve and the amount of H.T.

You will need, for the medium waves, a No. 50 or No. 60 coil to plug in the filter circuit.

There are several ways of adjusting this filter, but here is what is perhaps the best. Set the left-hand condenser (looking at the set from the front) to about the half-way position. Screw in the pre-set condenser and the small coupling condenser on the left-hand side of the screen. Then tune in some station, preferably one which is not too weak, but which is normally interfered with; tune this in only on the right-hand condenser, having the wavechange switch pulled out for the medium waves.

Now bring the left-hand condenser into tune, readjusting the right-hand condenser, if this is found necessary. You can then try slacking off both the pre-set condenser and the small coupling condenser. This, again, will upset the main tuning, but as this is only a preliminary adjustment it does not matter very much and you should spend five minutes or so in getting the sharpest tuning with the smallest value of coupling condenser.

Once you have found the best setting you can then tune in other stations, and it will be necessary only to adjust the condensers on the panel.

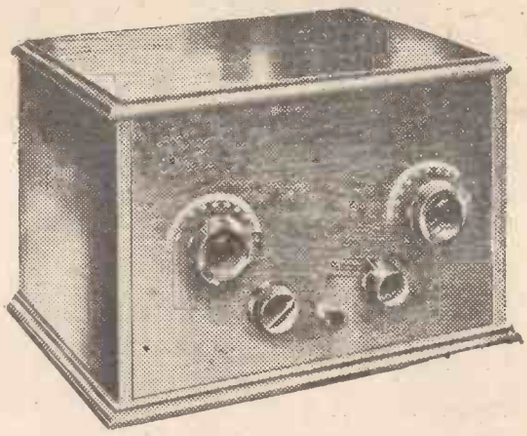
GET YOUR 'CENTURY SUPER' FROM READY RADIO

THE CENTURY SUPER

	£ s. d.
1 Cabinet complete with wooden panel 12" by 6" and baseboard 12" by 10" ...	15 0
1 Frame aerial wound to specification ...	1 0 0
2 Jackson .0005 mfd. variable condensers, Tiny No. 2	17 0
1 Colvern 50,000 ohm potentiometer ...	5 6
1 Readi Rad 3-point shorting switch ...	1 6
1 Set Wearite or Lewcos Super Hetero-dyne coils	2 10 0
6 Telsen 4-pin valve holders	6 0
1 Triple coil base	2 9
5 T.C.C. 1 mfd. fixed condensers... ...	14 2
2 Telsen .001 mfd. fixed condensers ...	2 0
1 Formo .0002 mfd. "Mikadenser" ...	6
1 Readi Rad 1-megohm grid leak and holder	1 4
1 Telsen "Ace" L.F. transformer ...	8 6
1 Terminal strip fitted 3 6-B.A. terminals	6
1 Readi Rad 15,000 ohm link resistance	1 3
1 Readi Rad 20,000 ohm link resistance	1 3
1 Readi Rad fuse and holder	1 3
8 Belling Lee wander plugs	1 4
2 Spade terminals, red and black ...	3
1 Packet Readi Rad "Jiffilinx" for wiring	2 6
6 Valves to specification, 2 S.G., 2 H.F., L.F. and Power	3 16 0
5 Yards thin flex, screws, etc.	11
Total (including Valves, Cabinet and Wound Frame Aerial) ...	**£11 : 9 : 6**

You are cordially invited to call for a free demonstration of the "Century Super" at our Showrooms at 159 Borough High St., London Bridge, S.E.1.

Come and hear it!



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RECOMMENDED ACCESSORIES	£ s. d.
2 Fuller 60-v. "Super" capacity H.T. Batteries	1 7 0
1 Fuller 9-v. grid bias battery	1 6
1 Fuller (S.W.X.9) 2 v. 40/80 amp. L.T. accumulator	12 9
1 Celestion D.10 loud-speaker	3 0 0
or 1 Amplion cone loud-speaker AC.21 ...	1 19 6

Components can be supplied separately

THE B.B.C. SELECTIVE TWO-VALVER

	£ s. d.
1 Black ebonite panel, 14 in. by 7 in. by ¼ in.	4 6
1 Cabinet with baseboard	1 0 0
2 Readi Rad .0005-mfd. variable condensers	9 0
2 Brownie S.M. Dials	5 0
1 Wearite "Talisman" dual range coil	10 6
1 J.B. .0003-mfd. differential reaction condenser	4 6
1 J.B. neutralising condenser	3 6
1 Readi Rad single coil holder	10
1 Sovereign .0003-mfd. preset condenser	1 6
1 Readi Rad 9 in. by 6 in. aluminium screen	2 0
2 Telsen 4-pin valve holders	2 0
1 Readi Rad .0003-mfd. fixed condenser	10
1 Readi Rad 2-meg. grid leak and holder	1 4
1 Telsen H.F. choke	2 6
2 Junit terminal blocks	1 4
1 Telsen "Ace" L.F. transformer (ratio 5-1)	8 6
1 Readi Rad filament switch	10
4 Belling-Lee "R" terminals	1 0
5 Belling-Lee wander plugs	10
2 Spade terminals	3
1 Pair G.B. clips	6
2 Mullard valves to specification (Det. and power)	19 0
Wire, screws, flex, etc.	1 9
Total (including valves and cabinet)	£5 2 0

Any of the above components can be supplied separately, if desired.

Kit "A" (less valves and cabinet) or twelve equal monthly instalments of 5/9. **£3 : 3 : 0**

Kit "B" (with valves less cabinet) or twelve equal monthly instalments of 7/6. **£4 : 2 : 0**

Kit "C" (with valves and cabinet) or twelve equal monthly instalments of 9/4. **£5 : 2 : 0**

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Write to Ready Radio for details and prices of the Ether Searcher, the sensational set designed by Mr. J. Sieger of "Amateur Wireless." Available for A.C. or D.C. Mains, or for battery-operation.

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VOLTRON HORNET TWO-VALVER

Makers : VOLTRON ELECTRIC LTD. Price 29/6

SOME time ago I was glad to be able to say some nice things about the Voltron Dyna-plus Three-valver, which, although extremely moderate in price, put up a fine performance. This week I have to record equally favourable impressions of a new Voltron set. This is called the Hornet Two-valver and its price is 29s. 6d. Of course, this price is for the bare set without valves or batteries, but even so the cost of a total installation with the Hornet set as nucleus is unusually small.

Using standard British valves, the detector would cost 8s. 6d. and a small power valve 10s. 6d. A slightly larger power valve would cost 13s. 6d., and to work such a valve one would need double-capacity batteries, whereas with a small power valve the standard-capacity battery would be just large enough.

Economical Running

The running cost of this set, using a P2 type of valve costing 13s. 6d., would not be great, for the measured anode current consumption of the set tested with this valve and a normal HL210 type of detector valve was found to be 12 milliamperes. Using a PM2 type of valve the total anode current consumption was no more than 8 milliamperes.

As one would expect in a simple two-valver, the first valve of the Hornet set is a leaky-grid detector, which is transformer-coupled to the power valve. Associated with the detector valve is a neatly wound dual-range tuning coil, whose wavelength is varied by means of a mica-dielectric tuning condenser. This combination of valves, as most readers will know, is very suitable for a set primarily designed to bring in the local station.

The development of the Regional Scheme has considerably affected the design of local-station sets. To-day it is not enough merely to receive the local at good loud-speaker strength, because there are usually *two* local stations. They must be not only received at loud-speaker strength on an average size of aerial, but must also be separated so that each is received at will clear of all trace of the other.

Selective

These remarks have a bearing upon the set under review, for the makers of the Hornet Two-valver have taken good care to provide a selective tuning coil. The aerial is tapped down part of the main inductance winding and in this way adequate selectivity has been achieved. Thus, with my normal 60-ft. aerial in south-west London I obtained the National station at 15 degrees and this powerful signal had entirely disappeared at 10 degrees and 20 degrees, a spread of only 10 degrees. Similarly, the Regional station, which came in at 26 degrees, was cut out entirely at 22 degrees and 30 degrees, a total spread of only 8 degrees. This is remarkably good selectivity for this type of set.

Simple Control

As readers know, I always pay particular attention to the controls of the set. The makers have done the same with regard to the Hornet. Thus I find two clearly engraved dials mounted on the left and right of the front of the set for tuning and reaction respectively. These dials have very open scales reading from 0 to 50 degrees. Such open scales are not merely permissible, but desirable in a set designed to tune in only a few stations. It is quite a good idea to use a degree-divided dial for reaction. For the reception of most stations one has to use some reaction and for non-technical members of the family the tuning and reaction readings for the stations in range are indeed a boon.

Below the two main control dials are two switch knobs. That on the left is for wave-changing. It is pulled out for medium waves, thus short-circuiting the long-wave winding. On the right is the switch in the filament-battery circuit. This is pulled out to switch the set on, and pushed in to switch it off.

With regard to the action of the tuning controls, I can say that the stations within range are well spaced on the dial and that reaction does not suffer from overlap; thus permitting the fullest use to be made of reaction in building up the strength of weak stations.

Testing for sensitivity I found that in addition to the local stations I was able to get Midland Regional at 31 degrees on the tuning dial, making full use of reaction. On the long waves the set also works well. I brought in Daventry 5XX at 38 degrees, and to my surprise and pleasure Radio Paris was received at moderate strength at 44 degrees. So was Eiffel Tower at 35 degrees.

Later in the evening I tried again on the medium waves and was able to bring in Brussels No. 1, Bueromunster, Rome, Stockholm, Hielsberg and Nürnberg at quite fair loud-speaker strength.

The Hornet Two-valver is remarkably compact in its neat and attractive metal case. It is necessary to remove the top part of the case to insert the valves, but as the picture shows there is plenty of clearance when the valves are inserted.

I must congratulate the makers on turning out such a sturdy little job at such a reasonable price.

SET TESTER.

A view of the interior of the Voltron Hornet showing the compact arrangement

PAUL N. HASLUCK

A PIONEER of handcraft and constructor literature, Paul Nooncree Hasluck died on Thursday, May 7, at the age of seventy-seven. Scores of thousands of handcraftsmen throughout the English-speaking world are familiar with his name and have profited from his books. Approximately half a century ago he founded the first lathework classes for the late Quintin Hogg at the Regent Street Polytechnic, London, and even in his early life, at a time when such efforts had the element of novelty, he was the author and editor of technical books and magazines. His name will live as that of the originator of the notable series of "Work" handbooks, millions of copies of which have been sold. That series sprang from "Work" (a periodical belonging to the old-established publishing house of Cassell & Co., Ltd., and now merged into "English Mechanics") of which he was editor from 1893 to 1909 and which, under his successor (the writer of this note) was the parent of AMATEUR WIRELESS.

The writer was for many years an assistant to "P. N. H." and offers this very brief record as a tribute to his memory.

B. E. J.

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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.

A New Varley Coil

THE Varley square-peak tuning coil which we have received this week for test is a band-pass tuner having attractive properties. It consists of two dual-range coils situated on the same axis, so that there is a certain magnetic coupling between. There is also provision for the connection of an external fixed capacity of .04 microfarad which is arranged to give a capacity coupling between the circuits. The total coupling is thus the sum of these two effects and, as is well-known, a suitable proportioning of the inductive to the capacity coupling will result in a constant band-width over a wide range of frequency.

In the present instance the band-width is designed to be constant over the whole broadcast range from 200 to 2,000 metres. We plotted a number of resonance curves at various frequencies within this band, and found that the effect was substantially obtained. The frequency band accepted is narrow, being of the order of 10 kilocycles only, which is sufficient to give good quality with excellent selectivity.

The construction of the coil is simple. It consists of a long tube, 6 in. long and 2 in. diameter on which the two sets of windings

The new Varley super-selective coil

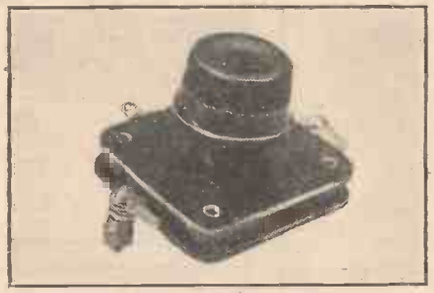
are placed. The long-wave sections are in the centre of the coil and the short-wave sections at the two ends. A single push-pull switch in the middle of the coil serves not only to change the wavelength as required but also provides a one-hole fixing for the arrangement.

In operation it is merely necessary to tune the device with a two-gang condenser and no screening of any sort is necessary between the two circuits, as the stray coupling between them is already utilised in achieving the peculiar properties of the coil.

This coil is selling at the reasonable price of 15s., and there is no doubt that it will be in considerable demand.

Lotus Differential Condenser

A NEW form of the well-known Lotus differential condenser has been received for test. One of the difficulties with these condensers which have a bakelised paper dielectric, is that unless the assembly is very accurate there is tendency for the moving plates to bind. The new Lotus condenser overcomes this difficulty in an ingenious way.



A differential condenser with several unique features—the Lotus

The two pairs of fixed plates are not rigidly fixed at the corners. The plates are registered by two holes which fit over short pillars one at each corner. They are thus fixed in position relative to the spindle, but they are capable of riding up and down the pillars in an axial direction.

As the moving plates are rotated, therefore, any unevennesses are taken up by the fixed plates giving way in the manner just described, and the net result is a very smooth motion. The capacity of two halves was found to be .00038 and .00035 respectively, the minimum in each case being 7 micro-microfarads.

The condenser is only ¼-in. thick, the other dimensions (over the terminals) being 3 by 2¼ in. respectively. A braided pig-tail takes the connection to the moving plates.

New Osram Valve

IN line with the continued improvement in valves which is steadily taking place, the G.E.C. have recently introduced the HL2 in their Osram valve range. The construction of this valve embodies somewhat different principles from those hitherto adopted, with the twofold object of improving the characteristics and avoiding microphonic noise. To this end the grid and anode are each carried on very stout supports which run the whole length of the electrodes, supported at the top with a small mica bridge which serves to anchor them and avoid movement which might set up microphonic noise.

The filament, which is in V formation, is not only anchored at the ends but is also secured internally. By this rigid assembly the old microphonic howling is almost completely obviated.

We found on test that this valve behaved excellently. The characteristics are an impedance of 18,000 ohms, with an amplification factor of 27, giving a mutual conductance of 1.5 milliamps per volt. We observed a noticeable increase in signal strength when inserting this valve in a receiver employing an older pattern of HL valve, due, of course, to the improvement in the characteristic, while there was no evidence of microphonic noise. The grid swing is sufficiently large for the valve to be used in a first low-frequency stage where such is employed, while those who still employ neutralised H.F. amplification, will find it an admirable valve for this purpose.

A NEW FRAME FOR THE "CENTURY"

"CENTURY SUPER" enthusiasts will be interested to know that Ready Radio, Ltd., have produced a very well-made and low-priced frame for this set. It

This is the new Ready Radio frame aerial for the "Century Super." It costs only £1 complete

is, of course, of the dual-range type, is centre-tapped and wound to the AMATEUR WIRELESS specification. It is supplied complete with a solid wooden base; the price is only £1. On test we found that this aerial tunes very sharply and is well up to the normal standard of sensitivity. Technically it is a very satisfactory job, the turns being well spaced and supported on rigid ebonite spacers.

A FURTHER LIST OF AGENTS AT WHOSE SHOWROOMS THESE VOLTRON PRODUCTS MAY BE INSPECTED.

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The HORNET

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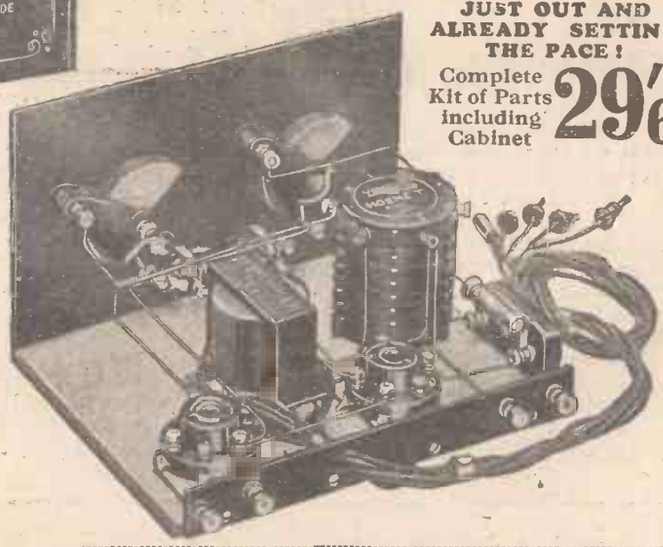

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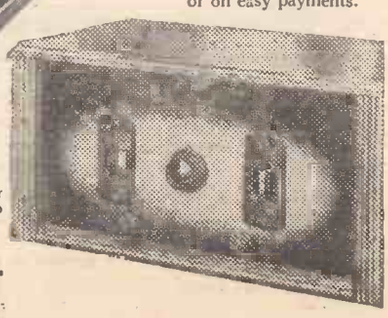

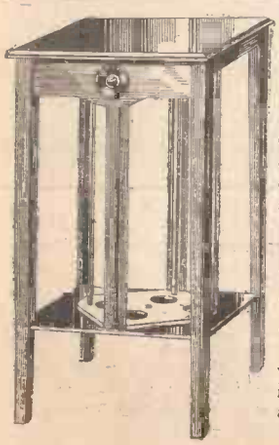

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CENTURY SUPER

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Rotation is dial controlled enabling different portions to be logged.

The wave change switch is integral and is controlled by knob in the centre of the dial.

It forms a charming piece of furniture on which to place the set and at the same time is the most efficient frame aerial on the market.

Price, Oak or Mahogany **63/-**

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

THE HOW AND WHY OF RADIO—XXXVII

WHAT GOES ON INSIDE THE VALVE

Written specially for beginners who want simple and practical explanations of the underlying principles of radio

NOW the battery, as stated last week, is primarily to heat the filament. Only incidentally does it charge the anode positively. Obviously for a two-volt filament we cannot use more than a two-volt battery, any more than we could use a 200-volt electric light bulb on a 240-volt supply.

So we must introduce another source of potential, simply to increase the electron flow, that is the anode current. Fig. 1 shows how this is done. We simply intercept the lead from anode to filament, connecting the positive side of the anode battery to the anode and the negative side to the filament battery, either to positive or negative. In this way the filament voltage is unaltered, but the voltage of the anode with respect to the filament is greatly increased; so, therefore, is the electron flow.

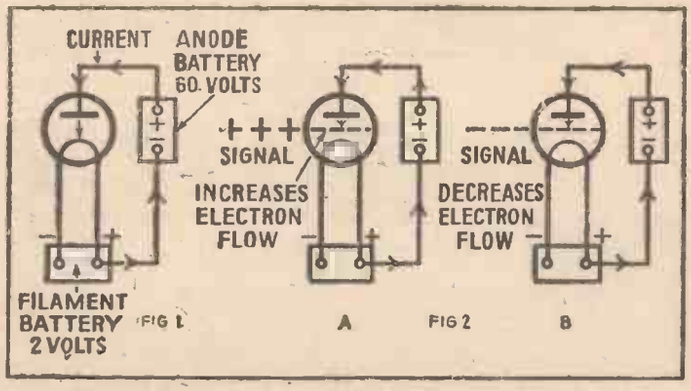

Fig. 1. This diagram shows the direction of the electron flow.
Fig. 2. The effect of the signal voltage on the grid is to increase or decrease the electron flow

Here let me explain why the negative side of the anode battery can go to either positive or negative of the filament battery. For convenience anode voltage is always mentioned with respect to the negative end of the filament; in last week's sketch the anode voltage is the voltage of the battery say 2 volts, positive with respect to the negative end of the filament; but obviously with respect to the positive end of the filament the anode voltage of Fig. 1A is the same—there is no difference of potential.

Well, in Fig. 1, where the negative end of the anode battery goes to the positive end of the filament battery, the anode is (60 plus 2) equals 62 volts positive with respect to the negative end of the filament, because the filament battery voltage is added to the anode battery voltage. If we connect the negative of the anode battery to the negative of the filament battery the anode is only 60 volts positive with respect to the negative end of the filament. For reasons I need not go into here, the standard connection is now anode battery negative to filament battery negative.

The introduction of the anode battery greatly increases the electron flow, but there is a limit to this increase, determined by the various constants of the valve. In the end the factor limiting the electron flow is the space charge. There is nothing to be scared about in this. We have already visualised the action of the valve as a flow of electrons—negative charges—from the filament to the anode; in the space between the filament and the anode there must always be a large number of these electrons. We saw early on that like attracts unlike and like repels like; so the electrons in the space will tend to repel each other. Electrons trying to leave the filament to get to the positive anode may find themselves strongly repelled by the electrons already liberated in the valve. They may be repelled so much that they cannot even leave the filament. This, then, is space charge, the limiting factor in electron emission.

The Grid

Now we come to a further step, whereby this space charge can be partly overcome. Last week I showed that between the filament and the anode of the valve is fitted a fine mesh wire called the grid. It is the grid that controls the electron flow. The grid carries a voltage, but not a steady voltage as at the anode or filament. For the grid voltage is the signal voltage, constantly changing from positive to negative and negative to positive.

When the grid is positive it acts like a small anode, and since it is much closer to the filament than is the anode, its positive charge is very much more effective in attracting electrons from the filament. A positive grid (Fig. 2A) means an increase in electrons from the filament and therefore an increase in the anode current. But the grid is just as often negative as positive, and when it is negative it helps the space charge effect in repelling electrons leaving the filament. A negative grid therefore means a decrease in anode current (Fig. 2B).

We can now see that the presence of the grid in the valve serves to interpret very minute signal voltage variations as quite considerable current variations. This is the most important lesson of the article and should, therefore, be learned before the next article is read.

HOTSPOT.

Next Week: Filament, grid and anode currents.

"THE 1931 'ETHER SEARCHER'"

(*Continued from page* 811)

are ganged. Each coil is supplied with a small connecting link and these links fit into slots provided in the switch rods. Working from the back of the set, join all three coils together by means of the links, taking care that the coil with the reaction is on the extreme left. See that all switches are open, that is with the ebonite switch bars flat, and the contacts apart. Make sure that the coils fit centrally in the screening box lids.

Simple to work as any Crystal Set

Owing to the one-knob tuning, the Searcher is probably the easiest set to operate which has ever been introduced by AMATEUR WIRELESS. A great deal of the success claimed depends, naturally, on the choice of correct valves. The screen-grid valve should be a Mazda 215SG, Osram or Marconi S215, or Cossor 220SG. The detector valve should be chosen from the following: Mullard PM2DX, Osram or Marconi L210, Cossor 210DET, or Mazda L210.

There is no need to have a power valve which takes an exceptional amount of high-tension current. Economical power valves are the Mullard PM2A, Mazda P220, Marconi or Osram LP2, and Cossor 215P. These valves take a maximum of about 7-milliamperes and require between 4 and 6 volts grid bias only.

Ganging and Tuning

In order to gang the set correctly and make the readings coincide with those given in the tuning scale published, tune the set as follows:

It is advisable to make use of the station log given with "A.W." No. 451. It is recommended that first all the trimmers should be rotated with a screwdriver in an anti-clockwise direction, so that the spring blades are separated by about ¼ in. Now it should be possible to tune in a local station at somewhere between 40 and 60 degrees on the dial. Reduce the dial reading by about 5 degrees and re-tune to the point of maximum volume by adjusting each trimmer in turn. As a final check, a distant station should be tuned in and the trimmers again slightly adjusted, if necessary. Sometimes in making the preliminary adjustment, it may be found necessary to reduce the dial reading by even more than 5 degrees in order to reach the point of maximum tune.

When adjusting the ganging of a set which is to be used within the swamp area of a main station, then the trimming condenser of the main aerial tuning condenser (on the left looking from the front of the set) should be screwed in so that it will be necessary to have the aerial pre-set condenser on the panel at its minimum setting with the vanes apart.

You will find that this pre-set condenser on the panel is a very handy control of volume, of selectivity and of the ganging at the extreme ends of the condenser scale.

See also page 823

RADIOGRAMS

A RUNNING commentary on Trooping the Colour will be relayed from the Royal Horse Guards Parade on June 3, the King's birthday. The commentator is to be Major J. B. S. Bourne-May.

Frank Titterton is to give a performance of some more of Sims Reeves' favourite songs on May 29.

The Derby will form the subject of a running commentary again this year, when it is run on June 3. Mr. R. C. Lyle, the well-known racing correspondent, will be responsible for the description which listeners to the National programme will hear.

The annual efforts to relay the song of the nightingale will be in full swing towards the end of this month, and it is hoped that listeners may have an opportunity of hearing this elusive songster on May 23.

Hector Abbas is to play the part of Professor Weltmann in the play entitled *Assault on Professor Weltmann*, by Felix Mendelssohn, which will be broadcast on May 22 (National) and 27 (Regional). This is a German radio play, which Mr. Abbas has himself translated into English specially for broadcasting. Lance Sieveking is the producer.

A novel entertainment is being prepared by John Watt for broadcasting on May 26 and 27. It is called *The Stage Revolves*, and will consist of a series of musical scenas, including a Viennese, a German, and a seaside scena; a miniature opera called *Willow Pattern* and a reconstruction of an old music hall.

The first of a series of talks on "Russia in the Melting Pot" is to be broadcast on May 25 by Mr. R. H. Knickerbocker, who is an authority on industrial conditions in Russia.

Another A. J. Alan story, this time "Adventure in Norfolk," will be heard nationally on June 16 and regionally on June 20.

Chief Os-Ke-Non-Ton, the Red Indian baritone, will take part in a concert to be broadcast on June 2. The Wireless Military Band will be conducted by B. Walton O'Donnell.

Piccadilly Dally will be heard by listeners to the National programme on June 3. The author is Gordon McConnel, whose light feature programmes are always very popular.

Two plays are to be broadcast on June 5 (National). The first, *Fame*, is described as an ironic comedy. The author is Gideon Clark, a well-known Fleet Street journalist, who has taken as his characters two newspaper reporters and a press photographer. The other play is a fantasy by L. E. Bunnett, called *Robinson*. This has been adapted by Peter Creswell, who is producing both plays.

A series of talks which should prove both interesting and entertaining opens on June 6 (National). They bear the general title "Escape," and will be given by people who have made exciting escapes from enemy hands. The first speaker is Mr. J. R. Ackerley.

Joseph Lewis will conduct the B.B.C. Orchestra and the Wireless Chorus in a first broadcast performance of *A Princess of Kensington* on June 6.

A group of old classical songs, sung by Alice Vaughan, will be a feature of the afternoon concert from Midland Regional on May 31. Handel's "Ah Mio Cor" and Caccini's "Amarilli" will be included.

The National Orchestra of Wales will give a concert, relayed on the Daventry National wavelength, on May 31. The vocalist will be Francis Russell.

A musical comedy programme will be given from the Cardiff studio on June 2. The vocalists will be Rose Hignell and Walter Glynne.

An All-electric "Century"

SIR,—I am very interested in your reply to J. G.'s (Croydon) letter published this week, in which you mention an all-mains "Century Super." I have "tried out" the "Century Super" at the invitation of a friend, and I am assured, without question, that it fills a very long-felt want; but having once enjoyed the trouble-free delights of using A.C valves, I do not wish to go back to the days of accumulator charging, no matter how good a set may be, and I am sure that I am by no means alone in this view.

I am now looking forward to the pleasure of building in the very near future (I hope) the "set ideal"; in other words, the "Century Super All-electric A.C. Receiver."

S. C. J. (London, W.13).

The "20s. Two"

SIR,—My friend brought a "20s. Two" blueprint to me and asked me if I would make the set. I scorned the idea and tried to persuade him otherwise! Ultimately the "20s. Two" came into being with two small alterations costing 2s. 9d. extra—an H.F. choke in the detector plate lead and .0005 variable condenser to tune the aerial coil. I now claim that we have the dinkiest two-valver obtainable at such a low price. And the volume control is not an ornament, but a necessity. The only small snag is a slight hand-capacity effect, which I cannot quite cure. I never took AMATEUR WIRELESS before this week, but now . . . !

F. W. R. (W.C.1).

A Novel Linen-diaphragm Speaker

SIR,—I have constructed a linen-diaphragm speaker, which I find compares favourably with a moving-coil for reproduction. Instead of one large and one small, or Bowden wire, both diaphragms are equal in area, but of a rather unusual shape. In fact, the piano frame gave me the idea.

Instead of jacking the frames apart, I spaced them with 2 B.A. rod and tubes and carefully manipulated the linen by hand. Otherwise the usual linen speaker features are retained. The unit is a Brown V and the set an old straight "three," det. and two L.F.

This combination has been running for two years now and many visitors have remarked on the quality of reproduction.

W. D. (Erith).

Exceeded Expectations

SIR,—I have built the "Century Super" and results have certainly exceeded expectations but, like most other fans, I would like even to surpass my present results. I wonder whether and how I can attach an outdoor aerial to this set to give me even better results. Can you advise me in this respect?

H. C. (Surbiton).

On no account should you attempt to use this set with an outdoor aerial on the broadcast band. Being a super-heterodyne, it will radiate interference over a very wide area. It is against the Post Office regulations to use a radiating receiver with a radiating aerial. The frame aerial is the only type of aerial that may be used with a super-het. Apart from this, selectivity will greatly suffer with an outdoor aerial.—ED.

A Television Question

SIR,—In reference to the article entitled, "How Good Can We Make Television Images?" in AMATEUR WIRELESS, No. 465, I do not think that "A. S. H." would have accepted such information from America or anywhere else if he had seen what British television can do.

Firstly, it has been proved by amateurs everywhere that a recognisable image can be obtained with a 10-kilocycle separation.

Secondly, it has been shown by Dr. J. Robinson that the dot principle used as a basis for obtaining the figures quoted is not applicable to television. Suffice it to say that the process of scanning, as used in television at the present moment, is an absolutely continuous one and not a jerky one, such as would be obtained by the passage from one element to another.

The width of frequency band does, of course, depend on the size of the object to be transmitted, but the width of band stated in the article is far in excess of that necessary.

G. A. (Brussels).

Mr. A. E. Bowyer-Lowe, a name well known in the radio industry, has been appointed chief engineer and works manager to Auto Electric Devices, Ltd., Diamond Works, Brighton, Sussex, and we can therefore look forward to various additions to the range of high-class components already in production by the company.

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 block letters.

Exide Service

HERE is a useful book—a complete list of Exide Service stations at home and abroad. The various aspects of the Exide Battery Service in connection with L.T. and H.T. accumulators and, of course, for car batteries, are doubtless well known to readers, and anyone who uses or contemplates using an Exide battery should have this booklet. **255**

Metal Coating

I like this new idea of metal spraying the outsides of valves. Triotron have just taken this up and have sent me their leaflet describing this new metal coating process as applied to their valves and also dealing with another novel idea—the packing of fine glass wool around the plate and filament to prevent vibration. **256**

Pye Portables

If you are thinking of getting a new portable for use this summer, then you should see a folder which Pye Radio, Ltd., have just sent me, dealing with the sets for summer use, chiefly the Pye twin-triple portable, which can be obtained for mains working if desired. **257**

A Ferranti Rejector

Ferranti, Ltd. have just produced a novel wavetrap which, according to their description, cuts out or reduces the strength of powerful stations between 440 and 550 metres, and particularly the North Regional station. If you are troubled with unselectivity, then write, through my Free Catalogue Service, for a leaflet which shows how the rejector is used. **258**

New Lissen Resistances

These spaghetti resistances are proving very popular, as I prophesied in these notes recently, and now Lissen, Ltd., have come out with a wide range of heavy-duty flexible resistances. A folder can be had, giving details of these. **259**

Philips and Selectivity

Philips Lamps, Ltd., have just brought out a folder with an extremely topical interest, namely, the matter of getting even greater selectivity than is normal with Philips sets. If you have a Philips receiver of any type, then write for a copy of this folder. OBSERVER. **260**

BROADCAST TELEPHONY

Broadcasting Stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is *aerial energy*.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (GSSW)	15.0
242	1,238	Belfast	1.2
261.3	1,148	Loudon Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	70.0
370.4	797	Glasgow	1.2
398.9	752	Midland Reg.	38.0
479.2	626	North Regional	70.0
1,554.4	193	Daventry (Nat.)	35.0
AUSTRIA			
218	1,373	Salzburg	0.6
246	1,220	Linz	0.6
283	1,058	Innsbruck	0.6
352	851	Graz	0.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
also testing on about 1,100 m.			
BELGIUM			
206	1,456	Antwerp	0.4
216	1,391	Radio Conférence Brussels	0.25
244.9	1,224.8	Schaerbeek	0.5
338.2	887	Brussels (No. 2)	20.0
509	594	Brussels (No. 1)	20.0
BULGARIA			
318.8	941	Sofia (Rodno Radio)	1.0
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
296.1	1,013	Tallinn	0.7
465.8	644	Tartu	0.5
FINLAND			
220.8	1,358.3	Helsinki	15.0
291	1,031	Tampere	1.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
222.3	1,349	Fécamp	1.0
235.1	1,275	Nimes	1.0
238.5	1,258	Bordeaux-Sud-Ouest	2.0
249	1,205	Juan-les-Pins	0.5
241.4	1,242.7	Béziers	0.6
256	1,172	Toulouse (PTT)	1.0
265	1,130	Lille (PTT)	15.0
272	1,103	Rennes	1.2
285.4	1,051	Montpellier	2.0
287.1	1,045.1	Radio Lyons	0.5
294.1	1,020	Limoges (PTT)	0.5
304	936	Bordeaux (PTT)	20.0
314.1	955	Natan-Vitus (Paris)	0.5
317.3	945.4	Marseilles (PTT)	1.5
327.2	917	Poste Parisien	1.2
328.2	914	Grenoble (PTT)	3.0
345.2	869	Strasbourg (PTT)	15.0
370	810.5	Radio LL (Paris)	0.5
385	779	Radio Toulouse	8.0
447	671	Paris (PTT)	2.0
466	644	Lyons (PTT)	2.3
1,445.7	207.5	Eiffel Tower	15.0
1,725	174	Radio Paris	17.0
1,725	174	„ „ (testing shortly)	85.0
GERMANY			
31.38	9,560	Zeesen	15.0
217	1,382	Königsberg	1.7
219	1,369.7	Flensburg	0.6
227	1,319	Cologne	1.7
227	1,319	Münster	0.6
227	1,319	Aachen	0.3
232.2	1,292	Kiel	0.31
239	1,256	Nürnberg	2.3
246.4	1,217.2	Cassel	0.3
253.4	1,184	Gleiwitz	5.6
259.3	1,157	Leipzig	2.3
269.8	1,112	Bremen	0.3
276.5	1,085	Heilsberg	75.0
283.6	1,058	Magdeburg	0.6
283.6	1,058	Berlin (E)	0.6
283.6	1,058	Stettin	0.6
318.8	941	Dresden	0.3
325	923	Breslau	1.7
360	833	Mühlacker	75.0
372	806	Hamburg	1.7
390	770	Frankfurt	1.7
418	716	Berlin	1.7
452.1	662	Danzig	0.2
473	635	Langenberg	17.0
533	563	Munich	1.7
550.7	536	Kaiserslautern	1.0
550.7	536	Augsburg	0.3
566	530	Hanover	0.3
570	527	Freiburg	0.35
1,635	183.5	Zeesen	35.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,590	Eindhoven (PCJ)	30.0
299	1,004	Hilversum	8.5
299	1,004	Radio Idzerda (The Hague)	3.0
1,030	283	Scheveningen-Haven	5.0
1,875	160	Huizen	8.5
HUNGARY			
550	545	Budapest	23.0
ICELAND			
1,200	250	Reykjavik	21.0
IRISH FREE STATE			
224.4	1,337	Cork (6CK)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
25.4 and 80		Rome (3RO)	9.0
295.9	1,013.6	Turin (Torino)	8.5
312.8	959	Genoa (Genova)*	1.5
332	905	Naples (Napoli)	1.7
441	680	Rome (Roma)	75.0
453	662	Bolzano (IBZ)	0.2
501	599	Milan (Milano)*	8.5
*testing on 525 m.			
LATVIA			
525	572	Riga	13.0
LITHUANIA			
1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	825.3	Algiers (PTT)	13.0
416	721	Radio Maroc (Rabat)	10.0
1,250	240	Tunis Kasbah	0.6
NORWAY			
235.5	1,275	Kristianssand	0.5
240	1,250	Stavanger	0.5
364	824	Bergen	1.0
368.1	815	Frederiksstad	0.7
453.2	662	Porsgrund	1.5
493.4	608	Trondheim	1.2
587.1	511	Hamar	0.8
1,071	280	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
312.8	959	Cracow	1.5
335	896	Poznan	1.9
366	819.5	Wilno	20.0
381	788	Lvov	21.0
408	734	Katowice	16.0
1,411.8	212.5	Warsaw—Raszyn	158.0
PORTUGAL			
290.5	1,033	Lisbon (CTIAA)	2.0
ROMANIA			
394	761	Bucharest	16.0
SPAIN			
252	1,193	Barcelona (EAJ15)	1.0
268	1,121	Valencia	8.0
349	860	Barcelona (EAJ1)	8.0
366.9	817.7	Seville (EAJ5)	1.5
424	707	Madrid (EAJ7)	2.0
453	662.2	San Sebastian (EAJ8)	0.6
SWEDEN			
230.3	1,304	Malmo	0.75
257	1,166	Hörby	15.0
304	986	Falun	0.05
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,220.5	244	Boden	0.75
1,352	221.9	Motala	40.0
SWITZERLAND			
244.1	1,229	Basle	0.65
246	1,220	Berne	1.1
403.5	743	Söttens	25.0
459.2	653	Beromuenster	75.0
680	441	Lausanne	0.6
760	395	Geneva	1.5
YUGOSLAVIA			
307.7	975	Zagreb (Agram)	0.7
430.6	696	Belgrade	3.
574.7	522	Ljubljana	2.

THE H & B "CENTURY" KIT

THE AMATEUR WIRELESS Technical Staff has now had an opportunity of testing a "Century Super" made up from a kit of parts supplied by the H & B Radio Co., of 34-38 Beak Street, W.1. The set, which differs only in minor details from the AMATEUR WIRELESS specification, was housed in the new H & B "Century" cabinet and worked off the special H & B dual-range frame, which is Litz wound. Entirely satisfactory results were obtained, and this kit is well up to standard.

A "Century Super" made up from a kit of parts supplied by H & B Radio, and working off the new H & B frame

WHEN SUBMITTING QUERIES . . . .

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

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

The designing of apparatus or receivers cannot be undertaken.

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

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

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

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Advertisements under this head are charged THREEPENCE PER WORD, minimum charge THREE SHILLINGS. DEPOSIT SYSTEM

As the Publishers cannot accept responsibility for the bona fides of advertisers in this publication, they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.

Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.

The amount of the Deposit and Fee must be remitted by Postal Order or Registered Letter (Cheques cannot be accepted), addressed to "AMATEUR WIRELESS" ADVERTISEMENT DEPARTMENT, 58/61 FETTER LANE, LONDON, E.C.4.

PHOENIX THREE-VALVE kits complete with cabinet, £1/17/6. Ditto with valves, £2/15/-. Ditto with H.T. and L.T. batteries and speaker, £4/19/6. H.P. terms on kit: 5/- deposit, 2/7 per week.—Phoenix, 314 High Road, Lee, S.E.13.

AGENTS WANTED to sell well known H.T. Units, etc., for cash or easy terms, Prices are very competitive and good commission is offered.—Brookman Rapid Radio Service, 105, Spencer Street, Birmingham. Wireless and Cycle Factors. Specialists in Radio Cabinet work.

PHILIPS 4-VALVE ALL-MAINS RECEIVER, type 2511, very little used, £26; also Philips, type 3002, H.T. Eliminator, used demonstration only, £4; Lissen 2-Valve All-mains A.C. Receiver, with Speaker, £7 10s.; B.T.H. Moving-coil Speaker, with 200-240-volt rectifier, £6.—Oakthorpe Motor Garage, Palmers Green. N.13. P.G. 2446.

ELECTRICAL ENGINEERS, Wiremen, Accumulator Service Men.—The T.E.C. will train you at home for a better job; unsurpassed courses in electrical engineering, wiring, and battery charging; prospectus post free.—Technical Engineering College, Crown Chambers, Regent Street, London, S.W.1. Principal, W. S. Ibbetson, B.Sc., A.M.I.E.E.

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EXPERIMENTER'S SURPLUS, brand new, unboxed, "Century Super" kit. Set 4 Coils, 39/-; 2 J.B. "Tiny" Condensers, 13/6; Colvernstat, 4/-; Valves, 59/6, etc. Also Paillard Induction Motor, 12-in. turntable, auto stop, 36/-; several TGSC Coils, 7/- each; Epoch B5, 57/6; 30-henry 70 m/a Choke, 6/6; B.T.H. Motor, 42/6; A.C. Accumulator Charger, 14/-; Filament Transformer, 8/6; Mains Transformer, 15/6; 35/- J.B. Chassiemount, 25/6; Pick-up, Condensers, etc. All new, must clear. Post free. C.O.D. or deposit.—Ransome, 6 Cyprus Avenue, N.3.

COMET THREE KITS (cabinet included) £2. 9s., complete with valves, batteries, speaker, £4. 19s. 6d. Splendid 5-valve portables, £4. 10s. Anything wireless supplied at keenest prices. Write for quotations, stating requirements.—Servwell Wireless Supplies, 74 Gough Street, London E.14

BRYCE'S, Mains Transformer and L.F. Choke Specialists. Regulation guaranteed nearly perfect. Supplied to leading Corporations and Manufacturers. Recommended by "Amateur Wireless." Type AB.64, 250-0-250 v. 60/80 m/a, 2-0-2 v. 1 amp., 2-0-2 v. 3 amp., 3-0-3 v. 1 amp. Price 25/6. Type AB.42, 300-0-300 v. 60/80 m/a., 2-0-2 v. 1 amp., 2-0-2 v. 3 amp., 2-0-2 v. 1 amp. Price 27/6. Write for test report.—Bryce's, Transformer Dept., Dawson Street, Bury, Lancs.

MARCONI 2-VALVE SETS, complete, £7. 15s. All power units, 70/-; Ediswan Threesome Kits, 15/-; Trickle chargers, 17/6.—Brightmore, Burbage, Hinckley.

CENTURY SUPER KITS.—100 stations; Wearite coils, 4½ gns. Money back guarantee. British H.T. batteries, 100 volt, 7/11; 120, 9/11.—Wisson, 2 Cheapside, Deans Lane, Edgware.

BATTERY-CHARGING PANELS for Sale. Size, 12 by 18 in. Includes Automatic Switch, 25-volt Meter and 40-amp. Meter, Three-way Switch, etc. Inspection invited.—R.C.A. Photophone, Ltd., Stores, 92 Dean Street, London, W.1. Any reasonable offer accepted.

CHARGE YOUR H.T. FROM YOUR L.T. AT HOME. Reliable, convenient, effective, trickle charge, set on or off. Equipment and diagram complete. 60 volts 7/6. 120 volts 10/6. Diagram 1/6.—R. Fox, 188 Camberwell Grove, London, S.E.5.

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BARGAINS.—Shop-soiled and partly-used components, Sets, Speakers, etc., all guaranteed perfect electrical condition. Supplied on seven days' approval against cash. Send list of your requirements.—Bostock & Stonnill, 1 Westbourne Terrace, S.E.23.

GENUINE UNWANTED MATERIALS.—Horn Speakers, 26 in. high, 5/- and 7/6. Telsen Radio Grand Transformers, brand new, 7/6. Ferranti Output Transformers, 10/- Valve Holders, 3d. Wall Jacks, 6d. Push-pull Switches, 6d. Filament Resistances, 6 ohm and 30 ohm, 9d. and 6d. Standard 5-amp. Tumbler Switches, 6d. Stamp for list. All guaranteed good condition; most store soiled only. C.O.D.—Tonge, West Crescent, St. Annes-on-Sea.

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