OUR SUPER SET

Amateur Wireless

and Radiovision

— WITH — CONSTRUCTOR'S PICTORIAL · GUIDE ·

Every Thursday

3d

Vol. XVIII. No. 434 Saturday, May 2, 1931

Building the "CENTURY SUPER"

Daily Mail SAYS THIS SET "WILL PROVE A BOON TO THOUSANDS OF LISTENERS"

B.B.C.'S NEW TELEVISION DEVELOPMENT

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

RANGE THE WORLD with The LEWCOS (Regd)

THIS new LEWCOS achievement—the Super-het Coil Kit—which has a nine-kilocycle waveband separation and consists of one Oscillator Coil, two I.F. Coils "with pigtails," and one I.F. Coil without pigtails, marks a new epoch in radio reception. The I.F. Transformers are accurately matched, thus giving a remarkable degree of efficiency.

This Kit, which is recommended for the "Century Super," can also be fitted with extraordinary ease in any set of similar design and the results will be truly astounding!

The small space available is completely inadequate to give even a short description of these wonderful new LEWCOS Coils, and you are invited to write for an illustrated explanatory leaflet.

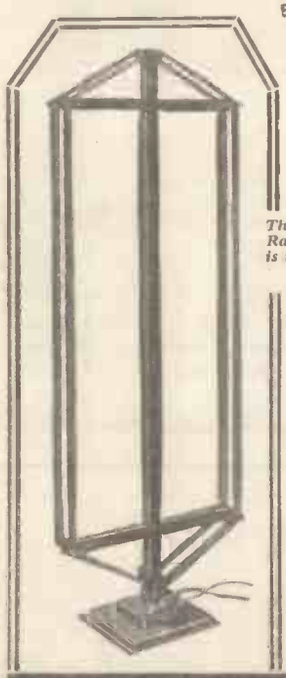
SUPER-HET COIL KIT

(Patent Pending)

which is recommended *for the* **"CENTURY SUPER"** receiver described in this issue.

Price **50/-**

BRITISH THROUGHOUT



This is a photograph of the LEWCOS Dual Range Centre-Tapped Frame Aerial which is recommended for the "Century Super."

PRICE **32/6**

LEWCOS "Spaghetti Resistances" of 15,000 and 20,000 ohms each
PRICE 1/6 each
are specified for the "Century Super"

A COMPLETE KIT OF PARTS FOR THE "CENTURY SUPER," WHICH INCLUDES THE LEWCOS SUPER-HET COIL KIT AND THE FRAME AERIAL, CAN BE OBTAINED FROM

READY RADIO LIMITED

H. & B. RADIO COMPANY

PETO-SCOTT CO., LTD.

—See separate advertisements in this issue—

LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

A set so good deserves the best loud-speaker . . .

Amateur Wireless "Century Super"

and the century's super cone speaker

The B T-H CONE

"Amateur Wireless" engineers—discriminating critics of loud-speaker performance—use and recommend the B.T.H. Cone for use in conjunction with the "Century Super."

Brilliant reproduction, with an attractive appearance, are the outstanding features of this Ediswan product. Ample bass, sparkling treble and a warm radio brown finish that will harmonise with any decorative scheme—see and hear it for yourself. Any good radio dealer can demonstrate it to you.

Price 50/-

To make sure of the best results you must have the best H.T. Battery—Ask your dealer for the "new process"

EDISWAN

2-60 volt 20 M/A 15/6 each

or

120 volt 20 M/A 31/- "

LONG LIFE—CONSTANT POWER

ALL BRITISH

THE EDISON SWAN ELECTRIC CO. LTD.
Radio Division
155 Charing Cross Road, London, W.C.2
Showrooms in all the Principal Towns

EDISWAN W.147

HERE are the valves that are making radio history—ETA. They demonstrate conclusively that highest efficiency can be combined with reasonable economy. Fit ETA Valves and know the satisfaction of wonderfully improved reception. Prices from **7/-**

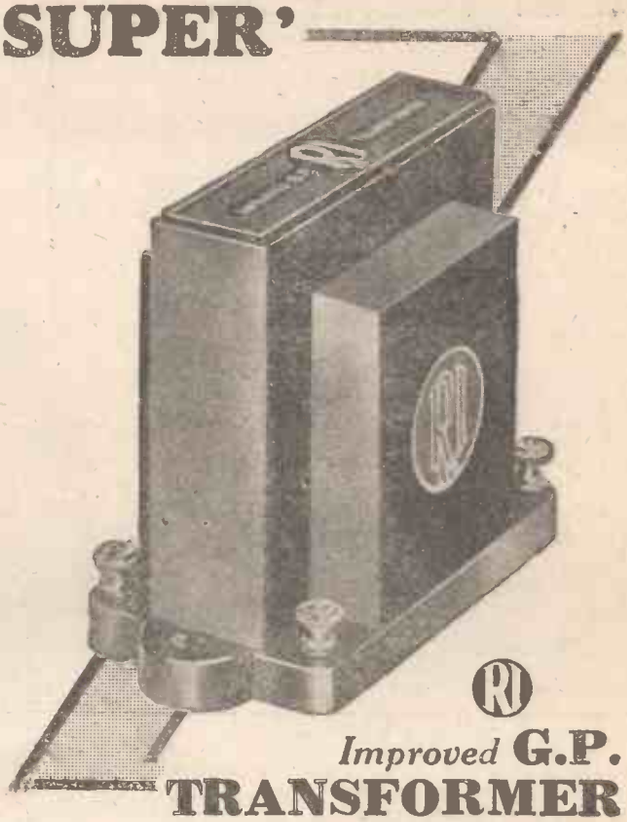
Ask your Radio dealer for particulars of the ETA Valve to suit your set.

ETA VALVES

The Electrical Trading Association Ltd., Aldwych House, Aldwych, W.C.2.

Telegrams: Eltradex, Estrand, London. Telephone: Holborn 8139.

Recommended for the 'CENTURY SUPER'



Improved G.P. TRANSFORMER

gives definitely the best performance of any transformer at its price.

A new, larger "general purpose" transformer for use where considerations of space do not arise. Fitted in a beautiful green bakelite case with an improved iron core, its electrical characteristics show a vast advance on the original G.P. model. It is the lowest priced transformer with such high primary inductance.

Resistance Primary D.C. 1,050 ohms.
Resistance Secondary D.C. 6,600 ohms.
Inductance Primary 35/40 henries.
Ratio 3½ : 1. Weight 1 lb. 2 ozs.
Overall dimensions 3¾" × 1⅞" × 2⅜" high.

10/6

The latest edition of the R.I. Catalogue is the most comprehensive and useful component reference obtainable. Ask your dealer—or us—for a free copy.

The HYPERMU NIKALLOY CORE TRANSFORMER

Without doubt the world's best transformer. Gives the highest and most uniform amplification of any commercial transformer in existence. 25 to 7,000 cycles. Primary inductance 85 henries. Ratio 4 to 1 **21/-**

R.I. LTD

The DUAL ASTATIC H.F. CHOKE

The only choke giving perfect amplification from screened-grid valves at all broadcasting wavelengths. Ensures freedom from resonant peaks and blind spots. Resistance D.C. 650 ohms. Inductance 60,000 microhenries **7/6**

R.I. Ltd., Madrigal Works, Purley Way, Croydon
Phone: Thornton Heath 3212

H & B GUARANTEED KITS

for

The "CENTURY SUPER"

MARVELLOUS VALUE
100% EFFICIENCY
SIMPLE TO BUILD
ONLY TWO TUNING CONTROLS
NO OUTDOOR AERIAL
NO EARTH

With the H & B Frame Aerial the stations log exactly as described in "A.W."

H & B CABINET

In OAK with polished Oak Panel and Baseboard **15/-**

Hand Polished Mahogany £1 . 3 . 6

H & B DUAL RANGE FRAME AERIAL

Complete with Turntable, Rubber flex, three plugs and three ebonite spacers **20/-**

H & B DUAL RANGE FRAME AERIAL fitted with WAVE-CHANGE SWITCH

Complete as illustrated below. The switch gives immediate change-over without having to disconnect any leads **25/6**

H & B GUARANTEED STANDARD KIT

	£	s.	d.
2 .0005 variable condensers with slow motion (J.B. "Tiny")		17	0
1 50,000 ohm wire wound Potentiometer (Colvern)		5	6
1 Three point shorting switch ...		1	3
1 Set of 4 superhet coils (Lewcos or Wearite)	2	10	0
6 Valve holders (Telsen)		6	0
1 Triple coil base (H. & B.)		2	0
5 1 mfd. fixed condensers (Dubilier)		12	6
2 .001 fixed condensers (T.C.C.) ...		3	8
1 .0002 fixed condenser (Formo) ...			6
1 Grid leak holder (Lissen)			6
1 1 meg. grid leak (Telsen)		1	0
1 L.F. transformer (Telsen "Ace")		8	6
1 Terminal strip with three terminals for baseboard mounting (H. & B.)			8
1 15,000 and one 20,000 Spaghetti resistance (Lewcos)		3	0
1 Fuse holder and fuse (Bulgin) ...		1	3
5 Yards of thin flex (Lewcos) ...			7
6 Wander plugs, engraved (Belling Lee)		1	0
2 Spade terminals, engraved (Belling Lee)			8
Connecting wire and sleeving (H. & B.)		1	3

CASH PRICE **£5-16-10**

H & B GUARANTEED SPECIAL KIT

	£	s.	d.
2 Variable condensers .0005 with slow motion (Polar "Ideal")	1	5	0
1 Potentiometer, wire wound (Electrad)		6	0
1 Three point shorting switch (W.B.)		1	3
1 Set of 4 superheterodyne coils (Lewcos)	2	10	0
6 Valve holders (W.B.)		6	0
1 Triple coil base (H. & B.)		2	0
5 1 mfd. fixed condensers (Dubilier)		12	6
2 .001 mfd. fixed condensers (T.C.C.)		3	8
1 .0002 mfd. fixed condenser (Formo)			6
1 Grid leak holder (Dubilier) ...		1	0
1 1 meg. grid leak (Dubilier)		1	8
1 L.F. transformer (Lewcos)		17	6
1 Terminal strip with three terminals (H. & B.)			8
1 15,000 Spaghetti resistance (Lewcos)		1	6
1 20,000 Spaghetti resistance (Lewcos)		1	6
1 Fuse holder and fuse (Bulgin) ...		1	3
5 Yards of Lewcoflex			7
6 Engraved wander plugs (Belling Lee)		1	0
2 Spade ends (Belling Lee)			8
Connecting wire and sleeving (H. & B.)		1	3

CASH PRICE **£6-15-6**

KITS NOW READY FOR IMMEDIATE DISPATCH. No delay the H & B Way

TERMS: *Carriage Paid on all Cash Orders. C.O.D. charges paid on orders over £1.*

TRADE SUPPLIED

RECOMMENDED ACCESSORIES:

2 Siemens Double Capacity 60-volt H.T. Batteries	27/-
1 Siemens 9-volt Grid Bias Battery	1/6
1 Exide 2-volt 100 amp Accumulator	14/6
1 Ormond Loudspeaker in Cabinet	27/6
6 Mullard Valves (as specified)	£3 16 0
LEWCOS C/T Frame Aerials in Stock	£1 - 12 - 6

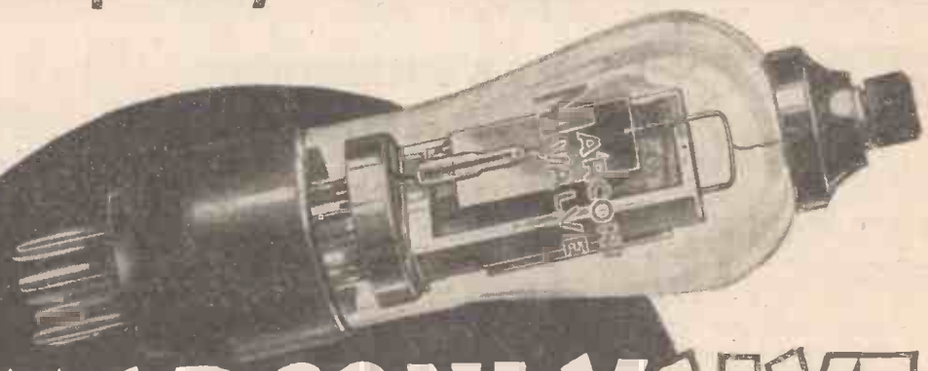
To meet the wishes of our clients we have a built "CENTURY SUPER" on show in our offices, you are welcome to inspect it without any obligation.

H & B RADIO CO.

34, 36, 38
BEAK STREET,
REGENT STREET
LONDON, W.1

Telephone: Gerrard 2834

National Physical Laboratory
Tests self-capacity of Marconi MS4!

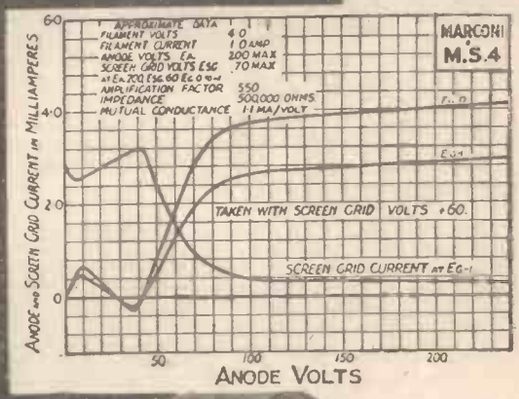


PRICE 25/-

MARCONI VALVE M.S.4

Filament Volts	4.0
Filament Current	1.0 amp.
Anode Volts	200 max.
Screen Grid Volts	70 max.
*Amplification Factor	550
*Impedance	500,000 ohms.
*Mutual Conductance	1.1 MA/volt

*Taken at anode volts 100 and grid volts zero.



Six standard MS4 A.C. indirectly heated screen grid valves have just been tested by the National Physical Laboratory; *their average self-capacity was found to be only .0019 MICRO-MICRO FARAD!*

The practical efficiency of any screen grid valve is, of course, dependent mainly on this inter-electrode capacity. Its measurement is, however, extremely difficult; for this reason, Marconi Engineers realised that an accurately certified figure was long overdue. Their enterprise is rewarded by this decisive tribute to Marconi superiority.

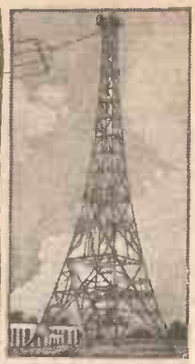
G Marconi

THE VALVES THE EXPERTS USE

THE MARCONIPHONE COMPANY LIMITED, 210-212 TOTTENHAM COURT ROAD, W.1

No. 464. Vol. XVIII. MAY 2, 1931

Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
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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

THE HUNDRED-STATION SET

IMMENSE public interest has been aroused by our introduction of the new "Century" set. This is the first home-built set for which an honest claim of hundred-station reception has been made, and, naturally, as this is such an important factor (taking into account the selectivity which it implies), even the national "dailies" have described the new "Century" system. Further details of this amazing set, together with a large size constructor's guide, will be found in this issue.

SAVOY BAND BROADCASTS

LISTENERS to Howard Jacobs' Dance Band on April 17 or April 21 must have wondered why the relay was not made from the Savoy ballroom. Actually, the band was playing in the Lincoln Room at the Savoy. B.B.C. engineers have tried hard to overcome the difficulties in relaying dance music from the Savoy ballroom, but so far it has been found impossible to eliminate the considerable degree of background noises under such conditions. Howard Jacobs' band was, as a matter of fact, engaged by the B.B.C. when it was performing at Claridges, and it was through the courtesy of the Savoy management that the Lincoln Room was placed at the B.B.C.'s disposal for the two final broadcasts of the band's engagement.

ANNOUNCERS ARE HUMAN!

IT is refreshing in these days of rigid anonymity among B.B.C. announcers to come across an incident proving that they still remain human in spite of their calling, or should we say announcing. The other night, during a reading of the debate on the Sunday Cinema Bill, the chief announcer at Savoy Hill had to read out a remark to the effect that there appeared to be no objection to Sunday broadcasts involving B.B.C. engineers *and announcers*. As an aside to listening millions the announcer said, "I did not know *that* was coming!"

THE "ETHER SEARCHER" COMPETITION

AS we go to press the final stage of judging the great competition of 1931 "Ether Searchers" is in progress, and it is hoped that in next week's issue it will be possible to give the full list of winners. The task of selecting entries and of testing each of the sets received has entailed a huge amount of work. Each set has been carefully tested and allotted marks for various good points. Even at this stage it is possible to say that the general standard of construction has proved even higher than was ever anticipated, and this has naturally made the judging a difficult and somewhat lengthy business.

MIDLAND REGIONAL

WHEN we remarked to the B.B.C. that complaints had been received in our post bag to the effect that the wavelength change of Midland Regional is giving trouble to many London listeners wanting to hear Midland Regional clear of London Regional, we were told that such complaints did not greatly worry the B.B.C. "After all," said an official, "such listeners are eavesdropping; they are not intended to listen to Midland Regional." And a few days ago the Chief Engineer remarked to journalists at the visit to Moorside Edge that the B.B.C. must put the reception of British stations first. While the B.B.C. thus disclaims any responsibility or indeed

PRINCIPAL CONTENTS

M.P.'S RADIO TURN

Did you hear the broadcast of sea shanties by a quartet which included Sir James Sexton and Mr. Ben Tillett, the two well-known M.P.'s? Here they are (in the centre of the group) before the microphone.

THE "CENTURY SUPER" — FURTHER DETAILS NEXT WEEK

NEWS & GOSSIP OF THE WEEK—*Continued*

any interest in reception beyond the local station or stations, there is no doubt that a very great number of B.B.C. subscribers buy their sets for rather more than the reception of the local B.B.C. station.

VERY MUCH ALIVE!

AN old superstition is going to be killed this year. There are people who will tell you that radio is "no good" in summer,

Broadcasting House's designer—Lt.-Col. G. Val Myer, F.R.I.B.A. He is responsible for the wonderful new B.B.C. building which is now rapidly growing in Portland Place, and has worked in co-operation with Mr. M. T. Tudsbery, Civil Engineer to the B.B.C.

and that when the foreign stations are difficult to pick up because of summer-time conditions; gardening is preferable to grid leaks, and antirrhinums to aerials! With old sets they may have been right, but this year they will be *wrong*! The new efficient sets such as the "Ether Searcher" and the "Century Super" are pulling in the stations despite the long, light days. So, be prepared for a good wireless summer!

SÖTTENS INTERFERENCE

WE understand that the strength of Midland Regional with its new aerial system is well maintained in its service area. But there is undoubtedly greater interference from foreign stations than before. Söttens, the high-powered Swiss station, immediately above Midland Regional's wavelength, is making rather a nuisance of itself to Midland listeners, much as Mühlacker is to London listeners.

SHEFFIELD IS WORRIED

IN spite of the fact that field strength measurements in Sheffield show that a signal of 20 millivolts per metre is possible in that district from the 479-meter North Regional transmitter, there is quite an agitation going on at the moment for the retention of the Sheffield relay. We expect the B.B.C. is rather sorry it ever promised to consult Sheffield representatives about closing down the relay, as it did some time ago. At present the B.B.C. has come to an agreement with these representatives that Sheffield shall be closed down during the reception tests of Moorside Edge. When they are concluded another meeting will be held to decide the final fate of this relay station.

BROADCASTING HOUSE

ALTHOUGH the staff at Savoy Hill is loth to forecast the date of its wholesale removal to Broadcasting House at Portland Place, there is a feeling in the air that a start will be made during August or at the latest in September. At all events, the staff appears to be preparing for early summer holidays.

FIRE! FIRE! FIRE!

NOT long ago the drummer of Jack Payne's band had a fire at his home in St. John's Wood, London. Unfortunately, he raised the alarm rather prematurely, for by the time the brigade arrived the fire was out. This naturally upset the brigade, who hated to be done out of a job of work. A bargain was struck; and the sequel was a very special request item during Jack Payne's 5.30 programme a few days later. "The number we have just played was Fire! Fire! Fire! and this is at the request of a certain fire brigade." Perhaps listeners will understand now why the band guffawed at this announcement.

ANOTHER RADIO CENSUS

AS a result of a canvass of the agricultural population by a French newspaper, it has been revealed that farmers prefer sports programmes. Next in order come popular songs, military marches, and concertina music. The nightly market reports broadcast by several stations are also eagerly looked forward to. So it is said: we wonder if the same appreciation of the Fat Stock prices is given by our farmers!

A POLITICAL SERIES

A SERIES of political talks has been arranged to take place. The subject will be: "The Effect of Tariffs on Employment," and representatives of the three political parties will speak as follows: Monday, May 4, 9.20 to 9.40 p.m., the Right Hon. David Lloyd George, representing the Liberal Party; Monday, May 11, 9.20 to 9.40 p.m., the Right Hon. William Graham, representing the Labour Party; Wednesday, May 20, 9.20 to 9.40 p.m., the Right Hon. Neville Chamberlain, representing the Conservative Party. This series is worth hearing.

SIR JOHN TO LECTURE

SIR JOHN REITH is going to New York next month to attend a conference on radio in education. The title of Sir John's address will be: "What Europe's experience in educational broadcasting can offer to America." Well, he should know!

PHILIP RIDGEWAY TESTS THE "CENTURY!"

Philip Ridgeway, creator of the famous "Parades," has been trying out the 'Century Super,' and in next week's issue his experiences with this set will be described. Listening also to the set is Beatrice Galleway, the new broadcast star of the "Parades"

THE REGIONAL SUPPRESSOR

A Simple Device for Cutting-out the Local Station—By J. H. Reyner, B.Sc., A.M.I.E.E.

The "Suppressor" complete

NOW that the North Regional programmes are commencing from Moorside Edge, some readers will be sure to be experiencing difficulty with selectivity. Foreign stations which they were wont to receive before will now be blotted out by the powerful local transmission. If one does not wish to go to the trouble of building a special receiver to meet the new conditions, one of the simplest remedies which can be adopted is the inclusion of a wavetrap or similar device in the aerial circuit.

The "Regional Suppressor" is a device which has been specially produced for the North Regional listeners. In circuits of this type experience shows that the simplest and most straightforward methods are usually the most effective. The principle adopted in the present instance, therefore, is the well-tried one of the absorption circuit, coupled in a suitable manner to the aerial. This circuit is tuned to the interfering station and its effect is to absorb a large percentage of energy from the aerial and thus prevent it from being passed on to the set.

The object of a wavetrap is not to blot out the local station, but to reduce the effect thereof to a reasonable amount, so that when one mistunes the receiver and adjusts it to some other station, serious interference is not experienced. A simple circuit such as that shown by Fig. 1a would entirely blot out the local station even at quite close distances, but it would have a very wide absorption band. It would not only absorb energy at the frequency of the interfering signals, but for a considerable range on either side.

In order to make effective use of the principle the aerial is best coupled to the absorbing circuit in a manner such as shown in Fig. 1b. This acts much in the same way as a coupled aerial circuit does in an ordinary receiver. We all know that if the aerial is connected straight across the coil the strength is fairly good, but the tuning is very flat. It is the almost invariable practice nowadays to couple the aerial

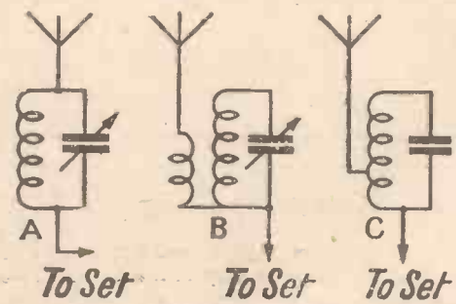


Fig. 1—Three forms of absorption trap

to the tuned circuit either by means of a separate coil or by taking a tapping thereon, and this enables us to get appreciably sharper tuning. In our wavetrap we adopt the same method, either coupling the aerial with a separate winding or taking a tapping as shown in Fig. 1c.

A further point of importance in a wavetrap is the question of the interaction between wavetrap and tuning circuit. The wavetrap circuit absorbs energy from the local station, and hence under operating conditions there is a large circulating current in this circuit. If this is placed near to the remainder of the receiver, the advantage derived from its use will largely be lost because the energy will be reintroduced into the circuit through the ordinary inductive effects existing between coils. Therefore, it is advisable to keep the wavetrap a little distance away from the receiver, or to arrange that the coil is of an astatic character so that it will not radiate appreciably. In the present instance this latter alternative has been adopted, the coil being wound in two sections in opposition to each other, so that the coil does not radiate energy to a serious extent.

The "Regional Suppressor" is very easily constructed. First of all take a piece of 2½-in. Paxolin, ebonite, or other suitable material. Starting a little way from one end, wind on 40 turns of 30 s.w.g. double-silk-covered wire. Now drill a hole about a ¼ in. away from the end of the winding and insert a small nut and bolt from the inside of the former. The wire should be bared and passed round the bolt, being held in place by the nut. This serves to hold the wire and also to serve as a contact point. A further 40 turns should now be wound on, this time in the *opposite direction*. The two sections should be kept apart, a separation of ½ in. in the centre being desirable (Fig. 2). In the second section a tapping should be taken at 20 turns.

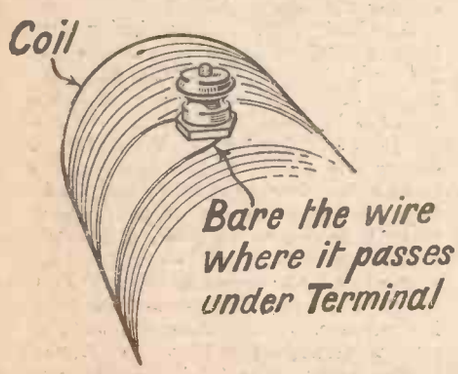


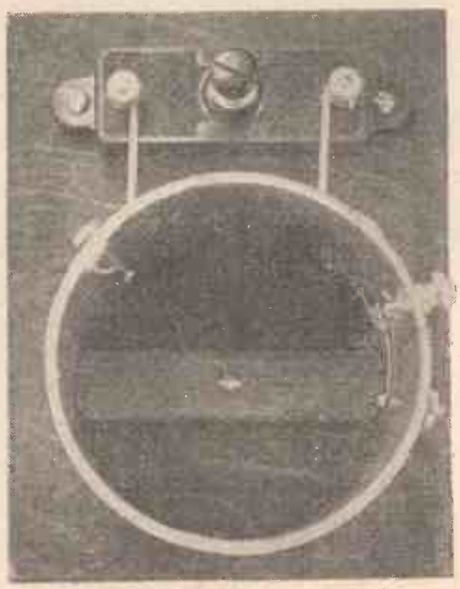
Fig. 2—Showing method of reversing winding and taking tapping at centre point

Connections

The winding is now finished off and the connections are taken to the various terminals. The beginning and end of the winding are connected to two terminals at the bottom of the coil former. The tapping in the centre of the second section of the winding is brought out to a third terminal, also at the bottom of the former, but a little further round. A connection to the centre tap has already been made during the process of winding the coil. The bolt should be pushed through from the inside of the former, the nut going over the wire.

It only remains to insert a small block of wood at the bottom of the coil in order to screw it down to a baseboard and to mount on the same baseboard a pre-set condenser.

(*Continued at foot of next page*)



A plan view of the "Suppressor"

The "Century Super"

Many of our readers will no doubt already have seen the comments on the "Century Super" which recently appeared in the "Daily Mail." For the interest of those of our readers who did not, we give below an extract from the "Daily Mail" of April 17, which has special reference to this amazing receiver.

SELECTIVITY BOGEY CONQUERED :: SECRET IN THE COILS :: LOW COST

BRITISH wireless engineers have taken an important step towards solving the problem of the crowded and chaotic state of the ether.

As foreshadowed in the *Daily Mail*, this has been done by greatly increasing the selectivity of the receiving set, and not by long international talks between the broadcasting countries.

A set is shortly to be put on the market on which more than 120 stations can be received with perfect clarity. Its price will be only about £10 10s.

This set, which will prove a boon to thousands of listeners, has been produced by the experts of *Amateur Wireless*. They worked in their laboratories for a year until this triumph rewarded their efforts.

The secret lies in greatly improved coils, which are now to be manufactured in this country, so that the set will be entirely of British manufacture.

BATTERY OR MAINS

The set, which is a super-heterodyne with special band-pass tuning of the intermediate high-frequency stages, has six 2-volt valves in a cabinet which is little larger than the ordinary portable gramophone. There is a frame aerial, and batteries are used, although the set can be adapted to "mains" use.

There are two tuning dials, and some idea of the selectivity can be gained from the fact that London National and London Regional stations can be cut out within one degree. Mühlacker can be heard without a trace of London.

Recently one of the best-known experts in the country took the set to Eastbourne to test it. He has signed a document to the effect that he obtained, and checked a second time, 115 European stations and 8 American stations. It is claimed that the manipulation of the tuning is extremely simple and can be mastered even by the inexpert in a few minutes.

ELIMINATOR VOLTAGE

THE rectified voltage across the terminals of an A.C. eliminator depends upon the amount of current used. For instance, where an eliminator is rated to give 25 milliamps at 120 volts, the voltage will rise if the set takes less current than that specified, and vice versa. On open circuit, i.e., when there is no load, the secondary winding acts simply as a choking coil, the back E.M.F. being equal to the primary voltage, except for the small magnetising-current. When the secondary circuit is closed through the potentiometer and valves, the rectifier, which has a high internal resistance, comes into circuit. The voltage drop across the rectifier obviously depends upon the amount of current drawn off, so that the remaining or available voltage is always greater for a small load current than for a large. M. B.

The B.B.C. Gaelic is not meeting with altogether complete approval. Every broadcast in the tongue of the North brings abusive as well as appreciative messages. It is a matter of some difficulty to decide upon a standard regarding Gaelic pronunciation.

The U.S.A. Federal Radio Commission has ordered all full-time broadcasting stations to be on the air a minimum of twelve hours each broadcasting day as from May 1.

Work on the new 75-kilowatt Königswusterhausen transmitter has been completed and the station will broadcast on this power within the next few days.

"THE REGIONAL SUPPRESSOR"

(*Continued from preceeding page*)

This condenser is connected across the whole coil and serves to tune it to the wavelength to be suppressed. The instrument is then ready for use.

Connect the aerial terminal of the set to the bottom end of the coil, that is to say to the left-hand terminal of the pre-set condenser, looking at the arrangement with this component facing one. The aerial itself is connected either to the tapping point or to the centre point of the coil (Fig. 3). In most cases the former connection will be found suitable, this being equivalent to tapping the aerial across one quarter of the whole circuit. Now tune in the receiver to the local station. Leaving the receiver set, carefully adjust the pre-set condenser in the following manner. Screw the operating knob right down to where some resistance is felt to the motion. This is the position at which the plates are compressed to their fullest extent. Now gradually unscrew the knob a little at a time. At one particular point (two or three turns back) the strength of the local station will be found to diminish. Find the setting which gives the minimum volume.

On retuning the receiver it will now be found that the local station tunes out in a comparatively short space, instead of occupying a large part of the dial as hitherto. It is not desirable to readjust the "Suppressor" when one is tuned to a distant station. Although this may momentarily give an increase in the reception, it will be found to be a purely passing effect, and the adjustment for the other stations will be usually found to be worse than before.

Always adjust the "Suppressor" with the receiver tuned in to the station which

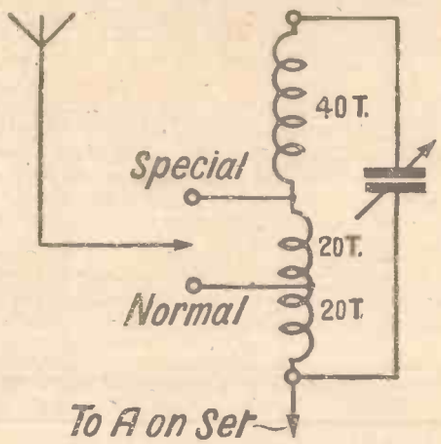


Fig. 3—Connections of the "Suppressor"

is to be cut out. Under these conditions it will not be possible to reduce the strength of the local station absolutely to zero, but only to a minimum value. Actually this minimum should be of just the right strength to be listened to in comfort, because, of course, this is the setting which one will use for listening to the local programmes and, therefore, the strength must not be reduced to an absolute whisper.

The second terminal—that connected to the actual centre tapping on the coil—has been marked "Special." This is for use where the reader is situated very close to a regional station. Here some rather greater measure of absorption is necessary and, therefore, the aerial circuit is connected across half the coil instead of only one quarter, as in the previous case. The absorption band with this setting is of necessity somewhat wider and, therefore, it is not desirable to use this except in special cases. In my own case, situated five miles from Brookmans Park, I found the quarter tapping sufficient to enable me to tune in stations 50 metres away, even using a full outside aerial.

One final point. This particular trap has been specially designed for the North Regional station. For this purpose the pre-set condenser employed should be the type "G" Formodenser, tuning from .0002 up to .001 microfarad. With this condenser the device will tune from 400 to 800 metres. It thus tunes to Slaithwaite at towards the minimum of the condenser, while it may also be used, if desired, by those readers situated in coastal districts, where it may be tuned to 600 metres, with the object of reducing some of the shipping interference. If any reader wishes to use it on a wavelength less than 400 metres, the Formodenser, type "F," should be used. This will enable a wavelength range of 200 to 400 metres to be covered.

"—taking You Over to Covent Garden"

Notes on the B.B.C.'s relays during the grand opera season that opened on April 27 at Covent Garden, London

BY this time *Der Rosenkavalier* will have opened the Covent Garden opera season and listeners will probably have heard Margit Angerer, leading soprano of the Berlin State Opera, as the Rose Baron. Once again B.B.C. listeners can, in imagination, take part in the splendour only fully appreciated by a visit to Covent Garden.

Perhaps it is a little curious that grand opera, in which spectacle is so intimate a part, should find such a wide appeal among the audience that only hears and does not see; yet the B.B.C. assures me that Covent Garden opera relays are among the best appreciated "O.B's."

No doubt the very fine acoustics of the vast stage enable the relays to achieve a certain spaciousness impossible in even the largest studio; but we must not overlook the fact that the very vastness of Covent Garden—and the elaborate disposition of the singers and scenery in the operas—entails considerable difficulties for the relay engineers. Since the first days of broadcasting, Covent Garden has figured in B.B.C. relays, so that present technique is the result of many experiments in the dispositioning of the microphones.

To-day the single microphone of early relays has been replaced by no less than four—one in the footlights, one at each side of the proscenium, and one on the rail of the orchestra pit. Sometimes the B.B.C. uses a fifth microphone—one that can "wander," in order to catch the more out-of-the-way excerpts. Thus the Dragon in *Siegfried* has his own microphone and so does the Emperor of China when perched up on his screen in *Turandot*.

Connected with these four or five microphones is what the B.B.C. calls a fade unit, worked by an engineer with an eye on the score of the opera being relayed. In this way that most dreaded of broadcast calamities, a "blast," is effectively avoided.

Apart from the avoidance of blast, the fade unit has a large bearing on the general balance of the relay, fading in and out the different microphones as the action moves from one part of the stage to the other.

The question is often asked as to what is a Covent Garden audience. It is divided, perhaps, between those in the stalls who really pay for the performance and those in the gallery who claim to be the only part of the audience that really appreciates the opera! What of the broadcast audience?

An interior view of Covent Garden Opera House with which many listeners will be familiar

Does that consist merely of opera fans subscribing to the next best thing to an attendance at Covent Garden—no one could pretend that broadcasting puts over the glamour and excitement of an actual attendance—or does the relay of opera serve to recruit a new audience from among those who normally have neither inclination towards opera nor opportunities to see it?

From conversations with Savoy Hill programme compilers I should say that the general impression is that broadcast opera appeals considerably to listeners not primarily interested in opera. At all events, the programme is compiled so that the opera relays form, as far as possible, an aesthetic contrast to the programme on the alternative wavelength.

It may be news to some readers that the B.B.C. regards the differences in the various operas available for broadcasting as so much light and shade for programme builders—especially when attempting to fit in contrasts for regional stations.

One of the difficulties about these opera broadcasts is the B.B.C.'s inability to state very far ahead which particular opera excerpt is to be broadcast. But we may trust the discrimination of the programme compilers to give us a good selection of the German and Italian operas of the Covent Garden season. In addition to such old favourites as *The Ring*, *Tristan and Isolde*, and *Lohengrin*, the season is notable for several new Italian productions.

The usually dazzling array of singers from all parts of Europe have assembled at Covent Garden, including Lotte Lehmann, Anna Tibell, from Stockholm, and the Danish contralto, Maria Olczewska.

A. S. H.

VARIABLE AMPLIFICATION

IN general the amplification factor of a high-frequency valve shows up better on the shorter wavelengths than on the long, so that, apart from fading, stronger signals can be secured on 250 metres than higher up the scale. Where a set is designed to receive over a range of from 200-2,000 metres, this, of course, means that its efficiency falls off as the wavelength is increased. One way of preventing this, and securing a better average response, is to use a "constant coupling" combination of inductance and capacity. The effect of the capacity on the short waves is then offset by the magnetic coupling on the long waves, giving a uniform amplification over the whole tuning range.

M. B.

THE HOW AND WHY OF RADIO

XXXIV—COILS HAVE MANY USES

If you are a beginner in wireless, now is your chance to gain a clear conception of its theory and practice. In this series of articles, specially prepared for the beginner, no previous knowledge of wireless is assumed. It is intended to deal with every aspect of the subject and the whole series will endow the beginner with sufficient knowledge to enable him to derive the greatest possible interest from the fascinating hobby of wireless

BEGINNERS evidently appreciated the recent article in this series on the different uses of the condenser, as explained in the April 18 issue of AMATEUR WIRELESS. So this week I am treating coils in a similar way, by showing the different uses of coils in the same two-valve circuit used to explain condensers. Readers will see that the outlines of the different coils are shown in pictorial form whereas the rest of the circuit is symbolised.

We may as well start at the aerial end of the circuit. First of all we have the aerial tuning coil shown at A. This is shown connected across a .0005-microfarad variable condenser. The two components from what is known as an oscillatory circuit. When its frequency is adjusted by means of the variable condenser to the frequency of the incoming signal, the phenomenon of resonance causes a considerable current to be developed. The extent of this current depends largely upon the type of coil A. If it has a low resistance the current will rise to a greater maximum at the point of resonance than it would with a high-resistance coil.

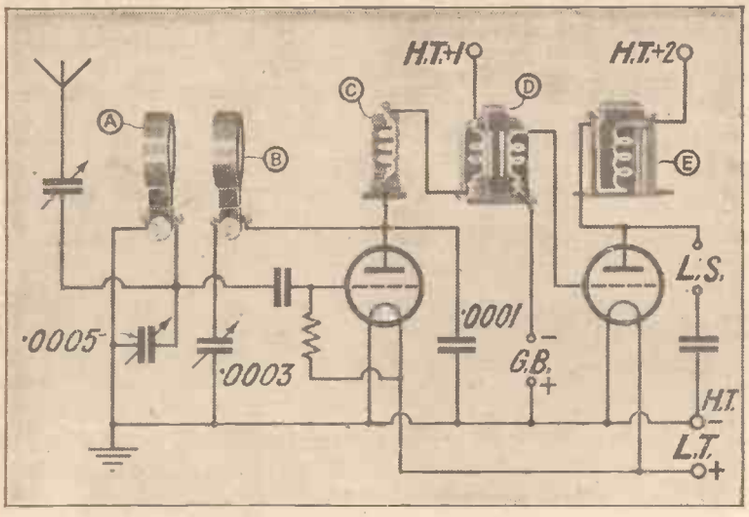
Between adjacent turns of coil A exists a small capacity, negligible as such but quite appreciable when added to all the other small capacities formed by adjacent turns. The sum total of these inter-turn capacities is called the self-capacity of the coil. Now it happens that capacity formed by turns of wire separated by the insulated covering of the wire is an inefficient form of capacity, very much more inefficient than the capacity formed by the air-spaced plates of the tuning condenser across the coil. For this reason tuning coils such as that shown at A need to be designed so that the self capacity is low.

The coil shown at B is not used for tuning, but for introducing reaction into the aerial tuning circuit, by handing back the oscillating high-frequency current flowing in the anode circuit of the detector valve. The size of coil B and its distance from coil A determine the degree of coupling between them. As this coupling is fixed we usually choose a coil just sufficiently big to provide reaction over the entire wavelength range covered by the aerial tuner. Of course, the amount of high-frequency anode current flowing through coil B is regulated by the variable condenser connected in series between coil B and earth.

Now we come to coil C, which is actually a high-frequency choke. Here again we have an untuned winding helping to provide reaction in the aerial circuit. When the high-frequency anode current reaches the anode end of the choke coil C, it is prevented from passing on due to the very high inductance value of the winding. Actually this high-frequency current is diverted through coil B and so through the .0003-microfarad reaction condenser to earth. Or if the reaction condenser is at minimum capacity this current finds a way to earth easily enough through the .0001-microfarad fixed condenser connected between the anode and earth.

The efficiency of the choke coil C must be of a high order. Its self-capacity must be low, otherwise we should have in effect a fixed condenser across the choke coil; in other words a capacity to earth only via the wrong route! Apart from low self-capacity in choke coil C we must insist upon a very high inductance value. For however low we may keep the self-capacity of the choke coil C it is obvious that whatever capacity is present will serve to form with the winding an oscillatory circuit.

If this has a frequency within the wavelength range used for broadcasting the choke acts as a tuned circuit and all sorts of queer things happen, such as uncontrollable oscillation. So in practice choke coils for the position shown at C are designed to have an inductance well above the value likely to produce a peak in the broadcasting range of wavelengths between 1,000 and 2,000 metres.



This pictorial diagram shows tuning and reaction coils in their relation to the high-frequency choke coil. Note also the low-frequency coils of the transformer and output choke

L.F. Stage

In the low-frequency transformer, coupling together the detector and power valves, are two coils, one the primary winding and the other the secondary winding. These coils at D differ from those at A, B, and C, in having considerably greater inductance. The primary is usually wound so that its inductance offers an impedance to low-frequency signals comparable with the impedance of the detector valve. The secondary winding has two or three times as many turns as the primary winding, so that a step-up ratio is obtained. Thus a signal voltage of 2 flowing in the primary winding would appear in the secondary winding as the signal voltage of 6, assuming a 3-to-1 ratio.

Finally, we have coil E, which is a low-frequency choke as distinct from the high-frequency choke at C. Broadly speaking, the functions of coil C and E are the same, in that both serve to act as a barrier to current wanted in another direction. Thus the low-frequency signals flowing in the anode circuit of the power valve are prevented from flowing through coil E owing to its very high impedance value, whereas similar low-frequency signals on a smaller scale, flowing in the anode circuit of the detector valve, have no difficulty in passing through coil C.

This point of difference between the actions of coils C and E is important. If we want to divert high-frequency current a very much smaller coil will serve than for the diversion of low-frequency current. Incidentally, the choke coil E offers no barrier to direct current of the anode supply of the power valve, nor does coil C prevent direct current flowing in the detector anode circuit.

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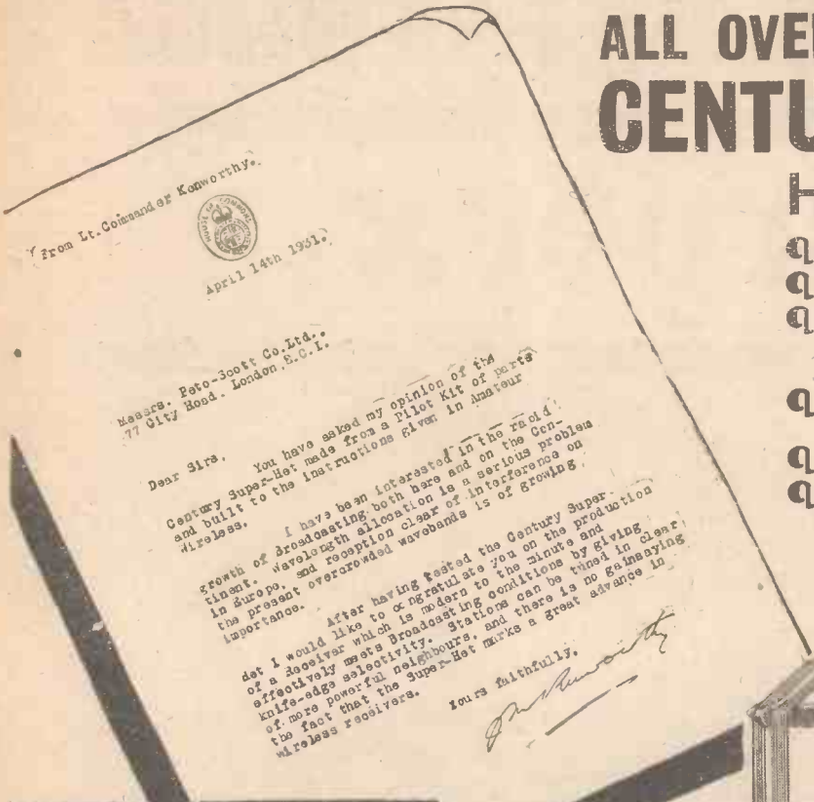

From Lt.-Commander Kenworthy.

April 14th 1931.

Messrs. Peto-Scott Co.Ltd.,
77 City Road, London, E.C.1.

Dear Sirs,

You have asked my opinion of the Century Super-Het made from a Pilot Kit of parts and built to the instructions given in Amateur Wireless. I have been interested in the rapid growth of broadcasting both here and on the Continent. Wavelength allocation is a serious problem in Europe, and reception clear of interference on the present overcrowded wavebands is of growing importance.

After having tested the Century Super-Het I would like to congratulate you on the production of a receiver which is modern to the minute and effectively meets Broadcasting conditions by giving knife-edge selectivity. Stations can be tuned in clear of more powerful neighbours, and there is no gainsaying the fact that the Super-Het marks a great advance in wireless receivers.

Yours faithfully,

KIT "A"

Complete Kit less Cabinet, Valves and Frame Aerial

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With Frame Aerial **£6 - 6 - 6**

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It is absolutely essential to build the Century Super-Het with a Pilot Kit of Parts with Peto-Scott Frame Aerial to ensure the marvellous results with which Lt.-Commander Kenworthy is so enthusiastic in his letter reproduced by his very kind permission in this announcement.

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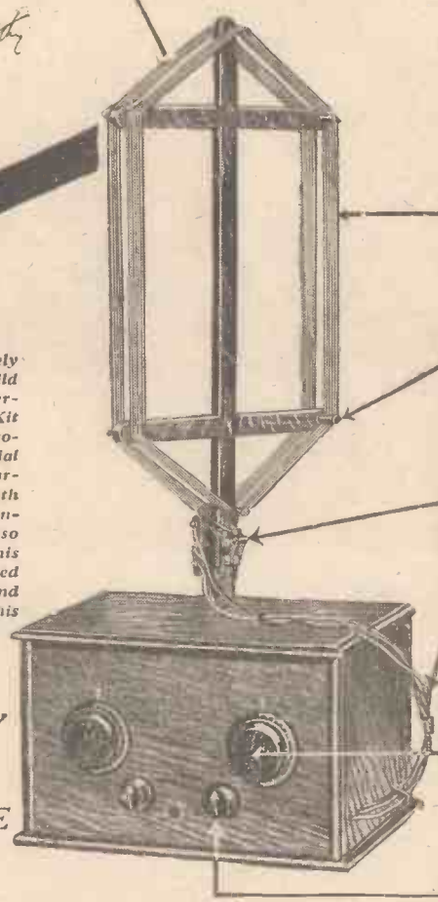

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On Your Wavelength!

CHANGING CONDITIONS

THE introduction of summer time usually marks a change for the worse in receiving conditions, particularly as regards the more distant stations. However, I do not think we shall run short of a reasonable choice of programmes from the Continent this year; so many of the "foreigners" have increased their power, that summer conditions should have very little effect. Actually, a little toning-down of the field strength, say from Mühlacker, would come as a boon and a blessing to many of us, especially on those occasions when one wants to hear the London Regional programme without a German background.

SKIP-DISTANCE

ON the other hand, one can sometimes get an odd station or two better in summer than in winter. It all depends, I suppose, on "skip distance," which, in turn, is governed by the height of the Heaviside layer. The longer hours of sunshine, and possibly the extra intensity of the ultra-violet rays, combine to shift the layer to a higher average level during the summer months. This may result in bringing the reflected waves from a far-off station down to earth at a point that is more favourable for reception than usual. Of course, I am speaking of cases where the earthbound component of the signal is already too attenuated for direct reception. Strictly speaking, "skip distance" is measured between the point where the earthbound component is wiped out, and the point where the space waves come back again to earth after deflection from the Heaviside "ceiling."

MERE WORDS

I SEE that the B.B.C. Advisory Committee on English "as she is spoke" has issued another list covering the pronunciation of some of those words on which we are all liable, at times, to feel a little shaky. The Committee includes several eminent authorities—amongst others Mr. G. B. Shaw and Sir J. Forbes-Robertson—so that I suppose one ought to do one's best to follow the lead they give. Accordingly, please note that the stress should come on the first syllable of "aristocrat," instead of on the second. I used to think otherwise, so that the next time (if ever) I have to use this particular word, I shall probably "foozle" it horribly. Incidentally, should you at any time be moved to refer to the other fellow's bad temper as "choler," mind you pronounce it "coller," or you'll lose the full effect.

BY THE WAY

ALL this careful attention to pronunciation reminds me of an old story that may be worth reviving. On a certain American railway there is a small mountain station situated at one of the highest points along the line. It is called Urelia. Although there is nothing very remarkable in the name, it sticks in the memory of most of those who pass through simply because of a long-standing feud between the station-master and the guard as to the way in which it should be pronounced. As the train slows up on arrival, the guard passes along the corridors announcing: "You're a liar! You're a liar! You're a liar!" Before the passengers can recover from their astonishment, the station-master on the platform caps the insult by shouting out in stentorian tones: "You reely are! You reely are! You reely are!!"

GRAMOPHONE MOTORS

THE new squirrel-cage of inductor motor for driving a gramophone turntable from A.C. mains is a decided improvement on the commutator type adapted to be run either from a D.C. or A.C. supply. The latter model is liable to be noisy, especially when used with a pick-up and amplifier, owing to the difficulty of preventing sparking at the brushes. Even with shunt condensers across both terminals and a centre tapping to earth, it is not easy to cut out the trouble entirely. In the inductor model this difficulty disappears with the brushes, giving a perfectly silent drive. One should, however, be careful to see that the "regulator" is always set for the correct mains voltage. I mention this because, the other day, after I had carried out some "spring-cleaning" operations, this "gadget" must have worked loose on its shaft, and connected up some of the field windings in parallel instead of in series. The first thing I noticed was that the "tempo" seemed to be altogether too fast. Then I happened to touch the motor-body and found it was distinctly "hot." I promptly switched off, and soon located the trouble.

THOSE SHOCKS!

I CAME across a friend of mine the other day playing with an L.F. choke. He was apparently trying to measure the current through the choke with a milliammeter, and I noticed that every time he took the meter off he gave a jump. I asked him what the matter was, and he told me that he was rather troubled because every time he removed the meter he got a shock. I investigated the matter, and found that he was passing something like 20 milliamps through the choke, and that in consequence he was setting up quite an appreciable magnetic field.

As I explained to him, every time he broke the circuit he was getting an appreciable kick off the winding, and as he had hold of the connection in a particular way which always left him connected across the choke, he got the full benefit of this kick; hence the shock! My friend objected to this explanation, however. He said that he had only 50 volts in the circuit anyhow, and that he was not so feeble as to get a shock off 50 volts. I had to explain to him that whenever one breaks a magnetic field a very large voltage is set up. This voltage actually tries to keep the field going by tending to pass a current in the same direction it was flowing in before the circuit was broken. Obviously it is unable to do this, as otherwise we should have a current flowing without any circuit; but, nevertheless, the voltage is set up, and this may rise to several hundred volts. I pointed out to him that it was this E.M.F. of self-induction, as it is called (hence the name inductance) that was causing the unexpected shock.

As a matter of fact, in some of the many-henried chokes which are available on the market to-day this problem is quite an appreciable one, and I daresay many of my readers will have experienced the same trouble when disconnecting chokes or transformers with high primary inductances. The anode current through a valve is sufficient to produce a magnetic field, which if broken will produce quite a healthy shock.

ANOTHER GOOD MARK

MORE than once I've pointed out that, unlike the great majority of scientific inventions, wireless shows a record consisting almost entirely of benefits to the human race. There can be little doubt that no invention of modern times has saved so many lives or done so much to increase the general happiness. An instance of the beneficent work of wireless occurred during the recent turmoil in Spain, when King Alfonso was obliged to leave his throne. Had there been no broadcasting stations there would undoubtedly have been serious rioting and bloodshed, for people would have thronged the streets to find out what was happening, and that is how riots start at such times. As it was, they found that they could learn more of current events by staying at home, and anxiety was allayed by frequent news bulletins summing up the position of the moment.

GLORIOUS DEVON

RECENTLY I have been making a stay in Devonshire and have toured about a good deal in the adjoining counties. Naturally, I was very keen to see what progress wireless had made as a popular hobby in the West of England, where the greater part of the country lies far outside the service area of any home station. The nearest B.B.C. main stations are Bournemouth, far away to the east, and Cardiff, far to the north. In addition, there is the tiny Plymouth relay, whose service area has not more than about a ten-mile radius. Things will, of course, be better when the Bristol H.P. twin transmitter gets going; but what does the West Country find to listen to now? I was agreeably surprised to find how well 5XX (or the Daventry National, to give him his up-to-date official name) is received down there. In the very south of Devon he comes in at excellent loud-speaker strength with a trio of valves.

On Your Wavelength! (continued)

This is really the only reliable home station, for the high-powered medium wavers mostly fade very badly. I could get hardly a sound of "Noisy Nat" with four good valves!

COMPENSATIONS

CURIOUSLY enough, when allowed to twiddle the controls of several sets in the West I found that Moorside Edge on 479 metres was often the most powerful of the home transmissions. He is of course, more distant that the others; but he has a longer wavelength, and therefore does not suffer so badly from fading. Quite possibly, too, this part of the world is outside his fading area—medium-wave stations, you know, are sometimes better received at three or four hundred miles than they are at a shorter distance. If the home stations are not too good, dwellers in Devon, Cornwall, and Somerset have some compensations in the splendid reception that is obtainable from Radio-Paris, the Eiffel Tower, Huizen, and other long-wave stations. On the medium band, too, French, Spanish, and some German stations usually come through remarkably well.

SURPRISING INDEED

SINCE the home-made programmes are so poorly received, except from the distant 5XX, a visitor might expect to find very little interest taken in wireless in the West. This, however, is very far from being the case. Except in a few places, you don't, of course, see the forests of aerial masts that meet the eye in Midland towns and villages. But, all things considered, the number of wireless sets in use, even in remote hamlets, is remarkable. They may not get the morning papers till tea time, but they have had the important items of the news the evening before by means of the headphones or the loud-speaker. There is one rather interesting aspect of wireless in the West Country, which the Big Wigs of the B.B.C. and of the wireless trade might well take to heart. It is the exception to find anything like a modern receiving set or loud-speaker in any but the wealthiest houses.

AN OLD FRIEND

WHAT did interest me very much was to come across still in use an AMATEUR WIRELESS "Ideal Unit Set." I designed that set when "A.W." was a good deal less than a year old, and a very good set it was in its day, though I sez so myself as shouldn't. But I didn't think that there was one still in action till I took tea at a country rectory. There it was, though, and still going strong. Its owner had modernised the L.F. department, but the H.F. side was in its primitive form, except that he had added a few knobs and switches to the original number, which was by no means inconsiderable. I counted eleven knobs and nine switches, but I may have missed a few! The old set was giving a jolly good account of itself, anyhow, and pulled in the foreigners like anything.

OPPORTUNITY WAITS

ONE thing is quite certain, and that is that as soon as Bristol gets going there will be a very big market for up-to-date wireless components, sets, and loud-speakers in the West. The B.B.C. would do well to speed up work on the Bristol station, and the wireless manufacturers should note that if they go the right way about it they will have a tremendous call for their wares. Even as things are, I think that there is plenty to be done in the West Country by making people realise that, though Bristol is not yet in existence as a high-powered twin transmitting station, a good modern set will bring in a wonderful number of programmes.

HOW DO YOU LIKE IT?

NOW that 5GB—or the Midland Regional, if you so prefer it—is down on 398.9 metres, quite a few readers in an area extending from the Midlands to the northern suburbs of London will be having a spot of bother with their sets unless these are up-to-date and pretty selective. The Daventry medium-wave station has a pretty big range and his field strength is considerable at distances up to fifty miles away or more. "Raucous Reg" is even more powerful, and the result is that many people are now finding duets from the two stations in progress when they switch on. Should you be one of those so troubled I'd suggest that you try out one tip before doing anything else. I have often found that if one changes from an outdoor to an indoor aerial there is a comparatively small drop in signal strength, but a big increase in selectivity. Therefore, try the indoor wire before you start pulling the set to bits and making elaborate changes in it. When the strength of B.P. and 5GB is really greater than you need with the outdoor aerial, you have something to play with, and changing to the indoor collector will probably still leave ample strength.

MIXING ACCUMULATOR ACID

When you put new electrolyte into the accumulator it must, of course, be sulphuric acid diluted to the correct specific gravity. Remember to add the

acid to the water, and not the water to the acid. This is most important, for the water will spray out in a dangerous fashion if poured into the acid.

DON'T FORGET THIS

TAKING indoor aerials all round, the best I have used is a plain single wire suspended round three sides of a room. Keep it about a foot from the walls and the same distance below the ceiling. But remember one thing. The efficiency of an indoor aerial is largely dependent on the smallness of its capacity. If you hang the wire too near walls or ceiling—I have seen aerials only an inch or so from both—or if you have rather a long down lead arranged near (or, worse still, fixed to) a wall, the capacity may become pretty considerable; the selectivity and signal strength are then both likely to suffer. You can easily see how the capacity of the indoor aerial compares with that of the outdoor by making a note of the reading of the first tuning condenser when the latter is in use and seeing what happens when you change over. With the indoor collector the reading of this condenser should be higher than with the other, since the first tuned circuit should now have a smaller amount of parallel capacity, due to the aerial-earth system.

A WORD IN SEASON

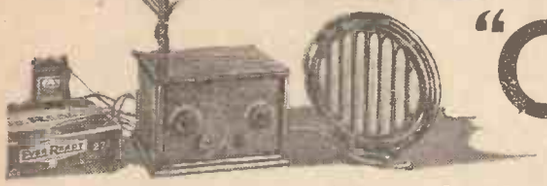
IF we haven't yet got summer-time we have, at any rate, summer time! The season of the year is now approaching during which accumulators, both H.T. and L.T., receive their worst doses of unintentional ill-treatment. Most people go out of doors more in the evenings, and therefore don't make so much use of their sets. Others go away for longish periods and forget all about their poor batteries. Make it a rule this summer that you will have yours charged regularly, even if your listening hours are less and they appear to last longer. Nothing harms a battery more than to stand idle in a run-down or semi-run-down condition. If you're wise, you'll arrange with the charging station to give yours a boost up and, if necessary, a top-up with distilled water once a month. The best way is to fix a date beforehand—say, the first Monday in each month.

'WARE POWER CABLES!

IN my newspaper this morning I read a paragraph which, if read by the layman, would be likely to cause some doubts concerning the safety of wireless in the home. The paragraph was headed: "Wireless Aerial Causes Electrocution." Now, this is only a half-truth. An aerial, which had been erected for some time and was being dismantled, came into contact with some power cables above which it was erected. The person doing the dismantling and holding the aerial wire received the full energy of the power cables through his body to earth, with fatal results. May I again emphasise the printed rules laid down by the authorities that it is not permitted to erect an aerial wire above power or telegraph cables. Should any listener be unfortunate enough to have such cables running over his property he should erect a single-wire vertical aerial as far away as possible.

THERMION.

AMAZING RESULTS With The "CENTURY SUPER"



An account of a test by the well-known authority on continental reception—

J. GODCHAUX ABRAHAMS

IN its time AMATEUR WIRELESS has submitted to its readers a large number of wireless receivers, but I doubt whether any of them can compare with the new six-valve super-het which was sent to me for an independent test. It is far in advance of any radio receiver it has been my privilege to operate and when, on the first evening I coupled it up to its batteries, I enjoyed myself thoroughly. I append a log of **115 stations,** all tuned in through a loud-speaker as, of course, the enormous power of the majority of signals heard precludes the use of headphones; as a matter of fact, it would be dangerous to use them for in most instances the volume at which certain transmissions were received, even from low-power stations, called for a generous use of the potentiometer control.

With this receiver, so to speak, you have **Europe at your elbow**; you may run around the dials with the certainty of capturing any station you set yourself out to bag. It will pick up almost any whisper on the ether and I experienced no difficulty in pulling in individual concerts from such lesser-heard stations as Nice-Juan-les-Pins, Riga, Zagreb, Naples, Kosice, Reykjavik and Istanbul at good loud-speaker strength.

On the first evening I logged over sixty-five long- and medium-wave transmissions; in three days I had increased this total to 115 and had checked and re-checked the condenser readings of those of which I was in some doubt. **Every station in the log has been individually identified.**

But just one word of caution : it is useless to twist the dials at random. If you do so you will miss all but the most powerful transmissions. The receiver is so selective that you will find **no difficulty in cleanly separating London Regional from Graz or Mühlacker,** Warsaw from Eiffel Tower, Istanbul from Reykjavik, London National from Leipzig and Moravská-Ostrava, Marseilles from Wilno, and so on. But the adjustment of the oscillator condenser must be carried out delicately, for one-quarter of a degree either way will spell success or failure. And yet, after a few hours practice you should tune in **one transmission after another with the utmost ease.**

As regards the American transmissions, I have no doubt that I could have logged many more, but I only devoted a period of three hours to that side of the game. Staying up after midnight after a long day's work does not appeal to me, but even in that short time I had ample proof that the happy owner of a "Century" can increase materially the log I have put forward.

And notwithstanding its exceptional selectivity and excellent DX qualities the "Century" gives you **clear-cut signals and almost perfect purity of tone.** For the reception of musical transmissions it is all that can be desired.

Personally, **I could not wish for a better receiver**; it did all I wanted it to do and, believe me, I am hard to please.

J. GODCHAUX ABRAHAMS.

MEDIUM WAVES

Wave-length	Station	Dial Readings Frame	Oscillator
217	Koenigsberg	13	28
218	Flensburg	13½	28½
221	Helsinki	13¾	28¾
223	Fecamp (Normandy)	14	29
225	Cork	14	29½
227	Cologne	16	30
230	Malmo	16½	30½
232.5	Kiel	17½	31½
234	Lodz	18	32
239	Nurnberg	18	33
240.6	Kristianssand (Norway)	19	34
242	Belfast	20	35
244	Cracow	20½	35½
249	Nice Juan-les-Pins	21½	36
253	Gleiwitz	22½	36½
255	PTT Toulouse	22¾	36½
257	Hoerby	23	37
259	Leipzig	23½	37½
261.3	London National	24	38
263	Moravska-Ostrava	25	38½
265	Lille PTT	26	39
272	Rennes PTT	27	40½
273.6	WPG Atlantic City, N.J.	27½	41
276	Heilsberg	28	42
279	Bratislava	29	42½
281	Copenhagen	29½	42½
282.8	U.S.A. Station, believed to be WTIC Hartford, Conn.	30	43
283	Berlin (Common Wave)	30	43
286	Montpellier PTT	31	43½
289	British relays	32	44
293	Kosice	33	45
295	Limoges PTT	33¼	47
296	Turin	34	47½
298.8	Hilversum	34	48
301	Aberdeen	34	48½
303	WBZ Springfield (Mass.)	34½	49
304	Bordeaux-Lafayette	35	49
305	KDKA E. Pittsburgh	35	49½
306	Zagreb	36	49½
310	Cardiff	37½	49½
312	Wilno	38	49½
315	Marseilles PTT	38½	49½
321	Goeteborg	39	50½
325	Breslau	39½	50½
328	Grenoble, PTT	40	51
332	Naples	41	53
338	Poznan	42	54
339	Velthem (Brussels No. 2)	43	54
342	Brno	43½	56
345	Strasbourg	44½	57½
348.6	WABC New York	45	58
349	Barcelona EAJ1	45½	58
352	Graz	46½	59
356	London Regional	47	59½
360	Mühlacker	47½	60
364	Bergen	48½	60¾
365	Algiers	49	61
368	Seville (EAJ5)	49½	61
372	Hamburg	50	61
376.4	Glasgow	50½	62
379	WGY Schenectady	51	62
381	Lvov	51½	62
384	Radio Toulouse	52	64
390	Frankfurt-on-Main	53	65
394	Bucarest	54	67
—	WJZ Boundbrook	54½	67
399	Midland Regional	55	68½
403	Söttens (Switzerland)	56	69
408	Katowice	57	70
413	Dublin	58	70½
416	Rabat (Morocco)	59	71
418	Berlin-Witzleben	59½	71
424	Madrid (EAJ7)	60	72
430	Belgrade	60	73
436	Stockholm	61	74
441	Rome	63	75½
447	Paris PTT	65	77½
454.3	WEAF New York	66	78
455	San Sebastian (EAJ8)	66	78
459	Beromuenster (Switzerland)	67	79
466	Lyons PTT	69	80½
473	Langenberg	70	81
479	Manchester (faint) / Northern Regional (full loud-speaker)	71	82
487	Prague	72	84
501	Milan	76	87
509	Brussels No. 1	76	88
517	Vienna	78	89
525	Riga	79	89½
533	Munich	81	91
541	Sundsvall	83	93
550	Budapest	84	95
560	Kaiserslautern-Augsburg	86	96
566	Hanover	88	96½
577	Ljubljana	89½	98

LONG WAVES

Wave-length	Station	Dial Readings Frame	Oscillator
900	Aerodromes and Aeroplanes	20	40
937	Kharkov	23	43
1,000	Leningrad	26	49
1,071	Scheveningen Haven	29	52
1,077	Oslo	30	53
1,103	Moscow Popoff	32½	55
1,153	Kalundborg	36	59
1,200	Reykjavik (Iceland)	37½	61
1,228	Istanbul (Turkey)	39	62
1,304	Moscow (Trades' Unions)	44	69
1,348	Motala	46	70
1,411	Warsaw	50	74
1,445	Eiffel Tower	51	75
1,481	Moscow (Old Komintern)	53	77½
1,554	Daventry National	58	80½
1,635	Berlin (Konigswusterhausen)	61	86
1,725	Radio Paris	65	89
1,796	Lahti	69	91
1,875	Huizen	73	95
1,935	Kaunas	78	98

BROADCAST ARTISTES IN PICTURE

PAUL BEARD.—Leader and first violin of the Unity Quartet, recently relayed from the Royal Society of Artists Gallery, Birmingham

MARJORIE PARRY.—One of the younger singers of the B.N.O.C., Miss Parry has become one of the foremost of our operatic singers

MISS CECIL LUCAS.—Heard on April 16 through the London Regional station, Miss Lucas sang with W. L. Trytel and his Octet

OSMOND DAVIS.—One of our best known tenors and one of the earliest of the concert-hall singers to broadcast. Mr. Davis made his debut at the Queen's Hall in 1919

HERMIONE GINGOLD.—One of the charming principals in "The Ridgeway Parades"

JACK PAYNE.—Leader and conductor of the B.B.C. Dance Band

GWYNETH EDWARDS.—A charming young soprano who sang recently through the London Regional station with the William Mathews Octet

BEATRICE GALLOWAY.—Another member of "The Ridgeway Parades." Listeners do not need reminding of the charm of her work

MAJOR YEATS BROWN.—A most interesting speaker, he is now commencing a new series of talks on Eastern subjects

PHILIP RIDGEWAY.—Actor, author, composer and singer. The producer of the now famous "Ridgeway Parades"

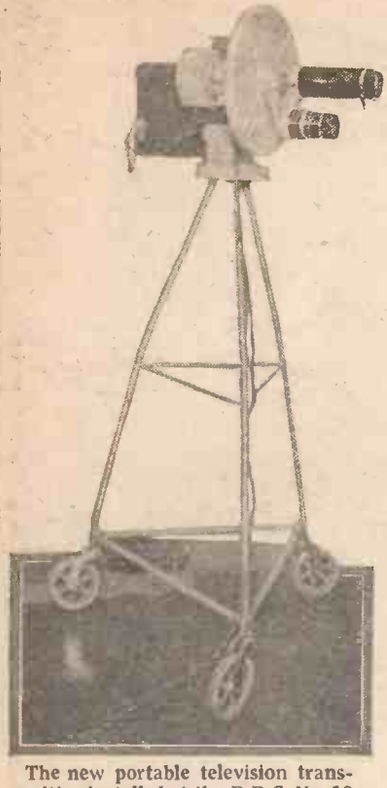
BERT COPLEY.—A popular entertainer and singer. He took part in a special programme on April 16 from Manchester

NOEL EADIE.—A famous member of the B.N.O.C., and heard frequently from the studios as well

CHARLES HEDGES.—Has had a wide concert-hall experience; his most recent broadcast was on April 16 through the Midland Regional

A PORTABLE TELEVISION TRANSMITTER FOR THE B.B.C.

Some interesting details of a new development
by H. J. Barton Chapple, Wh. Sch., A.M.I.E.E.



The new portable television transmitter installed at the B.B.C. No. 10 studio

A PORTABLE television transmitter has been supplied by the Baird Television Company to the B.B.C. This transmitter has been installed in No. 10 Studio and it is hoped that very shortly some of the well-known B.B.C. artistes will be televised while broadcasting.

Actually this portable transmitter was delivered to the B.B.C. on April 13 and, although it had not been made public, television transmissions by wireless had previously taken place from the Baird studios by means of this portable transmitter.

In a sense the standard apparatus shown by the accompanying photograph, working on the spotlight principle, is mobile, but obviously could not come within the designation of the word portable. This last-named term, however, can be truly applied to the latest form shown in the heading.

Truly Portable

For wireless purposes the name "portable" is applied to receiving sets the weight of which is such that except for the possibility of movement from room to room they are essentially fixtures. The present form of Baird portable transmitter now with the B.B.C. is certainly not a piece of apparatus which can be moved from pillar to post with impunity, but its design is such that the engineers in charge can cater for reasonable subject movement of the persons being televised and furthermore it can be set up easily in any desired position.

The basic transmitting mechanism is supported on a tubular tripod framework having pivoted rubber-tyred wheels. The supporting plate is so arranged that the disc, arc, lenses, etc., can be moved round in a horizontal plane, while, in addition, a movement in vertical elevation can be effected. The handle whereby these manipulations are carried out is seen on the extreme left of the arc casing.

Vertical Scanning

The disc is made for vertical scanning with the usual thirty holes arranged in the form of a spiral. It is completely enclosed in a casing to make it quite dustproof, while in addition the inclusion of the cover makes it almost noiseless in action. Driving the disc is a universal motor with provision made for the accurate maintenance of the correct running speed. As a source of light there is an arc lamp working with an automatic feed, the black casing surrounding this being visible at the back of the disc cover.

A particularly interesting feature of the apparatus is the provision of two lenses. These are carried on a casting pivoted at the centre and with the aid of registering pins dropping into positioned slots it is possible to bring either one or the other into action. The longer of these lenses has a focal length such that "close ups" (that is, head and shoulders) of a particular person can be televised, although the individual concerned may be several feet away. If a change is then effected to the shorter of the lenses the full length of the same individual is available to be televised. Furthermore, the lens with the shorter focal length covers those situations where a head and shoulders image of a person is required when that individual is fairly close to the transmitting mechanism. The whole apparatus is perfectly balanced and therefore can be run in any position.

The "auxiliary" equipment is not shown in the illustration, but consists of the photo-electric cells and initial stages of the cell amplifier housed and balanced on a pivoted stand; these can be positioned where desired to bring about the condition of best reflected light pick-up from the televised subjects. In this way reasonable movement of the artiste is catered for, the individual position change being followed closely by the engineer in charge in much the same way as the spotlight operator keeps his "beam" on stage artistes.

Quite separate there is the main amplifier and power supplies. The results of the tests will be awaited with interest.

This is the standard type of transmitter which has been used until recently

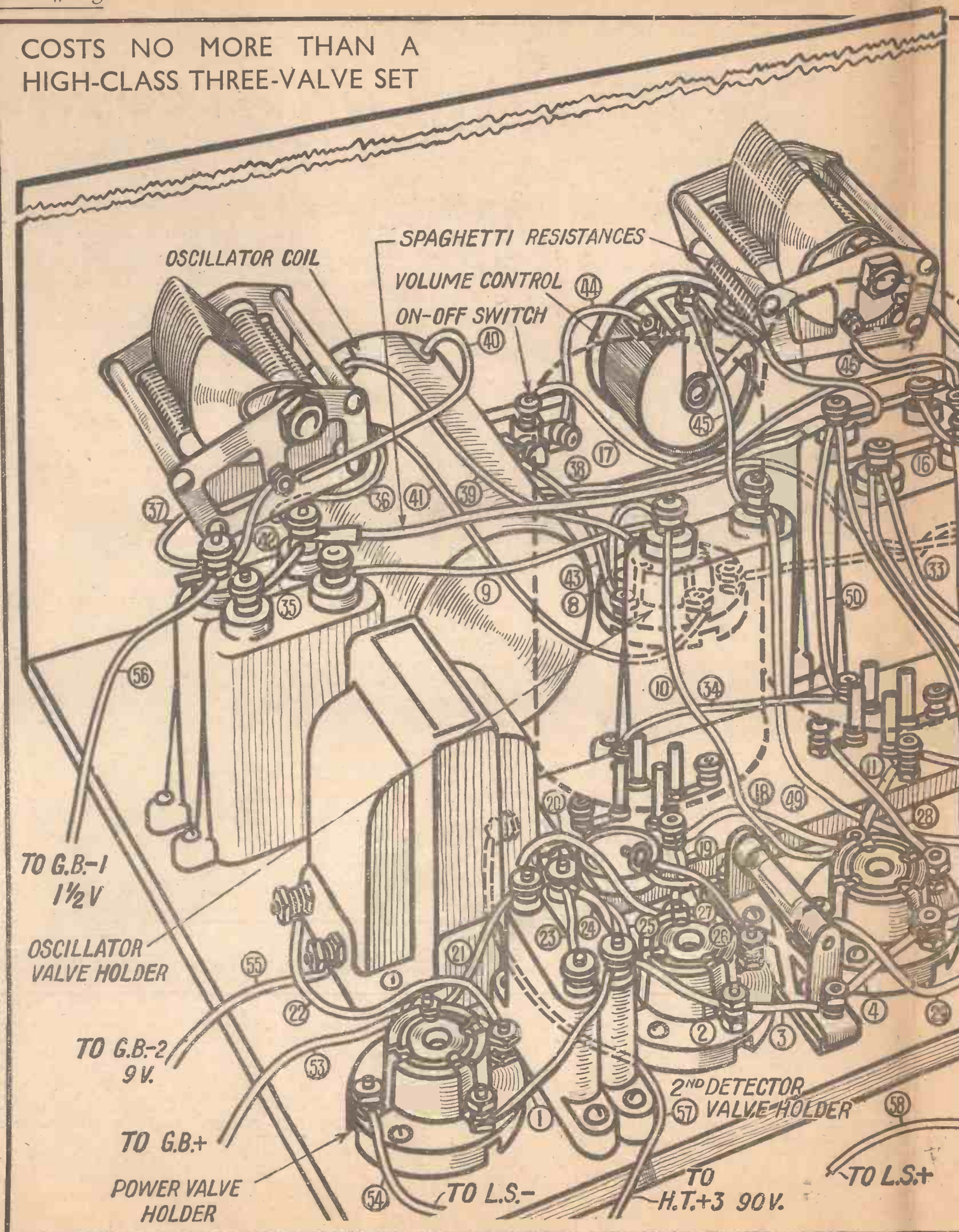
SCREENING

CONSTRUCTORS do not always realise that it is just as necessary to screen condensers as well as all coils on the high-frequency side of a set. The potential variations on the vanes of a tuning-condenser set up spreading fields of static force, which are just as liable to give rise to back-coupling and instability as the magnetic flux from a high-frequency coil. This liability to electro-static interaction between different circuits is, of course, greatly increased when several condensers are "ganged" together in close proximity to each other, so that care should always be taken to see that they are adequately screened from each other. B. A. R.

BUILD THE "CENTURY SUPER"

The Westinghouse Company recently requested from the Federal Radio Commission four relay wavelengths for the purpose of sending sponsored programmes over W8XK, auxiliary of KDKA of Pittsburg, with the object of advertising American products, particularly radio gear, to stimulate their sales abroad. Plans included special programmes to appeal to the particular countries intended to be reached. The application has been refused

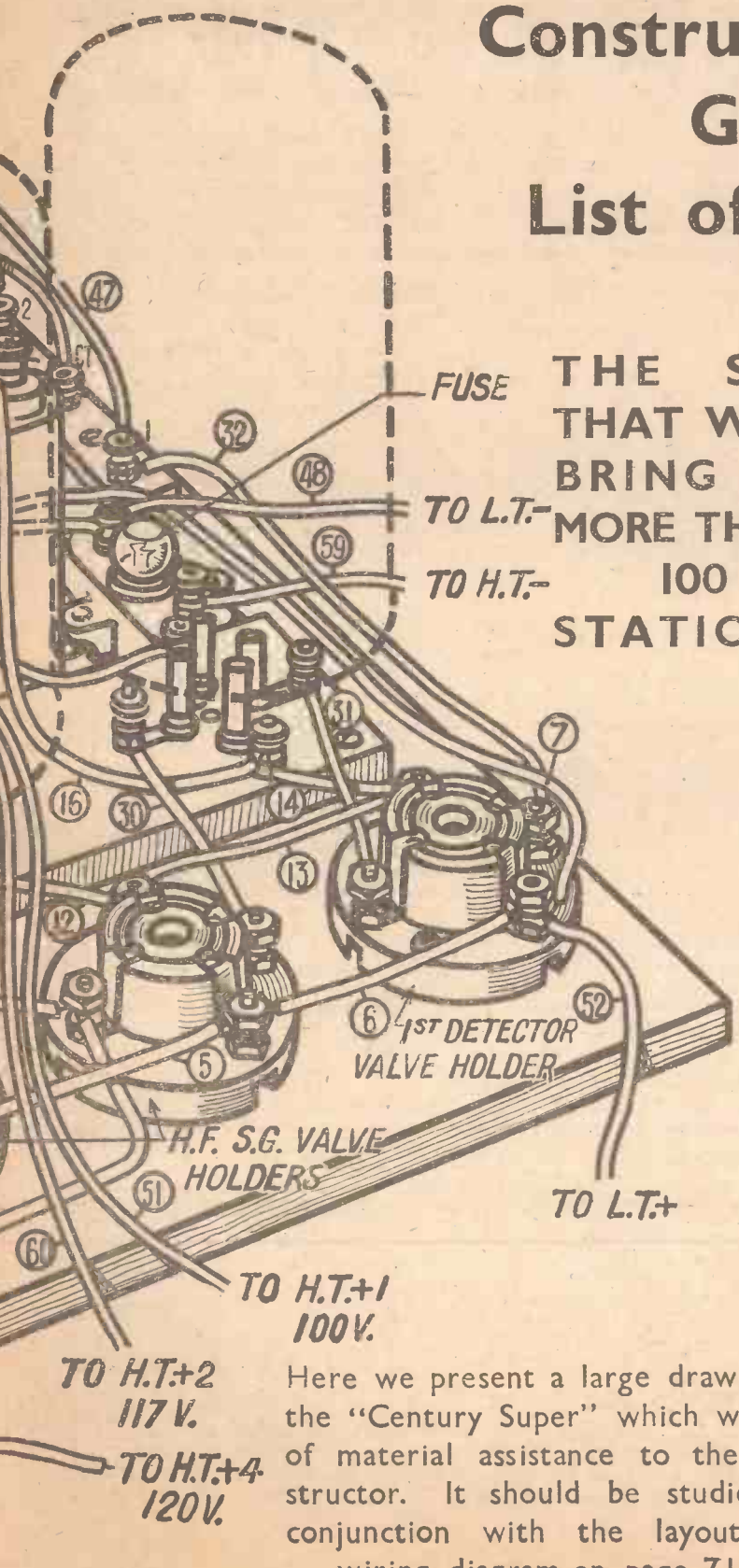
COSTS NO MORE THAN A HIGH-CLASS THREE-VALVE SET



THE "CENTURY SUPER"

DESIGNED BY W. JAMES

Constructor's Pictorial Guide and List of Components



Here we present a large drawing of the "Century Super" which will be of material assistance to the constructor. It should be studied in conjunction with the layout and wiring diagram on page 714.

COMPONENTS REQUIRED for the "CENTURY SUPER"

Special cabinet and baseboard, and wooden panel (Camco, Peto-Scott, H. & B.).

Two .0005-mfd. variable condensers with slow-motion movement (J.B. "Tiny No. 2," Peto-Scott, Lissen, Ormond, Readi-Rad, Cyldon).

50,000-ohm wire-wound potentiometer (Colvern, Sovereign, Regentstat, Rotor).

Three-point shorting switch (Readi-Rad, Wearite, Bulgin, H.B., Benjamin, Lissen, Junit).

Set of super-heterodyne coils (Wearite, Lewcos).

Six valve holders (Telsen, Wearite, Lissen, Lotus, Benjamin, W.B., Clix).

Triple coil base (Peto-Scott, Wearite).

Five 1-mfd. fixed condensers (Dubilier, Lissen, T.C.C.).

Two .001-mfd. fixed condensers (T.C.C., Lissen, Telsen, Dubilier, Formo).

.0002-mfd. fixed condenser (Formo, Lissen, T.C.C., Dubilier, Readi-Rad, Graham Farish).

Grid-leak holder (Readi-Rad, Wearite, Lissen, Bulgin, Dubilier, Formo).

1-meg. grid-leak (Lissen, Dubilier, Telsen, Graham-Farish).

Low-frequency transformer (Telsen "Ace," Lissen, Varley, Ferranti, Burton, Lewcos, R.I., Voltron).

Terminal strip with three small terminals for baseboard mounting (Peto-Scott).

15,000 and 20,000-ohm spaghetti resistances (Lewcos, Bulgin, Readi-Rad, Turner, Graham-Farish).

Fuse-holder and fuse (Bulgin, Readi-Rad).

Five yards of thin flex (Lewcos).

Eight wander plugs marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, H.T.+4, G.B.+, G.B.—1 G.B.—2 (Belling-Lee, Clix, Eelex).

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

Connecting wire and sleeving (Jiffilinx, Readi-Rad.)

Frame aerial (Peto-Scott, Lewcos, Wearite).

ACCESSORIES

One cone speaker (B.T.H., Amplion, Mullard, Ormond, Blue-Spot).

One double capacity 120-volt H.T. battery (Ever-Ready, Pertrix, Drydex, Lissen, Fuller).

One grid-bias battery, 9 volts (Ever-Ready, Pertrix, Drydex, Lissen, Fuller).

One 2-volt accumulator (C.A.V., Exide, Pertrix).

Valves: One Mullard PM1LF, one Mullard PM2, two Mullard PM1HF, two Mullard PM12.

Instructions for building this amazing set are given on pages 712, 713 and 714

Building the "C

THE SET THAT GIVES AMAZING RESULTS AND IS EASY TO BUILD AND MAINTAIN

By W. JAMES

THE coils used in the "Century Super," of which preliminary details were given last week, are of rather special construction. That is why I am not giving details of the numbers of turns and winding details.

The three long-wavelength transformers used in the beat-frequency amplifier are alike as regards their internal construction, but two of them have flexible leads coming out of the top of the metal pots for convenience in connecting to the screen-grid valves.

Inside each metal pot is a transformer having both windings separately tuned. Thus there are the usual primary and secondary windings, which are spaced by a certain amount to provide a suitable degree of coupling. Then there is a condenser connected across the primary and a further one joined across the secondary.

The Coils

These condensers are not in the usual form of copper or foil electrodes with mica insulating pieces. They are composed of a pair of wires twisted together. During manufacture, therefore, the primary and secondary coils are wound to a certain inductance, and the condensers are also wound. Afterwards, the values are most accurately adjusted in a testing appliance and finally the coils are tuned to a given wavelength.

The transformers do not tune sharply to a given frequency, but are designed to have a fairly flat topped resonance curve. This is a most important matter. The whole performance of the set depends upon the accuracy with which the coils are prepared according to the specification.

There are the three coils in the long wavelength, or, as some would call it, the beat-frequency, amplifier. If one of the coils is out, the magnification will be lower than normal and the tuning would be broader than necessary.

With these carefully matched coils the selectivity is good and the magnification is ample for the reception of the most distant stations. If you pull off the cover from one of the coils you will see that the coils have been very carefully made. They are treated in order that the tuning should remain constant. This was a fault with older super-heterodyne coils. They were so constructed and finished that the tuning did not hold over a period.

In these coils great care has been taken to ensure extreme accuracy and constancy. In the older types of coils, as no doubt some readers will remember, it was usual to provide trimming condensers in order that the user could match up the circuits.

If the present-day super-heterodyne coils had to be adjusted in this manner, I should have left them alone, as experience has shown that consistently good results cannot be obtained unless the coils are tuned to a definite wavelength and will remain tuned to that wavelength for an indefinite period of time.

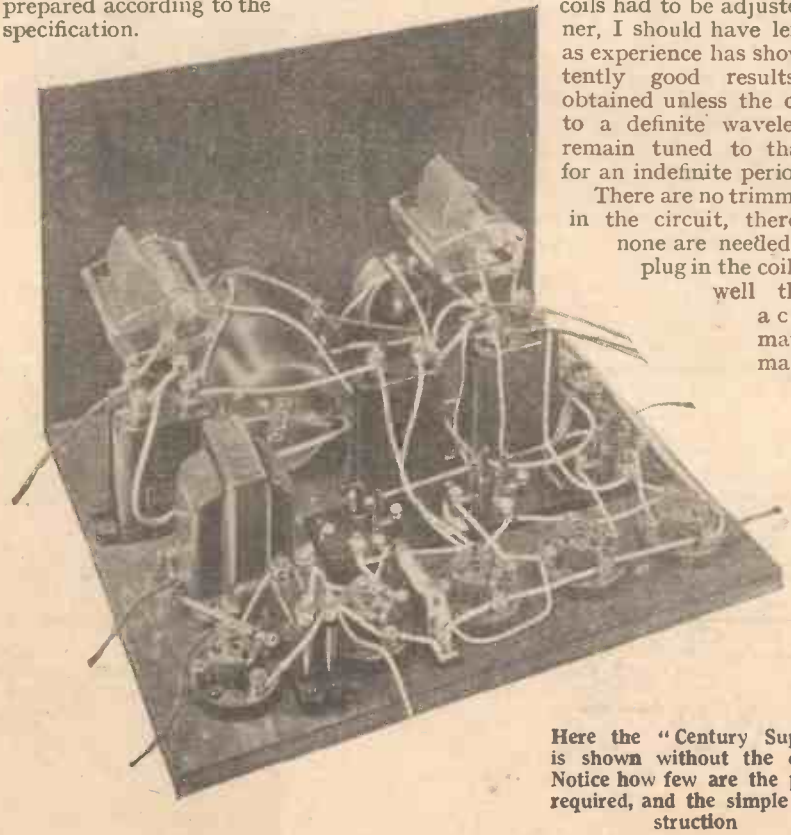
There are no trimming condensers in the circuit, therefore, because none are needed. You simply plug in the coils, knowing full well that they are accurately matched by the makers to the wavelength of the beat-frequency amplifier. The layout is chosen bearing this in mind, and the most careful tests on every part have failed to discover any lack of balance in the circuits.

It is here that we gain over the usual ganged tuning circuit, for the circuits must be properly tuned. This is easy enough for experienced amateurs, but is a great trouble to those who have not had much to do with the tuning of several circuits. In this set, therefore, the beat-frequency amplifier, which includes the two screen-grid valves, the second detector and the power valve, requires no tuning at all.

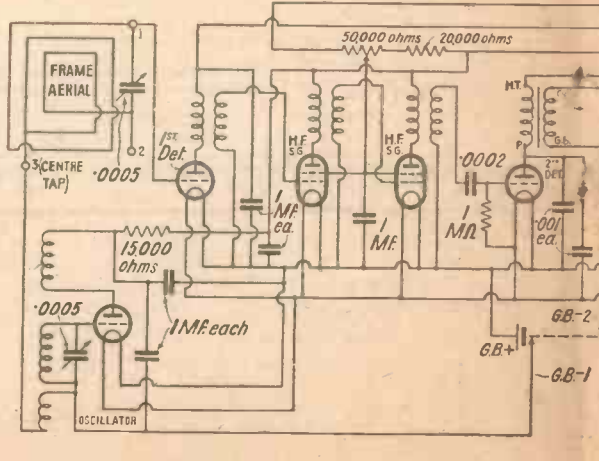
Component Positions

The parts are merely fixed in the positions given on the diagram on pages 670 and 675 in last week's issue and are bound to tune correctly and to magnify properly.

We have only the two circuits to tune,

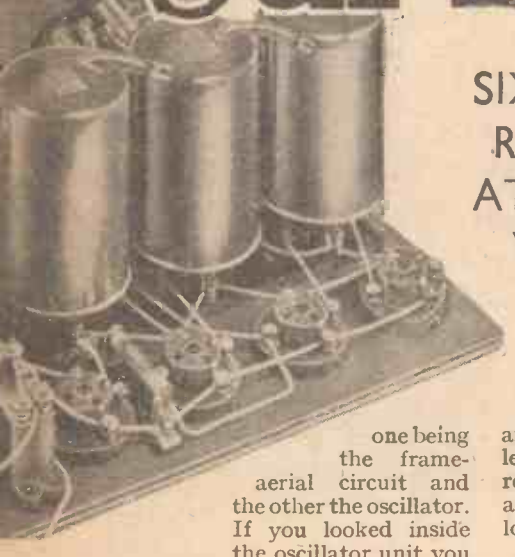


Here the "Century Super" is shown without the coils. Notice how few are the parts required, and the simple construction



ENTURY SUPER"

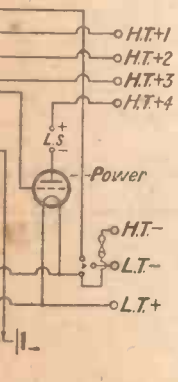
SIX-VALVE RESULTS AT THREE-VALVE COST



one being the frame-aerial circuit and the other the oscillator. If you looked inside the oscillator unit you would see a switch and the tuning coils. There is nothing much here although the coils must be fairly accurately made in order to tune over the wavelength ranges with the .0005 microfarad tuning condenser. The shield is, of course, essential, or we should have a coupling with the frame aerial which would be undesirable and cause an amount of trouble.

The Oscillator

The oscillator is connected to about the centre point of the frame aerial, and you will notice that both sides of the frame-aerial tuning condenser are at a high-frequency potential to the filament circuits. Therefore, a metal panel cannot be used unless the parts are provided with ebonite bushes.



The circuit

The construction is so easy and straightforward that there is little to be said about it. With the special three-point valve holder strip, used for the three beat-frequency amplifying coils, these coils are automatically suitably spaced, and the screen-grid anode leads come out in the right positions for the valves.

Some amateurs may want to make the frame aerial connecting strip themselves, and this is easy enough, as it comprises only a piece of ebonite or paxolin having three small terminals. These are for the two ends of the frame and the centre tap. The strip measures 2¾ in. by ⅞ in. and has two fixing holes as well as the three for the terminals. It is advisable to countersink the underneath sides of the holes for the terminals.

Detection

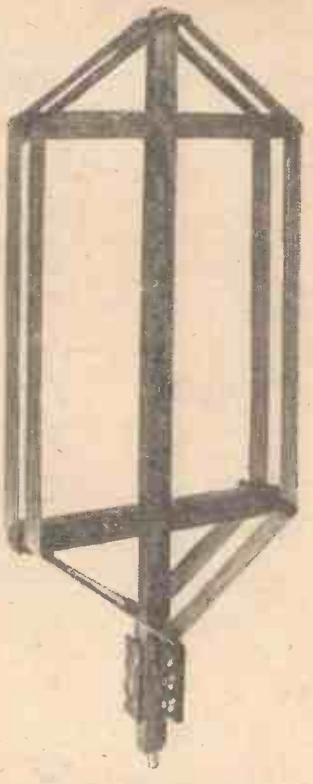
At the second detector we use a .0002-microfarad condenser and a 1-megohm grid-leak. These are smaller values than usual. But we have to preserve the quality and these values are better from this point of view than the more usual .0003-microfarad and 2-megohms. A detector of the grid-leak type always tends to reduce the relative strength of the higher notes, we avoid this so far as possible by using a little lower value grid-leak and condenser.

Good by-passing in the anode circuit being essential, there are two fixed condensers. One is connected from the anode to the negative side of the filament in the usual way and the other goes from the anode to the positive side. You will notice that the connections here are very short, which is as it should be. These two fixed condensers are fitted between the second detector and power valve holders.

It is not necessary to connect the core of the transformer to the filament circuit, using the transformer indicated, but you should always try this with other makes.

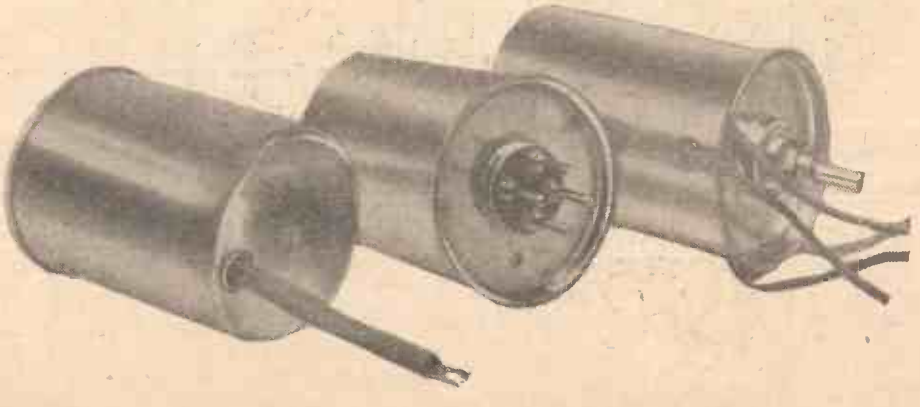
I have found the results to be the same from both the Wright & Weaire and the Lewcos sets of coils; they are in fact interchangeable. Actually, the Lewcos coils have a different internal construction from the Wright & Weaire coils, but they both tune to the same wavelength and are very well manufactured and tested.

This testing is an important item and any other old coils that you might have should on no account be used. I myself have several old patterns, having pre-set type condensers fitted to them which are not at all satisfactory. The great magnification is obtained in two ways: First, there is the straightforward amplification of the beat frequency amplifier. Being on a longer wavelength than any broadcast waves the amplification with stability is of course, greater, which is one of the reasons for the choice of the particular wavelength used.



Another advantage of the "Century Super" is that an outside aerial is not required. This picture shows the frame aerial used.

Then there is the effect of the oscillator and the first anode-bend "detector." If you were to experiment with oscillators of different strengths, you would find that, starting with a weak oscillation the signals from distant stations are also weak. As the oscillator is strengthened, thus increasing the strength of the oscillations in the grid circuit of the first "detector," the signals are brought up. A point is reached, however, where no further increase in the strength of the signals is brought about by adjusting the amplitude of the



These are the intermediate-frequency coils which are an important feature of the set

A Weekly Programme Criticism—By SYDNEY MOSELEY.

Without Fear or Favour

A POPULAR CONDUCTOR

AT SAVOY HILL

SOMETHING near what a debate should be was that between my old colleague, S. P. B. Mais and Ivor Brown. They spoke on holidays, "Beaten Track *v.* Quietude," and, strangely enough, both scored heavily. It was a good "hammer and tongs" debate, and there must have been a lot of rehearsing.

Mais was, perhaps, a wee bit too downright; but the whole thing was first class and I congratulate them both.

◆ ◆ ◆

Alfred Coates had an amazing reception at the Queen's Hall the other night. He has a way with him: is full of the joys of spring and enjoys robust health. After seeing him at the Queen's Hall I went to studio No. 10, and he seemed to wink and smile at each member of the orchestra in turn. No wonder he is popular.

◆ ◆ ◆

All is not well at Savoy Hill, I understand. The clique of young, "modern," pseudo-intellectuals—we used to call them in the war, "swankpots"—are getting the upper hand.

I have had more criticism about the programmes lately than for a long time. What is wanted is a strong policy.

◆ ◆ ◆

When I was up north recently they were trying to show me that they had the cream of singers. Some of them *are* the cream but I had my doubt about the others.

◆ ◆ ◆

Listening to "Memories," a programme of old favourites the other day, I thought: Well, what is there better than these good old tunes? I admit, however, that some of the modern ones are catchy. For instance, "You're Driving Me Crazy" is rather clever.

◆ ◆ ◆

The idea of getting vocal accompaniment to "More Melodious Memories" was good, although it shows up here and there the scrappiness of these dove-tail pieces.

◆ ◆ ◆

I listened to Cyril Smith playing the piano on Sunday. He is, of course, the television pianist. An earnest young man, keen on his work, I think he should go far. His transmission from Savoy Hill revealed great ability.

◆ ◆ ◆

I switched on for a moment to the Children's Hour the other day and heard the line, "You shall die to-night." I suppose that is something to give the children to go to bed with.

◆ ◆ ◆

Some of us were discussing "The Ridgeway Parade" the other day. One or two of my colleagues were very downright about it. But I found a little improvement in the last transmission, although I fear Mr. Ridgeway himself as "Mr. Ramsbottom" didn't quite get over.

DESCRIBED ON PAGES 712 TO 714—THE CENTURY SUPER—THE SET FOR YOU

◆ ◆ ◆

I have had no bricks, curiously enough, following my broadcast talk on films recently. The fact is, the talk was rather rushed on me and I was extremely busy at the time. I was very surprised, therefore, to hear from a friend at Savoy Hill that it went over fairly well. One day I may make an interesting exposure about the extraordinary muddle of these films talk in which, curiously enough, I myself figure.

An impression of Sandy Rowan, the popular Scotch comedian

THE TALKS DEPARTMENT

STUDIO APPLAUSE

◆ ◆ ◆

The talks department has suffered by lack of direction. The director herself is away and to my own knowledge three different people have had a hand. People outside have no idea of the chaos that prevails in a department that ought to be the easiest of all to organise.

◆ ◆ ◆

The Wagner concert must have pleased everybody, and I am quite certain that those who didn't care very much for the master before have come to love him. What more beautiful song is there than the Death Song from *Tristan and Isolde*? Stop, you lowbrows, dare to tell me I am highbrow! I have a pile of letters bullying me for having said we get too much Bach cantata on Sundays. Perhaps *you* prefer Bach.

◆ ◆ ◆

I see that a talk down by Ruth Maschwitz entitled, "Seeing is Believing," was changed for the more commonplace one of "The Antique Chair." Why on earth does the B.B.C. still ban that interesting subject, television? Miss Maschwitz would have been ideal for this subject.

◆ ◆ ◆

"Requests" programme from the Midland Regional contained some obviously popular items as the Adante Cantabile, by Tchaikowsky, and Fantasy on Grieg and, so far as the songs are concerned, "The Admiral's Broom," "Until," and "Nirvana." I am not so certain whether the other items of the programme could be universally regarded as "requests."

◆ ◆ ◆

The talk on the opening of the cricket season, by Mr. Howard Marshall, sounded rather sombre. He promised to go to the opening match at the Oval. It sounded as if he were going to his aunt's funeral.

◆ ◆ ◆

In regard to studio applause, why doesn't the B.B.C. institute more generally the rule that some of us observe when we go to No. 10 studio on Sundays? That is, to wait until the red light is off before offering polite applause.

BUILDING THE "CENTURY SUPER" (Continued from preceding page)

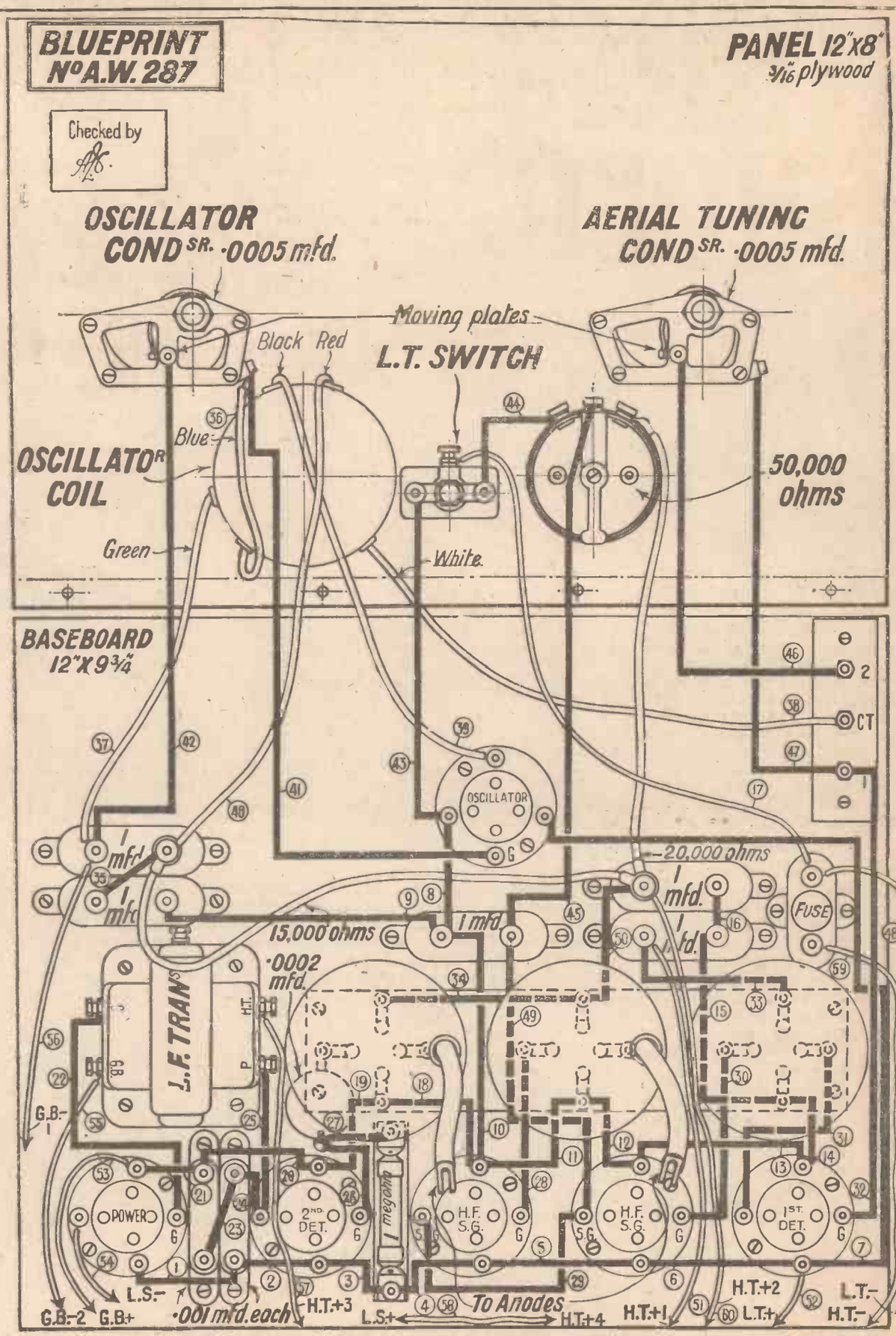
oscillations. When an oscillator is tuned to different wavelengths the strength of the oscillations applied to the grid of the "detector" varies, sometimes over wide limits.

To reduce this effect so far as possible, the oscillator is connected to the high-tension supply through a fixed resistance and a by-pass condenser, this acting also as a filter. The resistance used is 15,000 ohms and the condenser is 1 microfarad. This resistance acts to level the current taken by the oscillator over its range. If the current tends to increase, the voltage drop in the resistance rises and so tends to lower the voltage applied to the anode circuit. When, on the other hand, the current tends to fall off, the voltage drop is less and so a greater voltage is applied to the circuit, thus strengthening the oscillations.

If we had an adjustable resistance in the circuit we could vary the strength of the oscillations to suit all conditions, but this is not necessary in practice, the single fixed resistance being of such a value that good average results are obtained over all wavelengths.

A further fixed resistance, actually of 20,000 ohms, is included in series with the

(Continued on page 726)



The layout and wiring diagram. A full-size plan was included in last week's issue, and a full-size blueprint of the above is available, price 1/6

RECORDS of the MONTH'S BROADCAST MUSIC

The following notes are intended to link up current wireless programmes with the gramophone and assist readers to select permanent records of the most pleasing features. In every case the most suitable presentation of a particular item will be recommended and the name, make and number of the record given

A Fine Modern Suite

ON April 9, from London Regional, was played Eric Coates' "Four Ways." Here is a straightforward theme, each movement typifying an orthodox conception of lands and peoples to "Northwards," "Southwards," etc. They are orthodox in the sense that the tyro could readily name each piece if he did not know the title, but this is not to say that their presentation is in any way hackneyed. "Northwards," for instance, is a most virile inspiring march which tells its story in no uncertain manner. The whole suite is excellently played and superbly recorded by Columbia on two 12-in. records (DB9756-7). The performers are the Regal Cinema Orchestra. "Four Ways" is a most pleasing English work, which will delight again and again.

A Beautiful Serenade

Toselli's—played on a saxophone on April 25! A dreadful lapse, which we hasten to forget. Here is a most delicate artistry—a thing of great beauty. Its acquisition in the form I do most whole-heartedly commend is expensive, but worth the 6s. Renée Chemet's performance on H.M.V. DA955 is enchanting—it is one of the best violin solos recorded. It is doubtful if one would ever tire of this beautiful melody.

Two Delightful Songs

Here are two songs, given on April 5 and April 9 respectively, which will appeal to those who like ballads of sentiment—"Just because the Violets" and "A Song of Sleep." Both are sung by Walter Glynne, the first on H.M.V. B2372 and the second on H.M.V. B2723. Each will probably be derided by modernists, but the latter song achieved considerable fame in its day, although its theme is somewhat sombre.

Continental Light Music

There is a German talkie with the quaint title, "Three at a Petrol Station" from whose wealth of very good tunes the dance bands have been drawing lately. Further delving into the work of the German composers who are responsible for such music provides a heartening substitute for the American dance music "plugged" week after week. Let readers who want "something better" try Columbia DW2041, "*Ein Freund, ein guter Freund*," and H.M.V. EG2001, "Good Night." The first is a six-eight played by the Columbia Dance Orchestra, and the second a waltz by Marck Weber and his Orchestra. (On the back of the Columbia disc is a very delightful march-song, "*Adieu, mein Kleiner Gardeoffizier*," a number which the famous Taube has sung.) Yes, "Three at a Petrol Station" has done well by modern dancers. I believe foreign records of this type do not command a very great sale in England. This can only be for the reason that dealers will not stock and play them to their customers. They are definitely superior to many of the better-known tunes.

Round the Programmes

A few items, just as *reminders* to readers:

"The Belle of New York," newly revived and newly recorded by Zonophone (5822). A short selection this, unfortunately. Easthope Martin's "Fairings" and "Come to the Fair" (each on different dates). Both are on H.M.V., by Percy Heming, C1482. Drdla's Serenade. Hear Marjorie Hayward (violin) on H.M.V. B2140. This is a charming thing. "The Gipsy Princess," a jolly selection, is on the new Phonycord P117.

"The Midnight Review." Get Columbia DB9874 and enjoy Norman Allin's magnificent rendering. Finally, Strauss's "Ständchen," by Claire Dux (soprano), on Polydor 70690.

More New Records

Recent issues include some very pleasing items especially amongst the less expensive records. There appear to be signs of a tendency to forsake the boring duplication of jazz pieces for the more satisfying production of "straight" music.

Light Music

H.M.V. C2116 (4s. 6d.), "The Clock and Dresden China Figures," by Ketelby, is a novelty piece which should prove popular. A better musical study in horology than "The Clock is Playing" of recent fame. On the reverse Marck Weber's Orchestra plays "The Skater's Waltz" with customary ability.

Radio 1462, "*La Fille de Mme. Angot*." Here is a very pleasing selection from Lecocq's work of some generations ago. Gilbert and Sullivan enthusiasts should buy this excellent little disc.

The eternal "Blue Danube" reappears twice. Nevertheless, to Piccadilly 721 I would affix a V.H.C. card. Here, by Schomberg's Viennese Orchestra it is played as it should be (but in abridged form). Thanks, Piccadilly! To mention its performance by the Black Diamonds Band may smack of heresy, but on Zono 5849 one may hear a brass band play it with very proper restraint and sense of propriety. There are two re-issues of old favourites by the same company worthy of commendation: Zono 5822 and 5832 respectively, allotted to "Floradora" and "Belle of New York," and, secondly, "Nights of Gladness" and "*Valse Septembre*." The latter pair are completely equipped with zylophone, concertina, and the implements of musical modernity. One must notice the very satisfactory fare provided by Phonycord under this head. P109, "Waltzes of the World," is good—performance and tone are excellent. These gaily-coloured flexible records are a most interesting and convenient contribution to recorded music. It is a pity that they can be played only with the special Phonycord needle, however, two are presented with each record. "Saschinka," a Russian medley, is played finely by Marek Weber's Orchestra on H.M.V. C2100. This record may have a somewhat limited appeal, but is interesting and attractive.

Songs

First of all comes Piccadilly 700, "The Toymakers' Song," from the "Toymakers of Nuremburg." It is sung by Bernard Dudley with a delightful baritone voice and perfect enunciation. Everybody should buy this record.

Sanderson's Songs are happily drawn on for Edison Bell Winner L5233. The vocal parts of Morlais Morgan and Gladys Knight are really well done, but the accompanying Scala Concert Orchestra should not imitate a massed band organisation.

Terance O'Neill sings the "Snowy Breasted Pearl" on Radio 1468. A charming little ballad, well rendered and recorded.

Orchestral Music

"The Bronze Horse" overture (H.M.V. C1997). I mention this with qualifications. It has a vogue: somebody described it as a "bustling" piece. Whilst it is not wholly satisfying, it is worth hearing. The performance and recording are excellent, however.

"*Le Chasseur Maudit*" (Franck) demands mention, so good a performance is it. The music is too uncanny to be really popular, but it is worth while to learn how music can tell a story. Get a synopsis of this and let the composition interpret it to you on H.M.V. C2016-7.

"William Tell" Overture (Winner 5240-1). A straightforward and well-balanced production by the Vienna Symphony Orchestra.

Instrumental

The Paderewski Minuet and Mendelssohn's "*Rondo Capriccioso*" are played (concerto fashion) by a very able pianist, Yenovitch, on Broadcast 5216.

More Hawaiian guitar music. An excellent performance is that of "Aloma" on Sterno 629. The performers are The Pagan Three.

Humour

One of Leslie Sarony's attractive absurdities is recorded on Imperial 2417 (Icicle Joe), with a very competent orchestral accompaniment, whilst Broadcast are responsible for an excellent version of "Seven Veils," by Bob and Alf Pearson (3002).

WHAT DOES KENDALL THINK OF THE "CENTURY SUPER"?

Mr. G. P. Kendall, B.Sc. For 8 years with "Modern Wireless" and "Popular Wireless," as Assistant Editor and also as Chief of Research Department, heard the "Century Super" demonstrated at the Ready Radio Showrooms and was immediately impressed by its wonderful performance. Read what he says!

Coombe Cottage,
Oaklands Avenue,
Esher,
Surrey.

22nd. April, 1931.

The Managing Director,
Messrs. Ready Radio,
159, Boro'High St.,
London Bridge,
S.E.1.

Dear Sir,

I have had the pleasure of witnessing your demonstration of the extremely interesting possibilities of the "Century Super" receiver made up from a "Ready Radio" kit of parts.

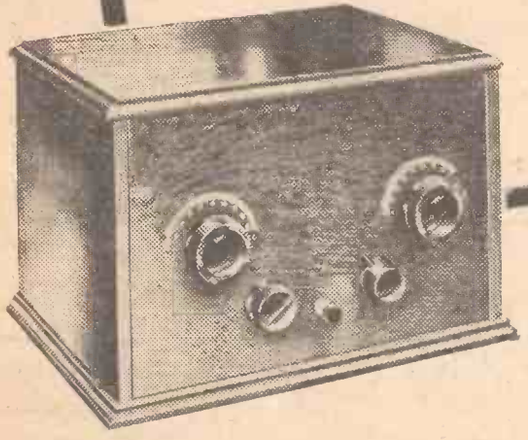
I was greatly impressed with the results obtained in the course of the demonstration, so much so, that I later took an opportunity of handling the receiver myself and applying some severe tests.

As a result of these tests I came to the definite conclusion that this receiver sets a higher standard of selectivity, range and power than has been forthcoming from any Superhet which I have previously handled. I am confident that the instrument must prove irresistible to every listener who requires a set capable of dealing with the difficult modern conditions, with real ease and certainty.

A point which is of greater importance than usual in a receiver of this sensitive, high power type, is the fact that the use of a properly Matched Kit of components can play a great part in determining the results obtained.

Yours truly,

G. P. Kendall



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Price Lists and Order Form on Page 719

IN MY WIRELESS DEN

WEEKLY TIPS— CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

"Slow" Mains Valves

I WONDER whether the valve manufacturers will ever be able to shorten the time now taken for a mains valve to reach its operating condition from cold.

The waiting time is a disadvantage and if it can be reduced all users would be grateful. No doubt the bulk of the cathode, or should one say of the insulating material upon which the cathode is carried, is responsible for the time taken.

There are American A.C. valves, I see, in which the construction has been specially arranged to make the heating time as short as possible. If this can be carried out with our own valves, without increasing the hum or noise, then something ought to be done about it!

The recently introduced metal-coated valves, which have a metal coating sprayed on to the bulbs, are a marked improvement. Being connected to the cathode pin of the holder in the case of indirectly heated valves, the coating forms a metal shield and is of value in reducing pick-up and improving the performance of screen-grid valves. More quiet operation is, therefore, to be expected and a gain in stability, which is all to the good. The valves, I understand, are not to cost more than the ordinary types.

Tracing a Hum

It is sometimes rather difficult to trace what is producing a hum in a mains set. There are so many possible faults, such as poor smoothing, centre tap out of position, and so on.

One fault that sometimes crops up is a poor contact of the grid pin of a valve with its socket in the holder. If this should be the detector valve a hum will in all probability be heard.

The grid circuit of a detector valve is extraordinarily sensitive. A poor contact will nearly always produce a hum or noise. Care should, therefore, always be taken that the valve pin makes a good contact and when a hum is heard it is as well to go over the valves.

Now Summer is Here

Summer time being here now, I expect we shall all notice a falling off in the number of stations received during the evening.

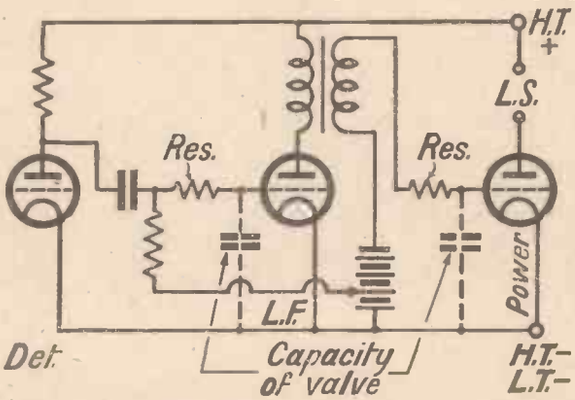
This is, therefore, a particularly good time to build a real long-distance set. It is surprising how few sets will bring in, say, a dozen stations during the hours of daylight, but a good super-heterodyne will do it.

We rely upon the long-wavelength stations partly, of course, as they are always fairly easily received. Personally, I like working during the hours of daylight, for if a set brings in stations then, I know that when it is dark any number will be heard.

Stray H.F 's

In an endeavour to prevent trouble through high-frequency currents passing through low-frequency circuits and perhaps reaching the speaker, fixed resistances are often included in the grid leads to the low-frequency valves.

These resistances act to reduce the voltage of the high-frequency currents applied across the grid-filament path of the valves. So far as the H.F. currents are concerned, we have a resistance in series with a condenser, made up of the working capacity of the valve. If, therefore, the impedance of the resistance unit is large compared with that of the capacity, the greater part of the voltage is set up across the resistance.



This idea for cutting out stray H.F. currents is described in the accompanying paragraph by W. James

In the accompanying diagram I show the resistance and capacity from which this point will be clear. We have low-frequency voltages in the circuit, however, and these reach the grid through the resistance. If the resistance is high, therefore, or the capacity is relatively large, the tendency will be for the higher audio frequencies to be weakened. This must be guarded against by not using a larger resistance than necessary. For one stage a 100,000-ohm resistance is often used, but values of 50,000 ohms will usually be satisfactory for two stages.

Use a Pilot Light

A pilot or dial light fitted to an A.C. set costs very little to run, but now and again I have letters complaining that the bulbs soon burn out. This is because the wrong type bulbs are used.

The filament or heater circuit has a voltage of 4, so a 4-volt bulb should be used. When a bright light is not needed, the bulb may have a higher voltage rating with advantage. A current of .1 ampere is usually enough, but much depends upon the arrangement of the set itself. Perhaps a bulb taking a heavier current is needed properly to light up the dial.

High H.T.

There is much to be said in favour of using a voltage of, say, 160 on the anode of the power valve of a battery set. The usual voltage of 100 to 120 (when the battery is new) is not enough for some purposes, although I know that many listeners are satisfied with the results obtained when the battery is of this order of voltage.

With the higher voltage and suitable grid bias, the volume will be much greater before overloading sets in and usually the quality will be better, as when the lower voltage is used the last stage is usually overworked.

A point to note, however, is that the current is fairly high when the voltage is of the order of 160, and the battery may not be suitable for supplying this relatively heavy current. Before investing in the extra battery, therefore, you should examine the valve maker's curves of the particular power valve used and find what the current is likely to be if the voltage is increased.

One part of the battery will, of course, be carrying the full current of the set and the other part a smaller current, as the anode circuits will be tapped off different points in the battery. If you raise the anode voltage of all the valves the total current will go up considerably.

Matching with the Speaker

The best way of dealing with speakers of very different impedances which it is desired to connect to a set is to fit separate output circuits.

One may well be connected through a choke-condenser filter, and the other may best be supplied through a transformer. It depends upon the characteristics of the loud-speakers, of course. A low-resistance loud-speaker must have its transformer coupling and a high-resistance one may be best connected through a 1-1 ratio transformer or a filter circuit.

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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
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1 Celestion D.10 loudspeaker ...	*3*	*0*	*0*
or 1 Amplion cone loudspeaker A.C. 21	*1*	*19*	*6*

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SETS OF DISTINCTION

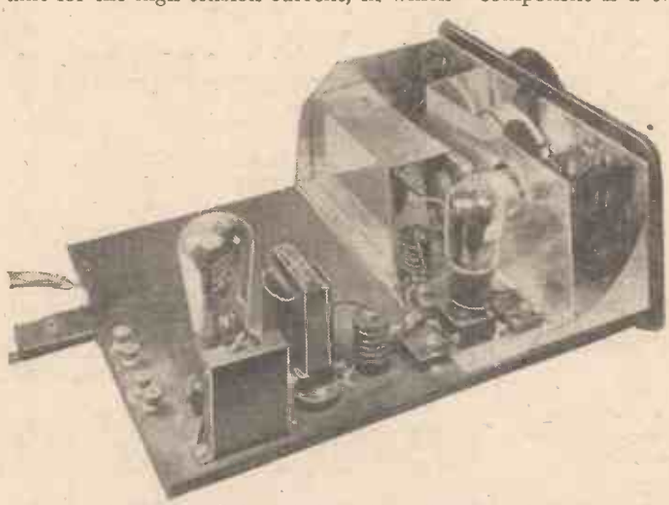
The CATESBY ORBIT RADIO-GRAMOPHONE

Makers : Catesby's. *Price :* £18 10*s.* (*for the complete instrument*)

MOST of the sets I test, although differing in many details, conform to what has become a standard method of construction and design. Here is something different; the Catesby convertible gramophone, three-valve radio set or radio-gramophone.

By an ingenious system of assembly, it is possible for the listener to start with a simple gramophone and by easy stages (easy payments, too, if necessary!) to convert it into a complete radio-gramophone. Or one can start with a three-valve console set and convert it later on into a radio-gramophone.

Plenty of scope is allowed for individual tastes, for the set can be either battery-driven or supplied with a Regentone mains unit for the high-tension current, in which case a trickle charger is used to keep up the low-tension accumulator.



The chassis of the Catesby Orbit radio-gramophone

Among the gramophone accessories one has a choice of a Collaro spring turntable motor or an electric motor.

The cabinet of the Catesby Orbit instrument, which makes these conversion ideas practicable, comprises a removable motor-board and suitable space to accommodate the necessary batteries, gramophone horn or loud-speaker, pick-up or tone arm; and there is still ample space left for gramophone records. In the door of the cabinet is fitted a frame aerial, so that the instrument can be used as an entirely self-contained radio-gramophone if necessary.

I was recently supplied with a completely assembled Orbit radio-gramophone for battery operation. On the motor-board is mounted a Collaro motor with a winder brought out to the side of the cabinet. This motor is a very good job and is fitted with all desirable gadgets, such as automatic stop.

Mounted in the correct position near the turntable I noted an Ultra gramophone pick-up. Convenient cups to take old and new needles are also fitted.

In the lower front part of the cabinet I found the loud-speaker, which is an Ultra double-linen-diaphragm type, capable of giving excellent results with a normal three-valver.

The three-valver, fitted into a suitable compartment immediately above the loud-speaker, is built up as a compact metal chassis. The layout of the components is somewhat unorthodox, but my tests show that this layout is justified by the entirely satisfactory radio reception. The chief component is a two-gang condenser, comprising two bakelite dielectric condenser units and an admirable slow-motion dial reading from 0 to 100 degrees.

As an auxiliary to the main tuning knob is a small knob for trimming the two condenser units. The lay-out of the panel controls is quite straightforward and all the knobs are notable for their ease of operation.

As already stated, the tuner occupies the centre of the panel. There are four other control knobs, two on the left and two on the right. The top left-hand knob controls the switch, providing gramophone reproduction or radio reception. For the radio side the circuit comprises a screen-grid valve, a detector and a transformer-coupled power valve, but for the gramophone side the high-frequency valve is not used.

Near this switch is the radio volume control, which, during tests, worked admirably. This control is of great use when receiving nearby powerful stations. To the right at the top of the panel is another switch knob providing medium and long-wave tuning. There is also a centre "off" position. Near this switch knob is the reaction control and this is, of course, essential when receiving most of the distant stations capable of being heard on this set.

As the chassis is designed for use as a gramophone amplifier in addition to its function as a three-valve radio set, the makers have quite rightly emphasised the need for amplification from the detector valve onwards. For this reason a 7-to-1 ratio low-frequency transformer is used to couple together the detector and power valves.

I am quite satisfied with the way in which this convertible instrument fulfils the makers' claims. Certainly the results are remarkable in view of the low price of the complete job. Quality of reproduction, probably due to the linen diaphragm loud-speaker, is above the average for an inexpensive console. Of course, a lot depends upon the power supply and on the last valve.

The radio side is quite easy to operate and works well in London with the frame aerial. By the way, this frame is directional, and for this reason the cabinet door in which it is fitted can be readily moved through a wide angle.

Very complete instructions are issued with the Orbit radio-gramophone and these are well worth a perusal by all readers of AMATEUR WIRELESS interested in this account.

SET TESTER.

TELEVISION FOR AVIATORS

AN American inventor has devised an ingenious television system for helping an aircraft pilot to land his machine safely during foggy weather, or at night, when it is not possible to get a direct view of the aerodrome. The approaching aeroplane is first picked up by direction-finding aerials installed at the aerodrome, and its subsequent movements are followed by electrical repeaters and projected as a moving spot of light on to a contour map showing the landing-field and its immediate surroundings. The map is then transmitted by television apparatus to the approaching machine, where it is thrown on to a viewing-screen on the instrument board, so that the pilot is able to follow his own course through the air by observing the spot of light as it moves across the background of the televised map. B. A. R.

Bordeaux-Sud-ouest (France) transmits a special late musical programme every Tuesday until midnight G.M.T.

The Compagnie Francaise de Radiophonie (Paris) officially states that the new Radio Toulouse transmitter now under construction will be so planned that its power can be rapidly increased from 60 to 150 kilowatts in the aerial.

C.O.D

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As illustrated, in polished Oak or Mahogany—Pay the Postman. **20/-**

Supplied with accurate-fitting bearing bush, wave-change switch, 3-way leads and six spacers. Each strand of wire is enamelled and covered overall, which ensures maximum results. Correct centre-tapped. This is a new type frame aerial designed at the request of "A.W." by Peto-Scott himself. No substitute will do. Beware of imitations. You must have a Peto-Scott Century Frame Aerial to ensure results obtained by "A.W." and *Daily Mail*. *If desired we can supply Lewcos Frame Aerial* **32/6.**

CABINET. Specification: Handsome Polished Oak, 12" × 8" × 10" deep. Fitted with figured oak panel, polished and drilled; also 12" × 10" 6-ply baseboard. Oak or Mahogany **15/-**

The Components included in every PILOT KIT are guaranteed against manufacturing fault. Faulty parts replaced.

ALSO SEND FOR THESE SPECIAL PARTS, C.O.D. Pay the Postman:

Wearite Super-Het Coils. Set of 4 coils. As used by the designers and included in Pilot Radio Kits. **£2-10-0**

6 Mullard Valves for Century Super-Het 1 P.M.1.L.F.; 2 P.M.1.H.F.; 1 P.M.2; 2 P.M.12. **£3-16-0**

Peto-Scott Cabinet Handsome French-Polished Oak Cabinet with Drilled Panel and Baseboard. **15/-**

• KIT "A" Less Valves, Cabinet and Frame Aerial. £5.6.6

Or 12 monthly payments of 9/9

KIT "A" with Frame Aerial, £6.6.6, or 12 monthly payments of 11/7

KIT "B" £9.2.6

As above with valves but less Cabinet and Frame Aerial

or 12 monthly payments of 16/9.

KIT "B" with Frame Aerial £10-2-6

or 12 monthly payments of **18/7**

KIT "C" £10.17.6

Complete with Valves, Cabinet and Baseboard, Panel and Frame Aerial.

or 12 monthly payments of **£1.0.0**

Kit of parts as approved by A.W.

	£ s. d.
2 .0005-mfd. Variable Condensers with slow-motion movement: Peto-Scott	12 0
1 50,000-ohm. wire-wound potentiometer. Sovereign	4 6
1 Three-point shorting switch. Ready Radio	1 6
1 Set of Super-het coils, Wearite or Lewcos	2 10 0
6 Valve holders. Telsen	6 0
1 Triple-coil base. Peto-Scott	2 9
5 1-mfd. fixed condensers. Franklin	10 10
2 .001-mfd. fixed condensers. Graham Farish	2 0
1 .0002-mfd. fixed condenser. Formo or Ormond	6
1 Grid leak holder	6
1 1-meg. grid leak. Telsen	1 0
1 Low-frequency transformer. Telsen "Ace"	8 6
2 Spaghetti resistances, 15,000 and 20,000-ohm. Keystone or Lewcos	3 0
1 Fuse holder and fuse. Ready Radio or Bulgin	1 3
8 Wander plugs marked: H.T.—, H.T. +1, H.T.+2, H.T.+3, H.T.+4, G.B.+, G.B.—1, G.B.—2, Belling-Lee	2 0
2 Spade terminals, L.T.+, L.T.—, Peto-Scott	3

Konecterkit. Terminal strip with three small terminals for baseboard mounting (Peto-Scott) 5 yards of thin flex, glazed connecting wire, fixing screws, bolts and nuts, etc. .. .. **GRATIS**

Customers ordering this Kit are supplied with matched knobs in mottled oak effect to tone with the polished oak panel. Black knobs supplied with Ebonite Panel. Also Dial Reading Chart supplied specially calibrated on Peto-Scott Condensers by our Technical Staff.

★*Fitted with J.B. "Tiny" Condensers 5/- extra*

SPECIFIED ACCESSORIES

	£ s. d
Handsome Polished Oak or Mahogany Cabinet with figured oak panel 12" × 8" ready drilled and 6 ply baseboard 12" × 10"	15 0
CENTURY SUPER FRAME AERIAL READY WOUND WITH SWITCH	1 0 0
Oak panel polished and drilled 12" × 8"	2 0
6 ply baseboard	1 0
Ebonite panel 12" × 8" × 3/16" drilled	4 6
1 Green Triangle 120V. H.T. Battery, Drydex ..	18 6
1 Grid Bias 9V Battery, Drydex	1 4
1 20/40 Accumulator, Exide ..	9 6
6 Mullard Valves, 1 P.M.1.L.F.: 2 P.M.1.H.F.: 1 P.M.2: 2 P.M.12	3 16 0

ANY PARTS SUPPLIED SEPARATELY

If value over 10/- sent C.O.D.

FREE with every Kit a Konecterkit containing all screws, nuts, bolts, etc., terminal strips, 5 yds. flex and glazed connecting wire.

FREE to every purchaser of the CENTURY, a full sized diagram and copy of "Amateur Wireless" containing constructional details.

FREE Every CENTURY owner becomes entitled to free technical advice and assistance.

FINISHED INSTRUMENT

Fitted with Valves, Cabinet and Frame Aerial - - - **£12.7.6**

Royalties extra **£1.10.0**

Or deposit **£3.17.6** *and 11 monthly payments of* **£1.**

NOTE: Batteries extra.

EXPRESS ORDER FORM

To PETO-SCOTT CO. LTD.

Please send me **C.O.D./CASH/H.P.**

.....

.....

.....

.....

for which I enclose **Cash / H.P. Deposit**

£ s. d.

Name .....

Address .....

.....

A.W. 2/5/31

PETO-SCOTT CO. LTD.

77 CITY ROAD, LONDON, E.C.1: *Clerkenwell* 9406. **62 HIGH HOLBORN, LONDON, W.C.1** *Chancery* 8266. MANCHESTER: 33 WHITELOW ROAD, CHORLTON-CUM-HARDY. *Phone: Chorlton-cum-Hardy* 2028. NEWCASTLE, STAFFS: 7 ALBANY ROAD. *Phone:* 67190.

Mains Hum

SIR,—In a note in a recent issue of AMATEUR WIRELESS, under the heading "An All-mains Weakness," "Thermion" quotes a friend whose set develops a hum in the morning.

The explanation is, of course, perfectly correct. I have experienced the same trouble ever since I installed an A.C. radio-gramophone. Not only is the radio part of the set inclined to hum in the morning, but interference from the gramophone motor, practically inaudible at night, is often very bad. This morning I have just tried to play a record, but the interference was so appalling that I had to stop it.

I may add that I have gone to a good deal of trouble in the way of scratch filters and tone controls to obtain the really good reproduction which I get in the evening. I often wonder whether H.T. accumulators combined with indirectly heated A.C. valves would be worth while trying.

C. M. S. (Fareham).

Penny-in-the-Slot Wireless

SIR,—You might be interested and amused to know that I have had a penny-in-the-slot fitting attached to my set for some time. Its average takings are 1s. 9d. weekly. By the time new batteries are required we have the necessary cash! The on-off switch on the panel is not used, anyone wishing to listen-in simply puts a penny in the slot and away it goes. I should be pleased to know if you have heard of a similar novelty of this kind.

A. J. (Sheffield).

Adding H.F. Valve

SIR,—I recently added an ordinary H.F. unit to my existing three-valve receiver, thinking to increase the receiving range. Contrary to expectation, this unit has decreased my range and also the power of stations that are received. Can you account for this? K. M. (Bath).

Your original set probably had reaction coupled into the aerial system, and this enabled you to overcome the effects of resistance in your aerial and earth system. Now that you have added an H.F. unit, you have, no doubt, cut off the reaction from the aerial and the aerial-earth resistance is causing you poor reception. By attending to the aerial and earth, reducing resistance as far as possible you should be able to improve your reception. Another thing, your H.T. battery may have been suitable for the working of a three-valve set, but is not capable of working four valves. If you are using a standard-capacity dry-cell H.T. battery for your four valves, replace it with a double- or triple-capacity dry-cell H.T. battery. In this way you will ensure that all valves get sufficient current for efficient working.—ED.

The "1931 Ether Searcher"

SIR,—I have just completed the above wonderful set and arranged it to work entirely from A.C. mains with great success. The only modification was to use a differential aerial series condenser so as to use it more as a volume control and a similar condenser for reaction. This was found necessary for stability.

Indirectly-heated valves were used throughout and the volume was sufficient fully to load the Mazda AC/Pr. H.T. and L.T. were fed from a combined transformer, the former feeding a H.T.7 Westinghouse rectifier. All circuits were generously decoupled and a variable H.T. feed was arranged for the detector as well as S.G. The detector was not at all critical as to its H.T., so a 30,000-ohm fixed resistance was put in circuit for simplicity.

The grid bias was arranged with variable resistances in the cathode leads, with, of course, the usual shunt condenser.

The set works admirably—splendid tone and very selective.

W. E. R. B. (Guildford).

Accumulator Charging

SIR,—I have been extremely interested in the recent discussion on accumulators, as it is my job to charge a number of these at the local garage. If "Thermion" could see some of the sulphated things that are sometimes brought in to be charged, his sympathy would be on my side.

With regard to the question of buying a low-tension accumulator, I should choose a glass cell with separators. Plates that are kept in position by flanges moulded in the case come to an untimely end by buckling, not necessarily due to ill treatment of any kind, but by reason of the fact that the positive plates expand; and as the glass holds the edges of the plates tightly, they cannot expand outwards, and buckling takes place.

It seems rather funny that, although the B.B.C. told us that the idea of the regional scheme was to give us alternative programmes on crystal sets and other simple apparatus, it is now necessary to have a six-valve super-het to obtain good results.

V. D. (Sidcup).

Faulty Variable Condenser

SIR,—I have built up a simple receiver consisting of a detector and two low-frequency valves, and although I receive the local station, the tuning condenser appears to make no difference to tuning.

L. L. (Alperton)

The fault appears to be in your tuning condenser. You should test it by arranging a battery and a measuring instrument between the terminal of the condenser and the plates to which the terminal is connected. With either the fixed plates or the moving plates you may detect a disconnection between the plates themselves and the actual terminal to which the plates should be connected.—ED.

Wavelengths and Frequencies

SIR,—As a technical inexactitude we wish to draw your attention to the first paragraph of the article "Introducing W. James' 'Century Super'," in the April 18, 1931, issue of AMATEUR WIRELESS.

Your contributor, Mr. A. Hunter, appears to have made a mistake in that he has confused frequency with wavelength. Since London Regional operates on 842kc. and Mühlacker on 833kc., it will be seen that the latter transmission is 9kc. *below* the London frequency.

From the point of *wavelength*, Mühlacker is *above* London Regional, being 360 against 356 metres of the latter.

Our reason for bringing the matter to your notice is one which affects all prospective constructors of super-heterodyne receivers, particularly as the use of "kilocycles" enables certain peculiarities common to these receivers to be explained. For instance, a number of constructors, having built the "Super 60" receiver, are puzzled as to the reception of Mühlacker when endeavouring to receive Warsaw on 212.5kc. (1,411 metres), both the frame aerial and oscillator switch being set for the high-wave reception.

A similar cycle of events is true for other powerful stations operating on the medium waveband, and explains the reason for their reception on the long waves.

Applying the same facts to the reception of medium-wave stations, and taking into account harmonics, which can only be multiples of a fundamental, it will be noted that the second and third "points" would occur below the lowest "point" on the tuning dials and in the neighbourhood of 2,000kc. (150 metres).

In the circumstances, it is easy to see why stations on the medium waveband are practically free from interferences from harmonics, and explains why the Americans so studiously avoid long-wave reception. Fortunately, the difficulties are not a fraction of what they appear on paper, because though harmonics are annoying, yet they can be taken in "one's stride" if it is remembered most of the "image" interference occurs on frequencies between those employed by the various long-wave stations.

The subject is a vast one and cannot be covered by a letter of this nature. Nevertheless, we believe the above notes if brought to your readers' notice are sufficient to show the immense value of computing wavelengths in kilocycles, and especially in dealing with super-hets.

WRIGHT & WEAIRE, LTD. (London).

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.

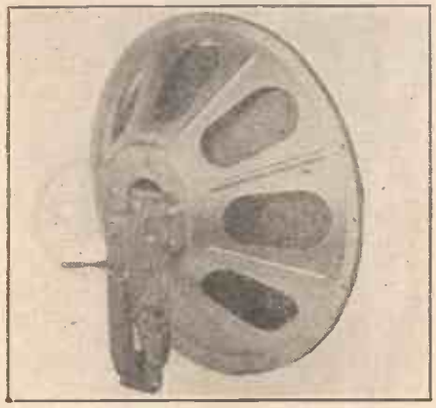
Wufa 60-pole Speaker

WE have this week tested a Wufa 60-pole speaker. One is a little intrigued by this designation at first, expecting to find a somewhat revolutionary magnet system. It transpires, however, that the magnet poles are laminated, there being a 4-pole system, each containing fifteen laminations.

As a matter of fact, it is the rest of the construction rather than this particular feature which interested us more. The movement is of the balanced-armature type, a long horseshoe magnet being employed to provide the necessary permanent magnetic field. This magnet carries the laminations, one set on each pole, and by means of a lever operating a cam, the two poles of the magnet can be sprung apart slightly, thereby varying the air gap. The farther the poles are apart the greater the vibration permissible before the armature touches the pole pieces, although, of course, the sensitivity will be somewhat reduced. Therefore, the speaker can be adjusted according to the input with which it is to be supplied.

A large diaphragm, some 15 in. in diameter, is driven by the mechanism. This diaphragm is housed in a metal stamping, so that the whole unit forms one complete assembly, which can be built into a cabinet or set without any difficulty. Another interesting point is that there are six tappings on the winding, intended to match the speaker to different types of output valves having impedances of 250, 500, 1,250, 1,500, 2,500, and 3,000 ohms respectively.

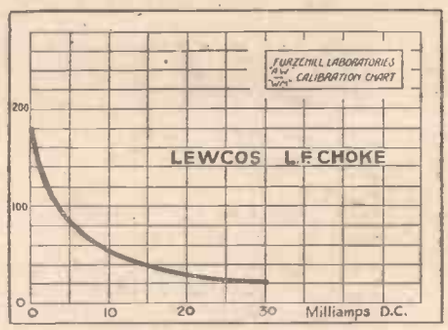
We measured the impedance at 400 cycles on each of these tappings and found them to be as shown in the accompanying table. It will be seen, therefore, that most of the values are approximately twice those of the recommended valve, which is of the right order for best matching. Valves having impedances as low as 250 and 500 ohms are not in everyday use, but we presume that these taps have been included to allow those readers who possess step-down transformers to make use of them.



The new Wufa 60-pole speaker

We chose the tapping which gave the best matching to our own amplifier and tested the speaker out on signals. The results were good, the sensitivity being of a high order and the quality also above the average. If anything, there was a slight loss in the upper frequencies, but we did not notice any marked resonances in any part of the scale. The instrument will handle a large power and can be recommended.

Valve impedance quoted.	*Impedance at 400 cycles.*
250	500
500	810
1,250	1,400
1,500	2,700
2,500	4,250
3,000	6,500



Characteristic curve of the Lewcos L.F. choke

Lewcos L.F. Choke

THE Lewcos L.F. choke which we have tested this week is built on the same generous lines as the L.F. T.5 transformer, which, by the way, has just been reduced in price. The same iron circuit is employed, so that one expects to find a large inductance, together with good current-carrying capacity. When we tested the instrument we were not disappointed, as the curve accompanying this test report will show. The inductance with no D.C. flowing was 220 henries, this value falling off somewhat rapidly as the polarising current increased. The inductance, however, is well maintained, being still 20 henries when 30 milliamps steady current is flowing through the choke.

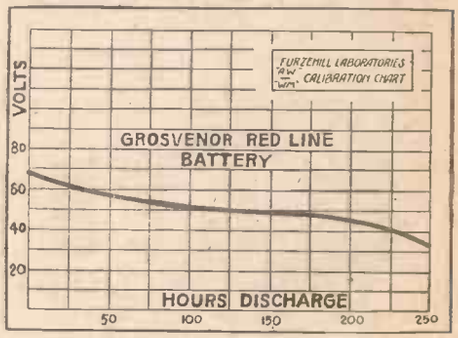
The dimensions of the instrument are 2¾ in. by 2¾ in. by 3¾ in. high. It is housed in the familiar blue metal case and is a useful addition to the range of Lewcos products.

Grosvenor Red-line H.T. Battery

THE Grosvenor Red-line battery which is reported on this week is well up to the standard which we should expect. Grosvenor batteries have been marketed for some time now and have achieved a reputation for reliability. The present model, although relatively small in size, measuring 9¾ in. by 3¾ in. by 2¾ in., gave a good performance. The voltage is 66, tappings being taken every 6 volts. The battery was discharged through a constant resistance, the discharge commencing at 7 milliamps and continuing until the voltage fell to half the initial value. This did not occur until after 264 hours, giving a discharge of nearly 1,400 milliampere hours. This is a high figure even for the modern battery, so that the results must be considered above the average.

One of the new Grosvenor High-test H.T. batteries

Constancy of voltage during the useful life is one of the claims made for this battery. The curve given herewith shows the manner in which the voltage falls during the discharge period.



The good performance curve of the Grosvenor H.T. battery

"THE 'CENTURY SUPER'"

(*Continued from page 714*)

potentiometer. This has its sliding contact taken to the screens of both screen-grid valves, so that the voltage of both screens can be adjusted. The fixed resistance prevents the application of too high a voltage and so safeguards the valves.

In order to avoid a steady flow of current from the high-tension supply, one end of the potentiometer passes to a switch contact and so the circuit is disconnected when the set is "off." A smooth control of the volume is obtained by adjusting the potentiometer, as this varies the characteristics of the screen-grid valves. At the same time the directional effect of the frame aerial must not be overlooked.

I have not found the frame aerial to be too directional, but there is a well defined minimum point. As you turn the frame you will notice that at first the signals do not vary much in strength, but presently a point is reached where they fall off rapidly and soon will disappear with a good frame.

This property of a frame aerial is hardly needed in tuning, but the point is that if the frame happens to be in quite the wrong direction for a given station, nothing of it will be heard. The directional properties of the frame are not needed in order to separate the London station from Mühlacker, for instance, the tuning of the set being good enough for this.

As a test of selectivity this is about as severe as one could wish for, as both stations are powerful and the frequency separation is 9 kilocycles. Even closer tuning is possible, however, so that it must be considered exceptionally sharp.

There are two separate windings on the frame aerial, one for the long waves and the other for the medium waves. Stranded wires are used. Solid wire is not so good, both electrically and mechanically. Tuning is a little sharper with a good frame and the strength is greater.

The frame windings can be used separately, on the medium wave one can be connected in parallel with the long-wave winding, using a simple switch. When the coils are to be used in parallel only one centre tap is needed.

A large frame is not needed. Actually, the signals are strengthened by using a larger frame, but we do not want the frame to be so large that it is unwieldy. A fair sized frame collects signals of ample strength and is easily handled.

The connecting wires between the frame and the set ought not to be too long, as they are part of the tuned circuit. If, therefore, the wires are free to move about easily the tuning is upset. A few ebonite spacers may be used with advantage to hold the wires and to avoid this.

Next week I shall describe the operation of the set and give a few hints regarding the valves as well as the wiring. Actually, the adjustment of the set is easy, but there are a few points of interest.

THE "SUPER" ON VIEW

Why not see the "Century Super" before you start the constructional work? Models are on view in London at Selfridge's, W.1; Ready Radio, 159 Borough High Street; Peto-Scott, 77 City Road and 62 High Holborn; H. & B. Radio, 34/8 Beak Street, W.; and in Manchester at Lewis's, Ltd.

The Federal Radio Commission in the U.S. has adopted the recommendation of the recent television engineering conference regarding the re-allocation of the assignments of the nineteen experimental stations so as to afford greater geographical separations and eliminate interference on the short-wave channels.

It should be noted that the price of Sovereign compression-type condensers was given incorrectly in Messrs. Sovereign Products Ltd. announcement in last week's issue. The price of these handy little components is, of course, 1s. 6d.

A Mullard development is the use of a sprayed metal coating on the bulbs of new valves, this thin metallic film acting as a screen for H.F. "Strays." These new valves are thus more stable in working, although the natural efficient characteristics are not impaired.

SPECIFIED FOR THE "CENTURY SUPER"

ADDITIONAL WEARITE COMPONENTS FOR THE "CENTURY SUPER"

WEARITE DUAL-RANGE FRAME AERIAL

Entirely new in design and embodying exclusive features which give extremely high efficiency. The windings are of Litzendraht wire, carefully wound at even tension throughout, in order to maintain the accuracy of spacing. The winding is centre-tapped and provided with the necessary three terminals for connection to set. The change from short to long waves is affected by means of a switch at the base: no other alterations to connections are necessary. The frame aerial swings through 180 degrees and is mounted on a polished mahogany base. It is of particularly handsome appearance. PRICE **42/-**

WEARITE THREE-POINT SHORTING SWITCH

Push-pull action. Sound self-cleaning contact. With insulated spindle. PRICE **1/6**

WEARITE GRID-LEAK HOLDER

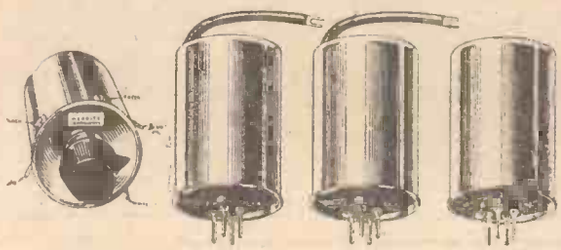
Has new type contact spring clips. Fits any size grid leak. PRICE **6d.**

WEARITE VALVE HOLDER

Robust construction. Sprung sockets ensure good contact. Fitted with terminals and soldering tags. PRICE **1/3**

The Coils chosen by Mr. W. James for his "Century Super" are made specially by Wright & Weaire Ltd., the oldest established firm in the Wireless Components Industry

The outstanding performance of this receiver is only made possible by the use of Wearite SUPER-HET COILS.



The Oscillator Coil is designed for panel mounting and is fitted with flexible connecting leads. The three long-wave coil units are fitted with standard valve pin bases so that they may be mounted in ordinary 4-pin valve holders.

Price of complete set of coils **50/-**

(Illustrated descriptive leaflet explaining the unique construction of these coils will be sent on request.)

TRIPLE COIL BASE

Base for above coils, complete with terminals and tags. Coil sockets are sprung similar to valve holders. PRICE **2/9**

Send for Free Illustrated Lists

WEARITE COMPONENTS

WRIGHT & WEAIRE LTD.

740, HIGH ROAD, TOTTENHAM, N.17

Telephone: Tottenham 3847-8-9

A "CENTURY SUPER" ON THE ROAD

BECAUSE the "Century" is a set of the transportable variety, the only parts outside the cabinet being the batteries and speaker, it is very well suited for out-of-door use, especially in the car. It is easy to make the "Century" in a self-contained cabinet, but as shown here by this set which is made up from a kit of Peto-Scott "Pilot" parts, the standard "Century" is quite a portable affair and well suited to out-door use.

"Century" builders will be interested to know that a set made with a "Pilot" kit has given the following very satisfactory and lengthy list of stations. These, it will be seen, are obtained with 180-degree dials and it is interesting to compare these readings with those obtained on a set having 100-degree dials.

Station	*Frame*	*Oscillator*
Nurnberg	36	71
Gleiwitz	44	79
Horby	46	81
London National	50	83
Heilsberg	57	90
Bratislavia	59	91
Copenhagen	60	92
Huizen	68	100
Goteburg	78	109
Breslau	79	111
Barcelona	89	119
London Regional	93	123
Algiers	96	126
Hamburg	99	128
Lvov	103	131
Toulouse	104	133
Frankfurt	106	134
Katowice	112	141
Berlin	116	144
Belgrade	120	148
Rome	124	152
Beromunster	131	157
Langenberg	135	160
North Regional	137	162
Milan	144	169
Vienna	152	174
Munich	155	178
Leningrad	89	102
Oslo	97	110
Kalundborg	110	123
Moscow	128	140
Motala	133	144
Warsaw	138	148
Eiffel Tower	143	152
Daventry	153	160
Zeesen	163	168
Radio Paris	172	172

A "Century Super" built with a "Pilot" kit, being tried out on the road

Messrs. Peto-Scott have submitted to us a "Century Super" set built from a "Pilot" kit. In general appearance it very closely resembles our own models, and follows the specification given in AMATEUR WIRELESS, with the exception of some small details of no particular importance. The coils and other chief components are, of course, as specified by us. We submitted a built-up kit to test, and have pleasure in saying that its performance is quite satisfactory.

RADIOGRAMS

SPEECHES by Lord Brentford and Lord Moynihan, at a dinner given in connection with National "Safety First" Week, will be relayed from Leeds on May 13, in the National programme.

London Regional listeners are to hear a relay from Bournemouth on May 23 of a concert by the Bournemouth Municipal Orchestra, conducted by Sir Dan Godfrey.

Arthur Young is an example of the youthful British composer who has "made good" in foreign lands. Berlin dances nightly to his dance rhythms and jazz tunes. On May 4 in the National programme and May 7 in the Regional programme, listeners to B.B.C. vaudeville will hear his music as a link between items which are to be provided by Gillie Potter, Greta Keller, and Mischa de la Motte. The programme will also include a sketch, *Crocus*, by Reginald Beckwith.

Stanford Robinson will conduct the B.B.C. Symphony Orchestra in a performance of "The Dream of Gerontius," by Sir Edward Elgar, in the Queen's Hall, London, on May 18.

A full-length play for broadcasting in the National programme on May 15 is *The Forest*, by John Galsworthy. With Dulcima Glasby as adapter and Howard Rose as producer, the B.B.C. is providing the strongest combination at its command to ensure a thrilling broadcast.

A mystery of the sea, based upon a true story, forms the theme of L. du Garde Peach's play, *The Mary Celeste*, which is to be broadcast on May 7 and 8. The broadcast version is by L. du Garde Peach himself. Listeners will get plenty of thrills from the broadcast, which will have a cast of thirty artistes.

Speeches by the Lord Mayor of Hull and Mr. John Drinkwater will be heard by North Regional listeners on May 5, when a banquet is held to celebrate the six hundredth anniversary of the granting of a charter by King Edward III to Hull.

The Three Valleys Festival will be held in the Pavilion, Mountain Ash, from May 9 to 16 inclusive. This is the second annual festival and the National Orchestra of Wales will again take part. Three concerts will be relayed to Cardiff listeners.

The Abbey Players, on their next monthly visit to the Belfast studio, which occurs on May 4, will present two plays, *Spring*, a play in one act by T. C. Murray, and *Meadowsweet*, a pastoral comedy in one act, by Seamus O'Kelly. Incidental music will be provided by the Radio Septet.

In order to escape from interference caused by the transmissions of the Trades Unions' station at Moscow-Stchelkovo, Motala (Sweden) has altered its wavelength to 1,352 metres (221.7 kilocycles).

The city of Nidaros (Norway), formerly Trondhjem, has been re-christened Trondheim, and the call from the broadcasting station has been altered in accordance.

In addition to the 150-kilowatt high-power transmitter to be built at Lahkihegy for the Hungarian broadcasting authorities, it is also proposed to instal a 5-kilowatt station at Nyiregy-Naza, close to the Romanian border and to open smaller relays at Miscolcz, Magyarovar, and Pecs.

The construction of the new Radio Paris transmitter is rapidly nearing completion and tests are to be expected very shortly. The plant has been so planned that the power, when desired, can be increased to 120 kilowatts (aerial).

Radio Lyon (France) will relay foreign stations on the first and third Saturdays in May, June, and July. These transmissions are to be extended to midnight B.S.T.

J3DE, the only short-wave amateur station in Wakayama Prefecture, Japan, exchanged communications with an amateur station in Madrid recently.

The only radio journal in Europe to have three successive morning editions—daily except Monday—is the journal broadcast by station EAJ7, Union-Radio, Madrid. The first edition is broadcast at 8 a.m. every day, the second at 8.20 a.m., and the third at 8.40 a.m. The radio journal begins every edition with a few gramophone notes of Rossini's opera, *William Tell*. The announcer is a woman and the news she broadcasts is nearly the same for all three editions. The journal is called *La Palabra*, meaning "the word."

The new French Government station, Bordeaux-Lafayette, recently underwent its final tests. Its transmissions are unusually clear. It will be used chiefly for communication with overseas colonies and for Press communications for North and South America.

With the hope of improving acoustics in the Law Courts, an experiment was made in the Divorce Division with two microphones, one placed in front of Lord Merrivale, on the bench, and another in the witness box, with loud-speakers suitably placed.

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 (G5SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	70.0
376.4	797	Glasgow	1.2
398.9	752	Midland Reg.	38.0
479.2	626	Manchester (temp)	1.2
479.2	626	North Regional testing	70.0
1,554.4	193	Daventry (Nat.)	35.0
AUSTRIA			
219	1,370	Salzburg	0.6
246	1,220	Linz	0.6
283.9	1,050	Innsbruck	0.6
351.7	853	Graz	9.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
also testing on about 1,100 m.			
BELGIUM			
206	1,456	Antwerp	0.4
215.5	1,392	Chatelineau	0.25
216	1,391	Radio Conférence Brussels	0.25
245.1	1,223.7	Schaerbeek	0.5
338.2	887	Brussels (No. 2)	20.0
509	590	Brussels (No. 1)	20.0
BULGARIA			
319	941	Sofia (Rodno Radio)	1.0
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
293	1,022	Kosice	2.5
341.7	878	Brunn (Brno)	22.0
487	617	Prague (Praha)	5.5
487	617	Cesky Brod (testing shortly)	75.0
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
296.1	1,013	Tallinn	0.7
463	648	Tartu	0.5
FINLAND			
221	1,355	Helsinki	15.0
291.5	1,029	Tampere	1.0
1,796	167	Lahti	54.0
FRANCE			
219.3	1,368	Béziers	0.6
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
237.2	1,263	Bordeaux-Sud-Ouest	2.9
249	1,205	Juan-les-Pins	0.5
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
307.6	975.2	Bordeaux (PTT)	35.0
313.8	956.8	Natan-Vitus (Paris)	0.5
317.3	945.4	Marseilles (PTT)	1.5
327.5	916	Grenoble (PTT)	3.0
329.5	910.3	Poste Parisien	1.2
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	1,383	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
559.7	536	Kaiserslautern	1.0
559.7	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	9,599	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 (1FS)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
25.4 and 80		Rome (3RO)	9.0
296.8	1,012.2	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
366.2	819.2	Frederiksstad	0.7
453.2	662	Porsgrund	1.5
493.4	608	Trondheim	1.2
580.3	517	Hamar	0.8
1,071	280	Oslo	75.0
POLAND			
214.2	1,400	Warsaw (2)	14.0
234	1,283	Lodz	2.2
312.8	959	Cracow	1.5
335	896	Poznan	1.9
368.1	815	Wilno	20.0
381	788	Lvov	21.0
408	734	Katowice	16.0
1,411.8	212.5	Warsaw —Raszyn	158.0
PORTUGAL			
240	1,250	Oporto (Teatro Apollo)	0.25
284.7	1,053.6	Lisbon (CTIAA)	0.25
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
427	702.5	Kharkov	4.0
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	100.0
1,060	283	Tiflis	15.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov (RV4)	25.0
1,304	230	Moscow (Trades Unions)	165.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	20.0
SPAIN			
253.5	1,188	Barcelona (EAJ15)	1.0
268	1,121	Valencia	8.0
349	860	Barcelona (EAJ1)	8.0
338	815	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
307	977	Falun	0.65
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,229.5	244	Boden	0.75
1,352	221.7	Motala	40.0
SWITZERLAND			
244.1	1,229	Basle	0.65
245.9	1,220	Berne	1.1
403.5	743	Söttens	25.0
459.2	653	Beromuenster (testing)	60.0
680	442	Lausanne	0.6
760	395	Geneva	1.5
TURKEY			
1,216.2	246.6	Istanbul	5.0
1,538	195	Ankara	7.0
YUGOSLAVIA			
305.1	983	Zagreb (Agram)	0.7
430.6	696	Belgrade	3.0
574.7	522	Ljubljana	2.8

DAY AND NIGHT RANGES

BROADCAST programmes on 200 metres or over generally come in best at night. Even long-wave commercial stations, which have a range of 3,000 miles or more at night, drop to 300 or 400 miles during the daylight hours. The reverse holds if one goes far enough down the wavelength scale. For instance, beam signals sent on wavelengths between 15 and 30 metres can be received at good strength 10,000 miles away during the day, though they have a comparatively small range at night. The explanation lies in the change of altitude in the Heaviside layer as the sun rises and sets.

M. A. L.

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.

OUR LISTENING POST

By Jay Coote

HAVE you noticed that for the past week or so a slight alteration has been made in the call put out by the Copenhagen station? As the short-wave transmitter has been transferred to Skamleback, the name of Lyngby drops out of the announcement, which now reads: "*Koebenhavn, Kalundborg og* (and) *Danemarks kortboelgesender*" (short-wave transmitter). Up to the present the Dane has not used an interval signal, but when gaps existed in the programme he has satisfied his listeners with a gramophone record or so. Imitation, however, being the sincerest form of flattery, Copenhagen, in future, intends to take a leaf out of Oslo's book of words and has decided to adopt a similar signal, namely, a few notes from the theme of a Danish folk song.

What the "Super" Will Do

In passing, I must add that one advantage I have reaped from the use of a "Century Super" is the steady reception at good loud-speaker strength of announcements made by the lady of Reykjavik. Although previously I had a slight doubt regarding the call, I can now give it in full; it is, "*Utvarpsstoed Islands i Reykjavik*" (phon.: *Ray-kce-yar-veek*), and when signing off her last words are *Goda natt*. It differs slightly from the greeting sent from Denmark, Norway, and Sweden.

The transfer of Midland Regional to 398.9 metres, I fear, in some instances, may render the reception of Söttens and Katowice somewhat difficult on all but selective receivers. (By the way, I can separate them perfectly with the "Super" and frame aerial.) It is a pity, as I know that from Geneva and Lausanne there are frequently excellent programmes to be picked up and they should not be missed. However, the close proximity of such powerful stations was bound to upset the apple-cart. For the time being Langenberg is being received at better strength. Later, in December, when the new 75-kilowatt station is launched on the ether, with Northern Regional as its immediate neighbour, we may, I take it, expect further trouble. As it is rumoured that the Cologne plant is to be transferred to Treves and that Muenster and Aachen are to close down, some less fortunate listeners may have to erase the "Westdeutsche" concerts from their daily log.

In Spain

Out of sheer curiosity, on the eventful April 14, I turned my frame aerial towards Spain; I was anxious to ascertain whether and in what manner the advent of a republic would affect the programmes. As luck would have it, I tuned in to Madrid at the exact moment of an announcement to the effect that a message would be broadcast by Alcala Zamora, the President of the Provisional Government. So far as I could ascertain, it was relayed by all the Union Radio net. Later I found Madrid, Barcelona, and San Sebastian broadcasting their usual musical and dance programmes as if nothing special had happened.

British Summer Time, this year was adopted by France, Spain, and Belgium on the same date; Holland, as usual, did not come in with us, but changes over on May 15. Bear in mind, therefore, that until that date Dutch time will be forty minutes *behind* B.S.T. and afterwards, as hitherto, namely, twenty minutes *in advance*. It makes all the difference between hearing a concert from Hilversum—or missing it. B.S.T. now brings us on a level with most of the Continental states, at least, all those working to Central European time. Make a note, however, that Algiers and Rabat (Morocco) do not alter, but retain Greenwich mean time. Russia, I understand, has advanced its clocks one hour.

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.

Triotron Valves

FROM Triotron comes an interesting little folder, complete with curves and characteristics of Triotron screen-grid valves. I confess I did not know that such a complete range of screen-grid valves is available in this make, both for battery and mains operation. You should certainly get this folder. **236**

Ever Ready Batteries

Nowadays most of us use a dry battery of some kind, even if it is only for grid bias or in a pocket torch. For that reason I think everyone should have the new Ever Ready catalogue which describes and gives full details of practically every type of Ever Ready battery, accumulator and accessory. **237**

The Ferranti Console

I advise everyone in search of a really high-quality set to write through my free catalogue service for a fine illustrated folder, which tells the whole story of the Ferranti rexine-covered console set. This is an all-electric three-valver, with one screen-grid stage and fitted with a magno-dynamic speaker in the top part of the cabinet. Useful technical information is given in the leaflet. **238**

A New Portable

Electrical & Radio Products, Ltd., have brought out a fine screen-grid four-valver made up in a portable type cabinet. A special feature is the low H.T. consumption, the demand from the battery being only six milliamperes. Full details are given in a free folder. **239**

The New PM254

The well-known Mullard PM254 super-power valve has always been a firm favourite and I see that rather than change this type concurrent with new valve developments, Mullards have wisely decided to retain this valve but to embody certain improvements in it. You can get, free, a folder giving details of the new and improved characteristics of the PM254 which is now truly a super super-power valve. **240**

For Selectivity

As the working of Moorside Edge has produced a new need for selectivity, the General Electric Company, Ltd., have reduced the price of the Gecophone wave-trap.—OBSERVER. **241**

PREPAID ADVERTISEMENTS

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.

PATENTS.—Trade Marks, Advice Handbook free.—B. T. King, Regd. Patent Agent, 146a Queen Victoria Street, London.

PERSONS WANTED as manufacturing agents, new and interesting industry. Regular work supplied, cash paid weekly. Write E. 87, "Everlast" Leather Matting Co., Wellingborough.

CHARGE YOUR H.T. FROM YOUR L.T. AT HOME. Wonderful discovery. Fox's Recharger will trickle-charge H.T. accumulators. Ratio, ¼ amp. Set can be on or off safely. Fitted 2 minutes. Guaranteed, 6/6 (diagram only, 1/6).—Fox, 188 Camberwell Grove, S.E.5.

A.C. H.T. ELIMINATORS, from 65/-, or 12 monthly payments of 6/-. A.C. H.T. Eliminator Kits from 43/- to 62/6; cash or monthly terms. Cabinet Speakers, 12/6 each, worth double. Cash or C.O.D.—Servwell Wireless Supplies (Dept. M.O.), 74 Gough Street, London, E.14.

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.

TRICKLE CHARGERS, A.C. mains for 2- and 4-volt accumulators, 0.5 amp., no upkeep, 18/6, carriage paid.—A. Benoit, 4 Manor Gardens, Gunnersbury Avenue, London, W.3.

"BEST BY 3" radiogram in cabinet, all parts new, including Lewcos coils, valves and Ekco H.T. mains unit, Blue Spot speaker and pick-up. Set never completed through owner travelling north England. What offers —Box No. 33, "Amateur Wireless," 58 Fetter Lane, E.C.

COLUMBIA 16-gn. portable, as new, £8 8s. cash.—Dunn and Duncan, 87 Chancery Lane, W.C.

FREE. TELSEN RADIOGRAND TRANSFORMER to every purchaser of a Wates 8-pole Star Unit. Send 25/- plus 1/- postage and take advantage of this offer now. Details of other bargains on request.—John Strait, 18 Mitcham Road, East Ham, London.

"BROOKMANS 4."—Coils and other components selling half-price.—"Chauffeur," Southbar, Renfrew.

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

SALE.—Ferranti A.F.5 (c), O.P.M.2 (c); Lewcos binocular coils, new (offers); also experimenter's surplus. Stamp particulars.—H. Hobbs, Bucknell, Salop.

MOORSIDE EDGE.—Special device to cut out new station within three degrees. Results guaranteed or money returned. Price 5/6, postage 3d. extra.—Wainwrights, Wireless Engineers, Wakefield Road, Ossett. Telephone 16.

A MAGNIFICENT SET.—The National and Regional Three, absolutely complete, including Tungsram valves, 2-volt accumulator, 100-volt H.T. battery, B.T.H. 45/- loud-speaker. Perfect reception from home and foreign stations. Guaranteed 12 months. Amazing value, £4, inclusive.—H. Panagakis, Radio Manufacturer, 91 Dale Street, Liverpool.

ENGINEERS, CAN'T WE GET TOGETHER?—All we ask is the chance to prove that you can earn £300, £400, and even £1,000 per year and more. Other men are doing it and you can do the same. If you wish for something more than a "bread and butter" job, you owe it to yourself to investigate our service. Our new handbook, "Engineering Opportunities," contains, amongst other intensely interesting matter, details of B.Sc., A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., A.M.I.A.E., A.M.I. Struct.E., M.R.San.I., L.I.B.O., F.S.I., G.P.O., C. & G., etc. Exams., outlines courses in all branches of Civil, Mechanical, Electrical, Motor, Wireless, Aeronautical, and Talkie Engineering, and explains the unique advantages of our Appointments Department. We alone guarantee "No pass—no fee." This is your opportunity. Send for our new handbook to-day. State subject or exam. of most interest (free and post free).—British Institute of Engineering Technology, 109 Shakespeare House, 29-31 Oxford Street, London.

BANKRUPT BARGAINS.—List free with 3-v. diagram. .0005 variable, 2/6; differentials, 2/6; S.M. dials, 1/6; dual coils, 5/- and 8/6; H.F. chokes, 1/6; transformers, 2/9; Telsen A.C.E., 6/6; Radiogrand, 9/6; valves, speaker units, eliminators, etc. 3-v. kits, 35/-; 2-v., 24/-, with cabinets.—Butlin, 143b Preston Road, Brighton.

It is understood that a new main cable has just been constructed from Manchester to Liverpool with special screened conductors, for the B.B.C.

Broadcasts from the Vatican (Rome) short-wave station are now taking place regularly at the following times: on 19.84 metres from 10.0 to 10.30 a.m. B.S.T. and on 50.26 metres from 7.0 to 7.30 p.m. B.S.T. Transmissions in telegraphy follow the telephony broadcasts.

From statistics issued by the German Ministry of Posts and Telegraphs it is computed that of the total number of sets used only 16 per cent. are now crystal sets.

The B.B.C. is inaugurating an important new series of orchestral concerts in the big studio at the Edinburgh station. A Scottish orchestra of about forty players has been assembled, and the series will be continued throughout the summer months.

An effort is being made to extend the usefulness of the Wireless League in Scotland. The League has appointed Mr. Andrew Aitken, 8 Fortrose Street, Glasgow, as the honorary secretary for Scotland.

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

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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When ordering, please send Postal Order, NOT STAMPS.

CRYSTAL SET (6d.)

B.B.C. Crystal Set AW284

ONE-VALVE SETS (1s. each)

One Control One AW267
Regional Ultra-selective One AW278
B.B.C. One AW280
Hartley One WM198

TWO-VALVE SETS (1s. each)

Talisman Two (D, Trans) AW194
No-battery A.C. Mains Two (D, Trans) .. AW230
No-battery Gramo-radio 2 (D, Trans) AW238
1930 Talisman 2 (D, Trans) AW239
Searcher Two (D, Trans) AW245
Arrow Two (D, Trans) AW249
Forty-five-shilling Two (D, Trans) AW250
Searcher Short-wave 2 (D, Trans) AW259
Challenge Two (D, Trans) AW261
Loftin-White Two (A.C. Mains) AW263
Everybody's All-in 2 (D, Trans) AW273
Twenty-Shilling Two (D, Trans) AW274
Brookman's Two (D, Trans) WM168
Gleaner Two (D, Trans) WM201
Music Monitor (D, Trans) WM208
Merlin Two (A.C. Set) WM213
Five-Point Two (D, Trans) WM220
Brookman's A.C. Two (D, Trans) WM225
Aladdin Two (D, Trans) WM231

THREE-VALVE SETS (1s. each)

1930 Clarion Three (SG, D, Trans) AW223
Beginner's Regional Three (D, 2LF) AW233
The "A.W." Exhibition 3 .. .. .. AW247
Push-Pull "Two" (D, Push-Pull) AW270
1931 Ether Searcher (SG, D, Trans) AW271
1931 Ether Searcher (A.C. model) AW276
Mains Unit AW277
Ultra-Selective Straight Three (SG, D, Trans) AW282
1931 Ether Searcher (D.C. model) AW284
Mains Unit AW285
Fanfare Three (D, 2 Trans) WM157
Brookman's Three (SG, D, Trans) WM161
Brookman's Push-Pull Three (SG, D, Trans) 1/6 WM170
Inceptordyne (SG, D, Pentode) WM179
Music Marshal (D, 2 Trans) WM190
Concert Three (D, 2 Trans) WM199
De-Luxe Three (D, RC, Trans) WM209
Five-Point Three (SG, D, Trans) WM212
Falcon Three (A.C. Set) WM217
New Brookman's Three (SG, D, Trans) .. WM218
Five-point Short-waver (D, RC, Trans) .. WM223
Baffle-Board Three (D, RC, Trans) WM226
Plug-in-Coil Three (D, 2 Trans) WM232
Regional Three (SG, D, Trans) WM236
Gramo-radio A.C. Three (SG, D, Trans) .. WM237

FOUR-VALVE SETS (1s. 6d. each)

Horizon Four (SG, D, 2 Trans) AW237
Challenge Radio Gramophone (SG, D, RC, Trans) AW265
Lodestone Four (HF, D, RC, Trans) WM193
Searcher's Four (SG, D, RC, Trans) WM194
Regional Band-pass Four (SG, D, RC, Trans) WM211
Five-Point Four (SG, D, RC, Trans) WM216
Regional A.C. Four (SG, D, RC, Trans) .. WM223
Supertone Four (SG, D, Push-pull) WM227
Brookman's Three-Plus-One (SG, D, RC, Trans) WM233

FIVE-VALVE SETS (1s. 6d. each)

James Quality Five (2SG, D, RC, Trans) .. AW227
Companion Portable (2HF, D, RC, Trans) .. AW279
1930 Five (2HF, D, RC, Trans) WM171
Radio-Record Five (SG, D, Trans-parallel) .. WM188
Overseas Five (3SG, D, Trans) WM191
Regional A.C. Five (3SG, D, Trans) WM224

SIX-VALVE SETS (1s. 6d. each)

Century Super (Super-het) AW287
Hyperdyne Receiver WM221
Super 60 (Super-het) WM229

AMPLIFIERS (1s. each)

"A.W." Gramophone Amplifier AW205
Two-valve Amplifier AW210
Simple Gramophone Amplifier AW257
High Quality Amplifier for A.C. Mains AW275
2-Watt Amplifier for A.C. Mains AW283
Radio-Record Amplifier (DC Mains) WM183
Selecto Amplifier (HF, Unit) WM219

MISCELLANEOUS (1s. each)

Simple Tester Unit (6d.) AW246
"A.W." Improved Linen-diaphragm Speaker .. AW248
Handy L.T. and G.B. Unit for A.C. Mains .. AW254
Our H.T. Unit for A.C. Mains AW264
Gramophone Tone Control AW264
Short-wave Super-het Adaptor AW268
H.T. Unit and Trickle Charger for D.C. Mains AW272
Booster Speaker AW286
"W.M." Standard A.C. Unit WM214
"W.M." Standard D.C. Unit WM215
Falcon A.C. Unit WM219
Hyperdyne Short-wave Adaptor WM228
Big H.T. Unit for A.C. Mains WM230

PORTABLE SETS

Continental Portable (SG, D, Trans) .. AW241 1/-
Companion Portable (2HF, D, RC, Trans) AW279 1/6
Pedlar Portable Two (D, Trans) .. WM195 1/-
Pedlar Portable Three (D, 2 Trans) .. WM197 1/-
Super 60 Portable (Super-het) WM238 1/6

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

Address letters:

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Sole Agents for South Africa: CENTRAL NEWS AGENCY, LIMITED. Sole Agents for Australasia: GORDON & GOTCH, LIMITED. Saturday, May 2, 1931

SUPER RESULTS WITH OUR "HOT" SET

THE HOW AND WHY OF THE VALVE

Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVIII. No. 465 Saturday, May 9, 1931

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

RANGE THE WORLD *with* The LEWCOS (Regd)

THIS new LEWCOS achievement—the Super-het Coil Kit—which has a nine-kilocycle wave-band separation and consists of one triple wave-band Oscillator Coil, two I.F. Coils with "pigtails," and one I.F. Coil without "pigtails," marks a new epoch in radio reception. The I.F. Transformers are accurately matched, thus giving a remarkable degree of efficiency.

This Kit, which is recommended for the "Century Super," can also be fitted with extraordinary ease in any set of similar design and the results will be truly astounding!

The small space available is completely inadequate to give even a short description of these wonderful new LEWCOS Coils, and you are invited to write for an illustrated explanatory leaflet.

SUPER-HET COIL KIT

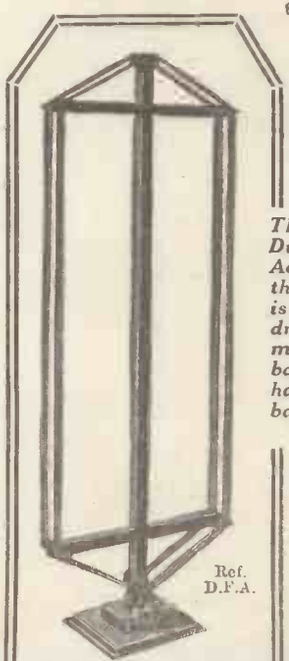
(*Patent Pending*)

which is recommended *for the* **"CENTURY SUPER"** receiver described in this issue.

Price **50/-**

Ref. S.H.K. No. 1.

BRITISH THROUGHOUT



This is a photograph of the LEWCOS Dual Range Centre-Tapped Frame Aerial which is recommended for the "Century Super." The Frame is wound with silk-covered Litzendraht wire and the switch and terminals are mounted on the moulded base, thus presenting a neat and handsome appearance. The wave-band change is effected by the turn of a knob.

PRICE 32/6

LEWCOS "Spaghetti Resistances" of 15,000 and 20,000 ohms each
PRICE 1/6 each
are specified for the "Century Super"

A COMPLETE KIT OF PARTS FOR THE "CENTURY SUPER," WHICH INCLUDES THE LEWCOS SUPER-HET COIL KIT AND THE FRAME AERIAL, CAN BE OBTAINED FROM

READY RADIO LIMITED.
H. & B. RADIO COMPANY
AND THE
PETO-SCOTT CO., LTD.

—See separate advertisements in this issue—

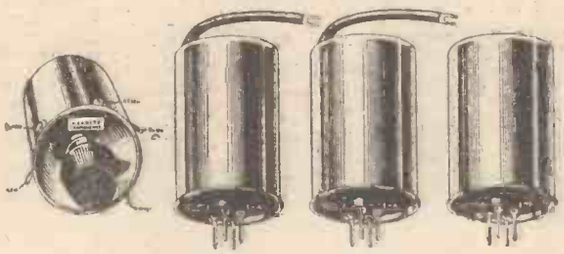
LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

SPECIFIED FOR THE "CENTURY SUPER"

The Coils chosen by Mr. W. James for his "Century Super" are made specially by Wright & Weaire, Ltd., the oldest component manufacturers in the industry

The outstanding performance of this receiver is only made possible by the use of Wearite



WEARITE SUPER-HET COILS

The Oscillator Coil is designed for panel mounting and is fitted with connecting tags. The three long-wave coil units are fitted with standard valve pin bases so that they may be mounted in ordinary 4-pin valve holders.

Price of complete set of coils **50/-**

(Illustrated descriptive leaflets explaining the unique construction of these coils will be sent on request.)

TRIPLE COIL BASE

Base for above coils, complete with terminals and tags. Coil sockets are sprung similar to valve holders. PRICE **2/9**

3-coil strip and 5-valve strip with all essential wiring complete as one chassis. PRICE **7/-**

Send for Free Illustrated List.

WEARITE

COMPONENTS

WRIGHT & WEAIRE, LTD.

740 HIGH ROAD, TOTTENHAM, N.17

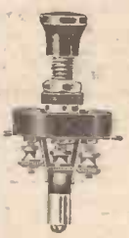
Telephone : Tottenham 3847-8-9

ADDITIONAL WEARITE COMPONENTS FOR THE "CENTURY SUPER"

WEARITE DUAL-RANGE FRAME AERIAL

Entirely new in design and embodying exclusive features which give extremely high efficiency. The windings are of Litzendraht wire, carefully wound at even tension throughout, in order to maintain the accuracy of spacing. The winding is centre-tapped and provided with the necessary three terminals for connection to set. The change from short to long waves is affected by means of a switch at the base: no other alterations to connections are necessary. The frame aerial swings through 180 degrees and is mounted on a polished mahogany base. It is of particularly handsome appearance. PRICE **42/-**

(Price per complete set of parts), less wire **30/-**



WEARITE THREE-POINT SHORTING SWITCH

Push-pull action. Sound self-cleaning contact. With insulated spindle. PRICE **1/6**

WEARITE GRID-LEAK HOLDER

Has new type contact spring clips. Fits any size grid leak. PRICE **6d.**

WEARITE VALVE HOLDER

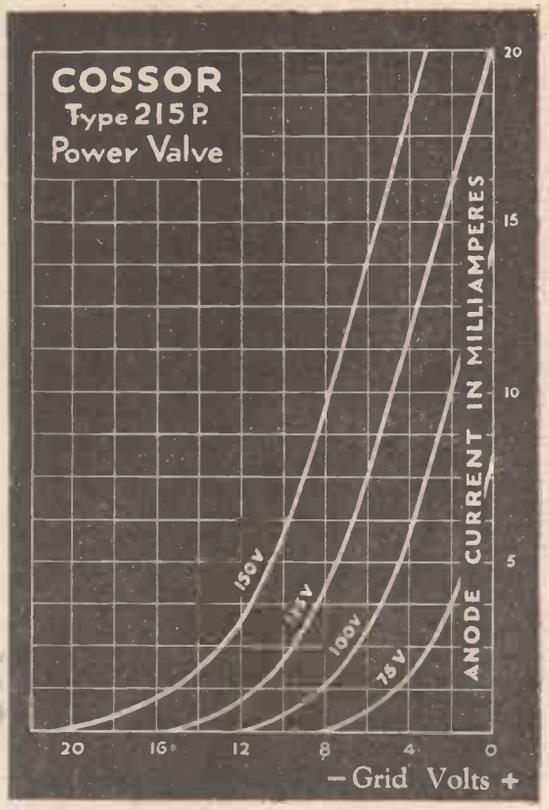
Robust construction. Sprung sockets ensure good contact. Fitted with terminals and soldering tags. PRICE **1/3**

GENUINE PAXOLIN PANELS MAHOGANY OR BLACK FINISH

12 × 8 × ¼ (Drilled to specification). **5/9**

12 × 8 × ⅛ (Drilled to specification). **4/-**

Simple facts for Valve Users



How Cossor ensures distortionless reproduction

THE quality of the reproduction of your Receiver is largely controlled by its output valve which is called upon to handle very considerable grid swings. If it is unable to do this, distortion is inevitable.

Cossor Power Valves are specially designed to meet these exacting requirements. As you can see from the characteristics of the Cossor 215 P the long straight portion of the curve will handle very large inputs with the assurance of perfect quality.

Uniformity of characteristics is ensured by the special insulated bridge method of construction which retains the various elements in life-long alignment. This method of construction is found in no other make of valve. To be certain therefore of obtaining the maximum volume with crystal clear reproduction choose a Cossor Power Valve in one of the several types available.

Over 50 types of Cossor Valves are available from any Wireless Shop to suit all 2, 4, and 6 volt Battery operated and A.C. Mains Receivers

Cossor 2 volt (Battery Operated) Power Valves

Cossor 215 P. 2 volts, .15 amp. Impedance 4,000. Amplification Factor 9. Mutual Conductance 2.25 m.a./v. Anode Voltage 75-150. Price **10/6**

Cossor 220 P.A. 2 volts, .2 amp. Impedance 4,000 Amplification Factor 16. Mutual Conductance 4 m.a./v. Anode Voltage 75-150. Price **10/6**

Cossor 220 P. 2 volts, .2 amp. Impedance 4,000. Amplification Factor 8. Mutual Conductance 2 m.a./v. Anode Voltage 75-150. Price **10/6**

Cossor 230 X.P. 2 volts, .3 amp. Impedance 1,500. Amplification Factor 4.5. Mutual Conductance 3 m.a./v. Anode Voltage 75-150. Price **13/6**

COSSOR

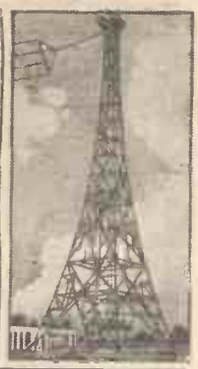
POWER VALVES

A. C. Cossor, Ltd., Highbury Grove, London, N.5.

♡ 829D

No. 465. Vol. XVIII MAY 9, 1931

Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
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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

NO SUMMER FADING

AS summer and summer-time introduced itself this year accompanied by a spell of bad weather, many of us stayed indoors and searched for stations instead of making the garden tidy or cleaning the car! And have you noticed that despite the long evenings the stations still come rolling in? Formerly we always talked of "summer effect," and prepared for a dearth of stations from May to September, but with the good sets we now have, the "summer effect" is a back number.

ANNOUNCERS, AGAIN!

"THE announcer frequently has to make his decision rapidly and seldom has time to refer to a gazetteer, or a universal pronouncing dictionary (which does not exist), so we may not be surprised if he does the best he can and gives us a purely English version. In the first three months of the present year there appeared in the news or in the programmes *over seven hundred foreign names or words taken from at least a dozen foreign languages*, and every one of them had to be pronounced, somehow or other, by the announcers. Whereas it is quite easy for any one critic to be familiar with one, two, or possibly three languages, it is quite impossible for the announcers to know all languages." So says the B.B.C.

THE PRINCE AGAIN

THE PRINCE OF WALES will be heard by National listeners on May 21, when his speech at the banquet given by the London Executive Committee of the British Empire Trade Exhibition, Buenos Aires, will be relayed from Dorchester House. A speech worth hearing, by a Prince with a fine broadcasting voice!

JOHN HENRY

JOHN HENRY, the first of English radio comedians, is visiting Australia with his wife, and is giving sketches every evening from 2UW. He was the first comedian to broadcast in this country—his first broadcast was in 1922—and since then he has written over half a million original words of revues, "double acts," and "single acts" for broadcasting.

PRINCIPAL CONTENTS

"MR. BUGGINS" MARRIES

Michael Hogan, well-known to listeners as "Mr. Buggins," and who appears before the microphone with Mabel Constanduros, was married last week to Miss Madge Saunders, the actress. Here the bride and bridegroom are leaving the church after the ceremony

A NEW BELFAST

WE understand that the Belfast station of the B.B.C.'s system will be entirely reconstructed at the same time as Daventry 5XX. Latest indications are that this reconstruction work will be put in hand before the Regional Scheme is completed. We may therefore expect work to start on the new Belfast and Daventry stations some time early next year. The present power of the Belfast station is only 1.2 kilowatts, but the B.B.C. intends to use a power of at least 15 kilowatts for the new station. It should thus offer a service to many outside the immediate region for which it is designed. We are thinking of Dublin listeners, many of whom, even now, tune in to Belfast in preference to the local station.

"STEALING" CROWD NOISES

SPECTATORS at Brooklands recently little realised that they were unwitting "supers" in Leslie Henson's play, *Speed*. Records were being taken by a "His Master's Voice" mobile recording studio of the noise of the racing cars, the applause of the crowd, and the cries of the bookmakers, and this will form a background of sound in the forthcoming production.

NEWS & GOSSIP OF THE WEEK—*Continued*

RUBBISH ?

"ACCORDING to a scientist, the air is full of rubbish. But you needn't tune in to it if you don't want to!"—*Sunday Pictorial.*

B.B.C. APPRECIATION

THE appreciations of musical broadcasts which swell the B.B.C 's postbag to the largest extent are Joseph Lewis's "Memories" programmes. Among several hundred congratulatory letters on one such programme recently given, three letters alone represented thirty-five, seventy-two and one hundred and twenty listeners. There is no doubt about the fact that these "Memories" programmes are popular; but don't let's have too many of them.

A RARE BIRD!

A New York station recently broadcast the song of the troupical—a rare bird from the Amazon forest district, and of which only two are in captivity. The little broadcaster is here sitting on top of the "mike"

THIS "STATIC" BUSINESS

FOLLOWING upon a recent Berlin case where a hairdresser was summoned for causing radio interference with a faulty hair-drier, it is announced that the authorities of one of the Belgian towns have made interference with radio reception an indictable offence with a heavy fine or one week as the penalty. Also we hear that a Calais hotel proprietress has been fined 5,000 francs for causing interference with radio programmes by using a faulty electric gramophone motor. They're very strict on man-made static in "furrin" parts, but unfortunately not so strict in England!

SPONSORED PROGRAMMES AGAIN ?

ONLY 300 miles from London is Luxemburg. At present this state boasts a 4-kilowatt transmitter on 222.9 metres. But recently completed is a giant transmitter in Luxemburg having an aerial power of 100 kilowatts. We naturally want to know why such a big transmitter is needed for such a small country. Perhaps it is to reach other countries, including England. Some syndicate is said to be preparing for radio advertising on an international scale and the medium of propagation is said to be Luxemburg. The language problem may be solved by announcing one night in French, the next night in German, the next in Spanish, and so on through the week to appeal to all the surrounding countries. If there is a serious attempt to put this idea into practice we imagine a longer wavelength will be sought.

WIRED WIRELESS

QUESTIONS are being asked at the moment as to the *bona fides* of those responsible for the listeners exchanges now so widely in use. It is suggested that in addition to sending over B.B.C. programmes the "relay chief" may quite easily make announcements through a microphone; and if announcements are made, what is to stop them containing advertising matter?

THAT SOCIAL SURVEY

SOME time ago a certain well meaning committee suggested to the B.B.C. that a nation-wide survey of the habits and customs of listeners would provide a useful index on which to base transmission times for educational matters. This scheme evidently scared Savoy Hill, for the suggestion has not been acted upon. But we understand that B.B.C. advisers are now playing with the idea of conducting such an experiment on a very limited scale. Our own view is that while the B.B.C. relies only on its correspondence to gauge the acceptability of the present programmes it will tend to be misled, for a fairly representative section of the people does not take the trouble to write.

THE WAVE CHANGES

SINCE Midland Regional, Glasgow and Manchester 2ZY changed over wavelengths recently, all sorts of pretty little reception problems have cropped up. Glasgow listeners report difficulty at night in separating Glasgow from London and Midland Regional stations on each side of it. Manchester listeners, just a few of them, have had some trouble in tuning up to 479 metres.

POOR ABERDEEN

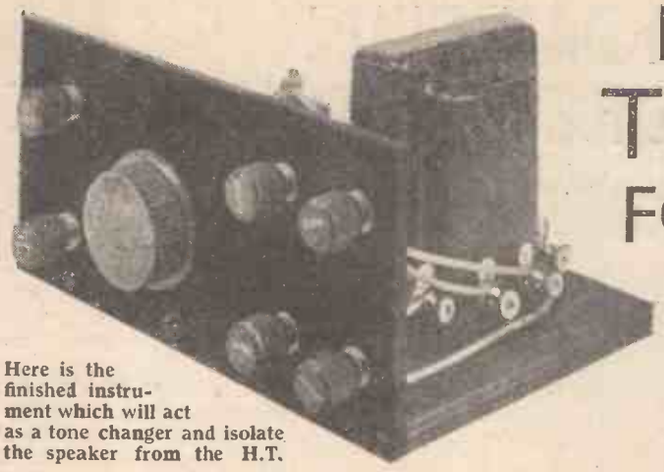
WE have more than a little sympathy at the present time for Scottish listeners who must unfortunately suffer for a few months as the result of regional scheme developments. Thus, when the North National station starts up soon on 301 metres, Aberdeen, which at present transmits on that wavelength, will be relegated to the national common wavelength of 288 metres. We understand that special synchronising gear will be installed at the Aberdeen station in order to avoid as much deterioration in range as possible. Listeners should have no difficulty in re-adjusting their sets from 301 metres to 288 metres. All the same, we expect Scottish listeners are eagerly awaiting the completion of the Regional station at Falkirk. It is now well on the way.

LONG WAVES SCORE

THE superiority of the longer wavelengths of the medium band is amply demonstrated at the present time by any London listener who cares to tune to 479 metres in the evening when Manchester 2ZY is transmitting on that wavelength with a power of only 1.2 kilowatts. Although nearly 200 miles away this low-power station can be received at fair loud-speaker strength on a good three-valver with an indoor aerial. Under these reception conditions Manchester 2ZY was very seldom heard when it was on the much shorter wavelength of 376 metres. Quite a number of northern listeners have written to the B.B.C. asking why Moorside Edge is so weak during the evening programme hours! Of course, Moorside Edge is not transmitting then and listeners are hearing the old 2ZY gear.

"UNCLE ARTHUR" AGAIN

Arthur Burrows, the first B.B.C. announcer and one of the pioneers of broadcasting in this country, came back from Geneva recently and broadcast a short talk. He does not seem to have lost any of his microphone personality



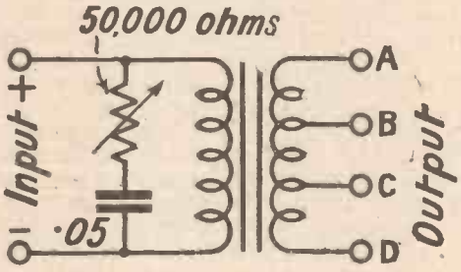
Here is the finished instrument which will act as a tone changer and isolate the speaker from the H.T.

MAKING A SIMPLE TONE CHANGER FOR YOUR SPEAKER

Here are constructional details of a little unit which any amateur can make and which, fitted to the output side of your set, acts as a tone changer and as an output transformer, insulating the speaker from the high-tension current.

WHY is an output unit necessary? That is what every amateur asks when he is advised not to connect his speaker directly to the set but to interpose some form of output circuit, either a transformer or a choke coupled arrangement.

Well, there are three main reasons. First the provision of, say, an output transformer



The circuit of the tone changer

in the loud-speaker leads prevents damage to the speaker as may arise when the set is suddenly switched on or off and there is a surge of a relatively large high-tension current; also as the speaker is insulated from the steady direct current it is not likely to become demagnetised.

A second advantage in fitting an output circuit is that this goes a long way towards reducing motor-boating which is not a trouble common only to sets which work from the mains, but is likely to be experienced with a battery-driven set, when the high-tension begins to run down.

A third advantage and perhaps one which is the most readily obvious is that it enables one to change the tone and correctly to match the speaker with the power valve. This is very pleasing for two reasons; one is that by choosing the correct tapping on the transformer you can make sure that the greatest power is passed on to the speaker and that the general level of tone is satisfactory; also it is quite easy to fit a resistance and a condenser so that at the turn of a knob the tone can be changed.

Simple To Make

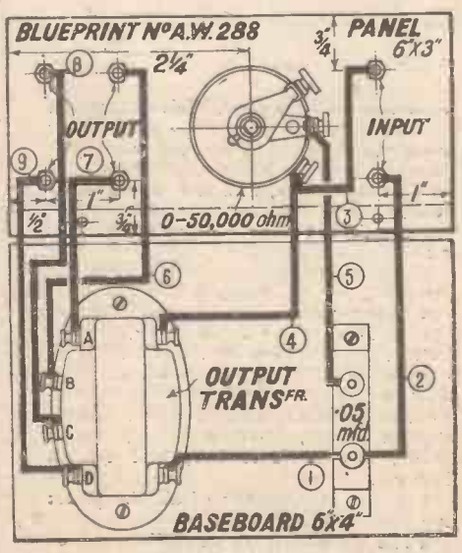
Obviously this is a control well worth having. In this simple output unit and tone changer a tapped output transformer is used in conjunction with a variable resistance and a large fixed condenser. The circuit shows how these parts are connected, the resistance and condenser being placed in series across the primary of the transformer.

In an accompanying panel are given recommended parts for the construction of this unit and a word of warning is necessary inasmuch as it is very necessary to adhere to the electrical values given. The tone-changing condenser, for instance, a .05-microfarad job, and the resistance has a maximum value of 50,000 ohms. These have been found on test to be the best values, giving a wide margin of tone control.

The unit is shown made up on a small baseboard with the terminals and tone control mounted on a vertical strip of ebonite. This is a convenient form of construction but, of course, the unit may be built into the set itself provided there is room for the three main parts, without undue crowding.

If the unit is incorporated in an existing receiver then take care that the output transformer is not placed too close to any other parts in the set with which it may couple inductively.

When the tone changer is wired and connected up, make a preliminary test of the tappings in order to find the most suitable ratio. In many cases a tapping will be found to give suitable results and then for normal working it will not be necessary to touch the tone control knob. When trying for the best tapping the unit should be worked with the resistance set at "full in," so that the full 50,000-ohms is placed in series with the condenser.



The layout and wiring diagram of the tone changer. A full-size blueprint is available, price 6d.

COMPONENTS FOR TONE CHANGER

Ebonite panel, 6 in. by 3 in. (Becol, Trelleborg, Potter).

Baseboard, 6 in. by 4 in. (Camco, Clarion).

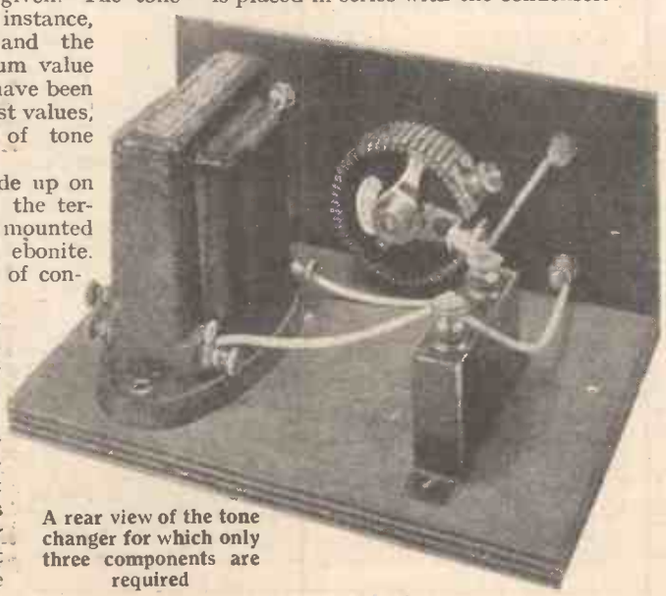
50,000-ohm variable resistance (Regenstat, Colvern Varley, Rotorohm).

.05-mfd. fixed condenser (T.C.C., Dubilier, Graham-Farish, Lissen, Ormond).

Tapped output transformer (British-General).

Six terminals, marked: L.S.+, L.S.—, Output (4), (Belling-Lee, Clix, Eelex).

Connecting wire and sleeving (Lewcos).



A rear view of the tone changer for which only three components are required

GETTING MORE FUN FROM FOREIGN STATIONS

By brushing up your knowledge of one or two foreign languages you can make far more enjoyable use of foreign-station reception

"*ALLO! Allo! Ici Radio-Paris, de la Compagnie francaise de Radiophonie. Mesdames, messieurs, vous allez entendre un concert exécuté dans notre auditorium.*"

It is, of course, Radio Paris, and you are bound to know it because you are tuned in to 1,725 metres. Perhaps, also, because this call is often repeated, you have caught the words "Radio Paris" rolled out as a sort of *Rrraadio Pahh-ry*.

The average British listener has to rely only on the music for the rest of the entertainment, the announcements being so much "double Dutch." It is an extraordinary thing that listeners know many European capitals only by the type of music most frequently broadcast and by their dial readings.

What You Miss

Just imagine a B.B.C. listener setting out to enjoy an evening's programme without understanding a word of what is said! Imagine how distracting every song, every radio play, and every vaudeville hour would be if one could not understand the words; yet that is just the sort of doubtful pleasure that we all must be content with getting from the European stations if we have not a smattering of the language.

I do not want to suggest that we should all start to learn an international language, for, unfortunately, there are several international languages, which confuses the issue at the outset. Because we are all inclined to mental laziness, I do not suggest, either, that we can find even wireless enthralling enough to make us take up extensive language courses.

Easy "Brushing-up"

I have been investigating various means of carrying out the brushing-up process recently, and I should like to bring several of them to your notice. People with radio-gramophones and gramophones are fortunate, because now there are several series of records issued which you can put on and listen to in the ordinary way, getting quite a deal of enjoyment from them and at the same time making the foreign language as enjoyable as English.

Some time ago the *Daily Mail* printed a series of "Brush up Your French" talks, which are also available in book form. Now, the first twenty-five conversations have been recorded by Columbia on five double-sided 10-in. records, and the set is available with the accompanying printed talks.

The Linguaphone Institute is making a special appeal to wireless enthusiasts also through the medium of gramophone records, and in this pleasant way you can "swot up" any language from German to Chinese and Esperanto to Afrikaans.

The great thing with a course such as the Linguaphone is that, because you hear the records on your gramophone or through the same loud-speaker of your radio-gramophone through which the foreign stations come, you can understand the perfect accent, and in brushing up your knowledge of the language you yourself speak with a correct accent because you never hear a word wrongly pronounced.

A Good French Course

For folk who are interested only in thoroughly understanding the French stations there is yet another gramophone record scheme, organised by Foyles, the book people, and known as the Foylophone course. I like this, because in the Foylophone records there are three voices—two men and one woman—and they all sound very "Radio-Paris-ish."

The Berlitz people make a great point of the slogan "Listen and Learn," and I believe that they make special arrangements for people who, taking the course, can also listen-in to the foreign stations and get additional pronunciation practice.

Admittedly, not everybody wants to go in for foreign-station reception so thoroughly as to take up a full course on any particular language, but from personal experience I can assure you that there is far more pleasure in being able to say, not "That is Heilsberg, because it is on 276.5 metres," but "That is Heilsberg, *because I understood what the announcer said.*"—K.U.

"1931 ETHER SEARCHER" COMPETITION

List of Chief Prize-Winners :: We Increase the Money Prizes

WE have great pleasure in announcing the results of the "1931 Ether Searcher" competition. Readers will remember that we asked any builder of the "1931 Ether Searcher" to send us an account of his set. In due course we invited a number of the competitors to submit their sets, we paying carriage both ways.

The judging, as we fully expected, proved a task of considerable difficulty. So much so that we were unable to adhere strictly to our published intention of awarding fifteen prizes of a total value of £50. We shall be forgiven, however, when we say that we are awarding, instead, twenty-one prizes, totalling to £55, and, *in addition*, forty-eight consolation prizes of 5s. each, so that instead of the £50 offer, we are, as a matter of fact, presenting £69 in cash prizes. We have increased the prizes and their number partly because of the high standard of merit reached by the sets in general, and partly because of the consequent dilemma in which we found ourselves in attempting to restrict the prizes to the number originally offered. Well, the competitors have the advantage of the alteration!

The chief prize-winners are as follows :

1st Prize : Cheque for Twenty Pounds.—W. F. Watson, 42 Ramsbury Road, St. Albans.

2nd Prize : Cheque for Ten Pounds.—Lawrence G. B. Davis, 66 Salford Road, Streatham Hill, S.W.2.

3rd Prize : Cheque for Five Pounds.—N. H. Russell, 146 Finchley Lane, Hendon, N.W.

4th Prize : Cheque for Three Pounds.—Chas. H. Wakefield, 65 Coston's Avenue, Greenford, Middx.

5th Prize : Cheque for Two Pounds.—E. A. Jenner, 19 Ansdell Road, Peckham, S.E.15.

We have added a sixth prize, in which four competitors are bracketed equally. Each receives £1 10s., their names being :

R. S. Dunford, Selwood, Erskine Road, Colwyn Bay.

Harry Cox, Brean Down, Burnham-on-Sea, Som.

J. L. Bullimore, 73 Gloucester Court, Kew, Surrey.

S. Lewis, 9 Pipers Row, Wolverhampton.

A prize of £1 each goes to **eleven other competitors,** two in Wales, one in Ireland, three in Lancashire, four in London, one in Gloucestershire, and one in Warwickshire.

In addition to the above we are sending a little consolation prize of 5s. to each of **forty-eight competitors** distributed as follows : one in Bucks, two in Cheshire, one in the Channel Islands, one in Derby, one in Durham, three in Essex, four in Hants, one in Hereford, one in Herts, one in Ireland, one in the Isle of Man, four in Kent, four in Lancs, one in Norfolk, one in Northants, three in Scotland, two in Surrey, three in Wales, one in Wilts, two in Yorkshire, and ten in London.

Cheques in payment of all the prizes have already been posted.

In next week's issue we shall reproduce a selection of the chief prize-winners' letters with photographs of their sets.

SOME HINTS ON USING

MODERN VALVES IN OLD SETS

IS THAT OLD SET WORTH WHILE?

Asks ALAN HUNTER, in this article of interest to all constructors using sets designed two or three years ago

TO scrap or not to scrap; that is the question not easily answered by many amateurs using apparatus two or three years old. I can quite appreciate the attitude of the reader with a set that, in spite of its antiquity, continues to provide the local station and a sprinkling of foreigners at loud-speaker strength. Why should such a set be scrapped?

Obviously it should not, but the snag is that valves do not last for ever; and when a modern valve is put in an old set several unpleasant things can happen. Quality may become terrible; the high-frequency stages may become unstable; and the output valve may be hopelessly overloaded by the increased amplification developed by modern valves.

An old set may be worth while before any attempt is made to bring it up to date, but quite hopeless when new valves are fitted. Fortunately, in old sets it is the exception to find high-frequency amplifying valves. A three-valver of two or three years ago is more likely to have a detector and two low-frequency stages than a high-frequency valve followed by a detector and one low-frequency valve. I say this is fortunate because the fitting of new valves to an old set without high-frequency amplification is often well worth while, whereas the instability resulting from a change-over of valves in high-frequency sets often involves so much structural alteration that one would be better advised to build an entirely new set.

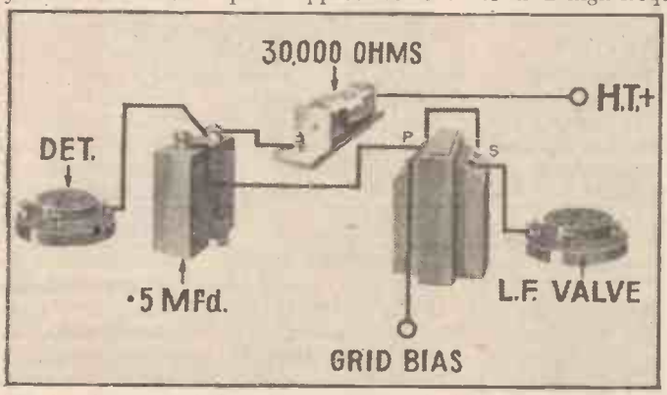


Fig. 1. A suggested alteration—resistance feed for the transformer

Let us consider a set with what must have been the most popular sequence of valves; detector, either anode-bend or leaky-grid, resistance-capacity coupled to a low-frequency-amplifying valve, in turn transformer-coupled to an output power valve. Suppose we fit this set with new two-volt battery valves. What shall we choose as a detector?

We have a wide choice now, impedances ranging from 50,000 to 12,000 ohms being suitable under various detection conditions. If we intend to keep to a fairly high value of anode resistance in the resistance-capacity coupling, and the maximum sensitivity is wanted, a high-impedance valve will be chosen, not because there is any advantage in high impedance but because only with a high impedance can we get a high magnification factor.

In these days, an impedance of 35,000 ohms is quite high enough, for a good valve will provide, for this impedance, a magnification of 35. If the set is to be worked particularly close to a broadcasting station, possibly a lower impedance, say 23,000 ohms, would be better, because with a lower impedance valve we can obtain a larger grid swing, and a larger grid swing means that a strong signal can be handled without overloading. A good valve with an impedance of 20,000 ohms should provide a magnification of 20.

Now we shall probably find the values of the resistance-capacity-coupling unit after the detector are all wrong for such modern valves as we are likely to fit. The value of the anode resistance may be .25 or .5 megohm, whereas we need only a 100,000-ohm resistance at most. Then the grid leak may be 5 megohms, whereas a 1-megohm leak would be preferable. The coupling condenser is probably too small; a .005-microfarad should be fitted.

What valves should be used after this coupling? Well, there are two considerations. Firstly, we want to avoid overloading, for owing to the high magnification of the first valve the voltage applied to the second valve may be quite considerable. For this reason a valve with a grid swing of 10 or so volts is advisable. Such a valve would have an impedance around 10,000 ohms. But there is another consideration; this low-impedance valve passes about 5 milliamperes with maximum anode volts and proper grid bias. Will the primary of the transformer, which follows this valve remember, pass such a current without saturating the core?

Probably not; unless the transformer is a particularly good specimen the primary current limit is two or three milliamperes. Here a slight alteration as shown by Fig. 1 is worth while. It consists in resistance-feeding the transformer. By this means the anode current is diverted from the primary and only the low-frequency signal current flows through it. The only draw-

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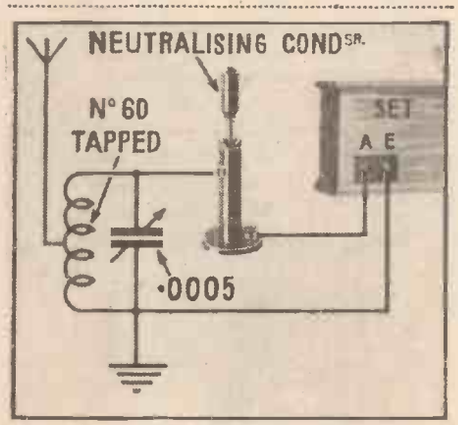


Fig. 2. Adding an external tuned circuit will improve selectivity

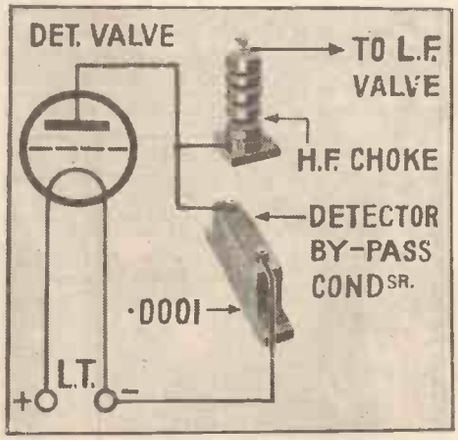


Fig. 3. An anode by-pass condenser will prevent instability

For the Newcomer to Wireless : BATTERIES

AS you know I haven't electric light in the house at present, so that I must operate my set from batteries. Will you advise me what to get?

We will think about the valve filaments first of all. These, as you probably know, are heated by current supplied from an accumulator. How many valves do you want to use, and of what classes?

I am thinking of a three-valve set containing a screen-grid valve, a detector and a super-power valve.

Well, whatever the voltage you want to employ you can reckon about a quarter of an ampere for the first two valves and from a quarter to .4 ampere for the last one. Your total actually, therefore, will be between .45 ampere for 6-volt valves and .6 ampere with 2-volters. If you don't want to spend much on the accumulator initially then go for two-volt valves, but if you don't mind spending a little extra with a view to getting a slightly better performance then six-volt valves will be worth your while.

The two-volt accumulator appeals to me I must say, partly on account of the ease with which I can carry it round to the charging station. Also I can buy two single-cell accumulators so as to have one in use and one under charge.

Quite sound reasons. In that case I would recommend accumulators with a capacity of about 20 or 30 actual ampere hours. So long as you regularly exchange one for the other you will always be sure of having plenty of filament "juice" available. If you had only one accumulator I would suggest something larger, with a capacity of, say, 60 ampere hours, and with 6-volt valves where you need a three-cell accumulator I would go for this capacity at least.

And now about the high-tension battery?

You may not know that high-tension batteries are made in four capacities, standard, double, treble, and quadruple. True economy consists in buying the battery best able to stand up to the load which your set imposes. Obviously, for example, it is foolish to spend 12s. 6d. on a battery which lasts for six weeks when you can buy for 17s. 6d. one that will do the work for three months. With your set you will probably use 120 or 150 volts of high-tension, for I know that you value quality. This means a pretty heavy drain on the high-tension battery and I would recommend you to purchase one of at least treble capacity and preferably of the largest capacity obtainable.

You are talking about dry high-tension batteries, aren't you? Suppose that I go in for a high-tension accumulator.

You'll find one of these excellent so long as you purchase a good one. You will be wise again not to go for the smallest capacity but to buy something rather bigger. One good reason for this is that the charging rate of larger capacity H.T. accumulators is reasonably big and that there is not so much risk of their being damaged by a careless charging station.

And the grid battery?

Buy one of good make of the ordinary small capacity size and make a cast-iron rule to renew it every nine months.

"IS THAT OLD SET WORTH WHILE?"

(*Continued from preceding page*)

back about this arrangement is the voltage drop across the resistance. Because of this a fairly high value of anode volts must be employed, say 150 volts.

Assuming the normal step-up ratio in the transformer, something fairly considerable in signal volts will be passed on to the third valve, at least when nearby signals are being received. Here a pentode is definitely ruled out. Such a valve requires only a small voltage input, as in a set using only one low-frequency stage. In the last two or three years the number of power valves has increased enormously, and so has power valve efficiency.

In our hypothetical set, a valve with a grid swing of not less than 20 volts is advisable. A valve with this swing will avoid overloading and consequent distortion. There is little merit in a big grid swing and what is more important is the undistorted A.C. output. A valve such as the P2, will conform with grid-swing requirements and will deliver 300 to 400 milliwatts output, which corresponds to average volume requirements.

The direct result of putting new life into a set by use of modern valves will be greater volume, better quality and probably improved sensitivity. But such improvements may entail loss of sensitivity and an increase in running cost. The simple single-tuned circuit with reaction is not good enough either for modern valves or modern reception needs. I suggest adding an external tuned circuit, such as that shown by Fig. 2, coupling it to the set by means of a neutrodyne condenser.

Some Simple Suggestions

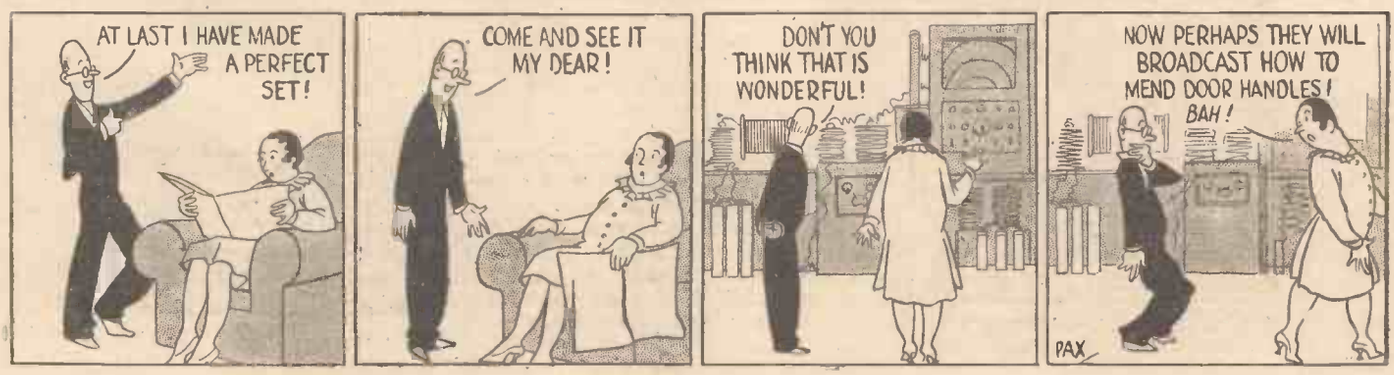
Or more simple methods may do the trick; try shortening the aerial or inserting a .0001-microfarad fixed condenser in the aerial lead, or a tapped coil if an untapped one is used at present.

Reaction methods have improved appreciably in the last year or so. Probably a notable omission in the set we have in mind is an anode by-pass condenser. Connect a .0001-microfarad fixed condenser between the anode of the detector valve and earth as shown by Fig. 3. This will improve detection and may easily prevent instability in the low-frequency stages.

The values of the grid leak and condenser for detection have also been modified during the last year or so. Instead of the .0003-microfarad fixed condenser that used to be accepted as standard we now use a .0002-microfarad capacity. And the 2-megohm grid leak might well be replaced with one of 1 megohm.

The lowering of valve impedances has meant a corresponding rise in anode current. A three-valver with valves such as I have recommended would certainly need a double-capacity high-tension battery. If the standard-capacity type of battery is used, its voltage will quickly fall after a few weeks' running. Then the improvements due to the valves will be more than offset by the deterioration in the power supply.

From what I have said, readers will appreciate that making an old set worth while is mostly a question of fitting new valves. But the fitting of new valves entails many little difficulties.



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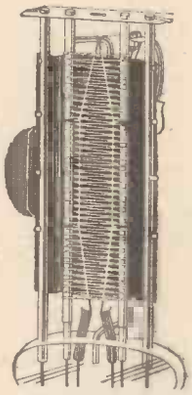

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Filament Current	0.1 amp.
Anode Volts	150 max.

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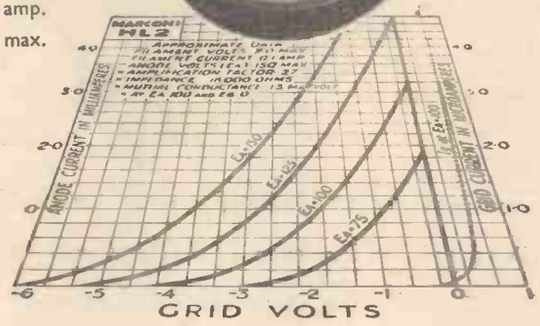

★ For the H.F. stages of non–screen grid portables

★ For the detector position in nearly all battery operated receivers

★ For the H.F. position in most neutralised–H.F. receivers

★ For the detector position in many portables

★ For the initial L.F. stage in practically every Detector – two L.F. receiver

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★ Marconi HL2 is a new 2–volt general purpose valve of exceptionally high efficiency, designed to provide greater amplification in modern circuits than is obtainable from existing valves in this class. Its high **mutual conductance (1.5 MA/volt),** high amplification factor and small current consumption render it particularly suitable for portable receivers, where its **definite antimicrophonic properties,** obtained by the use of a special inter–locked electrode assembly, are of real value

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On Your Wavelength!

LOUD-SPEAKER CUT-OFF

THE other evening I had two all-electric consoles on test and I was comparing their relative merits as regards selectivity. On tuning one of the sets to Midland Regional I was surprised to find that a heterodyne whistle had apparently just started up near this station. A few minutes before I had been listening to Midland Regional on the other set and there had certainly not been a heterodyne. So as a matter of interest I switched back to this set and found the heterodyne had disappeared again.

HETERODYNES AND LOUD-SPEAKER RESPONSE

NOW, this particular heterodyne note was of very high frequency and it did not take me long to realise that one of the sets had a loud-speaker with a sharp cut-off in frequency response, just below the frequency of the interference. That little test makes me wonder whether loud-speakers capable of very high-note response are really desirable in these days of heterodyne interference. There must be many examples of slight heterodyning causing a very high frequency audible note that actually remains inaudible unless the loud-speaker is particularly good.

It is interesting to record that the loud-speaker on which the heterodyne note could be heard was a moving coil, whereas the loud-speaker with the high note cut-off was an ordinary balanced-armature cone.

CONSOLE SETS

I HEAR a good deal these days, as I expect the reader does also, of the coming popularity of the console set. By console is meant a pedestal cabinet containing the set, power supply and loud-speaker, but not necessarily the aerial. Of course, the neatness of such sets will have a strong appeal and the purchase of a set containing a loud-speaker will presumably imply that the loud-speaker will match the output valve of the chassis. But there is a drawback to this type of set not often mentioned, possibly because it is not realised.

I know many listeners whose reception is done in one room but whose set is in another room. And quite often when I am asked to recommend a set the stipulation is made for an external loud-speaker for this very reason. I suggest that set-makers concentrating on consoles should make provision for the connection of an external loud-speaker.

WASTING THE H.T.

I RECENTLY advised a friend of mine, who has a five-valver, to try the effect of using a high-tension eliminator instead of a dry-cell battery. I met him again the other day, and asked him what he thought of the change. "Simply marvellous," he said, "especially on the distant stations. Programmes which used to want a bit of coaxing, now come roaring in unless I use the volume control." So far, so good. Then he went on to say that one night he switched off the filament current, which he still takes from an accumulator, but clean forgot the H.T. eliminator, which was left in circuit for about twenty hours until the oversight was discovered. He was now wondering how much his mistake would cost him. I was at once able to assure him that he wouldn't notice any effect in the next quarter's bill from the Electric Supply Co.

COUNTING THE COST

SO long as the valves in the set are not lit, the secondary of the supply transformer is open-circuited and therefore takes no current. A transformer, in fact, possesses the very useful property of automatically adapting itself to different circumstances. When the secondary circuit is open, the primary winding takes only an infinitesimal current—just enough to magnetise the core—which then acts as an automatic choke. If the secondary circuit is closed, then the primary supplies just enough energy to maintain the load and no more. In the case in question the secondary circuit was broken and was, therefore, out of action, so that the only current consumed was that taken by the filament of the rectifying valve. This would be approximately 1 ampere at 5 volts, or 5 watts in all. In the course of twenty hours this would account for about one-tenth of a unit, which, after all, doesn't amount to a row of beans.

MAGNETOSTRICTION

THE piezo-electric crystal was merely a scientific curiosity until the radio engineer found a new use for it as a high-frequency oscillator. Another rival is now emerging from the laboratory in the form of an alloy of iron nickel and chromium which possesses the property of magneto-striction in a marked degree. A magneto-strictive body is one which vibrates mechanically, at very high frequencies, under the influence of an applied magnetic field. Expansion and contraction occur alternately along the length and breadth of the substance, to an extent which varies with the intensity of the applied field.

There is a certain fundamental frequency at which the magnetostrictive effect reaches a maximum so that, like the quartz crystal, it can be used as a master control for the carrier waves used in broadcast transmission. With so many new stations coming on to the ether this question of stabilising the carrier frequency is becoming more and more important as a means of reducing heterodyne interference.

VALVE TROUBLE

I RECENTLY came across a case where a mains-driven set gave excellent reception for some little time after being plugged into the mains, and then proceeded gradually but very definitely to "give up the ghost", the signals dying away to a mere whisper. The symptoms rather pointed to some defective part gradually breaking-down under the effect of increasing temperature, but a careful search failed to find any circuit component at fault. The mystery was finally solved when, as a last resort, the existing valves were replaced by fresh ones. All the trouble at once disappeared. The trouble was caused by one of the valves suffering from what is called "grid emission." Under the influence of the heat radiated from the filament, the grid gradually reaches a temperature where it starts to emit electrons in large quantities on its own account, and in opposition to those coming from the cathode. The result is utter confusion inside the valve and a wholesale loss in signal strength. The defective valve was returned to the makers and was, needless to say, promptly replaced.

THE FUTURE OF DESIGN

I WONDER how much longer broadcast receivers will remain in their present form? Commercial receivers are changing their appearance completely and are gradually becoming more and more like telephone repeaters. There is a great deal to be said for this construction. All the apparatus is mounted on panels which are housed one above the other in a rack. Each unit is complete and is simply provided with input, output, and battery leads. A really hot receiver contains several of these racks side by side.

The system is one of considerable flexibility, and I am not at all sure that I shall not do something of the sort myself. Mr. Reyner has had a receiver of this type at Elstree for some time, but it was not until the other day that I saw it approaching its full glory. Following telephone practice the equipment is sub-divided, the various parts being cross-connected in all sorts of ways. At the bottom are the power pack and power amplifier. Higher up are the attenuation pads and mixing panels, while on top is the receiver which has two panels to itself. The equipment also contains H.F. and L.F. check oscillators which can be introduced in various parts of the circuit.

SIMPLE MODIFICATION

THE point about the whole thing is that any one unit can be taken out, modified to meet some requirement which experience shows to be necessary and reinserted without causing any upheaval whatever. We do not all require quite as much elaboration, but one cannot help being struck by the neatness of the system, and I am wondering whether our future receivers may not develop on these lines, at any rate as far as the real ham is concerned.

THE "REGGIES"

INQUIRIES show that there is a bit of a fight between "London Reg." and

On Your Wavelength! (continued)

"Midland Reg." in the area extending from the most northerly parts of London well into the Midlands. Those with very selective sets are not greatly troubled, but the crystalisers and users of broadly-tuned valve sets are having rather a poor time, since they cannot get either programme free from the other. One type of set which seems to be worse affected than almost any other is the cheap portable. Not so very long ago crowds of people invested in such receivers, mainly because they were cheap and simple to operate. In the early part of the year I saw scores of them in various shop windows offered at almost incredible prices—four-valvers, for example, at under a fiver apiece. Those who bought them were, without a doubt, delighted with their bargains at the time, but probably now they are wiser and sadder men.

A CONTRAST

ON the other hand, the really good portable of up-to-date design has not the slightest difficulty in separating the two stations at quite short range. My place is fifteen miles from Brookmans Park and about forty from Daventry, but the portable that Mrs. "Thermion" has for her own use brings in either "Midland Reg." or "London Reg." at will and quite clear of any interference. It is the old, old story. Sound wireless goods are already so cheap that anything offered at bargain prices certainly ought to be looked at several times before any money leaves one's pocket. And, whatever you do nowadays, you should always buy with an eye to the not-far-distant future. Don't forget, for instance, that "Northern Nat" will be starting in before long. Again, should you live in what will be the service areas of the twin stations that will complete the regional chain, bear in mind that you are likely to want more selectivity than the average set usually offers to separate high-power twin transmitters at short range.

ILLUMINATING

I TOLD you that I had recently spent a short time in Devon and that I had been surprised to find how well 5XX was received in every place where I tried a wireless set. There seems to be no doubt that 5XX's service area at all times of the year has a radius of at least 250 miles now for reception so long as one H.F. stage is used. Were the power of the station put up, as I have often suggested, to 100 kilowatts and were the station used as the only national transmitter, it could probably serve the whole country adequately and would have a very large area where no H.F. at all was needed. The more I move about the country and the wider my experience of reception under the regional scheme, so far as it has gone at present, the more convinced I am of the unsoundness of trying to jam nine British high-power transmissions into the broadcast band. I am convinced that by far the soundest plan would be for the B.B.C. to limit itself to a 100-kilowatt 5XX for the National programme and five stations of from 25 to 50 kilowatts on the medium band for the Regional programme.

GIVING THE LEAD

WHAT causes so much trouble at broadcasting conferences is that representatives of every country turn up imbued with the idea that all are going to stand by their rights at all costs. Great Britain has one long and nine medium wavelengths, and the B.B.C.'s idea is that she shall jolly well stick to them. Similar ideas are held about their own wavelengths by the French, Germans, and everybody else. If our people went to the next conference prepared to say: "Look here, the position at present in Europe is absolutely ridiculous. There are far more stations than there ought to be and the number is continually increasing. We are prepared to give up four of our wavelengths if other countries will make similar 'sacrifices.'" Don't you think that if this happened there would be a different spirit altogether and that we might hope to obtain peace rather than the present state of war in the ether?

THE ONE FLY

SOMETHING, I think, could be done on those lines. There is, however, hanging over the future of European broadcasting a threat which is still so small that few people have realised what importance it may assume before this time next year. One country has so far stood outside all conferences and has refused to fall into any wavelength scheme. This is Russia. If you look at any report of the Brussels Laboratory published last year, you will see that Russian stations have elbowed their way in on channels between those assigned to European stations, and if you do any long-distance work you will have had some experience of the heterodynes that they have been causing. None of the Russian medium-wave stations is using any considerable power, but at least forty, and possibly as many as sixty, stations with outputs up to 100 kilowatts or more are to be constructed in Russia within the next eighteen months.

A COIL HINT

Never insert or remove plug-in coils in the manner shown below. Continual treatment in this way is apt to

disturb the turns and may break the winding itself away from the plug fixing. Handle coils and valves by the base.

CONFUSION WORSE CONFOUNDED

TO show you what trouble they may cause I would mention one instance which may have escaped you. Sometimes, when Vienna has been coming in particularly well, you may have noticed a rather faint heterodyne whistle. The station causing this heterodyne is Archangel—quite a small fellow. Think what would happen to that whistle if Archangel possessed a 100-kilowatt transmitter. The result of putting from forty to sixty high-power Russian stations into the medium wave-band is likely to be of very great importance. If these stations select, as other Russian stations have done in the past, channels in between those allotted under the Prague Plan, the net effect will be to reduce the frequency separation for Europe from 9 kilocycles to 4½ over the greater part of the broadcast band. One needs to be no prophet to foretell that the receiving set of the future will require super-selectivity. A determined effort should be made to induce the Russians to send representatives to the next conference.

LOOKING FOR A SHORT

THERE is one tip, by the way, that I would like to give you about tracking down a high-tension short if one of those unwelcome manifestations occurs in your receiving set. Naturally, you have got to pass a current through the H.T. leads in order to find just where the leak is; but do not use the high-tension battery to supply this current, or you may do damage both to it and to other expensive things. My own method is this. I disconnect the high-tension battery just about as quickly as I can after switching off, and in its place I make use either of a flashlamp refill or an old grid battery that has still a volt or two left in it. You can then find where the short is occurring just as easily with the help of voltmeter, milliammeter, or earphones, and you don't run the risk of doing serious damage. If, by the way, you use the milliammeter for short tracking it is a sound precaution to place a spaghetti resistance with a value of 1,000 ohms in series with it. In this way you protect the instrument from an overload of current.

The reading that you get from the milliammeter will show you just what kind of short it is. If, for example, you do get 4½ milliamperes with a 1,000-ohm resistance there, this means probably that a high-tension positive lead is making direct contact with some earthed point. On the other hand, if you get practically no reading with the resistance, you can remove it and make just a flicking contact at first to see what happens. Should the needle not go right over, connect up and see what the reading is. If it is, say, 1 milliampere and there are 4½ volts driving the current you know that there is a resistance of between 4,000 and 5,000 ohms in circuit somewhere. This indicates that the short is somewhere between earth and the plate end of the primary of an L.F. transformer.

THERMION.

AROUND THE STATIONS

AT MANCHESTER BROADCASTING HOUSE

An Inside View of the Northern Broadcasting Centre, by "A.W.'s" Special Commissioner

WHEN AMATEUR WIRELESS recently interviewed the North Regional Director, Mr. E. Liveing, he said that, "By this development" (referring to the opening of Moorside Edge), "we have at last a real opportunity for the North to express itself in the programmes." That is just the purpose for which the Manchester Broadcasting House in Piccadilly, in the heart of the city, was designed.

The previous studios were not central nor convenient for the artistes, and there was a rather obvious lack of *liaison* between the broadcasting staff and the engineers.

Now, the new premises, which have been opened for a sufficient time to enable the authorities to judge Manchester's position in the broadcasting scale, give ample facilities with regard to studios and to the engineering side.

The Manchester Broadcasting House is situated in Piccadilly, overlooking the Municipal Gardens. Actually the lower part of the building is a bank and the B.B.C. entrance is at the side. There are three studios, one a double-decker with a gallery, one a small talks studio and the third a general-purpose studio.

The double decker is still an impressive affair, despite the fact that the Scottish Regional station now possesses the converted Queen's Hall theatre, and in the gallery at Manchester there are seats for an audience.

In the studio itself there is a built-in silence cabinet, which is handy for checking up musical transmissions and for the occasional direction of radio plays, which, when a large caste is involved, are sometimes broadcast from here.

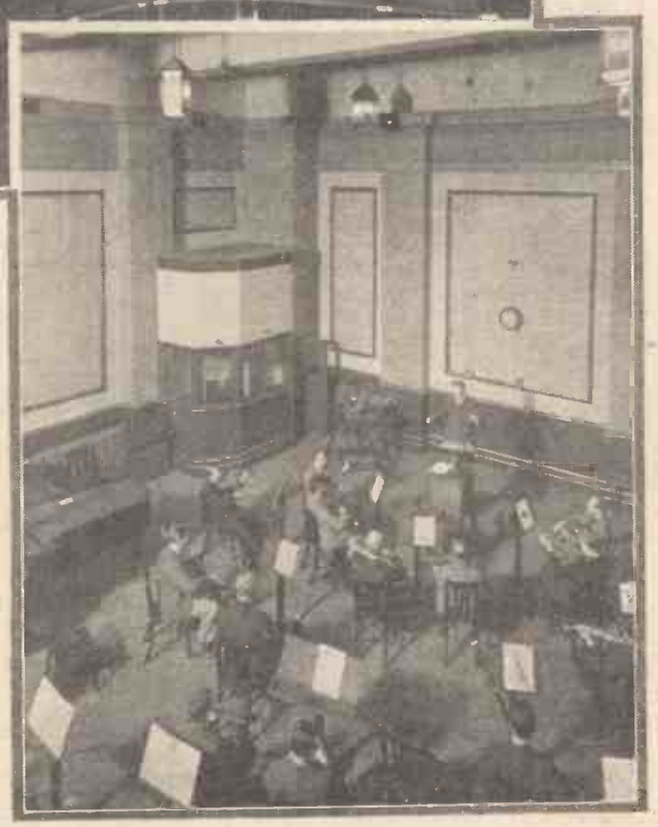
This large room has floor dimensions of roughly 54 ft. by 35 ft. and the extra height is obtained by utilising two stories of the building. There is a noticeable amount of echo and this appears to suit large orchestral broadcasts; perhaps that is why so many of these broadcasts from this studio are also given via the London National and Regional stations.

The next studio, in order of importance, has floor dimensions 33 ft. by 16 ft, and is a general-purpose room where small orchestral combinations can perform and where the Children's Hour is given.

The adjacent talks studio, which is panelled and furnished in Jacobean style, is used by the announcers for the ordinary news bulletins and, of course, by lecturers. There is a large reading desk, also in the Jacobean style, and the microphone is suspended above it on stranded cable. There is a gramophone in this room and this is occasionally used when "fill-in" gramophone items are not available in some other way, perhaps from London.

There is a very pleasantly-furnished reception room for the use of artistes going to any of these studios and a moving-coil speaker fitted in a large baffle in the corner

(*Continued in 3rd column of next page*)



(Top left) The artistes' waiting room at Manchester. (Centre) Part of the extensive land-line switchboard arrangements which link up with Savoy Hill, Slaithwaite and several of the relay stations. (Right) A view from the gallery of the big No. 1 studio at Manchester which is used for large orchestral broadcasts. The silence cabinet is in the corner and one of the microphones is seen suspended on cables above the conductor's head.

THE HOW AND WHY OF RADIO—XXXV

WHAT YOU SHOULD KNOW ABOUT VALVES

Here is another of "HOTSPOT'S" weekly articles, written specially for beginners who want simple and practical explanations of the underlying principles of radio

THE next few articles in this series are to be devoted to an elementary survey of valves, for whatever may be said about other components in the set, the valve is still by far the most important.

If we carefully break the glass bulb of a modern receiving valve (I have just done this to illustrate my text) the construction disclosed is something like Fig. 1.

Further examination shows that the outer structure is a thin metal shell. This

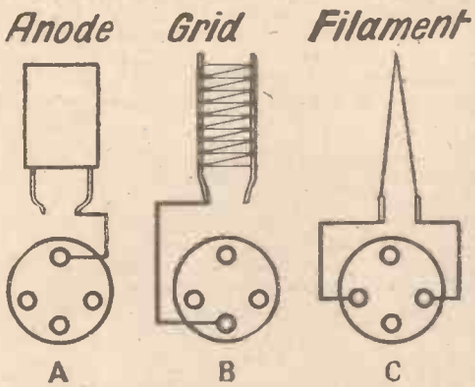


Fig. 2. Connections for anode, grid and filament of three-electrode valves

is the anode. Inside it is mounted a long thin wire wound in the form of a grid—and that is what it is called. Then right at the centre, inside the grid, is a V-shaped wire which is the filament.

There are thus, in a simple valve such as this, three separate parts, called electrodes. One, the filament at the centre, surrounded by, two, the grid, in turn surrounded by, three, the anode.

In the specimen I have just broken and illustrated by Fig. 1A, this triple structure is held up by six stout metal supports, embedded rigidly in the glass pinch. In this valve it is quite easy to see that four wires go right through the pinch and I can assure readers that these four wires come out to the four valve pins at the bottom of the bakelite base, in which the pinch is, literally, stuck.

One of the wires comes from the anode, another from the grid and the remaining two from the two ends of the filament. Here we come up against a first difficulty; why has the filament two leads and the other two electrodes—anode and grid—only one each? The answer is this: The filament has to be heated, by sending a current through it, and this can only be done by connecting its two ends to a battery.

For the action of the valve, the anode has to receive a positive charge and that is applied by connecting one end of the battery—the positive end—to the anode, every part of which receives this charge, no matter at what point it is applied. So with the grid; for some functions of the valve the grid must be positively charged, for others negatively. Whichever charge is wanted can be applied by connecting any part of the grid to one end of a suitable battery. Then the whole grid, like the anode, assumes the potential applied to any given point.

If we care to carry on our dissection, the structure of the grid can easily be seen, as shown by Fig. 1B. I think beginners would do very well to follow my plan—to take a valve to pieces. Then at the Fig. 1B stage it will be clear how the filament forms the centre of things and how the grid comes between the filament and anode.

The relation between the filament-grid-anode structure of Fig. 1 with the pins on the base of the valve can be seen from Fig. 2. In this diagram the anode connection is shown at A, taken to the pin set distinctly apart from the other three. At B is shown the connection of the grid, taken to the pin directly opposite the anode pin. At C is shown how the two ends of the filament are taken to the two pins on each side of the grid and anode pins.

This irreversible formation of the valve pins prevents the valve being wrongly

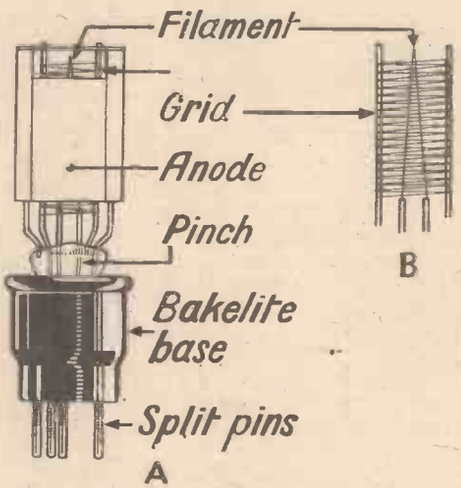


Fig. 1. The construction of a three-electrode valve

inserted. If the pins were interchangeable it would be easy to burn out the filament by inserting the valve so that the two filament pins came across the high-tension battery.

So much for the internal construction of a normal three-electrode valve. One thing we did not see on breaking the glass—the vacuum! It is necessary to exhaust all trace of air from the valve, otherwise, just as in an electric-light bulb, the filament would be rapidly consumed. The silvery coating noted on the inside of the bulb consists of oxide of magnesium. A small piece of magnesium is left in the bulb when it is sealed and evacuated, and as a final precaution this is allowed to ignite. In burning it uses up any residual gases and

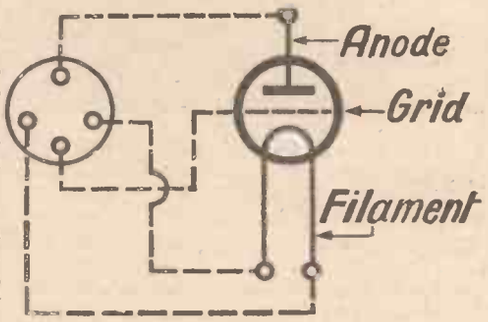


Fig. 3. Comparison between circuit symbol and valve holder

deposits itself as an oxide on the inside of the bulb.

Before finishing this introduction, I should like beginners to compare the circuit symbol for a three-electrode valve with the connections on a valve holder. At Fig. 3 can be seen the connection between the three parts of the symbol—anode, grid and filament—and the four sockets on a valve-holder.

HOTSPOT.

"AT MANCHESTER BROADCASTING HOUSE"

(*Continued from preceding page*)

of the room can be plugged in to one of the tone checking receivers.

Up on the top floor is the small room housing the dramatic control apparatus used for radio play production, and here again there is a pilot moving-coil speaker up near the ceiling in one of the corners of the room.

The various switching and fade-in and fade-out apparatus is of the very latest type developed by the B.B.C. engineers for their own particular requirements.

Cables go out to Manchester, to Moorside Edge, London, Leeds, Newcastle and many other centres and the importance of the Manchester Broadcasting House as a regional centre cannot be over-estimated.

Mr. Liveing, as North Regional Director, is bound to be a personality who will assume increasing importance as the scope of Moorside Edge widens.

PHILIP RIDGEWAY TESTS The "CENTURY SUPER"

Mr. Philip Ridgeway, of "Ridgeway Parade" fame, has been trying out the "Century Super" during the past few days and here he describes his experiences with the set in an entertaining interview with an AMATEUR WIRELESS representative.

"WELL, how many stations have you managed to get?" I asked Mr. Ridgeway when I caught him at Savoy Hill last week after a rehearsal for one of the "Parades."

He started to count up on his fingers and then laughed.

"Seriously," he said, "if I told you, you might think that I was exaggerating, especially as I am not an expert.

"As you know, I had your 'Century' set made up for me by a friend who said that it was bound to whack the portable set with which I have been vainly striving to get results.

"And he is right, too. No, I did not make up the 'Century' myself, but since I have had the set working I have experimented quite a bit and the layout looks so simple that I am sure even I could make up a set like it. In fact, some of the 'Parade' people who have heard my 'Century' working at home have been enthusiastic about it, and when this broadcast series is finished, during my break, intermingled with other work I might try my hand at the soldering iron. I promise you shall see my first home-built 'Century' set!

"But about the number of stations I have logged. I have had literally dozens of foreigners, the names of which I had seen in station lists, but I had never dreamed that people in this country could get, except on the most expensive commercial sets. A funny thing is that I have had dozens of stations, too, which I simply cannot log and which I believe are unknown quantities to the experts who make up the foreign stations lists!

"Would you believe it? Sometimes after coming back from Savoy Hill I have sat up until two and three o'clock in the morning. Stations have been coming in all the while. I never dreamed that there were so many stations on the ether, or that they worked so late at night.

"Another surprising thing is the large number of stations which I have logged and which have given announcements in English. Until I tried the 'Century' I did not know that there were so many stations which gave programmes which were quite intelligible to the average Englishman. This, of course, increases their 'programme value,' to use a familiar Savoy-hill term, and makes it all the more essential that nowadays you should have a good set like the 'Century' on which you can get a wide number of stations. I should be the last person to say that you need have a set which will only get B.B.C. stations! Everyone wants a set which gives a choice of Continental programmes, even though they may not always be so good as the local B.B.C. item, and, on the 'Century,' at any rate, you can do this.

"I have had Heilsberg, Breslau, Berlin, Rome, Milan, Vienna, Munich, Moscow, Radio Paris, Barcelona," said Mr. Ridgeway, reading from a scrap of paper in his pocket-book, "and there are dozens of others which I have not been able to log by their announcements because my wife has been impatient at my wasting so much time at the set when I ought to be preparing new material for broadcasting, and so on.

"She works it too, of course. It's such an easy set to tune because the two knobs move practically in step. I like the strength control too, for I have to cut down the volume on the stronger stations like Rome.

"The tone is exceptionally good, and although my previous set, a five-valver also good in this respect, the 'Century' certainly has it beaten. I do know enough about wireless to realise that in the ordinary way you want large batteries and a big power valve to get a nice tone, but my 'Century' is working off only a 120-volt battery, and the volume is great enough if I want to dance.

"A friend of mine who is a very keen wireless fan laughed when I told him that I was actually listening to Mühlacker. He said it wasn't possible because London drowns the German station, no matter what set one uses. Anyway, I have shown him that it can be done and for the first time in my life I feel like a real wireless expert!"

I asked Mr. Ridgeway if there were any stations he *couldn't* get, and he thought for a while.

"Yes," he said, adopting the "Ramsbottom" tone well known to listeners, "the only station I can't get is Rawtenstall."

Nor can anyone else, and perhaps he is the only one who has tried. Mars may be his next attempt.

INTERVALVE COUPLINGS

WITH two stages of L.F. amplification it is better to use choke or resistance coupling for the first valve, and a transformer for the second. If the arrangement is reversed, trouble is likely to be experienced in a mains-driven set, because if there is any "hum" in the output from the detector, this will be accentuated across the transformer, before being passed on to the last valve. By placing the transformer stage last, the relative amplification of any mains "noise" is reduced. Similarly on the high-frequency side, it is better to use a tuned-anode before a tuned-transformer coupling, unless both stages are thoroughly "decoupled" from the mains supply.

M. B.

EUROPE AT YOUR ELBOW WITH THE "CENTURY SUPER"

SCREENING

A NEW material designed for screening high-frequency components consists of paper coated with an extremely thin layer of aluminium. Electrically the material is equivalent to sheet aluminium, but is much more convenient to handle. It can easily be cut to any required shape, and if necessary glued on to a wood or ebonite former.

M. A. L.

Genoa is testing on 524 metres with a view to taking up this position in the waveband, in future.

HOW GOOD CAN WE MAKE TELEVISION IMAGES?

WHILE work on television continues in all parts of the world, along lines that may or may not eventually provide us with television on an entertainment basis, it is perhaps of value at this stage to see what degrees of perfection are possible through normal broadcasting channels. In this connection I have recently received some very interesting data from the Bell Telephone Laboratories of New York.

In the usual processes of tele-photography, as extensively used by newspapers, the picture can be considered as divided into a large number of small elements of equal size. The electric eye of the transmitting machine does not see the whole picture at once, but is focused on only one unit area at a time, passing rapidly along row after row until the whole picture has been scanned.

As each unit area is viewed in turn, an electric impulse is produced, the strength depending upon the light or shade of that particular portion. At the receiving end the apparatus re-creates the picture areas one by one, arranging them in the proper order to form a group that, viewed by the human eye, appear similar to the original picture.

Now it is obvious that in such a system any picture details smaller or closer together than the size of one picture element cannot be properly transmitted. In fact, the finest detail capable of being sent occurs when alternate picture elements are dark and light. The electric signals corresponding to these dark and light elements would be strong and weak respectively, a cycle being sent for each two elements. The frequency of this current is therefore the number of picture elements sent per second divided by two. For coarser detail the frequency could be lower.

From what has been said the reader will realise that in order to transmit good detail the apparatus must be able to handle all frequencies up to that corresponding to the finest detail—a frequency equal to the number of picture elements per second divided by two. If the telephone wire or the broadcasting channel over which the picture currents are sent cannot transmit a sufficiently high frequency, the received picture will appear coarse, just as though the picture had been divided into larger elements at the beginning. The important point to understand is that, no matter now nearly perfect the sending and receiving apparatus may be, the best picture that can be received will depend upon the available frequency band.

Television and Tele-photography

This condition applies just as much to television as it does to the more commercial process of tele-photography. The main difference between the two is the speed of transmission. In tele-photography several minutes may be taken to transmit a picture, but in television it is necessary to present to the observer a minimum of sixteen complete pictures per second in order to give the illusion of motion. This means that each picture can contain only the detail that can be transmitted in one-sixteenth of a second.

As an example, one might cite a 10-kilocycle broadcasting channel. With the usual broadcasting the total channel width is divided between two side bands. The highest frequency handled by the television apparatus is determined by the width of one side band, namely 5,000 cycles. As we have already seen, each cycle represents two picture elements, so the number of picture elements that could be received through a 10-kilocycle broadcasting channel in a second is 10,000 or 625 elements in one-sixteenth of a second.

From this it will be seen that no matter how good the television apparatus may be, the very best quality picture that could be obtained with a 10-kilocycle broadcasting channel would contain only about 625 elements, or about 22 by 28 elements. Television pictures of about this quality are illustrated in this article. These compare with the pictures obtained over the commercial tele-photography system containing 250,000 elements. To broadcast such good pictures as television images would require a frequency band with a width of 4,000,000 cycles, equivalent to 400 ordinary broadcasting channels!

Fig. 1 shows the detail obtained by tele-photography, corresponding to 400 ordinary broadcasting channels. Compare this with Fig. 2, which is barely recognisable, having 625 elements—the maximum number possible with a 10-kilocycle broadcasting channel. Figs. 3, 4 and 5 show the same pictures as they would appear when divided into greater numbers of elements than Fig. 2.

Fig. 3 has 1,250 elements, corresponding to two broadcasting channels. Figs. 4 and 5 have 6,250 and 12,500 elements, requiring ten and twenty broadcasting channels respectively. From these interesting comparisons, the reader will readily see that television with existing apparatus, even assuming that apparatus were perfect, requires a tremendous frequency channel for anything like good detail. Possibly the use of special single-side-band methods of broadcasting may help to solve the problem. It is instructive to note that in America, at least at the Bell laboratories, the present difficulties of accommodating television signals in broadcasting channels is far more fully recognised and admitted than in this country.

A. S. H.

These five reproductions throw interesting light on the amount of detail possible with perfected television apparatus used with various frequency channels. The corresponding amounts of detail for another picture are shown at the top of this page.

A Weekly Programme Criticism—By SYDNEY MOSELEY.

Without Fear or Favour

THE WRONG ATMOSPHERE

A STRIKING PLAY

WHAT I have written in these columns about "compereing" still holds good. Those "Two Pairs" are usually a good turn, but they certainly did not shine in introducing the other turns.

Claude Hulbert, who can sometimes be funny, imagines that all he had to say was "Have a drink" in order to make us laugh. *I strongly protest against this drink propaganda*, unconscious as it may be, in so many B.B.C. broadcasts.

Concert party after concert party put over quite the wrong atmosphere of "At Homes." These modern young things imagine that you cannot have a jolly time at a party unless from beginning to end it is a question of "lifting your elbow."

This is a matter of policy which should not be left to smaller men.

♦ ♦ ♦

As I met both Sir Ian Hamilton and Compton Mackenzie out in Gallipoli, I was particularly interested in the broadcasting of what they called "a discussion."

As I anticipated, it was scarcely a discussion but an opportunity for Sir Ian Hamilton to justify himself again, with Compton Mackenzie acting as a good and respectful foil. A real discussion on Gallipoli would be between an Easterner like Sir Ian and a Westerner, of whom there were many.

♦ ♦ ♦

I heard both John Gielgud and Harman Grisewood in the title part of Clemence Dane's *Will Shakespeare*. A striking and arresting play, and done much more efficiently and attractively than I thought possible.

I have paid lots of tribute to Grisewood, and he did very well, coming after so redoubtable a figure as John Gielgud, but the latter, who was recently accused of not being a mature "King Lear," was certainly more mature as Will Shakespeare than Harman Grisewood.

♦ ♦ ♦

Yet, as a matter of fact, the honours fell to Lilian Harrison, who really touched the emotions with her acting as Anne Hathaway.

The rest of the caste were worthy of a great play which was produced with Val Gielgud's usual efficiency.

That was an amusing mistake by the commentator regarding the presence of Royalty at the Cup Final. George apparently knows more about players than princes.

♦ ♦ ♦

I listened to the Theodora Guitter Trio—a name I have never seen before in the official programme. There are other new names too. This is good policy, for it enables the B.B.C. in searching for fresh talent to make discoveries. And you never know. As soon as they make names on the wireless they seem to go farther afield—where there is more money.

♦ ♦ ♦

Our friend Leonard Henry was not in his most bubbling mood in the "Up River" romp.

Wynne Ajello sang nicely but she could sing just as nicely without the stupid words that seem to be necessary in productions of this sort. There was also a sad song about "Laughing at the rain." Where was the laughter?

Ernest Longstaffe usually produces bright things. This, too, was bright in parts, but the weather was all against the river outing.

KEEPING THE LEADS SHORT

If you are designing your own set then take great pains to keep all connecting leads as short as possible. Here, for instance, are three input terminals to a set, one of which, as can

be seen, is only one inch or so away from the grid terminal with which it connects. The fixed condenser at the back is placed on its side so that its terminals, too, can be connected with very short wires.

NEW TALENT

SEA SHANTIES

Gillie Potter goes the way of all comedians—up and down. His talk about "The truth about the Press" was an example. To say that somebody whose "horses win except when they lose" may be a statement of fact, but is hardly a quip.

♦ ♦ ♦

I went up to the studio to see, as well as hear, Sir James Sexton, Ben Tillett and the Chorus put over Sea Shanties. They made a great effort, although Sir James, with a cold, was palpably nervous. It was amusing to see him hitch his trousers! At first I thought his voice, owing to the cold, was too husky to get over, but I went into the padded box in the studio and put on the earphones and found I could hear every word—including the downright "damn" *which was the only swear word they left in*!

♦ ♦ ♦

I *saw* two singers, Silvio Sideli and Gaby Valle, in the afternoon, and *heard* them over the wireless at night. Both have excellent full voices, but somehow they sang to better effect in the hall than at the studio. There is no doubt that we must hurry on television.

♦ ♦ ♦

I have heard Henry Ainley, but didn't quite recognise him in the impression given by Lawrence Anderson.

♦ ♦ ♦

The pure tones of the Tyldesley Temperance Prize Band were noticeable, although the waltz in what is now called *Lilac Time* was taken rather slowly.

Edinburgh Town Council proposes to take no action with regard to a broadcast relay scheme. The Post Office authorities had pointed out in a letter to the Council that they were opposed to the granting of a monopoly for a broadcasting relay service.

The Edinburgh transmitter of the B.B.C. which was situated at the Edinburgh University buildings since 1924, has been transferred to new premises at the St. Cuthbert's Co-operative Association, Port Hamilton, Edinburgh. The Edinburgh transmitter will remain at its new site until it is replaced by the high-power Scottish Regional station now being built at Falkirk.

GETTING THE STATI

with the "CENTURY SUP

A STATION EACH DEG AND HOW GET THE

By W. JAM

IT is very easy to wire this set, using the large diagrams given in the two preceding issues (Nos. 463 and 464).

Commence the work by removing the panel from the baseboard. In some instances a length of wire can be used to connect a number of points without cutting it.

Wires numbered 1 to 7, for instance, need not be separate wires but a single length joined to the terminals of the valve holders.

There are a number of flexible wires for connecting the batteries. These should be carefully marked in order that a mistake shall not be made afterwards when the batteries are being joined to the set. Note also the grid bias wires and be sure they are correctly labelled.

There are two forms of oscillator unit. One has connecting tags with coloured tabs for identification and the other has flexible wires leaving the can, these wires being coloured.

In the case of the units having connecting tags, flexible or 18-gauge copper wire may be used, the ends being pushed into the connecting tags.

The white wire goes to the centre terminal on the frame aerial connecting strip, as it joins with the centre tap of the frame. One side of the tuning condenser goes to terminal 2 on the strip. This side is joined to the frame aerial only and does not connect with the circuit. Terminal 1 goes to the frame, the tuning condenser and the grid of the first valve. Note particularly the connections of the oscillator. The black coloured wire, or the wire having the black insulating tab, goes to the anode terminal of the oscillating valve and the blue one goes to the grid of this valve and to the tuning condenser. The red wire goes to the 1-microfarad fixed condenser and to the high-tension through a 15,000-ohm flexible resistance.

VALVES TO USE IN THE "CENTURY SUPER"

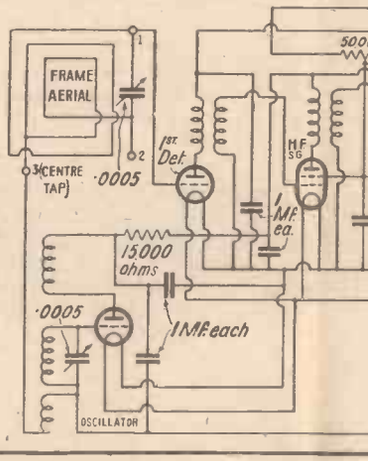
First Detector : Mullard PM1HF, Cossor 210HF, Mazda H210, Marconi H210, Osram H210, Eta BY2023.

Second Detector : Cossor 210HF, Marconi HL210, Osram HL210, Mazda L210, Mullard PM1HF, Eta BY2023.

Intermediate Stages : Marconi S215, Osram S215, Mullard PM12, Mazda 215SG, Eta BY6, Cossor 215SG.

Oscillator : Mazda L210, Osram L210, Marconi L210, Cossor 210LF, Eta BY2010, Mullard PM1LF.

Power : Osram P215, Marconi LP2/C, Mazda P220, Eta BW1304, Mullard PM2, Cossor 215P.



Here is the circuit of the "Century Super." A large pictorial diagram showing the battery connections is given on the following page

COMPONENTS REQUIRED FOR THE "CENTURY SUPER"

Special cabinet and baseboard, and wooden panel (Cameo, Peto-Scott, H. & B.).

Two .0005-mfd. variable condensers with slow-motion movement (J.B. "Tiny No. 2," Peto-Scott, Lissen, Ormond, Readi-Rad, Cyldon).

50,000-ohm wire-wound potentiometer (Colvern, Sovereign, Regentstat, Rotor).

Three-point shorting switch (Readi-Rad, Wearite, Bulgin, H.B., Benjamin, Lissen, Junit).

Set of super-heterodyne coils (Wearite, Lewcos).

Six valve holders (Telsen, Wearite, Lissen, Lotus, Benjamin, W.B., Clix).

Triple coil base (Peto-Scott, Wearite).

Five 1-mfd. fixed condensers (Dubilier, Lissen, T.C.C.).

Two .001-mfd. fixed condensers (T.C.C., Lissen, Telsen, Dubilier, Formo).

.0002-mfd. fixed condenser (Formo, Lissen, T.C.C., Dubilier, Readi-Rad, Graham Farish).

Grid-leak holder (Readi-Rad, Wearite, Lissen, Bulgin, Dubilier, Formo).

1-meg. grid-leak (Lissen, Dubilier, Telsen, Graham Farish).

Low-frequency transformer (Telsen "Ace," Lissen, Varley, Ferranti, Burton, Lewcos, R.I., Voltron).

Terminal strip with three small terminals for baseboard mounting (Peto-Scott).

15,000 and 20,000-ohm spaghetti resistances (Lewcos, Bulgin, Readi-Rad, Turner, Graham Farish).

Fuse-holder and fuse (Bulgin, Readi-Rad).

Five yards of thin flex (Lewcos).

Eight wander plugs marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, H.T.+4, G.B.+, G.B.—1 G.B.—2 (Belling-Lee, Clix, Eelex).

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

Connecting wire and sleeving (Jiffilinx, Readi-Rad.)

Frame aerial (Peto-Scott, Lewcos, Wearite).

ACCESSORIES

One cone speaker (B.T.H., Amplion, Mullard, Ormond, Blue-Spot).

One double capacity 120-volt H.T. battery (Ever-Ready, Pertrix, Drydex, Lissen, Fuller).

One grid-bias battery, 9 volts (Ever-Ready, Pertrix, Drydex, Lissen, Fuller).

One 2-volt accumulator (C.A.V., Exide, Pertrix).

ONS"
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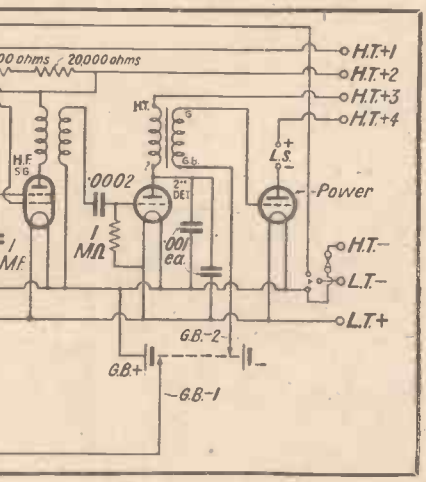
FOR
GREE
TO
EM
MES

When the wiring is finished fit the fuse bulb and then the super-heterodyne coils. Note particularly that one of the coil units has no connection from the top of the can. This is the first coil and should be plugged into the right-hand coil holder looking at the back of the set.

The next two coil units have flexible connecting wires coming out of their tops. They are interchangeable.

The following valves have been used during initial tests, and a full list of suitable valves is given in the accompanying panel.

In the oscillator ition a Mullard PM1LF (imped- e 12,000 ohms, amplification factor For the first detector a PM1HF 500 ohms and 18). In the two screen-



stages fit Mullard PM12 valves and the second detector use a PM1HL, a PM2 in the output stage. The PM2 valve is a small power valve having an impedance of 4,400 ohms, with an amplification factor of 7.5. Used with a high-tension of 120 volts, the grid bias should be negative 9 or 10.5 volts when the current is between 5 and 6 milliamperes. The second detector may be supplied with about 90 volts at H.T.+3 and the current is about 3 milliamperes. For the first detector we use about 100 volts, at H.T.+1, and the current taken is normally quite small, say .1 milliampere, or a little more when the oscillator is not connected and no signal is being received. The grid bias for this valve is taken from G.B.—1 and may be —1.5 or .3 volts. Both values should be tried when listening to a distant station and the high-tension at H.T.+1 ought also to be adjusted.

With the powerful stations no great difference in the volume will be noted over a range of anode voltages but the valve must be accurately set when listening to a weaker signal.

Frame Connections

Plug H.T.+2 has connected to it the anodes of the two screen-grid valves and also the potentiometer. As the total resistance of the potentiometer circuit is 70,000 ohms, the current flowing through it will be 1.7 milliamperes, with a high-tension of 120 volts. The two screen-grid valves themselves pass about 1.5 milliamperes each under normal working conditions, but pass less when the volume control is turned well down.

There is also the oscillator which is supplied from the tap H.T.+2, and this takes about 2 milliamperes.

With the batteries connected as shown in the diagrams and the loud-speaker joined to the set, switch on by operating the switch on the front panel. Set the switch of the oscillator to its mid position and the frame aerial to medium waves. The frame aerial, by the way, is connected by three flexible wires which should be as short as possible and be sure they are connected to the right terminals on the terminal strip. The centre tap goes to the centre terminal and the two outer ends may be taken to the outside terminals, it not mattering much which way round they are joined, although the effect of reversing them should be tried.

Tuning

If you now turn up the volume control, set the frame aerial tuning condenser, say, halfway and *slowly* move the oscillator tuning condenser, you will hear when the oscillator is brought into tune by a rushing noise if there is no station working.

This rushing noise is too well known to need description and is due primarily to the slight atmospheric noises picked up when the circuits are in tune and the set is in a sensitive condition.

Alter the volume control so as to get the rushing noises as loud as possible, without, however, causing the beat-frequency amplifier to oscillate. It can usually be made to oscillate, as the potentiometer circuit, to which the screens of the screen-grid valves are connected; is so arranged that slightly more than the normal voltage can be applied.

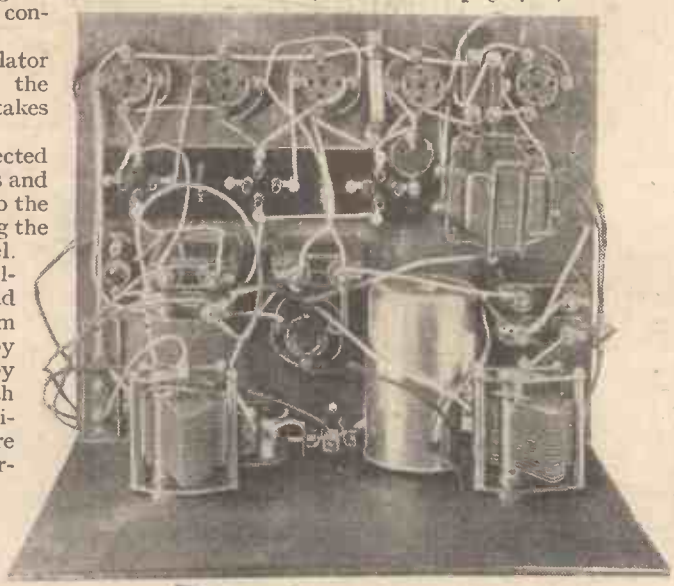
You must turn the oscillator very slowly.

Adjustments

Having heard a station, try adjusting the voltage applied through tapping H.T.+1, and also the grid bias at G.B.—1. Try a bias of —3 volts for instance, and then alter the high-tension at H.T.+1 to suit. Then try a bias of —1.5 volts and again alter the voltage applied through H.T.+1.

In this way you will set the first detector correctly and obtain the maximum sensi-

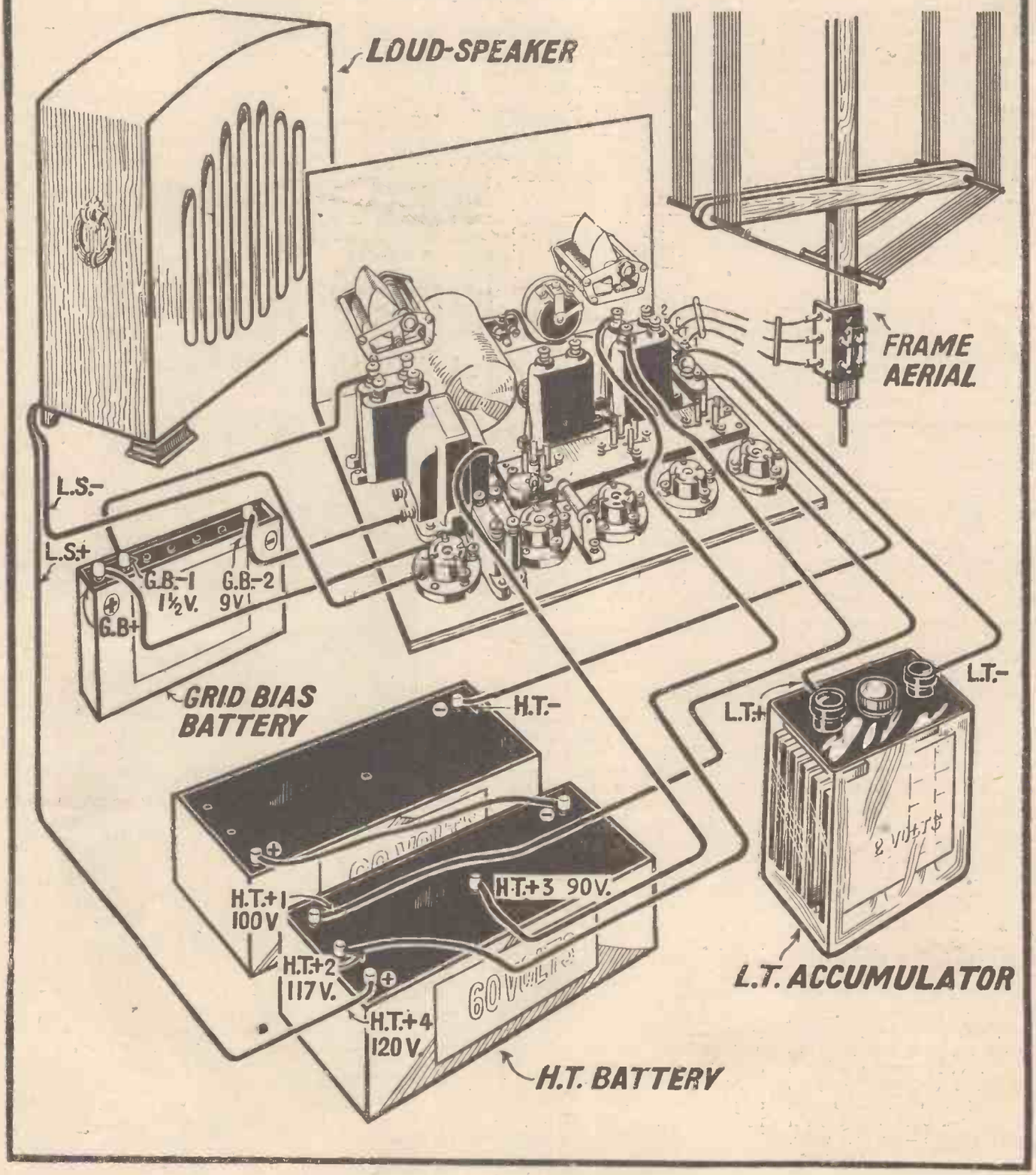
(*Continued on page 766*)



Two views of the "Century Super" which make apparent the simple construction and few parts required

THE BATTERY & AERIAL CONNECTIONS FOR THE "CENTURY SUPER"

A HELPFUL PICTURE



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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 Heterodyne 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 Telson "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		

RECOMMENDED ACCESSORIES

	£	s.	d.
2 Fuller 60-volt "Super" capacity H.T. batteries	*1*	*7*	*0*
1 Fuller 9-volt 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 loudspeaker or 1 Amplion cone loudspeaker A.C. 21	*3*	*0*	*0*
	1	*19*	*6*

Components can be supplied separately

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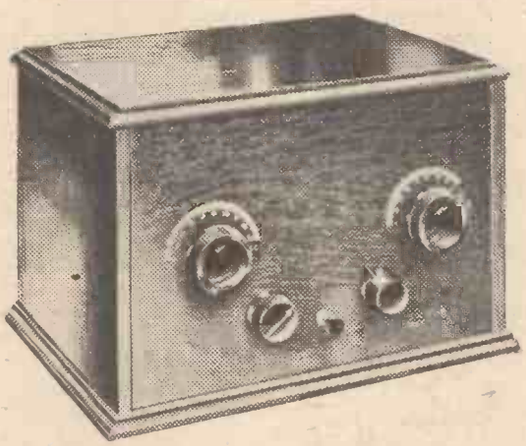

THE CENTURY SUPER

Completely assembled with valves, cabinet and wound frame aerial, ready for use and aerial tested. Price **£14:10:0**

or 12 monthly payments of 26/6.

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(Less Valves and Cabinet, but including Wound Frame Aerial.) **£6:18:6**

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IN MY WIRELESS DEN

WEEKLY TIPS—CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

New Valve Holders

TWO or three new makes of valve holders to hand prove that our manufacturers can do a good job. The valves with solid pins must be fitted to sound holders. Some of those now on sale are not very satisfactory, the contacts being too weak and flimsy They give trouble in use. Good holders are worth paying for and the poor ones are dear at any price.

Those Terminals

I often wonder why so many terminals fitted to transformers, coils, and other parts are round. The hexagon nut, with a slotted head, as used by some makers, is a so much more satisfactory job that I should have thought the old-fashioned circular terminal nut would have been discarded long ago.

A New Reaction Condenser

I suppose we all consider at times whether to fit a plain reaction condenser or one of the differential type.

There are times when it seems by careful test that the differential has no advantage over the plain type and then, of course, the difference in cost is a big point.

Actually, most detectors seem to work best when there is a condenser across the anode and filament, and whether this takes the form of part of a differential or a separate fixed condenser is a matter for careful experiment. We must obtain smooth reaction and good detection as well. When in doubt it is the better plan to use a differential.

Changing the G.B. Battery

How often should a grid-bias battery be changed? That is a question which we all have to answer, but I am afraid the answers show wide differences of opinion.

Some say every six months, others say at yearly intervals, and others reckon that a grid battery is good for the life of the set.

I have noted that one battery may be good for a few months only, while another is perfectly satisfactory after a year's use. For testing I prefer a low-resistance voltmeter and if the voltage falls rapidly I throw the battery away.

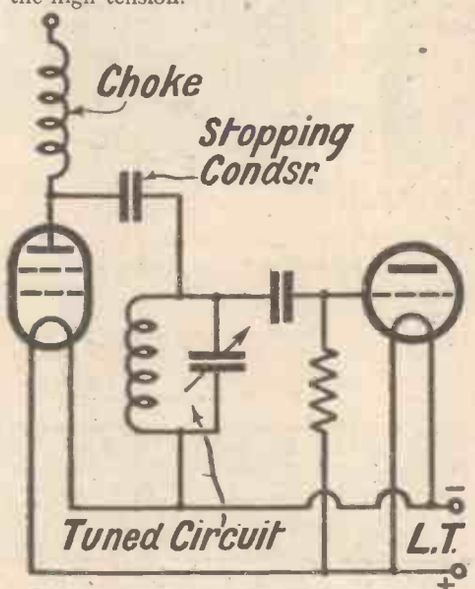
Those who have no voltmeter are in a difficult position unless they can have the battery tested for them. For safety the battery ought to be discarded after six months' service, unless testing shows it to be satisfactory.

When a high resistance develops and two or more circuits are connected to the battery, they are coupled and poor results may well be obtained. You may get poor quality or instability, and sometimes a high-pitched whistle may be traced to this cause.

An H.F. Matter

There are a number of ways of connecting a plain tuned circuit to the anode of a screen-grid valve. The most popular appears to be the circuit which includes a high-frequency choke in the anode circuit, which is coupled to the actual tuned circuit through a fixed condenser, as indicated in the accompanying diagram.

A point to note is that the high-tension is not applied to the tuned circuit, the fixed condenser isolating the circuit from the high-tension.



This is the popular H.F. coupling referred to

This condenser must therefore be of a type well able to withstand the full high-tension. A further point is that as the choke is connected across the tuned circuit, any losses in this component will affect the tuning and the amount of the magnification.

It is rather surprising what a large difference is to be noted as between various makes of chokes. Some are very good and others are so constructed that their inclusion in a set lowers the effectiveness.

It is not to be wondered at that such differences are found. Some chokes have at least twice as much wire on them as others. The former of some chokes is of good quality insulating material, and others again have poor electrical properties. So you see that the choke is an important component.

What Size Frame?

You may often hear the remark passed that a very small frame aerial is all that is needed for reception, as the set itself is so powerful.

This may be true enough and the tuning may seem very sharp when a small frame is used. The fact remains, however, that it is better to employ a frame of fair size, as usually the ratio of signal strength to noise is greater than with the smaller frame.

In experimenting with the "Century Super" I found out several things about frame aerials.

The fact is that the set itself provides so much magnification that a large frame is not needed from the point of view of signal strength. If you try, as I did, however, two frames, one of fair size and one of small size, you will see where the larger frame scores. Reception is definitely better with the larger aerial.

Incidentally, the presence of an outdoor aerial affects the results. It is interesting to tune the "Super" to a station and then to tune the outdoor aerial. All you need is a coil and condenser in the aerial circuit, and as you pass through the tuning point quite a difference in the results will be noted.

Those Fixed Condensers

The question is sometimes raised as to whether a metal case is better for condensers of the 1- or 2-microfarad type than a bakelite moulding.

Personally, I believe that electrically there is not much to choose between them. The manufacturers use the metal cased type possibly because they are cheaper than types having a moulded case.

Considering the parts used in condensers and the fact that sealing is essential, it will be understood that a sound case is essential. Small fixed condensers usually have a moulded case and when this forms part of the construction of the condenser itself cheap units are possible.

Some fixed condensers are well made in compact forms. The actual elements are small and a large case is not an essential.

A site for the new Leipzig high-power transmitter has been found in the neighbourhood of Pegau, only twelve miles from that city. Work on this station is to be started at once.

According to an official notice issued by the Italian broadcasting authorities, the new Palermo station will be opened in the course of next month. Its power is 3 kilowatts (aerial). Although a wavelength of 200 metres has been suggested, there is a possibility that it may effect an exchange with another Italian transmitter as the figure chosen would be unfavourable in view of the geographical site.

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2 .0005-mfd. variable condensers with slow motion movement. Peto-Scott★	12 0
1 50,000-ohm wire-wound potentiometer. Sovereign	4 6
1 Three-point shorting switch. Ready Radio	1 6
1 Set of super-het. coils. Wearite or Lewcos	2 10 0
6 Valve holders. Telsen	6 0
1 Triple-coil base. Peto-Scott	2 9
5 1-mfd. fixed condensers. Franklin	10 10
2 .001-mfd. fixed condensers. Graham-Farish	2 0
1 .0002-mfd. fixed condenser. Formo or Ormond	6
1 Grid leak holder	6
1 1-meg. grid leak. Telsen	1 0
1 Low-frequency transformer. Telsen "Ace"	8 6
2 Spaghetti resistances, 15,000 and 20,000-ohm. Keystone or Lewcos	3 0
1 Fuse holder and fuse. Ready Radio or Bulgin	1 3
8 Wander plugs, marked: H.T. —, H.T.+1, H.T.+2, H.T.+3, H.T.+4, G.B.+, G.B.—1, G.B. 2. Belling-Lee	2 0
2 Spade terminals, L.T. Peto-Scott	3
Konecterkit. Terminal strip with three small terminals for baseboard mounting (Peto-Scott) 5 yards of thin flex, glazed connecting wire, fixing screws, bolts and nuts, etc.	GRATIS
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Ebonite panel, 12 in. by 8 in. by ⅛ in., drilled	4 6
1 Green Triangle 120v. H.T. battery. Drydex	18 6
1 Grid bias 9v. battery. Drydex	1 4
1 20/40 accumulator. Exide	9 6
6 Mullard valves, 1 PM1LF, 2 PM1HF, 1 PM2, 2 PM12	3 16 0

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NOTE: Batteries extra.

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SETS OF DISTINCTION

COLUMBIA MODEL 332 CONSOLE

Makers: The Columbia Graphophone Co., Ltd.
Price: 23 Guineas

MY recent remarks on the subject of consoles have come home to roost. We now have an extremely inexpensive console in Columbia model 332, just announced by the Columbia Graphophone Co., Ltd. Here we have an installation that is entirely self-contained except for the aerial and earth connections. And judging by the strength of stations received during my tests, only a short indoor wire would be needed for the aerial.

At 23 guineas this pedestal set is certainly remarkable value for money. It works from A.C. mains of 200 to 250 volts and I am glad to say that there is also a model for D.C. mains.

A Compact Set

The size of the cabinet can best be visualised if I say that were a normal three-valve all-electric set stood on top of a cabinet cone loud-speaker, that would be about the space taken up by this new Columbia model. There is something very attractive about this cabinet. It is quite big enough for its job but is not so big that it would be cumbersome in the average home of to-day.

The nucleus of model 332 is a powerful three-valve all-electric set, comprising a screened-grid high-frequency amplifying valve, a leaky-grid detector valve and a transformer-coupled pentode power valve. There is another valve for converting the A.C. supply into direct current for the three receiving valves.

The set cannot be called expensive to run. Assuming electricity to cost 6d. per unit, the A.C. model can be run for ¼d. per hour and the D.C. model for ½d. per hour.

I spent an interesting evening at the controls of this Columbia console. Most of them are accommodated on an escutcheon plate fitted above the loud-speaker grille. There are two tuning controls, which take the form of thumb-operated dials mounted side by side, so that both can be rotated simultaneously. The right-hand dial is calibrated in wavelengths and the left-hand dial in degrees from 0 to 100.

I found the wavelength calibrations usefully accurate. They enabled me to find most of the powerful foreign stations without the need for a lot of preliminary skirmishing. The medium waves are calibrated in steps of 25 metres from 225 metres to 540 metres. The long waves go from 1,000 metres to 1,900 metres in steps of 100 metres.

In addition to these two tuning controls which are, by the way illuminated while the set is in operation, there are two other important controls, an intensifier on the left and reaction on the right.

Easy Control

The intensifier is really a pre-detector volume control and plays a great part in the separation of distant stations. There is a considerable degree of magnification in this set and for many foreign stations the use of reaction was found unnecessary, provided that the intensifier was at its maximum.

On the left-hand side of the cabinet is a small plate carrying the mains on-off switch, the aerial and earth sockets and a selectivity control in the form of an aerial series condenser. For a three-valve circuit one can hardly do with less controls than are fitted to this Columbia set. I am glad the makers have not omitted any of them. There is quite a false impression that simplicity of control is the same thing as absence of controls. Actually, in a three-valver any cutting down of controls means either critical operation or lack of efficiency.

One quickly grows accustomed to the operation of the various knobs on the Columbia console under review. It is necessary to make intelligent use of the selectivity control and of the intensifier control in order to separate the stations received. This applies especially when the set is worked within 20 miles of a station like Brookmans Park.

Selectivity

Some idea of the selectivity possible with this set, when the selectivity and intensifier controls are set to their half-way position, will be appreciated from the fact that London Regional then had a 30-metre spread. Thus Strasbourg below London Regional and Toulouse above it were brought in clear of interference. Sottens, just above Midland Regional was tuned in clear, which is good for a three-valver. On the long waves I was able to get Radio Paris and Eiffel Tower clear of Daventry, but considerable use had to be made of the subsidiary controls. The strength of Radio Paris and indeed of several other long-wave stations, was exceptionally good.

As I have said, this set has a good degree of sensitivity, which is not too greatly impaired when the set is made selective. I obtained a good log of stations by turning the calibrated dial to the required wavelengths.

The quality of reproduction is not the least attractive feature of this console. The makers have utilised a 12-inch cone, driven by a powerful balanced-armature unit. But even this does not entirely account for the extremely pleasing balance of tone noted during tests. Possibly the fact that the loud-speaker chassis is contained within a cabinet much larger than is usual in a cabinet loud-speaker accounts for the absence of "boominess." Speech is delightfully clear and music has a fine round tone.

SET TESTER.

AT THE QUEEN'S HALL

MYRA HESS was the soloist in the Schumann Concerto in A minor, for Pianoforte and Orchestra, given by the B.B.C. at their concert on April 29. She gave a spirited and brilliant performance.

Arnold Bax's No. 2 Symphony has moments of great poetical beauty, and the composer himself was accorded an enthusiastic ovation at its conclusion.

The greatest success of the evening, however, was Gota Ljungberg, who sang the arduous and difficult part of Salome in the final scene from "The Dance of the Seven Veils," by Strauss. Her voice possesses great power and range, but is never harsh.

—E. K.

A Century Super "Gadget."—"Century Super" builders should note that Messrs. Wright and Weaire are producing a strip, ready wired, carrying eight valve holders for the coils and valves of the set, together with numerous other small parts, such as grid leak clips. The use of this strip eliminates a great deal of the wiring, and simplifies the constructional work; it is bound to appeal to all builders of the "Century." The price is only 7s.

Radio Strasbourg has been compelled to suspend its relays of concerts broadcast from local cafés and restaurants, as the proprietors of these establishments have decided that such transmissions induce their customers to listen to them in their *own* homes!

It should be noted that the cartoon shown on page 711 of "A.W." No. 464 is a Robert's impression of Neil McKay, the popular Scots comedian

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MORE ABOUT THE REGIONAL SUPPRESSOR

The simple device described in last week's issue for cutting out the local station.

By J. H. Reyner, B.Sc., A.M.I.E.E.

THE "Regional Suppressor", a simple but effective wave-trap designed primarily for use with new North Regional station, but applicable to any programmes within the 250 to 550 metre band, was described in last week's issue, and I mentioned there that I would give particulars this week regarding the effectiveness of the trapping and the influence on other stations.

To be effective, a wavetrap should absorb energy at the frequencies immediately around that to which it is tuned, but should exercise as little absorption as possible on other frequencies only a little removed. When conducting the experiments on the Regional Suppressor the well-tried rejector principle was utilised. This can be used in any form of set no matter what the aerial coupling system is, and as will be seen from the curves (Fig. 1), a very serviceable arrangement has been produced which will meet the needs of the great majority of listeners.

The Test Circuit

The circuit for the tests is illustrated by Fig. 2. The laboratory standard totally-screened oscillator was employed to generate an artificial signal. This signal is under complete control, its strength being capable of variation from a whisper to several hundred millivolts per metre, this latter value corresponding to the signal received from a Regional station at between five and ten miles range. The signal from this oscillator is introduced into an artificial aerial circuit having constants equal to that of the average aerial.

This artificial aerial circuit was coupled to a tapped six-pin coil which was tuned to the signal in the ordinary way. The voltage developed across this circuit was applied to a sensitive valve voltmeter, and the signal strength was measured by this means.

Measuring the Voltage

The first test consisted in measuring the voltage across the circuit alone at different frequencies. This, of course, is not constant even though the input may be constant, because the magnification of the circuit depends upon the ratio of inductance to capacity. It is well known that if a small high-frequency voltage is introduced into the circuit—from an aerial for example—the voltage across the circuit is many times greater than the original voltage induced. This is the basis of the whole principle of tuning, and it is this property which enables us to select the station we want and disregard those which we do not require. The extent of the magnification depends upon the ratio of inductance and capacity, the circuit being more effective with small condenser values. Consequently as the wavelength is reduced, so the voltage across the circuit increases somewhat rapidly.

Most readers will have noticed this effect in tuning their sets. The amount of reaction required is usually quite small at the bottom of the tuning range, and increases as we go towards the top end of the scale. This is entirely due to the varying magnification of the coil. In the experiments being described no reaction was employed, of course, since this would introduce a variable factor into the results. The coil was used as it stood and consequently the voltage developed was much greater at 300 metres than at 600 metres. The actual variation is shown by the dotted line in the curve, from which it will be seen that there is a steady increase in the efficiency of the circuit as we go towards the shorter wavelengths.

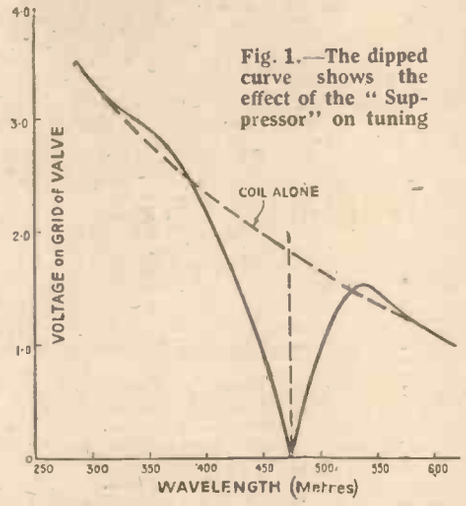


Fig. 1.—The dipped curve shows the effect of the "Suppressor" on tuning

Now we may take this dotted line to represent the normal state of affairs. If we introduce any extra circuit into the system and then measure the voltage which is developed, we can, by comparing this voltage with that obtained from the coil alone, see at a glance whether any serious change has resulted.

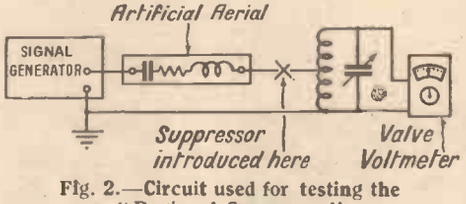


Fig. 2.—Circuit used for testing the "Regional Suppressor"

Consequently, the next part of the experiment consisted in connecting the "Regional Suppressor" in the lead between the artificial aerial and the coil, as shown at X in Fig. 2. This duplicates practical conditions, since, as was explained last week, the Suppressor is connected in between the aerial and the aerial terminal of the set. The coil was tuned to 475 metres, at which point the voltage developed was just over 1.8 volts. The Suppressor was then tuned as carefully as possible to the same wavelength when the voltage dropped to a value so small that it could not be measured with accuracy. It was in the neighbourhood of one hundredth of its normal value. The wavelength from the oscillator was then adjusted to various values on either side of the 475-metre mark, and the tuning circuit was carefully adjusted to give the maximum deflection at each point, leaving the Suppressor tuned to 475 metres. This again represents the practical conditions in which one adjusts the Suppressor to the interfering station, and then carries out the tuning on one's receiver in the ordinary manner.

The voltages obtained by this means are shown by the full line in the curve attached. It will be seen at once that we have not an ideal arrangement, but on inspection it will be clear that the departure from the ideal is not too serious. At 25 metres on either side of the tuning point the signal strength has risen again to 1 volt, while at 530 metres the signal strength with the Suppressor in circuit is exactly the same as when we started. On the other side, equal signal strength is not reached until 385 metres, due to the fact that the voltage with the coil alone has been rising rapidly as we decreased the wavelength, so that the action of the Suppressor is slightly more pronounced on the lower wavelength side of the tuning mark.

Reading the Curve

These are the points at which the signal strength is equal but the discrepancy between the readings is not very great for some distance closer than this. As we have seen, at 25 metres on each side of the tuning point, the voltage is about 50 per cent. of the normal and this means that distant stations can be heard quite well and tuned in with the aid of a little reaction without difficulty, whereas without the Suppressor in action they would be completely swamped by the powerful local transmission.

The result shows up one rather interesting point which is not usually appreciated regarding wave traps. While a circuit of the type employed in the "Regional Suppressor" undoubtedly cuts down the signal strength over a band of wavelengths on each side of the actual tuning point, it is not always realised that it gives something in return for this. The curve shows that just beyond the point where the signal strengths are equal the voltage developed with the Suppressor in action is actually greater than that with the coil alone. The difference is admittedly not very great, being a matter of some ten or twelve per cent. only.

The point which is naturally of some interest is how quickly the local station can be tuned out with a normal circuit when the "Regional Suppressor" is in use. It is not possible to say this with any degree of certainty from the results given in this article. A comprehensive series of tests would have to be taken, because the answer really depends very largely upon local conditions and the distance from the transmitter. Generally speaking, however, it may be taken that if the strength from the Regional station can be reduced to one fiftieth of its normal value, foreign stations can be tuned in without much difficulty.

"1931 Ether Searcher"

SIR,—I have made up the "1931 Ether Searcher," using a kit of components. The receiver certainly works, but there is no "punch" from it and although I can hear plenty of carrier waves, these cannot be resolved into stations. Can you suggest in what way I can improve my receiver and make it give the results you claim?

P. B. (Warrington).

As quite a number of readers appear not to have followed the special notes we published in regard to the general working of this set, we give below a résumé of the various points which have been explained and require special mention. First, see that you have arranged your coils in their correct positions. The two coils nearest the aerial terminal of the set should each have a fixed condenser in their bases. The other coil, nearest the detector-valve holder, has no such fixed condenser. Also check up the ganged condensers and ascertain whether the lower edges of the fixed plates are making contact with the metal screen surrounding the condensers. Then look to the screen-grid valve grid-leak holder. The terminals on this component must not make connection with the metal foil on the baseboard. If you are not using the special L.F. transformer recommended by the designer, try the effect of disconnecting wire No. 22 from the terminal of the detector-valve by-pass condenser. It may also be necessary to break wire No. 21 and connect a good H.F. choke between the points thus broken. Before attempting to gang up the receiver circuits it is essential to unscrew fully the knob of each trimming condenser. It sometimes happens that the mica between the plates of the trimming condensers becomes dislodged, and this allows the two plates of the trimmer to short the main tuning condenser. Finally, it is imperative that either the special H.T. battery recommended be used or a triple-capacity dry-cell H.T. battery of any other make.—ED.

"D.C. Ether Searcher"

SIR,—A number of friends and myself are interested in the D.C. version of the "1931 Ether Searcher," but as we all have ordinary battery-type valves, we would like to know whether these can be incorporated in this particular design of receiver?

W. W. (Leigh-on-Sea).

If you want to make up the "All-electric D.C. Ether Searcher," it is necessary that you use the special valves recommended. Ordinary battery-type valves cannot be used in this design of set. If you are not prepared to go to the expense of the new type of valves, then you should make up the battery model of the "Ether Searcher" and use a simple H.T. unit for D.C. mains. You cannot have an all-mains set without complications, when using ordinary battery-type valves.—ED.

"All-electric Century Super"

SIR,—The "Century Super" receiver is just the set I have been waiting for and I am prepared to go ahead and build it, provided it can be made all-electric. Can you, therefore, advise what changes or alterations are necessary to effect all-mains working?

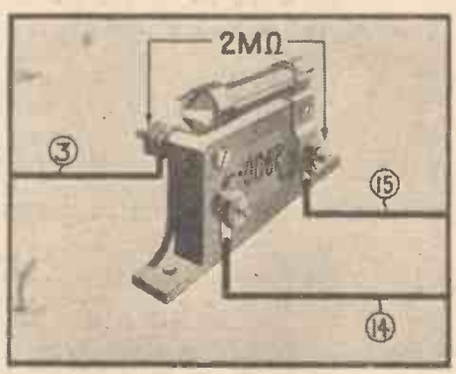
J. G. (Croydon).

The design of any all-electric set is rather a knotty problem and any design worked out theoretically must necessarily be experimented with to ensure good results. We do not and cannot undertake to advise readers in regard to the changes necessary to convert a battery-type set into an all-electric A.C. set. Our Research Consultant, Mr. James, is now working on a design such as you require and when it is completed we shall publish the details in the pages of this journal.—ED.

The "20s. Two"

SIR,—I have made up the "20s. Two" receiver, but fail to get reception of any kind. In going over the receiver connections, with the batteries connected up, I found that the tuning coil was quite warm. On disconnecting the batteries, the coil returned to normal and, so far as can be seen, no damage was done to the coil. Can you suggest where I have gone wrong, because, so far as my reading of your blueprint is concerned, my wiring is quite correct?

G. D. (Kent).



The grid condenser and leak wiring of the "20s. Two".

It seems that you have misread the wiring connections for the grid condenser and grid leak, and as it is difficult to illustrate the connections clearly in a wiring plan arrangement of drawing, we have shown a perspective drawing of the condenser and leak and the numbered wiring connections to each. If you will follow the wiring from this illustration, you will overcome your present trouble.—ED.

Adding the "Booster Speaker Unit"

SIR,—I have considered adding the "Booster Speaker Unit" to my loud-speaker, but an amateur who seems better informed on the subject than myself tells me that I shall probably experience distortion when the unit is added to my two-valver. He says, "As your set already incorporates a stage of transformer-coupled L.F., the extra transformer-coupled L.F. stage will give rise to distortion." He further suggests that I should make the extra stage R.C. coupling. Can you, therefore, advise me in this matter?

H. S. (Hammersmith).

If you have a nondescript transformer in your existing set then no matter what class of transformer you have in the "Booster" unit you will certainly be liable to experience some distortion. When using two good transformers you should get quite satisfactory results. In any case, distortion and overloading can easily be remedied by the following simple expedient. Disconnect the wire joining the secondary of your first L.F. transformer to your existing first L.F. valve and then connect one outer terminal of a 50,000 ohm potentiometer volume control to this terminal of the L.F. transformer. Take the other outer terminal of the volume control to the other secondary terminal of the transformer (which connects to the grid bias) and, finally, take the centre terminal of the volume control to the grid terminal of the first L.F. valve holder. Suitable adjustment of this volume control will now enable you to operate the set to give maximum volume with purity. R.C. coupling should not be used to follow a transformer-coupled L.F. stage, except in exceptional cases.—ED.

"The 1931 Ether Searcher"

SIR,—I should like to say that your "1931 Ether Searcher" is *all*, and *more*, than you claim for it—good tone and volume, and a "universal provider" of stations.

A. P. (Brighton).

The New "A.W." Crystal Set

SIR,—You may be interested to know that as an experiment I made the crystal set described in "A.W." No. 459, the only difference in construction being, using a home-made crystal detector and catswhisker. London Regional could be heard, Rome, and other Continental stations. This is indeed a most satisfactory result in Torquay.

W. B. C. (Torquay).

The Best Receiver

SIR,—I have submitted the "Century Super" to extended test and find it to be the best receiver your staff has ever produced. I tried it out with various valve combinations and I found the following to give very excellent results:

Cossor 210LF (oscillator)
Osram H210 (1st detector)
Cossor 215SG (intermediate stages)
Osram HL210 (2nd detector)
Mullard PM2 (last output valve)

or, alternatively, Osram P240 (with suitable grid bias) if large loud-speaker is used.

Heartiest congratulations to Mr. James and to your staff.

By the way, I strongly advise a bigger tuning dial with higher ratio, as this greatly facilitates tuning.

JAY COOTE (Eastbourne).

The "Century Super"

SIR,—I have been a regular reader of AMATEUR WIRELESS almost from the first copy published and have made and tested several of the sets described in your wonderful paper. The "Century Super" tops the lot and is, everyone will agree, the last word. When the 1931 Ether Searcher came out all readers, I am sure, thought that the set of their dreams had come true, and I am sure thousands have been built to your specification and are giving entire satisfaction. I am sure AMATEUR WIRELESS will be catering for all if in the future all sets appearing have circuits for (a) battery sets, (b) A C. all-mains, and (c) last but not least, D.C. all-mains sets.

The popularity of the paper can easily be seen as within a very short time yesterday, all the newsagents were sold out.

R. E. P. (Holyhead).

Stations Roll In

SIR,—It may interest you to know that I have just built the "1931 Ether Searcher," and to say that I am pleased with it is only to put it mildly. The way

MORE ABOUT THE "CENTURY SUPER" NEXT WEEK

stations roll in with the slightest of adjustments and without any interference seems too good to be true. I have not yet made a list of the stations obtainable, but so far I have touched nearly the fifty mark, and that without any special effort. It is a set I would recommend to anybody and I wish you all the success your paper deserves.

W. E. (Woking).

A Suggestion

SIR,—May I suggest that low-frequency transformers be made similar to valves, viz., with four pegs as terminals, so that they could be plugged in a valve holder in the set. This would be a great help to experimenters, enabling them to try out various transformers (makes or ratios) without touching the wiring at all. Of course, there would have to be agreement between *all* makers as to which of the pegs would be used for each connection.

A. H. (Holloway).

THREE FRAMES FOR THE "CENTURY"

A description of three popular frame aerials which are eminently suitable for use with the "Century Super"

A highly efficient frame with separate medium and long-wave windings, the Wearite

THE "Century Super" is designed for frame-aerial working, of course, and a double-range frame is advisable so that the set can be used either for medium or long-wave reception.

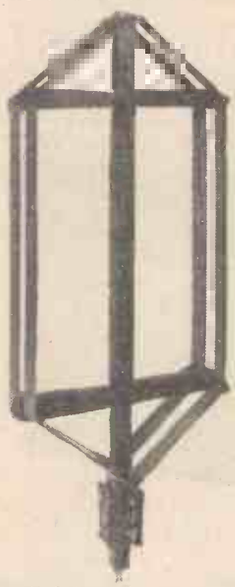
The "A.W." Technical Staff has now had an opportunity of testing three popular makes of frame on the market which are quite suitable for working with the "Century Super," and very good results have been obtained with each. The constructional details and general arrangement of each type of frame are different.

Last week the "Century Super" was illustrated working with the new Peto-Scott frame, a very low-priced job and one which was specially designed for the "Century." This frame is not supplied with a base, but fits into a boss on the top of the set cabinet, where very short flex leads suffice to connect up with the three terminals of the first detector.

The two winding sections of this aerial are concentric, but on separate formers, and a small double-pole double-throw switch on the pedestal of the turns enables the user to switch over from long to short, or vice versa.

On test we have found that this aerial is strongly sensitive to direction only at the minimum point, and this naturally is a convenience, for while a fair degree of directional effect is helpful in aiding the natural selectivity of the set, too sharp a directional effect makes station searching more difficult, for the frame has to be placed in the correct plane. A well-defined silent point is an advantage, however, for it prevents stations at right angles to the desired plane interfering with reception.

The Lewcos frame, wound with the well-known Lewcos frame aerial wire, also has the two sections concentric, and a rotary



Specially designed for the "Century"—the Peto-Scott frame

switch on the very neat base with which the frame is provided connects the winding as desired. This aerial, on test, was found to have a very good factor of efficiency, and this increases the already sharp tuning of the aerial stage. It was found that the frame tuning condenser, usually not quite so sharp in its readings as the oscillator condenser, gave considerably finer readings, and indicated a higher degree of natural selectivity on the part of the frame.

The arrangement of the Lewcos frame is such that the vertical sections of the windings are long in comparison with the small horizontal sections. It was found here, too, that the silent point was more noticeable than the point of maximum reception, but the directional effect was not so great as to make it necessary to "swing" the frame accurately in order to select stations. Once a station was tuned in, then in many instances a readjustment of the frame's position helped still further to sharpen up the tuning.

The Wearite aerial is of a slightly different pattern from the Peto-Scott and Lewcos frames, and on test has also given excellent results.

The two windings are on separate formers, the special medium-wave winding being spaced on tubular ebonite separators. The connections from each of the windings are taken out in a convenient manner to a terminal strip at the base. The medium-wave winding is at right angles to the long-wave winding, and so no absorption effect is noticed owing to the wire of the long-wave winding in the medium-wave field.

The Lewcos frame aerial which incorporates a neat switching arrangement for medium and long waves

The Wearite frame, tested with the "Century Super," was found to be particular sensitive and selective. The rotary switch, with an engraved scale, in the centre of the two windings, changes over from one set of turns to the other.

"THE CENTURY SUPER"

(*Continued from page* 753)

tivity. Afterwards you can try the effect of adjusting the voltages through H.T.+2 and H.T.+3. The voltages are not critical, but it is just as well to satisfy yourself that the best results are being obtained.

To tune in station after station is easy, but do not forget that the setting of the oscillator condenser, in particular, is sharp *and the controls must be turned slowly, always keeping them in step.*

It is of no real use tuning hurriedly, going rapidly over the dials, for only the more powerful stations will be heard.

Some frame aerials are much more directional than others, so the frame should be turned a little when tuning. A weak signal may be made strong by altering the direction of the frame aerial.

Condenser Settings

The oscillator and frame aerial tuning condensers will not keep in step as regards dial readings over the tuning range, but this does not matter much. You had better prepare a log, noting the readings of the dials of the two condensers. No doubt you will find it necessary to divide the scale readings at times, the tuning being so fine.

Stations are actually to be heard in two positions of the oscillator condenser when the wavelengths fall within a certain range. There is a sound reason for this.

BE UP-TO-DATE
AND BUILD THE
"CENTURY SUPER"

Suppose the frequency of the beat-frequency amplifier is 126,000 cycles and we wish to receive a station working on a frequency of 1,000,000 cycles (300 metres). Then we turn the frame aerial to the station, adjusting its frequency to 1,000,000 cycles. We also tune the oscillator to a frequency which can be 126,000 cycles above or below, that is, to 1,126,000 or 874,000 cycles. With these two settings of the oscillator we shall hear the station, because with both of them we produce a signal in the anode circuit of the first detector which has the frequency of the beat-frequency amplifier. Actually the amplifier is fairly broadly tuned and so passes a band of frequencies, but it is the central or carrier frequency that we are referring to.

If you understand this matter the operation becomes extremely easy and you will not worry why a station is heard at two places of the oscillator.

Tuning

It would be pure chance if your own dial readings agreed exactly with the published ones, as naturally the exact size of the frame aerial and the capacities of the tuning condensers affect the dial readings. Then again the oscillator coils may differ by a few per cent. The long-wavelength coils are, of course, accurately matched and are absolutely alike.

When you turn the oscillator to the long-wavelength position and also the frame aerial, you will have to tune just as carefully as when tuning over the medium wavelengths. Turn the dials slowly as before.

For the short waves a special aerial coil is needed and will be described later, as it is possible to bring in a number of the short-wavelength stations.

Do not use a small-size high-tension battery with this set. Use a large size if possible and about 120 volts. If you want to increase the volume of sound, a larger power valve can be fitted. Such a valve is the Mullard PM252, which with 120 volts at its anode passes a current of about 12 milliamperes with a grid bias of —12 volts.

The question now arises as to whether a mains unit can be used for the high-tension. Tests show that a good unit is suitable and the results will be perfectly satisfactory. But more of this in the next issue.

Probably there are readers who have valves by them and naturally want to fit them in the set if at all possible. They should be compared with the valves specified and if their characteristics are roughly correct, may be tried.

Choosing Your Valves

It is obviously necessary to use good valves in a set of this description, so do not use very old ones. Do not use an old grid-bias battery, either, as an old battery may give trouble.

There is no choke-condenser output filter in the set, as the current taken by the power valve is not large. Do not use too long loud-speaker wires, however, as they may act as an aerial. A fixed condenser of about .002-microfarad connected between the anode of the power valve and the filament wire helps to avoid trouble. Do not lay the loud-speaker wires near the frame aerial wires, as there may be a little coupling effect.

A big point in the operation of the set is that there is no deliberate reaction. The tuning of the frame aerial is not affected by that of the oscillator, although they must both be tuned to receive a signal. The point is that a slight adjustment may be made to the frame or the oscillator without affecting the other.

Altering the volume control does not affect the tuning of the set, as the efficiency of the screen-grid valves only is changed by this control. The tuning of the frame circuit may change a shade as the aerial is turned, but this is because of the flexible wires going between the frame and the set. Their relative position alters slightly as the frame is tuned and so the tuning condenser may need slight adjustment. The amount is not sufficient to lose a station, however, and I mention it only because you may hurriedly swing the frame and not take care to retune before noting the strength.

Tone is largely decided by the last stage, its high-tension, grid bias and, of course, the loud-speaker that is used. The low-frequency transformer and the detector stage also play a part and an effort has been made to arrive at satisfactory results considering the cost. The tone will be the same or better than from other smaller sets but having equivalent low-frequency circuits.

This super-heterodyne gives good quality, as the circuits are stable and satisfactory parts are used. I stress this matter as there are some who expect the quality from a super-heterodyne set to be inferior. This is not true of the present set.

RADIOGRAMS

SEVERAL excerpts from the Piccadilly Theatre play, *Folly to be Wise*, will be played in the National programme on May 23. Mary Eaton and Chorus will sing "Looking for a Sunbeam," while Cicely Courtneidge and Nelson Keys will be heard in the popular "All the King's Horses."

On most evenings a Belgian transmission on 43 metres can be picked up between 8 and 10 p.m. B.S.T. The broadcast emanates from a private station at Villereille-lez-Brayeux, near Binche. The call is: *Ici station expérimentale Radio Wallonia à Bonne Esperance.*" The power is 20 watts (aerial).

Vivian Ellis, the composer of numerous song successes in the West End theatres, will play his own compositions throughout the National vaudeville programme on May 16. Tex McLeod, "the spinner of ropes and yarns," makes a welcome reappearance for the B.B.C. in this programme, and Leonard Henry will be another star turn.

The Bugginses—Mabel Constanduros and Michael Hogan to wit—will view the Variety Artistes' Benevolent Fund Command Performance at the London Palladium on May 11 from the cinema projection-room at the back of the auditorium. From this loophole they will give listeners a running commentary on the turns which are not self-explanatory.

Iceland possesses a population of roughly 100,000, of which some 10,000 are registered broadcast licence holders. As the programmes of the Reykjavik station are developed it is expected that the percentage of listeners will increase.

The National Orchestra of Wales is paying its first visit to Aberystwyth to take part in the Cardiganshire Musical Festival, which is being held at the University Hall, Aberystwyth, on May 20. A concert in the afternoon by the orchestra, the Festival Choir, Robert Parker and Myfanwy Ellis, will be broadcast from 3.25 to 4.45 p.m. In the evening a performance of *Elijah* is being given but this will not be broadcast.

An orchestral and choral concert will be given from the studio on May 17, when the Cardiff University Madrigal Society, conducted by I. C. Williams, will give unaccompanied madrigals and folk songs

From 9.5 to 10.30 p.m., on May 10, the Northern Studio Orchestra, which on this occasion will consist of some thirty players, will give a light orchestral concert in the Manchester and Leeds programme.

Massenet was born on May 12, 1842, and for three quarters of an hour on his anniversary the Northern Studio Orchestra will play selections from his works.

A religious service will be relayed from Siloh Baptist Church, Tredegar, on May 17, at 8 p.m.

A Welsh service on the Daventry National wavelength will be relayed from St. Dunstan's Church, Ferndale, on May 17.

On May 10 there will be a brass band concert for Northern listeners from 4.15 to 5.30 p.m.

A programme entitled "Melodies of Yester-year" will be broadcast from the Belfast studios on May 28, and will include Tom Kinniburgh in a "Signor Foli" programme, John Rorke in an "Albert Chevalier" programme, and Alexander McCredie in a "Sims Reeves" programme. The Light Orchestra will play barn dances, quadrilles and other old measures.

The Northern Studio Orchestra, from Manchester and the Bramley Ladies' Choir, from Leeds, will participate in an orchestral concert on Saturday, May 16.

In Russia all letters addressed to the broadcasting stations by listeners are allowed to be sent post free.

OUR LISTENING POST

By JAY COOTE

ON Sundays, when the B.B.C. stations are resting, there are a number of good programmes to be picked up from the Continent, and if light entertainment is desired you might do worse than turn to Germany. Konigswusterhausen is well within the reach of most receivers and usually supplies what is required. Recently, when I tuned in to that station I was taken over to the *Grosses Schauspielhaus* for a dance-band competition, in which most of the orchestras regularly found in the Berlin programme were doing their very utmost to secure a first prize. In the course of this transmission I was able to pass in review the Ben Berlin, the Barnabas von Geczy, the famous Najos Bela, the Eddy Walls, and the Billy Barton dance bands. Such an entertainment helped to while away the dreary hours of a wet Sunday afternoon. On the other hand, if you want to hear some of the latest gramophone records, switch over to Radio Paris at 2 p.m. B.S.T. for a sixty-minute sponsered recital with French and English announcements.

When listening to Barcelona and San Sebastian a few evenings ago I made two noteworthy discoveries: firstly, that, contrary to both report and expectation, Spain has not adopted Summertime this year, and, secondly, that the transmissions, since the advent of the Republican Government, end up with that conventional revolutionary anthem, "La Marseillaise." Of course, with Spain working to Greenwich mean time, you will find Madrid, San Sebastian, and Barcelona frequently until 1.30 a.m.

It seems to me that our ex-friend Radio Belgique, now Brussels No. 1, is showing less initiative in its programmes than when privately operated. On the other hand, Brussels No. 2 on the lower wavelength has recently considerably developed its relay system, and on several occasions has broadcast from theatres and other places of entertainment. I learn also that this station intends to make a regular feature of the famous *carillon* of the Church of St. Rombaut at Malines. This relay is to be carried out on every Monday in June, August, and September from 9 to 10 p.m. B.S.T. Well-known melodies will be included in these recitals, given by the Chevalier Jef Denijn, already a familiar name to many listeners in the United Kingdom.

Have you noticed any decrease in strength in Bordeaux-Lafayette? For some time its power was advertised as being 35 kilowatts, but I am told that the station has never been used "all out." As a matter of fact, I am assured that the transmitter seldom radiates more than 11 kilowatts in the aerial. This seems to make little difference to the signals received for they are still on most nights at loud-speaker volume.

It might be worth your while to visit Radio Toulouse during the next few weeks at 11 p.m. on Mondays, Wednesdays, and Saturdays, if only to get an idea of the kind of gramophone records appreciated by French listeners.

Radio Strasbourg during the coming summer months (it still seems a long way off!) intends to carry out relays of concerts from the famous Orangerie in that city, also from the Esplanade at Metz, as well as performances from Nancy and Mulhouse.

By the way, I have been able to confirm the fact that the "Century Super" is a very efficient short-wave receiver. On a casual preliminary test, I found that *no aerial* was necessary to log such stations as Rome, Poznan, or Moscow. All that is needed is a five- or six-turn centre-tapped short-wave coil connected up to the existing frame aerial terminals on the receiver. I had no difficulty in securing powerful signals at my first attempt, and, although tuning was exceedingly sharp, it was just as easily accomplished as when working on the medium or long waves.

Try it—it will prove a revelation.

SOLDERING is now quite an easy and interesting job—thanks to Fluxite and the neat, compact little Fluxite soldering set. This contains a special "small-space" soldering iron with non-heating metal handle; pocket blow-lamp; Fluxite; solder, etc., and full instructions. It is simple to use and lasts for years in constant use. It costs only 7s. 6d. and is obtainable at all ironmongers and hardware stores. Fluxite is sold separately in tins at 8d., 1s. 4d., and 2s. 8d., and a new "Junior" size has just been placed on the market at 4d. per tin.

If any dealer who has sent a remittance in connection with the new "Hornet" two-valver does not find his name appearing in the Voltron announcement in this issue, he should communicate at once with Messrs. Voltron Electric Ltd., of Queensway, Ponders End, Middlesex. Unfortunately part of the Voltron mail received on April 29 is reported stolen, and this may account for the omission.

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.

WE TEST FOR YOU

A weekly review of new components and tests of apparatus

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

New Selfridge H.T. Battery

WE have just tested an H.T. battery marketed by the radio department of Messrs Selfridges. This battery is compact in size, measuring 9 in. by

One of the range of new Selfridge "Key" H.T. batteries

5 in. by 3 in. It delivers 99 volts when new and weighs 7 lb. It is very convenient for use in portable sets.

It was discharged at the standard rate of 7 milliamps, under which conditions it behaved very well, lasting for 260 hours. This is equivalent to capacity of 1,350 milliampere hours, a figure well in excess of the minimum which has been laid down from experience for standard-capacity batteries.

The battery sells at a price of 7s. 11d. and can be recommended.

Telsen Differential Condenser

ONE of the neatest differential condensers we have tested lately is the Telsen product which has just been placed on the market. This device is assembled with the usual bakelised paper dielectric, and is housed between pressed fibre end-plates. Good 4BA terminals are provided, which, while not occupying much room, enable one to obtain a good grip and will undoubtedly facilitate the making of connections.

The device occupies a space on the panel of 2 in. by 1½ in. overall, and is altogether an attractive job. The capacity is up to the stated figure.

Konductite Paper

MANY sets nowadays are mounted on a baseboard completely covered with metal foil. This assists in the screening necessary for high-frequency purposes, and forms a very convenient earthing plate. We have received this week a sample of Konductite metallic paper, which is intended to be used for this purpose. It resembles a particularly robust brand of tea paper, but as far as we could gather from an inspection of the sample submitted it is made of a very thin sheet of foil backed with paper board about 20 mils thick—the thickness of an ordinary visiting card.

The sample supplied measured 8 in. by 4 in., and we checked the resistance from corner to corner, but were unable to obtain any measureable reading. It appears, therefore, to have a perfectly satisfactory conductivity and should be suitable for screening. The material appears to suffer from one disadvantage compared with an actual metal sheet, which is that we found it impossible to solder any connections thereto. However, it is possible to overcome this difficulty quite easily by inserting a soldering tag under a screw head and driving the screw home, and as we have said, we imagine that in other respects the material should behave perfectly satisfactorily. Its price is distinctly attractive, being only 2s. for a piece 30 in. square.

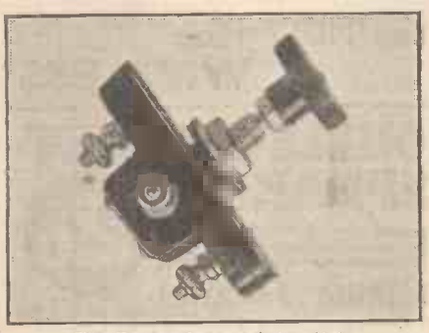
New Busco Switch

WE have recently tested a push-pull switch known as the Busco. This combines a push-pull action with a knife-switch contact, and we were somewhat impressed with the sample in question. We have now received a three-point switch made by the same firm and operating on a similar principle.

The switch is rather the same in general construction as the original two-pole model. There is a plunger operated by the push-pull knob which carries a bridge piece at its extremity. The ends of this bridge piece are bent downwards, and when the plunger is pulled out the ends of this bridge piece are forced into two spring contacts.

By the provision of an extra spring attached to this bridge piece, contact is now made to a third terminal carried on the side of the moulding, so that if the plunger is pulled out all three points are connected together.

We found that some force was required in order to pull the plunger into the position where the three contacts were connected



The Busco three-point switch

together, and the addition of the extra contact has made the action somewhat harder. However, there is no question that the contact is good, and being self-cleaning is likely to remain so.

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 (G5SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	70.0
376.4	797	Glasgow	1.2
398.9	752	Midland Reg.	38.0
479.2	626	Manchester (temp)	1.2
479.2	626	North Regional testing	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	9.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
also testing on about 1,100 m.			
BELGIUM			
206	1,456	Antwerp	0.4
215.5	1,392	Chatelineau	0.25
216	1,391	Radio Conférence Brussels	0.25
245.1	1,223.7	Schaerbeek	0.5
338.2	887	Brussels (No. 2)	20.0
509	590	Brussels (No. 1)	20.0
BULGARIA			
318.8	941	Sofia (Rodno Radio)	1.0
CZECHO-SLOVAKIA			
250	1,202	Prague	2.0
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
293	1,022	Kosice	2.5
341.7	878	Brunn (Brno)	22.0
487	617	Prague (Praba)	5.5
487	617	Cesky Brod (testing shortly)	75.0
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			
221	1,355	Helsinki	15.0
291	1,031	Tampere	1.0
291	1,031	Viipuri	15.0
690	434	Pori	1.5
1,796	167	Lahti	54.0
FRANCE			
219.3	1,368	Béziers	0.6
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
237.2	1,263	Bordeaux-Sud-Ouest	2.9
249	1,205	Juan-les-Pins	0.5
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
307.6	975.2	Bordeaux (PTT)	11.0
314.1	955	Natan-Vitus (Paris)	0.5
317.3	945.4	Marseilles (PTT)	1.5
327.2	917	Poste Parisien	1.2
327.5	916	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	Hellsberg	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
559.7	536	Kaiserslautern	1.0
559.7	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	9,599	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 (1FS)	1.5
413	725	Dublin (2RN)	1.5
ITALY			
25.4 and 80		Rome (3RO)	9.0
296.3	1,012.2	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) *testing on 525 m.	8.5
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
366.2	819.2	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)	14.0
234	1,283	Lodz	2.2
312.8	959	Cracow	1.5
335	896	Poznan	1.9
368.1	815	Wilno	20.0
381	788	Lvov	21.0
408	734	Katowice	16.0
1,411.8	212.5	Warsaw —Raszyn	158.0
PORTUGAL			
240	1,250	Oporto (Teatro Apollo)	0.25
284.7	1,053.6	Lisbon (CTIAA)	0.25
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
427	702.5	Kharkov	4.0
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	100.0
1,060	283	Tiflis	15.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov (RV4)	25.0
1,304	230	Moscow (Trades Unions)	165.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	20.0
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
307.1	977	Falun	0.65
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,229.5	244	Boden	0.75
1,352	221.9	Motala	40.0
SWITZERLAND			
244.1	1,229	Basle	0.65
245.9	1,220	Berne	1.1
403.5	743	Söttens	25.0
459.2	653	Beromuenster (testing)	60.0
680	442	Lausanne	0.6
760	395	Geneva	1.5
TURKEY			
1,216.2	246.6	Istanbul	5.0
1,538	195	Ankara	7.0
YUGOSLAVIA			
305.1	983	Zagreb (Agram)	0.7
430.6	696	Belgrade	3.0
574.7	522	Ljubljana	2.8

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.

Changing Your Mains

HAVE you D.C. mains users ever thought how easy it is nowadays to change the supply to A.C. so that you can work a standard A.C.-operated set? If not then write through my free Catalogue Service to Wates for a copy of a folder describing a new converter (costing well under £10) which changes standard D.C. supplies to an A.C. supply at 220-volts 50 cycles. This is a good idea. **242**

Buy a New H.T.

Is a new H.T. battery needed? Then if so pick out a new suitable type in the new Grosvenor folder. There are standard, popular and super-power batteries from which to choose and grid-bias batteries in three separate types. **243**

Triotron Speakers

Triotron speaker units are well-known to all home-constructors, but I confess that until I received the latest booklet I did not realise what a wide range of completely-assembled Triotron speakers is available. Models are made which will suit any furnishing scheme, and I advise you to get this. **244**

Build your Own Parts

When you have built that new set why not turn your attention to the construction of a good-looking cabinet to go with it? Messrs. Charles A. Osborn will send you, free, a catalogue describing dozens of types of console cabinet, which, if desired, can be supplied as a kit of parts. **245**

Something New

I see that the Silvertown Co. are placing on the market a new dry cell to be known as the Condor. This certainly appears to be something quite new. **246**

Fluxite for Amateurs

If you want to make a good job of soldering the connections of your set then you must have a good flux, such as Fluxite. I hear that a new size tin of Fluxite specially for radio amateur use has just been produced, this being known as Junior Fluxite. **247**

The Columbia 332

If you want a moderate priced all-electric set housed in a well-made console-type cabinet, then see the new folder describing the Columbia 332, which is an entirely new model. OBSERVER. **248**

PREPAID ADVERTISEMENTS

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, £4/10/6. H.P. terms on kit: 5/- deposit, 2/7 per week.—Phoenix, 314 High Road, Lee, S.E.13.

CHARGE YOUR H.T. FROM YOUR L.T. AT HOME. Wonderful discovery. Fox's Recharger will trickle-charge H.T. accumulators. Ratio, ¼ amp. Set can be on or off safely. Fitted 2 minutes. Guaranteed, 6/6 (diagram only, 1/6).—Fox, 188 Camberwell Grove, S.E.5.

A.C. H.T. ELIMINATORS, from 65/-, or 12 monthly payments of 6/-. A.C. H.T. Eliminator Kits from 43/- to 62/6; cash or monthly terms. Cabinet Speakers, 12/6 each, worth double. Cash or C.O.D.—Servwell Wireless Supplies (Dept. M.O.), 74 Gough Street, London, E.14.

MOORSIDE EDGE.—Special device to cut out new station within three degrees. Results guaranteed or money returned. Price 5/6, postage 3d. extra.—Wainwrights, Wireless Engineers, Wakefield Road, Ossett. Telephone 16.

TRICKLE CHARGERS, A.C. mains for 2- and 4-volt accumulators, 0.5 amp., no upkeep, 18/6, carriage paid.—A. Benoit, 4 Manor Gardens, Gunnersbury Avenue, London, W.3.

"BROOKMANS 4."—Coils and other components selling half-price.—"Chauffeur." Southbar, Renfrew.

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.

EXPERIMENTER'S SURPLUS, brand new, unboxed, "Century Super" kit. Set 4 Coils, 30/-; 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.

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.

ENGINEERS, we offer you the finest and most complete book on Engineering Careers ever compiled, absolutely free of charge. This book contains 180 pages of invaluable information and advice. It also contains details of B.Sc., A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., A.M.I.A.E., A.M.I.Struct.E., M.R.San.I., L.I.O.B., F.S.I., G.P.O., C. & G., etc. Exams, outlines home-study courses in all branches of Civil, Mechanical, Electrical, Motor, Wireless, Aeronautical, and Talkie Engineering, and explains the unique advantages of our special Appointments Department. We alone Guarantee "No pass—no fee." You owe it to yourself to read our handbook. Send to-day, stating branch or subject of most interest.—British Institute of Engineering Technology, 109 Shakespeare House, 29-31 Oxford Street, W.1.

"CENTURY SUPER" KIT. Advertiser suddenly requires money. Must sell Coils, J.B. Condensers, Valves, Colverstat, etc. What offers?—H., 54 Clifton Road Finchley, N.

A MAGNIFICENT SET.—The National and Regional Three, absolutely complete, including Tungsram valves, 2-volt accumulator, 100-volt H.T. battery, B.T.H. 45/- loud-speaker. Perfect reception from home and foreign stations. Guaranteed 12 months. Amazing value, £4, inclusive.—H. Panagakis, Radio Manufacturer, 91 Dale Street, Liverpool.

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 12-GUINEA MOVING-COIL SPEAKER. Approval, £6. List other bargains.—103 Cambridge Road, Southport.

BANKRUPT BARGAINS. List free, with 3-valve diagram. .0005 Variable, 2/6; Differential, 2/6; Midget, .0005, 2/-; Transformers, 2/9; Sutra, 3/3; Telsen, A.C.E., 6/6; Radio-grand, 9/6. Dual Coils, 5/-. S.M. Dials, 1/6. Tungsram-Triotron Valves, 4/6; power, 5/6. Triotron Speaker Units, 9/6; Ormonde, 10/6. Also Motor, Undy, etc. Three-valve Kits with cabinet, 35/-; Two-valve, 24/-. Get my price for anything first.—Butlin, 143b Preston Road, Brighton.

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

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.

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

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

MIKES FOR HOME RECORDING

Pulpit Pedestal, 12/6, Pedestal Broadcaster, as illustrated, 18/6, Microphones with handle, 15/-, powerful Public Address models 55/- and 65/-, Transformers 4/6, Couplers 15/-, Valve Amplifiers 55/-, for Band Repeater or Public Address work, Home Recorder for Gramo.

ELECTRADIX RADIOS
218 Upper Thames Street, London, E.C.4
CITY 0191.

YOU CAN BUILD A £40 GRAMO-PHONE WITH OUR SCALE DRAWINGS FOR 40/-

Book of Instructions 3d. Catalogue of Motors, Tonearms, Soundboxes, latest internal amplifiers, Gramophones and Cabinets Free, Cash or Terms.

W. BURT, 185 High St., Deptford.

MAGNUM
ALL THAT IS BEST IN RADIO COMPONENTS SETS ETC.
BURNE-JONES & CO. LTD.
294, BORO' HIGH ST. LONDON S.E.1.

KONDUCTITE
[Prov. Patent 4817/31]
METALLIC PAPER

Kondactite consists of a thin sheet of aluminium mounted on a comparatively stiff backing paper and has all the advantages of sheet metal. It is very easy to work with and infinitely superior to tin or copper foil. It is now specified in all leading circuits.

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Searcher Two (D, Trans)	AW245
Arrow Two (D, Trans)	AW249
Forty-five-shilling Two (D, Trans)	AW250
Searcher Short-wave 2 (D, Trans)	AW259
Challenge Two (D, Trans)	AW261
Loftin-White Two (A.C. Mains)	AW263
Everybody's All-in 2 (D, Trans)	AW273
Twenty-Shilling Two (D, Trans)	AW274
Brookman's Two (D, Trans)	WM163
Gleaner Two (D, Trans)	WM200
Music Monitor (D, Trans)	WM208
Merlin Two (A.C. Set)	WM213
Five-Point Two (D, Trans)	WM220
Brookman's A.C. Two (D, Trans)	WM225
Aladdin Two (D, Trans)	WM231

THREE-VALVE SETS (1s. each)

1930 Clarion Three (SG, D, Trans)	AW223
Beginner's Regional Three (D, 2LF)	AW233
The "A.W." Exhibition 3	AW247
Push-Pull "Two" (D, Push-Pull)	AW270
1931 Ether Searcher (SG, D, Trans)	AW271
1931 Ether Searcher (A.C. model) Mains Unit	AW276 AW277
Ultra-Selective Straight Three (SG, D, Trans)	AW282
1931 Ether Searcher (D.C. model) Mains Unit	AW284 AW285
Fanfare Three (D, 2 Trans)	WM157
Brookman's Three (SG, D, Trans)	WM160
Brookman's Push-Pull Three (SG, D, Trans) 1/6	WM170
Inceptordyne (SG, D, Pentode)	WM179
Music Marshal (D, 2 Trans)	WM190
Concert Three (D, 2 Trans)	WM199
De-Luxe Three (D, RC, Trans)	WM209
Five-Point Three (SG, D, Trans)	WM212
Falcon Three (A.C. Set)	WM217
New Brookman's Three (SG, D, Trans)	WM218
Five-point Short-waver (D, RC, Trans)	WM223
Baffle-Board Three (D, RC, Trans)	WM226
Plug-in-Coil Three (D, 2 Trans)	WM232
Regional Three (SG, D, Trans)	WM236
Gramo-radio A.C. Three (SG, D, Trans)	WM237

FOUR-VALVE SETS (1s. 6d. each)

Horizon Four (SG, D, 2 Trans)	AW237
Challenge Radio Gramophone (SG, D, RC, Trans)	AW265
Lodestone Four (HF, D, RC, Trans)	WM193
Searcher's Four (SG, D, RC, Trans)	WM194
Regional Band-pass Four (SG, D, RC, Trans)	WM211
Five-Point Four (SG, D, RC, Trans)	WM216
Regional A.C. Four (SG, D, RC, Trans)	WM222
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1930 Five (2HF, D, RC, Trans)	WM171
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Overseas Five (3SG, D, Trans)	WM191
Regional A.C. Five (3SG, D, Trans)	WM224

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Continental Portable (SG, D, Trans)	AW241	1/-
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Pedlar Portable Two (D, Trans)	WM195	1/-
Pedlar Portable Three (D, 2 Trans)	WM197	1/-
Super 60 Portable (Super-het)	WM238	1/6

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

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Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVIII. No. 466

Saturday, May 16, 1931

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

RANGE THE WORLD with The LEWCOS (Regd)

THIS new LEWCOS achievement—the Super-het Coil Kit—which has a nine-kilocycle wave-band separation and consists of one triple wave-band Oscillator Coil, two I.F. Coils with "pigtails," and one I.F. Coil without "pigtails," marks a new epoch in radio reception. The I.F. Transformers are accurately matched, thus giving a remarkable degree of efficiency.

This Kit, which is recommended for the "Century Super," can also be fitted with extraordinary ease in any set of similar design and the results will be truly astounding!

The small space available is completely inadequate to give even a short description of these wonderful new LEWCOS Coils, and you are invited to write for an illustrated explanatory leaflet.

SUPER-HET COIL KIT

(Patent Pending)

which is recommended *for the*

"CENTURY SUPER"

receiver described in this issue.

Price **50/-**

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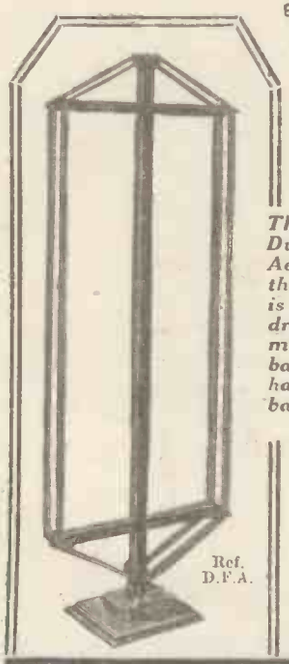

This is a photograph of the LEWCOS Dual Range Centre-Tapped Frame Aerial which is recommended for the "Century Super." The Frame is wound with silk-covered Litzendraht wire and the switch and terminals are mounted on the moulded base, thus presenting a neat and handsome appearance. The wave-band change is effected by the turn of a knob.

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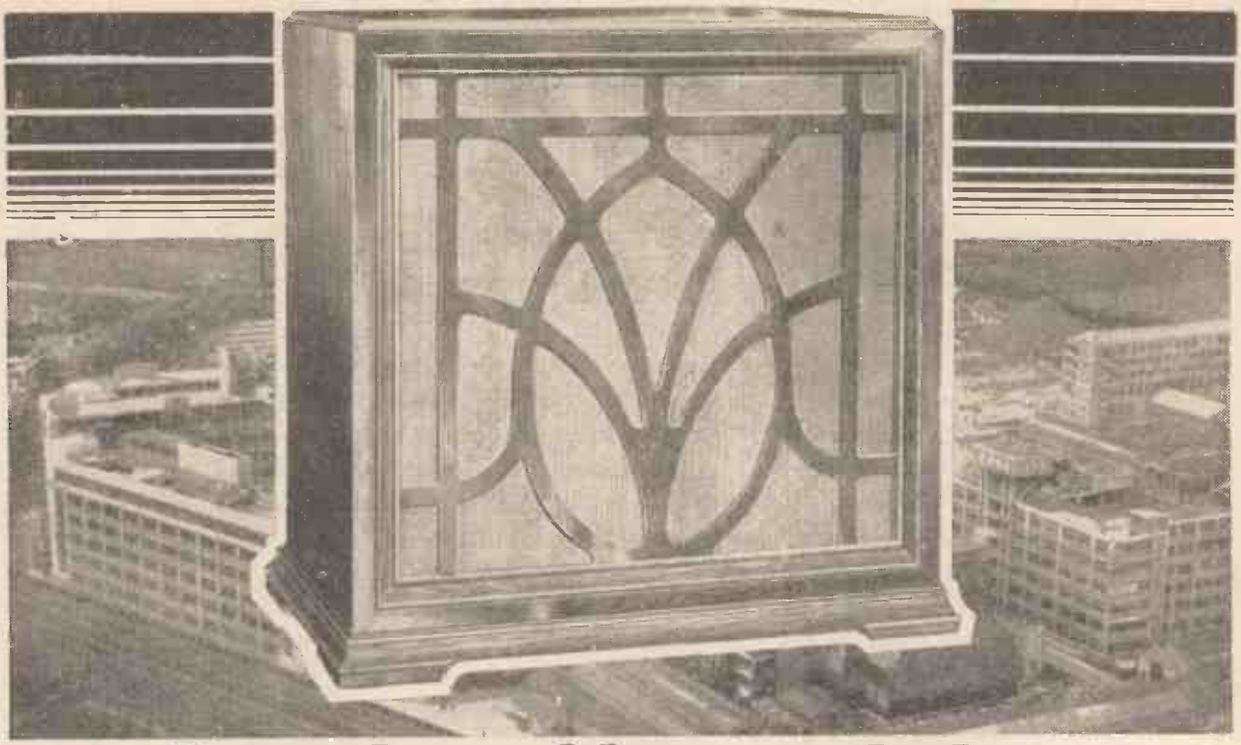

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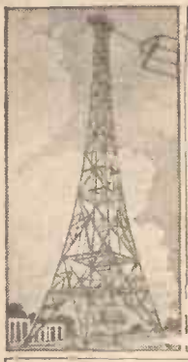
No. 766. Vol. XVIII. MAY 16, 1931



Amateur Wireless and Radiovision

EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J. H. REYNER, B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

GOOD THINGS

DOES this fine weather make you feel less like radio—less like staying indoors to listen; well, take the set out into the open with you. In this connection why not use the "Century Super" out of doors. A hundred-station set, working off a small frame as does the "Century," is ideal for summer-time out-of-door working.

NORTH REGIONAL ALWAYS CALLING!

READERS in the north who have delayed modifying sets to bring in the North Regional transmissions on high power, wavelength 479 metres, will have to get a move on. For after Sunday, May 17, all stations in the north region will close down to make way for the full-time working of the new transmitter at Moorside Edge. Only Newcastle will be left of all the small relay stations. The preliminary period of tests has convinced the B.B.C., as well as most listeners, that the new transmitter is being very satisfactorily picked up on all but absolutely "dud" sets.

A SMART N.B.C. MOVE

JUST before Sir John Reith, Director-General of the B.B.C., left for the U.S.A. to tell Americans how education is put across British listeners, a vice-president of the National Broadcasting Company of America, Mr. Elwood, called at Savoy Hill. No doubt his visit had something to do with the question of inter-changing programmes between America and this country. We know there is keen rivalry between the N.B.C. and Columbia organisations. It looks as though the N.B.C. has stolen a march on Columbia in calling upon Sir John before he sailed.

NEW B.B.C. ORCHESTRA

BEFORE the summer is over the B.B.C. will have formed a new light orchestra. Listeners are mostly aware that the B.B.C. Symphony Orchestra can be split up into a number of smaller combinations, but it appears that none of the combinations is able to deal with the requirements of vaudeville shows and revues. We suppose it is rather too much to expect the orchestra to play Bach one day and Gershwin the next! At all events, the new Light Orchestra will consist of twenty players and will, no doubt, be a great help in supplying incidental music to broadcast vaudeville.

BIG ORCHESTRA PACKS UP

DURING June and July the B.B.C.'s great Symphony Orchestra goes on holiday. It is perhaps lucky for the programme compilers that Covent Garden is on tap for heavy orchestral broadcasts during this period. No doubt the absence of the B.B.C.'s orchestra will cause a noticeable thinning of the programmes, but still, during the summer months we would certainly prefer the light orchestral touch, so there is nothing to worry about. The orchestra will be back in August for the Proms season.

AN ACOUSTIC PROBLEM

IN designing the big studio at Broadcasting House, the B.B.C. is determined to produce something acoustically perfect. But there are snags. Early tests seem to show that an extension of the platform is

PRINCIPAL CONTENTS

"PARADING" FOR THE RECORDS

Philip Ridgeway and the Ridgeway Parade chorus are now busy making gramophone records, and here they are in the gramophone studio, dressed in their microphone costumes

NEWS & GOSSIP OF THE WEEK—*Continued*

desirable. Another alteration that will be made shortly is a reduction in the seating accommodation from the 1,200 originally planned to 750. These structural alterations may take some months. Before the much-talked-of organ tests are made the engineers propose to get the studio acoustically right.

NORTH NATIONAL SOON

VERY soon after May 17, when North Regional, on 479 metres, takes over regular service hours, the B.B.C. proposes to start the gradual introduction of an alternative programme on 301 metres. This programme will be as from Daventry 5XX and the 261-metre Brookmans Park station. We are told that the period of introduction for North National, as the 301-metre station is to be called, will be of much shorter duration than the test period for North Regional. It is thought that sets adapted for North Regional reception will have been provided with facilities for the reception of the 301-metre transmission.

B.B.C. IN GERMANY

MR. JOSEPH ACKERLEY, of the B.B.C. programme department, has been searching Germany for a German prisoner who was lucky enough to escape from a British camp during the war. He has met several, some with very harrowing tales to tell. One German naval man held at Wales, arranged to be rescued by submarine; he duly escaped from the camp but was unable to locate the German submarine waiting for him just off the shore at Llandudno. A more lucky prisoner was Oberlieutenant A. D. Heinz Justus, of the 73rd Fusiliers. He is soon to give a talk in the B.B.C.'s "Escape" series.

PRINCE OF WALES BROADCASTS

TWO interesting broadcasts will be made by the Prince of Wales on May 21 and 27. The second date is interesting because the Prince is then speaking as President of the Wireless for the Blind Fund. We hear that another £15,000 is needed before all the 23,000 blind persons who need sets are properly equipped. Everything is provided for them, including the aerial. A thousand sets are held up at the moment pending the introduction of Moorside Edge on a service basis.

RADIO ADVERTISING

RAVAG has decided to include advertising in its programmes in future. For the time being, these advertisements will be broadcast only for half an hour weekly. In view of the prevailing tendency on the part of listeners against radio advertising, it is remarkable that the Austrian broadcasting authorities have embarked on the experiment. It has been found, particularly in America, that although radio audiences will listen to a sponsored programme, they do not pay much attention to the advertisers' announcements.

TO HELP THE DOCTOR

Manfred von Ardenne, the well-known Berlin scientist, has developed a radio outfit which, by means of an oscillograph, turns heartbeats and lung movements into light rays. German doctors hope that this will help in tracing lung diseases

FORTHCOMING VAUDEVILLE

IT looks as though we are having more vaudeville programmes now that summer is here. For instance, National vaudeville on May 22 will be given by Tommy Handley, "Fred and Mary," in Matters of the Moment (their names hide the identity of two popular broadcasters); Bransby Williams, in Dickens character studies; Marius B. Winter and his dance orchestra; the Carroll Sisters, in harmonised duets; Leonard Henry; and a sketch by Frank Burton entitled *Shingled Shakespeare*. We certainly can't have too much of this kind of thing during the fine weather.

ANOTHER BEACON

A NEW radio beacon has been established on May Island, near the Firth of Forth. This transmitter uses the call-sign MMM, and may be heard working on a wavelength of approximately 1,000 metres. The signals are similar to those emitted from the other beacons already at various points around the coasts of Great Britain, and consist of several repetitions of the call-sign, followed by a prolonged dash and the call-sign sent once. You will find these beacons interfering with some of the Russian stations on just round the 1,000-metre wavelength.

THE "PROMS"

ARRANGEMENTS are now in hand for next season's "Proms." The thirty-seventh season of "Proms" will be given by the B.B.C. Orchestra under the conductorship of Sir Henry Wood, in the Queen's Hall, from Saturday, August 8, to Saturday, October 3. Sir Henry Wood has conducted thirty-six seasons of Promenade Concerts, and since 1927 the concerts have been given annually under the auspices of the B.B.C. A number will be broadcast during the forthcoming season.

THE CHILDREN'S HOUR!

COMMENT on a section of the B.B.C. programmes was made recently by Mr. J. A. R. Cairns, the well-known London Police magistrate. He said: "In my childhood days a five-year-old would have assaulted his nurse if she had tried to put across the stuff that is sung over the wireless in the afternoon. If only they would sing sense!"

MIDLAND MOANS

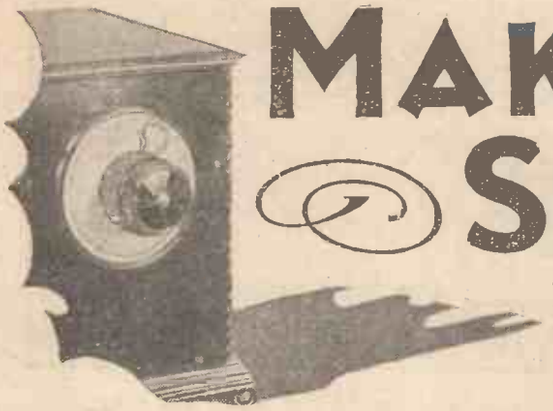
SINCE Midland Regional went on to 398 metres, listeners around Birmingham have been complaining of interference from foreign stations. Undoubtedly Sottens, the new high-power Swiss station, is received very loudly at night; its wavelength is just above that of the Midland station. There is also difficulty in separating London and Midland Regional stations, both in the Midlands and in London. The B.B.C. regards the dislocation due to the wavelength changes as very slight.

NORTH REGIONAL'S RECEPTION

ANALYSING the post-bag relating to the test transmissions from Moorside Edge, the B.B.C. finds that 38 per cent. report satisfactory reception from all points of view. As opposed to this is the 12 per cent. who report that the new station interferes with their reception of foreign stations and another 12 per cent. who report generally unsatisfactory reception. The remaining percentage is made up of letters dealing with minor matters not affecting the main argument.

Sweden now has 122 licensed amateur transmitting stations of which 26 are in Stockholm. Ten operators are in possession of the International WAC badge, which means "worked all continents."

Seven hundred motor-cars, all carrying wireless receivers, assembled at Ostia, Italy, recently on the occasion of the Automobile Radio meeting. The object was to prove the usefulness of the radio-equipped car. The cars received instructions as to the route, stops and time-table by wireless. They were reviewed by Signor Mussolini and prizes and medals were afterwards distributed.

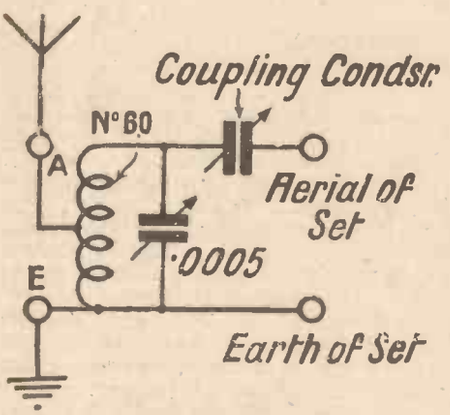


MAKE THAT SET SELECTIVE—

—with the simple external tuning arrangement described by "Hotspot" in this article. The circuit, which is recommended by the B.B.C., can be applied to almost every set in use to-day but is especially applicable to sets with detector and low-frequency amplifying circuits

IT is all very well to tell listeners how to make sets more selective; but I know many sets cannot readily be altered internally. Such sets are either sealed by the makers or the wiring is difficult to follow. For listeners so placed I suggest an external tuning circuit will provide the easiest means of increasing selectivity.

Leaving aside wavetraps, which have a special application in cutting out one strong local signal, we have to fall back on a coil and condenser, coupled in some way to the aerial tuning circuit of the set.



The circuit of the selectivity unit

Not long ago, the B.B.C. recommended me to try out an arrangement suggested in one of their pamphlets. I did; and the results were so striking that the unit shown in this article was built up for AMATEUR WIRELESS readers.

The diagram shows the whole scheme, which is really very simple. It consists essentially of a tapped plug-in coil, tuned by a .0005-microfarad variable condenser. The aerial and earth leads, which would normally go to the appropriate terminals on the set, are taken to the two ends of this external coil and condenser, as shown. Then the aerial tuning circuit so formed is coupled to the tuning coil of the set; this is done by connecting the earth end of the external circuit to the earth terminal of the set and the aerial end through a small neutralising condenser to the aerial terminal of the set.

The size of this coupling condenser is very important. It must have a very low minimum capacity, preferably as low as two micro-microfarads. If the coupling capacity is too large the extremely good selectivity possible with the unit under normal conditions will not be derived.

Simple Construction

Any reader who cares to dig out a No. 50 or No. 60 coil, preferably of the tapped variety, put across it a .0005-microfarad variable condenser and couple the circuit up as shown by the diagrams to the existing set, will be very well rewarded, especially if the existing set is at present unselective.

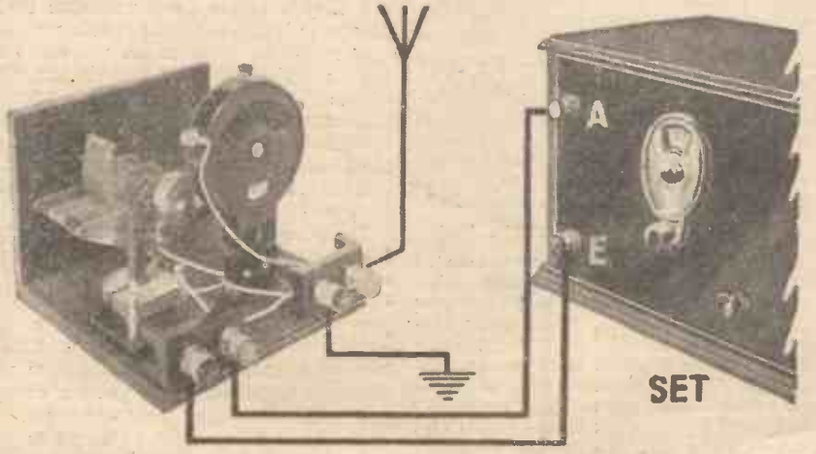
Having joined up the unit as indicated the operation is quite simple. Firstly, adjust the unit condenser to its half-way point and then tune in the desired station at full strength by means of the normal set tuning controls. At this stage there will probably be some interference. Then adjust the unit condenser until the external circuit is also tuned to the incoming signal; this will be at the point on the unit dial where the wanted signal is still further increased in strength.

All Wavelengths

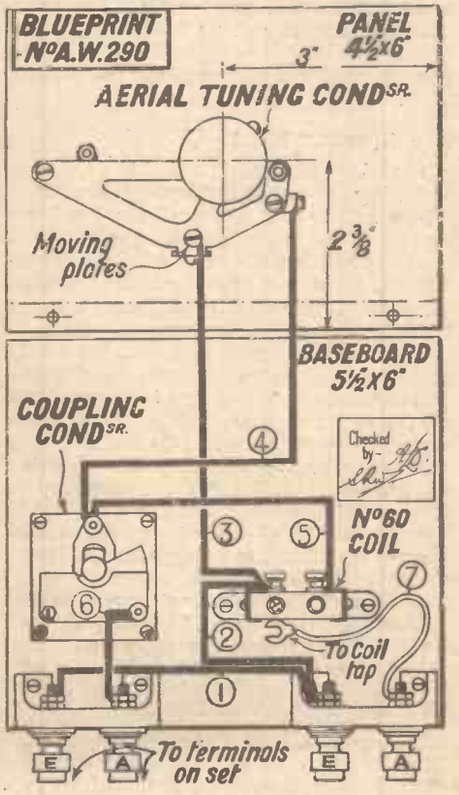
If this second tuning adjustment does not eliminate the unwanted signal, the capacity of the coupling condenser is probably too large. The remedy is to reduce the setting of the neutralising condenser. It is rather surprising how low this capacity can be made without reducing signal strength.

I ought to emphasise the fact that this external tuning circuit must be re-adjusted for every station received.

Although there is thus some extra complication in tuning a set with this unit attached to it, its selective properties are obtained on all wavelengths.



This pictorial diagram shows how the unit is connected to the aerial, earth and the set



The layout and wiring diagram. A full-size blueprint is available, price 6d.

This article by Set Tester indicates the logical developments in the design of next season's receivers. Hundreds of commercial receivers pass through Set Tester's hands in the course of the year and he is therefore fully aware of present-day needs and to what extent these are met.

AT the moment the radio trade is busily preparing next season's designs for broadcast receivers. As in the motor trade, a certain amount of secrecy surrounds their activities, but there are undoubtedly certain inevitable developments which I should like to forecast.

Reviewing the sets I have tested during the past six months, I am bound to say that the general failing has been unselective tuning. With the growth of high-power stations in every country in Europe the problem of separating a station from its immediate frequency neighbours has become acute. Some of the high-power European stations are indeed so powerful that at night time their reflected rays produce an enormous field strength in this country. Even if we are receiving only local stations we can no longer adopt an insular attitude towards the foreigners. They have literally invaded our slice of the ether.

The Greatest Need

The selectivity problem that has developed during the last year affects all classes of listener. The set designed for local reception does not seem able to cut out traces of the foreigners on adjacent wavelengths. The set designed for distant reception only with difficulty cuts out the locals.

To design and market a set sufficiently selective to cope with modern conditions and at a popular price; that is the problem all the set makers are at the present time trying to solve. It seems to me that two solutions are at hand; one is the adoption of band-pass aerial tuning, whereby a three-valver would have three tuned circuits instead of the present and inadequate two; and the other solution is the super-het.

In home-constructed sets such as the "Ether Searcher" and "Century Super" we have, I believe, the makings of next years' commercial practice.

The Super-het Will Return

Next season, I am perfectly sure, we shall be able to choose from a whole batch of factory-built super-hets, both for battery and mains operation. These sets will, at last, bring us level with America in the matter of selectivity. We Londoners will be able to get the stations immediately above and below the two Brookmans Park stations without local interference. This can be done now only by the home constructor using a "Century Super."

When super-het sets become generally available as the products of our radio factories we shall be able to pull down the aerial poles and revel in the convenience of the frame aerial; for the super-het does not need an elevated aerial wire.

I hope to see battery versions of the super-het for about £15, but the mains models will, I imagine, cost at least £25. Judging by my correspondence, there are plenty of listeners willing to pay these prices to get what they want. But there are many more whose purses are limited and for these something cheaper, but offering great selectivity, will have to be produced.

Band-passing

I suggest that band-passing is the way out for inexpensive selective sets. It would be a good thing to incorporate such a device in the local-station sets as well as in the sets designed for distant reception. As already pointed out, selectivity is a universal need these days, just as urgent among listeners wanting their home stations free from distant-station interference as among listeners wanting distant stations clear of the locals.

So much for the circuit considerations relating to selectivity in factory-built sets. I hope I have not under-estimated the resourcefulness of our set makers!

Simplified Control

Now about controls; we want more simplified tuning; with a large dial, easy to grip, illuminated and calibrated for medium and long wavelengths. We do not want to have to put up with two tuning dials marked in meaning-less degrees, badly engraved, difficult to handle and still more difficult to co-relate in their settings for each station received.

I expect to see better volume controls. I hope to handle sets with volume controls that really do provide an audibility range from a whisper to the full output. Many of the volume controls on this year's sets fail in not being able to reduce the locals to moderate volume. After all, it is the locals that need volume controlling and not distant stations, which usually come in only at moderate volume.

With regard to the layout of factory-built sets, I see nothing to stem the rush of consoles—sets in cabinets that also contain the loud-speaker. The console, like the pedestal gramophone, is a logical development. We should not dream of buying a mechanical gramophone with a separate acoustic horn, yet we cheerfully pay a lot of money for a good set and trust that the loud-speaker on hand or bought separately, from probably a different maker, will do the set justice.

OUR LISTENING POST

By Jay Coote

ON a recent evening I picked up a faint transmission in the French language and spent some time in identifying the broadcast. It was from Radio Conference, a small station at Brussels on about 216 metres. Some considerable difficulty was experienced in separating it from its hoftier neighbours, but a slight lull in their transmissions enabled me to register the call. Concerts are broadcast daily at about 8.30 p.m. B.S.T. The quality of the transmission, although signals are faint, is remarkably good. Radio Chatelineau, by the way, which was previously heard fairly well on about the same wavelength, has been compelled to close down for lack of financial support. It was run by a small group of Charleroi amateurs.

I am told that it is very doubtful whether the new Radio Paris transmitter will be on the air before the autumn months, although possibly it may be found testing at a much earlier date. The installation of the plant is well in hand, but the necessary land cables have to be laid to connect the transmitter to the Paris studio.

It might prove an interesting pastime to make a search for the only broadcasting station situated in Portugal. It is run by an amateur whose call sign is CT1AA, and regular programmes are transmitted on Sundays, Wednesdays, and Saturdays between 10 p.m. and midnight B.S.T. The wavelength is 283.6 metres, and all announcements are put out in Portuguese, Spanish, English, French, and German. I have not yet logged this orphan, and should be pleased to hear from anybody who has.

PRIZE-WINNING "ETHER-SEARCHER" SETS

WHAT THE PRIZE-WINNERS SAY ABOUT THEIR RECEIVERS

AS announced last week, the awards have now been made in our great "1931 Ether Searcher" Competition. It has been found necessary to increase the money prizes from the originally promised £50 to a total of £69, partly because of the high standard of merit reached by the sets in general and partly because of the consequent dilemma in which the judges found themselves in attempting to restrict the prizes to the number originally offered.

One of the most gratifying things which result from an analysis of the entries in this most successful competition is the general high standard of merit in the constructional work.

It will be recalled that the competition was open to any amateur builder of a "1931 Ether Searcher," either battery or mains driven. In order to enable builders of the mains set to compete fairly (for the mains set was described in AMATEUR WIRELESS several weeks after the battery model) the closing date of the competition was postponed for several days, so that the mains-set constructors might have time to get a good reception log.

The reception reports which we received from competitors amply proved our claim of fifty stations on the extremely easy-to-build and cheap three-valver, and when the various sets were requested to be sent in for a final performance test in the "A.W." laboratory, these lengthy reception logs were proved correct.

It is a gratifying tribute to the selectivity of the "1931 Ether Searcher" that the first prize winner, W. F. Watson, works his set at St. Albans, only five miles from Brookmans Park. He says: "I came to the conclusion that if my aim was selectivity, together with quality, the only solution appeared to be in a circuit using a bandpass filter . . . the deciding factor came when I saw the full-size prints published in AMATEUR WIRELESS. Construction was ridiculously easy, having the clear diagrams to follow. **The National programme came in at deafening strength without a sign of the Regional.** . . . I found that I could get five stations, all at loud-speaker strength, in between these two." His set is shown in the photographs (1).

The second prize winner, Lawrence G. B. Davis, works his set at Streatham Hill, London, S.W.2, and he is most enthusiastic over the Searcher. He says: "I have proved its worth by **logging in daylight the relays on 288 metres, Strasbourg and Langenberg, clear of 5GB** . . . there is a marked decrease in background noise, compared with previous sets I have handled. A very fine set and most economical on H.T." His set is shown at (2).

THE HOW AND WHY OF RADIO—XXXVI

HOW THE FILAMENT MAKES THE VALVE WORK

Another of the series of weekly articles, written specially for beginners who want simple and practical explanations of the underlying principles of radio

WHATEVER doubts the beginner may justifiably have from time to time about different aspects of valve working, he may, at least, be sure of one essential fact—that the filament is the source of its action. We might go back a few years to a very early type of valve, having just a filament, or cathode as it is sometimes called, and an anode. Suppose we connect up this valve to a battery as shown by Fig. 1A; what happens?

Firstly, the current from the battery flows through the filament and heats it. When hot, the filament emits electrons, which shoot off into the space around. Many are attracted on to the anode—why? Because in electricity it so happens that like attracts unlike and repels like; the electrons are negative charges of electricity and the anode is positive. At least, it is something positive with respect to all but the very positive end of the filament.

These electrons from the filament are attracted to the anode and flow back to the battery as shown. Before we go any deeper into this business, let us clear up what little we have to know about electrons. An electron is the smallest quantity of electricity capable of moving by itself between atoms, which are the smallest quantities of matter. The electron is just a charge of electricity. It is not matter.

This is rather difficult to follow; but we have good reason for believing it, because however long we allow the electrons to flow to the anode that anode never gains the slightest weight.

Before this electron theory was propounded and accepted, scientists thought of electricity as consisting of particles of matter; a flow of current was compared to a flow of water; and just as water flows only from one level to a lower level and never to a higher level, electricity was thought to flow from any given point of voltage to a point of lower voltage. So if a battery

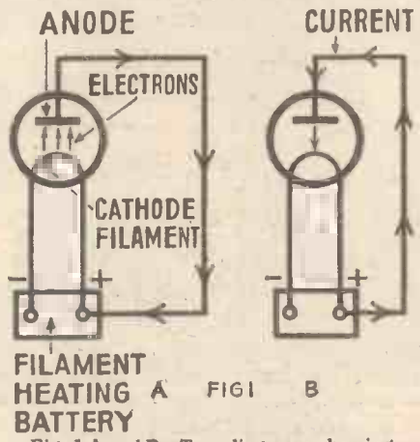


Fig. 1 A and B. Two diagrams showing the part the filament plays in the action of a valve

were joined by an external resistance a current would flow from the positive or high voltage end to the negative or zero end.

But, as we have seen, electricity really means a movement of electrons; and electrons, besides being non-material, are negative charges and are therefore attracted towards the positive source. We still speak of current flowing from positive to negative, which is just the opposite of the direction of electrons.

The electrode from which the electrons flow is called the cathode, which in the valve of Fig. 1A is the filament. The electrode towards which the electrons flow is called the anode; in the Fig. 1 valve this is the metal plate near the filament.

Getting back to Fig. 1A, let us be clear that without the electrons emitted from the heated filament the whole action of the valve would be impossible. Having understood that, forget about the direction of electrons and concentrate on Fig. 1B, where the direction of current caused by this phenomenon is indicated.

The filament battery is for heating the filament; this is caused by a current said to flow through the filament from the positive end of the battery to the negative end. The heating of this filament causes the electron emission from filament to anode, which is interpreted as a flow of current from the positive end of the battery through the valve from anode to filament and back to the battery. That is the anode current.

Now this attraction of electrons from filament to anode can be increased in several ways. We can make the filament hotter; we can make its surface area larger; we can make the anode larger; and bring it closer to the filament; yet another way is to increase the positive charge on the anode.

HOTSPOT.

"PRIZE-WINNING 'ETHER SEARCHER' SETS"

(*Continued from preceding page*)

The third prize winner is another listener who lives only a few miles from Brookmans Park, at Hendon, and in spite of this handicap on the very first evening test of his "Searcher" he succeeded in dialing thirty-seven stations on the medium and long waves, thirty-three of which were at full loud-speaker strength. His set is shown in the photograph (3). He says: "the selectivity is exceedingly good, several stations being logged although **only a half to one degree apart** on the dial. I have already made three sets . . . but the 'Ether Searcher' certainly excells in performance in every way."

The fourth prize was won by a Greenford (Middlesex) reader, Chas. H. W. Wakefield, who made up an A.C. version of the "Searcher," just before the official mains set was published. He has converted it into a fine radiogramophone, and in the first test, **after only five minutes' experience, tuned in thirty-two stations.**

E. A. Jenner, a Peckham reader, took the fifth prize with a "Searcher" which was actually the first screen-grid set he had ever built. He **received thirty-three medium-wave stations and twelve long-wavers,** and hopes to do still better when he has had more experience in handling the set.

In addition to the five main prizes, a sixth prize was included in the competition, four competitors being bracketed equally for this. One of these competitors says of the "Searcher": "**its selectivity is amazing,** Mühlacker and London, and other stations usually found with a spread on the dial, being separated quite easily."

Eleven prizes of £1 each were awarded to competitors in widespread parts of the country, in Wales, Warwickshire and Gloucestershire.

The photographs of the other six chief prize winners are illustrated, in order, on page 779.

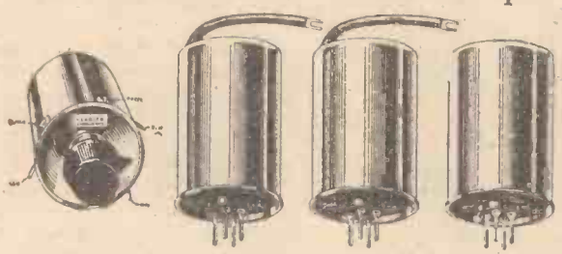
Owing to the high standard of construction, consolation prizes were awarded to forty-eight other competitors, and it is interesting to note that many of these are working their sets in localities far removed from broadcasting stations, or, alternately, in areas where selectivity is of the utmost importance; and they are all getting excellent results.

The "1931 Ether Searcher" Competition has proved that for the man who wants **a cheap easy-to-build and easy-to-work fifty-station three-valve set,** the "1931 Searcher" is "it."

SPECIFIED FOR THE "CENTURY SUPER"

The Coils chosen by Mr. W. James for his "Century Super" are supplied specially by Wright & Weaire, Ltd., the oldest component manufacturers in the industry

The outstanding performance of this receiver is only made possible by the use of the Wearite Coils (patent pending), who are the sole Concessionaires in the British Empire.



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12×8×$\frac{3}{16}$ (Drilled to specification). **5/9**

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On Your Wavelength!

CONCERNING "UNITS"

I ALWAYS think there is something rather fascinating about the standards of measurement we use in magnetism and electricity. For instance, the other day I heard a Navy man talking about so many "jars" of capacity, where most people would have said microfarads. Not that a "jar" is the same as a microfarad, though it is a recognised unit of capacity. It was, I imagine, originally derived from the old-fashioned Leyden jar—which was one of the earliest forms of condenser—though nowadays it seems to have dropped out of use. No doubt the Navy has its own reason for preferring the older term.

THE SIGNIFICANT FIGURE

AS a matter of fact, there are nine hundred "jars" in a condenser of 1 microfarad capacity, and in some respects there is a lot to be said in favour of it on this score. The farad is fantastically large as a unit. We take the millionth part of it—the microfarad—and regard this as our practical unit. But in nine cases out of ten, especially in radio work we are chiefly concerned with capacities very much smaller again. Personally I dislike calculations in which all the significant figures come on the wrong side of the decimal point, especially when there are several "noughts" in between. By contrast, if we used the Navy unit, a capacity of .003 microfarad would become 2.7 jars, which would, I think, be more convenient all round.

FRAME AERIALS

THE superhet is certainly going to come back this year, and one of the first consequences will be a revival in the use of frame aerials. Stress is often laid upon the directional property of this type of aerial, particularly as a means of cutting-out unwanted stations. Unfortunately, in many cases the effect is more apparent than real. The directional action is always present, of course, to some degree, but its sharpness is often seriously "blurred" by capacity leakage to earth across the grid and filament of the first valve.

This allows some of the signal voltage to get on to the grid, no matter in what direction the frame is turned. In fact the windings then act partly as an ordinary earthed aerial, and so long as this occurs the true directional effect of the frame is seriously diminished. One remedy is to introduce an earthed balancing condenser, so as to neutralise the effect of the non-directional pick-up. The signal voltage on the grid is then limited to that flowing in the frame windings, as a closed circuit, and this will then produce a clear-cut directional effect.

A QUESTION OF SIZE

BY the way, it is best, even with a superhet receiver, not to use too small a frame. A safe rule is to make it as large as possible, having regard to the available space and to general convenience. Some people go from one extreme to the other. Having got rid of the garden pole, they promptly descend to a 12- or 15-in. frame and expect to get just as many stations on it. Of course, a lot can be done even with a frame of this size, but the standard of the portable receiver, where the designers go all out for compactness, ought not to be followed too closely in every case. After all, the signal pick-up is directly proportional to the area of the windings, and it is asking rather a lot to cut this down to a square foot. A two-foot side giving an effective area of four square feet gives the more distant stations a much better chance, and can hardly be said to be unwieldy for ordinary indoor work.

AMERICAN VALVES

AMERICA seems to be having a wave of enthusiasm for special valves. In the first place, the pentode is gradually being accepted by the manufacturers as a better proposition than the triode. Such a well-known firm as Atwater-Kent have adopted it in their new superheterodyne receiver, and several other well-known manufacturers are following suit. The advantages of the pentode, of course, are greater undistorted power output for a given anode current, and greater sensitivity in that the necessary output can be obtained with a smaller grid swing. Hence, one stage of low-frequency is all that is necessary, the pentode being energised directly by the detector.

AN IMPORTANT ADVANCE

THE greatest interest, however, is centring around this new variable-mu tube which certainly seems to have much to commend it. In this country we have been particularly backward producing automatic volume control on receivers, but in the States this form of circuit has become almost standard. One of the difficulties, however, is the cross modulation which is introduced when the bias on the H.F. valve is altered and the new super-control tubes offer a new way out of the difficulty.

I am looking forward to trying one of these tubes shortly. In the meantime I presume our own manufacturers will not be long before they produce something of the sort. The demand in this country will not be so large, perhaps, but I think our engineers will soon wake up to the advantages. I am not at all sure that it will not prove to be one of the most important advances in valve construction that we have seen for some time past.

THE TASTE-METER

QUITE a while ago I suggested jokingly in these columns that what the B.B.C. programme people really needed to guide them in their selection of items was an instrument which would record the number of sets that were switched off whenever a turn that made no wide appeal was put on. Fantastic as the idea then seemed, it has now actually been developed in a particularly interesting way. As many readers know, there are now in existence in many big towns companies which supply the wireless programmes, laying them on to houses very much as gas and water are laid on. The company installs such a set in a suitable locality and runs wires to the houses of its subscribers, who require no other outfit than a loud-speaker in order to hear the programmes. This kind of thing would not, of course, appeal to the real wireless enthusiast, who finds the greatest joy in twiddling his set's knobs and being able to find foreign stations when he wants them.

"LOSING THEIR FILAMENTS"

THERE is—or, at any rate, there used to be—current at Savoy Hill a very expressive phrase about performers who failed to do themselves justice before the microphone. You would hear someone listening-in in the control-room say: "I bet that fellow is losing his filaments." This simply means that listeners are switching off all over the place. Now, a relay service such as that mentioned in the last paragraph gives a means of discovering to what extent the filaments are lost by an unpopular item and vice versa to what extent switching on occurs when something bright and entertaining comes along. You see, the central distributing set has to be designed for a certain maximum load when all the subscribers are hearing the programme.

VALUABLE INFORMATION

IT is important that the engineers should know just what the output load is at any particular time, so that they can assure that everyone is getting sufficient juice. For this reason meters are installed in the output to record what we may call the load pressure. By means of them you can ascertain pretty closely what proportion of the subscribers are "taking" (I love that B.B.C.-ism) any item. This fact was brought recently to the notice of the B.B.C. by the Brighton relay people, and the B.B.C. has decided that there is something in it. It has, in fact, asked for records over fairly long periods, and the result is that curves showing which items lose filaments and which gain them are being made week by week.

A FINE IDEA

THIS is an excellent idea, and since there are a large number of subscribers to the Brighton radio exchange, the record will give a genuine indication of public taste in the matter of programmes. It will, though, be a little difficult to discover exactly what they mean. One can, for example, feel pretty sure that, irrespective of the programme value of the items given, there are far more loud-speakers in use

On Your Wavelength! (continued)

between 7 and 9 p.m. than between 11 a.m. and 1 p.m. The reason is that people have leisure in the evenings. One particularly interesting point that sticks right out from the records already made is the extraordinary popularity of light music in the early part of Sunday afternoons. The relay station always puts on a foreign station then, since there is nothing available at home, and the curve shows that the output load at that time is one of the biggest of the week. I have never been able to see why we should have to go abroad for entertainment between midday and 3 p.m. on Sundays, and I do think that the B.B.C. should give us at this time concerts of light, cheerful music.

A GROWING ARMY

THIS year of grace is certainly going to be one of astonishing progress in wireless. Do you know that in the first three months of the year the number of new licences taken out was in the neighbourhood of a quarter of a million? Before the end of the year the majority of homes in this country are likely to have wireless sets, and a condition of affairs will be realised which I ventured to prophesy eight long years ago. I wrote then—remember that in 1923 the very simplest set cost about a fiver and there were very few indeed in use—"Within ten years the wireless receiving set will have become as ordinary an article of household furniture as the dining-room table." And, mark my words, that prophecy is being fulfilled to the letter.

WOULD YOU BELIEVE IT?

CURIOUSLY enough, though, I know quite a number of people who could well afford to have wireless sets, but for various reasons refuse to install them. I could think right off of at least a dozen amongst my friends and acquaintances who are like this. In most cases I believe they are rather like you and me when we are faced with the business of getting into a cold bath on a chilly morning. You know what I mean. You hesitate to make the plunge, but once you are in you thoroughly enjoy it. Many, I admit, have been put off by hearing thoroughly bad demonstrations of wireless, and don't believe that programmes can and ought to be received with first-rate quality. Others—and this is one of the strangest of all points—still regard wireless as something rather uncanny and shrink from the idea of putting into their houses what they regard as a kind of witch-doctor's mystery box.

A HELP

EVERY reader should remember that the more licensed listeners there are, the more money there is to spend on programmes. It is in our interest, therefore, to convert as many as possible of those friends who are still living in the dark ages. One of the best methods I find is to ask such friends round one evening without mentioning wireless. Choose an evening when there is something really good on, and when they turn up let them hear what the right set and the right loud-speaker can do.

INTO THE FOLD

HERE is the story of how one of my friends was brought to see the light. He is very well off, and both he and his family are distinctly musical. They live in a country house and, as they do not go out much in the evenings, time used to hang rather heavily on their hands, particularly in winter. I asked my friend one day why he didn't put in a wireless set, and he replied that (*a*) he didn't want to disfigure his house with an aerial, (*b*) he was sure that he would never understand such a complicated thing as a wireless set, (*c*) his wife refused to have batteries and things cluttering up the drawing-room, and (*d*) having heard one or two sets he did not like the nasty tinny sounds that emanated from their loud-speakers. "You have electric light, haven't you?" I inquired, and on hearing that he had I told him that there was no need for any batteries or anything of that kind. I also showed him that he didn't need an outside aerial and that modern sets were so simple to operate and so completely reliable that they gave no trouble at all. The next thing was to get him and his family to come to hear a Queen's Hall concert as reproduced by my local-station receiver. He has now put in a first-rate all-from-the-mains set with built-in frame aerial and the last word in moving-coil loud-speakers!

A QUEER HAPPENING

FROM another friend of long experience and considerable skill with the tuning of wireless sets I have a very amazing report. About a month ago he was searching with a very sensitive and selective receiving set near the lower end of the broadcast band at half-past eight in the evening. He tuned in a transmission which he could not for the moment identify, as it did not correspond with the wavelength of any European station as shown by his calibration chart. After a little waiting he was rewarded by hearing the call-sign, which, to his amazement, turned out to be that of one of the shorter-wave Americans—WPG I think it was. In the next half-hour he picked up a couple more of them. Then they entirely disappeared, and there wasn't a trace of them to be heard until the small hours of the following morning.

There was, I suppose, some freak effect in the condition of the Heaviside layer during that half-hour which enabled these transmissions to travel across the three thousand miles of the Atlantic ocean. I have myself at a later hour in the evening found Lemberg (or Lvov, as some prefer it) interfered with by another station and discovered after the Polish transmitter had closed down that the interference came from WGY. I shall not be in the least surprised if next winter some of the American giants cause a bit of trouble by heterodyning or jamming European stations.

SOME SHORT!

I AM faced just now with the kind of problem that I much rather were yours, dear reader, than mine. In a word, I have in a seven-valver a short circuit which absolutely defies detection. The wiring of the thing is exceedingly complicated. But I have traced it out and have applied every means that I know of locating the trouble. In the course of a long and checkered career I have never before been baffled by a short-circuit, but I do here and now confess that up to date this one leaves me completely guessing. It is not a direct short, but a leak somewhere, probably owing to an insulation defect. Tests show that current is taking a wrong path through a resistance of approximately 45,000 ohms, but I will be hanged, drawn, and quartered if I can discover where the defect is. There is probably something wrong with the insulation at one little point, but, as there seems to be about a mile of H.T. positive busbar wandering from one screened department to another, I have not yet discovered where the weak point is.

TO BATTERY CHARGERS

THERE is one little point that I really would like to bring to the notice of those who run battery-charging stations. This concerns high-tension accumulators, which are generally made up in five-cell units with a nominal E.M.F. of 10 volts. You send your 60-volt trays of units to the station with the units arranged and connections made in your own particular and special way. They are returned to you arranged quite differently. The battery, in fact, is usually inside out, and you must spend quite a while in putting it back into order. The positive and negative ends of each of my trays are carefully marked by a large *plus* sign in red at one end and an equally large *minus* sign in black at the other, and I have gone so far as to attach to each tray a luggage label showing the arrangement of these units. But that has so far availed me nothing. The fellow at the charging station seems to take a fiendish delight in altering things and in giving me unnecessary work to do.

THERMION.

SCREEN YOUR STAGES

If designing a new set remember that modern valves and parts result in great efficiency and screening is usually necessary to keep the set stable. Here

is a simple H.F. stage, consisting of a coil, condenser and valve holder which, as can be seen, is totally screened from the parts on the other side of the set.

CHANGING OVER from BATTERIES TO MAINS

Mains apparatus is now so cheap and easy to instal that many amateurs can contemplate the change over. Here is some useful advice by KENNETH ULLYETT

IN his "In My Wireless Den" notes recently, Mr. W. James made a remark which, personally, I think every amateur should note. He said "I really cannot understand an amateur having a supply of electricity in the house using dry batteries

"You will see that in any good set . . . . condensers of the 400-volt test type are specified at all important points"

for high tension, as mains units are not only reliable but satisfactory electrically as well."

There are, I think, only three things which prevent a man with mains in his house from using them for radio. The first is cost, the second is a vague fear about the danger or the difficulty of changing over for mains operation, and the third is the natural inclination to use batteries so long as there is a vestige of "juice" in them and to use battery valves, instead of mains valves, so long as there is any emission left in the old ones.

D.C. mains users have a problem of their own, because while it is practically certain that all districts will eventually change over to A.C. mains, this conversion may not in some parts of the country take place for five, eight or ten years and so in these districts D.C. apparatus is still an investment. In certain parts of London, for instance, where D.C. mains are even now being changed over to A.C., it is not worth while spending too much for converting a set from battery to mains working, for only part of the D.C. mains working will be useful when A.C. mains come along. The smoothing side of the high-tension unit may be useful if used with an A.C. rectifier, but hardly any of the low-tension or grid-bias arrangement will do for A.C. mains.

The first thing when changing over from battery to mains is to examine the set, to see what its safety factor is and what current demands it will make on the eliminator. Commercial units are usually available in groups, the smallest of which may give 120 volts at 15 milliamperes, the next perhaps 120 volts at 20 milliamperes, the next 150 volts at 25 milliamperes, and so on. There is a marked difference in cost between each group and the type of unit you will need depends on the number of valves in the set, and the current demands; generally the power valve is the deciding factor.

A three-valve set with one screen-grid stage, a detector and a normal power valve may take 15 milliamperes, the power valve taking 12 milliamperes of this. If you have not a milliammeter then borrow one before scrapping your batteries and put it temporarily in the negative high-tension lead. This will show the total high-tension consumption and you should allow a margin on this when choosing the new eliminator.

It is very possible that you will change the set or the valves within the next year and a larger eliminator may then be needed to get good results and to give a sufficient output current for a larger power valve. It is cheaper to buy a unit giving 150 volts at 25 milliamperes at the outset, even for a set which takes 15 milliamperes at 120 volts. The extra 10 milliamperes may be needed when alterations are made to the set.

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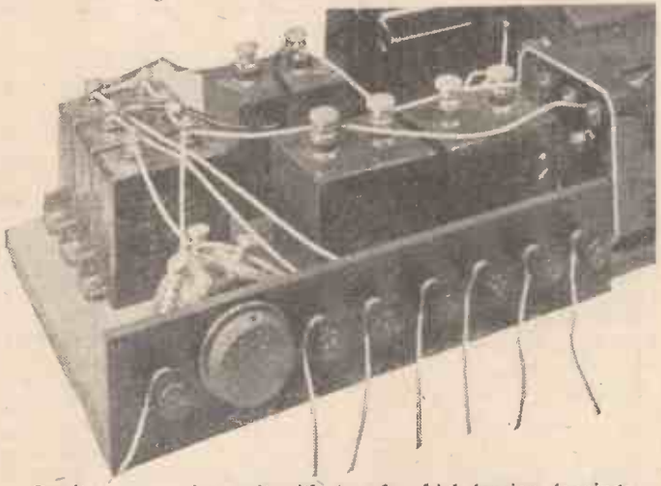
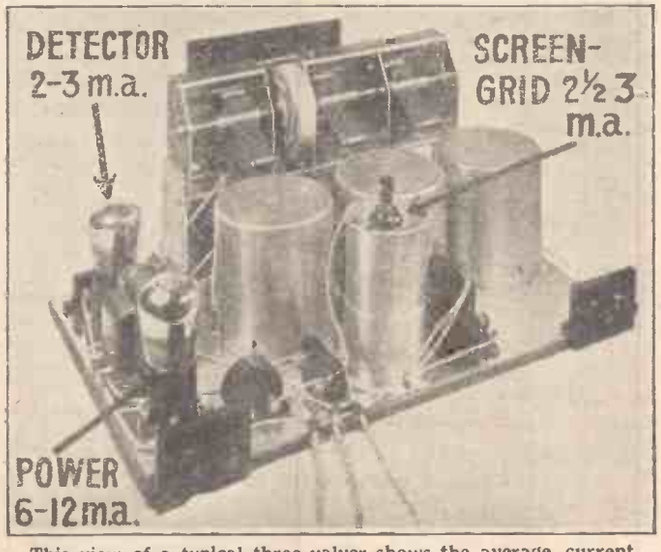


Don't use a mains unit with too few high-tension tappings. This H.T. unit for the "Ether Searcher" has four separate tappings, and this is a great advantage



This view of a typical three-valver shows the average current taken by the screen-grid, detector and power valves. The H.T. unit must give sufficient current

"SUMMER NIGHTS ARE RADIO NIGHTS"

"Observer," who runs the Postcard Radio Literature feature, here talks about a novel aspect of summer-time radio

I SEE that last week someone wrote in "News and Gossip of the Week," that there are people who will tell you that radio is no good in summer, and that when the foreign stations are difficult to pick up because of summer-time conditions, gardening is preferable to grid leaks and antirrhinums to aerials!

Of course, they are wrong, for, keeping in touch with the trade, as it is necessary for me to do, I know that for the past two years there has been a decreasing tendency for radio interest to drop during June, July and August.

Take your own case as an example. I'll wager that during the holiday season you will find just as much time for using the set as you do in the spring and autumn. The difficulty has been in the past that with inefficient sets it was not possible to get half so many stations during the long light evenings as it is when darkness covers half the wireless waves' travels.

If you do find that the number of foreigners which you can consistently log is decreasing, then very probably your set is not up to 1931 standard.

If you are interested only in indoor listening, then you are bound to find a big difference if you become a devotee of the super-het. principle and build a "Century Super," or if you turn to the bandpass "faith," and make up some such set as the popular "Ether Searcher."

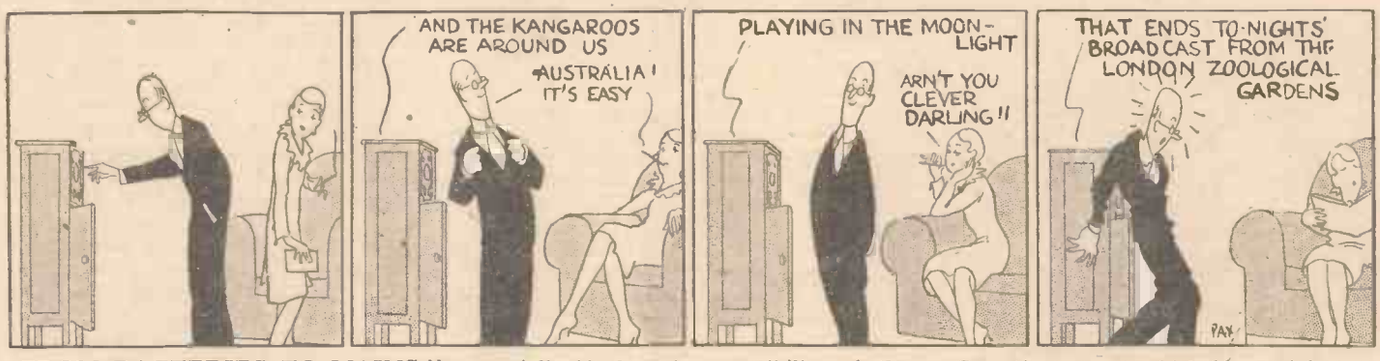
Even portable sets this year are going to have a good time of it and I am reminded of this by a fine catalogue which I have had from one manufacturer in particular, Pye Radio Ltd. They have the slogan "Summer nights are Pye nights," and I am sure they will not mind me generalising this and saying, this year, of any set, "Summer nights are radio nights." All those concerns which manufacture portable sets are preparing for a large number of listeners this summer, and they are taking steps to ensure good reception, which also you will find accomplished in AMATEUR WIRELESS home-constructor portables for the new season.

A trouble is that there is a long-standing superstition that summer-time reception is not worth while. I admit that even our new efficient sets will have a hard job to dispel this illusion.

Anyway, I do give you my wholehearted advice to carry on listening during the summer months, for it is always expensive to let a set stand idle.

Batteries run down, and dust covers a disused set. Don't let this happen to your outfit merely because you think that now the light evenings are here it is not worth while listening. Carry on probing the ether for the distant stations which came in so well in the early part of the year and which you may be surprised to find still at good strength.

Then you will realise that radio progress really has made great strides, and that with modern gear "ether touring" is an ideal hobby for summer nights.



"FROM BATTERIES TO MAINS"

(*Continued from preceding page*)

There is the safety factor to be considered. Some cheap commercial sets, designed for battery operation, have condensers which are designed only for the work in hand; that is for use in a set operating from batteries having a maximum voltage of 100, or perhaps 120. This is the greatest possible voltage that is ever applied to them, and they may work well. But when the set is worked with a mains unit, giving at all times a constant voltage of 120, 150 or perhaps more, and occasional peak voltages, when switching on, of perhaps double this amount, these condensers may not be good enough. You will see that in any good set, such as the D.C. "1931 Ether Searcher," condensers of the 400-volt test type are specified at all important points.

This applies particularly to the mains unit used with a set, and if you are making up your own mains apparatus, then be on the safe side in using mains type condensers and not ordinary paper di-electric receiver type condensers where mains voltages are being handled.

D.C. Working

With a D.C. supply you can get low-tension by means of a dropping resistance, or you can still keep the accumulator and trickle charge it by means of a lamp or series resistance from the mains. This latter is probably the cheaper method (unless you use the new D.C. mains valves), especially if there is a possibility of the mains supply being changed over to A.C. in the near future.

Undoubtedly the best way of working an A.C. operated set, so far as L.T. is concerned, is with A.C. mains valves. This is a very cheap way of getting L.T. and a three-valve set, which I use constantly, having A.C. mains valves working off a 4-volt A.C. supply, costs about ¼d. an hour to run. Surely nobody could wish for greater economy than this.

Mains Valves

A.C. valves are easy to instal in a set, and it is possible to purchase a kit of parts complete with special adaptor valve holders which enable you to change over from battery valves to mains valves with practically no alteration to the original wiring of the set.

If you are changing over to A.C. valves on your own eliminator, however, it is necessary only to fit five-pin holders and to use twisted flexible wire for connecting up the heater terminals. Twisting the heater wires in this way cuts down the A.C. interference.

Watch the H.F. and detector stages if H.F. instability crops up. It is due to the better characteristics of the mains valves and may indicate the need for a by-pass condenser for the detector, an H.F. stopper circuit for the screen-grid valve, or alteration of H.T. values for the detector and H.F. stages.

Sometimes a set which has satisfactory screening for battery valves, needs more screening to stabilise the circuit when mains valves are used. A set with a simple vertical screen separating the H.F. and detector sides may be subject to spurious oscillation owing to the greater amplification of a mains fed screen-grid valve. The best plan, then, is to rig up a metal screening box covering the whole of the H.F. stage. This can easily be made out of aluminium or copper foil of fairly stout gauge and should cure the trouble.

H.T. Voltage

If merely substituting a mains unit for a high-tension battery, leaving the valves alone, causes the set to be unstable in tuning, then you will probably find that this is because the high-tension voltage is greater than that to which you have been accustomed with batteries.

The average battery driven set does not work with a full 120 or 150 volts for more than a month or so. A battery, especially if overworked, drops in voltage after a short while and many users of battery driven sets are accustomed to working with a lower voltage than they may suppose.

When the mains are used, providing a constant H.T. voltage, then the set may appear to be unstable, because it is actually working in a more efficient way than it did before. Try lowering the detector voltage a little to make the set stable when the reaction control is handled.

A Weekly Programme Criticism—By SYDNEY MOSELEY.

Without Fear or Favour

GRAND OPERA

GOTA LJUNGBERG

WHAT a week of opera—of grand opera! The finest opera in the world. That is Mrs. Snowden's answer to her critics.

"Isn't it well worth while," she asked me, "to have such productions transmitted into every home?"

◆ ◆ ◆

I was in the particularly happy position of hearing them all and seeing three of them. There was *Der Rosenkavalier*. Of course, I fully admit that there is a good deal of recitative in some of these grand operas. They might well be cut in parts. In fact, *Tristram and Isolde* was curtailed. *Der Rosenkavalier* has become extraordinary popular, although I prefer *Die Fliedermaus*.

◆ ◆ ◆

Some of the music in *Tristram and Isolde* is too exquisite. Unfortunately, we don't always get the best part of the opera broadcast owing to time and other exigencies of the programme service. But this much I must say. Many listeners who used to complain to me of "too high-brow stuff" are beginning to enjoy symphony concerts and grand opera.

◆ ◆ ◆

But I doubt whether I shall ever be educated up to chamber music! Still, let's be broad-minded.

◆ ◆ ◆

I doubt whether *The Rhinegold* is ideal for broadcasting. I consider it the dullest of the Wagnerian "Ring." *La Traviata* ought to be good. And when the Italian season begins—well, at any rate, lovers of opera can't complain these days!

◆ ◆ ◆

At the time of writing no arrangements have been made with Sir Thomas Beecham to transmit his Russian operas from the Lyceum. And, from what I know of the circumstances, I do not suppose there will be

◆ ◆ ◆

I gave you the tip to listen to Gota Ljungberg, the famous operatic soprano. What do you think of her? What a powerful, full voice she has! Listening to her singing "Return a Conquerer," from *Aida*, I pictured her when she took the stage at the State Opera, Berlin, as Santuzza in *Cavalleria Rusticana*. I thought, by the way, that "control" at Savoy Hill, realising her powerful voice, damped her down too much. The result was I couldn't hear the orchestra at all; it sounded as if she were unaccompanied. That was a pity.

◆ ◆ ◆

I suppose Gota Ljungberg stayed over from the symphony concert at the Queen's Hall on Wednesday till the Sunday concert at No. 10 studio. As she sang but one song, it seems rather an expensive wait. Why couldn't she sing two songs? An expensive and wonderful artiste should be used when she comes here.

◆ ◆ ◆

Some rather "unrefained" laughter—coarse, vulgar, don't you know—spoilt the "Ridgeway Parade".

◆ ◆ ◆

Since I was one of the party concerned, I listened with special interest to the "discussion" between General Sir Ian Hamilton and Compton Mackenzie. As I anticipated, it was a nice chat between two old friends and was in no wise a discussion or a debate. Mind, I am not saying that Sir Ian wouldn't more than hold his own with a real adversary on a subject which means more to him than life itself. Unfortunately, no efforts were taken to bring in someone who would take the opposite point of view. Therefore, the whole point of the discussion was lost. I have suggested this matter to a friend at the B.B.C., and very likely we shall have a real debate on Gallipoli one of these days.

◆ ◆

The B.B.C. Orchestra certainly has a varied choice of conductors. I can count twenty I have heard and seen. The two last were John Barbarolli and Basil Cameron. Each has his own way of placing the orchestra and in interpreting the big works.

THE GALLIPOLI DISCUSSION

B.B.C. CONDUCTORS

◆ ◆ ◆

May Mukle, whom I heard playing the 'cello when a boy, reveals herself master of that much beloved instrument.

◆ ◆ ◆

Margitt Angerer has a beautiful voice, but she should be seen as well. She is just as beautiful as her voice.

◆ ◆ ◆

Philip Snowden made microphone history again by coming to tell us about his Budget. Not a bad broadcaster, either, although here and there he betrays where he "cooms' from.

◆ ◆ ◆

What a remarkably popular person is Myra Hess, the pianist. She is, of course, among the first of her art, and, as great as she was before the advent of broadcasting, she has added lustre to her fame.

A WELL-KNOWN BANJOIST

AN outstanding feature of the West Country programme to be broadcast from the Cardiff station on Friday, May 22, will be the banjo solos by Tarrant Bailey, Junior.

His first solo broadcast was from the Cardiff studio in January, 1924, at the age of fourteen. Since then he has made frequent appearances, featuring solos on banjo, tenor banjo, saxophone, guitar and balalaika. His other broadcast engagements have included banjo and guitar solos from Midland Regional, London Regional and National. He has also made a number of gramophone records.

He was elected Judge (at the age of twenty-one) of the first National Banjo Contest, at Blackpool, under the auspices of the British Federation of Banjoists.

More about The "CENTURY

USING THE "SUPE

SOME HINTS B

THE third position of the oscillator switch, as I pointed out last week, is for short waves, from about 19 metres. Thus the switch has three positions, short, medium and long, and so far we have dealt only with the medium and long wavelengths. This is because the frame aerial used is suitable only for these wavelength ranges.

But we can receive the short waves very easily. It is necessary to remove the frame and to connect a short-wavelength coil to the ends of the flexible wires. A suitable short-wave tuning coil would have from 6 to 10 turns of wire, and a number of makes are available. The two ends are connected in place of the outer ends of the frame aerial and the flexible wire from the set which normally goes to the centre tap of the frame, is taken to the centre of the tuning coil.

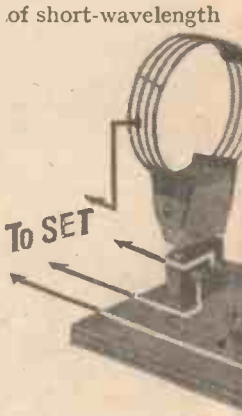
It is advisable not to have too long leads in short-wavelength work, so they should be reduced in length as much as possible.

A coil holder may be fitted to the side of the cabinet just where the leads pass through the hole in the side or for a quick test the short-wavelength coil may be attached to the side of the cabinet. A length of wire or a proper outdoor aerial may be used. It should be connected through a very small capacity to one end of the coil or to a tapping. A balancing condenser may be used in the aerial circuit for the series condenser, as shown in Fig. 1. (page 790). Try connecting the aerial first to one end of the coil and then to the other. Personally, I find but little difference in the results. It is sometimes better to connect the aerial to a tap on the coil instead of to the end.

This, too, you can find by experiment as the size of the aerial affects this. The aerial can be fastened to a clip which can be used to connect with any point of the bare wire coils.

Some short-wavelength coil units have a separate aerial winding, as shown by Fig. 2. An aerial condenser may not be necessary when the aerial winding can be changed in its position relative to the grid circuit coil, but one should be tried.

I have used all sorts of short-wavelength coils and there is nothing much to choose between the various types. The point is that the coil must be connected correctly and then stations will be heard.



Here the short-wave mounted with the s separat

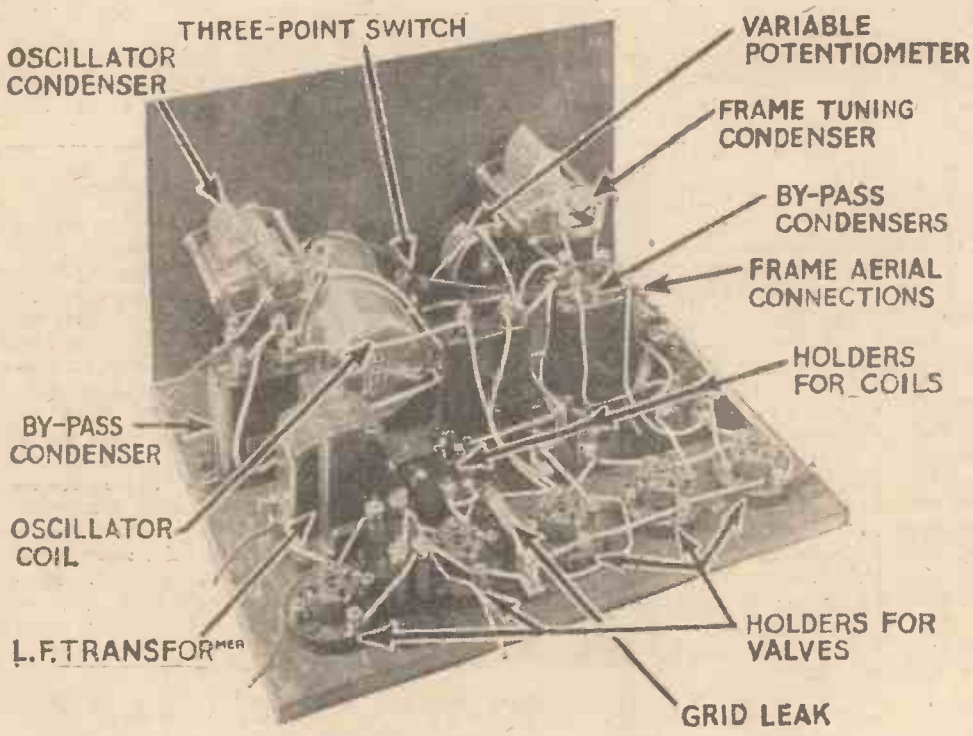
You might feel that as .0005-microfarad tuning condensers are used in the set that the tuning over the short wavelengths will be very difficult. Actually this is not so.

Tuning is sharp, of course, and you must tune very slowly.

If you want to make your own short-wavelength tuning coil, try eight turns of wire spaced on a 3-in. former. Take the ends to the frame aerial terminals inside the set marked 1 and 2, and take the centre tap to the centre tap (3) terminal on the connection strip.

Join an aerial to the second turn from the centre tap through a fixed condenser of .0001 microfarad or less and earth the negative side of the filament battery.

If now you turn the oscillator coil switch to the short-wave position and tune in the usual way, stations will be heard.



This photograph shows the positions of the various components of the "Century Super" which can be identified in the accompanying list

... SUPER"

...ER" ON THE SHORT WAVES

...Y THE DESIGNER—W. JAMES

THE IDEAL SET FOR SUMMER TIME

Tuning must be very carefully carried out First find the position of the oscillator tuning condenser which puts this circuit in tune with the aerial. Then very slowly proceed increasing the wavelength, keeping the two circuits in tune. When a station is heard you can experiment with the aerial circuit, altering the position of the aerial tapping and so on until the strongest signals are obtained.

The set is surprisingly stable I find, and a good number of stations from distant parts can be received. Even when a mains unit is used there is no trouble. Those who are interested in the short wavelengths should fit the short-wavelength coil to the side of the cabinet so that the leads are short. Then the frame aerial can be connected in place of the coil.

The voltages applied to the receiver do not have to be altered in any way when changing wavelengths and as reaction is not used the adjustment of the set is really quite easy. You tune just as on the broadcast wavelengths excepting that the dials must be turned even more slowly.

It seems that practically any short-wavelength coil will do, something being heard, but, of course, it pays to give a little attention to the coil and the method of joining it to the set. Owing to the great magnification of the set strong signals are received fairly regularly and consistently.

...coil—an Atlas—is ...all condenser on a ...e base

Naturally, the results are not so uniform as on the medium and long wavelengths.

This set with its three wavelength ranges has now proved to be just the receiver for a large number of readers. It is surprising what an amount of interest has been taken in it. From all parts I am having reports of the fine results obtained. There have proved to be no difficulties in building the set. Some were at first puzzled by the fact that their oscillator coil had connecting leads fitted while others had tags. These coils are alike excepting for this feature and thus there is nothing to choose between them. The makers are now issuing engraved labels which fit on the switches and so show clearly their positions. Coil- and valve-holder units are now available, comprising a piece of ebonite having numerous valve holders, and with the essential wiring completed. Strip connections are used and the work of finishing off the set is simplified.

I have been asked why an output transformer or choke-condenser filter was not used. The output valve recommended for the battery set is an ordinary power valve not passing much anode current.

Thus there is no need for an output filter as the relatively small current cannot damage the most sensitive loud-speaker. If you are using a moving-coil instrument, a transformer or filter will have to be used and should be fitted on the loud-speaker baffle. With a mains unit, too, a filter might

(*Continued at foot of next page*)

COMPONENTS REQUIRED FOR THE "CENTURY SUPER"

Special cabinet and baseboard, and wooden panel (Camco, Peto-Scott, H. & B.).

Two .0005-mfd. variable condensers with slow-motion movement (J.B. "Tiny No. 2," Peto-Scott, Lissen, Ormond, Readi-Rad, Cyldon).

50,000-ohm wire-wound potentiometer (Colvern, Sovereign, Regentstat, Rotor).

Three-point shorting switch (Readi-Rad, Wearite, Bulgin, H.B., Benjamin, Lissen, Junit).

Set of super-heterodyne coils (Wearite, Lewcos).

Six valve holders (Telsen, Wearite, Lissen, Lotus, Benjamin, W.B., Clix).

Triple coil base (Peto-Scott, Wearite).

Five 1-mfd. fixed condensers (Dubilier, Lissen, T.C.C.).

Two .001-mfd. fixed condensers (T.C.C., Lissen, Telsen, Dubilier, Formo).

.0002-mfd. fixed condenser (Formo, Lissen, T.C.C., Dubilier, Readi-Rad, Graham Farish).

Grid-leak holder (Readi-Rad, Wearite, Lissen, Bulgin, Dubilier, Formo).

1-meg. grid-leak (Lissen, Dubilier, Telsen, Graham Farish).

Low-frequency transformer (Telsen "Ace," Lissen, Varley, Ferranti, Burton, Lewcos, R.I., Voltron).

Terminal strip with three small terminals for baseboard mounting (Peto-Scott).

15,000 and 20,000-ohm spaghetti resistances (Lewcos, Bulgin, Readi-Rad, Turner, Graham Farish).

Fuse-holder and fuse (Bulgin, Readi-Rad).

Five yards of thin flex (Lewcos).

Eight wander plugs marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, H.T.+4, G.B.+, G.B.—1 G.B.—2 (Belling-Lee, Clix, Eelex).

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

Connecting wire and sleeving (Jifilinx, Readi-Rad.)

Frame aerial (Peto-Scott, Lewcos, Wearite).

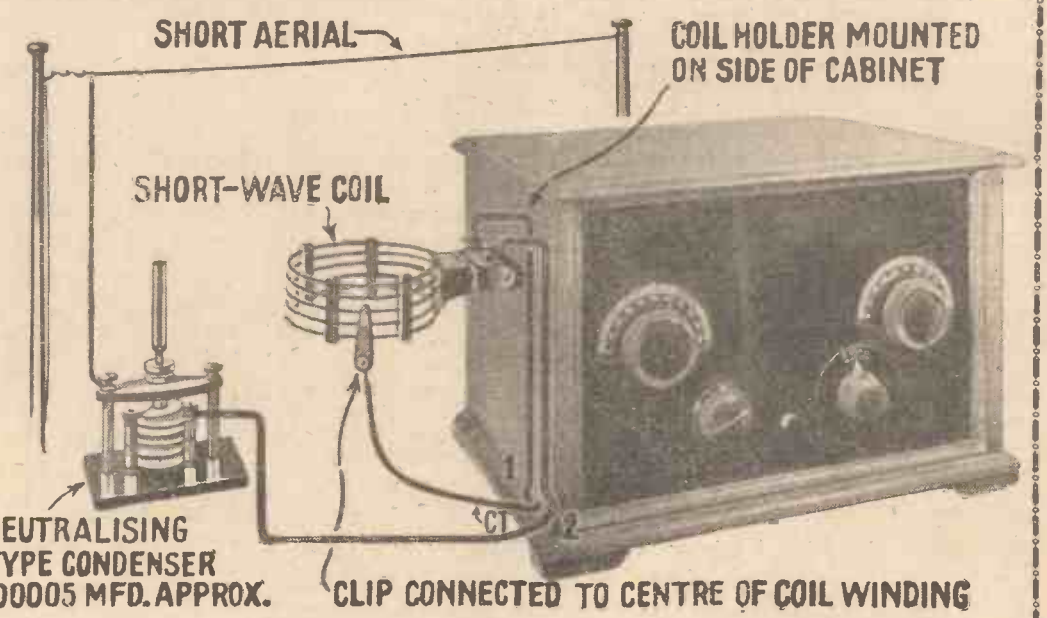
ACCESSORIES

One cone speaker (B.T.H., Amplion, Mullard, Ormond, Blue-Spot).

One double capacity 120-volt H.T. battery (Ever-Ready, Pertrix, Drydex, Lissen, Fuller).

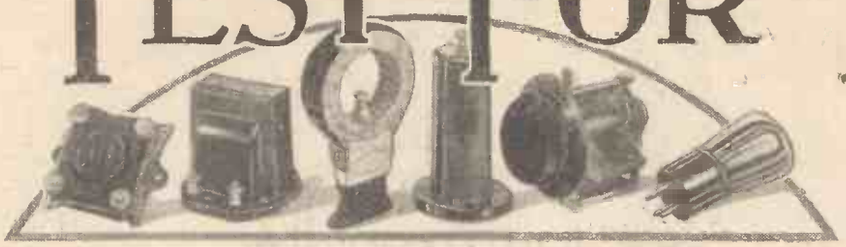
One grid-bias battery, 9 volts (Ever-Ready, Pertrix, Drydex, Lissen, Fuller).

One 2-volt accumulator (C.A.V., Exide, Pertrix).



The actual arrangement for short-wave working is shown in this picture. Note the slight modification that is required

WE TEST FOR YOU



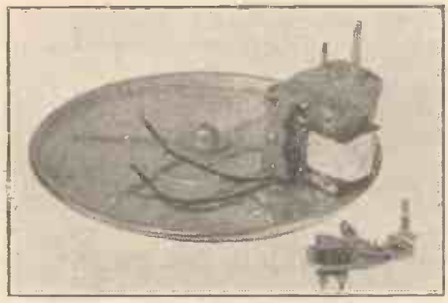
A weekly review of new components and tests of apparatus.

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

New Paillard Gramophone Motor

THE standard Paillard gramophone motor has earned a well-merited reputation. The new Junior unit is thus of some interest. It is again constructed on the induction motor principle, and although it is quite different both in appearance and make-up from the standard model, it nevertheless incorporates the same sound design.

One of the main differences is that the motor is no longer provided with a large



The Paillard Junior electric gramophone motor assembly

mounting plate. The unit comprises merely a compact chassis which is bolted to the top board in the same way as a clockwork motor. The driving portion is more or less conventional in pattern. There is a field system built up of stampings and energised by a coil, while in the gap rotates an ordinary armature. The winding on the armature, however, is completely closed in itself, there being no connections necessary. This, of course, is the familiar induction-motor principle and it has the great advantage that there is no sparking or consequent interference.

We tested the instrument for steadiness and found that it ran not only silently but very steadily. The ordinary recording even on a heavy passage did not produce any noticeable slowing up, and there was complete absence of hunting. All told, the instrument is a thoroughly workmanlike product, particularly in view of the low price. An automatic brake can be obtained for an extra 2s. 6d.

Spa Aerial Suspender

A FORM of aerial insulator which appears to have interesting possibilities is the Spa Aerial Suspender which has been submitted to us by Messrs. F. E. Harmer & Co., of Bolton, Lancashire. This is on similar lines to the old Post Office strop insulator. It consists of a rod or strop rubber some ½-in. in diameter having eye-holes formed at the ends. Into these holes are inserted egg insulators of the usual pattern. The aerial wire is made off at one end, while the tail is made off at the other. The distance between the centres of the eyes is 10½-in., so that there is a long leakage path, and even in bad weather the insulation should be good.

The original Post Office strop insulators were provided with a steel wire core and had vulcanised rubber around them. This particular model has no core, but is simply high-quality rubber, and stretches considerably when placed in tension. We thought it advisable, therefore, to make some test as to the suitability of the insulator in actual practice.

The tension on an aerial wire of 80 feet span, having one foot sag in middle, is a little over twelve pounds, we therefore suspended twelve pounds weight from the insulator in question. This elongated it from 10½ to 13½ inches, but it showed no indication of undue strain. The weights were made to jerk up and down in order to simulate bad weather conditions in which sudden shocks would be placed on the wire causing considerable increase in the tension. The insulator in every case returned quite satisfactorily to its original length, indicating that in no case had it been strained beyond its elastic limit. We were satisfied, therefore, that this insulator will stand up to the conditions encountered in actual practice, and we can recommend it to our readers.

Isoluna Dials

THE Isoluna vernier dial is one of a range of knobs and dials of continental design marketed in this country by Messrs. G. Robinson & Sons, Ltd., River Plate House, South Place, London.

The dial consists of a moulded bakelite escutcheon plate, a white ivorine scale with a slow motion mechanism and a lamp situated behind the dial brought into operation with an on-off switch at the

One of the range of Isoluna vernier dials

top. The full instructions for mounting the dial are included. The operation entails the cutting of a somewhat large hole in the panel, but this is facilitated by the template provided.

The action of the dial is very smooth, the reduction ratio being approximately 11-1. The scale, which is viewed through a window in the escutcheon plate, is moved in the same direction as the knob, which is always a desirable feature. An ordinary flash-lamp bulb is inserted in the holder for illumination purposes.

The whole outfit, which sells at 5s. 6d., is very neat and well made, and should interest set builders. The overall dimensions are 5¼ in. high by 4½ in. wide.

"MORE ABOUT THE CENTURY SUPER" (*Continued from preceding page*)

well be used and it can be arranged in the loud-speaker cabinet, as this is the most convenient place for it. Do not overlook the fact that a 9-volt grid battery may be too small when a mains unit is employed or when a fair-sized output valve is fitted.

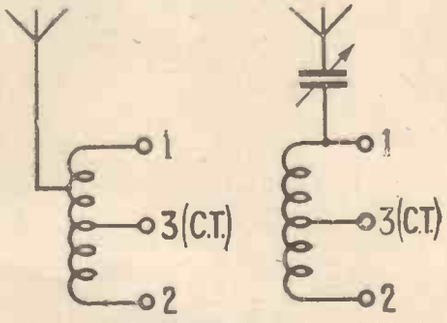


Fig. 1. Balancing condenser in aerial lead

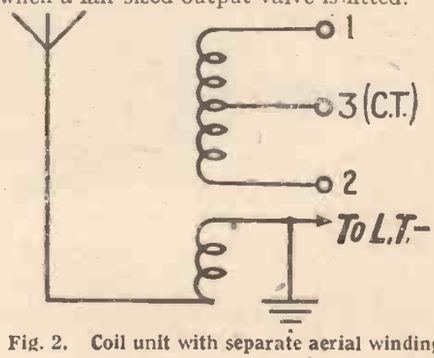


Fig. 2. Coil unit with separate aerial winding

GET YOUR 'CENTURY SUPER' FROM READY RADIO

READY RADIO FRAME AERIAL

Dual range, centre tapped. Wound to "Amateur Wireless" specification.

Price complete,

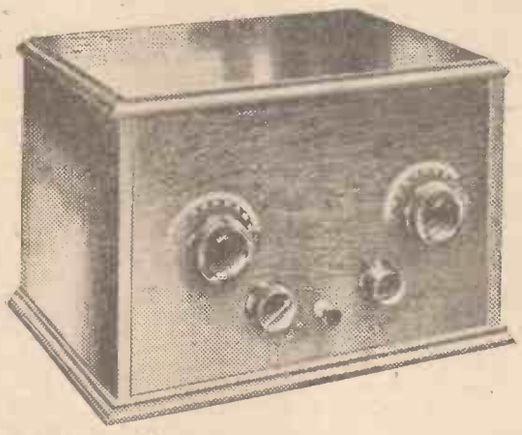
£1 : 0 : 0

TO INLAND CUSTOMERS

Your goods are dispatched Post Free or Carriage Paid.

TO OVERSEAS CUSTOMERS

All your goods are very carefully packed for export, and insured, all charges forward.



KIT A

(Less Valves and Cabinet, but including Wound Frame Aerial.) **£6 : 18 : 6**

or 12 equal monthly instalments of **12/8**

KIT B

(Including Valves, Wound Frame Aerial, but less Cabinet.) **£10 : 14 : 6**

or 12 equal monthly instalments of **19/8**

KIT C

(Including Valves, Cabinet and Wound Frame Aerial.) **£11 : 9 : 6**

or 12 equal monthly instalments of **21/-**

THE CENTURY SUPER

Completely assembled with valves, cabinet and wound frame aerial, ready for use and aerial tested. Price **£14:10:0**

or 12 monthly payments of 26/6.

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

Come and hear it!

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 Heterodyne 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**		

RECOMMENDED ACCESSORIES

	£	s.	d.
2 Fuller 60-volt "Super" capacity H.T. batteries	*1*	*7*	*0*
1 Fuller 9-volt 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 loudspeaker or 1 Amplion cone loudspeaker A.C. 21	*3*	*0*	*0*
	1	*19*	*6*

Components can be supplied separately

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IN MY WIRELESS DEN

WEEKLY TIPS—CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Use a Fuse

FUSES are not used in wireless circuits as much as they should be for safety. You never know when a part is going to fail, and it might destroy all the valves in the set.

A valve might break down, for instance, and be the cause of the other valves getting current from the high-tension supply through their filaments. This would be avoided if a fuse were fitted in the high-tension negative wire.

When a mains unit is used a fuse ought to be fitted, as an overload may easily damage the rectifier in the unit or one of the other parts.

Fortunately, from this point of view, many of the smaller mains units have poor regulation. Their output voltage falls rapidly as the current increases. This limits the current in the event of a short circuit, but does not save the valves if their filaments are in circuit. Stopping resistances are a help in many circuits. They restrict the current which can flow if there is a short circuit in the apparatus in the set to which they are connected.

Proper fuses are no trouble and they do save the cost of a new set of valves if a mistake should be made, or if one of the parts should fail and tend to apply the high tension to the filaments.

Close Electrodes

The electrodes of modern valves of the steep-slope type are very closely placed. Clearances are small and, in fact, the modern valve is a very well and accurately made component.

A difficulty is that the least misplacement of the electrodes alters the characteristics, making the valve different from the standard. From the valve manufacturers' point of view, therefore, it is probably much more difficult to produce the modern types and to maintain a good standard than the older patterns.

Costly and elaborate machinery is, of course, used, but the task of the manufacturers is difficult. All things considered, we have easily the best valves in the world—there is no doubt about it.

These New Valves

A point to note in connection with the new metallized valves is that they must be cautiously used in existing circuits. If there is a valve screen, for instance, and it touches the metal coating of the bulb, it is possible that a bias resistance may be short-circuited.

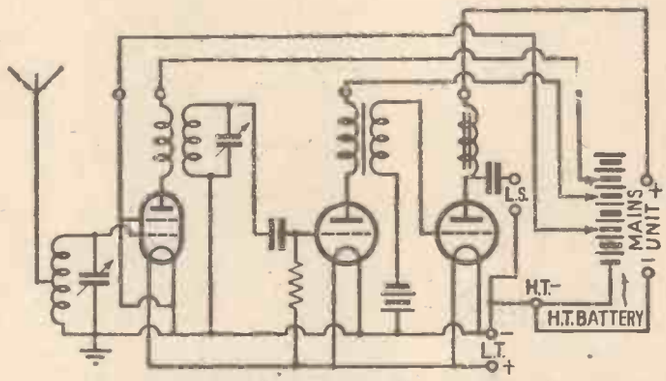
With battery valves care must also be taken, as the coating is connected to one of the filament contacts. The maker's notes should, therefore, be consulted.

For One Stage Only

Now and again I receive a letter from a reader asking how a separate battery or a mains unit can be fitted to the power stage of a set.

They realise that the amplifying and detector valves may easily be run from a dry battery, but that when a fair-sized power valve is used the total load is rather too great for a small battery.

Some wish to use a separate battery for the last stage, therefore, and others a mains unit. The accompanying diagram shows how the connections are made. There is nothing much in the circuit. The negative wires are connected together and the positive points are taken to the circuit of the set in the usual way.



As explained in the accompanying paragraph, it is possible to have a mains unit working in conjunction with a high-tension battery

Thus the power stage is quite free from the others and the chances of motor-boating occurring are remote indeed. A mains unit need not have much smoothing when it is to supply the last stage only, and those who are normally troubled with a hum or noise when they run the whole set from the mains unit may well consider using a dry battery for the first part of the circuit.

The current not being great, a dry battery will last a reasonable length of time. It seems, perhaps, a poor way of dodging a difficulty, but it has its advantages and may enable you to continue with a mains unit that would otherwise not be very useful.

Slow-motion Dials

Slow-motion dials are again in great demand now that really selective sets are available. A good slow motion is essential if fine tuning is to be carried out.

When you want to be able to tune to a part of a degree, an accurate dial is essential. Clearly, backlash of any amount is to be avoided.

Some dials are not very good for the purposes of say, a super-heterodyne, although they may be satisfactory in other less sharp tuning sets. Pay attention, therefore, to the slow-motion dials if good trouble-free results are desired.

Old Super-hets

I wonder how many readers used a super-heterodyne receiver six or seven years ago. A few manufacturers produced them, but the sales were not very large.

For one thing the sets were fairly costly to run and there were not so many powerful stations about then as now. Screen-grid valves were not used and the circuits were usually not balanced or neutralised. There was usually a potentiometer somewhere in the circuit for stabilising the intermediate stages, which was accomplished by applying positive bias to the grids of the valves.

Tuning used to be tricky, as you may well imagine. The various circuits had to be separately adjusted before the set would work at all. Now all that is changed.

We have screen-grid valves and are able to get stable high-frequency magnification. The circuits, too, are better understood, with the result that a modern super-heterodyne of good design is very easily handled.

There are no tricks. The tuning is easy, tone quality good, and stable working is obtained. The screen-grid valve is responsible to an extent, for the stable working. Without it little could be effected. At the same time the special beat-frequency coils used nowadays are far superior to any coils that we had when super-heterodyne sets were first popular.

Speaker Cones.—It should be noted that the special composition cones described on page 678 of AMATEUR WIRELESS, No. 463, are not the product of the British Electrical Development Association, Ltd., as stated.

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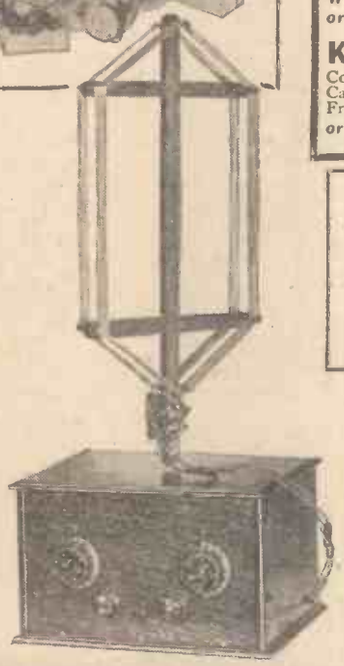

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(*See page 799 this issue*)

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FERRANTI METAL CONSOLE

Makers: FERRANTI, LTD *Price £29 : 8 : 0*

HERE is one of the best-designed three-valvers of the present season—the Ferranti Metal Console. Thus the makers describe a radio outfit consisting of a set and loud-speaker in a single cabinet. Instead of the usual oak, walnut, or mahogany, the cabinet is made of metal, tastefully covered with blue, brown or grey rexine.

This console is actually the standard three-valve Ferranti A.C. chassis with the Ferranti permanent-magnet moving coil loud-speaker. Its small dimensions will appeal to flat dwellers and its unusual finish should certainly fit in with modern furnishing ideas.

Novel Features

Before relating my experiences with the set, let me give some of the technical data. This three-valver has three stages; there is a screened-grid high-frequency-amplifying valve, transformer coupled to an extra high-amplification grid-leak detector. This is transformer coupled to the output valve. A good point of design, often overlooked by less particular makers, is the arrangement of the detector and transformer combination in such a way that the output valve overloads before the detector. It is claimed that this detector gives distortion-less rectification up to at least 70 per cent. modulation. This is in accordance with modern practice and tends to offset the distortion produced by deeply-modulated signals, such as those from Brookmans Park and Moorside Edge.

The output valve is a P625 and this provides 900 A.C. milliwatts undistorted power for the moving-coil loud-speaker. This corresponds to quite considerable undistorted volume.

The makers do well to point out that the demands of selectivity and sensitivity are necessarily conflicting in a three-valver, where the number of tuning stages is limited to two. While I should hesitate to agree with them that no commercial selective receiver can produce the higher musical notes effectively, there is no doubt that many three-valvers are made selective only at the expense of quality, due to the cutting off of the higher audible frequencies.

Now for some practical points about this excellent set. It is designed for A.C.-mains operation only. The voltage may be between 200 and 250 and the periodicity between 40 and 100 cycles. At a small extra cost the set is adaptable to 100-volt supplies. The running cost is very low, being less than 30 watts.

Controls are arranged below the loud-speaker grille as shown by the illustration. At first sight, readers may think that the number of controls is rather considerable for a three-valver. But I cannot stress too much the fact that the smaller the number of valves in a set the greater is the need for controls.

Adequate Controls

We must have a tuning control and, even though the aerial tuning circuit and the high-frequency-amplifying tuning circuit may be ganged, we cannot afford to throw away efficiency by omitting a trimming device for the tuner. In a three-valver we must also have a reaction control and in every set we ought to have a volume control.

All these are present in the Ferranti Metal Console, together with an ingenious wave-change switch and a mains on-off

A rear view of the Ferranti Console

switch. When the set is switched on the calibrated dial is brightly illuminated. When the wave switch is set to medium waves, the long-wave calibrations are covered up and when the long waves are being received the same thing happens to the medium-wave calibrations. The calibrations are unusually accurate, going from 200 to 550 metres in steps of 50 metres on the medium waves, and from 1,000 to 2,000 metres in steps of 200 metres on the long waves. The tuner is one of the best I have yet examined.

The dial is worked by the large right-hand knob and a corresponding knob on the left acts as a tuning compensator. The knob on the extreme left is for the volume control. This is actually a variable condenser in series with the aerial lead and works effectively in cutting down the strength of all but the local stations to the point of inaudibility, without appreciably affecting the quality of reproduction. On the extreme right is the reaction control knob.

The reaction in this set differs from the normal in that reverse reaction can be applied if desired. Reaction is obtained by a rotating coil and is at zero when the control pointer is at vertical. Clockwise rotation increases reaction and anti-clockwise rotation applies reverse reaction. The effect of reverse reaction is to flatten the tuning and so prevent deterioration of quality by avoiding side band cut-off. This effect is most likely to be wanted when the set is tuned to a powerful station such as the local.

Good Selectivity

The selectivity of this set depends a good deal upon the setting of the volume control. I can say that selectivity is well up to standard. This is something of an achievement in a set designed for quality. I was able to receive Midland Regional on 398 metres quite clear of London on 356 metres. Hilversum on 298 metres was also heard clear of the London station. On the long waves Eiffel Tower and Radio Paris were clear of Daventry 5XX.

Using my standard 60-foot aerial I obtained a very satisfactory log of stations. Searching was made easy by the accurate wavelength calibrations on the tuning dial.

Undoubtedly, the best feature of the set is the quality of reproduction. Speech was reproduced more naturally than I have heard for a very long time. Such natural bass and full-bodied top notes are not often heard. Altogether a fine set for listeners desiring quality above all things and adequate selectivity and sensitivity to reproduce a good selection of home and foreign stations on an aerial of average efficiency.

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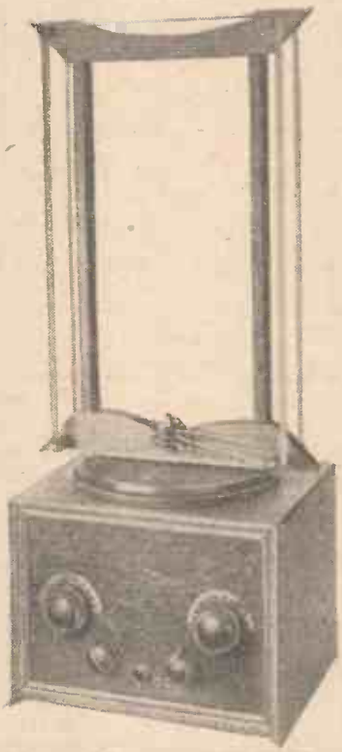

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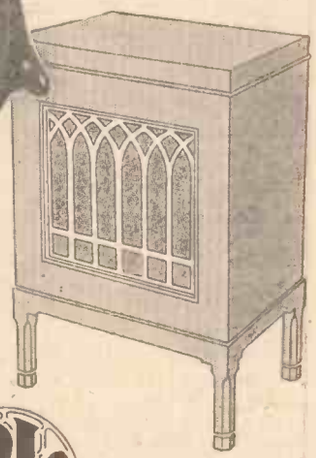

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DO S.G. VALVES NEED BIAS?

By J. H. REYNER, B.Sc., A.M.I.E.E.

THERE seems to be a certain amount of confusion among users of screen-grid valves as to whether bias should be placed on the valves or not. Some authorities claim that the performance is improved by the addition of a small amount of grid bias, while others suggest just the opposite, saying that the valve works better with the tuning circuit connected direct to the negative L.T. lead.

A great deal depends upon the conditions under which the valve is to be used, but before we proceed further it is as well to consider what justification there is for the suggestion that grid bias is necessary at all on a high-frequency valve. It is a well-known maxim that some distortion of the carrier wave is permissible without causing any low-frequency distortion. The limit to this permissible distortion occurs when cross-modulation becomes serious. If the H.F. valve is allowed to rectify on a powerful signal, this signal modulates all other signals in the vicinity, even though the receiver may be tuned to some quite different station. The result is a wipe-out action, which renders selectivity hopeless.

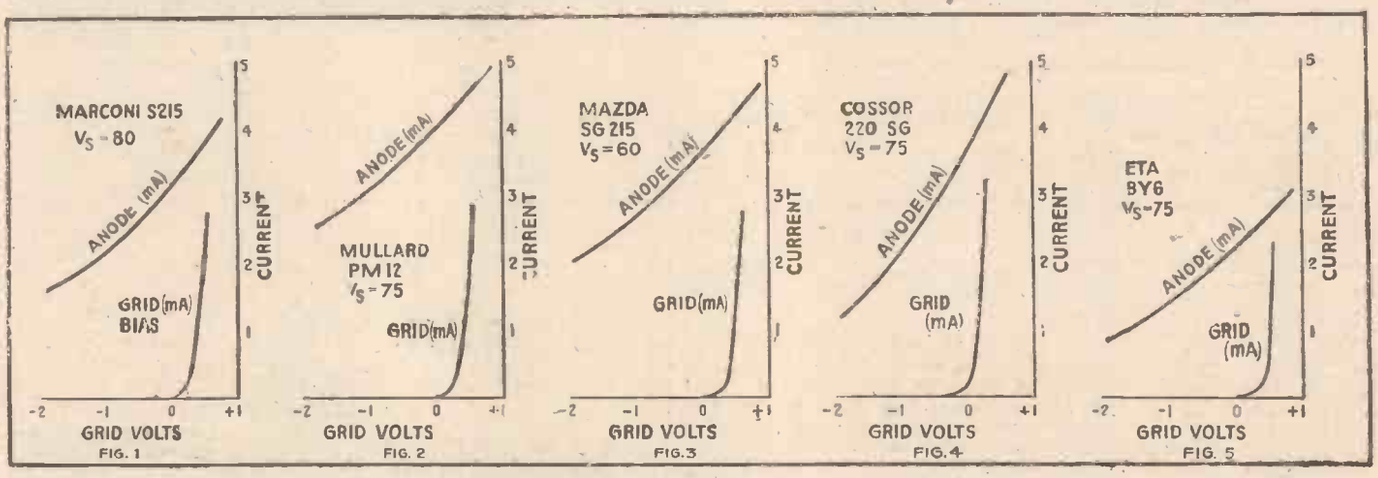
If we want to avoid rectification, therefore, we must work on a portion of the characteristic which is reasonably straight. In the majority of cases this occurs around the zero grid-bias mark and, therefore, the tuning circuits are usually connected to L.T. —. The signals alternately make the grid positive and negative, and we should get a faithful amplification of both halves of the wave if it were not for the following facts.

As soon as the grid is made positive, a small amount of grid current flows. For example, take the case of the Marconi valve in the curve accompanying this article. If the grid voltage is 0.2 volt positive, a current of 0.3 microamp flows. This is equivalent to a resistance across a grid and filament of about 650,000 ohms, and the effect of such a shunt will be to increase the resistance of the tuning circuit by something like 50 per cent., assuming an average coil and condenser. Now a signal which produces an average value of 0.2 volt on the positive and negative side respectively is quite a small signal as matters stand to-day. The signal received at my laboratories from the Brookmans Park transmitter is several volts in strength. Moreover reference to the curves will show that grid current, once started, increases very rapidly. Reverting to the same example as before, if the voltage is increased to 0.4 the grid current increases to 1.5 microamps, which is a shunt of 250,000 ohms only, and thus conditions get progressively worse.

In order to determine where grid current began to flow, and whether valves of different makes were reasonably the same, a series of grid-current characteristics was taken under conditions approximating to those in an actual set. The voltage on the anode was 120, that on the screen grid being 80. The grid current was then measured with a sensitive microammeter at various values of grid voltage. These values have been plotted in the curves accompanying this article, and they reveal one or two rather interesting factos. Incidentally the same current scale has been used to represent microamps for the grid current and milliamps for the anode current.

The five valves tested are all reasonably similar, the point at which the grid current lifts varying from a small positive voltage in the case of the Mazda and Eta valves to a small negative voltage in the case of the Cossor valve. In the case of the Mazda and Eta valves one could reasonably use this without any grid bias, provided the input was small. With the Mullard and Marconi valves, grid current begins to lift at zero grid volts, therefore it would appear desirable to apply a small grid-bias voltage. With the Cossor valve grid current begins to lift even when the grid is negative, so that the use of a grid-bias battery appears to be essential.

The question arises as to how much grid bias should be applied and how best it may be obtained. In general, the use of a 1½-volt cell is too much. It brings one on to the curved portion of the characteristic and, this being so, the effective slope of the valve curve is reduced. This means that the amplification obtained decreases, so that the valve is not so efficient, and this immediately gives an indication as to whether the valve is working correctly or not. If the application of grid bias causes a noticeable decrease in the signal strength, then we are running on to the curved portion of the characteristic and rectification with consequent cross-modulation, will occur. If, however, grid bias of the right order is applied, the signal strength will not be decreased, but will probably be increased.



Figs. 1 to 5. Characteristic curves of some typical screen-grid valves

In order to overcome the difficulty of applying the correct grid bias, Messrs. Siemens Bros. have produced a special dry cell giving only 0.9 volt instead of 1.5, as in the case of the ordinary battery. This is a convenient value and is applicable to most valves, as can be seen by reference to the curve. In order to make the curves more useful the anode current characteristics under the same conditions (V_a = 120 and V_{sg} = 18) have been plotted. It will be seen that at 0.9 volts the characteristic is still straight for a reasonable portion on either side, so that rectification is not likely to occur and grid current is avoided.

A simple and convenient method is illustrated in Fig. 6, where an ordinary 400-ohm potentiometer is shunted across the filament circuit and used in conjunction with a 1½-volt dry battery to get any grid bias between + ½ volt and — 1½ volts. It is quite an easy matter to make up such an arrangement and to find the best operating point by actual trial. In most cases it will occur with the slider of the potentiometer about mid-way between the two extremes, corresponding to a bias of about — 0.5 volts.

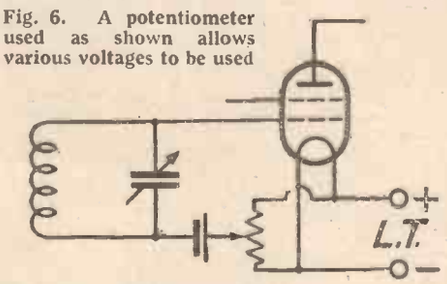


Fig. 6. A potentiometer used as shown allows various voltages to be used

Mains Hum

SIR,—I was interested in the letter under the above heading of your correspondent *C. M. S.*, of Fareham, in your issue of May 2

The periodic variation in the amount of mains hum is peculiarly irritating when carrying out comparative experiments over a number of hours. The last paragraph of your correspondent's letter holds the solution, however, and I hasten to assure him that perfect results are obtainable by the use of L.T. and H.T. accumulators with A.C. valves. To obtain the maximum economy in first cost and maintenance, however, the batteries should be trickle charged from the A.C. mains. I have had such a scheme working for some considerable time, with consistently good results. I find that using a battery of Exide type W.H. accumulators of 5,000 milli-ampere-hours capacity in conjunction with a trickle charger capable of passing a charging current of 30 milliamperes, a discharge of 360 milli-ampere-hours can be replaced comfortably during one day. No fear need be entertained that the load due to A.C. valves will be too great for accumulators of medium capacity.

The low tension supply may be dealt with in the same way, and without the need for a battery gigantic in proportions.

In conclusion, sir, let me assure you, *C. M. S.* and all other readers, that in this way one may approach the wonder set whose "background" is no more noticeable with the switch "on" than with the switch "off." S. B. (Manchester).

The "Challenge Three"

SIR,—I have made up the "Challenge Three Kit Set," and it certainly brings in the stations but many stations seem to come in at the same time! In other words, I seem to get no selectivity.

M. S. (Pinner).

In your locality you should not attempt to use a large outdoor aerial. An aerial of the single-wire vertical type, not exceeding 30 ft. overall length of wire, is the maximum we would advise. Possibly an indoor aerial, consisting of about 15 to 20 ft. of wire, would be quite suitable for good reception and good selectivity. You could also try an indoor counterpoise in place of a direct earth connection. This may consist of about 20 ft. of multi-stranded insulated copper wire stretched across the floor of the room in which the receiver is used. One end should be connected to the earth terminal of the receiver and the other end thoroughly insulated from earthed objects. Your ordinary earth should be disconnected from the set. Your observation of these points should enable you to improve your selectivity.—ED.

A New Idea in Detection

SIR,—I have considered building the "Challenge Four" receiver, but before doing so I thought of using power-grid detection in place of that illustrated. One reads so much of this new form of detection that I wonder it was not incorporated by the designer.—N. B. (Hanwell).

Before deciding upon power-grid detection, it is necessary to consider both the input and output energies which will be available in the receiver. The input signal must be of sufficient amplitude to operate the power-grid detector valve satisfactorily and the output signal from the anode of this valve must not be so powerful that it will overload the grid of the power valve. In the case of a receiver which is designed for local-station and distant-station reception, the amplitudes of signal energy dealt with vary so much that it is not wise to attempt power-grid detection. On one transmission you might not be getting sufficient energy to operate the detector properly, and this would give rise to detector distortion, whilst on a powerful or nearby transmission you might be getting so much signal energy you would overload the power valve grid and get L.F. distortion. Power-grid detection is to be recommended in sets where a definite amplitude of signal energy is being received and where large outputs, for operating moving-coil speakers in large halls, are to b dealt with.—ED.

An Old-type "Searcher"

SIR,—I have made up the "1930 Ethe Searcher" and am very satisfied wit the results on the medium broadcast band No matter how I try, however, I do no seem to be able to get satisfactory result on the long waves. I can just hear Daven try 5XX and at different settings I ca still bring in the two medium-wave Londo stations.—F. B. (Woodford).

The trouble you are experiencing points t your using an unsuitable switch for wave changing. If you have used another make fron that specified it would seem that one of th leaves in your switch is in direct contact wit the metal bush. Such a switch prevents chang ing over one of the coils from medium wave to long waves. If you will look into this matte you will no doubt discover the switch to be th cause of your trouble Both switch leave must be insulated from the metal bush, but th metal bush itself must be in good electrica contact with the metal panel.—ED.

A Mains Set Matter

SIR,—I have been running my receive from the D.C. mains for the past yea or more and have never experience trouble of any description. Just recently decided to put up a new aerial. Whils lowering the aerial I felt a slight electri shock, but did not take much notice of it A little later I learnt that the aerial coil i my receiver was burnt, and that the hous fuses had blown.—L. M. S. (London, E.).

If the positive line of your D.C. mains i earthed and you have no condenser in serie between your aerial lead-in wire and the aeria terminal or tuner of your set, when the aeria came in contact with the ground you put a dea short circuit across the mains through the aeria coil. This caused the coil to burn out and als caused the house fuses to blow. When usin D.C. mains for H.T. supply it is necessary t interpose between the aerial and the receive a fixed condenser which has a test voltage of a

ast double the voltage of the mains supply. A fixed condenser having a similar test voltage hould also be connected between the earth erminal of the receiver and the actual earth ire. These condensers prevent short-circuiting of the mains no matter which main is arthed.—ED.

The "Century Super"

SIR,—Ever since the end of 1928 I have been using a similar set as described by you with equally good results.

You can easily adapt this set for using a double grid valve as oscillator and detector which is useful when you want to turn it into a portable set, you then save one valve. The G.E.C. manufactures a very good double-grid valve for this purpose, which is marketed on the continent but not in England. It has the initials BG4.

I have used for the past nine months a band pass in the intermediate stages and obtain easily 9 k.c. selectivity.

I congratulate you that yours is the first journal in England to break away from the old sets. L. C. (Brussels).

An Oscillating "Four"

SIR,—I have made up the "Challenge Four" receiver—except that as I have been unable, so far, to get the volume control, I have used a rheostat to control the filament current to the first S.G. valve. My trouble is incessant oscillation as soon as all three circuits are correctly in tune.

W. J. (Birmingham).

Let "Amateur Wireless" solve your problems

The volume control variable resistance not only permits varying the maximum potential that is applied across the grid and filament of the first S.G. valve, but it also gives rise to just sufficient damping in the aerial-grid circuit to prevent this circuit oscillating before the H.F. tuning circuits. If the aerial system oscillates before the other grid circuits, instability is sure to result. We advise you to fit the special volume control.—ED.

Penny-in-the-slot Wireless

SIR,—With reference to the letter appearing in your issue of May 2 from A. J. (Sheffield), you may also be interested to know that I, too, have been using a device for operating my wireless set on the penny-in-the-slot principle. I have, in fact, taken out a provisional patent on the idea, and hope to get it exploited within the next few months.

C. D. W. (London, S.E.).

RADIOGRAMS

SIR HENRY NEWBOLT is to come to the microphone again on May 18 to broadcast the first of a series of talks on "The Progress of English Prose."

A. J. Alan is to make a welcome reappearance on May 19 (National), when he will tell a new story, "Mr. Pappas." Regional listeners will hear the story on May 21.

Joseph Lewis's "Memories" programme, which proved so successful some weeks ago, will have three repeat performances in the near future. On May 17 his programme will be a popular one, including many old favourites, and on May 31 and June 30 he will broadcast "More Memories."

Mr. James Fitton has three pictures hung on the line at this year's Royal Academy. Just what you would expect of the designer of our last Christmas Number cover.

A gramophone recital of East African and Cuban music will be broadcast by Mr. Christopher Stone on May 12 (Regional) when he will include "Good King Wenceslas," sung in Swahili by native mission children, and a prayer sung by the son of the Sultan of Zanzibar.

Sir William Beveridge made a successful début at the microphone last autumn when he contributed his views in the series on "Trade Within the Empire." Listeners will hear him again on May 19, when he is to give the first of a new series of talks on the causes of unemployment.

Sunday orchestral concerts on the London Regional and Midland Regional wavelengths have proved a popular innovation. Many well-known conductors and soloists have appeared in the big Number Ten studio under Waterloo Bridge. On May 17 Jelly d'Aranyi and Adila Fachiri will play "Bach Concerto in D minor" for two violins. The B.B.C. Orchestra will be conducted by Basil Cameron, and the programme will also include works by Elgar, Haydn, and Mozart.

Regional vaudeville on May 23 will include turns by Mabel Marks, Muriel George and Ernest Butcher, Horace Kenney, Jack Mackintosh, Alec McGill and Gwen Vaughan, Arthur Prince and Jim, and Geraldo's Gaucho Tango Orchestra.

On May 19 the vaudeville programme for Regional listeners will include Jean Melville and Billy Thorburn, Norah Howard and Billy Milton, George Nicholson and Jeanne Chevreau, Chaterine Stevens and Geoffrey Wincott, Edward Cooper, Mabel Constanduros and Michael Hogan. Captain Harry Graham, who was responsible for the English book of *White Horse Inn*, will read some new humorous poems.

The Bristol Hippodrome Orchestra will be relayed to Cardiff from the Hippodrome, Bristol, on May 27. The director of music is Mr. Edmund Gaeton.

A Welsh variety programme will be given for Cardiff listeners on May 28, when the artistes will be Doreen Heal, the Glanhowy Concert Party, conducted by D. M. Williams, Ted Hopkins, and the West Regional Trio.

Empire Day this year will be celebrated by the B.B.C on May 23 with a relay from Hyde Park. Community singing will be conducted by Mr. Gibson Young, and listeners will hear massed bands of the Coldstream, Irish, Welsh, and Scots Guards, and massed choirs of London churches.

The first television wedding has just been staged in New York between Miss Grayce Jones and Frank B. Duvall, a television expert. The couple stood in the centre of a dazzling spotlight during the ceremony. Reports say that the wedding scene was a complete success.

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 (G5SW)	15.0
200	1,500	Leeds	0.16
242	1,238	Belfast	1.2
261.3	1,148	London Nat.	68.0
288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
301	995	Aberdeen	1.2
309.9	968	Cardiff	1.2
356.3	842	London Reg.	70.0
376.4	797	Glasgow	1.2
398.9	752	Midland Reg.	38.0
479.2	626	Manchester (temp)	1.2
479.2	626	North Regional testing	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	9.5
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	590	Brussels (No. 1)	20.0
BULGARIA			
318.8	941	Sofia (Rodno Radio)	1.0
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
293	1,022	Kosice	2.5
341.7	878	Brunn (Brno)	22.0
487	617	Prague (Praha)	5.5
487	617	Cesky Brod (testing shortly)	75.0
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
296.1	1,013	Tallinn	0.7
405.8	644	Tartu	0.5
FINLAND			
221	1,355	Helsinki	15.0
291	1,031	Tampere	1.0
291	1,031	Viipuri	15.0
1,796	167	Lahti	54.0
FRANCE			
219.3	1,368	Béziers	0.6
222.9	1,346	Fécamp	1.0
235.1	1,275	Nimes	1.0
238.5	1,258	Bordeaux-Sud-Ouest	2.9
249	1,205	Juan-les-Pins	0.5
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)	11.0
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
559.7	536	Kaiserslautern	1.0
559.7	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	9,599	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
1,250	240	Tunis Kasbah	0
NORWAY			
235.5	1,275	Kristianssand	0
240	1,250	Stavanger	0.
364	824	Bergen	1
368.1	815	Frederiksstad	0.
453.2	662	Porsgrund	1
493.4	608	Trondheim	1
587.1	511	Hamar	0
1,071	280	Oslo	75
POLAND			
214.2	1,400	Warsaw (2)	1.
234	1,283	Lodz	2
312.8	959	Cracow	1
335	896	Poznan	1
368.1	815	Wilno	20
381	788	Lvov	21.
408	734	Katowice	16.
1,411.8	212.5	Warsaw —Raszyn	158
PORTUGAL			
283.6	1,058	Lisbon (CTIAA)	0
ROMANIA			
394	761	Bucharest	16
RUSSIA			
427	702.5	Kharkov	4
720	416.6	Moscow (PTT)	20.
800	375	Kiev	20.
824	364	Sverdlovsk	25.
937.5	320	Kharkov (RV20)	25.
1,000	300	Leningrad	100.
1,000	283	Tiflis	15.
1,103	272	Moscow Popoff	40.
1,200	250	Kharkov (RV4)	25.
1,304	230	Moscow (Trades Unions)	165.
1,380	217.5	Bakou	10.
1,481	202.5	Moscow (Kom)	20.
SPAIN			
252	1,193	Barcelona (EAJ15)	1.
268	1,121	Valencia	8
349	860	Barcelona (EAJ1)	8.
366.9	817.7	Seville (EAJ5)	1.
424	707	Madrid (EAJ7)	2.
453	662.2	San Sebastian (EAJ8)	0.
SWEDEN			
230.3	1,304	Malmo	0
257	1,166	Hörby	15.
304	986	Falun	0.
322	932	Göteborg	15.
436	689	Stockholm	75.
542	554	Sundsvall	15.
770	389	Ostersund	0.
1,208	248.3	Boden	0
1,352	221.9	Motala	40.
SWITZERLAND			
244.1	1,229	Basle	0.6
244.1	1,229	Berne	1.
403.5	743	Söttens	25.
459.2	653	Beromuenster (testing)	75
680	443	Lausanne	0
760	395	Geneva	1
TURKEY			
1,216.2	246.6	Istanbul	5.
1,538	195	Ankara	
YUGOSLAVIA			
305.1	983	Zagreb (Agram)	0.
430.6	696	Belgrade	3
574.7	522	Ljubljana	2.

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.

THE WAVELENGTH SCALE

"LONG" and "short" as applied to broadcast wavelengths are necessarily only comparative terms. The "medium" wave band is, at present, considered to extend between 200 and 600 metres. Those between 600 to 2,000 metres are called long waves, though, of course, wavelengths up to and exceedi 10,000 metres are used in long-distan commercial signalling. Short waves, we know them to-day, extend between and 150 metres, whilst those below t 40-metre mark are labelled ultra-sho In long distance beam signalling wav lengths between 15 and 30 metres a employed.

B. A. R.

Postcard Radio Literature

A New Speaker

I LIKE the new Motor speaker units, the types S.4 and S.5. These are fitted to very well-designed chassis and cones and are also available complete in cabinets of pleasing futuristic designs. I advise you to get the folder describing these new Tekade Motor units. **249**

For Mains Users

I am told by Ferranti Ltd., that they have brought out several new mains transformers, matched up with popular types of Westinghouse metal rectifiers. You can get, through my free catalogue service, details of Ferranti transformers to suit any particular job. **250**

A Loud-speaker Novelty

If you are building a new cone speaker then I advise you to see the Weedon "Adaptadisk". This is a novel idea which really does make a firm job of connecting a loud-speaker cone of any angle, to the driving rod of practically any unit. Full details are given by an illustrated leaflet which can be had free. **251**

Talisman Coils

From Wearite comes a most interesting folder showing how Talisman coils operate and how they can be used in many popular sets. As the Talisman coil is of special design I think you should make a point of having this folder; especially if you are troubled with lack of selectivity or with poor tuning. **252**

A D.C. Three

Ferranti Ltd., issue a number of helpful constructional charts and the latest deals with a screen-grid three-valver working on D.C. mains. It is designed so that in the event of the local supply being changed to A.C., the set can easily be modified. These charts can be obtained through my free catalogue service. **253**

A New Tone Control

I like the new Gambrell Vario-Chromatic tone control which you will find handy for your speaker in that with a mere turn of the knob you can accentuate the bass or treble at will. This novel control is built in also to the Gambrell Vario-Chromatic speaker, one of the latest permanent-magnet moving-coil speakers on the market and which is described in the same leaflet as the tone control. OBSERVER. **254**

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.

There are ninety-six broadcasting wavelengths available for Canada and the United States. Of these Canada uses six exclusively and shares eleven others with America. Thus Canada has virtually the use of seventeen wavelengths, while the United States has ninety.

In Norway experiments are being carried out in ultra-short wave transmissions. The tests are made to ascertain the value of the 7-metre wave for telephony and broadcast to act as a link between Oslo and Trondhjem.

The great Scottish Ecclesiastical event of the year, the General Assembly of the Church of Scotland, will provide material for a broadcast on Tuesday, May 19, when a relay will be made of the Devotional Service in St. Giles Cathedral, at noon, followed by the Opening Ceremony from the Hall of Assembly at 1 p.m.

PREPAID ADVERTISEMENTS

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.

MOORSIDE EDGE.—Special device to cut out new station within three degrees. Results guaranteed or money returned. Price 5/6, postage 3d. extra.—Wainwrights, Wireless Engineers, Wakefield Road, Ossett. Telephone 16.

TRICKLE CHARGERS, A.C. mains for 2- and 4-volt accumulators, 0.5 amp., no upkeep, 18/6, carriage paid.—A. Benoit, 4 Manor Gardens, Gunnersbury Avenue, London, W.3.

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.

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.

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.

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.

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Contributions are always welcome, will be promptly considered, and if used will be paid for.

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Forty-five-shilling Two (D, Trans)	AW250
Searcher Short-wave 2 (D, Trans)	AW259
Challenge Two (D, Trans)	AW261
Everybody's All-in 2 (D, Trans)	AW273
Twenty-Shilling Two (D, Trans)	AW274
Brookman's Two (D, Trans)	WM168
Gleaner Two (D, Trans)	WM201
Merlin Two (A.C. Set)	WM213
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The "A.W." Exhibition 3	AW247
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1931 Ether Searcher (A.C. model)	AW276
Mains Unit	AW277
Ultra-Selective Straight Three (SG, D, Trans)	AW282
1931 Ether Searcher (D.C. model)	AW284
Mains Unit	AW285
Fanfare Three (D, 2 Trans)	WM157
Brookman's Three (SG, D, Trans)	WM161
Inceptordyne (SG, D, Pentode)	WM179
Music Marshal (D, 2 Trans)	WM190
Concert Three (D, 2 Trans)	WM199
De-Luxe Three (D, RC, Trans)	WM209
Five-Point Three (SG, D, Trans)	WM212
Falcon Three (A.C. Set)	WM217
New Brookman's Three (SG, D, Trans)	WM218
Five-point Short-waver (D, RC, Trans)	WM223
Baffle-Board Three (D, RC, Trans)	WM226
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Regional Three (SG, D, Trans)	WM236
Gramo-radio A.C. Three (SG, D, Trans)	WM237

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Regional Band-pass Four (SG, D, RC, Trans)	WM211
Five-Point Four (SG, D, RC, Trans)	WM216
Regional A.C. Four (SG, D, RC, Trans)	WM222
Supertone Four (SG, D, Push-pull)	WM227
Brookman's Three-Plus-One (SG, D, RC, Trans)	WM233

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Companion Portable (2HF, D, RC, Trans)	AW279
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Gramophone Tone Control	AW264
Short-wave Super-het Adaptor	AW268
H.T. Unit and Trickle Charger for D.C. Mains	AW272
Booster Speaker	AW286
"A.W." Tone Changer	AW288
"A.W." Selectivity Unit	AW290
"W.M." Standard A.C. Unit	WM214
"W.M." Standard D.C. Unit	WM215
Falcon A.C. Unit	WM219
Hyperdyne Short-wave Adaptor	WM228
Big H.T. Unit for A.C. Mains	WM230

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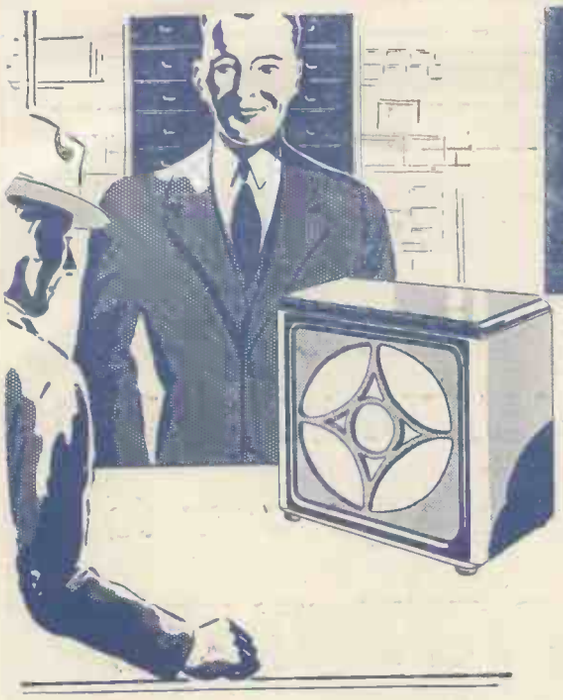

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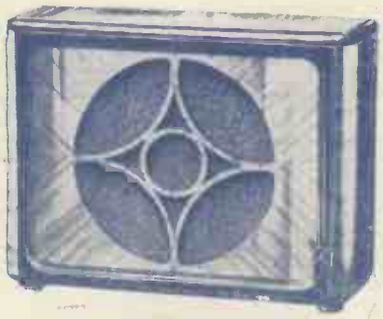

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A B.B.C. SELECTIVE TWO-VALVER

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

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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 :—

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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.

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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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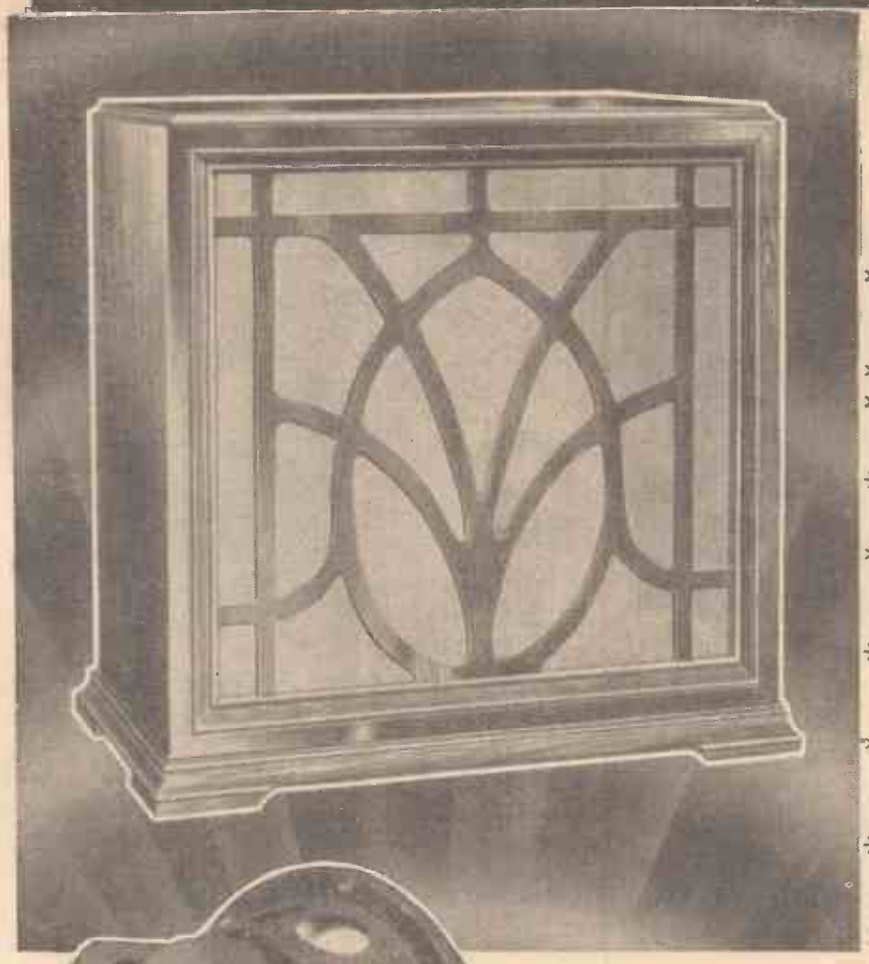

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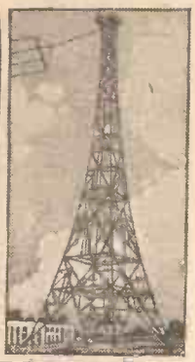
No. 457. Vol. XVIII. MAY 23, 1931

Amateur Wireless and Radiovision



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

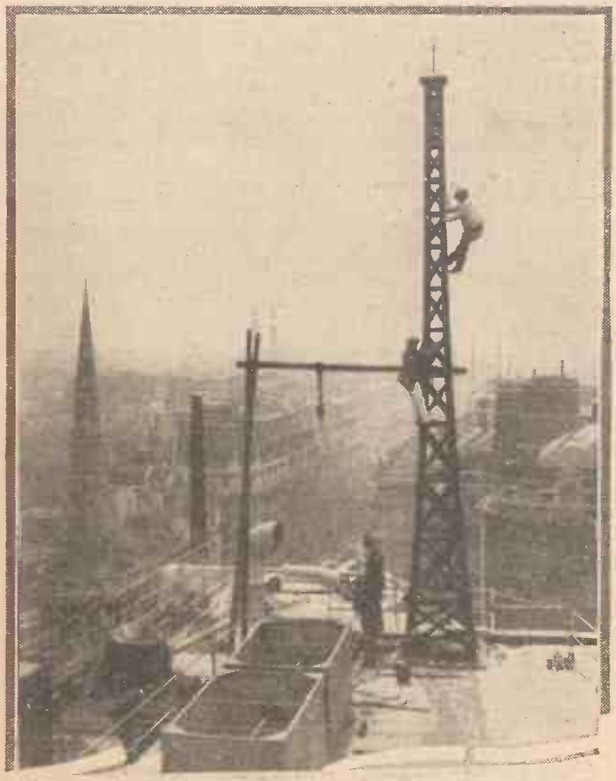
MORE STATIONS TO HEAR

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

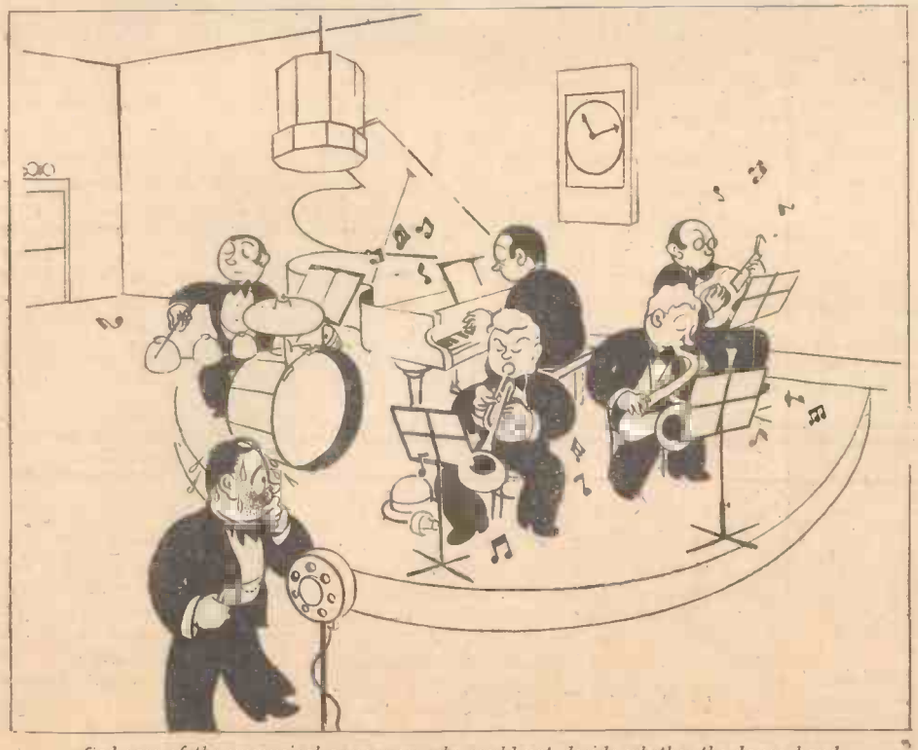
SO far, there does not appear to be any appreciable interference to broadcast reception from the high-voltage power lines now being erected all over the country to complete the grid system of electricity distribution. This is rather surprising to those who know the trouble power lines cause in Canada 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.

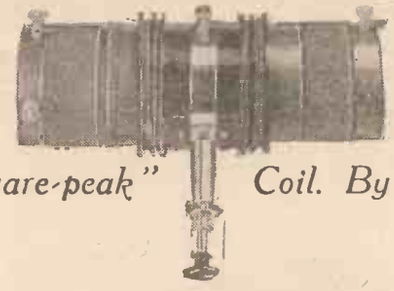
Apart from the relay taken by the Lahti high-power transmitter, the Helsinki (Finland) broadcasts are now available through Viipuri, where a new 13.2-kilowatt (aerial) transmitter, working on 291 metres, has been installed. Finland's radio system is being completely reorganised at a cost of some 15 million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

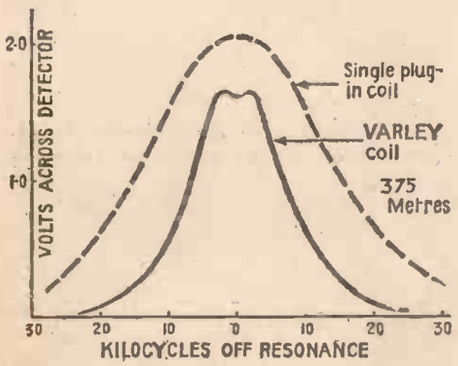


Fig. 1. Response curve of new coil on a wavelength of 375 metres

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

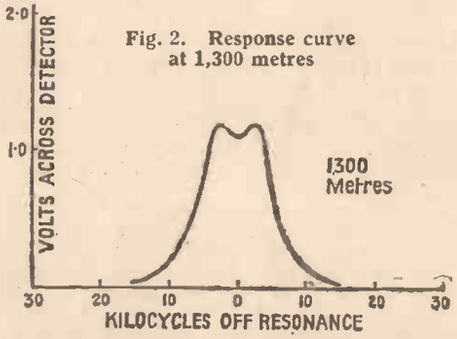


Fig. 2. Response curve at 1,300 metres

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.

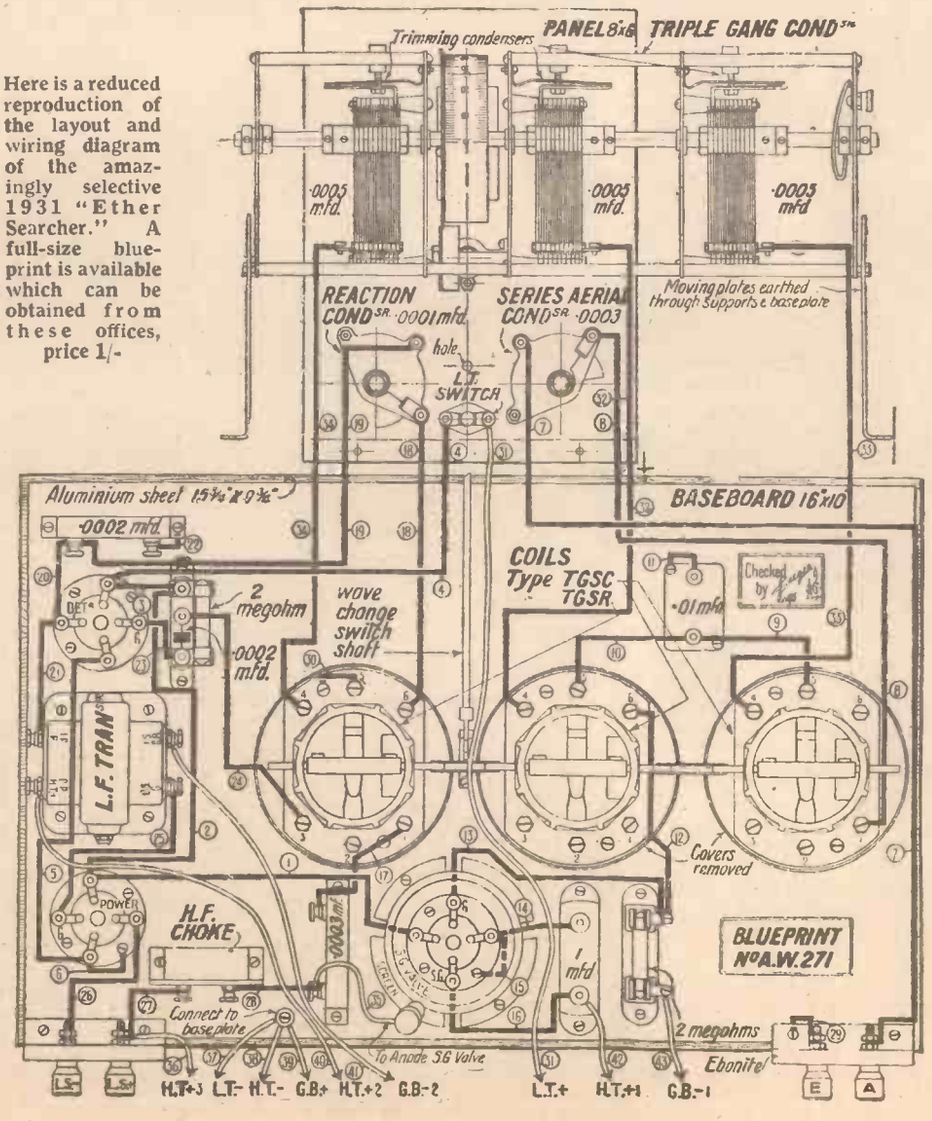
There is very little panel drilling to be done and the only point which presents any difficulty is the cutting of the hole for the condenser drum. The full-size blueprint gives the exact size of this and either a fretsaw can be used or else a number of small holes can be drilled around the edge of the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

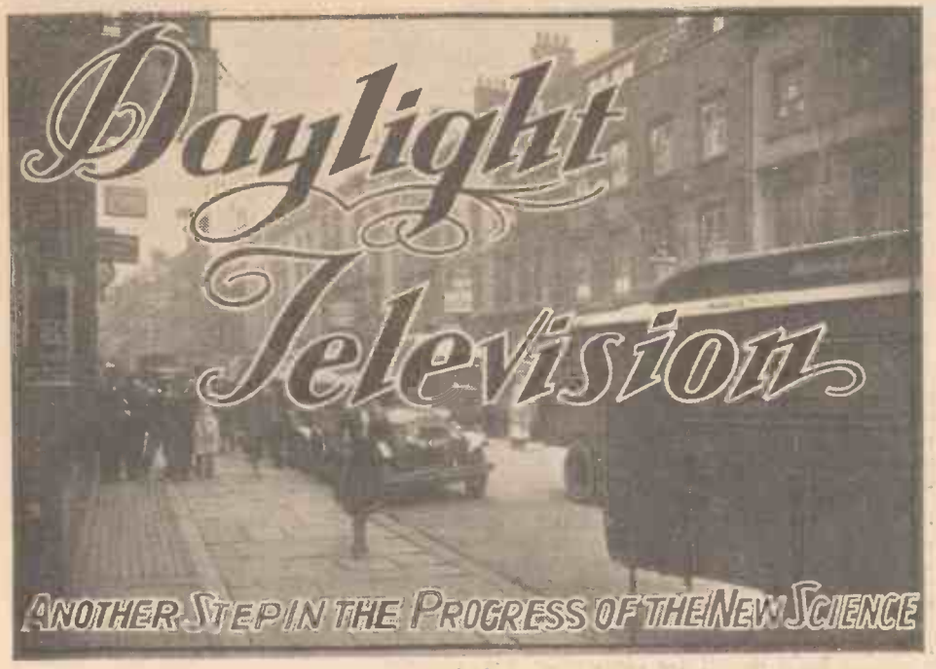
Be careful when placing the coils on the foil-covered baseboard. One of the coils has four sections of windings on the long-wave part instead of three, this extra winding being for reaction.

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.

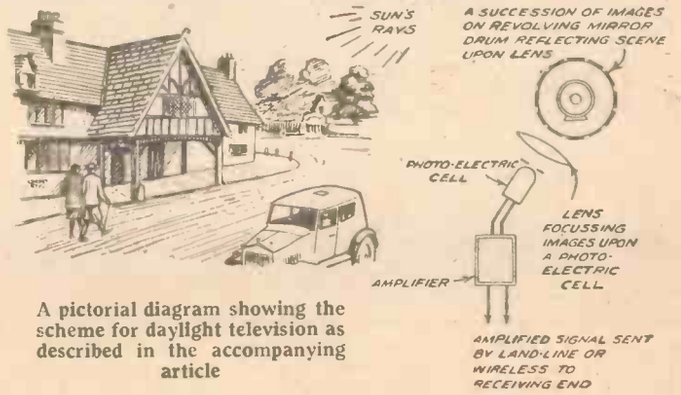
The van and the local scene being televised are shown in the accompanying illustration. On one of the occasions when I was a privileged spectator I saw on the screen a policeman who had evidently crossed over to see what was going on. One noticed that the quality of the image varied according to the 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.

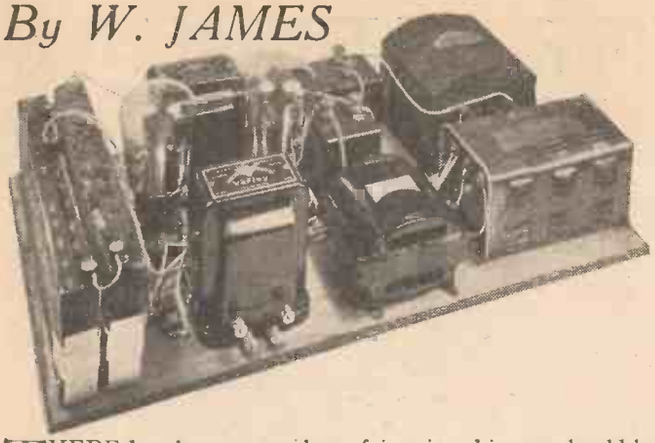
THERMION.

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

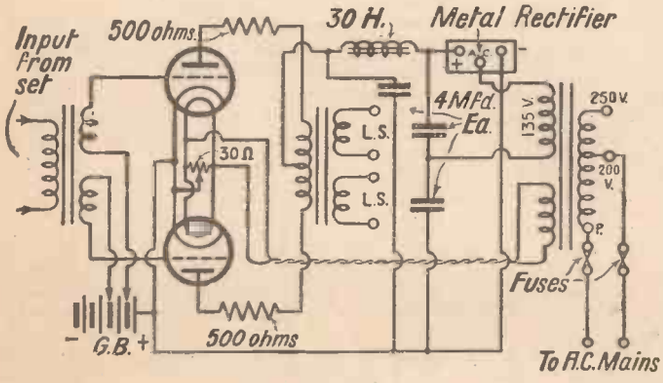
This amplifier is of particular interest to those who have built the "Century Super," although it is quite suitable for use with any type of receiver where maximum volume is desired.

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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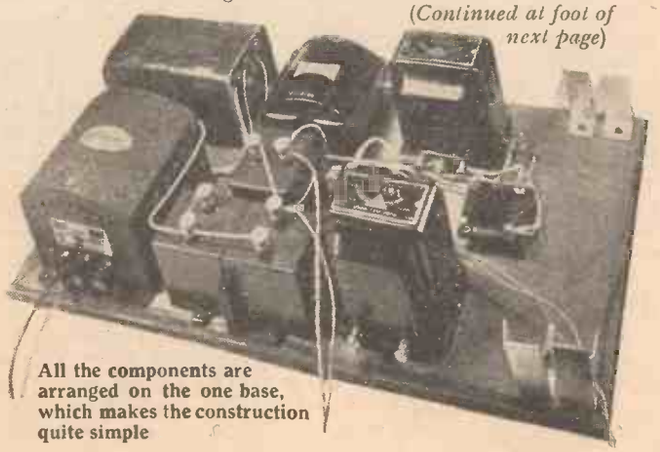


All the components are arranged on the one base, which makes the construction quite simple

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

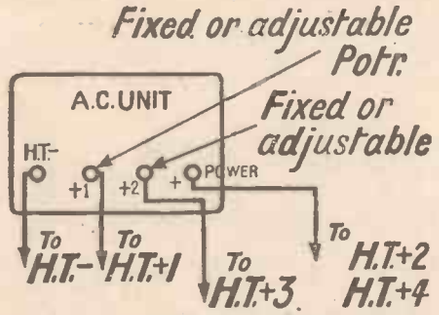


Fig. 1. H.T. connections for the "Century Super" using an ordinary mains unit

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,

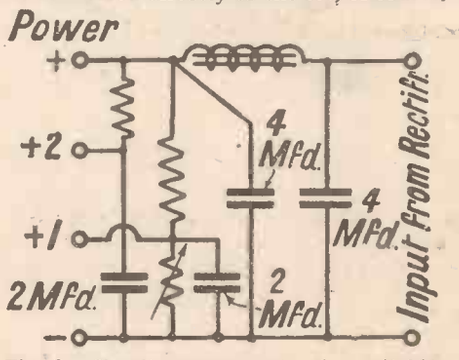


Fig. 2. Circuit arrangements of a suitable mains unit

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.

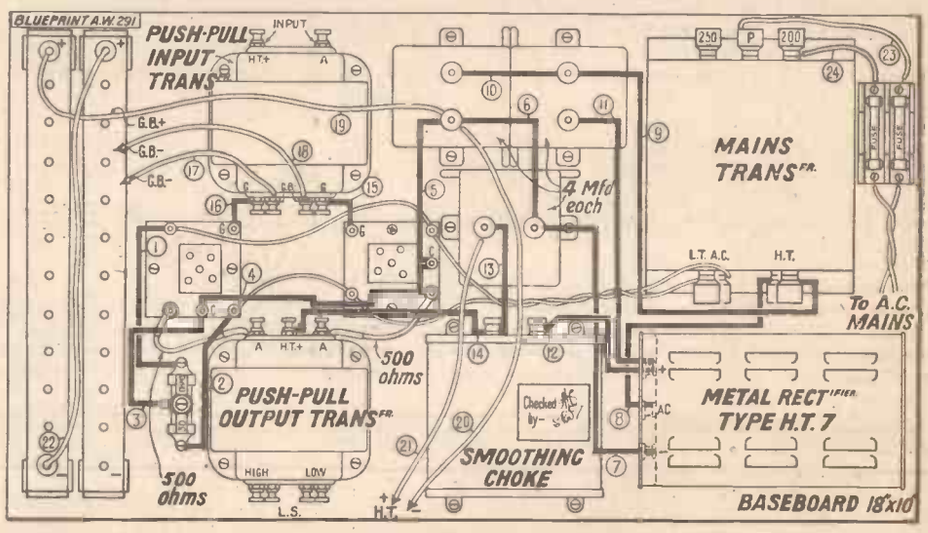
Do not connect the milliammeter in the common high-tension lead and note the current passed by both valves and then with only one of the valves in circuit. For one thing the high-tension voltage will increase when one of the valves is pulled out and so the remaining valve will pass more than its normal 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.

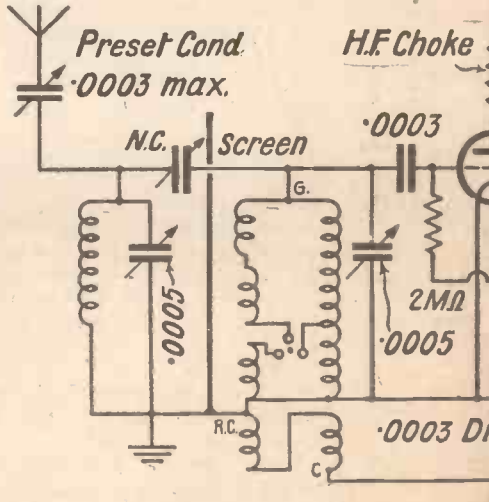
You will see that there are two tuning condensers in place of the usual one, this additional condenser being used to tune an additional coil in a filter circuit which precedes the main tuning arrangement. Briefly, then, the parts on the larger side of the screen are those of an ordinary dual-range two-valver,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

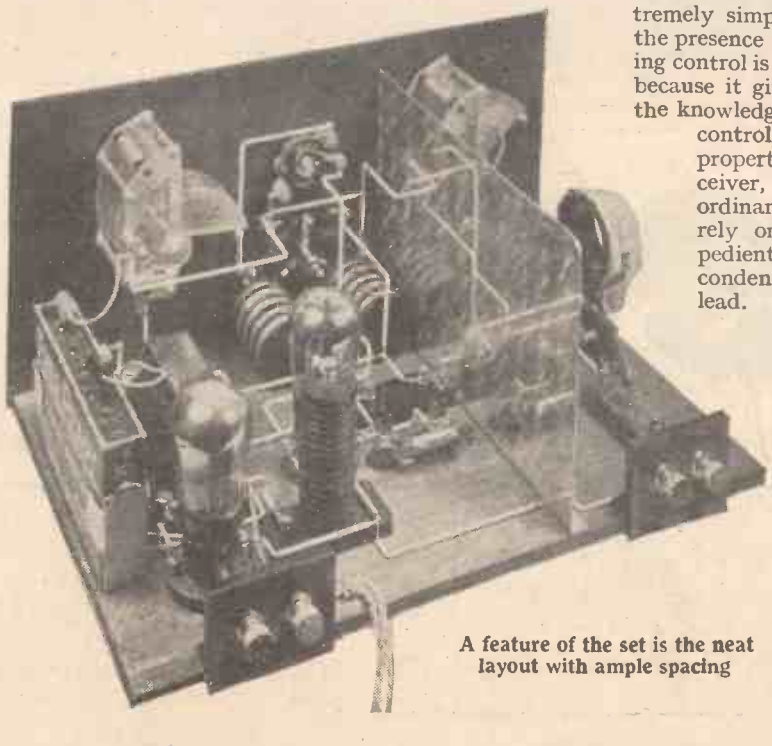
Despite the fact that this set is ultra selective it is extremely simple to work and the presence of the extra tuning control is a real advantage because it gives the operator the knowledge that he has full control of the selective properties of the receiver, whereas in the ordinary set one has to rely 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

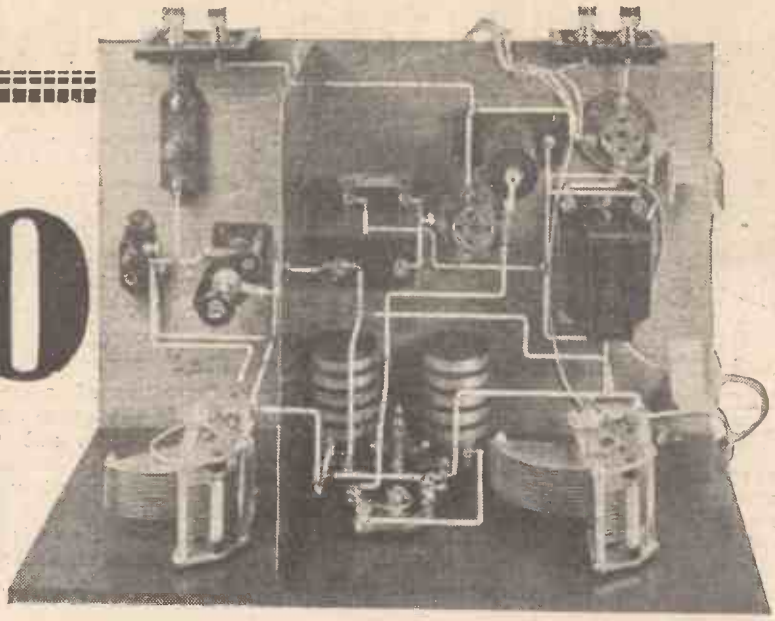
Grid-leak holder (Lissen, Wea gin, Dubilier).

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

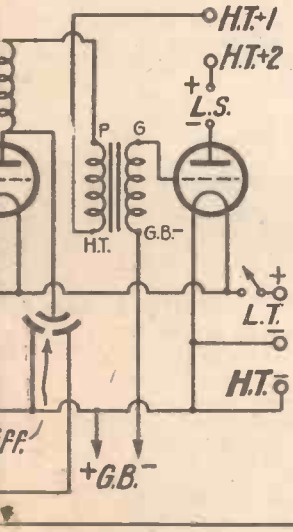


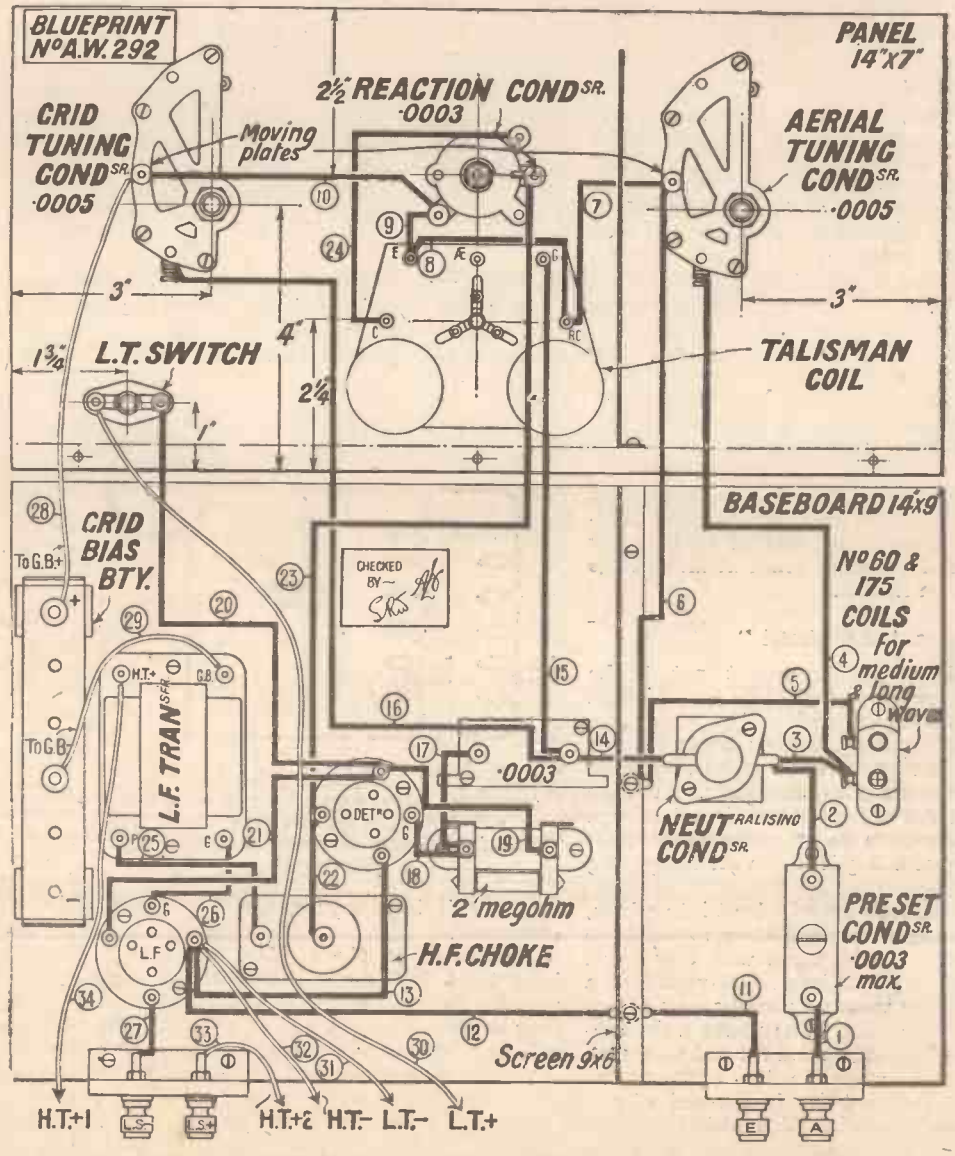
can be obtained, price 1s., from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. It is not possible to publish a full-size print of this set in AMATEUR WIRELESS and it is well worth while ordering a copy of the print when you purchase the parts for the set. It shows each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

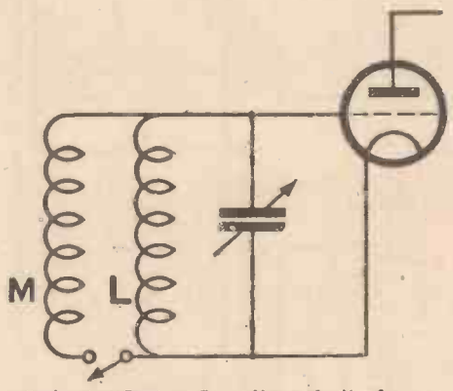
With a loud-speaker of 2,000 ohms connected directly in the anode circuit of a valve and a current of 10 milliamperes, the voltage drop is 20.

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.

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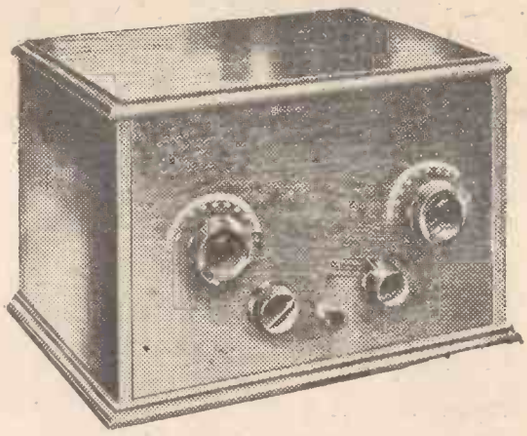
THE CENTURY SUPER

	£ 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!



THE CENTURY SUPER
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(Including Valves, Cabinet and Wound Frame Aerial.) **£11 : 9 : 6**
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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**

THE ETHER SEARCHER

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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SETS OF DISTINCTION

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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1 50,000-ohm wire-wound potentiometer. Sovereign ...	4 6
1 Three-point shorting switch. Ready Radio	1 6
1 Set of super-het. coils. Wearite or Lewcos	2 10 0
1 Triple-coil base. Peto-Scott	2 9
5 1-mfd. fixed condensers. Franklin	10 10
2 .001-mfd. fixed condensers. Graham-Farish	2 0
1 .0002-mfd. fixed condenser. Formo or Ormond ...	6
1 Grid leak holder	6
1 1-meg. grid leak. Telsen ...	1 0
1 Low-frequency transformer. Telsen "Ace"	8 6
2 Spaghetti resistances, 15,000 and 20,000-ohm. Keystone or Lewcos	3 0
1 Fuse holder and fuse. Ready Radio or Bulgin	1 3
8 Wander plugs, marked ...	2 0
2 Spade terminals, L.T. Peto-Scott	3
Konecterkit. Terminal strip with three small terminals for baseboard mounting, 5 yards of thin flex, glazed connecting wire, fixing screws, bolts, nuts, etc.	GRATIS
	£5 0 0

Customers ordering this Kit are supplied with matched knobs in mottled oak effect to tone with the polished oak panel. Black knobs supplied with Ebonite Panel. Also Dial Reading Chart supplied specially calibrated for Peto-Scott Condensers by our Technical Staff.

★*Fitted with J.B. "Tiny" Condensers 5/- extra*

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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

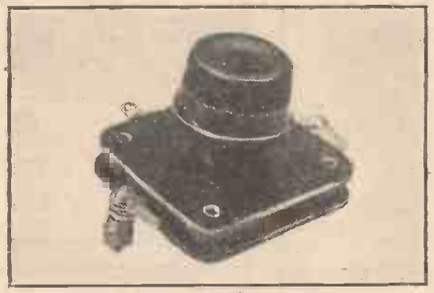
are placed. The long-wave sections are in the centre of the coil and the short-wave sections at the two ends. A single push-pull switch in the middle of the coil serves not only to change the wavelength as required but also provides a one-hole fixing for the arrangement.

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.

LONDON.—The Electric Shop, 303, High Road, Chiswick, W.4. Bostock & Stonnill, 1, Westbourne Terrace, Park Road, Forest Hill, S.E. 23. Pugh Bros., Holloway Road, N. J. C. Sharp & Son, 2, Kensington Park Road, Notting Hill Gate, W.11. **BEDFORD.**—John C. Vockins, 47, Bower Street. **BELFAST.**—Belfast Radio & Electric Co., Ltd., 17/19, Queen Street. **BIRMINGHAM.**—H. Baker, 222, Green Lane, Small Heath. A. J. Corrall, 226, Warwick Road, Greet. W. H. Eldridge & Sons, 625, Bordesley Green. H. Liddiard, 1379, Pershore Road, Stirchley. The Red House, Phillips Street, Aston. S. M. Spain, 1529, Pershore Road, Stirchley. E. Wright, 48, Alum Rock Road, Saltley. **BOLTON.**—The Bolton Radio Service, 47 Bridge Street. T. Francis and Sons, 174, St. Georges Road. J. Howarth, 138, Folds Road. **BROMLEY.**—The Record Radio Stores, 18, East Street. **BROOMSGROVE.**—C. Wynne, Electrical Contractor, 19, Worcester Street. **CADISHEAD.**—Whitfield Bros., Liverpool Road. **COVENTRY.**—Brocks, Ltd., 45, Earl Street. **CRUDEN BAY, ABERDEENSHIRE.**—W. J. Findlay, 31 Main St. **GOSPORT.**—R.C.S. Whittingham, The Raphael Wireless Stores, Raphael, Fortum Road. **HINCKLEY, LEICESTERSHIRE.**—M. Brightmore, 61/2, Sketchley Road. **MANCHESTER.**—Baylems, Ltd., 146/8, Ashton New Road, Beswick. Presto Royal, Church Lane, Moston. **NUNEATON.**—D. W. Ward, 8, Tomkinson Road. **PONDERS END.**—Freeman, 260 High Road. **REDHILL.**—F. J. Andrews, Radio Stores, Honeycrock Lane, Salfords. **STOCKPORT.**—The Carter Radio Service, 140, Buxton Road, Heaviley. **TORQUAY.**—Batten, 174, Union Street. **WORKSOP.**—Ezra Sugden, 109, Gateford Road.

WHOLESALERS:

LONDON—Apollo Gramophone, 4/5, Bunhill Row, E.C. Beaver Elec. Sup. Co., Gt. Chapel St., W.1. Brown Bros., Gt. Eastern St., E.C.2. Johnson Talking Machine, 96, Clerkenwell Rd., E.C. Runwell Cycle Co., 16, Gt. Eastern St., E.C.2 BELFAST—J. C. Holland & Co., 27, Franklin St. BIRMINGHAM—Priestly & Ford, 3/11, Carrs Lane. LIVERPOOL — B.N.B., 65, Renshaw St. MANCHESTER — Universal Elec. Sup. Co., 4, Brown St.

The HORNET

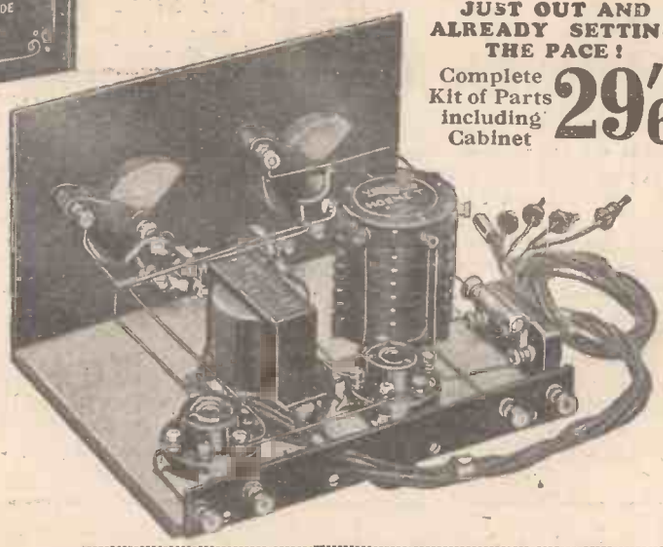
2-VALVE KIT-SET

Read this—from Glasgow—

" received several Continental stations on both high and low waves—Warsaw being exceptionally good."

JUST OUT AND ALREADY SETTING THE PACE!

Complete Kit of Parts including Cabinet **29/6**



The HOME CONSTRUCTOR IS STILL SUPREME

He is the man who buys not on a flashy outer appearance, but on the quality of "what is inside."

That is why Voltron Kit Sets designed around the World-famous Voltron components are supreme amongst home constructors.

The circuits are inherently sound and with just those exclusive refinements for which Voltron are justly renowned.

Extreme selectivity, long distance capabilities, and ease of assembly are their outstanding features.

VOLTRON DYNAPLUS

SCREENED 3

Leading technical authorities are now agreed that the Dynaplus is the most efficient screened 3 receiver available to the public.

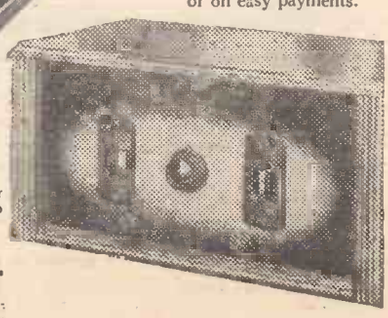
Owing to the improved 1931 coils, selectivity has been still further increased and *with no loss of sensitivity.*

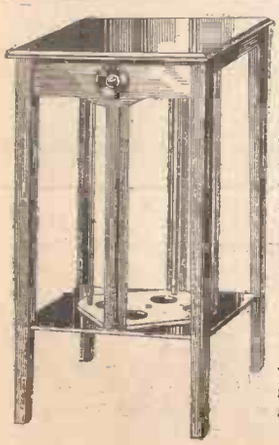
£3.12.9
complete kit of parts ex valves

Complete Kit of parts including valves and patent collapsible cabinet

£6:6:0

or on easy payments.





VOLTRON FRAME AERIAL

for the

CENTURY SUPER

Outselling all other Frame Aerials by reason of its unique design. Ultra low loss windings exact to specification are employed embodying silk covered stranded wire with individual strands insulated. Turned Ebonite spaces reduce the losses still further.

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/-**

If there is no Voltron Agent in your district please send your order direct to the manufacturers:

VOLTRON ELECTRIC LTD.

Queensway, Ponders End, Middx.

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.

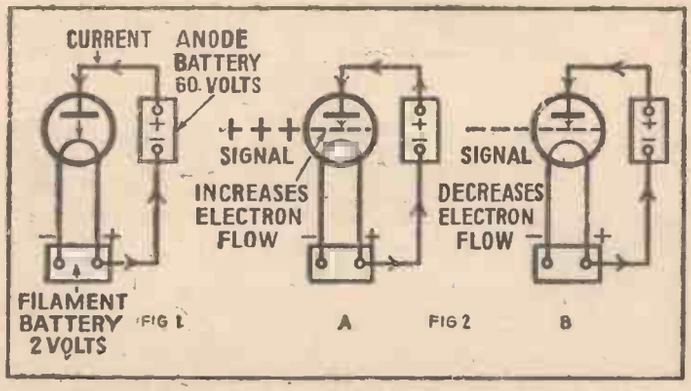


Fig. 1. This diagram shows the direction of the electron flow.
Fig. 2. The effect of the signal voltage on the grid is to increase or decrease the electron flow

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.

PREPAID ADVERTISEMENTS

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.

ENGINEERS, we offer you the finest and most complete book on Engineering Careers ever compiled, absolutely free of charge. This book contains 180 pages of invaluable information and advice. It also contains details of B.Sc., A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., A.M.I.A.E., A.M.I.Struct.E., M.R.San.I., L.I.O.B., F.S.I., G.P.O., C. & G., etc. Exams, outlines home-study courses in all branches of Civil, Mechanical, Electrical, Motor, Wireless, Aeronautical, and Talkie Engineering, and explains the unique advantages of our special Appointments Department. We alone Guarantee "No pass—no fee." You owe it to yourself to read our handbook. Send to-day, stating branch or subject of most interest.—British Institute of Engineering Technology, 109 Shakespeare House, 29-31 Oxford Street, W.1.

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.

FOR SUMMER RECEPTION SENSITIVITY, fix Insulated Insulators on your aerial, 3/9 pair, post free.—Williams, Netherend Cradley, Birmingham.

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.

AN EXCEPTIONAL OPPORTUNITY OCCURS FOR YOU to increase your income in your spare time at home in a business of your very own and which quickly brings you full-time earnings in the Mail Order Business. Little capital only needed. No experience, canvassing, rent, rates, or other overhead expense. Success certain with this new method. Send to-day for free booklet.—Business Service Institute, Dept. 149, 6 Carmelite Street, London, E.C.4.

PERSONS REQUIRED IMMEDIATELY to make Leather Matting. Regular work supplied, cash paid weekly.—Write, E.87, "Everlast" Leather Matting Co., Wellingborough.

WEEDON UNIVERSAL SINGLE OR DOUBLE LINEN SPEAKER. Kit of parts includes 21 in. square chassis, best linen, dope, self-centre rod, and complete instructions. Only a few left. Single, 7/6; double, 9/6. Carriage 1/- extra. —Weedon & Co., 26a Lisle Street, Leicester Square, London, W.C.2.

FRAME AERIAL WIRE, enamelled, stranded, as specified for "James 60" and "Century Super" sets, 9/40 and 27/40, in reels sufficient for winding each waveband, 2/9 each or set of two, 5/-.—Weedon & Co., 26a Lisle Street, Leicester Square, London, W.C.2.

PEERLESS ADAPTOR (prov. pat.). Something entirely new. Big improvement in reception guaranteed. 2/6.—Particulars, DAVIDSON, 107 Bowes Road, N.13.

ACCUMULATOR FREE to all purchasing beautiful Cabinet Speaker. Reliable unit, perfect reproduction. Only 20/-, carriage paid.—MAURICE LEBLANC, Radio Engineer, 173 Albert Road, Croydon.

HORNET 2-VALVE KITS with valves and Amplion speaker. 57/6. Hubbard. High Street, Downham Mkt.

BANKRUPT BARGAINS.—List free with 3-valve diagram. Transformers from 2/9; Telsen Ace, 6/6; Radiogrand, 9/6. .0005 Variable, 2/6; Differentials, 2/6; S.M. Dials, 1/6; H.F. Chokes, 1/6; Three-valve Kits, with cabinet, 35/-; two, 24/-; Speaker Kits, from 12/6; Triotron Units, 9/6; Bullphone, 9/6; Dual coils, 5/-: All smaller parts. Let me quote for anything radio. Tennis rackets, usual 15/- line. 6/9 carriage 9d., or 3 for £1 paid.—Butlin, 143b Preston Road, Brighton.

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS.

CRYSTAL SET (6d.)

B.B.C. Crystal Set	AW281

ONE-VALVE SETS (1s. each)

Regional Ultra-selective One	AW278
B.B.C. One	AW280
Hartley One	WM198

TWO-VALVE SETS (1s. each)

Talisman Two (D, Trans)	AW194
No-battery A.C. Mains Two (D, Trans)	AW230
No-battery Gramo-radio 2 (D, Trans)	AW238
1930 Talisman 2 (D, Trans)	AW239
Arrow Two (D, Trans)	AW249
Forty-five-shilling Two (D, Trans)	AW250
Searcher Short-wave 2 (D, Trans)	AW259
Challenge Two (D, Trans)	AW261
Everybody's All-in 2 (D, Trans)	AW273
Twenty-Shilling Two (D, Trans)	AW274
B.B.C. Selective Two (D, Trans)	AW292

THREE-VALVE SETS (1s. each)

1930 Clarion Three (SG, D, Trans)	AW223
Beginner's Regional Three (D, 2LF)	AW233
The "A.W." Exhibition 3	AW247
1931 Ether Searcher (SG, D, Trans)	AW271
1931 Ether Searcher (A.C. model)	AW276
Mains Unit	AW277
Ultra-Selective Straight Three (SG, D, Trans)	AW282
1931 Ether Searcher (D.C. model)	AW284
Mains Unit	AW285

FOUR-VALVE SETS (1s. 6d. each)

Regional Band-pass Four (SG, D, RC, Trans)	WM211
Five-Point Four (SG, D, RC, Trans)	WM216
Regional A.C. Four (SG, D, RC, Trans)	WM222
Supertone Four (SG, D, Push-pull)	WM227
Brookman's Three-Plus-One (SG, D, RC, Trans)	WM233

FIVE-VALVE SETS (1s. 6d. each)

James Quality Five (2SG, D, RC, Trans)	AW227
Companion Portable (2HF, D, RC, Trans)	AW279
1930 Five (2HF, D, RC, Trans)	WM171
Radio-Record Five (SG, D, Trans-parallel)	WM188
Overseas Five (3SG, D, Trans)	WM191
Regional A.C. Five (3SG, D, Trans)	WM224

SIX-VALVE SETS (1s. 6d. each)

Century Super (Super-het)	AW287
Hyperdyne Receiver	WM221
Super 60 (Super-het)	WM229
A.C. Super 60 (Super het)	WM239

AMPLIFIERS (1s. each)

"A.W." Gramophone Amplifier	AW205
Two-valve Amplifier	AW216
Simple Gramophone Amplifier	AW257
High Quality Amplifier for A.C. Mains	AW275
2-Watt Amplifier for A.C. Mains	AW283
A.C. Push-Pull Amplifier	AW291
Radio-Record Amplifier (DC Mains)	WM183
Selecto Amplifier (HF, Unit)	WM210

PORTABLE SETS

Continental Portable (SG, D, Trans)	AW241	1/-
Companion Portable (2HF, D, RC, Trans)	AW279	1/6
Pedlar Portable Three (D, 2 Trans)	WM197	1/-
Super 60 Portable (Super-het)	WM238	1/6

MISCELLANEOUS (1s. each)

Handy L.T. and G.B. Unit for A.C. Mains	AW254
Our H.T. Unit for A.C. Mains	AW262
Gramophone Tone Control	AW264
Short-wave Super-het Adaptor	AW268
H.T. Unit and Trickle Charger for D.C. Mains	AW272
Booster Speaker	AW286
"A.W." Tone Changer	AW288
"A.W." Selectivity Unit	AW290

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

Address letters:

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

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

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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NEW SELECTIVITY IDEA IN THE "SQUARE-PEAK 3"

BUILDING YOUR OWN FRAME AERIAL

Amateur Wireless

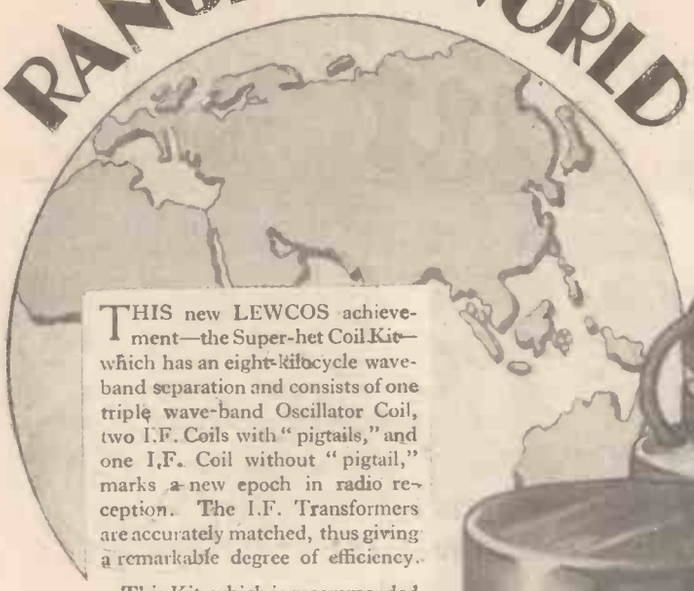
and Radiovision

Every Thursday 3d

Vol. XVIII. No. 468 Saturday, May 30, 1931

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

RANGE THE WORLD with The LEWCOS (Regd)



THIS new LEWCOS achievement—the Super-het Coil Kit—which has an eight-kilocycle wave-band separation and consists of one triple wave-band Oscillator Coil, two I.F. Coils with "pigtails," and one I.F. Coil without "pigtail," marks a new epoch in radio reception. The I.F. Transformers are accurately matched, thus giving a remarkable degree of efficiency.

This Kit, which is recommended for the "Century Super," can also be fitted with extraordinary ease in any set of similar design and the results will be truly astounding!

The small space available is completely inadequate to give even a short description of these wonderful new LEWCOS Coils, and you are invited to write for an illustrated explanatory leaflet.

SUPER-HET COIL KIT

(Provisional Patents Pending)

Designed and manufactured at our Leyton Works,

which is recommended *for the*

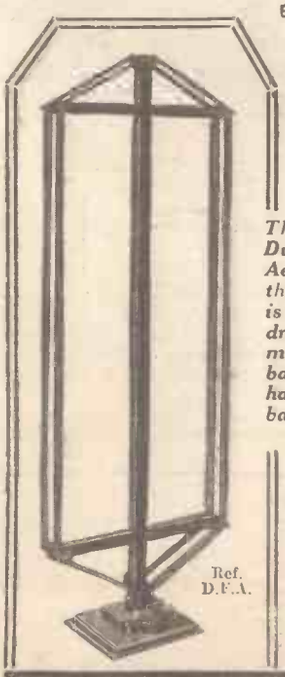
"CENTURY SUPER"

receiver described in "A.W." No. 464

Price **50/-**

Ref. S.H.K. No. 1.

BRITISH THROUGHOUT



This is a photograph of the LEWCOS Dual Range Centre-Tapped Frame Aerial which is recommended for the "Century Super." The Frame is wound with silk-covered Litzendraht wire and the switch and terminals are mounted on the moulded base, thus presenting a neat and handsome appearance. The wave-band change is effected by the turn of a knob.

Size: 30" high x 10" wide.

PRICE 32/6

A TRIPLE COIL BASE FOR I.F. COILS (Ref. I.F.B.3)

Price **2/6**

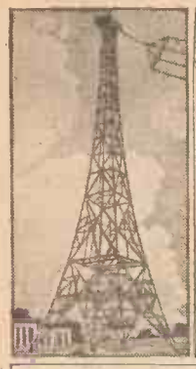
IS NOW AVAILABLE.

LEWCOS "Spaghetti Resistances" of 15,000 and 20,000 ohms each
PRICE 1/6 each
are specified for the "Century Super"

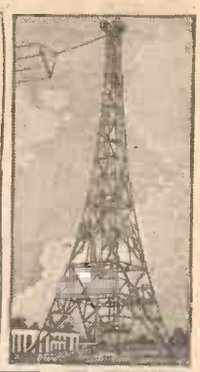
LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

No. 468. Vol. XVIII. MAY 30, 1931



Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J. H. REYNER, B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

ANOTHER SELECTIVITY IDEA

AMATEUR WIRELESS does not mean to give readers any cause to grouse about their sets! The most common trouble now is interference. On old sets even the local B.B.C. transmitters jam one another. In this issue is a description of yet another aid to selectivity, incorporated in a really fine receiver designed by our Technical Editor. It uses the new "square-peak" coil, and is described on pages 852 and 853.

LIKE A SHIP

"A.W." ventured the opinion a long time ago that Broadcasting House bears a strong resemblance to a ship, and Colonel A. Val Myer, the architect, is being "chipped" by the daily press about the "H.M.S. Broadcasting House" appearance. In defence he says: "It has also been described as an iceberg, and as a gigantic breakwater, but those analogies are not quite so good. The battleship effect is, of course, accidental. It has resulted from the shape of the site, and has been added to by the necessity of sweeping back the roof to comply with the building regulations. The problem to be faced in design was out of the ordinary, for broadcasting is so new. This is a modern building with a modern purpose, and we have tried to break away from the convention without being odd. There are no German or Continental effects; the design has a fundamentally traditional basis without being unnecessarily ornamental."

THE BIGGEST SET?

WHICH is the biggest set in the world? One naturally looks to America for a record of this nature, and it is said that the Waldorf Astoria Hotel in New York has one of the largest sets. Each of the 2,000 rooms can take any one of six programmes simply at the turn of a switch. In addition to radio, tea-time and dance music is relayed from the hotel ballroom, while guests can if they wish switch on to the musical section of the talkies which are shown in the hotel cinema. Radio listeners are catered for by 150 rooms, each of which is fitted with a set connected to a common aerial above the hotel at a height of nearly 600 feet.

PRINCIPAL CONTENTS

TELEVISION'S FOUR "EYES"

Photo-cells connected to the television transmitter are housed behind this panel with its four windows, and small objects are rotated on turntables before the transmitter so that observers can watch the movement of the image. This is National Broadcasting Co. (American) apparatus

A TELEVISION "STUNT"

THE first "sale" has been made by television, or, at least, so it is said! Goods displayed by a manufacturer several miles away from a buyer in a large New York department store, followed immediately by the placing of an actual order for £1,000 worth of goods, is reported. The stunt, arranged by an American firm, was carried out recently by the television apparatus of the New York Telephone Company.

MORE FACILITIES

BY the way, talking of television, announcement is made of the formation of a television company in France to exploit the invention and patents of Baird Television in France, Belgium, Luxembourg and the French and Belgian colonial possessions. It is expected that further

NEXT WEEK: MORE ABOUT THE NEW "SQUARE-PEAK" SELECTIVITY IDEA

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

facilities for television experiments in these countries will shortly be available, which is all to the good.

MORE MEN ANNOUNCERS

WE hear that the Italian broadcasting authorities intend gradually to replace their women announcers by male staff. Although no reason is given for the change, it is suspected that the shoals of letters addressed to women announcers making all kinds of offers, have something to do with the ban!

JACK PAYNE'S BIG OFFER

IT would seem that Jack Payne, leader of the B.B.C. Dance Band, is very much sought after. He has just received an offer running well into four figures for a week's performance in Berlin. And the B.B.C. has given him permission to accept the offer for the late summer. Every day Jack Payne receives letters from Holland, so perhaps he is waiting to see whether a higher bid comes from Amsterdam! Anyway, most listeners will agree that he deserves all he can get.

NEWCASTLE'S FATE

SO Newcastle is definitely to work on 479 metres, simultaneously with North Regional. This is the first time a high-power station and a low-power station have attempted to work on a single wavelength. A tuning fork is being installed at Moorside Edge and a new fork is on the way to Newcastle.

NATIONAL COMMON WAVELENGTH

THE wavelength of 288 metres, at present used as a National common wavelength for British relays, may become the exclusive wavelength for the Scottish National, when the plant at Falkirk is ready to operate. This is partly the reason for shifting Newcastle to 479 metres. Then again, on 288.5 metres Newcastle would have had to relay National programmes, whereas on 479 metres it will relay North Regional programmes, to which it will no doubt contribute.

SCOTTISH REGIONAL

WHILE the Scottish National will transmit on 288.5 metres, Scottish Regional will be on 376.4 metres. The frequency separation between the Scottish Twins should therefore be adequate for all but very unselective sets. True to traditions, the Scottish Regional centre will economise by the use of only two masts for the two aerials, thus saving £4,000, the cost of a 500-ft. mast such as is erected at Moorside Edge.

NORTH NATIONAL

ALREADY test signals have been heard from Moorside Edge on 301 metres. As a preliminary to full North National tests, Aberdeen is fitting a new tuning fork ready for May 31 when it relinquishes its 301-metre wavelength and goes down to 288.5 metres. A week later, on June 8, North National on 301 metres will be heard in programme hours. While the Regional children's hour is in progress on 479 metres, dance music will be sent out from North National on 301 metres. During the late evening North National will also broadcast dance music while North Regional will do light music.

BROADCASTING HOUSE

DECORATIONS at Broadcasting House are receiving a good deal of the B.B.C.'s attention. Subject to engineering needs, each department is responsible for the decorations of its particular studios. It is now possible for the engineers to say how much wood, glass and upholstery is required for each studio to produce the required acoustic effects.

CRAMPED OFFICES

UNDOUBTEDLY the office accommodation at Broadcasting House has been sacrificed to make room for "bigger and better" studios. One suggestion was that pink walls, white furniture and a daylight lamp gave the illusion of spaciousness, but we hear that pale buff will be the predominating colour of the walls in most of the offices! But a panelled wall will indicate that the occupant is a member of the Control Board.

WIFE: *"John, couldn't we have one of those 'wireless fans' I've just read about? This room gets so very stuffy."*

ENGINEERS ARE HUMAN!

THE other day a B.B.C. engineer was showing a lady friend round the studios at Savoy Hill. He stopped in front of the microphone in one of the talks studios to demonstrate how broadcasting is done. After some minutes another engineer popped his head into the door of the talks studio and gently explained that *the microphone was in use at that time for some tests.* Would the first engineer kindly demonstrate elsewhere? He did!

LONDON ANNOUNCER

THAT London station announcer with a voice somewhat reminiscent in its intonation of a school master, namely, Mr. E. H. Wheldon, will leave the B.B.C. towards the end of the summer to become one of His Majesty's Inspectors of Schools. In a recent temporary exchange of announcers, Mr. G. D. Adams of London has been in Birmingham and Mr. Cowper has been announcing from the London studio, instead of from the Midlands.

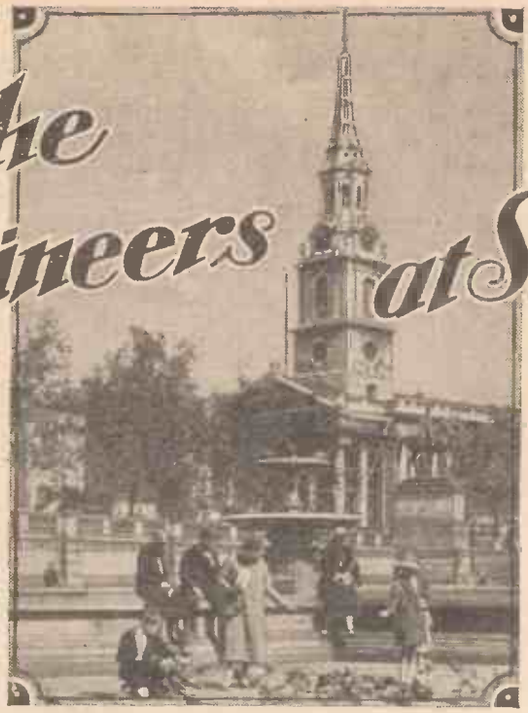
B.B.C. ON TOUR

AN interesting tour for inquiring spirits on the staff of the B.B.C. is now being planned, with the idea of their visiting some of the broadcasting organisations of European countries. The itinerary, at present under discussion, may be from Brussels to Cologne, on to Coblenz, Mühlacker, Stuttgart and finally Strasbourg. We hope it keeps fine for them!

HEARING HIS OWN BROADCAST!

Christopher Stone, the popular B.B.C. gramophone record broadcaster, has made "announcement" records which are broadcast in the H.M.V. gramophone concerts from Rome and Radio Paris, and he is here listening to his own voice, from Paris!

With the O.B. Engineers at St. Martin's



The B.B.C. Outside Broadcasts engineers have tackled many difficult problems in relaying programmes from places outside the studios.

Here an "Amateur Wireless" Special Commissioner describes the arrangements at a popular "O.B." centre

OF all the B.B.C. church broadcasts, there is no doubt that that from St. Martin's-in-the-Fields, London, is among the most popular.

Greatly to the credit of the B.B.C. engineers, the hundred and one difficulties connected with broadcasting from such an "echo-ey" place as a church have been overcome and now, within two or three hours' notice, the engineers can rush off in the O.B. van, make a balance test and get the microphones slung up in the best positions so that they "pick up" well from the pulpit, are not drowned by the organ, or are not too near some member of the congregation who has a particularly bad cough!

Getting the Lines

As the B.B.C. likes to make Sunday broadcasts in connection with a large number of denominations, these microphone-in-the-church problems have to be confronted and quite frequently there is all too little time in which to get lines from the Post Office and make the balance tests. At St. Martin's, of course, the microphones are nearly always in the same position and really only one big change in the layout has been made since broadcasts were first made from this popular church.

The special broadcast services attract very large congregations and it is no uncommon sight on a Sunday evening to see people queueing up to get into St. Martin's during the radio hour, for the simplicity of the broadcast service draws many to the church who prefer to attend in person.

St. Martin's is reckoned to be an "easy" church so far as broadcasting goes and there are only two microphones. One "mike" is suspended on a wire cable about halfway down the body of the church and is well above the heads of the congregation. The organ, which broadcasts well, is on a balcony at the end of the church remote from the altar. When St. Martin's was first chosen as a broadcasting centre a third microphone was slung up on the balcony near the organ, but it was found that this gave too much organ in relation to the volume of sound picked up from the congregation, and the "fade" on this special microphone for the organ had to be turned down to the very soft position. Recently the engineers have done away with this microphone and now there are only the suspended microphone and the microphone placed above the pulpit.

The Amplifier Room

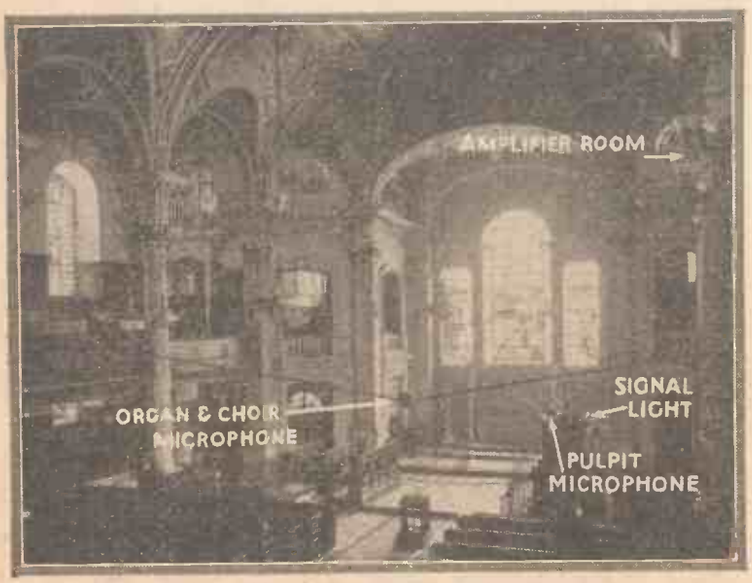
The whole service is conducted from the pulpit and so there is no need to have a large number of microphones for the choir and so on.

The O.B. engineer sits up in a little room on the right-hand side of the church at the top of a winding flight of stairs and through a small window he can see what is going on in the church below. A length of flex runs down to a red light in front of the pulpit's reading desk.

The engineer listens on a separate phone line to Savoy Hill, until the Control Room officials tell him that the announcer has finished in the studio. Then the engineer in the church flashes the red light and the service starts.

Some three million listeners all over England join in the singing at St. Martin's.

INSIDE ST. MARTIN'S



This view of the inside of the famous London church, from which broadcasts are so frequently made, shows where the two "mikes" and the signal light are placed

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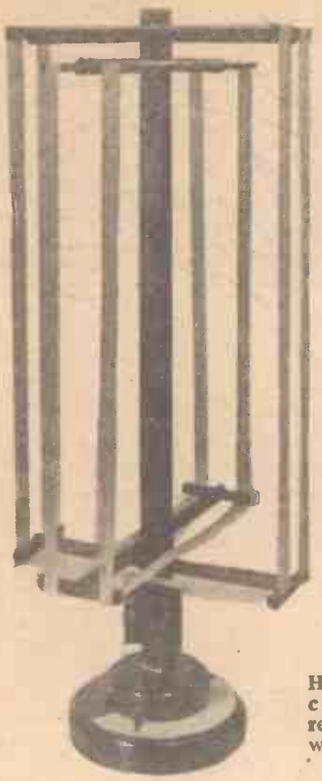
The new 2-kilowatt (aerial) relay transmitter to be installed at Treves (Germany) will be fed by the Frankfurt-on-Main studio and will work on a common wavelength (259.3 metres) with this station when the new 25-kilowatt plant for the latter city has been erected.

The lifeboats of the new American ocean liners *President Coolidge* and *President Hoover* which were recently launched have been equipped with wireless transmitting and receiving apparatus working on a wavelength of 600 metres, thus permitting the boats themselves to broadcast S O S calls.

MAKING A FRAME FOR THE "CENTURY SUPER"

Constructional details of a simple frame aerial which can easily be made and which will give fine results in any big set such as the "Century." It covers the medium and long waves



Here is the frame complete and ready to work with the "Century"

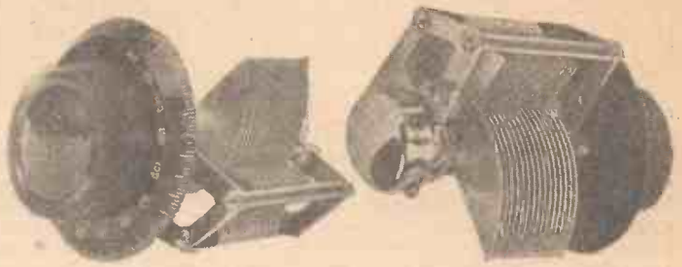
IT is safe to say that sets such as the "Century Super" have created a new vogue for frame aerials. It is, of course, against the Post Office regulations to work a super-het., which is a receiver of an oscillating type, on an outdoor aerial and it is for this reason that a frame (which, technically, is a closed circuit) is essential.

As is well known though, the sensitivity of the "Century Super" is so far above the average that even with a medium-performance frame it is possible to log approximately one hundred stations, and this proves that, given the right receiver, the sensitivity of the frame aerial is of a satisfactory order for modern conditions.

It is possible to purchase the cabinet and the frame aerial ready made for the "Century Super," but as so many readers want to carry out the whole of the constructional work, we are here giving particulars of a simple frame aerial which is designed for the "Century Super," and which anyone can make up.

The essential part of the frame is a pillar of hard wood and the rest of the frame should also preferably be made of some good hard wood. The cross pieces are of ½-in.-diameter dowelling and each piece should be 10 in. long. Four sections are required. The central pillar is drilled so that each piece of rod may be passed through and it is secured at the centre point with a woodscrew.

The general scheme of construction is apparent from the accompanying sketch. On the end of each cross piece an ebonite winding support is placed. These are ebonite strips measuring 3 in. by ⅜ in. by ¼in. Preferably small notches should be filed for the medium- and long-wave windings as shown. This is not really necessary but prevents the windings from sliding along the supports if, when complete, the frame is accidentally knocked. These ebonite supports are attached to the end of the cross pieces by means of wood screws, a small hole being drilled in the centre of each support and a countersunk screw being passed through. There are several ways of arranging for the frame aerial to pivot round as is necessary in order to get the windings in the same plane as the transmission.



The new 40-1 reduction J.B. condensers referred to. They simplify tuning the "Century"

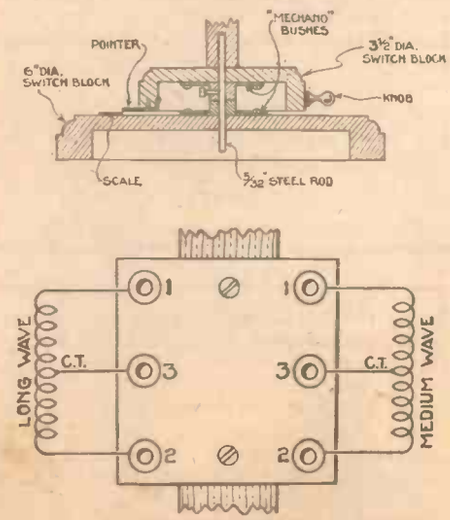
A practical idea is that shown by the accompanying sketch, where it will be seen that a simple small base is made up. All the necessary details are shown. It is, of course, possible merely to fit the steel spindle to the end of the frame shaft as shown and to pivot this in a bush on the top of the cabinet. Where it is not convenient to have the frame on the cabinet top, though, the special base must be used. It is not very important how this mounting is carried out, provided that the frame can easily be swung into any direction and that the base or support is solid enough to prevent the frame overturning.

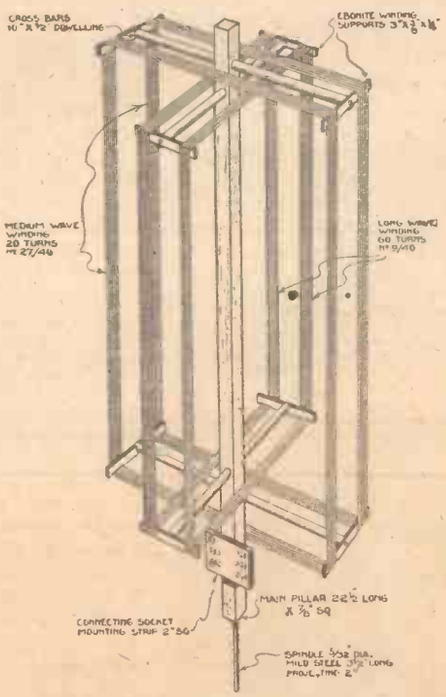
At the base of the main pillar is fixed a small socket contact strip which should be about 2 in. square, and should, of course, be ebonite. Eight holes must be drilled in this, six for the sockets and two for the fixing screws.

You will see that in this frame aerial the medium- and long-wave windings are entirely separate and are, of course, at right angles. No wave-change switch is incorporated, the three leads being plugged into the sockets 1, 2 and 3 on either the medium or long-wave side of the frame contact strip as required. A three-pole double-throw switch could be fitted, of course, but would complicate the winding.

The job of winding the frame is an easy one but it is advisable to use the special stranded frame aerial wire. No. 27/40 wire should be used for the medium-wave

(*Continued on page* 850)





(Left above) Details of a simple base to hold the aerial. (Left below) The connections of the terminal block on the frame, and (right) the complete frame, showing various constructional details

GIVING COLOUR to YOUR RADIO MUSIC

(*Marconiphone photo*)

An article of interest to all set-users anxious to get the best reproduction, by
ALAN HUNTER

TALKING the other day to an American friend, I was specially struck by one of his remarks. "Radios, like most other products, are sold on slogans in the States. And one of the most successful radio-set slogans this year has been built around tone colour." Which is all very typical of America.

How many of us ever worry about, even if we understand the meaning of, the phrase tone colour? Precious few; neither the manufacturer nor the amateur in this country seems to demand more of a set than volume control.

Are we, perhaps, a little too easily pleased with our loud-speaker output—too ready to accustom ourselves to a tone that may instinctively offend our musical sense? I personally think we might take a cue from America and pay a little more attention to colouring our loud-speaker tone in addition to controlling its volume output.

Here is a chance for the keen manufacturers to outdo their immediate rivals by

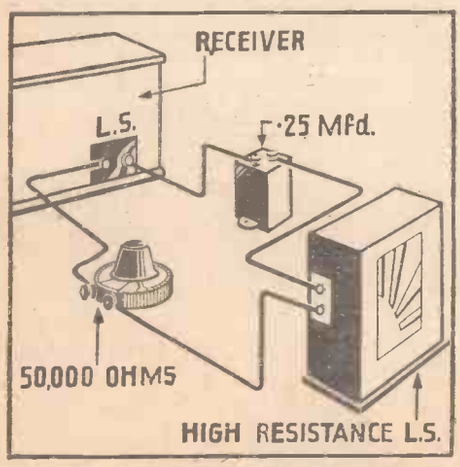


Fig. 1. Simple high-note suppressor

next Show Time. But the amateur, lucky man, need not wait for Shows to get on with the job of loud-speaker tone colouring. There are several ways and means of adding a little light and shade to the reproduction—simple and cheap enough for all to try.

Here it is as well to distinguish quite clearly between tone control and volume control. When volume is controlled the relative output of high and low notes should remain unaltered. But when tone is controlled by simple means a portion of either the high or low notes is suppressed. When the high notes are cut off the reproduction assumes a low pitch, whereas when the low notes are cut off the effect is high pitched. These alterations to the tone of the output should be obtained without altering the overall volume.

The changes of tone obtained by suppression of high or low notes are, of course, artificial. For when the reproduction is made to sound low pitched by cutting out

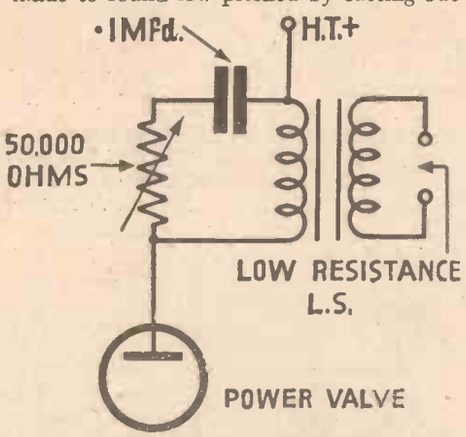


Fig. 2. Tone filter for use with output-transformer arrangements

the high notes, the low-note reproduction is not actually increased at all. Similarly, when the tone is made to sound high pitched by cutting out the low notes, there is no real increase in the output of high notes. I mention this because there are more complicated methods whereby the reproduction of high and low notes can be accentuated.

Those interested in a few simple experiments in tone control should certainly try the arrangement shown by Fig. 1. Here we have a high-resistance loud-speaker con-

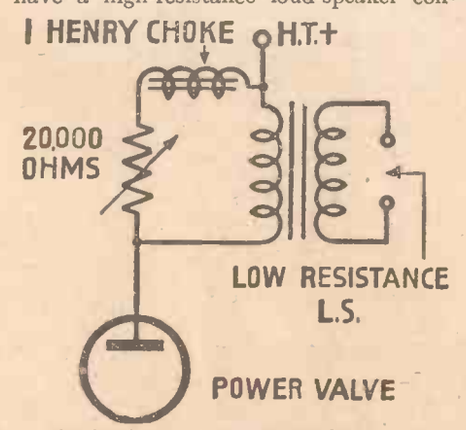


Fig. 4. Low-note suppressor for output-transformer circuit

nected directly in the anode circuit of the power valve of the set. The tone control consists of a fixed condenser and a variable resistance in series across the loud-speaker terminals. This device, therefore, has the advantage of being readily added without alteration to the interior of the set.

One might term this type of tone control a high note by-passer. If the impedance of the fixed condenser is low enough the high notes that would normally pass through the winding of the loud-speaker will be by-passed through the condenser. In practice a value of .25 microfarad will be found to provide a good variation in the high note by-passing.

To obtain this variation we use a variable resistance in series with the fixed condenser. Its value is not critical, but a maximum of 50,000 ohms is suitable. As the value of the resistance is lowered, so will be the impedance of the tone filter; consequently a decrease in the variable resistance means an increase in the high note by-passing and,

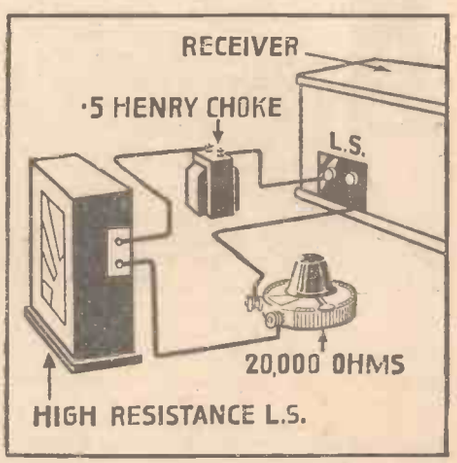


Fig. 3. Simple low-note suppressor circuit

therefore, a lowering of the loud-speaker tone.

In many modern sets there is a transformer between the output valve and the loud-speaker, especially when the impedance of the loud-speaker is radically different from that of the power valve. For example, a 2,000-ohm power valve is often coupled to a low-resistance moving-coil loud-speaker by means of a step-down transformer. Under such conditions the tone filter arrangement of Fig. 1 cannot be applied externally, but must be fitted across the primary of the output transformer (see Fig. 2).

(*Continued on next page*)

IN MY WIRELESS DEN

WEEKLY TIPS—CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

L.F. Transformer Facts

SMALL low-frequency transformers are satisfactory in many sets and may, as a matter of fact, help to correct the tone. This is to be traced in many instances to a rising characteristic.

The transformer is so constructed and used that the higher notes are emphasised. In some sets the higher notes are materially weakened by the tuner and detector, and the transformer helps to correct the results. It is possible, however, that a high-pitched whistle may be produced by the transformer stage.

This may be removed by connecting a grid leak of .5 megohm or a little less across the secondary winding. The whistle may not be noticed with certain valves, but others of greater efficiency may well cause the stage to oscillate.

Sometimes the addition of a by-pass condenser will have the same effect, and it is possible that reversing the connections to the primary or secondary windings will stop the whistle. These small transformers are often satisfactory when properly used, but there is always the chance of poor results being obtained through failure to connect the right way and to use the best valves.

Use Sufficient Grid Bias

The practice of using a 9-volt grid-bias battery is probably responsible for the overrunning of many high-tension batteries.

Quite a small power valve, such as the PM2 is rated to take a bias of negative 10.5 volts when the anode voltage is 125. If only 9 volts is used the anode current will be, of course, a little greater and is of no value.

Many other instances could be given, which all goes to show that a 9-volt battery is hardly large enough for many purposes. This is a point which you should look into rather carefully. You will often find that the bias can be increased a little above the value suggested without spoiling the tone. As the high-tension current is reduced by increasing the bias it is clear that an economy is to be effected in many instances.

With too much grid bias the signals are bound to be distorted, but practical test very soon shows when one has gone far enough. When using a mains unit great care must be taken of the last stage.

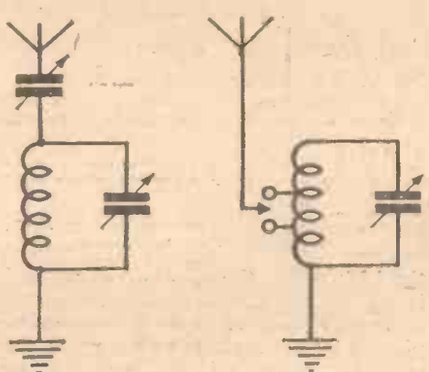
A choke-condenser output might often well be fitted and the bias must be carefully adjusted, if possible, with a milliammeter in the anode circuit. An old grid battery is likely to be a source of trouble, especially when more than one grid circuit is connected to it.

These Series Condensers

The method of improving selectivity by connecting in the aerial circuit a pre-set condenser and setting it to a low value has the disadvantage in many instances of reducing the signal strength.

It depends, of course, upon the capacity of the condenser when it is set to the value found by experiment as being right from the point of view of selectivity. In many instances the signal strength is reduced and distant stations cannot be heard.

The alternative scheme shown in the figure should then be tried. It consists in tapping the aerial coil. The aerial is connected to a tap instead of to the top of the coil through a pre-set condenser. As the



Two methods of getting better selectivity—the series condenser, and the tapped coil

aerial is taken towards the earth end of the coil, the selectivity increases and at the same time there may be an improvement in the signal strength.

If the aerial is connected to a point on the coil too near the earth end the strength will decrease, but it is quite possible that the selectivity may be improved by a worth while amount without much affecting the strength.

In many sets it is fairly easy to reach the coil for the purpose of tapping it. The wire should be gently lifted and then have the insulation removed for about a quarter of an inch. To this portion a wire can be fastened. Try first a tap about the centre point of the coil, and then another nearer the earth end, taking care not to break the wire.

What H.T. is Needed?

It is fairly safe to state that the higher the magnification factor of the valve used for detection, the greater must be the anode voltage for good results.

In this connection it is important to remember that a grid-leak detector does at least two things. First, it rectifies the signals applied to it in the grid circuit.

Grid current is necessary for this, and so the circuit is arranged to pass grid current. Usually the grid leak is taken to the positive side of the filament circuit, for then the grid bias of the valve is made suitable for rectification. If it is joined to the negative side the amount of the grid current may not be sufficient for good detection.

The rectified signals are magnified by the valve in the usual way and for this reason the high tension must be sufficient or distortion will result.

It is amplitude distortion that must be avoided and with plenty of high tension this is not at all likely to happen. With a battery set it would be silly to apply 120 volts to the circuit with a low-impedance detector. The current would probably be 5 or 6 milliamperes and the valve would be capable of handling signals which would overload the power stage.

"GIVING COLOUR TO YOUR RADIO MUSIC"

(*Continued from preceding page*)

A smaller value for the fixed condenser may be advisable. Keeping a 50,000-ohm variable resistance, a good variation in high-note suppression will be obtained with a .1-microfarad fixed condenser.

The tone filter just described is very suitable for use with loud-speakers inclined to sound harsh owing to the absence of real bass notes in the reproduction. Sometimes the opposite effect is obtained, namely, a certain "woolliness," due to the absence of high notes; this sort of trouble can be to some extent overcome by the Fig. 3 arrangement. It will be seen that instead of a fixed condenser in series with a resistance we use a low-impedance choke.

The choke will offer considerable impedance to the high notes but, with a certain value, which can be determined by the setting of the variable resistance, the lower notes will be by-passed, thus giving the effect of a raising in loud-speaker tone.

To apply this form of tone control to a set with an output transformer, one must, as shown at Fig. 4, connect the arrangement across the primary of the transformer. The value of the choke should be between .5 and 1 henry.

Experiments are now in progress for the development of more ambitious forms of tone control, but the simple arrangements detailed in this article should serve as a good start for amateurs interested in this refinement.

On Your Wavelength!

IT'S EASY!

WITH the greatest interest I read that Professor A. M. Low has been conducting an investigation into the effects upon health brought about by noises of various kinds. It is stated that he sought to discover what kind of noise made people feel ill. To do this he tuned in the B.B.C.'s tuning note and superimposed upon it one of lower pitch. This appears to have had the desired (?) effect. Now I, too, have been experimenting, and though my natural modesty makes me hesitate to mention my own efforts in the same breath or, at any rate, in the same paragraph, as those of the professor, I feel that I must stifle my better feelings for the moment and give you the results of my own labours. For I have found a far, far simpler way of filling the house with noise that makes people sick. No superimposing is required.

All that you have to do is to tune in, neat and undiluted, one of the B.B.C.'s ultra-modern concerts. Believe me, it works every time.

OTHER QUEER NOISES

THE effects of other strange noises pushed into the ether by the B.B.C. are almost equally interesting. As a result of the most careful investigations, I have found that whenever there emanates from the loud-speaker a noise rather like that produced by a badly dented trombone accompanied by the words "The . . . ah . . . sebject of . . . mai . . . ah . . . leetle tauk this . . . ah . . . evening is . . . ah . . . the psychology of . . . ah . . . tadpoles," those who are listening immediately begin to yawn. And a still more curious reflex action is to be observed when they have been under the influence of the noise for periods varying from ten to thirty seconds. The subjects rise, move rapidly across the room, fumble for the switch, and turn it to the "off" position. Wishing on one occasion to observe what would happen if the subject were prevented from carrying out this reflex action, I tied a friend (at least, he was then a friend) into a chair, switched on one of these talks, and carefully watched him. The yawning reflex was duly followed by an effort to rise. This being frustrated by his bonds, the efforts of the patient to escape became more and more violent. Realising at length that he could not leave his chair, he rapidly removed his right boot and flung it at the speaker!

A PROBLEM

TYPISTS play queer pranks at times, and the results can be distinctly amusing. This morning I had a letter from an eminent firm of wireless manufacturers who did me the honour of asking my advice.

"We believe," they wrote, "that we make the best earth contact that there is, but the trouble is that many people appear to have a strong objection to digging the necessary hole. We would appreciate any suggestion from you as to the best means of doing this job with a minimum of comfort."

The missing "dis", how much it means! I expect that most of us could answer *that* question pretty easily. It always happens, somehow, that the only occasion when you have the time to spare to dig that wonderful hole for the earth connection that you have been meaning for so long to make is one when Dame Nature automatically ensures the minimum of comfort. She has been waiting for you. By a period of drought she has made the ground so hard that it takes you all your time to make the slightest impression upon it. Pleasantly cool days have preceded that upon which you labour and cool ones will follow it. But the day of days is scorching hot with never a breath of wind. You begin by tackling your task with a will, but by the time that you have got down six inches the cooling of your ardour is directly proportionate to the rise in your general bodily temperature.

LET US BE SERIOUS

SERIOUSLY, though, it is jolly well worth while to use a first-rate earth contact and to dig the deepest hole that you can to contain it. Time and time again have I come across instances of poor reception which could be traced directly to an earth contact that was not all that it looked. The most astonishing instance I can remember concerned a brand-new set of excellent make which could produce no more than a faint bleat from the local main station at a range of but twenty miles. The set was quite obviously right up to the mark and the aerial was all that an aerial should be. Inquiries about the earth, which was, of course, not then visible, seemed to show that it was a good one, but when we came to investigate with the aid of a spade we found that it was buried in gravelly soil. Deepening the hole by a foot brought us down to clay, and directly the earth plate was inserted into this reception at full loud-speaker strength was obtained.

It is surprising, too, to find what a difference a good earth makes to summer-time reception. The man whose earth is not up to the mark may obtain in winter time results almost or even quite as good as those of the fellow with a first-rate connection. But the bad-earth man begins to complain of an all-round falling off in signal strength, whilst the other fellow is still able to pull in stations all round his dials.

STILL GOING STRONG

THOUGH we are now well into summer, the number of foreign stations receivable is astonishingly large and, as I ventured to predict, signal strength is not declining generally to anything like the same extent as in previous years. There are, I think, two causes for this. First of all, sunspots are becoming less and less in number and in size, and, secondly, we have now so many super-power stations operating within the limits of the broadcast band. It is quite remarkable that so many of them come in well in broad daylight. Brussels No. 1 and Brussels No. 2, for example, I can receive at any time of the day when they are working. Hilversum is nearly as good, and there are many other stations one often finds coming through with very respectable strength long before lighting-up time. Even with a set of quite moderate size—that is, only one screen-grid stage—I find that I can bring in on any evening at least a score of stations whose transmissions come through so well that they are of real entertainment value.

NEXT YEAR IN EUROPE

I HAVE mentioned in these notes that we are in for a lively time on the broadcast band within the next twelve months, and almost every week fresh reports of great new schemes come in. Russia, as you know, will have about forty stations rated at from 50 to 500 kilowatts working on the broadcast band. Russia is a long way off, but Germany is a very near neighbour of ours. Germany has now only two stations of 75 kilowatts, but by the end of this year the number will be increased to seven and within twelve months it will have risen to nearly three times as many. Italy is not going to be left behind, France has a big building programme, Belgium is quite likely to add a few supers, and the medium-wave Hilversum may go much beyond his present 8.5 kilowatts. Poland, Sweden, Czechoslovakia, and several other countries have also big programmes.

MORE WAVELENGTHS?

EVEN if we make our receiving sets selective enough to effect a clean-cut separation between stations 9 kilocycles apart, there will most certainly not be room on the broadcast band for all the big stations of the near future. As no country seems willing to agree to restrictions in the matter of the number of these stations or as regards their output power, the only possible way out seems to be to allot more wavelengths to broadcasting. The most desirable of all wavelengths for broadcasting purposes fall into two bands. The first of these extends from about 300 to 700 metres; the second from 1,000 to 2,000 metres. At present there is no band that belongs exclusively to broadcasting, since shipping and commercial stations have wavelengths within the limits of both the medium-wave and long-wave bands.

There is a suggestion that strong efforts shall be made at the next International Conference to obtain a fresh allocation of commercial and broadcast wavelengths. Those between 200 and 300 metres, for example, are not ideal for broadcasting, though they might be used by morse stations. The disappearance of the spark transmitter, which by international agreement will shortly be accomplished, makes easier the path of those who have to deal

On Your Wavelength! (continued)

with the allocation of wavelengths. As most of us know by bitter experience, a spark transmitter cannot be sharply tuned. This has meant in the past that a pretty wide band had to be allotted to commercial and shipping transmissions. With the change over to tonic train and C.W., sharp tuning becomes the order of the day and narrower commercial wavebands should suffice. It is not, therefore, beyond the bounds of possibility that the broadcast band may in time extend from 300 to 650 or 700 metres and the long waveband from 1,000 to 2,000 metres, each band being entirely free from commercial interruption.

THE ONE SNAG

THERE is, though, one rather serious problem which will have to have a great deal of attention at no distant date. This is concerned with the terrible crop of harmonics produced by many commercial transmitters and not a few broadcasting stations. A surprising amount of the heterodyning and of the general mess-up that you hear in places below 300 metres is due to the second harmonics of stations with wavelengths between 400 and 550 metres. Vienna, for example, who works on a wavelength of 517 metres, has a nasty second harmonic on 258.5 metres, which interferes at times with both Leipzig and Hörby. And the long-wave stations are in some cases very bad producers of harmonics. Our own 5XX was at one time an offender in this way. I used to be able to obtain full loud-speaker reception of his fifth harmonic in broad daylight, and with a very sensitive set I once collected most of them up to the thirteenth. Much is done in the modern transmitters to prevent the production of harmonics, but the problem that they present is one which still calls for a full solution.

COMMERCIAL STATIONS

MANY of the commercial stations are still great offenders in the matter of harmonics. If you run over the broadcast band with a sensitive set you will find a good many patches where mush is greatly in evidence. This is largely a product of long-wave commercial harmonics and its effects upon reception can be very serious. Some stations, too, have powerful "direct" harmonics as opposed to mere mush. These are in some instances so strong that their signals are read just as easily on the harmonic as on the fundamental wavelength. Clearly, with the ether as crowded as it is, we cannot allow one station to occupy anything up to half a dozen wavelengths, and the business of harmonic suppression is exceedingly important.

WORTH TRYING

LUCKILY, we seldom suffer really badly from atmospherics in this country. You may hear Smith telling Robinson that atmospherics were appalling on the previous night; but Brown, who has lived in the tropics, merely smiles and remarks that those who live in England don't know what atmospherics are. Be that as it may, the tearing and crashing noises that they produce on occasion can be most annoying and sometimes quite bad enough to ruin one's pleasure in the programmes even of the local station. Here is an interesting point. Atmospherics consist of trains of heavily damped waves, usually of irregular form. The more efficient the aerial system, the worse are the effects that they produce by shock-excitation, and therefore the louder are the noises that you hear. A moment's thought will show that if you reduce the efficiency of your aerial tuning system you are likely to experience much less trouble through atmospheric interference. Here is a tip which I have found useful. Try it yourself and see how it works. The local station usually comes in so powerfully that you have more strength than you require; in other words, you have something to play with. You can therefore introduce damping deliberately into the aerial system without reducing your signal strength too much. There are two useful ways of doing this, both of which are worth trying if there is a good programme going and atmospheric interference is rather annoying.

TWO USEFUL TIPS

THE first method consists in using a much smaller aerial coil with, of course, a larger amount of capacity to tune it. If your set contains, as it probably does, a high-frequency transformer with aperiodic aerial tuning, this simply means using a transformer with much fewer turns on the secondary. Now, suppose that your local station comes in in the ordinary way with the tuning condenser so set that the parallel capacity is about .0003, what you need to do is to evolve a transformer which will bring in the same station with about three times the capacity in parallel. Wind one with fewer secondary turns and wire, say, a .0002-microfarad fixed condenser across it. You then tune in the station by means of the variable, and you will probably be surprised to find how greatly atmospheric interference has diminished. This method introduces damping by parallel capacity. Another way is to use a parallel resistance. Connect an ordinary resistance holder between the aerial and earth terminals of the set and try resistances of various values until you find one which cuts down atmospheric interference whilst still giving you adequate signal strength.

EASY CONSTRUCTION

Never use more wires than absolutely necessary in the construction of a set. Very often by careful placing of the parts you can cut out a number of leads. For instance, the coupling con-

denser shown here is placed directly by means of its soldering tags between the two holders, and no wires are needed. Small fixed condensers and grid leaks in clips can often be mounted in this way.

A MATTER OF VOLTS

I HAD a most extraordinary example the other day of the effect of the small increase in anode voltage on the power output. Theoretically, of course, the power output is proportional to the 5/2th power of the anode voltage, which is a mathematical expression meaning that the power increases a little more rapidly than the square but not as rapidly as the cube. If it obeyed a square law, then if the anode voltage were doubled the output would go up four times, whereas actually, according to the formula, it goes up 5.7 times.

What is not always realised is that this effect applies even for small increases of voltage. If the voltage is increased 10 per cent. the power output is increased 27 per cent., assuming that the grid bias has automatically been increased to compensate for the additional anode voltage, and that the input has also been increased up to the limit of the new value of grid bias. Now, a 27 per cent. increase in power is distinctly audible, but, of course, in the majority of sets an increase in anode voltage is not automatically accompanied by an increase in grid bias, this latter having to be adjusted independently.

TRYING A D.C. SET

IT so happened the other day that I was playing about with a D.C. mains receiver in which the majority of the voltage was dropped on a breaking down resistance, and this voltage drop was used for high-tension purposes. A small voltage was dropped on the filaments of the valves, and a somewhat larger portion (about 25 volts) was used for grid bias. Now, this particular receiver had been designed for 200 volts, and there was actually 175 volts on the anode, 6 volts on the valve, and 19 volts grid bias. The power output was reasonably good, and I was quite satisfied with the results, but I wanted to modify this set to suit a friend of mine whose voltage was 240.

Accordingly a small extra resistance was wound up dropping 35 extra volts, while the grid bias resistance was slightly increased to give a bias of 24 volts instead of 19. I may say that I made these alterations principally with the idea of preventing the valve filament from being overrun, because, of course, the values of the resistances were so proportioned to pass the exact current (actually a quarter of an amp.) through the valve filament. When I connected everything up, however, I was amazed to find that the set was distinctly more lively and was giving, appreciably greater punch. This was due to the increase in the anode voltage to 210 volts.

THERMION.

WORKING THE "B.B.C. SELECTIVE TWO"

Some useful information on getting the best results from the simple and ultra-selective two-valve receiver, constructional particulars of which were given in last week's issue

A GREAT point about the "B.B.C. Selective Two" is that it incorporates a "tuning sharpener" of a type recommended by the B.B.C. for getting the utmost selectivity with ordinary coils.

The special three-valver described elsewhere in this issue is, of course, an entirely different proposition for the man who is building a slightly larger set and wants to get the very best results in the way of tuning, purity (because of the bandpass arrangement), and sensitivity.

The filter circuit included in the B.B.C. recommended two-valver, though, is a novel means of using an additional coupled circuit to increase the natural selectivity of the Talisman dual-range coil used in the set.

It will be seen that the filter circuit is screened off from the main portion of the set and in order to get the best working of the filter it is essential that there should be no mutual coupling between the filter coil and the main tuning coil.

This is prevented in the set partly by the screening and partly by the fact that the axes of the two coils are such that mutual coupling is practically impossible.

In last week's issue recommended valves and battery values were given. It is worth noting that as an ordinary detector and power valve are needed in this set, there is no need to have anything very elaborate but if you are buying new valves then you should adhere to the recommended types in order to get the best results.

It is worth while spending a preliminary half-hour or so in getting the filter properly adjusted. Once the best values have been found then tuning is every bit as simple as that of a straightforward set and the selectivity is really amazing.

When setting up the filter in the first instance, make a note of these points. Having put a No. 50 or 60 plug-in coil in the single socket as explained last week, screw in the knobs of the coupling and pre-set condensers on the small side of the screen and then set the main variable condenser on the filter side to about the half-way position.

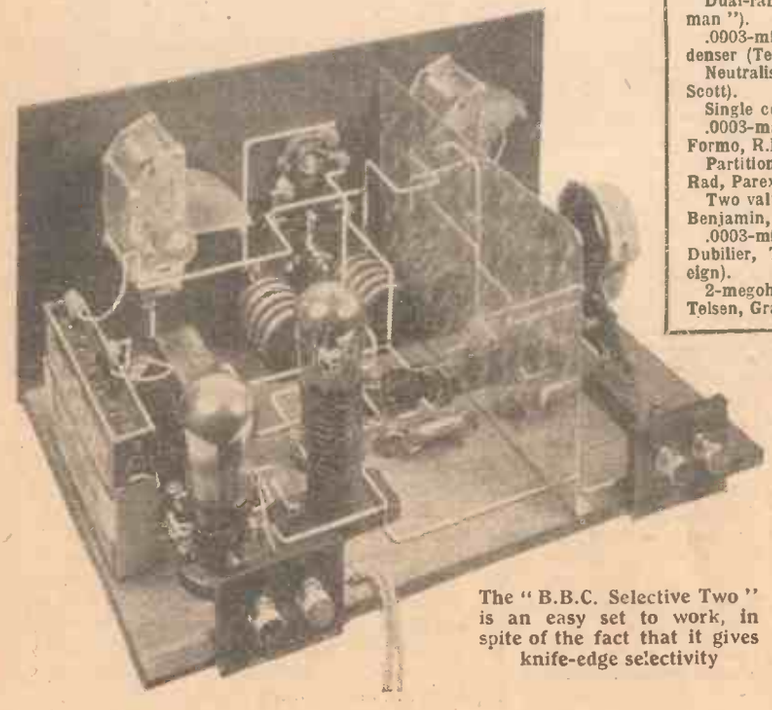
With the other condenser then tune in a station which normally forms a good reception guide. With the condensers at this setting there will probably be some interference. Bring the filter circuit main condenser into tune and readjust both condensers until the station is as loud as possible.

Now slack off the coupling condenser, but not beyond a point when volume drops off.

Additional selectivity can be obtained when necessary by slacking off the knob of the pre-set condenser connected to the aerial terminal, but it must be pointed out that alteration of this value will probably upset the relationship between the dial readings of the filter and main tuning condensers.

COMPONENTS REQUIRED FOR THE "B.B.C. SELECTIVE TWO"

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 in. (Readi-Rad, Parex, Peto-Scott).
Two valve holders (Telsen, Junit, W.B., Benjamin, Wearite, Burton).
.0003-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish, Sovereign).
2-megohm grid leak (Lissen, Dubilier, Telsen, Graham-Farish, Sovereign).
Grid-leak holder (Lissen, Wearite, Bulgin, Dubilier).
High-frequency choke (Lewcos, Telsen, Varley, Wearite, R.I., Burton, Watmel, Sovereign).
Low-frequency transformer (Ferranti type A.F.8: Telsen, Lissen, Varley, Lewcos, R.I., Burton, Voltron).
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).



The "B.B.C. Selective Two" is an easy set to work, in spite of the fact that it gives knife-edge selectivity

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Radio Normandie at Fécamp is collecting funds with a view to erecting a 25-kilowatt (aerial) broadcasting station at Bréauté-Beuzeville. It is stated that such a transmitter would give an adequate broadcast service to Normandy, Brittany and the adjoining provinces.

THE HOW AND WHY OF RADIO—XXXVIII

MORE ABOUT HOW THE VALVE WORKS

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

BEFORE beginners can hope to understand the many interesting facts regarding valves in the different parts of a modern set, it is essential to be able to distinguish quite clearly between the three main valve circuits.

Fig. 1 shows a normal three-electrode valve, consisting of a filament, grid, and anode, dissected at A, B, and C into its three constituent circuits.

At A is the filament circuit. This comprises a low-voltage battery across the two filament connections. It can be a 2-, 4-, or 6-volt battery, according to the voltage rating of the filament. The connection of the battery to the filament causes current to flow through the filament, thus heating it to the point where electrons—minute negative electricity charges—are thrown off into the space inside the valve bulb.

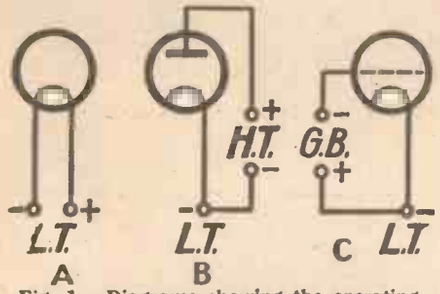

Fig. 1.—Diagrams showing the operating circuits of a valve

The amount of filament current that flows depends upon the resistance of the filament wire. With a 2-volt valve having a filament of 20 ohms resistance the filament passes .1 ampere. This can easily be worked out from Ohms Law. (See article No. 15 in this series.)

At Fig. 1B is shown the simple outline of a valve's anode circuit—a little more complicated than the filament circuit. It would be quite correct to trace the anode circuit thus: from the negative side of the filament, across the valve to the anode, through the high-tension battery from the positive to negative end and so back to the negative side of the filament.

Such a route indicates the real direction of electron movement, but it contradicts the convention that has become accepted to the effect that current flows from a point of high potential to a point of lower potential. So we had better consider the anode circuit as starting at the positive end of the high-tension battery, going through the valve to the filament and so back again to the anode, via the high-tension battery.

Just now we saw that the filament current is limited by the resistance of the filament; in much the same way the anode current is limited by the resistance of the valve. Perhaps it is not easy to see how a valve can have this sort of resistance, when there is no apparent connection between the electrodes. Actually there *is* a connection, namely the flow of electrons forming a conduction current from the filament to the anode.

The size of the electrodes and their distance apart, together with other constructional details of the valve, decides the resistance of the valve. We find that a low-resistance valve takes a large anode current. For example, a small power valve with a resistance of 5,000 ohms might take 10 milliamperes. As the valve resistance is increased, so the anode current is decreased; thus a 20,000-ohm valve might take only 1 milliampere anode current.

At Fig. 1C is shown the outline of a valve's grid-circuit. Here the grid is biased negatively but sometimes, as in a popular form of detection, the grid is biased positively. The important point is that current will flow in the external grid to filament circuit unless the grid is sufficiently negatively biased.

Since all the anode current depends on the electrons emitted from the filament, it follows that all electrons going to form a grid current must do so at the expense of the anode current.

The main function of the grid is to control the anode current flow, by helping or hindering the flow of electrons from filament to anode. The grid does this work by becoming alternatively positive and negative as the incoming signal is applied to it. For this controlling function, it does not matter whether the grid is at zero potential or at some negative potential. If the grid is made permanently negative by a bias battery as at Fig. 1C the incoming alternating voltage will simply add or subtract from whatever potential is on the grid and this will vary the flow of electrons just as if the grid were at zero potential.

From this it will be understood that we can make the grid as negative as is necessary to stop any positive signal voltage from making the grid actually positive. When the grid is prevented from becoming at all positive, grid current is also prevented, although the controlling action of the grid is still maintained.

A simple means of seeing how grid voltage affects anode current can be readily fixed up by the reader in accordance with Fig. 2. Here we have a valve with appropriate high- and low-tension batteries, arranged so that there is a milliammeter in the anode circuit and a grid-bias battery in the grid circuit. If a fairly low-impedance valve is used quite appreciable changes will be noted in the anode current as the amount of negative grid bias is varied.

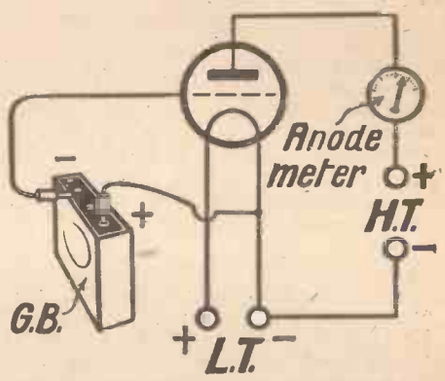

Fig. 2.—How the grid voltage affects the current flow in the anode circuit

HOTSPOT.

MAKING A FRAME FOR THE "CENTURY SUPER"

(*Continued from page 842*)

winding and No. 9/40 should be used for the long-wave winding.

For the medium-wave winding, for example, leave about 8 in. of wire to connect up to terminal 1 on one side of the connecting socket, put on ten turns on one side of one former, make a loop to connect up with the centre terminal 3, complete the winding by putting on ten turns on the other side of the former and connect up to terminal 2. This makes a total of twenty turns for the medium-wave winding.

The long-wave winding should be put on in exactly the same way, there being a total of sixty turns. Thirty turns should be put on each half of the winding and the centre tapping should be taken out to terminal No. 3.

The ends of the winding 1 and 2 connect with terminals 1 and 2 on the set, and centre tapping terminal 3 is similarly connected. It is advisable to make a note of which side of the connecting strip holds the sockets for the medium and long waves; otherwise there will be difficulty when the frame aerial is first tested in getting windings in the right direction for any station.

If this frame is made up exactly as described it will be found to tune very sharply and the aerial tuning condenser must be turned very slowly indeed as should be done with the oscillator condenser.

Condensers which have a large gearing reduction are a help in fine tuning, and in this connection it is interesting to note that Messrs. Jackson Bros. have produced for the "Century Super" a special condenser which has a gearing ratio of 1 to 40. These condensers, which are otherwise the same as those originally specified for the "Century," cost 10s. 6d. each, and there is no doubt but that this large gearing reduction makes for easy tuning.

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

JACK PAYNE

THE COMMAND PERFORMANCE

"WHAT do you think of the Rumba?" Jack Payne asked me as I watched his boys in No. 7 studio.

"I'll buy it," I replied.

It seems that the Rumba is a new kind of tango-tied rhythm. Jack doesn't care for it much; nor do I.

That is why, I suppose, he played "The Peanut Vendor."

◆ ◆ ◆

"The money you're making now," I said to him, "means you will retire soon."

"How would you spend your time?" somebody asked.

"Why not take up *music*?" I said to Jack.

He laughed.

"A palpable hit," he said.

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I like Jack better than I like his music. Some of the comedy stuff is good. But many of the newer numbers, alas, are cheapish; and I haven't hesitated to tell him so.

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One of the best things the B.B.C. achieved in its early days was in selecting the right sort of announcers. There has been a sad falling away. Announcers come and announcers go, but none reach the level of Uncles Arthur, Rex, and Caractacus.

I prefer the latter's announcing to his plays.

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The opera question is going to be a big one. We are paying heavily for transmissions; but a good many are not very suitable for transmissions. The *Rose Cavalier*, for instance, must have been well-nigh unintelligible to listeners.

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Late as it is, I must not forget to say a word or two about the transmitting of the Royal Command performance. Our friends the Buggins family started off well, but, alas, overdid it! They impinged too much and actually spoilt our hearing of the best turn of the evening. Mark you, I think the Command show altogether is always rather over-valued. Certainly, as far as broadcasting is concerned, the average vaudeville programme from the studio is better.

I suppose it is the general atmosphere that enhances its value. Marie Burke's was one of the least suitable voices for the opening "National Anthem." Her vibrato hardly commends itself on normal occasions. Max Miller is a matter of taste. I saw him a few nights later at the Holborn and thought him vulgar. (So were many of the other turns.) The motoring sketch with Douglas Wakefield needed seeing.

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The only turn that came over well was the comedy piano and vocal act, and the opening of that was, as I said, spoilt by the Buggins' talk on fish and chips. Pity!

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"Chinese Moon Party" aimed high and needed concentration, which, alas, I was unable to give that night, owing to "company." As a change from variety, however, I listened to Olive Bloom, the pianist, playing with the B.B.C. Orchestra the symphonic variations by Caesar Franck! As a change, I say. And a darned good one.

An Impression of Rupert Hazel

OPERA TRANSMISSIONS

"THE FOREST"

The *Magic Flute* has such an absurd story that I wonder why Mozart troubled to put his scintillating music to it. Here again, unless the listener was quite conversant with the story, the broadcast of the second act from Covent Garden must have been lost on him.

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Tristan and Isolde has endearing music to "carry it." The story is the ordinary triangle with a faithless friend who informs the king of his wife's amour. The love-music is the greatest in the world.

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On Friday I counted seven talks. *Counted*, I said. I certainly didn't listen.

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The Forest, by John Galsworthy, is a play that appeals to me. I read it before listening—a course I commend to those listeners who can borrow or buy the book. Anything, of course, that Galsworthy wrote is worth listening to, and Dulcima Glasby, who adapted, and Howard Rose, who produced, did their work well. I should very much like to hear it again.

Broadcasts from the Moscow Trades' Unions studio are simultaneously transmitted on 1,304 and 50 metres. Plans for the development of the Soviet radio system call for eleven 100-kilowatt and thirty-eight 10-kilowatt transmitters to be in operation by the end of 1936. It is proposed to use the 500-kilowatt transmitter now in course of erection at Noginsk (near Moscow) solely for International propaganda. A new 75-kilowatt station is nearing completion at Kolpino.

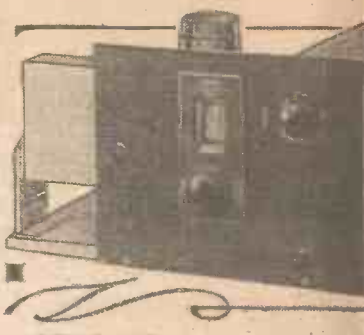
Some remark is being occasioned in Scotland, as elsewhere, by the varying nature of the penalties imposed on wireless "pirates" in different parts of the country.

It is argued by some Scottish critics that the chief engineer of the B.B.C. has confessed, in his recent talk, that the B.B.C. has no intention of attempting to provide any service for the Highlands and Islands of Scotland. They also contend that no real service is proposed for Scotland north of Oban and Montrose. The allocation of wavelengths for the existing Scottish stations is made another matter for complaint.

The SQUAR

A NOVEL SET, DESIGNED BY J. H. REY ING THE NEW SQUARE-PEAK COIL W IT IS FINE FOR DISTANCE-GETTING, FROM THE LOC

" Where the present set scores is in the remarkable selectivity . . . both the London stations tune in and out in a matter of ten degrees (at Elstree) even with a full aerial . . . in a final run over the dials I picked up



THE use of the mixed-coupled band-pass filter was discussed in last week's issue. By the judicious mixture of magnetic and capacity coupling a band-pass tuner can be arranged in which the selectivity is substantially constant over the whole wavelength scale. The new Varley coil is the first commercial coil to be produced on these lines and it has been incorporated in a simple three-valve set which is described herewith.

The conditions in the ether to-day are as good as they were some years ago and are approaching one of the regular cycles of good reception. Consequently comparatively simple receivers will pull in a number of stations if the tuning arrangements are sufficiently selective. In the present instance, therefore, a three-valve set has been employed using a screen-grid H.F. valve, a detector, and L.F. stage in which a pentode may be used if the reader wishes. Such a set will bring in a good selection of programmes, although, of course, the use of reaction is necessary, particularly on the more distant ones.

Remarkable Selectivity

Where the present set scores is in the remarkable selectivity. On any ordinary three-valve set at Elstree there is little hope of receiving anything but London. Even though the tuning circuits may be reasonably good, cross modulation is produced in the H.F. valve, and reception of any foreign stations is practically impossible if one uses a normal full-sized aerial. With this receiver both the London stations tune in and out in a matter of ten degrees even with a full aerial on, and in a final run over the dials I picked up twenty-five other stations without a trace of interference from Brookmans Park. I have no doubt this figure will be exceeded by many readers.

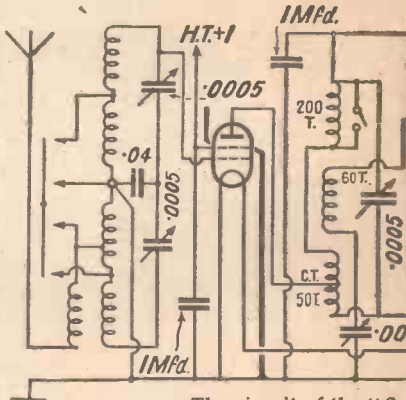
Perhaps a little more care in tuning may be required, for we are using a circuit which accepts only a very narrow band of frequencies, and the set is remarkably quiet unless it is actually tuned to a station. I have, however, spent some time on this particular set with the object of making it as simple as possible in operation, and I do not think that any serious difficulty will be experienced if the layout is followed.

As a matter of fact when the set was first constructed it did not behave at all nicely, and after I had looked into the matter I realised that this new coil requires to be treated with more respect than the average tuning coil. We are accustomed, for example, to place a tuner fairly close to a metal screen without worrying very much as to the possible loss of efficiency which may result from the eddy currents set up in the screen. In the case of this coil we cannot be so light-hearted, and particularly if we place the screen at one end of the coil only we shall throw it out of balance and the results will be very disappointing. Therefore, you will notice that the coil has been placed in a vertical position well away from any metal work. There is no copper foil on the baseboard and this must not be used, as you will find that bringing any sheet-metal within ½ in. of the end of the coil will cause a marked reduction in the signal strength. In order to mount the coil in this way and still operate the wave-change switch from the panel, I found it necessary to remove the metal back from one of the chassis-mount condensers. This is quite a simple operation.

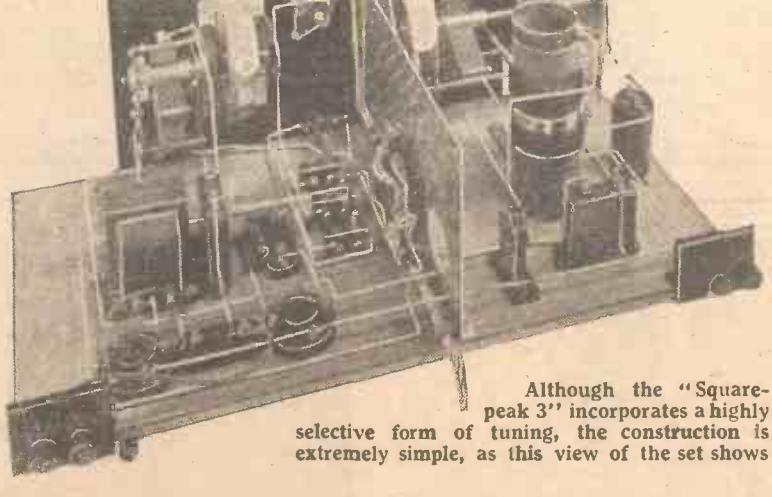
Valve Mounting

The H.F. valve is mounted horizontally, and is pushed through a partition screen which separates the H.F. grid circuits from the anode circuits. This screen, by the way, must not be allowed to touch the framework of the chassis-mount condensers, since it is actually at a slightly different potential, and if the two are allowed to touch it will short-circuit the .04 microfarad coupling condenser in the band-pass tuner.

Plug-in coils are used in the anode circuit. This was done in the interests of simplicity and also efficiency, for I found that without going to a certain amount of trouble I was unable to obtain as good results with a dual-range coil. Incidentally, this is rather surprising and suggests that there is something seriously wrong with the design of present-day dual-range coils. A simple push-pull switch serves to short out the long-wave coil when not in use.



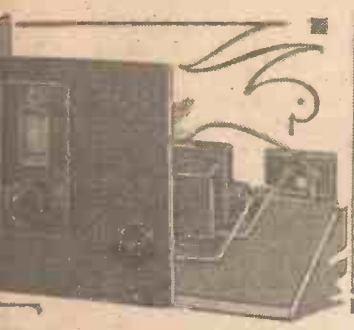
The circuit of the " Sq



Although the "Square-peak 3" incorporates a highly selective form of tuning, the construction is extremely simple, as this view of the set shows

COMPONENTS REQUIRED FO

Ebonite panel, 14 in. by 7 in. (Becol, Trelleborg, Potter).
Baseboard, 21 in. by 10 in. (Clarion, Camco).
Two-stage .0005-mfd. gang condenser with drum drive (J.B. " Chassimount," Lotus, Polar).
.0005-mfd. variable condenser with drum-dial (J.B. " Universal Log " and drum, Lotus, Polar).
.0003-mfd. reaction condenser (Readi-Rad, Bulgin, Telsen, J.B., Formo, Burton).
Filament switch (Bulgin, Wearite, Readi-Rad, Lissen, Junit, W.B.).
Wave-change switch (Readi-Rad, Wearite, Bulgin, Lissen, Junit, W.B.)
Horizontal mounting S.G. valve holder (Parex, Junit, H. & B., Wearite).
Two 4-pin valve holders (Wearite, Telsen, Lotus, Benjamin, Junit).
Varley Constant Square-peak coil.
1-meg. grid leak (Lissen, Graham-Farish).
Three single coil holders
.0001-mfd. fixed conde (Dubilier, T.C.C., Telsen, L
.0002-mfd. fixed condens sen, Lissen, Formo).
Special .04-mfd. fixed c LDAA).
Two 1-mfd. fixed conde Lissen, Formo.)
.25-mfd. fixed condenser(
Low-frequency transfo grand," Lissen, Varley, Burton, Voltron).
10,000-ohms spaghetti re Tunewell, Sovereign).
Partition screen, 10 by

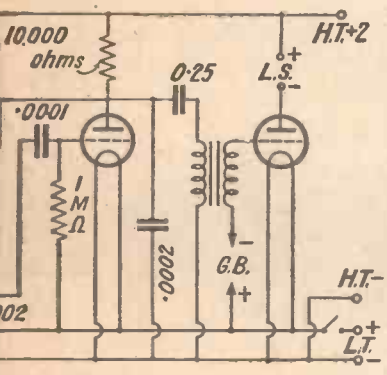


twenty-five other stations without a trace of interference from Brookman's Park . . . I have spent time on this set with the object of making it as simple as possible in operation."

RE-PEAK "3"

'NER, B.Sc., A.M.I.E.E., INCORPORAT-HICH GIVES AMAZING SELECTIVITY. AND THERE IS NO INTERFERENCE CAL STATIONS

The detector and L.F. circuits require no comment except to point out that a parallel feed system is used for the L.F. transformer to act as a partial decoupling and to avoid the passage of heavy current through the primary winding of the transformer.



uare-peak Three"

The actual de-coupling resistance is somewhat low, being only 10,000 ohms. This was done in order to maintain a high voltage on the detector and so minimise the risk of overloading.

A pleasing layout has been adopted. It was possible to bunch the controls together in the centre of the panel, and therefore the panel is only 14 in. long, whereas the baseboard is 21 in.

Construction is easy, particularly if you take advantage of the full-size blueprint which is available, price 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. You can, of course, work with the small reproduction of the full-size blueprint given here, which shows all the connections, but the novice will find it very handy to have the full-size chart, which can be used as a drilling and mounting template.

I hope that the apparent spare space will not tempt anyone to endeavour to reduce the size, because as I said before this new coil requires handling with respect and there is some danger that the results will fall short of the expectations unless the layout and spacing shown are adhered to.

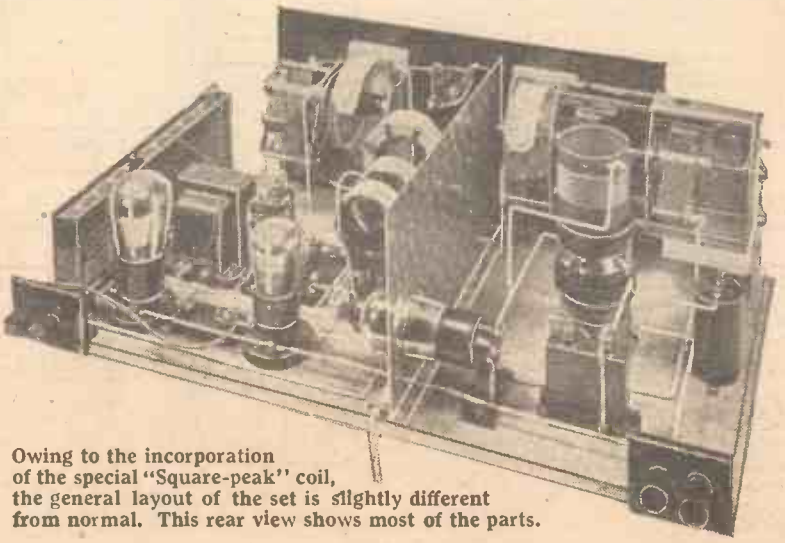
For the same reason it is desirable to use a really reliable gang condenser for the band-pass tuning. Unless this is done there is a danger that the two capacities will fall out of step as one goes round the dial, and it is hopeless to expect ganging under such conditions. As we have only a very limited band width it is clear that any failure to tune correctly will be fatal, the signal strength being reduced very considerably. Incidentally, it is rather curious to note that the sharpest tuning on this set occurs on the aerial dial, the tuning on the H.F. circuit being fairly broad.

It has not been possible to obtain quite a symmetrical panel layout owing to the height of the change-over switch on the band-pass coil. The whole panel, however, presents a balanced appearance and, moreover, the controls are evenly laid out with regard to operating. In marking out the panel, first of all drill the holes necessary for the drum dials. These are situated 3 in. on each side of the centre line of the panel, and two holes are drilled on this line, one coinciding with the top of the escutcheon plate and the other with the bottom. Two screws may now be inserted temporarily in order to bolt the back plates on to the panel. The square hole can then be marked out by scribing through on to the panel, or if desired the hole may be cut to shape with the back plate still in position. The best way to do this is to drill a number of holes about ⅛-in. diameter as close together as possible all round the rectangular portion to be cut out. The necks in between the holes can then be cut through with a hand saw and this will remove the whole of the centre portion. A file will then smooth up the rough edges until a neat rectangular hole is the result.

Panel Mounting

One more hole will be required at the bottom for the operating spindle of the condensers. The only other holes required on the panel are those for the switches and the reaction condenser which can quite easily be placed in position as shown. Be careful to get the hole for the extension rod of the band-pass coil switch at the correct height.

The right-hand condenser is mounted directly on the panel as also are the reaction condenser and the push-pull switch immediately underneath it and the on-off switch at the right hand of the panel. The chassismount condenser is supported on brackets from the baseboard. These brackets are provided with a number of holes, and the bottom pair on each bracket were used in the present instance. Having mounted the brackets on the end of the condenser, with the feet turned inwards, the condenser should be allowed to stand in position on the baseboard with the spindle projecting through the hole in the front panel, which has already been cut to receive it. The exact position of the two holes may then be marked and the screws may be inserted. If necessary, having marked out the positions, the condenser



Owing to the incorporation of the special "Square-peak" coil, the general layout of the set is slightly different from normal. This rear view shows most of the parts.

OR THE "SQUARE-PEAK 3"

bilier, Telsen, Watmel,
(Lotus, Lissen, Wearite).
nser, with series clips
issen, Formo).
er (Dubilier, T.C.C., Tel-
ondenser (Dubilier, type
ensers (T.C.C., Dubilier,
T.C.C., Dubilier, Lissen).
mer (Telsen "Radio-
Lewcos, Ferranti, R.I.,
istance (Lewcos, Bulgin,
6, with hole for S.G. valve (Parex, Wearite, Peto-Scott, Readi-Rad, H. & B.).
Two terminal blocks (Junit, Lissen, Belling-Lee).
Five-way battery cord (Bulgin, Lewcos, Belling-Lee).
Four terminals marked: Aerial, Earth, L.S.+, L.S.— (Belling-Lee, Eelex, Clix).
Connecting wire (Glazite).

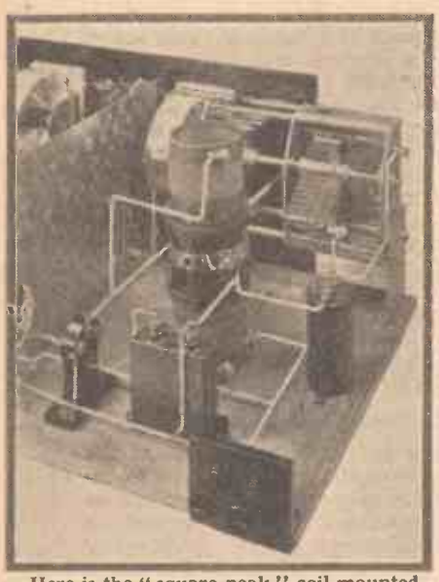
RECOMMENDED ACCESSORIES

Three plug-in coils: 50 "centre-tapped," 60 and 200 (Tunewell, Lewcos, Atlas).
120-volt H.T. battery (Ever-Ready, Lissen, Pertrix, Drydex, Fuller). 9-volt G.B. battery (Ever-Ready, Lissen, Pertrix, Drydex, Fuller).
2-volt accumulator (C.A.V., Fuller, Exide, Ever-Ready).
Loud-speaker (B.T.H., Amplion, Mullard, Blue Spot).

THE "SQUARE-PEAK 3" (Continued from preceding page)

may be removed and gimlet holes made in the baseboard first.

The next operation is the mounting of the bracket for the coil. This must be very carefully centred to coincide with the hole



Here is the "square-peak" coil mounted in the set

drilled in the panel through which the switch rod has been pushed. The bracket may then be screwed down in such a position that the coil, when mounted, occupies a position in about the middle of the baseboard as shown. An extension rod for the switch is provided with the coil, one end of this containing a small length of threading. It will be necessary to cut about half an inch off and then to screw the extension piece on to the end of the normal switch by means of the coupling collar provided. It is advisable to do this, and to link up the switch rod to the coil before finally screwing down the bracket.

Preliminary Testing

The remaining portion of the construction requires no comment. Details as to how to get the best results from the receiver will be given next week.

A few remarks may be made for the benefit of those who have finished the receiver before next week's article appears. The high-tension voltage should be 120 or more. This voltage is applied to all the valves, the detector voltage being broken down by virtue of the 10,000-ohm resistance so that there is 70 to 80 volts actually on the anode of the valve. I used a Cossor detector valve in this position, as I found that it gave me the best reaction and the loudest signals. Any valve having L or HL characteristics will be suitable in this position, however, the valve being preferable on account of the fact that it will handle more grid swing without overloading.

A signal of 3 volts or so can safely be handled by a detector valve operating under the conditions provided in this receiver, and unless one is living very close to a broadcast station, the voltage is not likely to exceed this value.

The disadvantage of using an L valve in the detector stage with the average set is that the L.F. transformer following the detector tends to saturate. This, of course, is obviated in this present set by the use of a parallel-feed system, so that there need be no fear in this direction.

The screen-grid valve receives the full high-tension voltage, while the screen-grid itself is fed with a separate H.T. tap. This may be adjusted to the value recommended by the maker, and if necessary altered by trial when the set is being tested out. Alternatively, the screen-grid voltage may be fed from the full H.T. through a variable resistance such as a Volustat, which enables the best operating point to be obtained.

Volume Control

I found when using the receiver, however, I was able to obtain quite a satisfactory volume control by mistuning the detector.

The very sharp band-pass characteristic of the aerial tuner does not permit any interfering stations to come through, even if the detector is mistuned slightly, so that it gives quite a satisfactory volume control and avoids any liability to cross modulation, which is always present if one varies the sensitivity of the H.F. stage by reducing the screen-grid voltage.

In the output stage use a good power valve or a pentode. While a pentode will give louder signals on the distant stations, there is more likelihood of its being overloaded on powerful local signals.

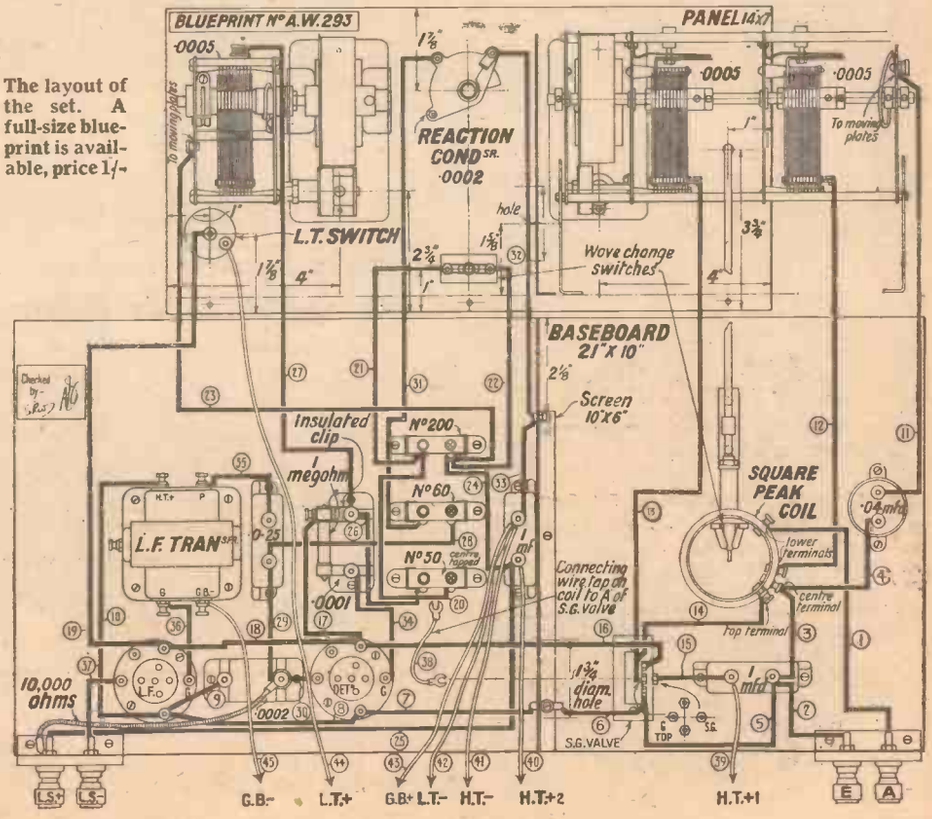
The detector, as we have seen, will carry 3 volts H.F. and this delivers a voltage of 20 or more to the output valve. This, of course, only applies when the detector is fully loaded, but it will be understood that under such conditions a pentode will overload very seriously. The best valve to use, therefore, is a good super-power valve capable of taking a grid swing of 15 to 18 volts and which will handle a large input and will be more generally satisfactory.

I found that the loud signals in this set were not confined to the local stations, as many foreigners came in at considerable volume and indeed with such clearness and freedom from mush that I had a certain amount of difficulty in deciding whether they were foreigners or local stations!

London readers should note that the "Square-peak 3" is on view in the Radio Department windows of Messrs. Selfridge & Co., Ltd., Oxford Street, London, W.1.

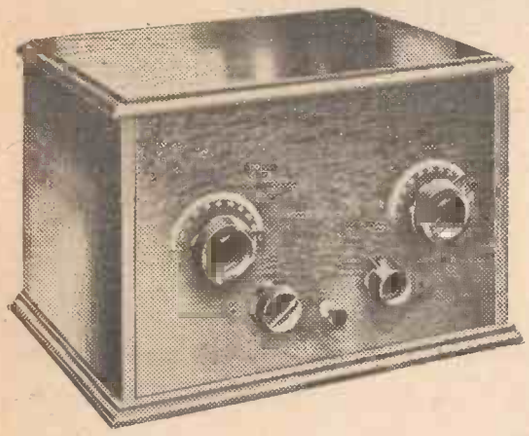
REACHING OUT

THOSE enthusiastic amateurs on the other side of the "Herring Pond," Eric H. Palmer and Junior, are getting fine results from 5SW, and according to their reports this station is getting good reception now despite the longer daylight hours. Just recently Eric senior, enjoyed a Jack Payne programme and then got through to a British amateur, G2VQ, and told him how much he appreciated it. "Just been listening to Jack Payne," said Palmer. "So was I. Pretty lively, eh?" said G2VQ from London across the Atlantic. "It's a fine moonlight night here, how's the weather over there?" Palmer sent back the message that it was a nice bright day in America! It's really wonderful what these amateur transmitters do on the short waves.

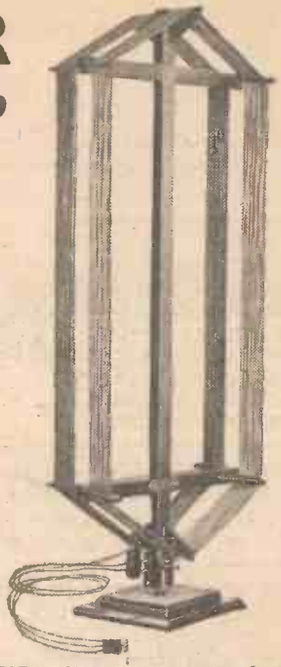


The layout of the set. A full-size blueprint is available, price 1/-

SEND TO READY RADIO FOR YOUR "CENTURY SUPER"



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



Can be obtained from your local dealer.

THE CENTURY SUPER
Completely assembled with valves, cabinet and wound frame aerial, ready for use and aerial tested ... ... Price **£14:10:0**
or 12 monthly payments of 26/6

"THE SQUARE PEAK THREE"

	£	s.	d.
1 Ebonite Panel, 14 in. by 7 in. by $\frac{1}{4}$ in., drilled to specification		4	6
1 Baseboard, 21 in. by 10 in.		1	5
1 Jackson D.2 Chassimount .0005-mfd. condenser	1	6	6
1 Jackson .0005-mfd. Universal Log Condenser, with junior drum drive		16	6
1 Readi-Rad .0003-mfd. Brookmans Condenser		3	6
1 Readi-Rad Filament Switch			10
1 Readi Rad 3-point Wavechange Switch ...		1	6
1 Junit S.G. Valve Holder		1	9
2 Telsen 4-pin Valve Holders		2	0
1 Varley Constant Square Peak Coil		15	0
1 Readi-Rad 1-megohm Grid Leak			10
3 Readi-Rad Single Coil Holders		2	6
1 Dubilier .0001-mfd. Fixed Condenser, with series clip		2	2
1 Readi-Rad .0002-mfd. Fixed Condenser ...			10
1 Dubilier .04-mfd. Fixed Condenser, type 9200		2	0
2 T.C.C. 1-mfd. Fixed Condensers		5	8
1 T.C.C. .25-mfd. Fixed Condenser		2	3
1 Telsen "Radiogrand" L.F. Transformer ...		12	6
1 Readi-Rad 10,000-ohm Link Resistance ...		1	0
1 Readi-Rad Screen, 10 in. by 6 in., with S.G. hole		2	6
2 Readi-Rad Terminal Blocks			6
4 Belling-Lee "R" Terminals: A, E, L.S.+, and L.S.—		1	0
1 Bulgin 5-way Battery cord, B.C.3		1	9
3 Lewcos Coils, 50 C.T., 60 and 200		13	6
1 Packet ReadiRad "Jiflinx" for wiring ...		2	6
TOTAL (including all necessary Coils)		£6	5 0

KIT A - - £6:5:0
Or 12 equal monthly instalments of ... 11/6

KIT A
(Less Valves and Cabinet, but including Wound Frame Aerial.) **£6:18:6**
or 12 equal monthly instalments of **12/8**

KIT B
(Including Valves, Wound Frame Aerial, but less Cabinet.) **£10:14:6**
or 12 equal monthly instalments of **19/8**

KIT C
(Including Valves, Cabinet and Wound Frame Aerial.) **£11:9:6**
or 12 equal monthly instalments of **21/-**

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

Cash, C.O.D. or Easy Payments

READY RADIO DUAL RANGE FRAME AERIAL
Centre tapped. Wound to "Amateur Wireless" specification. Price complete **£1:0:0**

"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 Heterodyne 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 "Jiflinx" 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

IMMEDIATE DESPATCH ORDER FORM

To: Ready Radio (R.R. Ltd.), 159 Borough High St., London Bridge, S.E.1

CASH ORDER. Please despatch to me at once the goods specified for which I enclose payment in full of £ .....

C.O.D. ORDER. Please despatch to me at once the goods specified for which I will pay in full the sum of £ .....

HIRE PURCHASE ORDER. Please despatch my Hire Purchase order for the goods specified for which I enclose first deposit of £ .....

Cross out whichever does not apply.

Name .....

Address .....

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KIT REQUIRED .....

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Your goods are despatched Post Free or Carriage Paid.

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All your goods are very carefully packed for export, and insured, all charges forward.

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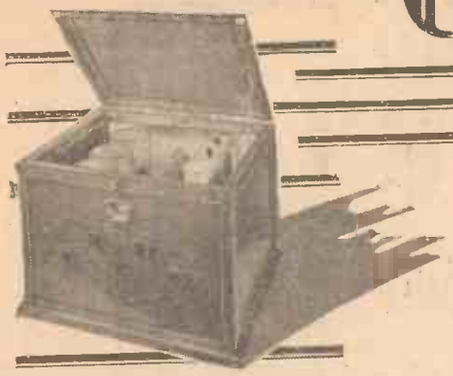
SETS OF DISTINCTION

COSSOR COMMANDER FOUR VALVER



Makers: A. C. COSSOR LTD. Price: £14: 14 : 0

AMONG factory-built sets there is a very marked absence of four- and five-valvers for battery operation. The average set maker seems content to stop short at the three-valver, comprising the ever-popular though by no means final combination of high-frequency amplifier, detector and power output. One or two firms have shown more initiative in producing sets with two high-frequency-amplifying stages.

Such firms are, undoubtedly, to be thanked for thus providing sets that can effectively cope with modern selectivity problems. Of course, multi-valve sets are available in plenty for mains operation, but unfortunately the majority of listeners have no mains supply and must, therefore, put up with battery sets.

An Efficient Circuit

One of the exceptions that prove the rule among battery sets is the Cossor Commander, with a four-valve circuit consisting of two screen-grid high-frequency amplifiers, a detector and a transformer-coupled power valve. One of the arguments advanced against multi-valve battery sets is that with more than three valves the anode-current consumption is so excessive that battery costs are prohibitive. But the increase in anode-current consumption noted when an extra stage of high-frequency amplification is added to a standard three-valver is quite negligible, being usually only one or two milliamperes.

I think it is obvious that all but the simplest two-valvers need double- or treble-capacity batteries. As the Cossor Commander employs a P2 type of power valve, giving ample undistorted output, the total anode-current consumption of the four valves is naturally too much for a standard battery. I found it was 14 milliamperes.

One of the advantages of using two high-frequency amplifying stages is increased selectivity without loss of quality. For the two high-frequency valves are used to couple together three tuned circuits. While each tuning circuit can be designed to avoid high-note loss, by making each one only moderately selective, the overall selectivity obtained from the series of three tuned circuits is most marked, unless the high-frequency valves are giving excessive amplification.

Some of my test readings will indicate the measure of selectivity obtainable from the Cossor Commander. London National was tuned in at its maximum at 22 degrees and was entirely cut out at 17 and 27 degrees. There was thus a spread of only 10 degrees for a very powerful station.

Readers who compare the readings given in these test reports may sometimes wonder why a set with three tuned circuits appears to be no more selective than a set with one or two tuned circuits. The point is that the selectivity obtained with the three tuned circuits is accompanied by much better quality than can possibly be achieved with more simple sets.

London Regional was eliminated just as easily as the National. It was at its maximum at 53 degrees and was cut out at 46 and 56 degrees, again indicating a spread of only 10 degrees. From these readings it will be seen that there is a 19-degrees "zone of silence" between the limits of audibility of the National and Regional transmissions. I was able to get seven stations at good strength between the two London stations and quite free from interference.

A rear view of the Cossor Commander: note the ample battery space and efficient screening

When tuned to the long waves the Cossor Commander brought in Radio Paris and Eiffel Tower perfectly free from Daventry 5XX. But I was unable to get Zeesen clear of interference.

Some idea of the disposition of foreign stations around the 100 degree tuning dial can be gained from the following extracts from my log. Brussels No. 1 came in at 88 degrees, North Regional, 82 degrees; Langenberg, 80 degrees; Midland Regional, 64 degrees; London, 53 degrees; Hilversum, 35 degrees; and London National, 20 degrees. These and many other stations were received at excellent loud-speaker strength and unusually good quality.

One of the best features of the set is the strength with which long-wave stations are brought in. Huizen at 93 degrees and Kalundborg at 40 degrees were received at better strength than usual.

It was quite a treat to hear such good quality on a battery-operated set. No doubt, the three tuned circuits contribute to this good feature although we must not forget that a Cossor P2 power valve is used in the output stage.

Controls are notable for their straightforward layout. Single-knob tuning is the big feature—obtained by a robust three-gang condenser. One knob simultaneously tunes the three separate tuned circuits as well as the tuning dial, which is engraved in degrees from 0 to 100.

Near the knob for tuning is a knob for reaction. This provides a surprising amount of increased strength when tuning foreign stations. On the extreme left is the wave-change switch knob. This has an exceptionally precise action, due to the ganging of three separate tumbler switches underneath the chassis. Another very good control is the knob on the extreme right for volume.

This is a low-frequency control and reduces the volume of even the strongest signal—to inaudibility if desired. There is still another control knob, mounted on the left-hand side of the cabinet. This controls the variable condenser in the aerial lead and I found it especially useful in avoiding local-station swamping.

From my tests I have no hesitation in saying that the Cossor Commander is a well-designed four-valve battery set, fully capable of coping with modern selectivity requirements and of delivering excellent quality of reproduction from innumerable home and foreign stations.

Notes from the Set-makers

Following my recent test report on the Ferranti metal console I have received a letter from the Radio Sales Manager of Ferranti Ltd., telling me of a feature just added to this excellent set.

By tapping the mains on to the aerial coil, through a condenser the makers now utilise the mains as an aerial. This provision enables the set to be taken from room to room and used without any connection to the ordinary and earth system.

The mains aerial connection should prove very useful listening on this set to powerful transmissions such as Brookmans Park and Moorside Edge.

From the General Electric Co., Ltd., I have received advance information of a new Gecophone set, a six-valve super-heterodyne tuning from 13 to 720 metres.

"Century Super" Success

SIR,—I have now had the "Century" going for nearly a fortnight, built up according to your description, but with a slight difference in layout. With a frame aerial the performance is wonderful, but using my old outside aerial (40 ft. high and 60 ft. long), it surpasses my most ambitious hopes.

I have joined the two wires which used to lead to the ends of the frame to a coil holder, and inserted a two-pin coil (60 for medium, 250 for long, 9 for ultra short), the lead which used to go to the centre of the frame now goes to the centre tap on the coil, and the aerial is placed on one terminal of the coil holder.

The stations come in so strongly that I have had to fit a volume control in the output stage. The selectivity has not suffered at all. I can still separate Midland Regional from Sottens, Mühlacker from London Regional, and, more remarkable still, Hilversum from Turin—these last two have not 9 kilocycles between them. My list of stations is easily one hundred (and I have not mistaken the alternative position on the dial for another station). During daylight hours just after lunch I can put any of the stations now mentioned at good strength on the loud-speaker. Brussels No. 1, Langenberg, Rome, Toulouse, Barcelona, Mühlacker, Brussels No. 2, Strasbourg, Hilversum, Cologne, Cork, Dublin, Belfast, and Leeds, as well as the British stations. Of course, all the long-wave stations come in at full strength.

At night the foreign stations roll in at every degree on the dial. It is easily the best I have made or even heard and the quality is far above the average.

On the ultra short waves, W2XAF and W8XK are often as loud as the locals and "Amos'n Andy's" escapades are followed by us practically every night. Rome, Zeesen, PCJ, Nairobi, the Vatican, Moscow, and countless amateur stations from France, our own country, Germany, Spain, Portugal are heard at all times of the day and night.

My valves are: First detector, Triotron SD2, second detector, Triotron SD2, oscillator, Triotron TD2, screen-grid Mullard and Mazda, power-valve, Mazda P240.

In conclusion, the "Century Super" seems to have done away with the necessity of any conference as to the limitation of power and the reshuffling of wavelengths.

Many thanks to your staff, Mr. James, and the makers of the coils for combining forces and producing *The Set of the Century*.

N. M. (Sparkbrook, Birmingham).

"Hotspot" Disputed

SIR,—"Hotspot," describing the electron in a recent article, states that an electron is not matter.

If an electron is capable of being weighed, is it not matter?

Recent information tells us that science does not know the structure or the materials which go to the making of electrons and protons, but it does know their sizes, their masses, and the amount of energy associated with each of them.

From figures recently published we are told that the proton is 1,845 times heavier than the electron, although the electron is much larger in radius. It is also assumed that both particles are roughly spherical, and it has been suggested that the electron is a small kind of bubble and that the material scooped out from it went into making the proton.

It is well known that electrons and protons accumulated in a certain way will form inorganic matter, while if accumulated in some other way will form living and reproductive cells, in fact they are the bricks of which everything is built. An electron possesses a certain amount of mass or inertia and a force is necessary to increase its velocity or accelerate it. When a body is set into motion, a certain amount of energy is expanded during the process and the energy is stored in the moving body. Energy in this form is known as kinetic energy and is proportional to the mass of the body and to the square of the velocity.

In the case of the valve, the energy coming from the H.T. battery is employed in accelerating the electrons emitted from the filament. By the time that the electrons reach the anode they have acquired an enormously high velocity, they collide with and are brought to rest by the anode itself, giving up their kinetic energy which is converted into heat, causing the anode to become red hot in some cases. If an electron therefore possesses radius and mass, and is capable of storing kinetic energy, is it not matter? H. B. H. (Leeds).

"Century Super" and Pick-up Wiring

SIR,—I am building the "Century Super" and wish to use a gramophone pick-up with it. Can you advise me of the necessary wiring connections to enable me to carry out the above slight alteration?

G. D. (Essex).

Mr. James does not personally recommend the use of a pick-up with the "Century Super," but for your information we give the point-to-point wiring alterations to enable you to carry out the proposed modification. Disconnect wire No. 26 in the wiring plan and then add a two-pole change-over switch to the panel. You will also need to arrange a 50,000-ohm potentiometer on the panel to act as a volume control for gramophone. Connect the grid terminal of the second detector to the lower centre arm of the switch and take the upper centre arm of the switch to the L.T. switch wire No. 43. Take the right-hand lower terminal of the switch to the grid-leak-wire No. 27, and take the left-hand lower switch terminal to the centre terminal of the volume control. The two outer terminals of the volume control should be connected to the two terminals of the pick-up. Now disconnect wire No. 43 from the oscillator-valve holder and connect the wire to the terminal of second detector to which is connected wire No. 20. Disconnect wire No. 19 altogether and connect a further wire from the upper right-hand terminal of the switch to the terminal of the oscillator-valve holder to which wire No. 43 was originally connected. With the switch-arm over to the right, the set is switched for radio. With the switch arm over to the left, the set is switched for gramophone, and the valves not in use are switched off.—ED.

Over-running Valves in Mains Sets

SIR,—I have a home-made mains set in which I use two mains-type valves and two directly-heated power valves in push-pull. All valve heaters and filaments are supplied from a mains transformer delivering 4 amperes at 4 volts. After three weeks working my power has gone off to a mere whisper. I tried other valves and find that my first two power valves were useless. These consume a quarter of an ampere each, so I suppose I have damaged the valves in some way or other. Can you explain how this can have happened and how I can remedy the trouble.

J. D. (Croydon).

If your filament secondary to your transformer supplies 4 amperes at 4 volts and you have two mains valves and two directly-heated power valves consuming a total of 2½ amperes, then you have an excess current of 1½ amperes at 4 volts to dissipate. It is this extra power which has over-run your power valves and it must be absorbed by artificial means if you are to save further valves from early decease. You should introduce a resistance across the secondary terminals of your transformer which will absorb the excess amperage, and the method of determining a suitable resistance is to divide the voltage developed across the secondary by the excess current in amperes, in your case $4/1.5=2.66$ ohms. A variable resistance of 3 ohms maximum, capable of carrying 1½ to 2 amperes without overheating, is what you require. Reference to any standard resistance wire tables will enable you to determine a suitable gauge of wire for your needs. Eureka resistance wire should be used for the purpose.—ED.

A Noisy Portable

SIR,—My five-valve portable set, which has in the past behaved splendidly, has now developed a crackling noise which I cannot cure. I have renewed the H.T. batteries, tried an outside speaker, and gone over all connections for a fault. I have even replaced the grid-bias battery, but the crackling still persists.

S. B. (Brighton).

It appears that the primary winding of one of your L.F. transformers has become broken or fractured. We suggest you replace your L.F. transformers or have both tested through for continuity. If you have only one transformer and one R.C. coupling for your two L.F. stages, possibly the insulation of the coupling condenser in the R.C. unit may be defective.—ED.

WE PAY HALF THE COST OF YOUR LOUD-SPEAKER —IF YOU BUY A VOLTRON KIT-SET

It is no secret that in the summer, sales of radio apparatus tend to decrease. In spite of this, sales of Hornets are increasing to such an extent, that even an increased staff is forced to work overtime in order to meet the demand.

Now, to press the advantage home, to get to a wider public, and to persuade you not to delay buying your wireless set, we introduce an offer the like of which has never been known in the radio trade. Go to your dealer to-day and buy a Hornet or a Dynaplus kit set. With it you will get avaluable coupon worth 7/6. Send this coupon to us together with a postal order for 7/6 and we shall send you by return one of our Standard Hornet Loudspeakers as sold in the shops for 15/-. Do not delay. This is a genuine offer, open for a limited period only, and will not be repeated.

HORNET CONE LOUD-SPEAKER
For Punch and Purity of Tone. **15/-**
Code : TENOR

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Address your telegram to Voltron, Queensway, Ponders End. Then give the code word NYCAB, and your name and address. The telegram should read as follows :

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NYCAB, J. Jones, 10 Brown Street, London.

If you wish to avail yourself of our special Loud-speaker offer, add the code word RETON to your telegram.

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The Hornet Two-valve Kit Set has met with instantaneous success. AMATEUR WIRELESS last week were enthusiastic in its praise. Extreme selectivity, long distance capabilities and ease of assembly are the outstanding features.

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★ DYNAPLUS TRANSFORMER

The greatest Transformer value ever offered to the radio public **6/9**

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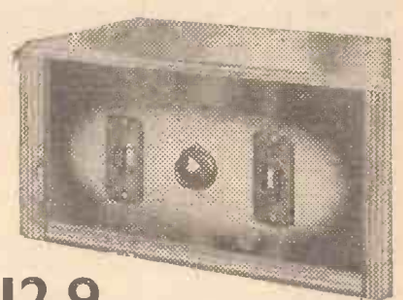

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Complete Kit of Parts less Valves and Cabinet.

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Complete Kit of Parts including Valves and Cabinet. **£6.6.0**

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Voltron Dynaplus Screened 3

Leading technical authorities are now agreed that the Dynaplus is the most efficient screened 3 receiver available to the public.

Owing to the improved 1931 coils, selectivity has been still further increased and with no loss of sensitivity.

Its long distance capabilities are confirmed by the *Daily Express* Wireless expert who received 'thirty stations at full loud-speaker strength when only four miles from Brookman's Park.''

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

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 Handy Terminal Cleaner

A NEAT little accessory which will appeal to many readers is the Coney terminal cleaner. This is exceedingly simple and yet effective. It consists of a piece of corrugated steel having a handle at one end, and a hole at the other. The terminal nut on the accumulator is removed and this cleaner is inserted so that the hole fits over the top of the terminal. A spring-washer is then placed over the top and the nut is loosely screwed on. By rotating the terminal cleaner, the edges, which are sharp, cut into the corrosion and dirt on the surface of the terminal and burnish it, leaving a clean surface which will make a good contact.

The device saves all the trouble of fiddling about with a penknife, which is not only unsatisfactory from the accumulator's point of view, but harmful to the knife!

A few turns with this simple device, which sells at 4½d. only, overcomes all the trouble.

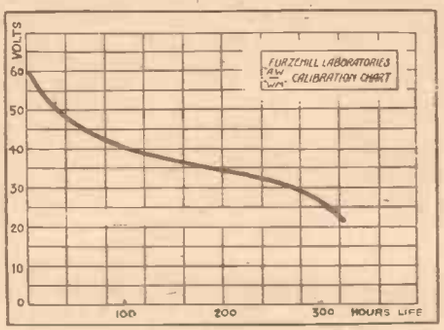
Ediswan H.T. Battery

THE new Ediswan battery which has been received for test this week appears to be of particularly good performance. The battery itself measures 8½ in. by 3½ in. by 3 in. high, and is housed in an attractive cardboard carton, access to the tappings being attained through holes in the top. This battery, therefore, is somewhat smaller than the average, but it seems to have a performance distinctly above the usual run.

The battery was discharged through a constant resistance, the discharge commencing at 7 milliamps and continuing until the voltage had dropped to half. This occurred after 280 hours, which is equivalent to a milliampere-hour capacity of nearly 1,460. We have got used to finding our arbitrary figure of 1,000 milliampere hours handsomely exceeded, but it is not often that we find a battery which gives nearly 50 per cent. in excess of the rating.

A newcomer to the ranks of H.T. batteries—the Ediswan

The voltage falls somewhat rapidly for the first few hours, and then settles to a steady relatively slow falling off. This initial fall is, of course, responsible for the somewhat longer life obtained from the battery, since the current drain was only 4 to 5 milliamperes for the greater part of the time. There is no doubt that good materials have been used in the battery and it should give long and useful life.



The good performance curve of the Ediswan H.T. battery

Wearite Earth Tube

ONE of the difficulties in obtaining a good earth arises from the trouble of making a satisfactory connection to the earth tube. For the best results the earth tube should be in a damp locality and this, unfortunately, is very conducive to corrosion, so that if one is relying on a screw joint or terminal connection of some sort there is a risk that a high-resistance fault will develop sooner or later. The best method, of course, is to solder the lead on to the earth tube, but this requires the application of large quantities of heat, particularly if any attempt is made to solder the wire on to the tube when it is in position in the ground, and as often as not results are worse than a screw joint.

Messrs. Wright & Weaire have brought out an ingenious tube which solves many of the difficulties. The general construction is similar to the ordinary form of earth tube. It consists of a copper rod perforated at intervals in order to allow free access of moisture. It is provided with an iron spear head at one end and a cap at the other, to take the blows in driving the tube in. About six inches from the upper end is a small cup, and an inch or two above this is a second smaller cup containing a ring of resin-cored solder.

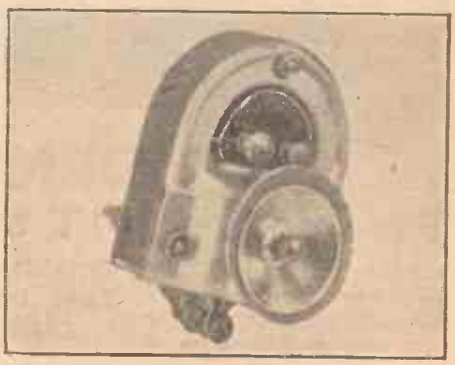
The earth tube is first driven into the ground in the required position. The end of the earth wire is then thoroughly cleaned and is wrapped around the tube and fitted into the top cup, with the ring of solder just on top of it. The bottom cup is now filled with methylated spirit, which is ignited. The heat generated by this melts the solder and so unites the end of the earth lead to the top of the tube in a thoroughly sound fashion.

We tried this device out and found that it worked admirably.

Triotron Speaker Unit

THE Triotron loud-speaker unit tested this week is a compact, well-made instrument of the four-pole balanced-armature type. The so-called multi-pole type of construction as used in many of the new loud-speaker units, is employed. An adjustment is provided at the base of the unit for tensioning the armature and thus avoiding rattle. A large magnet is employed, while the whole of the mechanism is covered in by a pressed metal shield, thus preventing buzzing due to extraneous matter such as dust, etc., getting between the pole pieces of the armature.

On test the output was fairly uniform from 3,000 to 100 cycles, resonances appearing at 2,500, 1,800, and 150 cycles. The quality was up to standard for this type of loud-speaker unit, although in comparison with our standard moving coil it appeared somewhat to lack brilliance and the sensitivity was, if anything, slightly below normal, but the unit showed no signs of distress when handling over 2 watts output from the amplifier.



One of the new Triotron units

The impedance at 400 cycles was approximately 5,500 ohms. This is a useful figure to use when matching the loud-speaker and the output stage of the amplifier.

RADIOGRAMS

ON May 31 Radio Normandie, at Fécamp, will relay from the Rouen Cathedral two carillon recitals, which conclude the festivities in celebration of the fifth centenary of Joan of Arc.

The new Leipzig transmitter to be erected at Pegau will work with a power of 75 kilowatts (aerial) and will be so planned that it can be increased to 150 kilowatts if so required.

Radio Strasbourg now relays at regular intervals open-air military concerts from the Esplanade at Metz and dance music from the Municipal Kursaal at Niederbronn les-Bains.

Work on the new 75-kilowatt Königswusterhausen transmitter is so far forward that it is hoped to bring it in regular operation by the beginning of June. In this installation 140-kilowatt valves are being used for the first time.

According to the latest statistics, Sweden now possesses 518,026 registered wireless listeners, of which the greater number reside in the Stockholm, Malmo, and Goeteborg districts.

Strasbourg (France) is to have an alternative broadcast programme, as the 800-watt private transmitter which was formerly working in that city has again started testing on 125 metres. The wavelength has not yet been definitely fixed, but it will be below the broadcast band.

The German Reichspost is proceeding with a series of experiments in short-wave transmission. The broadcasts, with a power of from 2 to 4 kilowatts (aerial), will be carried out through the Königswusterhausen station on various wavelengths between 3 and 4 metres.

It is understood that a new wireless beacon is soon to be erected at Croydon aerodrome.

Experiments in short-wave telephony were recently carried out by the s.s. *Belgenland* when in Naples Harbour. Successful two-way communication was established with London and Washington.

The new Palermo (Sicily) broadcasting station is rapidly nearing completion and will be testing within the next few days on or about 200 metres.

"Alexander and Mose" will be heard by listeners to the London Regional vaudeville programme on May 29. With them in the studio will be Leslie Sarony, Thornley Dodge in "My Potted Pantomime," Dorothy McBlain, and Jack Payne.

John W. Elwood, vice-president of the National Broadcasting Company, New York, is visiting England, France, Germany and Italy to investigate the possibilities of a regular transatlantic programme exchange. Arrangements have already been made with the B.B.C. and negotiations are proceeding with companies in France and Italy, while the German company is starting a regular exchange on June 15.

A 230-mile radio beacon trail has been established between Kansas City and Wichita, Kan. The beacon transmits a beam of radio impulses, in form of dots and dashes to pilots in the air. The signal A, a dot and a dash, informs the aviator he is on the course. The signal N, a dash and then a dot, warns the flyer he has veered to one side of the correct route.

A wireless telephony medical service for the use of ships in Northern waters has been inaugurated by the Danish Government, and is worked through the Skamlebaeck Blaavand (Jutland), Thorshavn (Faroe Isles), and Julianehaab (Greenland) coastal stations, working on 31.6 metres.

The number of prosecutions undertaken during the twelve months ended March 31 last, for the use of wireless sets without licences was 1,433, and the total amount of the fines imposed was £1,110.

OUR LISTENING POST

By JAY COOTE

BRUSSELS, I find, may be found working every Sunday morning from 7 a.m. until about midday. The Belgians are ardent pigeon fanciers and race their "homers" on the Sabbath over long distances. From that early hour the old Radio Belgique transmitter gives out news and results of the competitions. These take place in the capital, at various provincial centres, and even at places so far away as Arras, Creil, Compiègne, and the South of France. On these occasions gramophone records are broadcast to kill time between the news bulletins.

Vienna, this year, for its annual music festival week promises a number of record programmes, including a relay of a choral concert given by 8,000 singers on June 17; in July and August the famous Salzburg open-air dramatic and operatic performances will also be transmitted.

Beromuenster, the giant Swiss National transmitter, now appears to work nightly and relays programmes according to a fixed rota from Berne, Basle, and Zurich. So far as I have been able to ascertain, the last-named studio does not contribute much to the radio entertainments. The call picked up clearly indicates from which city the broadcast emanates. Both Basle and Berne have adopted musical interval signals, but the melodies differ greatly and can be identified easily. The German language alone is used in the announcements and the station is referred to as the *Deutsch-Schweizerischer Landessender* (national transmitter); it is seldom that Beromuenster is mentioned. Bear in mind that Berne is pronounced *Bairn*; Basle, *Bar-zel*; and Zurich, *Tsue-rish*.

Béziers, that little private transmitter in the south of France which for the past few weeks has been vacillating between 219.3 and 240.6 metres, is still to be heard nightly, Sundays excepted. If you hear as an interval signal the shrill crowing of a somewhat noisy cockerel you will know that you have captured him. As wireless entertainments the concerts are considered of secondary importance, as publicity broadcasts boosting the wines of the district come first. It is seldom that the station can be heard after 10.15 or 10.30 p.m. B.S.T.

It is a curious point that, notwithstanding the fact that the German national anthem is played several times nightly, I still receive a number of inquiries regarding the melody heard. Previous to the war "Heil Dir im Sieger-kranz," to the tune of our "God Save the King" was the anthem used; after 1918 the Germans adopted the "Deutschlandslied" ("Deutschland über Alles"), which is played to the melody of Haydn's hymn to the Emperor ("Austria").

As we are on the subject of national anthems, let me add that from Huizen on some evenings, instead of the "Wilhelmus van Nassau" you will hear the "Internationale" as a concluding item; the latter is played when the V.A.R.A., the Labour radio association, is responsible for the entertainment. In the same way, when the Socialist organisation sponsors the programmes at Brussels No. 2 the "Red Flag" is also heard.

Readers are sometimes puzzled by the fact that they cannot identify Oslo as the source of the broadcasts during the day on 1,071 metres, namely, Hilversum's old wavelength. It is not the Norwegian station, but that of Scheveningen-Haven, a Dutch commercial transmitter working from about 6.40 a.m. until roughly 6 p.m. daily. The transmission is usually opened by chimes, a time signal, and a hooter. At various periods throughout the day stock exchange quotations, commercial reports, news bulletins, and weather forecasts are broadcast. From this station you will never hear music or any kind of wireless entertainment.

SHORT-WAVE TELEVISION IN GERMANY

THE German Post Office has always displayed a great interest in television, and it is therefore noteworthy that quite recently they should have inaugurated a new series of experimental television transmissions through the short-wave station at Doberitz. The station lies about halfway between Nauen and Berlin.

Tele-cine apparatus is employed, as the Germans still have a great partiality for this side of the science. The transmitter is built up on normal lines, horizontal scanning being employed with a picture ratio of four horizontal by three vertical. Since the short waves are utilised—the station wavelength is actually 142.9 metres (2,100 kilocycles)—a larger sideband spread is possible. This is taken advantage of by using 48 lines per picture (3,072 picture points), while the number of images per second is 25; that is, twice that used in England. Flicker in the resultant image is, in consequence, reduced, while a greater amount of detail can be shown.

Reception tests within a small radius of the station have so far proved satisfactory, but one drawback is the weak modulation. A figure of 10 per cent. has been employed so far. The difficulties of wireless reception are greater than is the case on the medium broadcast band, but that is mainly a question of manipulation practice. The power of this station is rated at 5 kilowatts, but the transmission times are indefinite. When "on the air," however, the broadcast starts between 5 and 6 p.m., and continues till between 8 and 9 p.m., but so far there are no reports of signal reception having been undertaken in this country.

H. J. B. C.

AT COPENHAGEN

THE Chief Engineer of the B.B.C. and its Foreign Station Liaison Officer are soon to go to Copenhagen. There, the members of the International Technical Consultative Committee on radio are meeting to prepare the ground for the Madrid Conference in 1932. The importance of Copenhagen lies in the fact that the technical possibilities of wavelength extensions for broadcasting will be discussed and probably decided upon.

According to an order of the Mexican Department of the Interior, no services in Mexican churches will be broadcast. It has been ruled that the clause in the Constitution, which decrees that public worship shall be within the walls of the churches, applies to broadcasting.

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 (G5SW)	15.0
242	1,238	Belfast	1.2
261.3	1,148	London 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
376.4	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	9.5
453	666	Klagenfurt	0.6
517	581	Vienna	20.0
also testing on 1,249 m. from 8.0 p.m. (Mon. Wed. Sat.)			
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	590	Brussels (No. 1)	20.0
BULGARIA			
318.8	941	Sofia (Rodno Radio)	1.0
CZECHO-SLOVAKIA			
263	1,139	Moravska-Ostrava	11.0
279	1,076	Bratislava	14.0
293	1,022	Kosice	2.5
341.7	878	Brunn (Brno)	34.0
487	617	Prague (Praha)	5.5
487	617	Cesky Brod (testing shortly)	75.0
DENMARK			
281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
296.1	1,013	Tallinn	0.7
405.8	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	Beziers	0.6
250	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
559.7	536	Kaiserslautern	1.0
559.7	536	Augsburg	0.3
566	530	Hanover	0.3
570	527	Freiburg	0.35
1,635	183.5	Zeesen (testing shortly on 75 kw.	35.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
299	1,004	Hilversum	8.5
299	1,004	Radio Idzerda (The Hague)	3.0
1,060	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
456.6	657	Bolzano (1BZ)	0.2
501	599	Milan (Milano) *testing on 525 m.	8.5
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	1,274	Kristianssand	0.625
240.6	1,247	Stavanger	0.625
364	824	Trondelag	1.35
368.1	815	Frederiksstad	0.7
453.2	662	Porsgrund	0.8
493.4	608	Bergen	1.35
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
369.4	812	Wilno	20.0
381	788	Lvov	21.0
408	734	Katowice	10.0
1,411.8	212.5	Warsaw —Raszyn	158.0
PORTUGAL			
290.5	1,033	Lisbon (CTIAA)	2.0
ROMANIA			
394	761	Bucharest	16.0
RUSSIA			
427	702.5	Kharkov	4.0
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
937.5	320	Kharkov (RV20)	25.0
1,000	300	Leningrad	100.0
1,060	283	Tiflis	15.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov (RV4)	25.0
1,304	230	Moscow (Trades Unions)	165.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	20.0
SPAIN			
259	1,158	Barcelona (EAJ15)	1.0
266.5	1,125.6	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	Malmö	0.75
257	1,166	Hörby	15.0
304	986	Falun	0.65
322	932	Göteborg	15.0
436	689	Stockholm	75.0
542	554	Sundsvall	15.0
770	389	Ostersund	0.75
1,229.5	244	Boden	0.75
1,352	221.9	Motala	40.0
SWITZERLAND			
244.1	1,229	Basle	0.65
246.9	1,215	Berne	1.1
403.5	743	Sottens	40.0
459.2	653	Beromuenster	75.0
680	442	Lausanne	0.6
760	395	Geneva	1.5
TURKEY			
1,216.2	246.6	Istanbul	5.0
1,538	195	Ankara	7.0
YUGOSLAVIA			
307.7	975	Zagreb (Agram)	0.7
430.6	696	Belgrade	3.0
574.7	522	Ljubljana	2.8

A RADIO COUNTER

THE New York Department of agriculture, industry, and commerce has worked out a method of counting bees by wireless. A microphone is placed in the entrance of the hive and as the bees crawl home, their feet scrape over the microphone, generating a current which is amplified, causing operation of a counting device. It does not sound very precise, but the officials state that very accurate counting is possible.

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.

Postcard Radio Literature

From R.I.

TO hand is a fine booklet from Radio Instrument Ltd., giving details of all the latest parts—mains units for all supplies, transformers, chokes, coils, condensers, and so on throughout the whole extensive range. A section is also devoted to the Madrigal complete sets. Take my tip and get a free copy of this booklet. **261**

Pertrix Reputation

The best thing a good H.T. battery can have is a good reputation, and Pertrix have adopted a novel idea to prove that users are thoroughly satisfied. They have just sent me a folder giving, among other things, actual copies of many unsolicited testimonials. You can get a copy of this from Pertrix, together with literature on the whole range of high-tension and grid-bias batteries. **262**

Eelex Connectors

We see so many of the new Eelex treble-duty terminals that I am sure some of us are apt to overlook the equally useful Eelex plugs and sockets. Before you fit up that new set, why not get from Eastick's a leaflet giving details of the colourings and name plates for these connectors? **263**

A Pocket Tester

Here is something useful. From the Nivex people comes useful information about a handy little pocket tester which can be used for checking over a hundred and one faults in any radio gear and which is also handy in testing the electrical system of your car. You should get this. **264**

A McMichael "M.C."

When L. McMichael, Ltd., produce some new radio gear you may be sure that it is good, and this recommendation applies to the new McMichael moving-coil speaker. If you are in search of a good new speaker of the permanent-magnet moving-coil type, then get a leaflet describing this. **265**

A Handy Chart

From Triotron comes a chart which I know you will want to have. On one side it gives a full list of Triotron valves for battery or mains working, and on the reverse side it gives a topical list of European broadcasting stations, with wavelength and power ratings. This useful chart can be obtained free through my catalogue service.
OBSERVER. **266**

With the change of the Glasgow station wavelength comes a chorus of complaint from listeners. Some declare that it is now more difficult to cut out the local station when something further afield is wanted.

ADRIAN BOULT'S ASSISTANT

AT the end of his first season, Dr. Adrian Boult, the Director of Music of the B.B.C., has found it impossible to continue to do so much conducting as well as carrying out his many other duties. So Mr. Owen Mase has been appointed Assistant Music Director.

HEARING THEMSELVES

THE B.B.C. has found the Blattner recording machine very handy for letting artistes hear their own voices, and following this example, the Prague station is installing a gramophone recording plant which will record artistes' performances by a microphone adjacent to the studio. It is hoped that the artistes will be able to improve their performance by carefully listening to a recorded version of their broadcast.

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

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS.

CRYSTAL SET (6d.)

B.B.C. Crystal Set AW281

ONE-VALVE SETS (1s. each)

Regional Ultra-selective One AW278
B.B.C. One AW280
Hartley One WM198

TWO-VALVE SETS (1s. each)

Talisman Two (D, Trans) AW194
No-battery A.C. Mains Two (D, Trans) AW230
No-battery Gramo-radio 2 (D, Trans) AW238
1930 Talisman 2 (D, Trans) AW239
Arrow Two (D, Trans) AW249
Forty-five-shilling Two (D, Trans) AW250
Searcher Short-wave 2 (D, Trans) AW259
Challenge Two (D, Trans) AW261
Everybody's All-in 2 (D, Trans) AW273
Twenty-Shilling Two (D, Trans) AW274
B.B.C. Selective Two (D, Trans) AW292
Brookman's Two (D, Trans) WM168
Gleaner Two (D, Trans) WM201
Merlin Two (A.C. Set) WM213
Five-Point Two (D, Trans) WM220
Brookman's A.C. Two (D, Trans) WM225
Aladdin Two (D, Trans) WM231
Ever Tuned Regional Two (D, Trans) WM241

THREE-VALVE SETS (1s. each)

1930 Clarion Three (SG, D, Trans) AW223
Beginner's Regional Three (D, 2LF) AW233
The "A.W." Exhibition 3 .. .. .. AW247
1931 Ether Searcher (SG, D, Trans) AW271
1931 Ether Searcher (A.C. model) AW276
Mains Unit AW277
Ultra-Selective Straight Three (SG, D, Trans) AW282
1931 Ether Searcher (D.C. model) AW284
Mains Unit AW285
Square Peak Three (SG, D, Trans) AW293
Fanfare Three (D, 2 Trans) WM157
Brookman's Three (SG, D, Trans) WM161
Inceptordyne (SG, D, Pentode) WM179
Music Marshal (D, 2 Trans) WM190
Concert Three (D, 2 Trans) WM199
De-Luxe Three (D, RC, Trans) WM209
Five-Point Three (SG, D, Trans) WM212
Falcon Three (A.C. Set) WM217
New Brookman's Three (SG, D, Trans) .. WM218
Five-point Short-waver (D, RC, Trans) .. WM223
Baffle-Board Three (D, RC, Trans) WM226
Plug-in-Coil Three (D, 2 Trans) WM232
Regional Three (SG, D, Trans) WM236
Gramo-radio A.C. Three (SG, D, Trans) .. WM237

FOUR-VALVE SETS (1s. 6d. each)

Regional Band-pass Four (SG, D, RC, Trans) WM211
Five-Point Four (SG, D, RC, Trans) WM216
Regional A.C. Four (SG, D, RC, Trans) .. WM222
Supertone Four (SG, D, Push-pull) WM227
Brookman's Three-Plus-One (SG, D, RC, Trans) WM233

FIVE-VALVE SETS (1s. 6d. each)

James Quality Five (2SG, D, RC, Trans) .. AW227
Companion Portable (2HF, D, RC, Trans) .. AW279
1930 Five (2HF, D, RC, Trans) WM171
Radio-Record Five (SG, D, Trans-parallel) .. WM188
Overseas Five (3SG, D, Trans) WM191
Regional A.C. Five (3SG, D, Trans) WM224

SIX-VALVE SETS (1s. 6d. each)

Century Super (Super-het) AW287
Hyperdyne Receiver WM221
Super 60 (Super-het) WM229
A.C. Super 60 (Super-het) WM239

AMPLIFIERS (1s. each)

"A.W." Gramophone Amplifier AW205
Two-valve Amplifier AW216
Simple Gramophone Amplifier AW257
High Quality Amplifier for A.C. Mains AW275
2-Watt Amplifier for A.C. Mains AW283
A.C. Push-Pull Amplifier AW291
Radio-Record Amplifier (DC Mains) WM183
Selecto Amplifier (HF, Unit) WM210

PORTABLE SETS

Continental Portable (SG, D, Trans) .. AW241 1/-
Companion Portable (2HF, D, RC, Trans) AW279 1/6
Pedlar Portable Three (D, 2 Trans) .. WM197 1/-
Super 60 Portable (Super-het) WM238 1/6

MISCELLANEOUS (1s. each)

Handy L.T. and G.B. Unit for A.C. Mains .. AW254
Our H.T. Unit for A.C. Mains AW262
Gramophone Tone Control AW264
Short-wave Super-het Adaptor AW268
H.T. Unit and Trickle Charger for D.C. Mains AW272
Booster Speaker (6d.) AW286
"A.W." Tone Changer (6d.) AW288
"A.W." Selectivity Unit (6d.) AW290
"W.M." Standard A.C. Unit WM214
"W.M." Standard D.C. Unit WM215
Falcon A.C. Unit WM219
Hyperdyne Short-wave Adaptor WM228
Loud-speaker Tone Control WM234
"W.M." Lissen Diaphragm Loud-speaker .. WM235
Two Minute Adaptor for Short Waves WM240
Big H.T. Unit for A.C. Mains WM230

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

Address letters:

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

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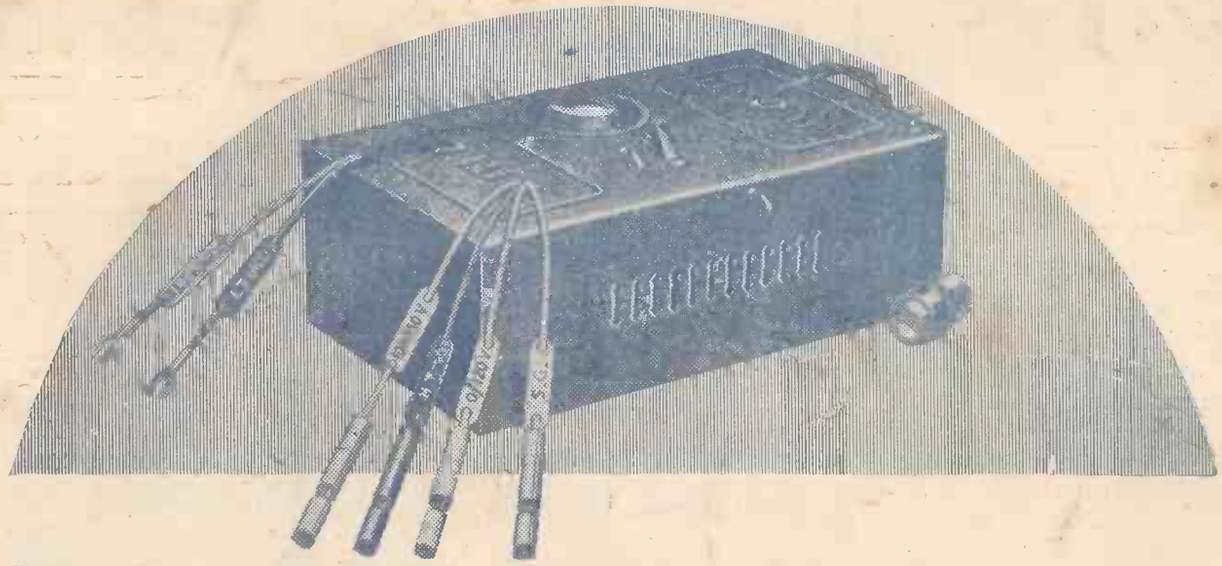

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Woburn

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