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Practical and Amateur Wireless

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WEDNESDAY

Edited by F.J. CAMM

a GEORGE
NEWNES
Publication

Vol. 7. No. 165.
November 16th, 1935.

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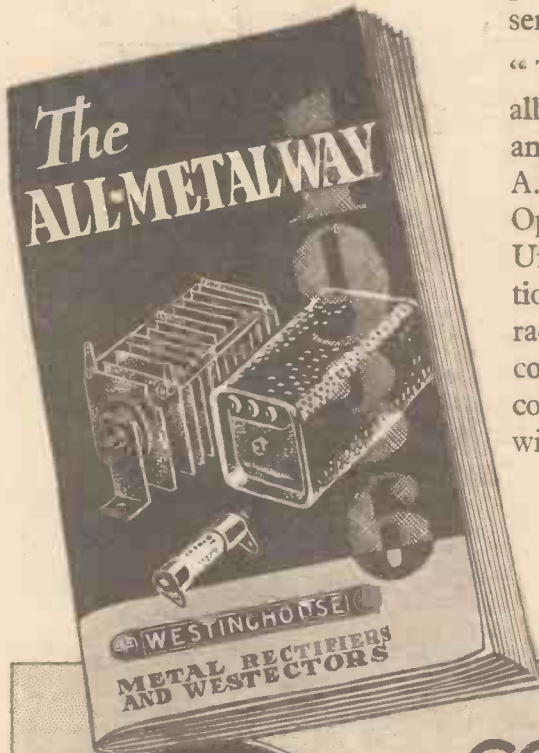


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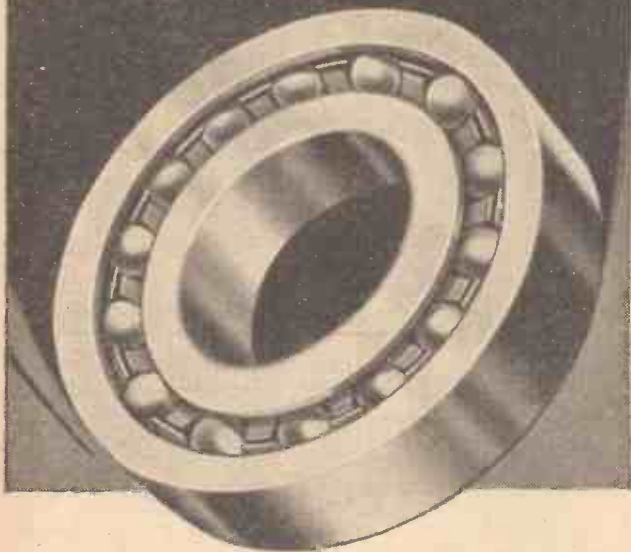
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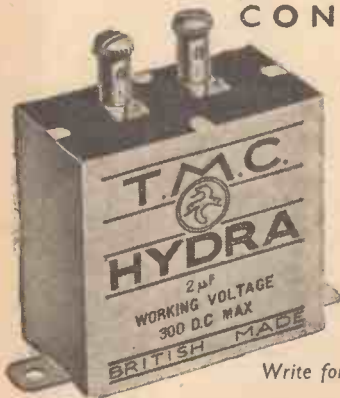
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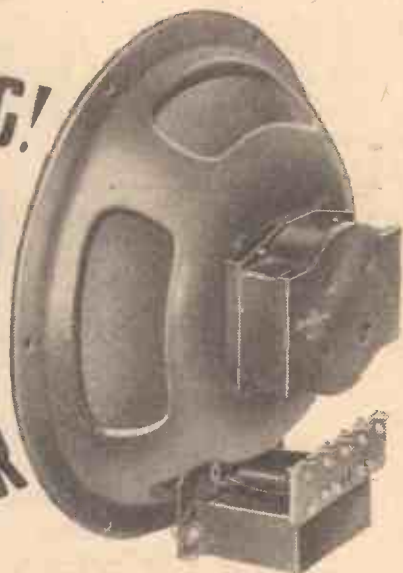
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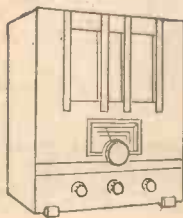
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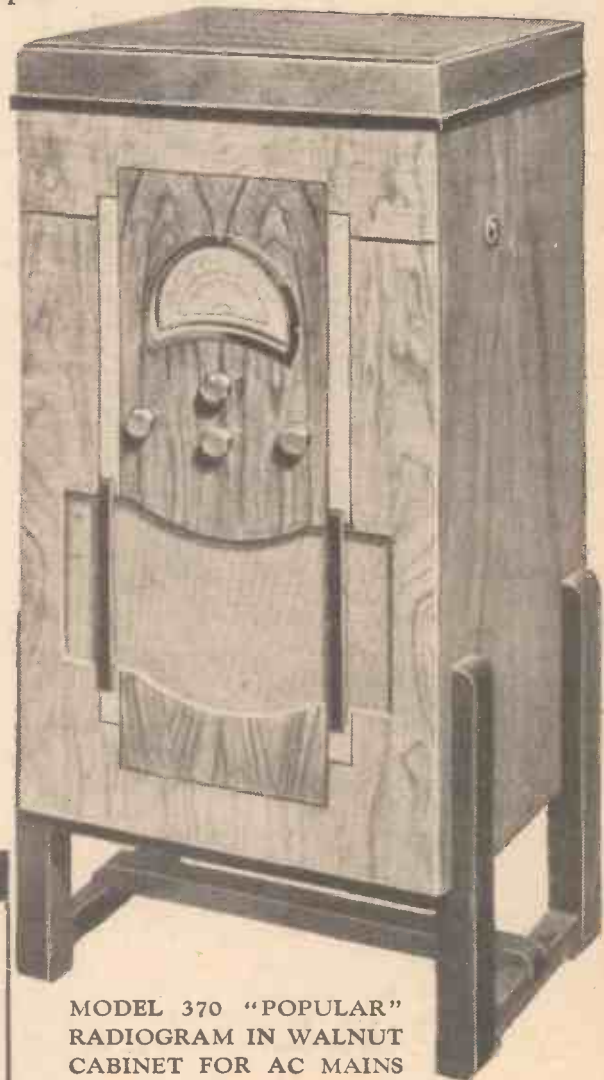


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BUILD THE £4 SUPERHET 4 TO-DAY!



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:

W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

VOL. VII. No. 165. November 16th, 1935.

ROUND *the* WORLD of WIRELESS

ONCE again PRACTICAL AND AMATEUR WIRELESS leads and shows the way, in presenting to its readers Mr. F. J. Camm's latest receiver, The £4 Superhet 4. As all designers have admitted, the congested state of the ether can only be conquered by means of the superhet principle. Until Mr. Camm's successful series of superhet receivers were placed before constructors, these were too expensive to make and too intricate to adjust without an oscillator and other laboratory instruments. The Editor of this journal has succeeded in bringing the undoubted advantages of the superhet within the means of every constructor. His untiring efforts have considerably simplified the design and construction and he has also attacked the price problem. As every constructor knows—whether he reads this journal or not—every important development in construction during recent years has emanated from this journal.

We have been consistently flattered by imitation—often copied but never equalled. This is a remarkable tribute to the ingenuity of the Editor and staff of this journal. Our Free Gift Tools, our Data Sheets, our Presentation Handbooks on Wireless and Television are but a few of the instances in which we were first in the field. That our ideas were right is proved by their general adoption. Hence there is every justification for our claims that WE LEAD and SHOW the WAY.

Our latest receiver has been tested right under the aerial at Brookmans Park, and it was easily able to cut out that station with a hair-line movement, and immediately tuned in when desired merely by operating

the tuning control. Note that no wave-traps or special gadgets, with their additional controls and need for frequent connection and disconnection, are necessary. What other straight receiver could pass this exacting test? What other receiver has been tested immediately beneath the Brookmans Park aerial?

We urge every reader to build this new receiver, which, employing an intermediate frequency of 465 kc/s, has the quality of reproduction of a straight receiver and a degree of

F. J. CAMM'S
£4 Superhet 4!

THE LEADING
SET FOR 1936

Sponsored by the
Leading Journal and
the Foremost Designer

selectivity vastly superior to the ordinary superhet.

The £4 Superhet 4 is in every way worthy of the new laboratories specially built for us and into which we have recently moved. It is fully equipped with the very latest apparatus, it is probably the largest and best-equipped laboratory possessed by any journal.

Readers in swamp areas should make a point of building this new receiver straightaway, and end the troubles introduced by powerful local stations.

New Paris PTT Shortly Due on the Air

THE 120-kilowatt station which the French broadcasting service has erected at Villebon-sur-Yvette, at some twelve miles from Paris, will take over its regular duties within the next few weeks. The power of the old station in the capital will be raised, and the plant is to be retained as a stand-by transmitter.

Another French Super Station Delayed

ALTHOUGH it had been hoped to open the new Toulouse Muret high-power transmitter simultaneously with the local radio exhibition, the PTT authorities have been compelled to postpone the date. The station, which is expected to test towards the middle of November, will work on 386.6 metres (776 kc/s); its power is 80 kilowatts.

A Floating Broadcaster

THE new liner *Queen Mary* will possess the most elaborate broadcasting equipment ever installed in a ship. It will enable her to relay simultaneously three separate programmes for the benefit of her passengers, and at the same time permit a transmission of her concerts and entertainments for rebroadcast on land. Some thirty separate wavelengths have been allotted to the liner for traffic duties, and nine aerials will be used. It is expected that on her trial trip broadcasts from the *Queen Mary* will be taken by the N.B.C., in the U.S.A., and possibly by the B.B.C. on this side of the Atlantic.

Six Continents on 10 Metres

MISS NELLY CORRY, an amateur experimental transmitter at Walton-on-the-Hill, Surrey, recently secured a record by establishing contact with radio fans in six continents in six hours and twenty minutes, on the 10-metre band. The log included Assam, Queensland, Uruguay, London, Algiers, North Africa, and Florida, U.S.A.

PTT Lyons on High Power

THE new transmitter at Lyon-Tramoyes is now working every day between midday and G.M.T. 14.00 and again from G.M.T. 18.30 onwards. It is well heard in most districts of the British Isles.

ROUND the WORLD of WIRELESS (Continued)

Hallé Concert

EMANUEL FEUERMANN will be the solo 'cellist in the Hallé concert which is to be relayed to Northern listeners from the Free Trade Hall, Manchester, on November 21st. The orchestra will be conducted by Sir Thomas Beecham, and the programme will include Beethoven's Symphony No. 4 in B flat, in addition to Schonberg's Concerto for 'cello and orchestra.

"I Remember"

THIS is the title of a new series of recollections of Wales and the South-West of England. The first speaker in the series, the first talk in which will be given from the Western Regional on November 18th, is Sir Richard Gregory, who has many associations with Bristol. He is Editor of "Nature," and has published several text books on physical geography, experimental science, physics and chemistry.

The Wessex Quartet

THIS popular Quartet, directed by A. H. Morgan, will give a Concert from the Bristol studio in the Western programme on November 19th. A. H. Morgan was leader of the orchestra on the Flag Ship *Queen Elizabeth* with Admiral Beatty during the War. Later he was musical director of a Picture House in Bristol until the "talkies" came.

Penzance Orchestral Society

A CONCERT will be relayed from St. John's Hall, Penzance, on November 20th, when listeners will hear the Penzance Orchestral Society, conducted by Walter Barnes. This Society was formed in 1906 and still has the same President and Honorary Conductor. The members come from all parts of Cornwall to rehearsals, some of them having to make a journey of twenty-five miles each way. The soloist in the concert will be Malcolm McEachern (bass).

Variety from Cardiff

HALF-AN-HOUR of variety will be relayed from the New Theatre, Cardiff, on November 19th.

B.B.C. Midland Orchestra

H. FOSTER CLARK conducts the B.B.C. Midland Orchestra on November 19th, in a programme which includes the Symphony in G by Michael Haydn (brother of Joseph Haydn), and the "Mother Goose" suite by Ravel. This programme is followed by "Songs of the Midland Counties" to be given by the B.B.C. Midland Singers, conducted by Edgar Morgan.

"Joe Gutteridge Again"

AN attractive varied programme on November 23rd includes—a Black Country sketch, "Joe Gutteridge Again"; a relay of Leonard Henry's entertainment from the Central Hall, Walsall; and a song recital by Heddie Nash, the famous operatic tenor.

"La Bohème" Relay

THE fourth and last act of Puccini's opera, "La Bohème," as performed by the Royal Opera Covent Garden Company, will be broadcast to Northern listeners from the Grand Theatre, Leeds, on November 19th. The cast includes Lisa Perli, Dina

NEW H.M.V. RADIOGRAM



The new H.M.V. 16-guinea radiogram provides popular entertainment for all members of the family.

SOLVE THIS!

PROBLEM No. 165.

Robert's receiver was a home-made A.C. three-valve set with an H.F. pentode, triode detector, and directly-heated power valve in the output stage. Being dissatisfied with the volume he decided to fit a pentode, and accordingly (as he already had a five-pin valveholder in the output stage) he obtained a five-pin pentode of the A.C. type—actually a Marconi MPT4. As in this valve the cathode is joined to the centre-pin, he disconnected the lead to his existing valveholder, and took this lead to the cap on the top of the valve, connecting the centre-pin to earth. When switched on results were very poor indeed, and volume could not be brought to a value to compare with the original valve. Why was this? Three books will be awarded for the first three correct solutions opened. Address your envelopes to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 165 in the bottom left-hand corner, and must be posted to reach this office not later than the first post on Monday, November 18th, 1935.

Solution to Problem No. 164.

The higher efficiency of the valve Smithers bought caused the instability, but when he earthed the metal coating he was short-circuiting the bias resistance, and, consequently, this increased the trouble. The following three readers successfully solved Problem No. 163 and books are accordingly being forwarded to them: A. G. Haken, Rosendale, Hyde Street, Winchester; H. Davies, 30, Morley Avenue, Fallowfield, Manchester 14; W. D. Martin, Court Close, Manor Drive, Ewell, Surrey.

Borgioli, John Brownlee and Odette de Foras. The scene, it will be remembered, is played in a garret studio in Paris, and the principal event is the tragic death of Mimi.

Variety from Newcastle

A BRIEF variety act will be broadcast to Northern listeners from Newcastle on November 19th. The artist will be Jack Claizie, a well-known local Hawaiian-guitar player.

Carl Rosa Opera Company

THE Royal Carl Rosa Opera Company is doing a short season at the Theatre Royal, Nottingham. Parts of two operas are being given—"Il Trovatore," on November 15th, and "La Traviata" on November 18th. Charles Webber is the conductor, and the first two acts of "La Traviata" are being given. There is a very strong company, including Ivor John.

Eminent K.C. to Broadcast

MR. NORMAN BIRKETT, who was for a number of years connected with the Midlands both as a barrister and politician, before he went to London, is to make the appeal for the Birmingham Settlement in the Week's Good Cause period on November 17th. The Birmingham Settlement has provided a centre for the people of one of the poorer wards in Birmingham for the last thirty-six years. Students reading for the Social Study Diploma of the University of Birmingham live there and take their practical training. Over 800 members come to the clubs each week.

Repertory Plays on Sundays

LAST winter Midland Regional began a series of representative plays by Repertory Companies in their area; these were relayed on Sundays. The experiment was generally regarded as being successful, and the series is to be resumed this winter, but with the difference that the plays will be given from the studio, instead of the theatres. The first is Tyrone Guthrie's radio play, "The Flowers are not for you to Pick," and it is being presented by the Birmingham Repertory Theatre Company on November 17th. Owen Reed is producing. The principal parts are taken by Donald Eccles, Elspeth March, Arthur Ridley, Olive Milbourne, and Marjorie Lane.

The "Vagabond Lover"

WHO is the Vagabond Lover who is appearing before the microphone for the first time in the Regional programme on November 14th? The B.B.C. is creating an anonymous character whom they have called the "Vagabond Lover." He is an artist who possesses great appeal in his voice and is also a brilliant violinist. The idea of creating an anonymous character grew out of the fact that many letters arrive at the B.B.C. stressing the enjoyment that listeners, especially women, experience from the beauty and appeal of a romantic voice singing love songs old and new. Out of this knowledge grew the idea of enlisting the services of an artist who possessed great appeal, and by featuring the Vagabond Lover fortnightly, a romantic programme will be rendered.



Presenting
F. J. CAMM'S
£4 SUPERHET 4

By F. J. Camm

IN introducing to my readers the stupendous technical achievements epitomised in my latest design—the £4 Superhet 4, employing 465 kc/s. intermediate frequency—I have a difficulty owing to my joint rôle as Editor of this journal and designer of its boom-sets. As it would appear unseemly for me to praise my own work, I have a natural diffidence to employing superlatives in describing my sets. I have been accused in the past of being too modest in my claims, and it has been pointed out to me by members of the trade that even my very large following amongst home constructors would have been considerably enhanced had I indulged in the extravagance of language employed by so many other designers. I refer to that commodity of the egregious known in America as ballyhoo.

I wonder! When I visit a picture palace I am left unimpressed by the screaming flashes and high-pressure announcements of next week's programme, which never seems quite up to expectations aroused by the announcements made the previous



Tested and Adjusted Beneath

week. The film magnates have cried wolf so many times that they must not blame the public if it takes no notice when the wolf arrives. Again, the public rapidly tires of an acrobat who persistently turns double somersaults in order to entertain the public. The latter wants triple somersaults after a time. If they are unable to perform a triple somersault they either fade out from the stage and join a circus, or print "loud" handbills which do not always speak the truth.

I have preferred to take every precaution with my designs to see that the constructor gets a square deal; a better deal, in fact, than he would get in some cases, were he to purchase a commercial receiver. Important members of the component industry tell me that all of my designs are consistently made and that they go on receiving orders for parts for two years after the design appears. I seek no monopoly of the home constructor market, nor is it necessary for me to parade my accomplishments immodestly before you in order to persuade you to build one of my receivers.

Nor do I claim to be the only designer of wireless sets. To indulge in these tactics is to invite the public to proclaim with Shakespeare, "Methink'st thou dost protest too much." So my designs have gone forth without a surround of embellishing superlatives so often effective in disarming criticism of the design itself. You will remember the old comic song "It's not the girl which takes the johnny's eye, it's the parsley round the bird." But no amount of parsley, nor paper frills, nor flowery language, can make a tough bird tender, and the frills and parsley are soon forgotten when you come to sample the dish.

I feel it necessary to make these opening remarks so that readers may not conclude that my omission of journalese negatives the design. I have preferred to let my guarantee be my watchword. Ordinary commercial receivers are guaranteed for ninety days after the date of purchase.

I guarantee mine for the whole of their useful life! I do not leave you in the air regarding the components you should use. I have, with extreme care, selected them for you! There are no alternatives, and in inviting you to build a receiver of my design and thereby to spend a few pounds on parts, I have recognised your claim to satisfaction. I have in the past visited readers' homes; I have given demonstrations in our laboratories; I have adjusted readers' receivers for them; I have even purchased components for readers where they have experienced difficulty in purchasing locally.

In these and many other ways have I backed my designs and demonstrated their intrinsic merit rather than to convert myself into a passable imitation of a circus showman. So two courses were open to me after I had successfully demonstrated to myself and my staff my latest receiver. The first was to tour the country and demonstrate its capabilities; the second was to offer to do so after publication of

the design, when readers would have had an opportunity of first considering the merits of the circuit and my claims.

It occurred to me that it would be unwise of me to put myself in the position of mock auctioneers who in the market-place dangle a gold watch before your eyes, and, after extolling its virtues and knocking it down for 2s. 6d. to a wide-eyed purchaser, invite you to purchase a number of sealed packages, having captured your confidence and implying that those sealed packages also contain gold watches!

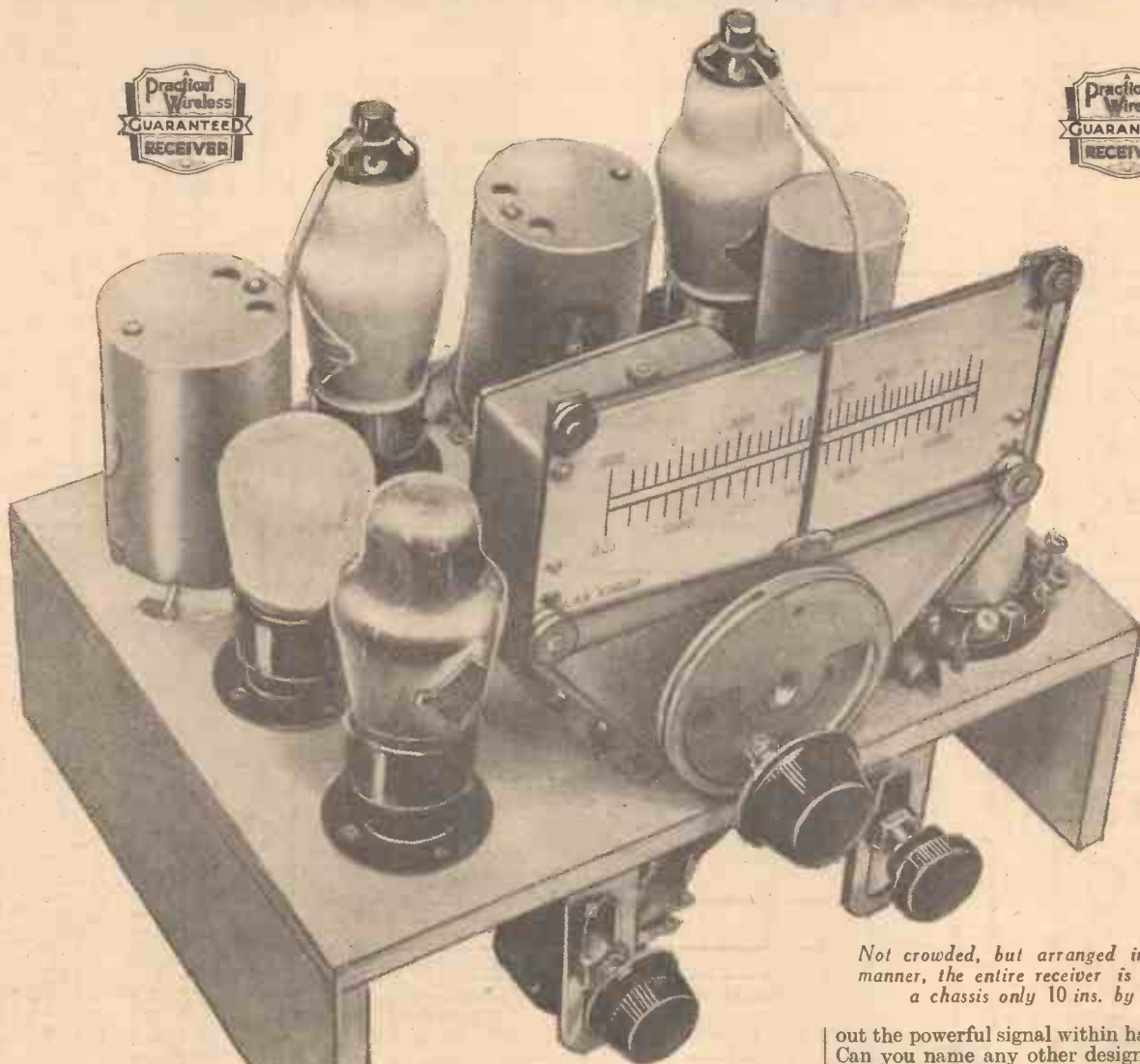
What every home constructor is interested in is his ability to duplicate without tricky adjustments and weeks of toil the results obtained by the designer. What guarantee have you that any receiver demonstrated to you is not a super-tuned version capable only of reproduction in a laboratory and with laboratory apparatus?

What other designer issues such a generous guarantee as is behind every one of my circuits? What other designer can



The receiver in the neat Peto-Scott cabinet, and on the left the members of the staff are seen at a demonstration of this new and remarkably efficient receiver, which has been tested directly beneath the Brookmans Park aerial.

the Aerials at Brookmans Park



Not crowded, but arranged in a compact manner, the entire receiver is mounted on a chassis only 10 ins. by 8 ins.

claim to have produced so many new circuit arrangements?

Good wine needs no bush, and the reason that my designs have been so eminently successful in the past is due to that assurance that I am behind my readers and my sets. I have been catering for the man with practical interests for over twenty-five years; over six million copies of my books have been sold to the public in that time. I hope I may be allowed to claim, therefore, that I am no new-comer either to the realms of journalism or to radio. I started the first practical wireless journal; it was called *Amateur Wireless*, and was originally published as a sixteen-page supplement to a journal of which I was the editor and which was entitled *Everyday Science*.

My well-known series of £5 Superhets have been made in their tens of thousands; with my new receiver I have added a valve but reduced the price by about £1. I learn that Messrs. Peto-Scott Co., Ltd., have priced the kit at 83s. 6d., but this includes screws, connecting wire, and chassis. The price of the necessary components comprising Kit "A." if you omit those

items, is actually 78s. 0d. Not only have I produced another new guaranteed circuit, but actually I have given you a better set for less money. No other designer has tackled the problem from that angle; every day you are assailed with the competition of the cheap commercial receiver; the home constructor has to meet that competition. As a designer I know that it cannot be met by rhetoric and the choice arrangement of words. A good deal has been written of late about the difficulty of separating stations; the only solution is the superhet. In my latest receiver I have got rid of the last vestige of that peculiar something which distinguishes the superhet from the straight receiver. You now have superhet selectivity with the quality of the very best commercial receiver, at the ridiculously low price of £4. Another problem I have had in mind—those unfortunates who reside in swamp areas. In some cases the powerful signal from the local station will gate-crash through any of the normal selectivity devices offered to you. My £4 Superhet will separate the stations by a hairline movement even directly under the aerial at Brookmans Park. I visited Brookmans Park, slung up an aerial, improvised an earth, and was able to cut

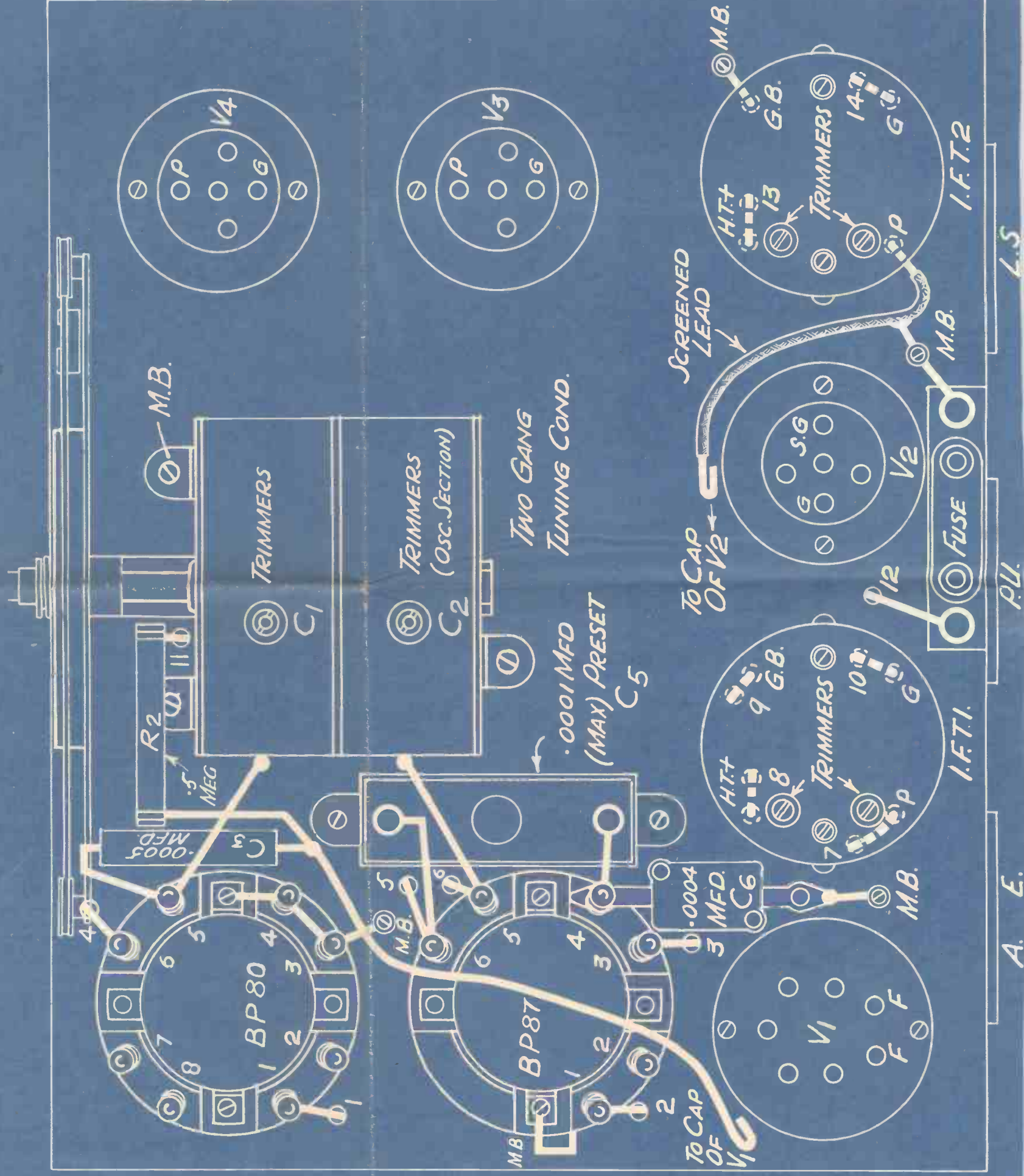
out the powerful signal within half a degree. Can you name any other designer who has been beneath this mighty aerial with its gargantuan output, in order that those readers who are swamped may at last enjoy alternative programmes?

This new receiver celebrates the erection of the new PRACTICAL AND AMATEUR WIRELESS laboratories into which we have just moved. A new Parliament will shortly go into power and, if I may adopt metaphorical language, I ask you, too, to vote yourself into a new era of high-quality supersensitive and superselective radio by building this new and cheap, yet amazingly powerful, four-valve receiver. It is a revelation in station getting; it has amazed me, and it certainly will surprise you. It is a vast advance on anything I have hitherto produced. I have tested it on a tape aerial and find it almost equally as good. I have tested it under flat-dweller conditions; I have anticipated all of the snags. It is the set for everybody. Second channel interference is absolutely abolished and there is no need to employ the band-pass arrangement which, whilst conferring advantages, definitely reduces signal strength and hence volume. Notice that there is only one padding condenser to adjust. Let me take you through the theoretical circuit and explain in greater detail the various technical points.

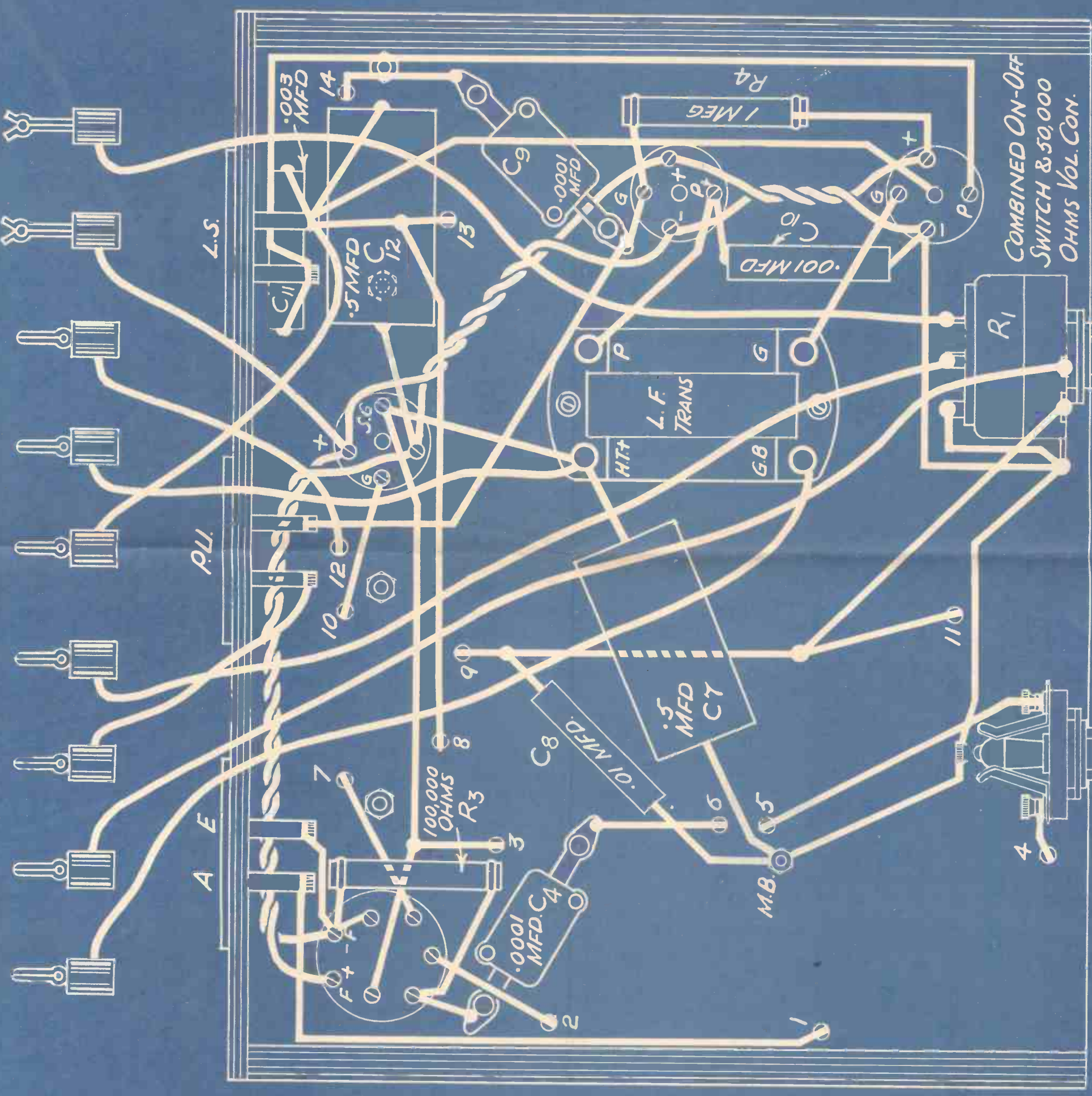
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F.J. Camm's £4 SUPERHET 4

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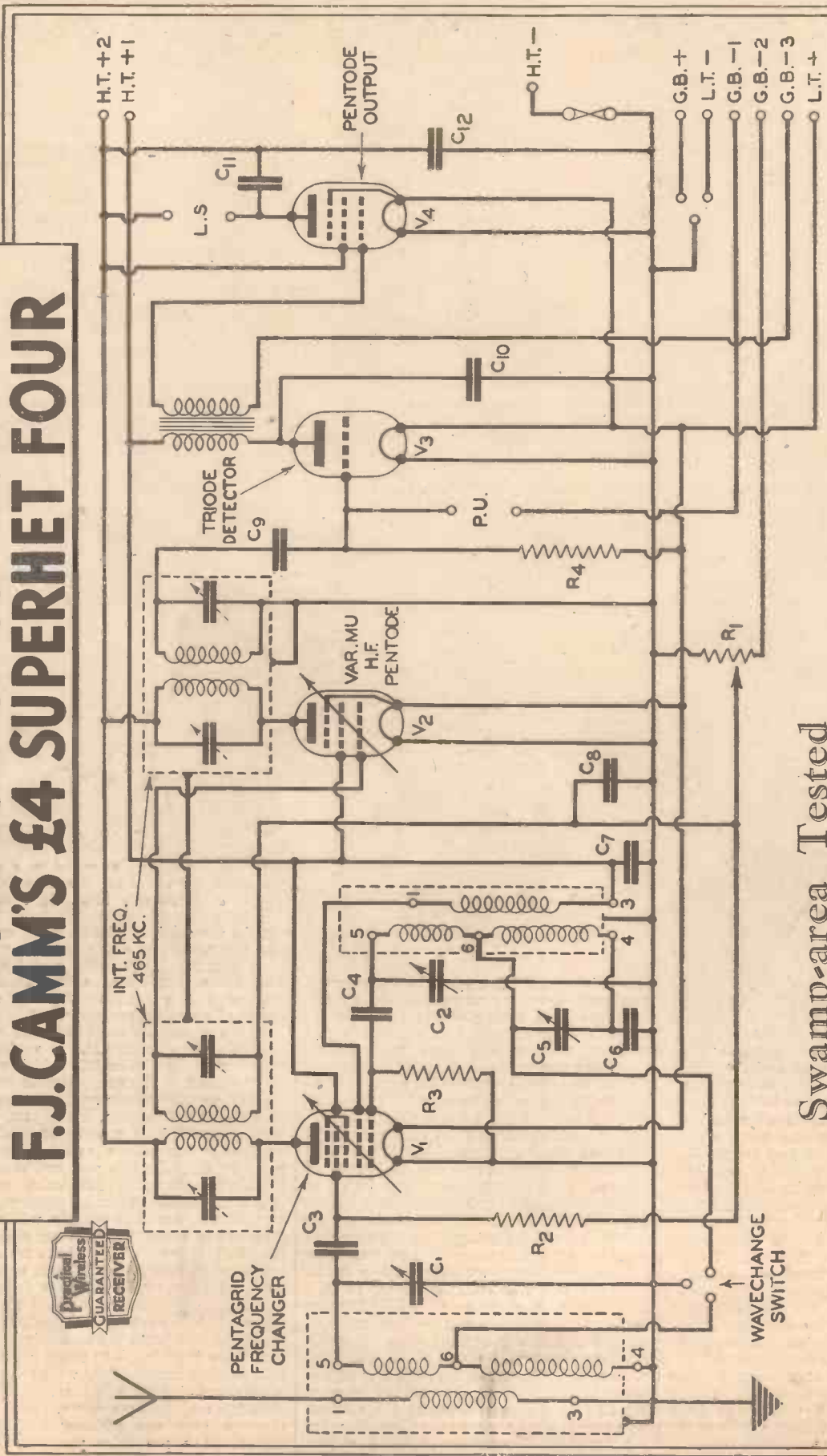
1 MEG R4

.001 MFD C10

100,000 OHMS R3



THEORETICAL CIRCUIT FOR F.J.CAMM'S £4 SUPERHET FOUR



Swamp-area Tested Principal Component Values

- CONDENSERS.**
 C1, C2—Ganged aerial-oscillator 465 kc/s tuning condensers.
 C3—0.005 mfd. tubular non-inductive grid condenser.
 C4—0.001 mfd. mica oscillator grid condenser.
 C5—0.001 mfd. pre-set long-wave padding condenser.
 C6—0.004 mfd. mica long-wave padding condenser.
 C7—5 mfd. tubular decoupling condenser.
 C8—0.01 mfd. tubular grid decoupling condenser.
- RESISTANCES.**
 R1—50,000 ohm potentiometer volume control.
 R2—3 megohm non-inductive frequency-changer grid decoupling resistance.
- VALVES.**
 V1—210 PG
 V2—210 VPT
 V3—210 Det.
 V4—220 PT. } Cossor
- Other Values:**
 R3—100,000 ohms non-inductive oscillator grid leak.
 R4—1 megohm non-inductive 2nd-detector grid leak.

The Only Guaranteed Constructors' Superhet

THE CIRCUIT OF THE £4 SUPERHET FOUR

THERE are only four valves in this receiver, but the first of the series fulfils two separate functions and the receiver is thus equivalent to a five-valve set of earlier design. As the majority of readers are now aware, in the superhet circuit the original frequency which is received in the aerial circuit is changed into a totally different frequency or, put in another way, the wavelength at which the signal is received is changed into a different wavelength, and it passes through the receiver at this new frequency before becoming rectified and made audible at the loud-speaker.

Examining the actual circuit used in the £4 Superhet Four, we find that the aerial circuit is a simple H.F. transformer, a single aperiodic winding serving for both medium and long waves. The component which is used is provided with a tapping point provided for wave-change purposes, but it has been found unnecessary to use this in the present circuit. The secondary winding is fairly closely coupled and is provided with a tapping point which is brought out to a three-point switch mounted beneath the chassis, whilst the entire coil is enclosed in a metal screening can. The signal is tuned by the first section of a ganged condenser in the ordinary way, and is applied between the grid and filament of the frequency-changer valve. Bias is applied direct to the grid through the volume control potentiometer and resistance R2, a condenser C3 being interposed in the grid lead to prevent short-circuiting of the bias voltage.

Frequency Changing

Arranged in the same valve are two further grids, to one of which is joined a

tuned circuit coupled to a coil which is included between the other grid and the H.T. battery. This is, of course, a standard reaction arrangement, and the grid in this case functions as an anode. As a result of this arrangement, oscillation takes place and the moving vanes of that section of the gang condenser marked C2 are cut to a certain shape which causes the tuning in this circuit to be 465 kc/s above the frequency to which the first coil is tuned. An anode is arranged around the grids, which have already been referred to (in addition to a screening grid which functions in the normal manner), and thus a mixed stream of electrons is found passing from the filament to anode. This mixture consists of the original signal tuned by condenser C1, to which are added the oscillations produced in the oscillator coil or section, and so at the anode appears the difference, as a beat note, upon which are superimposed the fluctuations of the original signal. The rectification of the original signal impulses have not been referred to, although, in addition to the above mixing, the complication of partial rectification takes place.

Long-wave Padding

To enable the condenser C2 to tune the coil over both medium and long waves, it is necessary to add some additional capacity to the total circuit, and to increase the general "stray" capacity across the coil a pre-set condenser C5 is included, whilst condenser C6 is added in series with the coil. These two condensers are, of course, short-circuited when medium-wave reception is desired, and the same switch as is used for the aerial coil is employed for this purpose. In the anode circuit of this first

valve a transformer is inserted, and this is designed to be tuned to a frequency of 465 kc/s—small pre-set condensers being included across both primary and secondary to balance out stray capacities. Thus, when each of these windings is correctly adjusted we shall find the original signal impulses present in primary and secondary, but being borne at a frequency of 465 kc/s instead of the frequency originally received in the aerial circuit. Amplification is next carried out by the variable-mu H.F. pentode in the usual manner, variable bias being applied direct to the grid through the secondary winding of the I.F. transformer, and a similar component is included in the anode circuit of this valve to transfer the signal to the next valve, which is known as the second detector. This is arranged to function in the usual grid-leak rectifier principle, and thus in the anode circuit of this valve we find our signal in the form of an audio- or low-frequency impulse which may be employed to operate a loudspeaker or headphones, or be further amplified at low frequency.

Do not forget to check the wiring against the blueprint which is presented free with this issue.



The Cheapest Superhet Ever Produced

Selectivity

It is obvious, from the previous description, that great selectivity will be obtained with a circuit of this nature, as, apart from the number of tuned circuits employed (there are actually six of these) the production of the beat note in the frequency-changing stage adds still further to the selectivity, and thus it becomes possible to obtain such a high degree of selectivity that the musical side-band of the transmitted signal may be cut. Obviously, this is not desirable in the interests of quality reception, and therefore the general arrangement of the

circuit is such that the selectivity reaches just that stage which ensures that a separation equivalent to the band of frequencies which are broadcast is obtained, and thus a high standard of quality is obtained, and, provided that a signal is not actually heterodyned due to another station working within the allotted frequency band, it is possible to separate every broadcasting station from its neighbour.

To remove mush and noises accompanying some of the foreign stations which work rather close in frequency, a simple tone-

control device has been incorporated in the anode circuit of the output valve, and this acts very effectively in removing the background noises without spoiling quality. Further tone control is not desirable if good-quality signals are desired, although if it is found that in certain parts of the country a station is required for regular reception but is spoiled by a heterodyne, a high-note cut-off may be introduced. It must be appreciated, however, that this can only result in a spoiling of the musical quality and we do not recommend such a drastic step.

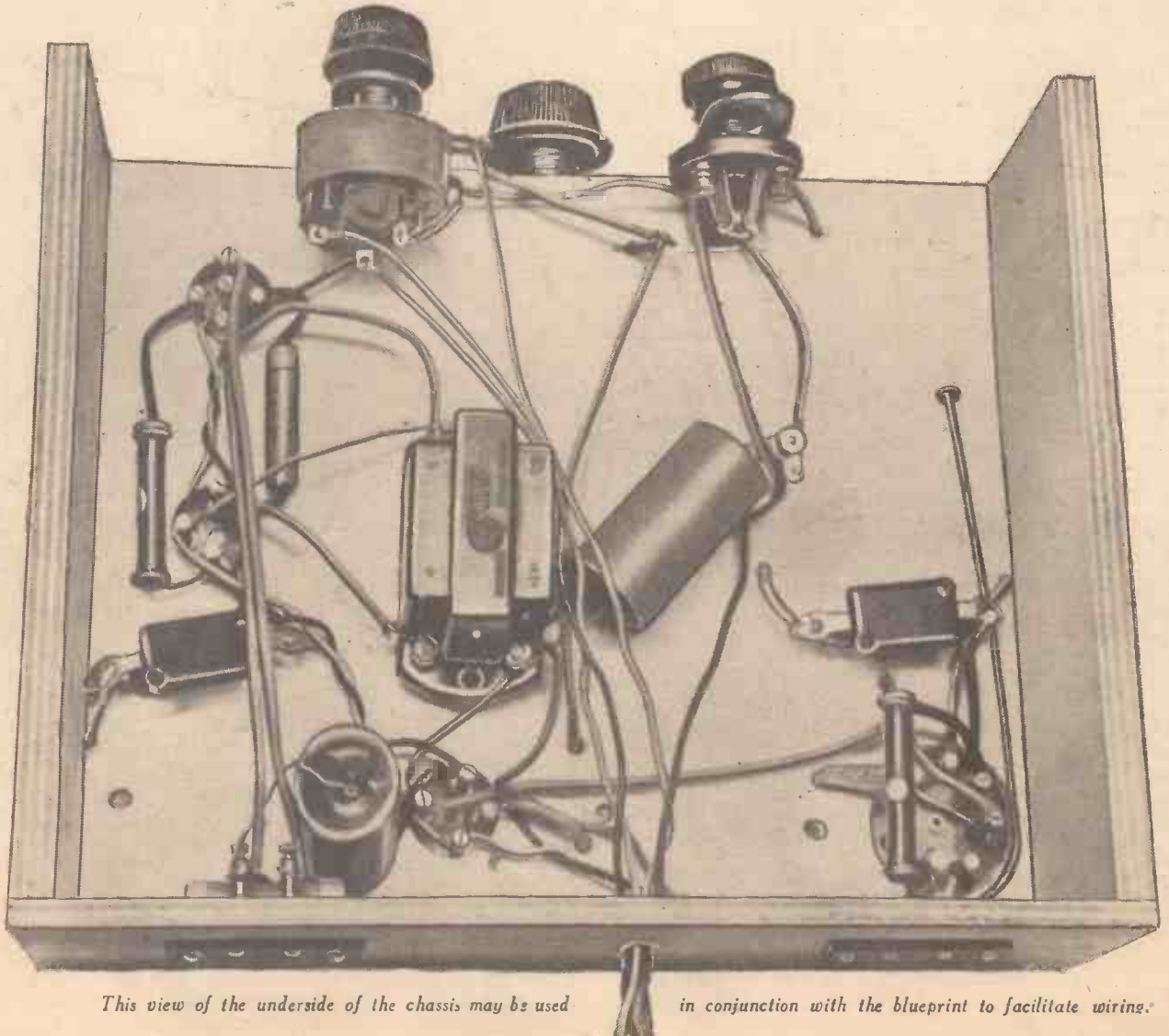
CONSTRUCTING AND OPERATING THE RECEIVER

The first task is to mark out the chassis, using the blueprint as a guide. The valveholder, terminal strip, and wiring holes may then be drilled. A 1½ in. drill should be used for the 7-pin valveholder V1, and a 1 in. drill for V2, V3, and V4 holders. It is advisable to clear the metallising from the surface of the baseboard around the edge of the valveholder holes in order to avoid a short circuit occurring between valve pins and the earth terminal. A ¼ in. drill

is suitable for the terminal strip sockets, and ¼ in. holes are adequate for the wiring leads. The valveholders, terminal strips, and the two component brackets may now be mounted, care being taken to use short screws for the brackets in order that contact will not be made to the upper metallised surface of the chassis. It is suggested that the sub-baseboard components be mounted first, and the wiring carried out as far as possible with only these components in

position. This method of construction prevents the possibility of damage to the coils, I.F. transformers, and gang condenser when reversing the chassis. A numbered wiring diagram with point-to-point instructions is given on page 269. It is not essential to follow the sequence shown on this, but the diagram will prove very useful when the final wiring check is made.

It is emphasised at this point that the screening cans of the coils and I.F. trans-



This view of the underside of the chassis may be used

in conjunction with the blueprint to facilitate wiring.

Designed by the Leading Designer for Home Constructors

formers and the metal chassis of the gang condenser must make good contact with the metallised surface of the baseboard, and therefore it is advisable to fix a washer underneath every M.B. contact screw. If there is any doubt concerning the efficiency of the contact between the condenser legs and the chassis, an extra lead should be connected between one of the chassis screws and the metallised surface of the baseboard. For the same reason, the I.F. transformers should be securely clamped, care being taken at the same time not to use too much pressure on the clamping

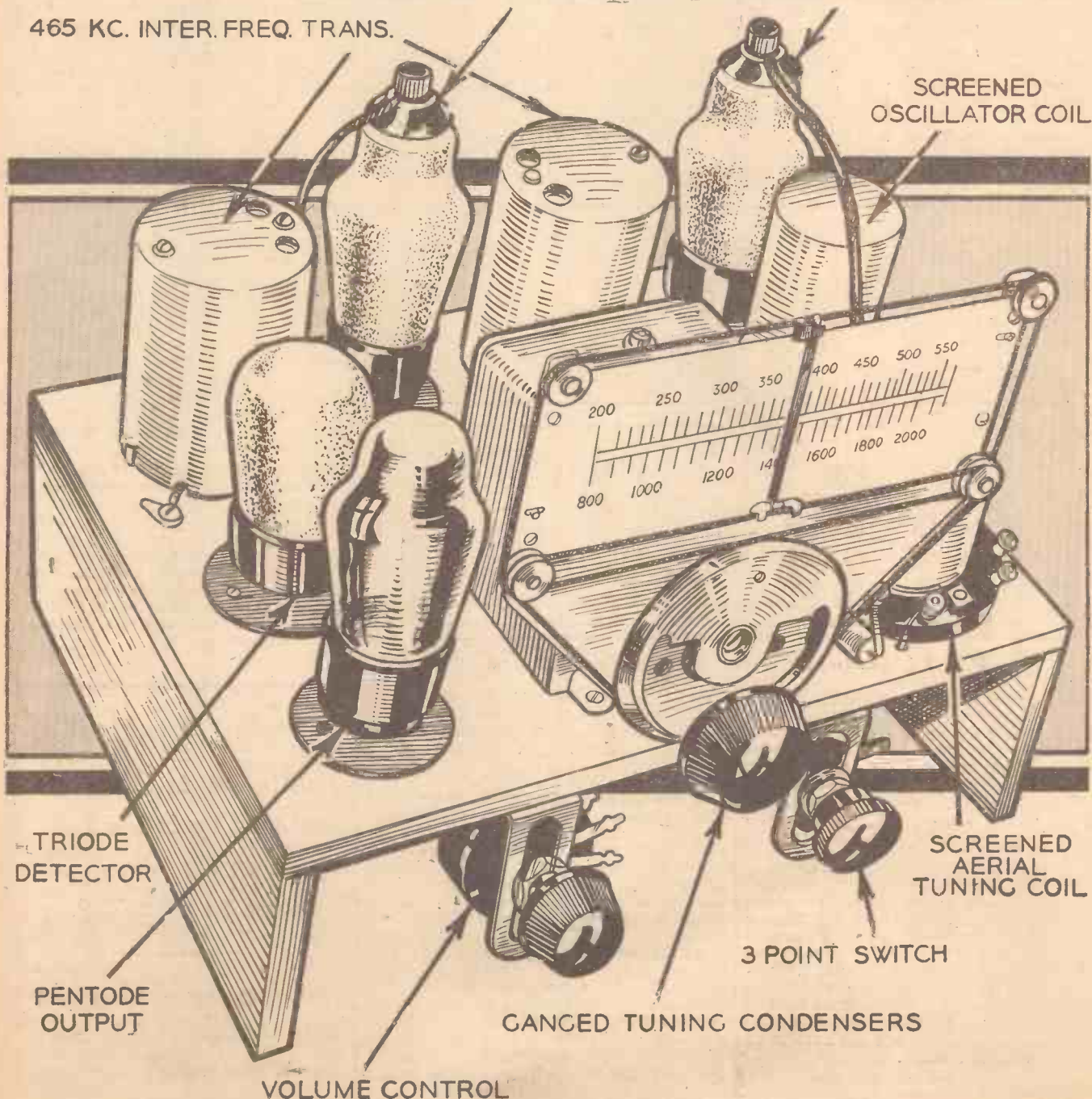
screws or the sharp edge of the screening can may pierce the chassis surface. These apparently simple points are emphasised, as our experience with home-constructed receivers indicates that inefficient results are mainly due to lack of attention to details such as these.

It is also found that few home-constructors take the trouble to learn how to solder. In a wireless receiver, especially in the H.F. stages, soldered joints must be perfect, otherwise noises and high resistance effects will become manifest after the set has been in use for a short period. Soldering

is a very simple procedure, provided that a clean well-tinned iron and a clean soldering surface are used. The end of the wire should be perfectly cleaned and smeared with a very small quantity of Fluxite or similar soldering paste. The well-tinned end of the iron should then be pressed on the wires to be soldered together and a little solder applied. When the iron has been removed, the soldered surface should appear smooth and glossy, and the wires joined together should be able to withstand a sharp tug.

VARIABLE-MU H.F. PENTODE PENTAGRID FREQ. CHANGER

465 KC. INTER. FREQ. TRANS.



Our artist's impression of the receiver, with all the essential parts clearly indicated.

May be Built and Operated by Everybody

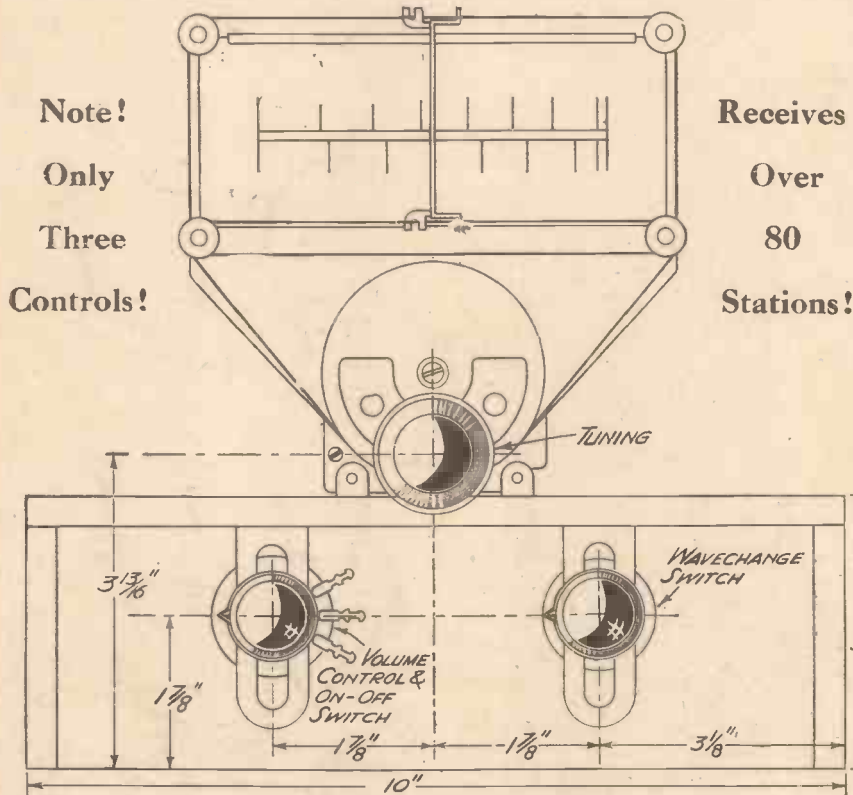
Tone Control Condenser

It will be noted that a condenser (C11) has been connected across the speaker sockets; this has been added for tone correction purposes. The value of this condenser may be varied to suit the listener's requirements in the matter of tone; for example, the capacity may be increased to .01 mfd. if a more mellow tone is desired. The chosen value of .003 mfd. is likely to suit the great majority of listeners. It will also be noted that the pick-up strip is shown at the centre of the back runner in the wiring diagram. A combined L.S./P.U. strip may be used if desired, however, and this is specified in

aerial-earth leads may be joined to their respective sockets. The two L.T. spades should be joined to the + and - sockets of the L.T. accumulator, the G.B.+ plug to the + socket of the G.B. battery, and the H.T.— plug to the - socket of the H.T. battery. G.B.—1, G.B.—2, and G.B.—3 should then be plugged into the —1 $\frac{1}{2}$, —9, and —9 to —12 sockets of the G.B. battery respectively. The higher the voltage applied to the grid of the 220PT valve the lower will be the H.T. current consumption, and, therefore, if a small dry battery is used, it is suggested that G.B.—3 be plugged into the —12 volt socket of the G.B. battery. The H.T.+1 and H.T.+2 plugs should be

Trimming

The preliminary trimming adjustments are best made with the set tuned to the medium-wave band; this is done by pulling out the knob of the wave-switch at the right side of the chassis. The trimmers of the I.F. transformers should be adjusted to approximately half-way setting, the back trimmer of the gang condenser to within one-eighth of a turn from the full-in position, and the front trimmer of the gang condenser to within approximately one quarter of a turn from the full-in position. It is emphasised, however, that the required setting of C1 trimmer is slightly affected by the length of the aerial. When all the trimmers are correctly adjusted their settings should hold at all points on the dial. If it is found necessary to re-set the trimmer of C1 as the tuning dial is rotated towards its maximum setting, the I.F. trimmers should then be slightly readjusted.



Use this diagram for marking out and drilling the cabinet front.

the component list as it is slightly cheaper than two separate strips. Another little point that may be of interest to some readers is the wave-change switch knob. The one supplied with the switch is of the small type, but a larger type to match the knob of the volume control will be found in the Bulgin range.

Battery Leads

Flexible battery leads should be used, and these may be bunched together and passed through a hole positioned half-way between the aerial-earth and speaker terminal strips. It is very desirable to keep the speaker and its leads away from the H.F. components of the receiver, and, therefore, it is necessary for the cabinet to have the speaker compartment on the left side (when viewed from the front), in order that the speaker leads will not have to be passed over the receiver.

Adjustments

After the wiring has been completed and carefully checked, the battery, speaker, and

inserted in the 60 and 120 sockets of the H.T. battery respectively, and the receiver may then be switched on by means of the switch attached to the volume control.

Aerial

It is worth mentioning at this point that a very efficient outside aerial is not essential with this set, and good speaker reception of the local stations may be obtained with only two or three yards of wire attached to the aerial socket. This makes the set very suitable as a transportable, really good reception being obtainable with a moderately efficient indoor aerial, or a short throw-out aerial if the set is to be used out of doors.

Although it is probable that several stations will be picked up the first time the tuning dial is rotated, best results will not be obtained until the various trimming condensers have been carefully adjusted. Two trimmers will be found on the gang condenser, and two on each of the intermediate frequency transformers. They are situated on the top.

The Long-wave Band

When a setting of C2 and the I.F. trimmers is found which does not necessitate readjustment of C1 as the tuning position is varied, attention should be transferred to the long-wave band. For reception of long-wave stations the wave-switch should be pushed in, and the pre-set condenser adjusted until accurate ganging and maximum volume is obtained. It has been found by experiment that the best setting is nearly full-in (in a clockwise direction). It is permissible to use a pre-set having a capacity range between .0002 and .001 mfd. in place of the fixed condenser C6, but as a value of .0004 mfd. was found to work satisfactorily in this position, a fixed condenser was specified in the interests of simplicity.

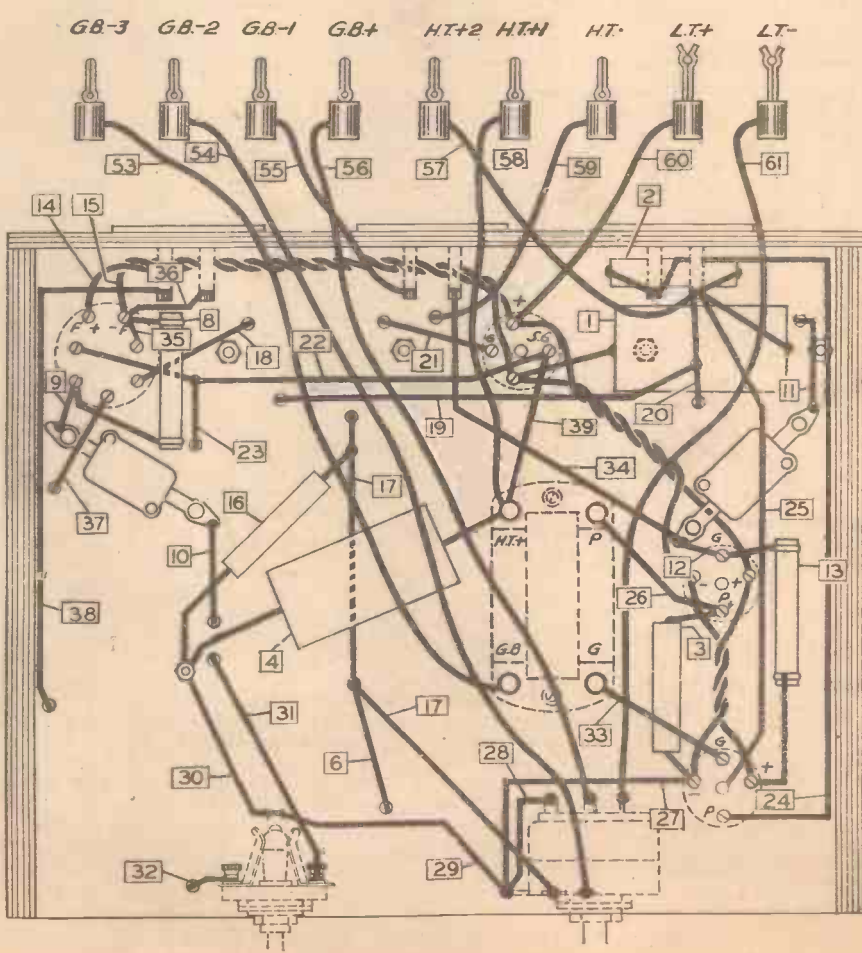
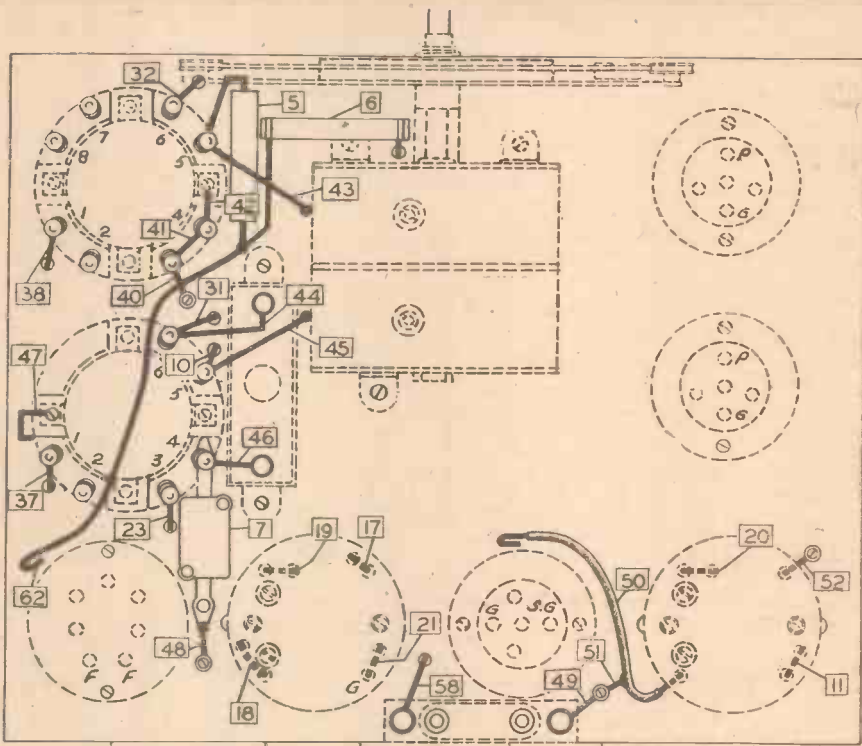
It is improbable that any reader will experience difficulty in the construction of this ultra-efficient little set, but if there is any point which is not quite clear our Free Advice Bureau will be pleased to offer helpful advice. It is also pointed out that automatic volume control and tuning indication can satisfactorily be added to this set, and it is proposed to give the necessary detailed instructions and illustrations in a later issue.

Follow the Full-Size Blueprint given in this Issue, and wire up in the order shown on the Wiring Key given on page 269.

Further Operating Notes and some Test Reports will be given in next week's Issue.

Point to Point WIRING DIAGRAM

- No. 1.—Connecting leads of C12.
- No. 2.—Connecting leads of C11.
- No. 3.—Connecting leads of C10.
- No. 4.—Connecting leads of C7.
- No. 5.—Connecting leads of C3.
- No. 6.—Connecting leads of R2.
- No. 7.—Connecting lead of C6.
- No. 8.—Connecting leads of R3.
- No. 9.—Connecting lead of C4.
- No. 10.—C4 to terminal 5 of BP87 coil.
- No. 11.—C9 to lead G of I.F. transformer.
- No. 12.—C9 to G terminal of V3.
- No. 13.—Connecting leads of R4.
- No. 14.—F+ leads between V1, V2, V3, and V4.
- No. 15.—F- leads between V1, V2, V3 and V4.
- No. 16.—Connecting leads of C8.
- No. 17.—Centre terminal of volume control to C8.
- No. 18.—P of I.F. transformer to terminal 7 of V1.
- No. 19.—H.T. of I.F. transformer to L.S. socket.
- No. 20.—H.T. of I.F. transformer to L.S. socket.
- No. 21.—G of I.F. transformer to G of V2.
- No. 22.—Terminal 3 of V1 to S.G. socket of V2.
- No. 23.—Lead 22 to terminal 3 of coil BP87.
- No. 24.—P of V4 to L.S. socket.
- No. 25.—Centre pin of V4 to L.S. socket.
- No. 26.—P of V3 to P of L.F. transformer.
- No. 27.—F- of V4 to end tag of volume control.
- No. 28.—End tag of on-off switch to end tag of volume control.
- No. 29.—End tag of volume control to lower terminal of wave-switch.
- No. 30.—Lower terminal of wave-switch to M.B.
- No. 31.—Side terminal of wave-switch to 6 of BP87 coil.
- No. 32.—Side terminal of wave-switch to 6 of BP80 coil.
- No. 33.—G of V4 to G of L.F. transformer.
- No. 34.—C9 to P.U. socket.
- No. 35.—Terminal 6 of V1 to F- of V1.
- No. 36.—F- of V1 to E socket.
- No. 37.—Terminal 1 of V1 to terminal 1 of BP87 coil.
- No. 38.—Terminal 1 of BP80 coil to A socket.
- No. 39.—SG of V2 to H.T. of L.F. transformer.
- No. 40.—Terminal 3 of coil BP80 to M.B.
- No. 41.—Terminal 3 of coil BP80 to terminal 4.
- No. 42.—Terminal 4 of BP80 coil to the screening can.
- No. 43.—Terminal 5 of BP80 to F of C1.
- No. 44.—Terminal 6 of BP87 to C5.
- No. 45.—Terminal 5 of BP87 to F of C2.
- No. 46.—Terminal 4 of BP87 to C5.
- No. 47.—Screening can of BP87 to M.B.
- No. 48.—C6 to M.B.
- No. 49.—Fuse-holder to M.B.
- No. 50.—P of I.F. transformer to cap of V2.
- No. 51.—Screening cover of No. 50 to M.B.
- No. 52.—G.B. terminal of I.F. transformer to M.B.
- No. 53.—G.B. terminal of L.F. transformer to G.B.—3.
- No. 54.—End tag of volume control to G.B.—2.
- No. 55.—P.U. socket to G.B.—1.
- No. 56.—Centre tag of on-off switch to G.B.—+.
- No. 57.—L.S. socket to H.T.—2.
- No. 58.—H.T.—+ of L.F. transformer to H.T.—+1.
- No. 59.—Fuse-holder to H.T.—.
- No. 60.—F+ of V2 to L.T.—.
- No. 61.—End tag of on-off switch to L.T.—.



Swamp Areas Abolished

HOW TO USE THE CALIBRATED DIAL

ONE of the principal features of the superhet type of receiver is, as I have pointed out on numerous occasions, that the dial may be definitely calibrated, or that a calibrated dial may be employed with the receiver. In this particular superhet we have adopted a Polar ganged condenser, designed for use with coils having a definite inductance value, and as each signal, when received, is changed to another frequency, it follows that the setting of the oscillator section of the circuit will be constant irrespective of the aerial and earth system or any other outside influence. This does not hold good, of course, for the ordinary type of receiver where the signal has to be passed from stage to stage at its own frequency and thus will be found at any combination of settings. It is possible, of course, to take a receiver

been carried out, the aerial trimmer would be adjusted for maximum volume, and then the I.F. transformer trimmers adjusted for maximum response. By proceeding in this way—that is, making certain that the oscillator section is adjusted to bring the wavelength reading correct for any one station, it only remains to gang the I.F. transformers and aerial circuit accurately for the tuning settings to hold throughout the entire range.

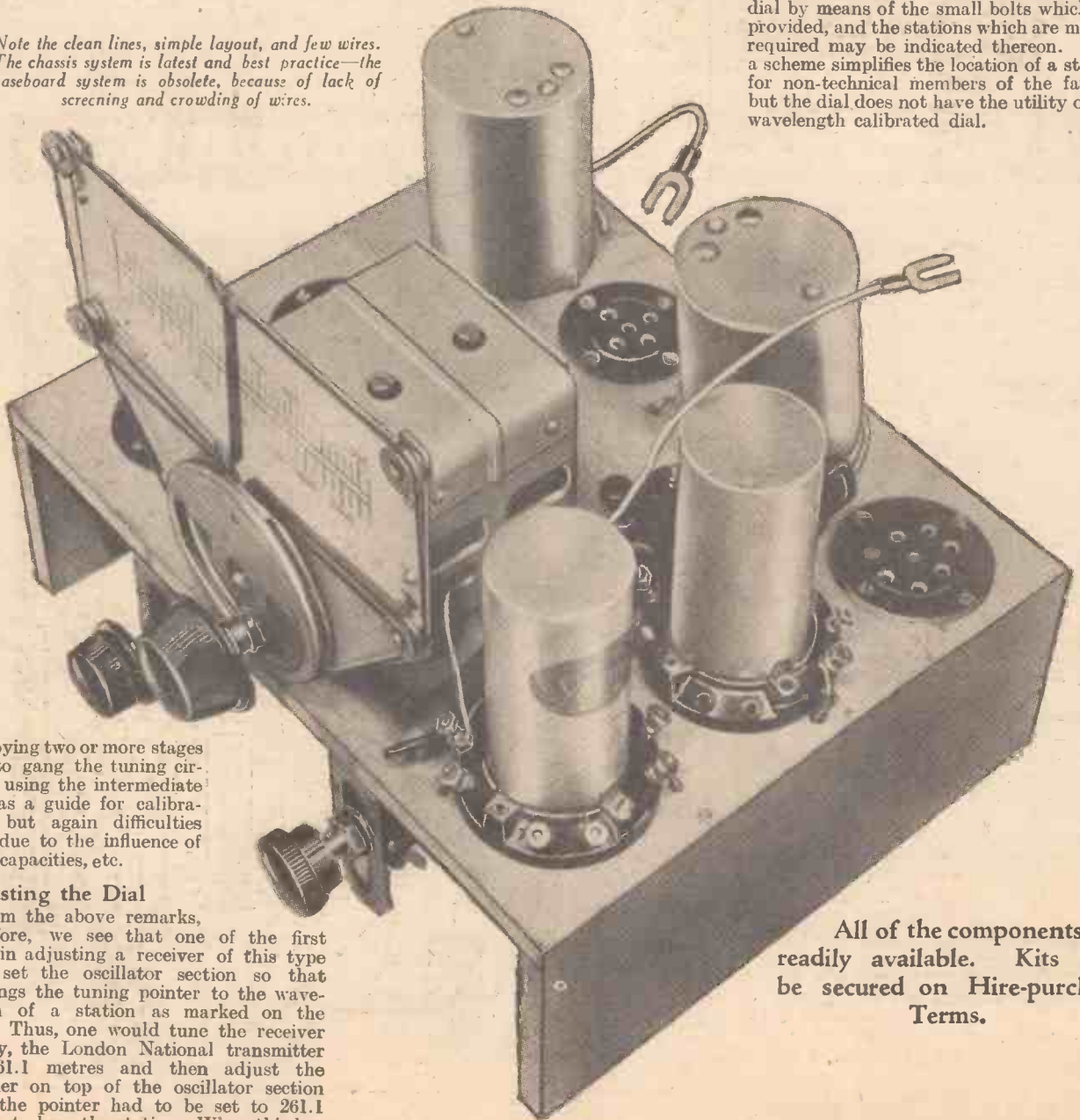
Finding the Stations

From the above remarks it will be seen that any station may subsequently be found simply by adjusting the pointer so that it corresponds to the wavelength of the desired station, and in the dial which is employed the upper portion is divided into divisions of 10 metres, with markings at

every 50 corresponding with 200, 250, 300, 350, and so on up to 550 metres. These markings are evenly spaced and quite open in character so that, if desired, intermediate marks may be made with the aid of a sharp point across which some dark medium (indian ink, for instance) is rubbed. On the long-wave section, the markings are spaced at intervals of 50 metres extending from 800 to 2,100 metres and these are slightly wider than the medium-wave markings.

On page 273 a diagram is given illustrating the setting for the majority of the well-known European stations, and this will serve as a guide when first using the receiver. A list of such stations should be compiled and kept at hand so that any station may be found at a glance, or a strip of paper may be cut and fastened to the dial by means of the small bolts which are provided, and the stations which are mainly required may be indicated thereon. Such a scheme simplifies the location of a station for non-technical members of the family, but the dial does not have the utility of the wavelength calibrated dial.

Note the clean lines, simple layout, and few wires. The chassis system is latest and best practice—the baseboard system is obsolete, because of lack of screening and crowding of wires.



employing two or more stages and to gang the tuning circuits, using the intermediate coils as a guide for calibration, but again difficulties arise due to the influence of stray capacities, etc.

Adjusting the Dial

From the above remarks, therefore, we see that one of the first steps in adjusting a receiver of this type is to set the oscillator section so that it brings the tuning pointer to the wavelength of a station as marked on the dial. Thus, one would tune the receiver to, say, the London National transmitter on 261.1 metres and then adjust the trimmer on top of the oscillator section until the pointer had to be set to 261.1 metres to hear the station. When this has

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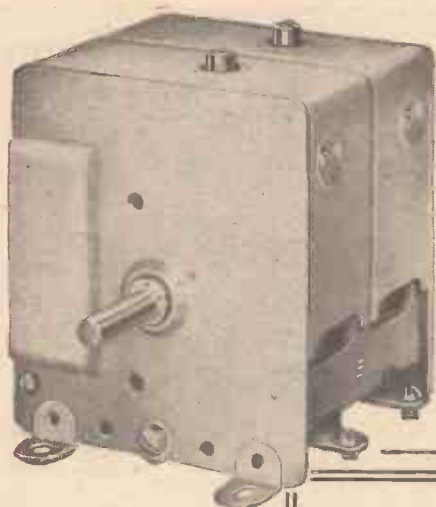
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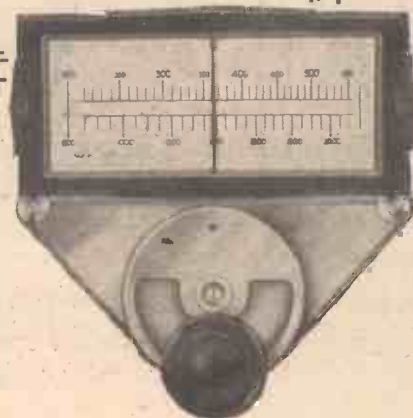
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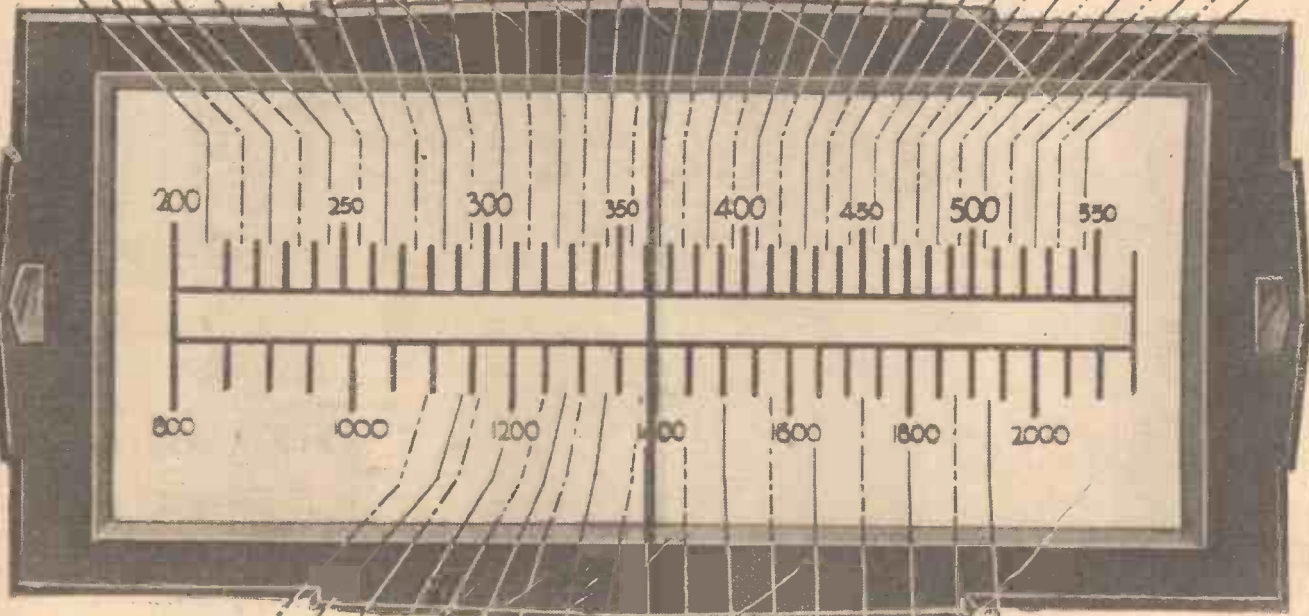
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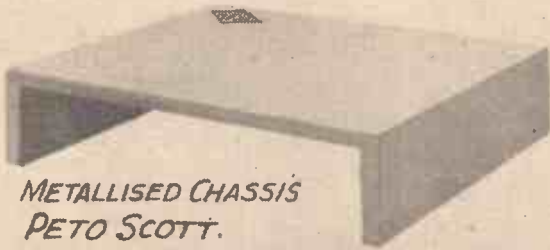


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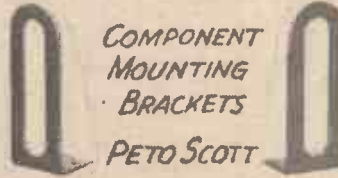
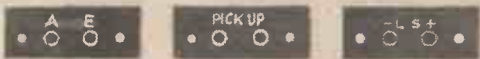


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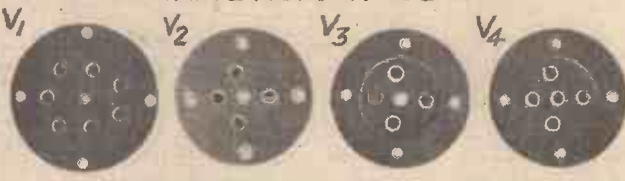
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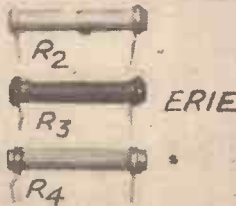
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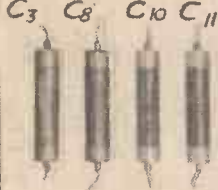


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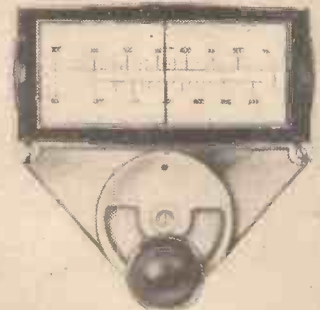
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MY GUARANTEE

I guarantee my £4 Superhet 4 to do what I claim for it, provided that the specified components are used.—(Signed) F. J. CAMM.



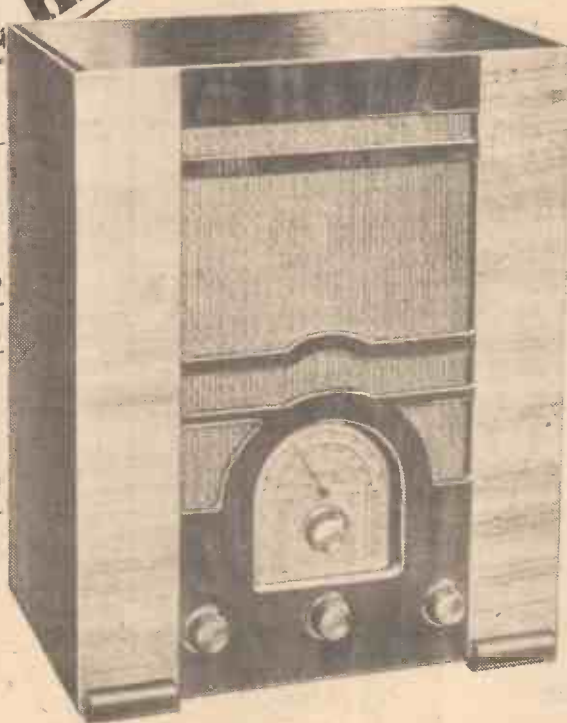
A NEW INTEREST TO LISTENERS

Vidor All-wave Radio enables you to hear



VIDOR ALL WAVE BATTERY SET
£8.8s

VIDOR ALL MAINS SET
£10.10



AMERICAN DANCE BANDS DIRECT

100 EXTRA PROGRAMMES FOR YOU TO CHOOSE FROM

LEAGUE OF NATIONS REPORTS DIRECT FROM GENEVA

EXCLUSIVE NEWS AND VIEWS FROM ALL OVER THE WORLD!

AT **NO EXTRA COST!**

AND ALL YOUR USUAL HOME AND CONTINENTAL PROGRAMMES AS WELL!

FREE 2 COLOUR BROCHURE TELLS YOU ALL THE EXTRA STATIONS

Here is a new interest for listeners—a new thrill for everybody—a new radio receiver which reaches out across the world and brings in not only the ordinary entertainment programmes of the Home stations and the Continent, but those far distant transmissions, those super-important broadcasts which are **only transmitted on short waves** and which no ordinary radio receiver will pick up at all!

And if you want light entertainment. With this wonderful Vidor All-wave Set you can get **America direct at full strength**, and listen to their famous radio stars entertaining the millions. While nearer home, you have at your command the day-and-night Empire Short Wave broadcasts . . . the interest of the Trans-Atlantic Ship-to-Shore Telephone . . . the intimate conversations, even, between Lightship and Lightship around our coasts. All these **new interests** are yours immediately you get a Vidor All-wave Receiver. And remember, it costs you **no more** to get these extra programmes. For only £8 8s. you buy the Vidor All-wave Battery Set, for £10 10s., the Vidor All-wave Mains Set.

Your first step is to post the Coupon below—it will bring you the most lavish free brochure you have ever seen describing the new Vidor All-wave Radio, and telling you the actual stations which you can receive . . . their wavelengths . . . and a Time-Chart, specially compiled for Vidor, from which you will be able to see at a glance what time it is in the country to which you are listening. Post the coupon **TO-DAY!**

Yours SIMPLY BY POSTING COUPON
1d. STAMP ENOUGH IF UNSEALED!



VIDOR

ALL-WAVE RADIO

To Advt. Dept.,
VIDOR LTD., ERITH, KENT
Please send me your Brochure on All-Wave Radio—FREE!

Name

Address

..... P.R.V.46

A SUPERHET



for

£4

designed by Mr. F. J. Camm.

Coils by Varley

This is the set for which everyone has been waiting. A battery superhet, designed by Mr. F. J. Camm, at the amazingly low price of four pounds.

The instructions for building given in this issue are abundantly clear and easy to follow.

Two Varley coils are embodied in the set—adding greatly to the efficiency.

A letter or telephone call secures instant delivery of these units. When ordering please state that they are required for "Mr. Camm's £4 Superhet."



The Varley coils chosen by Mr. Camm for his £4 Superhet are that illustrated (BP80) H.F. Transformer, with reaction Price 6/-.

Also (BP87) Oscillator Coil 465 k.c. Price 6/-.

Varley

OLIVER PELL CONTROL, LTD., BLOOMFIELD ROAD, WOOLWICH, S.E.18. TELEPHONE: WOOLWICH 2345.

DON'T HESITATE!

Put New Life Into Your Old Set

The marked deterioration of the performance of your set is invariably caused through gradual loss of emission in the Valves; there is no cure for this other than by replacing them with reliable counterparts.

NOW, you may say that you cannot afford to buy a complete set of new valves—right—then buy them one at a time and start off with the output stage by fitting a HIVAC Power Valve, the results will more than justify your choice. If you are in doubt as to the correct types to purchase send us the name of your set or a list of the old valves and we will advise you by return of post which Hivac Valves to use.

Here are some of the HIVAC Power Valves which are in demand for replacements.

P 2154/9	Y 22010/6
P 2205/6	AC/L12/6
PP2206/6	AC/Y15/6

For characteristics see Hivac Valve Guide "N" free on request.

HIVAC

THE SCIENTIFIC VALVE

BRITISH MADE

HIGH VACUUM VALVE CO. LTD., 113-117, Farringdon Rd., London, E.C.1.

SPECIFIED

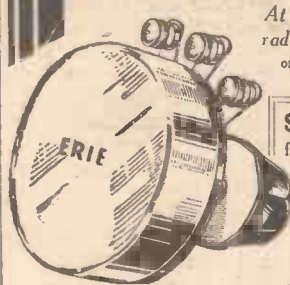
every time—for

Reliability

Follow the Designer's lead

Fit your set with the Erie Volume Control—the result of years of research. It will never develop faults. The Erie resistance element, plus precision construction, ensure smooth, positive contact, without hop-off noises, for a life-time's use. All sizes 2,500 ohms to 2 megohms.

At all good radio shops **3'6** or with built-in Mains Switch 5/-



SPECIFIED for both D.C. and A.C. model of the "SUPER-FORMER 4"

ERIE Resistors specified for the "£4 Superhet 4"

ERIE

VOLUME CONTROL & ERIE RESISTORS

Write for Erie Colour Code Chart
The Radio Resistor Co., Ltd., 1, Golden Sq., London, W.1

LIST OF COMPONENTS FOR F. J. CAMM'S £4 SUPERHET 4



Mr. F. J. Camm's Guarantee only applies when the following components are employed in the £4 Superhet Four. You should, therefore, firmly refuse any substitutes which may be offered to you, and ensure perfect satisfaction and maximum performance by building this receiver with components which have been tested and found satisfactory in this circuit.



COILS

- One Type BP80 screened aerial transformer (Varley).
- One Type BP87 screened oscillator coil (Varley).

CONDENSERS (Variable)

- One Two-gang Midget, Type 465 kc/s. (with Type V.P. Horizontal Drive) (Polar).
- One Compression, Type F (.0001 mfd.) (Ward and Goldstone).

CONDENSERS (Fixed)

- Two .0001 mfd. Type M (T.C.C.).
- One .0004 mfd. Type M (T.C.C.).
- One .0005 mfd. Type 300 (T.C.C.).
- One .001 mfd. Type 300 (T.C.C.).
- One .003 mfd. Type 300 (T.C.C.).
- One .01 mfd. Type 300 (T.C.C.).
- Two .5 mfd. Type 250 (T.C.C.).

RESISTANCES (Fixed)

- One 100,000 ohms non-inductive 1 watt type (Erie).
- One .5 megohm non-inductive 1 watt type (Erie).
- One 1 megohm non-inductive 1 watt type (Erie).

RESISTANCE (Variable)

- One 50,000 ohm Type VM 47 with 3-point switch (Bulgin).

I.F. TRANSFORMERS

- Two Type No. 674 (465 kc/s) (Eddystone).

L.F. TRANSFORMER

- One Type L.T. (ratio 1-3) (B.T.S.).

SWITCH

- One 3-point shorting switch (B.T.S.).

VALVE-HOLDERS

- Two 4-pin Type V.2 (with terminals) (Clix).
- One 5-pin Type V.2. (with terminals) (Clix).
- One 7-pin Type V.2 (with terminals) (Clix).

TERMINAL STRIPS

- One Type D—marked A.E. (Clix).
- One Type D—marked P.U. and L.S. (Clix).

CONNECTING PLUGS

- Seven Wander Plugs, marked G.B.—1, G.B.—2, G.B.—3, G.B.—+, H.T.—1, H.T.—2, H.T.— (Belling and Lee).
- Two Spade connectors, marked L.T.— and L.T.—+ (Belling and Lee).

FUSE

- One 100 mA and holder (Microfuse).

VALVES

- One Pentagrid, Type 210 P.G. (Cossor).
- One variable-mu H.F. Pentode, Type 210 V.P.T. (Cossor).
- One Triode, Type 210 Det. (Cossor).
- One L.F. Pentode, Type 220 P.T. (Cossor).

CHASSIS

- One Metaplex, measuring 10in. by 8in., with 3in. runners (Peto-Scott).

COMPONENT BRACKETS

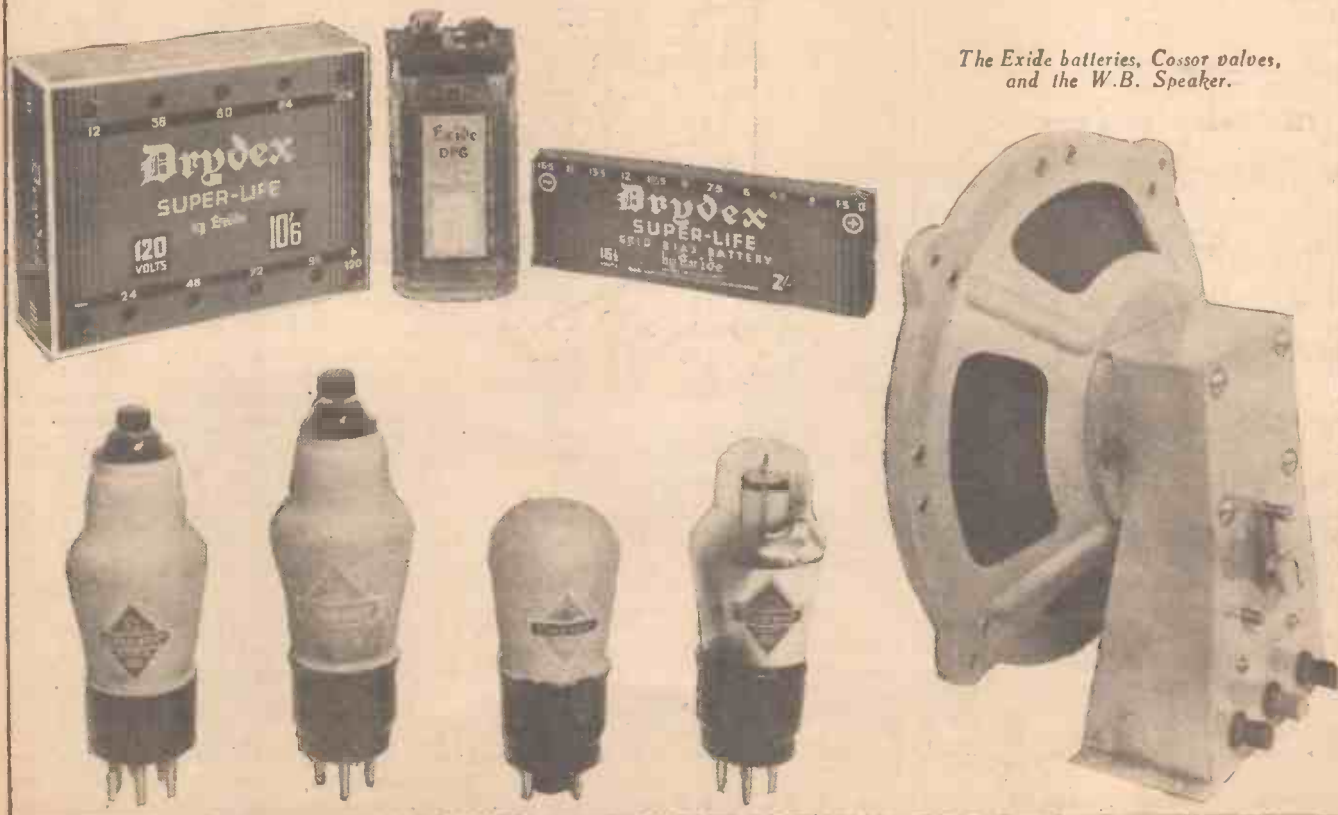
- Two 2½in. chassis type (Peto-Scott).

ACCESSORIES

- One Stentorian Loud-speaker (W/B).
- One 120-volt H.T. battery (Drydex).
- One 16.5-volt G.B. battery (Drydex).
- One 2-volt L.T. accumulator (Exide).
- Connecting wire, screws, etc.

For the identification of each individual component (C1, C2, R1, R2, etc.) see the full-page circuit diagram on page 264.

THE POWER AND THE VOICE of the £4 Superhet 4



The Exide batteries, Cossor valves, and the W.B. Speaker.

A PAGE OF PRACTICAL HINTS

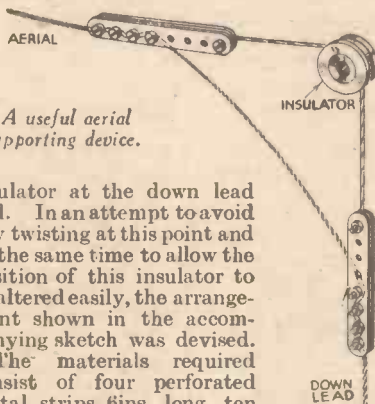
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

An Aerial Hint

AN aerial which is kept reasonably taut generally snaps prematurely because it has been bent and twisted at some point, more often than not at the



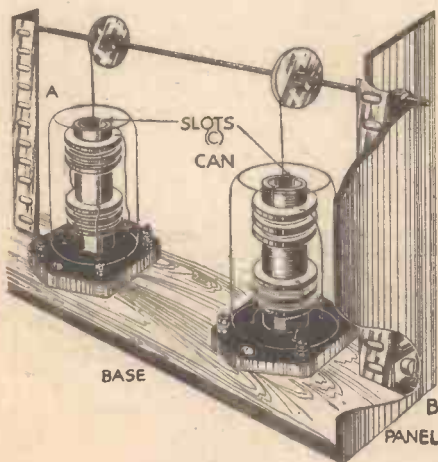
A useful aerial supporting device.

insulator at the down lead end. In an attempt to avoid any twisting at this point and at the same time to allow the position of this insulator to be altered easily, the arrangement shown in the accompanying sketch was devised.

The materials required consist of four perforated metal strips 6ins. long, ten small nuts and bolts, and about a foot of aerial wire. The aerial is clamped between two pairs of perforated strips joined together by the length of wire, which is fastened securely at its middle point to the insulator. The sketch shows the details clearly. The aerial is then very firmly held without any twisting; while to change the length of the down lead it is only necessary to take out the eight clamping bolts, and refasten the strips at the required point.—A. W. B. (Liverpool).

Variable Selectivity Device

WITH the aid of a few perforated metal strips and angle pieces it is possible to convert an old type of I.F. coil to the more modern type. First of all take two angle girders, 5½in. long, and screw them down on the base with the aid of small angle brackets and a wood screw. Next get a rod the length required and fix on it two 1in. pulley wheels directly in line



A simple variable selectivity device.

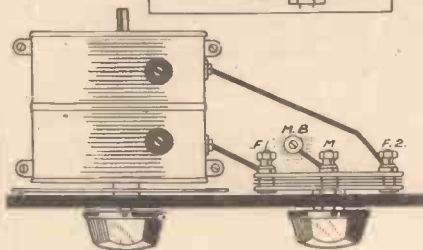
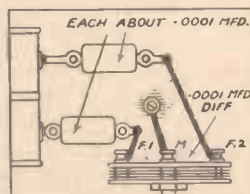
THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes Ltd., 8-11, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." Do NOT enclose Queries with your Wrinkle.

with the coils, and a little to one side so as to bring the groove of the pulley over the centre of the coils. Next carefully remove the top coil and make a fine saw cut down the centre of the former so as to accommodate the fine wire which is stretched across the centre of the top coil. Ease the coil so that it moves freely on the former, bore a hole through the centre of the top of the cam and then solder a short length of thin wire in the groove of the pulleys. Finally, make two small hooks to fasten on the ends of the wire, and the device is complete.—J. GRAHAM (Morley).

Differential Trimming

THERE are, no doubt, many readers of PRACTICAL AND AMATEUR WIRELESS who are in possession of excellent sets of the screen-grid, detector, and power combina-



tion utilising twin gang condensers of the pattern illustrated with trimmers on top. Often it is possible to gang up correctly, but there are times when the two halves are just out at the top or bottom of scale and best results cannot be obtained without lifting the lid of the cabinet and re-adjusting the trimmers at different parts of the scale. The following scheme will abolish trimming troubles. Take down a differential condenser of about .0001 mfd. and build up a very small one, using only one moving and one each of the fixed plates. Connect the fixed plates to fixed plates of ganged con-

denser, and moving plate to metal base-board or earth. To operate, first unscrew trimmers of condenser to minimum, then tune in stations at bottom and top of scale. It will be found that a slight movement of the differential will have the desired effect. Slight readjustment of the main tuning knob is necessary after trimming.—C. EVERETT (Hampton, Middx.)

[It must not be overlooked that this method of trimming, although ingenious, will introduce small additional capacitance coupling between the two tuned circuits, owing to the end-to-end capacity between the two sets of fixed plates of the differential condenser. This additional coupling would alter the overall response curve of the receiver, tending to make the tuning less sharp.—Ed.]

A Short-wave Valve-holder

MANY amateurs no doubt have by them some of those old valve-holders of the under-panel mounting variety, as shown in sketch, a type in vogue several



OLD TYPE LOW LOSS UNDER-PANEL-MOUNTING VALVE HOLDER



EBONITE TUBE

VALVE HOLDER CONVERTED FOR SHORT WAVE USE & MOUNTED ON EBONITE PILLARS.



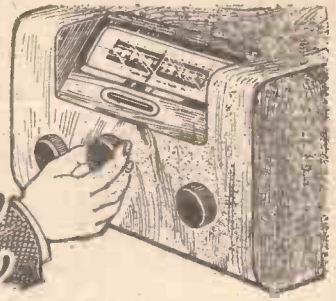
WEDGE SHAPED PCS. CUT OUT TO MINIMISE SURFACE LEAKAGE.

A method of converting an ordinary valve-holder for short-wave work.

years ago. These can readily be converted for ordinary short-wave work, and will be found quite satisfactory for experimental purposes. It is merely necessary to mount them on ¼in. ebonite pillars, using the two original fixing holes and two ¼in. brass screws to fix to the baseboard. It is preferable to solder connecting wires direct to the spring contacts, and not to the soldering tags, which can be discarded. To minimise surface leakage, wedge-shaped cuts should be made across the insulating ring between the contacts, as shown. The holder could, of course, be mounted at other heights than that given, and if too high to fix by screws, the following method could be adopted. Cut a strip of ebonite to form a base and fix to the bottom of the pillars by two countersunk set-screws, the valve-holder itself being fixed to the top of the pillars by a further pair of set screws.—R. L. G. (St. Albans).



On Your Wavelength



By Jhermion

The General Election

IN common with all other listeners, I shall sit up and listen to the election results, a most exhausting business, for politics always seem more terrifying in the early hours of the morning. You watch your party's progress with rising interest or descending gloom, and the whisky bottle provides a barometer of your feelings. If



Sitting up late listening to election results is an exhausting business. Somehow politics always seem more terrifying in the early hours.

your party is winning it is just cause for celebration, if it is losing you take double doses. How you hate the announcer when with monotonous regularity he tells you that your political opponents are winning. He seems to be on their side; he seems a decent sort of chap, however, when the announcements tell you of sweeping successes for your own party. I listened in to the political speeches broadcast before the General Election, and came to the conclusion (1) that none of the parties had any constructive policies, (2) that they all seemed as bad as one another, (3) that the whole lot of it was carefully planned eye-wash, (4) that each of the parties had selected points on which it could catch most votes, irrespective of the needs of the country, (5) that the speeches consisted of internecine conflict and recrimination and (6) that I would make a better politician than all of them put together. The salary of £400 per annum, however, does not attract me. You cannot expect good men for such a low salary, and perhaps that is why some politicians are unsuccessful, drawn from the have-nots and the never-wassers, who would like to be amongst the I-ams and the would-bes, yet only succeed in becoming never-will-bes. This social climber business is terrible.

Restaurant Bands

MOST of the London restaurants employ tame dance bands, consisting of tired-eyed musicians and knights of the cat-gut who scrape out lazy tunes while you eat. No one ever seems to listen to them, and occasionally when they broadcast the applause seems to come from about three pairs of hands in an otherwise empty room. These bands are useful in that they provide

a background for conversation and render it inaudible to your neighbours at the next table. There is a tendency, however, for your jaws to catch the jizz disease, with dire effects to your gustatory organs. Wherever you go to-day there is noise and jizz. Remember that a boy may grow to be a man or a crooner, but he cannot be both, as someone said the other day.

Our Efficient Post Office

I RECEIVED a reminder the other day that my wireless licence had expired. I was duly grateful to the Post Office, for the renewal had completely slipped my memory. This is one of the few annual payments I am compelled to make which gives me real pleasure. It is 10s. well spent; bearing in mind that the Post Office only gets 1s. of it, that it issues a reminder, and that it will investigate complaints of electrical interference, promptly and efficiently, no one can complain. There is not another item in the world which represents such excellent value for money spent.

This reminder set me thinking. Quite often I have forgotten to renew my driving licence, which costs me 5s., in return for which the country does absolutely nothing except to provide me with a small vest pocket book which I must sign like a ticket-of-leave man, and which contains spaces on which magistrates can enter endorsements. Why does not the Ministry of Transport remind me when it is overdue? It can well afford to do so. If the Post Office can do it out of a bob, the M.O.T. can do it out of five. But, of course, too much revenue is extracted from the motorist in the form of fines for this to be done. They want you to forget so that they can sting you for a further quid should you venture to drive your vehicle.

The Best English

I DO not agree with the statements made in Maurice Healy's broadcast on the evening of November 4th, that Englishmen spoke English carelessly. He supported his asseveration by instancing "The Trial of Madeleine Smith" from Edinburgh. Here, he said, was the English language spoken at its best by Scots. I do not think that anyone except Scots will agree with this. Personally, I hate to hear the re-rutulated R

(Continued overleaf)

My New Office

OWING to the colossal success of PRACTICAL AND AMATEUR WIRELESS and the remainder of the publications produced by the publishers of this journal, I have been moved, in common with the Editor and his staff, into the nice new building erected on the site made famous by the late Sir George Newnes when he founded *Tit-Bits* some years ago. Paradoxically enough, any business which expands externally contracts internally, until re-building becomes an absolute necessity. My new office is tastefully panelled in oak, relieved in green. Architraves, transomes, jambs, and styles are all of the latest devices in building construction, including sprinkler valves in case of fire. There is a nice new desk upon which further jewels of wisdom can drop from my pen, and everything is so tidy that I cannot find a thing I want. You must excuse me this week, therefore, if my writings do not bear the imprint of high-glass literature with which my name has for so long been associated.

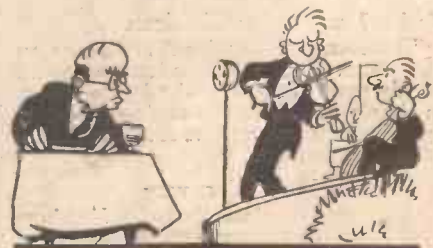
This Moving Business

THIS moving business is all very upsetting and mildly exciting. The splendid new PRACTICAL AND AMATEUR WIRELESS laboratory situated in a lofty part of the building, well equipped and commodious, and in which has been produced Mr. F. J. Camm's £4 Superhet 4-valver as described in this issue, has put me off my stroke a little. I am still finding my way about, and the old well-trodden passages and corridors will know me no more, for they are in the hands of the demolition party. There was a touch of sadness in the parting, for our old offices had been the scene of exciting activity and intensive endeavour under the leadership of your Editor.



I have been moved to a new office with all new furniture, and everything is so tidy that I can't find a thing I want.

The campaign successfully conducted in the interest of home construction was launched from those offices, and he was the spearpoint of the attack on dud components which gave rise to his solus policy.



Some of these restaurant bands are all right—for a background for conversation over the meal table, but are not good enough to broadcast.

(Continued from previous page)

of those over the borrrrrrder. It is quite unnecessary and pure swank. Other examples of poor Scottish English is mon for man, naw for no, and the staccato abbreviation of words, together with the Germanic pronunciation nacht and nicht for night. I think it undesirable for racial prejudices to be fostered in this way. Would an Englishman have been allowed to slate our friends the Scots in similar manner?

"Facet"

MANY listeners have written to the B.B.C. to ask when "Facet" will appear again in the Western programmes, as it is almost exactly two years since the last one was broadcast. "Facet" returns on November 13th, when the subject is "Man is man and master of his fate." There is so much material that it will be continued in the next number, probably early in the New Year. The first illustration of the theme is from "Hamlet" and is a generalisation about man's function in life. Another illustration comes from "The Offence," by Mordaunt Shairp, when man is shown as a complex being, the victim of all sorts of inherited and acquired impulses. Two further illustrations will show man as the victim of woman, but the second shows that he is at times the worm which turns in the end.



I had a reminder the other day that my licence had expired. I wonder why the Minister of Transport does not send them when the car licence or driving licence is due?

In the Nick of Time

A STOCKHOLM listener, sitting at his evening meal, switched on his wireless receiver to hear the news. Compelled on account of ill-health to sweeten his tea with saccharin bought that day, he was on the point of drinking it when he heard the studio broadcast an SOS. It was to the effect that a chemist, by mistake, had supplied a customer with poisonous tablets instead of saccharin. When he heard the name of the chemist, he realised that had it not been for radio he would have drunk the tea—for he was the customer.

Chinese Broadcasting Network

IT is reported that the Nanking Government has placed contracts for the installation of ten broadcasting stations, of which at least one is to be of the 100-kilowatt type; it is to be erected at Pellingmao.

Radio Journal for Children

THE Berne (Switzerland) studio, as an innovation, will broadcast a special weekly news bulletin destined to children. In simple phrases it will explain the chief topical events and matters of interest to the younger generation.

Marconi's New Discovery

ROME papers state that the Marchese Marconi has now perfected a new system of telephony transmission on short waves, in which, by regular changes of frequency, communications cannot be intercepted. It is to be used on the Asmara



Notes from the Test Bench

I.F. Coupling

IT is generally considered that the amplification given by the intermediate-frequency amplifier of a superhet is dependent upon the closeness of coupling in the I.F. transformers. This is true up to a point, and it is also true that the sharpness of tuning is adversely affected by making the coupling too tight, but the rule should not be adhered to too closely. As a case in point, a four-valve A.C. superhet intended for operation from a mains aerial was recently found to perform very unsatisfactorily, although a glance over the circuit suggested that all should be well. After making progressive component tests, it was found that the constructor, in an attempt to get "the last ounce" out of the set, had adjusted the movable coils in the I.F.T.s so that they were touching. After moving those in the first transformer until they were 1/16 in. apart, and setting those in the second to 1/16 in. apart, both selectivity and volume were greatly improved. Additionally, a trace of instability which had previously been apparent, vanished completely. This experience is worth passing on to others who use I.F. transformers in which the coupling is variable.

Speaker Vibration

AN unusual cause of speaker "tizzing" was experienced lately, and every time certain high notes were struck a most unpleasant vibration effect was noticed. Inspection of the energised moving-coil speaker revealed that the speech coil was properly centred in the magnet gap and that there was neither dust nor grit between the coil and magnet. It was also found that the centring spider was rigidly fixed, and that the cone itself was undamaged.

Suspicion fell on the receiver, so a permanent-magnet type of speaker was connected, the field winding being replaced by a choke of similar resistance. Results were then perfectly satisfactory. Careful examination of the original speaker revealed that the field winding was slightly loose on the magnet, and that this had been the cause of the entire trouble; after wedging the spool with a thin strip of paper the speaker was again put into commission.

Trickle Charging

A READER was perplexed by the fact that the rectifier and mains transformer of his home-made trickle charger became unduly hot after the accumulator had been on charge for a few hours, although everything was in order after first switching on. Examination showed that the metal rectifier had not been used as specifically directed by the makers—the "ballast" resistance had been omitted. In consequence, the charging current increased to a figure higher than that at which the rectifier was rated, due to the low external resistance. In cases like this the makers' instructions should carefully be followed.

In their literature the makers give a table showing the value of resistance required for various types of rectifier. The value generally lies between .5 and 2.5 ohms.

(Eritrea)-Coltano (Italy) service, as soon as possible.

Wave Switches and Potentiometers

THESE components have always been a source of worry to the radio manufacturer. They generally work satisfactorily for three months or so, and then become noisy. Fortunately, however, it is fairly easy to decide whether noises are due to faulty switches or volume controls. If a potentiometer is noisy it becomes very pronounced as the control is operated. It is difficult to remedy such a defect, and the cheapest procedure is to fit a new component. When a wave-switch is noisy, the noise usually shows up on one wave-band, and a definite crackle is produced when changing over from one wavelength to another. It is not difficult to correct a noisy switch, however. It is only necessary, in most cases, to clean the contacts by means of a very fine grade of emery paper, and see that the contact arms are making good connection.

D.C. Receivers

D.C. RECEIVER hum is generally more difficult to eliminate than that experienced in receivers supplied from A.C. In some cases it is found that a difference of potential exists between the earthed main and the receiver earth connection. This invariably causes hum, the simplest cure for which is the disconnection of the earth lead. The more complicated method of balancing the potential difference by means of potentiometers can be adopted, but this is not recommended for the home constructor.

Another troublesome form of D.C. receiver hum is that caused by the generating machines at the power station. This generally takes the form of a high-pitched buzz, and may be eliminated by the connection of a choke and condenser filter in the input circuit. The required inductance of the choke is governed by the pitch of the hum, an inductance of 2 henries generally being found effective for a moderately high-pitched note.

What is Scopphony?

THE Scopphony television system differs in principle and construction from any other method.

Scanning is carried out by a light, slowly-oscillating mirror which, in conjunction with a series of lenses projects the televised picture on to a screen in much the same manner and size as that obtainable with a small home cinema.

It is understood that there is no immediate intention of marketing Scopphony television receivers, and that the working agreement reached by the Scopphony and Ekco companies is merely a preliminary arrangement to work together when a satisfactory programme service is ready.

Up to the present we have not been enabled to witness a demonstration of the Scopphony system.

"Music Shop"

THE third episode in the "Music Shop" series of "musical extravaganzas" is entitled "The Publishing Racket," and will be broadcast to Northern listeners from the Manchester studios on November 15th. Although this show, like its predecessors, will serve primarily as a pretext for the singing of many popular songs (arranged by Henry Reed and Ben Morton, Jnr.), this particular episode will see the reappearance of those popular Northern comedians, Professor Zweistein and Mr. Griffiths Griffiths. It is these two "loving enemies," in fact, who keep the music shop, but they have now apparently added to their anxieties by becoming involved in the publishing racket.

The Control of Volume

There are Only Two Methods of Controlling Volume, and the Difference is Described in This Article, which Also Deals with the Various Methods of Applying Them
By W. J. DELANEY.

PRACTICALLY every receiver of modern design has a volume control, but no matter what form this takes, it carries out its function in one of two ways. This may seem rather strange in view of the large number of controls which are available, but nevertheless it remains true. When all the schemes are analysed it is found that at some part of the circuit a device is fitted across which all the signal voltages are developed at that part of the circuit, and for the succeeding circuit only a portion of such voltage is tapped off; or a component is provided with a limiting action. As examples of each of these schemes we may take the connection of a

and we endeavour to tune to another station. Without going into the actual effect, we may simply consider the effect as an over-amplification of weak signals which are present as a background to a fairly strong signal, which does not receive the same amplification owing to a saturation effect on the valve. Thus, in such a case we must introduce the control over volume in the first stage, and if an H.F. valve is employed we can adopt either method No. 1 or No. 2. In the latter case, of course, we must employ a variable-mu valve and restrict the amplification of the valve by varying the grid bias. For the benefit of new-comers the essential parts of such a circuit are shown for battery receivers in Fig. 1 and for mains receivers in Fig. 2.

Aerial Circuit Control

If, however, we wish to use an ordinary valve in this stage and consequently desire to employ control method No. 1, we must provide some means of tapping off only part of the total signal. There are two methods of doing this in this part of the receiver—one by using a resistance across the circuit and the second by using a special balanced condenser method. The latter may be simplified by employing an ordinary

differential reaction condenser, and again the essentials only are shown in Figs 3 and 4. In Fig. 3 the total signal is produced

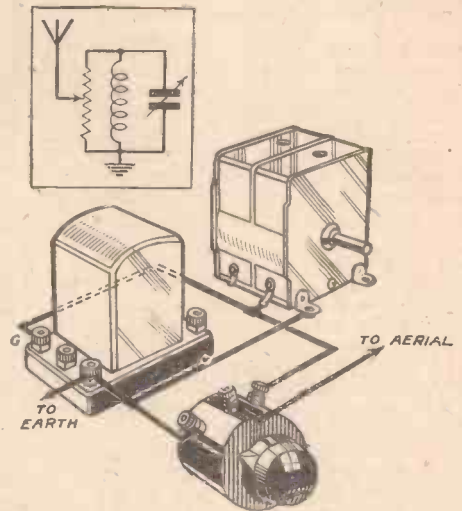


Fig. 3.—A potentiometer across the aerial coil enables the volume to be controlled without appreciably affecting the tuning.

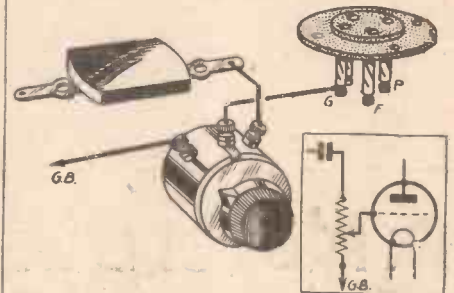


Fig. 5.—An effective low-frequency control which provides for the tapping off of a portion of the voltage developed across the grid leak.

across the ends of the resistance as well as across the tuning coil, and an arm on the resistance is adjustable so that part is short-circuited. This scheme is not much used owing to variation in tuning, and is generally incorporated with the bias potentiometer which is employed for a variable-mu valve to obtain the advantages of both schemes.

In Fig. 4 a somewhat different effect is obtained, as the transference of the un-

(Continued overleaf)

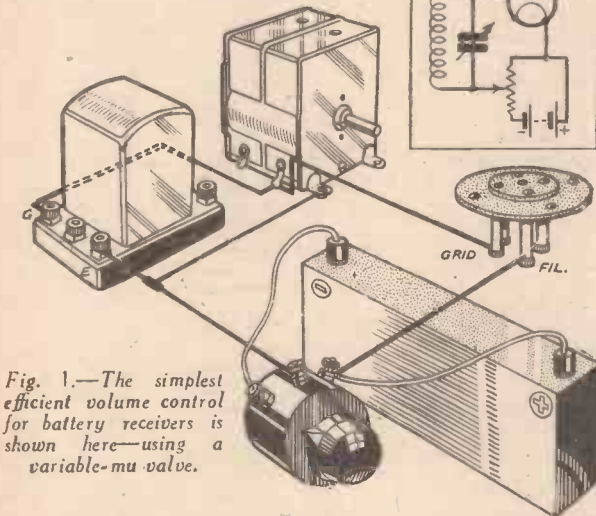


Fig. 1.—The simplest efficient volume control for battery receivers is shown here—using a variable-mu valve.

volume control across the secondary of an L.F. transformer (method No. 1) and the use of a variable-mu H.F. valve (method No. 2). Going further into the question, we can see that difficulties due to over-loading may not be cured by method No. 1, and therefore where the volume control has to be fitted owing to this trouble it may be necessary to consider a mixture of both schemes or the provision of the second method.

Early Control

When a receiver is installed close to a high-powered broadcasting station there is a large signal voltage present in the aerial circuit and the more efficient the aerial circuit the greater the voltage which will be present between aerial and earth. Now the first valve in a receiver may be an H.F. amplifying valve or a detector valve. In the latter case it may be taken as a general rule that the more powerful the signal the better, and where a diode is employed it is essential to make quite certain that a really strong signal is applied to avoid distortion. In the case of an H.F. amplifying valve, however, we may experience difficulties if a powerful signal is present

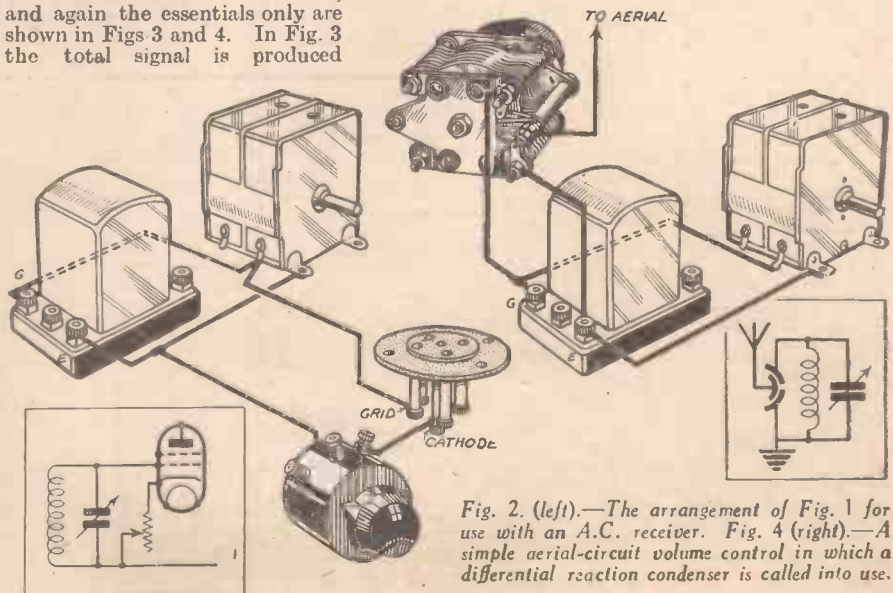


Fig. 2. (left).—The arrangement of Fig. 1 for use with an A.C. receiver. Fig. 4 (right).—A simple aerial-circuit volume control in which a differential reaction condenser is called into use.

(Continued from previous page)

wanted signal voltages is carried out through the capacity existing between the vanes of the condenser, and not direct through the medium of actual contact as in Fig. 3. In this case also a limiting effect is introduced, as it will be seen that the signals in the position of minimum volume pass to earth through the condenser instead of going through the coil.

L.F. Controls

On the L.F. side of the receiver a potentiometer is the only practical device, and it may be used alone or in conjunction with a transformer. In the first case it will form the grid leak of an ordinary resistance-capacity coupled stage, and in the second case it will be joined across the secondary of the transformer. (It could be placed on the primary side of the transformer, but this is not desirable owing to noises introduced due to the fact that current is flowing through it and its effect is also generally erratic.) Figs. 5 and 6 show the two methods in essentials, and it will be seen that in the first case the total signal will be developed only across the control, whilst in the second the transformer winding is also included. Thus in this case the actual response curve of the

transformer will be modified, and it is necessary to choose the value of the resistance with a full knowledge of its effect on the inductance of the secondary winding, and the makers' instructions must be followed. The moving arm again is used to select the desired proportion of the signal voltage.

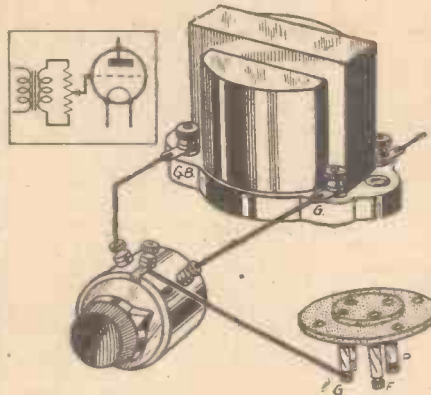


Fig. 6.—A potentiometer across the L.F. transformer. This method modifies the L.F. response slightly by flattening the response curve.

Speaker Control

There is one position left at which control can be exercised, and that is the loud-speaker. Obviously, from what has been said, this control cannot prevent overloading of valves or components in the receiver, and is therefore only of use where the speaker is being used as a remote listening point and an item is received which is not desired. In this case the signal will be by-passed, which is a reversal of the method No. 2, and it may be accomplished by a potentiometer device across the secondary of the speaker transformer, or by a resistance of such a value that the speech coil is gradually short-circuited. In general it will be preferable to ignore control methods on the primary of the speaker transformer for the same reason as in the case of the L.F. transformer.

In all cases where the signal voltages are present across the control it is obvious that the change from one point to another must be carried out very gradually, or noises will be introduced, or other troubles will be present, due to the sudden jumps from one point to another, and thus the selection of a component for volume control purposes requires some care, and only the best should be obtained.

A Novel Dual-range Coil

I GIVE herewith details of a coil which I have had in use in my receiver for the last six months, and which has never failed to give good results. The change from one range to another is carried out by the simple touch of the rod on top of the coil, thus making each coil self-contained. It will be seen from the diagram (which is exactly half scale) that the coil ends go direct to the plug pins and this does away with long leads and risks of losses. The change-over switch is a direct and simple affair and quite cheap and effective. The following details of my

coils will no doubt enable other readers to construct coils of a similar type.

The grid coil should be wound first and is as shown below.

On the rotor or contact disc will be seen 4 sets of 4 contacts. Two stop pins are

Grid Winding

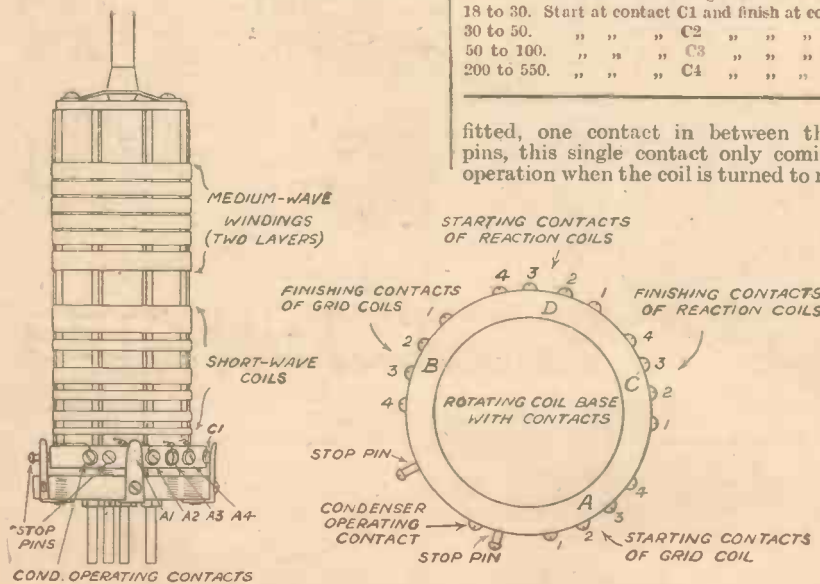
18 to 30.	Start at contact A1 and finish at contact B1
30 to 50.	" " " A2 " " " " B2
50 to 100.	" " " A3 " " " " B3
200 to 550.	" " " A4 " " " " B4

Reaction Coil winding to above:—

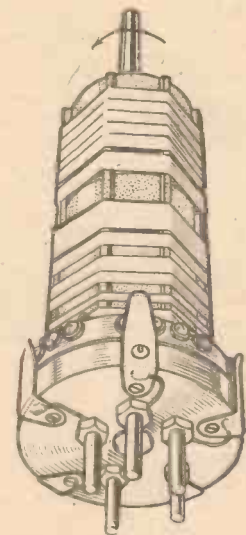
18 to 30.	Start at contact C1 and finish at contact D1
30 to 50.	" " " C2 " " " " D2
50 to 100.	" " " C3 " " " " D3
200 to 550.	" " " C4 " " " " D4

fitted, one contact in between the stop pins, this single contact only coming into operation when the coil is turned to medium

wavelength, or, in other words, when the metal contact strips are at rest on A4, B4, C4, D4. This single contact operates the opening and closing of the split con-



Details of windings, contacts, and rotating base for the dual-range coil.



A view of the complete dual-range coil showing the plug-in pins and contact strips.

denser which is used in my set. This same 5-pin plug-in coil is used with a set requiring an aerial coil, but five sets of contacts would be required on the rotating disc, the aerial coil would be wound on top of the grid coil, one end of aerial coil to grid, whilst the other end of aerial coil to the extra studs or contacts, and a separate switch could be used to operate the split condensers. This coil and switch are entirely my own invention. In the early stages of this coil I found many difficulties on the short-wave lengths. I overcame this trouble by winding all the short-wave coils in one direction and the longer wavelength coils in the opposite direction.—T. M.

Random Jottings

News from Abyssinia

ARRANGEMENTS for news from the war front in Abyssinia to be broadcast to America are being made by Paramount News and Fox Movietone News. Exide Batteries will be used for the sound equipment being sent to the seat of operations.

1,000 Sets Working at Once

ONE section of the "His Master's Voice" factories at Hayes, Middlesex, called the Soak Test Department would not find favour with the Anti-Noise League because it has now been extended so that 1,000 radio receivers, or radiogramophones, can be played simultaneously. This extension has been necessary owing to the release of the new H.M.V. nine-guinea receiver, Model 360, which, although very low priced, undergoes the same exacting tests as the larger receivers.

For the purpose of the "soak-test" the receivers and radiogramophones are placed in lines, switched on, and left running over long periods during which time they are tuned to a number of British and Continental stations. Every hour while on "soak-test" each instrument is examined and tuned to a different wavelength. Nearly a hundred employees spend their days by going from one set or radiogramophone to another and tuning in different programmes, at the same time examining each instrument so that any slight manufacturing fault has the opportunity to show itself before the instrument leaves the factory.

Baird Television in Australia!

IT is learned that Baird Television Limited has satisfactorily concluded negotiations with the Australian Radio Manufacturers' Patents Association Limited, of Sydney, N.S.W., whereby that Association has been appointed the exclusive representatives in Australia of the Baird Company, both for the construction and operation of television transmitting stations, and the manufacture of television receivers under the Baird Patents. This alliance is looked upon by the Baird Company as being of great importance, as the Australian Radio Manufacturers' Patents Association Ltd. is composed of a majority of the leading radio manufacturers throughout the Commonwealth of Australia, and it is their intention to develop television as an adjunct to sound broadcasting.

It is proposed to erect experimental transmitters in Sydney and Melbourne in the near future, with a view to the ultimate provision of a commercial high-definition television service.

CT1AA (Lisbon)

This station, one of the old stagers on 31.25 metres, would appear to be trying out other channels with a view to finding something more favourable in a less congested part of the band. Tests have been picked up on 26.91 metres (11,148 kc/s), but this frequency may not be the one eventually chosen. In the meantime broadcasts continue to be made on 31.25 metres, from G.M.T. 21.30-24.00 every Tuesday, Thursday and Saturday.

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1 B.T.S. L.F. Transformer, ratio 3-1	4 6
1 Bulgoin Volume Control and Switch	4 9
1 B.T.S. 3-point Switch	1 3
2 Clix Terminal Strips	1 2
4 Clix valholders with terminals	3 1
7 Belling-Lee Wauder Plugs	1 2
2 Belling-Lee Spade Terminals	4 4
9 T.C.C. Fixed Condensers	10 1
3 Erie 1-watt Resistances	3 0
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2 Peto-Scott Component Brackets	8
Connecting Wire, Screws, Flex	2 9
KIT "A" CASH OR C.O.D. Carriage Paid	£4 4 0

Author's Kit of first specified parts, including ready-drilled Metaplex Chassis, less valves, cabinet and speaker. Cash or C.O.D. Carriage Paid £4/4/0 or 7/6 deposit and 11 monthly payments of 7/9.

7/6
DOWN

KIT "B" As for Kit "A" but including set of 4 first specified valves, less cabinet and speaker. Cash or C.O.D. Carriage Paid. £6 15/0. Balance in 11 monthly payments of 12/6.

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If Peto-Scott specified Horizontal Cabinet is required with Kit "C" instead of Vertical Model, add 19/- to Cash or C.O.D. price, or 1/8 to Deposit and to each monthly payment.

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A.C. Mains 200/250 volts. Output 120 volts at 12 m.a. 4 tappings. Cash or C.O.D. Carriage Paid, £1/10/0. Balance in 10 monthly payments of 3/- only **2/6**

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Balance in 12 monthly payments of 6/-.

GARRARD 202A INDUCTION ELECTRIC MOTOR. A.C. mains, 100-250 v.; 25-60 cycles. 12" Turntable. Automatic switch. Cash or C.O.D. Carriage Paid. £2/10/0. Send **5/-** only
Balance in 10 monthly payments of 5/-.

B.T.S. COMPLETE OCEANIC S.W.3 KIT. Send
Complete Kit for building, less Valves and Cabinet. Cash or C.O.D. Carriage Paid. £2/15/0. Balance in 12 monthly payments of 5/- only **5/-**
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B.T.H. NEW PEZOLECTRIC POWER PICK-UP. Cash or C.O.D. Carriage Paid. £2/2/0. Send **2/6** only
Balance in 11 monthly payments of 4/-.

GOLDRING 1936 PICK-UP MODEL 55/1. Send
Complete with volume control. Cash or C.O.D. Carriage Paid. 15/6. **2/6** only
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Leclanche type. 120v. units in trays with lids. No. 3, 12,500 m/a. Output 13 m/a. Will give 1,040 hours use at 12 m/a discharge. Cash or C.O.D. Carriage Paid, £2/12/0, or 7/6 deposit and balance in 7 monthly payments of 7/6.

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Receiver Sensitivity

IT used to be the custom, several years ago, whenever longer range or greater sensitivity was required, to increase the number of high-frequency-amplifying stages. It was not always realised that when more than two or three such stages were used the efficiency of each stage had nearly always to be reduced in some manner or other in order to maintain stability. The writer well remembers building and using for several weeks an eight-valve set with four H.F. stages before discovering that results were somewhat better after two of these stages were eliminated! The position to-day is rather different, due to the vast improvement which has been made in valve design, but it is still true that if more than two H.F. stages are employed the efficiency of each is nearly always impaired.

Even if this were not so, there would still be a practical limit to the amount of useful H.F. amplification, because, if sensitivity is increased beyond certain limits, background noises become so prominent that reception cannot be enjoyed. The range might be increased, but if "interference" noises are amplified to the same extent as the received signals, the net result is hardly changed. How can we measure sensitivity? This can be done with great accuracy by measuring the input voltage which must be applied to the aerial and earth terminals in order to produce any given output wattage at the speaker terminals. The generally accepted method is to determine the number of microvolts which must be applied to the input terminals to produce an output of 50 milliwatts. Using this method of computation, it is found that a simple type of superhet or two-H.F. receiver of good design has a sensitivity factor of about 50 microvolts per 50 milliwatts output, whilst a highly-efficient superhet of advanced design may provide the standard output with an input of as little as 10 microvolts. Generally speaking, a sensitivity factor in excess of this is neither obtainable nor desirable, for the reason given above.

In making the sensitivity tests the volume control, where fitted, is turned full on, and the input from the aerial to the aerial-earth terminals is varied. By following this system the method holds good, and provides a convenient standard of comparison, regardless of the type of low-frequency amplifier.

Eritrea and Italy

LISTENERS who are always on the alert for something out of the ordinary, may be interested to know that there is at present considerable traffic between IDU, Asmara (Eritrea) and IAC, Coltano (Italy). IDU, a 5-kilowatt, works on 22.42 metres (13,380 kc/s) and IAC, on 23.45 metres (12,795 kc/s). At G.M.T. 16.00 these channels are used for a transmission of war news bulletins from Eritrea, rebroadcast throughout the entire E.I.A.R. medium-wave network. In view of the success of the Asmara (Eritrea) and Addis Ababa (Abyssinia) transmissions made by American war correspondents for the benefit of the U.S.A. N.B.C. and C.B. systems, the Italians propose to broadcast special commentaries from the front.

HOW MANY
MILLIWATTS?



BEGINNER'S SUPPLEMENT

A Discussion on the Advantages of High Undistorted Outputs, and Some Simple Facts Concerning a Very Debatable Subject.

It is often a difficult matter to decide upon the most suitable type of output stage, due to the fact that the actual amount of power which is required to feed the loud-speaker is not easy to determine. It is all very well to say that perfect reproduction cannot be obtained unless the output is at least 5 watts, but there are thousands of experienced wireless-set users who would not tolerate a speaker working with such an input—at least when that speaker was placed in the drawing-room. Besides, there are many who prefer what they call “pleasing” reproduction to absolutely “natural” reproduction.

When it is remembered that the average battery-operated three-valve receiver with triode output valve has a maximum undistorted output of about 150 milliwatts, and that the corresponding figure for a four-valve A.C. superheterodyne is from 2,000 to 3,000 (yes, two thousand to three thousand) milliwatts, the question seems more complicated than ever. You know that a three-valve battery set used with a modern moving-coil loud-speaker provides quite enough volume for comfortable listening in an average-sized room, and you also know that you are by no means deafened by the more powerful receiver.

Power Output and Volume

If you were to listen to the two sets on following evenings you might form the impression that one was twice as loud as the other, but you would certainly not imagine that the output of one was something like twenty times as great as that of the other. Where, then, is the catch? Well, in the first place the audible sound is not in proportion to the output expressed in milliwatts—far from it. In the second place, the reproduction provided by the battery set is probably far from perfect, whilst that from the mains set is appreciably better; and good reproduction never sounds as loud as distorted reproduction—if the latter can rightly be called reproduction! An example of this was thrust upon me the other day when I was trying out a 6-watt amplifier. A friend popped in to see me and listened to the small auditorium speaker for some time before remarking that the quality was excellent. I replied to the effect that it ought to be, since the cost of parts for the amplifier was over ten pounds, and that the output valve alone cost 25s. He was amazed, and said that he couldn't understand why I should go to all that expense for such a modest output. It was my turn to be surprised, for I hardly look upon

6 watts as being modest, and I knew the amplifier was working efficiently. On inquiring exactly what my friend was driving at, he explained that he had a three-valve battery set which cost him about £7 a few years ago, and that he got “rather less volume” than the amplifier was giving.

After inquiring for full details of his receiver, I found that he was using a small power output valve rated to give a maximum of 170 milliwatts output. I could not convince him that the output from my amplifier was fully thirty-five times as great as that from his set, and when I suggested—I only suggested—distortion, he was most indignant.

MAXIMUM UNDISTORTED OUTPUTS FOR TYPICAL VALVES

	Triodes		Pentodes
Cossor		220 HPT	500 mW
215P	150 mW	220 PT	1,000 mW
230XP	450 mW	MP/Pen	3,000 mW
4 XP	1,000 mW	42 MP/Pen	3,400 mW
4 IMP	1,250 mW		
Hivac		Y 220	500 mW
P 220	175 mW	Z 220	750 mW
PX 230	450 mW	AC/Y	3,400 mW
AC/L	675 mW		
Osram		PT 2	500 mW
LP 2	150 mW	PT 4	2,500 mW
P 2	300 mW	MPT 4	2,500 mW
ML 4	650 mW	PT 25	10,000 mW
PX 4	2,500 mW		
PX 25	5,500 mW		
Mazda		Pen 220	500 mW
P 220	150 mW	Pen 220A	1,100 mW
P 240	350 mW	AC/Pen	2,500 mW
AC/P	650 mW	AC 2/Pen	3,400 mW
PP 3/250	3,500 mW		

When any two valves are used in push-pull the total output is approximately two and a half times the output of a single valve.

Volume and Distortion

There is another kind of person who firmly maintains that an output of more than the 200 milliwatts given by the average battery set with pentode must of necessity deafen the listener. This type of person will not allow himself to believe that the volume of sound which reaches his ears when he is in the auditorium of a concert hall listening to an orchestra, or when he is standing near the bandstand on the promenade at Folkesbourne, is at least equivalent to what he gets from a speaker fed from 5,000 milliwatts and working in his own drawing-room. Instead, because his own speaker becomes “uncomfortably loud” when the volume control is turned full on, he thinks that the speaker is overloaded, and that his aural discomfort is actually due to the reproduction being too loud. Nothing of the sort; the trouble is merely that

one or more of the valves is being overloaded, causing distortion and harshness which offends the ears.

Maximum or Average Output?

But this is not all. Because a receiver is capable of providing a maximum undistorted output of, say, 5 watts, it does not mean that this power is actually being applied to the speaker whenever the volume control is turned to its maximum setting. In fact, the speaker will, in all probability, receive 5 watts only once in several hours, and during the rest of the time the average output may be no more than 150 milliwatts. The truth of the matter is that for the speaker to do full justice to all kinds of music the maximum volume of sound from the speaker must be several hundred times as great as the minimum; and for that minimum to be comfortably audible the available maximum must be very nearly 2 watts when the speaker is used in a drawing-room of average size. Many competent acoustic engineers are quite emphatic in stating that the lowest maximum undistorted output necessary for “natural” reproduction is 5 watts—some give figures higher than this.

Making a Decision

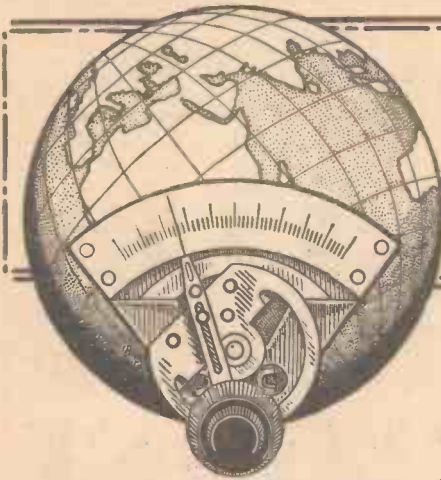
And while there is so much disagreement between technicians, the normal listener cannot help but be in a quandary. The best course he can take, therefore, in an attempt to solve the problem to his own satisfaction is to go to the show-rooms of a large dealer and listen to as many good receivers as possible of different output ratings, and to decide what output best suits his own requirements. He can then proceed to build his amplifier, or design the output stage of his receiver, accordingly. This is, of course, assuming that he can afford to build an instrument capable of providing the output desired, and also assuming that a mains supply is available. If he is limited to batteries, he must be content with about 1½ watts, and if funds are limited he must be satisfied with an output which most nearly approaches that preferred. Whatever the requirements, there is a PRACTICAL AND AMATEUR WIRELESS receiver to satisfy them. Incidentally, the highest output from any of these receivers is given by the “Universal Hall-Mark Four,” which has an undistorted output of 6 watts, and can be built extremely cheaply.

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SHORT WAVE SECTION

EXPERIMENTING ON THE ULTRA-SHORT WAVES
A Description of Two Types of Oscillator Which Can be Used for Checking
Experimental Ultra-short-wave Receivers

By FRANK PRESTON

ONE of the first difficulties encountered when experiments in ultra-short-wave reception are first taken in hand is that of knowing whether or not the receiver is functioning correctly. To those who have not yet "gone down" below 10 metres this may seem rather a peculiar state of affairs, but it must be remembered that there are not, as yet, regular transmissions on the ultra-shorts. In consequence, if it is found that signals cannot be received the set may be at fault, or the

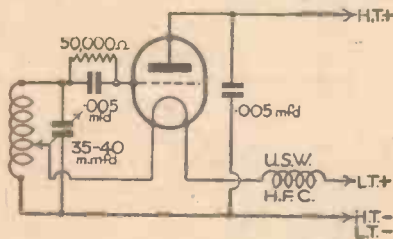


Fig. 1.—The circuit of the simple electron-coupled modulated oscillator described.

reason may simply be that there are no transmissions being sent out at the time which are within range.

Despite this handicap experiment on these below-10-metre waves can be very interesting, and it certainly offers some diversion to the enthusiast. The simplest way out of the difficulty is apparent—make your own transmitter. But a special licence is necessary for that purpose, you will probably reply. That is so, but there is no objection to the construction of a wavemeter, which may be of such a form that it is, in fact, a transmitter with an effective range of a few feet only.

An Electron-coupled Oscillator

A suitable wavemeter of the oscillator type can be made very cheaply, and by using standard receiver components throughout. A circuit for a suitable electron-coupled arrangement, using an ordinary triode valve of the H.F. or H.L. type, is shown in Fig. 1, from which it will be seen that the valve is wired rather like a leaky-grid detector, but with important variations. The first of these concerns the tapped coil, of which one portion is in the grid-filament circuit and the other in the filament-anode circuit—through the .005-mfd. fixed condenser. It can also be seen that the H.F. choke, instead of being in the high-tension lead to the valve, is in the low-tension circuit. The general principles of the electron-coupled-oscillator circuit have been described in these pages before, so there is no need to go into the

theory of the arrangement here. In passing, however, it should be pointed out that it is customary to employ a screen-grid type of valve for electron-coupled circuits, but that the simple triode has been found to be perfectly satisfactory on the ultra-short waves.

Suitable Components

The correct type of coil should consist of about 5 turns $\frac{1}{2}$ in. in diameter, and the Eddystone No. 1021 is very suitable. This is a component which has been introduced for the 1936 season, and it is mounted on a special steatite-type baseplate. The tapping for the filament lead should be approximately 2 turns from the lower end of the winding, and can be made by means of a tapping clip, since the coil is not actually provided with a tapping. The tuning condenser may be a standard component of 35 or 40-mmfd., and this will cover a range of about 4.5 to 7 or 8 metres, according to the exact capacity of the condenser. It will be evident that the ultra-short-wave H.F. choke must be of an efficient type, having a low D.C. resistance, and at the same time it must be capable of carrying the .1 amp. required by the valve filament. Values are assigned to the grid condenser and leak, these being different from those employed in a normal detector circuit. The grid leak acts as an automatic bias control, since the potential developed across it varies according to the grid current and thus, according to the intensity of the oscillation. The values of grid condenser and leak also govern very largely the pitch of the note which is "transmitted," and if unsuitable components were used there would be a danger of the note being above audibility or being of such a low pitch that the valve oscillated intermittently.

Using the Oscillator

In using the oscillator in conjunction with a receiver it should be connected to a 60-volt H.T. battery and 2-volt accumu-

lator and placed a short distance away from the set. It is then tuned to about 6 metres by setting the tuning condenser to its midway position, and the receiver is tuned until a note is heard in the 'phones. After this has been arranged it is best to move the oscillator as far away from the set as possible so that the received note is only just audible. The effect of any alterations to the receiver can then be checked by observing if the note increases in loudness or becomes inaudible. A good deal of useful experimental data can be compiled in this manner, and it can be ascertained that the receiver functions correctly before wasting time in trying to pick up real signals from amateur stations or from experimental television transmitters.

After a few stations have been logged, and when the wavelengths are known (they are generally announced) the oscillator may be calibrated so that it may later be used as a wavemeter. There are, of course, "direct" methods of calibration, but these call for a fair amount of skill and a certain amount of apparatus.

Another Type of Oscillator

Those who prefer to use a more conventional type of oscillator may employ the circuit given in Fig. 2, which is that of a modified Hartley arrangement, in which a pair of 4-turn coils are used in conjunction

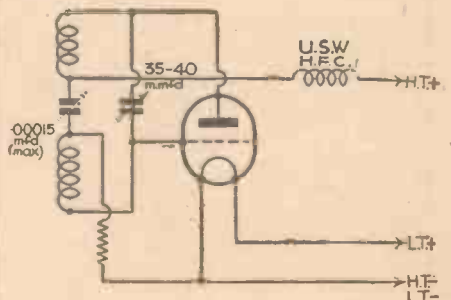


Fig. 2.—This is the circuit arrangement of a conventional ultra-short-wave oscillator.

with a .00015-mfd. (max.) pre-set reaction condenser and a 35-mmfd. or 40-mmfd. tuning condenser. Here again, an H.F. or H.L. valve is employed, and is fed from an H.T. battery giving up to 60 volts. In this case, the output is not modulated and can therefore be picked up only when the receiver is in an oscillating condition. For this reason the "squeak" is heard at two points on the tuning scale, and there is a "silent point" between them; it is the latter which indicates the wavelength to which the set is tuned when the oscillator is calibrated. An advantage of this type of oscillator is that it can be used as part of a super-regenerative receiver when desired.

POPULAR FLYING

November Number Out Now

6^p

The National Aviation Paper for everyone interested in Flying—whether you belong to a club or take an occasional "flip" at a flying display.

LEAVES FROM A SHORT-WAVE LOG

JUDGING from my log, the month of October has been kind to the short-wave listener, and if conditions are maintained we shall have no reason to grumble.

In comparison with the same period last year, each evening brings in an increasing number of broadcasts, and in general from greater distances than in the past. This may be due to two main reasons, namely (a) that a greater number of transmissions are available in different parts of the world, and (b) that the power of many stations has been increased. Apart from the "regulars" such as Zeesen, Skamblebaek, Oslo, Rome, Moscow, Madrid, Schenectady, Pittsburgh and so on, on most evenings it is possible to pick up a dozen or more South Americans. Such countries as Venezuela, Brazil, Mexico and Colombia seem to be continuously installing new transmitters; apparently many "fans" who, in other countries, would remain mere experimental amateurs, aim at establishing a regular broadcasting service. In addition, some of the governments of the South American States are also following the lead given to them by European countries.

Mexicans

Mexicans which have been recently logged are: XEGR, Mexico City, on 40.60 metres (7,390 kc/s), which is operated by the Mexican Foreign Office and usually provides an orchestral concert on Sundays between G.M.T. 23.00-00.00, and XECW, a much lower-powered station, also in the Mexican capital, operating on 50.17 metres (5,980 kc/s), which is to be picked up in the early morning hours.

Recently a totally different kind of transmission was logged on 27.27 metres (11,000 kc/s); it emanated from XBJQ, a 1 kilowatt station used by the Mexico City Police Department, and on that occasion was heard calling the Boston Police authorities!

There are so many signals to be picked up between, say, 30.45 metres and 31.25 metres that I am not surprised many readers find a difficulty in distinguishing Madrid from Lisbon. Fortunately, both stations give their call fairly frequently—both in their native language and in English. EAQ, Madrid, does not appear to have adopted any kind of interval signal, but CT1AA, Lisbon—you may hear the announcer call it (phon.): *Say-Tay-Oono ah-ah*—retains its cuckoo. It is a very crowded portion of the short-wave band, as you will find when you try to disentangle Zeesen, Oslo, Daventry and Schenectady, which, if distant from each other geographically, are very close neighbours on the condenser dial.

International Conference

It is good to learn that in February next there will be held at Paris an International Conference, to which representatives of all broadcasting associations will be invited. Its aim is to devise a proper plan for short-wave transmitters, in a similar way to the one produced at Lucerne for medium- and long-wave stations. If agreement can be reached, and the authority of governments secured for its recommendations, there is little doubt that a better allotment of channels would result, and in consequence, listening to long-distance transmissions would be facilitated.

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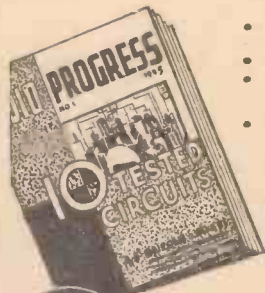
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Trouble Tracking Made Easy-6

WHEN a receiver is considered to be excessively noisy in operation the first thing to do is to find out whether the noise is being picked up by the aerial-earth system or the mains supply leads, or is due to a defect in the receiver. Mains receivers are generally more noisy than battery operated receivers, this being mainly due to the higher voltages used in the former causing slight defects to occur in components, and to the fact that the mains leads act also as conductors for external noises.

External Noises

Bearing in mind that external noises can be picked up by the aerial, by the mains leads, or partly by both, a test should be conducted to decide by which path the interfering noises reach the receiver. If they are being picked up solely by the aerial and earth leads, disconnection of these leads from the receiver will produce a cessation of the interference. All man-made noise, or static as it is commonly called, can best be dealt with at its source, but it is often difficult to trace this source, and therefore a remedy has to be applied at the receiver end. Radiated interference of this type can only be prevented from reaching the receiver by screening the latter effectively, and passing the aerial down-lead through a special metal screening cover. Ordinary screened lead is unsuitable as the capacity between the metal covering and the lead itself is too great. Readers who are troubled with aerial-borne interference (except that of the atmospheric type) are advised to fit any of the many anti-static aerial systems now obtainable. It is emphasised that atmospheric interference cannot be eliminated, but luckily this form of interference is seldom very violent in this country.

Mains Interference

If the noises continue after the aerial and earth leads have been disconnected it will indicate that they are due to a receiver defect, or are being picked up by the mains leads. It is rather difficult to differentiate between these two sources of interference, and therefore the easiest method, probably, is to borrow a friend's set having a somewhat similar degree of sensitivity and note whether this is silent in operation; if so, a receiver defect is indicated. Mains-borne interference can generally be eliminated by connecting a condenser-choke filter in the mains input leads, although, where possible, it is advantageous to connect the filter to the external machine which is giving rise to the interference. A lengthy discussion of the various types of interfering noises emanating from electrical machinery is outside the scope of this article, but it is pointed out that several types of noise suppression units are now available suitable for fitting to the receiver input leads or to external electrical machinery. Fig. 2 shows a filter which generally proves very effective when connected in the mains input leads of receivers of the A.C./D.C. type. The special chokes shown should consist of approximately 700 turns of insulated copper wire

The Cause and Elimination of Receiver Noises is the Subject Dealt With in This Article of the Series By IDRIS EVANS

wound on a 1½ in. to 2 in. diameter former, it being ascertained that the wire used is capable of carrying the current consumed by the set; 24 s.w.g. wire is suitable for the majority of receivers.

Receiver Noises

If it is found that the noises and crackles are not being picked up by the aerial-earth



Fig. 1.—Showing simple method of compressing valve-holder socket to ensure good contact with valve pin.

system or the mains leads, the receiver must be subjected to test. Internal noises can be due to one of many possible defects, the most common of which are loose or dry joints, valve faults, bad contact at switches, and volume control potentiometers. It is generally an easy matter to locate bad joints, but valve noises are not so easily traced. Some faults are common to battery and mains type valves, the most troublesome of these being insulation leakage. This causes a rushing noise to be heard in the speaker, and is due to leakage across the mica supports of a valve; it is most commonly experienced in pentodes, especially those of the output type having a high voltage on anode and priming

grid. Crackles can be experienced with both valve types, due to loose electrodes or to bad contact between the valve pin and the internal connecting lead or between the pin and the socket of the valve-holder.

A Simple Point

This fault can generally be eliminated by resoldering the pin lead, and compressing the holder socket by means of a pair of pliers as shown in Fig. 1. It is sometimes suggested that valve pins should be opened by means of a penknife if bad contact is experienced; this method is not recommended, however, as there is a possibility that the internal lead to the pin may be broken by the sharp edge of the knife unless great care is taken. Tizzing noises can sometimes be traced to a loose frame in the output valve, especially in valves of the large type. It is pointed out, however, that this trouble is seldom experienced in modern valves as the frames are now being clamped very rigidly. Cathode rattle is a troublesome defect associated with indirectly-heated valves. In the first place the fault may only show up when a person is walking across the room or when a door is slammed, but eventually slight speaker vibration can produce this effect; this may, of course, give rise to confusion between modulation hum and cathode rattle, as both defects will produce maximum interference when a strong signal is being received.

A further trouble experienced with indirectly-heated valves is bad heater to cathode insulation. This generally causes what is known as resonance hum, as it makes the heater resonate at a multiple of the mains periodicity. It is generally most pronounced at 200 cycles when the supply frequency is 50 cycles. The faulty valve can best be traced by the localising method suggested in the article of this series which was published last week.

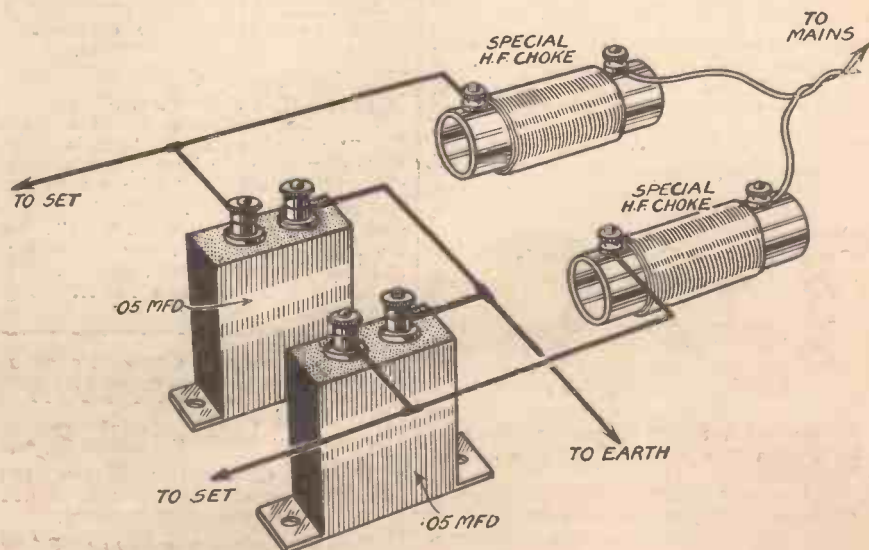


Fig. 2.—A choke-condenser filter suitable for connection across the mains leads of A.C./D.C. receivers.



IMPRESSIONS ON THE WAX

By
T. O'nearm

FOUR tenors are featured in the "His Master's Voice" list for this month—McCormack, Crooks, Derek Oldham, and Webster Booth. McCormack sings with his customary ease and beautiful tone two simple ballads, "The Little House I Planned" and "Rise, Dawn of Love" on *H.M.V. DA1428*. Crooks, the American star, records "For Love Alone" and Haydn Wood's "Unforgotten Melody" on *H.M.V. DA1436*.

Derek Oldham sings "Love, I give you my all" and the waltz songs from "Waltz Dream," in which he broadcast a year ago, on *H.M.V. B8384*, and Webster Booth, with chorus, sings a selection from Richard Tauber's new film "Heart's Desire," on *H.M.V. B8384*.

Songs by Peter Dawson

THIS famous baritone has recorded two new songs which are typical of this popular artist. It is sometimes said that the sentiment of most songs is old-fashioned. "Song of the Thames" and "The Air Pilot," which appear on *H.M.V. B8373*, and sung by Dawson, are extremely up to date.

Miliza Koryus turns to Johann Strauss and Eva del' Acqua for the songs on her latest record, which is a plum-label bargain. With wonderful technique which has made her name a byword, she sings, on *H.M.V. C2784*, Strauss's "1001 Nights" waltz and the ever-popular "La Villanelle."

Beethoven Second Concerto by Schnabel

TWO concertos have been recorded this month by "His Master's Voice." Schnabel completes his recording of the five Beethoven Concertos by his latest set of four records containing the second Concerto, brilliantly played with the London Philharmonic Orchestra under Malcolm Sargent on *H.M.V. DB2573-6*. Heifetz's record, Saint-Saëns' "Introduction and Rondo Capriccioso," is one of the most popular short violin concertos. This piece severely taxes the resources of the most accomplished violinist, but Heifetz plays it with consummate ease. The accompanying orchestra is the London Philharmonic under John Barbirolli, and the number of the record is *H.M.V. DB2580*.

Crystal Palace Band Records

THOUGH written more than ten years ago, Romberg's "Student Prince" has lost none of its appeal, and Nathaniel Shilkret directs a sensational record of selections from this tuneful light opera for "His Master's Voice" this month. Many well-known American singers took part in this recording, which constitutes a new style of vocal selection. The number of the record is *H.M.V. C2785*.

There is no greater thrill than of hearing the Massed Bands Concert at the Crystal Palace every September, and the atmosphere of this wonderful scene has been captured in the two records just issued by "His Master's Voice." The records contain

"Sing a Song" and "Grand March from Le Prophète," on *H.M.V. BD285*, and "Amen Chorus from the Messiah" and "Champion Medley March No. 13" on *H.M.V. BD286*.

A Waltz Medley by Palladium Orchestra

THE London Palladium Orchestra, whose broadcasts are a regular feature of the B.B.C. Sunday afternoon programme, has recorded a waltz medley called the "Golden Valsè" on *H.M.V. C2779*, which contains all the best-known waltzes.

There are two novelty records this month on "His Master's Voice." Ken Harvey gives his interpretation of "Traumerei" on a guitar, which he couples with a banjo version of the twinkling "Doll Dance" on *H.M.V. BD248*. Sydney Gustard plays an old and a new favourite, Gounod's "Funeral March of a Marionette" and "Nola," two pieces which are eminently suitable for the cinema organ, on *H.M.V. BD245*.

Intriguing Light Singers

TWO new light singers make their bow to record fans this month. Effie Atherton, star of the B.B.C. "Air-do-Wells," sings two sophisticated numbers, "My Young Man is Ever So Nice," and "Dennis, the Menace from Venice," undoubtedly the man on the flying trapeze's greatest rival. The number of this disc is *H.M.V. BD287*. Hal Yates, a new American popular singer, records "Why Stars come out at Night" and "It's my Mother's Birthday to-day" on *H.M.V. BD283*.

"Top Hat" Records

CHEEK to Cheek, "Isn't this a Lovely Day?" "Top Hat," and "Piccolino" are four big hits from this new film, and Vivian Ellis has made a brilliant medley of the tunes for His Master's Voice on *H.M.V. BD261*, whilst the best dance record of the first two numbers is that by Eddie Duchin on *H.M.V. BD246*, Ray Noble's version of the latter two songs will be considered to be the best by rhythmical experts.

Temple Church Choir Record

MILLIONS of listeners will remember Master Ernest Lough's famous record with the Temple Church choir of "Hear My Prayer." This month "His Master's Voice" release "As Pants the Hart," sung by Master T. Meddings, with the same choir, coupled with "Blessed are the Departed." Many listeners will consider this new record, *H.M.V. B8380*, to be even better than Master Lough's famous recording.

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RADIO CLUBS AND SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

THE RADIO, PHYSICAL AND TELEVISION SOCIETY

AN interesting evening was afforded members of this society on Friday, November 1st, when a lecture and demonstration was given on "Micro Waves" by Dr. C. G. Lemon, assisted by Mr. J. Hobbs. The lecturer described and illustrated the various circuits suitable for such high frequencies, and he stated that micro waves had been originally used by Hertz in the nineteenth century. Among other points raised it was interesting to note that a new use has been found for the old crystal detector in that it acts as an efficient rectifier of micro waves. In the transmitter and receiver demonstrated, the circuits of which were almost identical, the valves used were of the old bright emitter type with cylindrical anodes, as these have been found to be the only type suitable.

Readers of PRACTICAL AND AMATEUR WIRELESS are cordially welcomed to our meetings, and the next one will be at 8 p.m. on Friday, November 15th, at 72a, North End Road, West Kensington. Further details may be obtained from the Hon. Sec., M. E. Arnold, 12, Nassau Road, Barnes, S.W.13.

THE CROYDON RADIO SOCIETY

MR. L. C. IRVINE, the well-known authority on set design, lectured to the Croydon Radio Society in St. Peter's Hall, Ledbury Road, S. Croydon, on Tuesday, October 29th. His topic, "The Design of a High Fidelity Straight Receiver," excluded any compromise with a receiver for distant reception, which was left for the Superheterodyne. An interesting time was spent laying bare the ideals for Mr. Irvine's design. There were two low-impedance triode valves, the first as a buffer to minimise damping, and the system was inherently stable. The H.F. transformer's design was distinctly fascinating, as was his account of the diode detector stage. This was quite distortionless, and indeed he spent much time in explaining why that was so. Reaction was cleverly introduced, and the valve tone corrector was much approved by the society. Mr. Irvine, although getting highly technical when discussing cut-off distortion, and the disposing of unwanted H.F. voltages, made their problems very understandable. On November 19th, Mr. Valentine of the Mullard Valve Co. is lecturing on the "Latest Valves." Fixture cards are ready for any PRACTICAL AND AMATEUR WIRELESS readers who care to apply for them. Hon. Publicity Secretary, E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

INTERNATIONAL SHORT WAVE CLUB

THE meeting of the Manchester chapter of the I.S.W.C. was held on Tuesday, October 29th, 1935, at the British Legion Club, Long Street, Middleton, at 8.0 p.m. An interesting demonstration of an all-wave receiver was given by a local firm of radio dealers. The star transmission of the evening was W3XAL on 16.87 metres. A good number of stations were brought in at R9 strength. On November 26th a lecture will be given by the chief engineer of Messrs. Clarke, Atlas Works, M/C, when all readers of PRACTICAL AND AMATEUR WIRELESS will be given a hearty welcome. Full particulars may be obtained by enclosing a stamp for reply to the Hon. Sec., H. Wild, 1, Elm Street, Middleton, Nr. M/C, Lancs.

BOOKS RECEIVED

"SHORT WAVE"

THE mysteries of short-wave reception are revealed, and very useful information given, in a book published for Messrs. Lissen. The contents include "Calling the British Empire," which gives interesting details regarding the B.B.C. Empire service; "What entertainment can the world offer to-night?" which gives details of various well-known or easily-received transmissions; "The Language you can learn in a week," which is an interesting presentation of the Morse code; "Why Short Waves?" "Before you switch on," "How to erect a short-wave aerial," "Choose your time and choose your wavelength," and details for constructing the Lissen Bandspread Short-Wave 3.

A useful Time-Zone map of the world clearly marked with various station positions, together with a list of these stations at the foot of the map with the call signs, is given free with the book, which costs only 2d., and it will no doubt be found of extreme interest to all who are experimenting in short-wave reception.

A CAMERA COMMENTARY

"HIS MASTER'S VOICE" have just produced a twenty-four-page book entitled "A Camera Commentary on Radio in the Home." This interesting book includes a number of extremely attractive photographs showing "His Master's Voice" instruments in use in various homes. It also reveals for the first time the authentic story of the famous Trade Mark—the picture of the dog listening to the old-fashioned gramophone—which has become synonymous all over the world with the fine quality of "His Master's Voice" instruments. A copy of this book can be obtained free of charge on application to "His Master's Voice," 90a, Clerkenwell Road, E.C.1.

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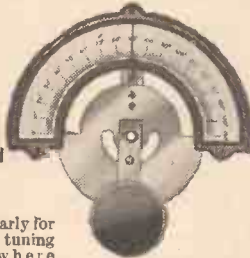
Makes H.T. from your L.T. 2-volt battery, rectified and smoothed. 3 tappings. Lasts indefinitely. A boon. List £3/15/0. New, guaranteed, 37/6.

WIRE. Lead-covered single 3/029, 7/- 50 yds.; 7/029 ditto, 9/6 per 50 yds. L.C. Twin, 1/064, 12/- per 50 yd. coil; L.C. Twin, 1/044, 16/- per 50 yd. coil. Plain V.I.R. lighting, 1/044 600 meg., 5/3 per 100 yds., 9,000 yds. 27/40 Litz for H.F. coils, 1/- per dozen yds. Heavy Mains Flex, for Electric Heaters and Irons, etc., 4/- per doz. yds., post 6d. Twin lighting Flex, 2/- per doz. yds., post 4d. Insulated Earth Cable, 1/6 per doz. yds., post 4d. Lead-in Cable, rubber-covered, 2/- doz. yds., post 4d. Red and Black Flex, 1/6 per doz. yds., post 3d. 1,000 other Bargains in our illus. Sale List "N" Send addressed envelope for this money saver.

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Built particularly for Short Wave tuning purposes where accuracy and smoothness of movement are essential. Free from backlash with 22:1 slow motion ratio.

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SHORT WAVE H.F. CHOKE.

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No. 1010. 5-180 metres. Price 2/-.

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SHORT WAVE COMPONENTS

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Everything Radio supplied on the lowest available terms. Send list of requirements for quotation by return. Prompt delivery. Price lists free.

NEW LISSEN SHORT-WAVE 3 KIT

(World-wide reception)
 Cash price £3.9.6 or 6/4 with order and 11 monthly payments of 6/4. (In STOCK)

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W.B. Stentorian 36J	42/6	2/6	11	3/-
Blue Spot Senior	29/6	2/6	7	4/2

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Atlas T10/30 H.T. unit and trickle charger combined .. 69/6 5/- 12 5/11

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Marconiphone 25	32/6	2/6	11	3/-

All makes of pick-ups supplied. Illustrated price lists available.

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Experienced Constructors always insist on TRIOTRON Valves !!



HERE ARE A FEW POPULAR 2 VOLT TYPES:

- FOR EFFICIENT H.F. AMPLIFICATION For sets fitted with 7-pin valve holders:
 - H.F. PENTODE Type S218
 - 0.18 amp.
 - 150 volts
 - 1.85 mA/V
 - 530,000 ohms
 - SCREENED GRID Type S215
 - 0.18 amp.
 - 150 volts
 - 90 volts
 - 1.5 mA/V
 - 330,000 ohms
 - FOR UNDISTORTED RECTIFICATION DETECTOR Type A214
 - 0.1 amp.
 - 200 volts
 - 10,000 ohms
 - 2 mA/V
 - 20
- VAR MU PENTODE Type S217
 - 0.18 amp.
 - 150 volts
 - 1.7 mA/V (variable)
 - 500,000 ohms
- VAR MU SCREENED GRID Type S213
 - 0.18 amp.
 - 150 volts
 - 90 volts
 - 1.3 mA/V (variable)
 - 300,000 ohms
- DETECTOR Type W213
 - 0.1 amp.
 - 150 volts
 - 22,000 ohms
 - 1.3 mA/V
 - 28

The history of Radio from the early pioneer days is the history of TRIOTRON. To-day, as always, TRIOTRON is among the leaders in the industry. Every TRIOTRON VALVE is a precision-built scientific instrument of accurate characteristics and dependable performance—the first choice of thousands of experienced Radio engineers who recognise their technical excellence. More than 70 types, with prices ranging from 3/6 for General Purpose types to 45/- for the 50-watt Amplifiers for public address equipment.

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Mains Transformer Model W.20. Price 14/-
 L.F. Smoothing Choke Model 751. Price 12/6
D.C. MAINS UNIT.

L.F. Smoothing Choke Model 751. Price 12/6
 Delivery From Stock.



Send Now for Free descriptive lists, describing Heayberd Mains Transformers, Chokes, Chargers, etc.

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5 to 100 METRES

This S.U.S. Converter is the latest addition to our range of Short-wave Converters. It is an entirely new model original in design and covering both Short and Ultra-Short wavebands. Special circuit employed gives maximum results on all wavebands. Enjoy all the advantages

of an expensive all-wave set by just attaching the S.U.S. to your present receiver. There's a model for Battery or Mains users.

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Covers 5 to 100 metres, aeroplane dial. Ratio 100-1. New Type with special scale. Two controls only. Two connections only to set. Also receives 240-line Television sound. In addition to world-wide short-wave broadcasts. All metal non-hand-capacity cabinet. Complete with valve ready for use.



Battery Model 506. £3 5 0.

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Cash or C.O.D. Carriage Paid.

List "N" Free. Other models also available. 'Phone: OLE 5340.
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LETTERS FROM READERS



The Editor does not necessarily agree with opinions expressed by his correspondents.

All letters must be accompanied by the name and address of the sender (not necessarily for publication).

Feminine Enthusiasm and Appreciation

SIR,—As a regular reader of your valuable journal I do not recollect having read any letter or comment from a member of my own sex.

I am deeply interested in the short-wave side of radio, and the enjoyment derived is endless. My receiver is an o-v-2, constructed from various circuits you have published from time to time. I will remember a year or two ago grumbling at my husband for the late hours, dangling wires everywhere, and the untidiness of that part of the room where the receiver was installed; also for his irritable ssh! when some elusive station had at last been "tuned-in." Nowadays it is so different; receivers are compact, tidy, and really pleasing to the eye. My husband and I now share the delights of short-wave listening, of getting new stations, receiving verifications, and carrying out receiver modifications. As for late hours, why worry?—after the thrill of receiving, say, an Australian amateur, writing out, and sending the report. Think of the pleasure, after weeks of anticipation, when at last

Jazz-ravings of a Half-wit

SIR,—Anent the screed from your correspondent at Thorpe Bay as a contribution to your attack on jazz, such an epistle cannot be allowed to pass without notice. It is not an attack on modern dance music as it pertains to be, but purely and simply, as is clear to anyone, a tirade of abuse. His letter is the meanderings of a half-wit, and the ravings of one completely devoid of any intelligence and common decency. This correspondent's signature is, you say, not decipherable, and I suggest he has not the courage to make it otherwise.—**E. GOLDENSON** (Kenton, Harrow).

A Reader's S.W. Station

SIR,—Perhaps the enclosed photograph of my short-wave receiving station may be of some interest to other readers of your most interesting journal, which, by the way, I have read from the first issue. I have been a short-wave fan for about three and a half years, and have found it a most interesting hobby, and, as shown in the photograph, I have received verifications from about forty-five countries, among them are some from America



Mr. F. G. Sadler's S.W. receiving station at Stamford Hill.

that verification does arrive. May I congratulate you on your excellent short-wave section, also for the very interesting "Short-wave Handbook," given free with the October 12th issue?—**IRENE M. LOGAN** (Hertford).

Television Data: Glasgow Radio Club

SIR,—I must congratulate you on your excellent paper. Lately in your columns we have heard a lot of discussion about transmission data. Many people have written asking you to devote part of your paper to this subject, and to this request I add mine. Also, will you please put me in touch with a Radio Society in or near Glasgow?—**ERIC DUNLOP** (Clarkston)

[We suggest that you write to the Secretary, Glasgow and District Radio Club, 42, Maryland Dr., Glasgow, S.W.2.—Ed.]

W1 to 10, Japan, India, Peru, Chile, Cuba, Costa Rica, Tunis, Canal Zone, and Estonia.

My receiver is a simple home-constructed 2-valver, using H.F. and L.F. three-electrode valves; my coils are wound on valve bases. My aerial is about 30 feet of 7/22 insulated wire, it runs between two windows and is stuck on the wall.

I certainly agree with Mr. A. E. Millinchip who, in a recent issue of your journal, complained of the congested 40-metre band, but would advise him to give this band a close search between 05.00 and 07.00 G.M.T. any morning when conditions are good, as, owing to lack of British amateurs on this band at these hours, good DX can be logged.—**F. G. SADLER** (BRS 1,287), Stamford Hill, N.16.

The Sonotone and Fury Four

SIR,—It gives me great pleasure to find I am a fortunate winner in your recent competition. This being my first

occasion to write to you, I trust I am not too late to congratulate you on the excellence of your magazine. I have spent many happy and perhaps profitable hours with the help of the useful information contained within its pages. I may say that since the first issue there has never been any lacking of something interesting in any one number.

You may be interested to know that I built the Sonotone receiver, described in one of your early issues, and it is still giving excellent results. I have since constructed the Fury Four, and this I find is quite an excellent receiver, as regards quality of tone and good DX reception.

I am at present on D.C. mains here, but expect to change over to A.C. in a few weeks time, when I hope to build something really "super" of the A.C. type.—GEORGE H. TAYLOR (St. Margarets).

Australia on the Silver Souvenir

SIR,—I have been reading your magnificent weekly since the amalgamation and have always scanned the pages for a high-class all-wave set. When the Silver Souvenir was published I obtained the kit of parts, and, after building the set, I was quite pleased with results, but as I am in a very good position I thought it poor only to receive stations like OXY and CTIAA, etc. Until last August I had been using a long lead in for aerial and earth, but I had occasion to shorten it in September, and tried out the set again on a Sunday afternoon, about 5.28. I tuned in to 31 metres, not expecting much difference, but imagine my surprise when I heard a voice saying, "Hallo, this is VK3ME, Sydney, calling you. We are now saying good morning, good afternoon, good evening to all our listeners in Australia and the world." On the same night I received 3 or 4 U.S.A. stations at R8 at 11 p.m. Sunday!—J. PALMER DOUGLAS (Dunbar, East Lothian).

CUT THIS OUT EACH WEEK.

Do you know

—THAT when building a mains transformer you can obtain a "screened" effect on the primary by arranging the L.T. windings on each side of it.

—THAT if a metal screen is used instead of the above arrangement it must not be a complete screen as the transference from primary to secondaries is by induction.

—THAT a loop of wire for locking beneath a terminal or nut should be turned in the same direction as the rotation of the nut, otherwise it will be forced out or loosened when the nut is locked.

—THAT acid or other corrosive fluxes should not be used when constructing a wireless receiver.

—THAT acid spilt from an accumulator should be instantly neutralised by applying soda or other alkali.

—THAT any frequency may be used in the I.F. stages of a superhet, but for maximum efficiency and freedom from whistle and other interference the oscillator circuit and I.F.'s must be chosen together to tune to a frequency which is not used for broadcasting.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Neumes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

Mr. F. J. Camm's £4 SUPERHET 4

Components specified by the designer



"Bow-Spring" Wander Plug No. 1112 1½d. each



Spade Terminal No. 1025 2d. each

Seven Belling-Lee "Bow-Spring" Wander Plugs : GB-1; GB-2; GB-3; GB+; HT 1; HT 2; HT-

Two Belling-Lee Spade Terminals : LT-; LT+

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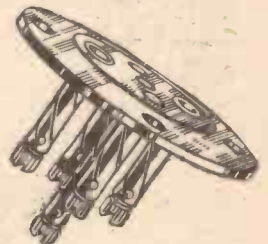
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"CLIX" PREVENTS CLICKS!

If you were to ask any radio service engineer which was the most common fault found when servicing receivers, the answer would be "Contacts." Extreme care is always taken in the wiring up of a job, but just because valveholders, plugs, sockets, etc., are small components, their contact quality is often overlooked.

For years now the designers of sets described in this and all the British radio publications have consistently chosen CLIX, because Clix have and still do specialise in producing the finest and widest range of Perfect Contact Components. To prevent Clicks—Ask for "CLIX."



SPADE TERMINALS

An important feature embodied in each of the 3 sizes of Clix Spade terminals is the metal shoulder piece which prevents acid creeping up to the leads. The wiring contact is positive metal to metal.

No. 2—for Accumulator contacts or H.T. connections to set. Prices: Large 2d. Small 1½d.

No. 3—Heavy Duty model for bringing aerial or earth leads direct to set without breaks or joins. Price 3d. each.

"MASTER" PLUGS

The most important feature in these is the efficiency of the pin, which is non-collapsible. There are now 5 types to choose from. Two for H.T. and G.B. or general plug and socket work. One for heavy duty, such as A or E contacts. One for Power work and a 5 amp. model.

H.T. or G.B. 1½d. each
Heavy Duty 3d. "
Mains Type 4d. "
5 amp. Model 4½d. "

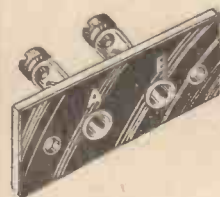


CLIX VALVEHOLDERS

There are seven different types of Clix Chassis and Baseboard mounting valveholders and each model is available with or without terminals for connections.

The Clix Standard model is specified by Mr. F. J. Camm for his £4 superhet 4.

4-pin, 8d.; 5-pin, 9d.;
7-pin, 1/-
(3d. less without terminals.)



CLIX CONNECTION STRIPS

Some users call these Terminal Strips, but actually they are for Plug and Socket contacts with Terminals to facilitate wiring (Note Illustration). The Types available with engraved markings are listed below. We recommend Clix Solid Plugs at 2d. each for use with these.

Type "A." Engraved Mains Aerial. In-Out. . . . 6d. each
"B." Engraved ALA2E 7d. "
"C." Engraved —L.S.— Pick-up. 8d. "
"D." Engraved A.E. or L.S. (See illus.) 6d. "

The Two New Clix Folders "N" give details and illustrations of over 40 Clix perfect contact components. Send a p.e. request for them. Free.

CLIX Perfect Contact Components SPECIFIED for the "£4 SUPERHET 4"

LECTRO LINX LIMITED, 79a, ROCHESTER ROW, LONDON, S.W.1



Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS. STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.	Date of Issue	No. of Blueprint
All-Wave Unipen (pentode)	14.10.33	PW31A
Two-valve : Blueprints, 1s. each.		
All-Wave Two (D, Pen)	—	PW28
Four-range Super Mag. Two (D, Pen)	11.8.34	PW30B
Three-valve : Blueprints, 1s. each.		
Bijou Three (SG, D, Pen)	20.10.32	PW5
Argus Three (SG, D (pen), Pen)	12.11.32	PW6
Solo Knob Three (D, 2 L.F. (trans.))	10.12.32	PW8
Selectone Battery Three (D, 2 L.F. (trans.))	—	PW10
Alpha Q.P.P. Three (D, Q.P.P.)	25.3.33	PW14
Ferrocort Q.P.P. Hi-Mag Three (SG, D, Q.P.P.)	25.3.33	PW15
Three-Star Nicore (SG, D (SG), Pen)	24.6.33	PW24
Auto-B Three (D, L.F., Cl. B)	—	PW27
F.J.C. 3-valve A.V.C. (Transfer Print) (SG, D, Pow.)	—	PW32
Sixty-Shilling Three (D, 2 L.F. (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Pow.)	8.3.34	PW35
Summit Three (HF Pen, D, Pen)	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen), Pen)	22.9.34	PW30
Hall-Mark Three (SG, D, Pow.)	—	PW41
Hall-Mark Cadet (D, LF, Pen (R.C.))	23.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-wave Three)	13.4.35	PW49
Genet Midget (D, 2 L.F. (trans.))	June '35	PM1
Cameo Midget Three (D, 2 LF (trans.))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector Pen)	17.8.35	PW53
Battery All-wave Three (D 2 LF (R.C.))	3.8.35	PW55

Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF Cl. B)	15.4.33	PW17
Radiopax Class B Four (SG, D, LF, Cl. B)	27.5.33	PW21
Nucleon Class B Four (SG D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push Pull)	2.2.35	PW46

Five-valve : Blueprints, 1s. each.		
Superset (SG, SG, D, LF, Cl. B)	—	PW26
Mains Operated		
Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (pen), Pen)	22.4.33	PW18
A.C.-D.C. Two (SG, Power)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.)	29.4.33	PW19

Three-valve : Blueprints, 1s. each.		
Mains Express Three (SG, D, Pen)	8.10.32	PW3
Double-Diode-Triode Three (HF Pen, D, D.T., Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	16.9.33	PW20
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF, Pen, D, Pen)	31.3.34	PW35B
Ibique (HF Pen, D (Pen), Pen)	28.7.34	PW30A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW60
"Allwave" A.C. Three (D, 2 LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56

Four-valve : Blueprints, 1s. each.		
A.C. Quadpack (SG, SG, D, Pen)	2.12.33	PW34
A.C. Fury Four (SG, SG, D, Pen)	25.2.33	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	10.2.34	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF Pen, D Push-Pull)	0.2.35	PW47

SUPERHETS.		
Battery Sets : Blueprints, 1s. each.		
Supersonic Six (Six valve)	—	PW16
Premier Super (Five valve)	23.9.33	PW30
£5 Superhet (Three valve)	—	PW40
F. J. Camm's 2-valve superhet (two valve)	13.7.35	PW52
Mains Sets : Blueprints, 1s. each.		
Luxus A.C. Superhet (four valve)	14.10.33	PW33
A.C. £5 Superhet (three valve)	—	PW43
D.C. £5 Superhet (three valve)	1.12.34	PW42
Universal £5 Superhet (three valve)	15.12.34	PW44

SHORT-WAVE SETS.			
Two-valve : Blueprints, 1s. each.			
Midget Short-wave Two (D, Pen)	15.0.34	PW38A	
Three-valve : Blueprints, 1s. each.			
Empire Short-wave Three (D, 2 LF (R.C. and Trans))	—	PW7	
Experimenter's Short-wave Three (SG, D, Power)	23.9.33	PW30A	

PORTABLES.			
Three-valve : Blueprints, 1s. each.			
Atom Lightweight Portable (SG, D, Pen)	2.6.34	PW36	
Four-valve : Blueprints, 1s. each.			
Featherweight Portable Four (SG, D, LF, Cl. B)	6.5.33	PW12	

MISCELLANEOUS.			
S.W. Converter-Adapter (1 valve)	23.2.35	PW48A	
AMATEUR WIRELESS AND WIRELESS MAGAZINE.			
CRYSTAL SETS.			
Blueprints, 6d. each.			
Four-station Crystal Set	—	AW427	
1934 Crystal Set	4.8.34	AW444	
150-mile Crystal Set	—	AW450	

STRAIGHT SETS. Battery Operated.			
One-valve : Blueprints, 1s. each.			
B.B.C. One-valver	—	AW344	
B.B.C. Special One-valver	—	AW387	
Twenty-station Loud-speaker One-valver (Class B)	—	AW449	
Two-valve : Blueprints, 1s. each.			
Melody Ranger Two (D, Trans)	—	AW388	
Full-volume Two (SG, Det, Pen)	17.6.33	AW392	
Iron-core Two (D, Trans)	—	AW395	
Iron-Core Two (D, Q.P.P.)	12.8.33	AW396	
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A	
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A	
Lucerne Minor (D, Pen)	—	AW426	
Family Two (D, Trans)	—	WM278	

Three-valve : Blueprints, 1s. each.			
8 Radiogram (D, RC, Trans)	—	W343	
P.T.P. Three (Pentode-Triode-Pentode)	June '35	WM389	
Class-B Three (D, Trans, Class B)	22.4.33	AW386	
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394	
Home-Built Coil Three (SG, D, Trans)	14.10.33	AW404	
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410	
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412	
1934 Ether Searcher : Baseboard Model (SG, D, Pen)	20.1.34	AW417	
1934 Ether Searcher, Chassis Model (SG, D, Pen)	3.2.34	AW419	
Lucerne Ranger (SG, D, Trans)	—	AW422	
Cosor Melody Maker with Lucerne Coils	—	AW423	
P.W.H. Mascot with Lucerne Coils (D, RC, Trans)	17.3.34	AW337A	
Mullard Master Three with Lucerne Coils	—	AW424	
Pentaquester (HF Pen, D, Pen)	14.4.34	AW431	
£5 5s. Three : De Luxe Version (SG, D, Trans)	19.5.34	AW435	
Lucerne Straight Three (D, RC, Trans)	—	AW437	
All Britain Three (HF Pen, D, Pen)	—	AW448	
"Wireless League" Three (HF Pen, D, Pen)	3.1.34	AW451	
Transportable Three (SG, D, Pen)	—	WM271	
Multi-Mag Three (D, 2 Trans)	—	WM288	
Percy Harris Radiogram (HF, D, Trans)	—	WM294	
£6 6s. Radiogram (D, RC, Trans)	Apr. '33	WM318	
Simple-tune Three (SG, D, Pen)	June, '33	WM327	
Tyers Iron-core Three (SG, D, Pen)	July '33	WM330	
C.B. Three (D, LF, Class B)	—	WM333	
Economy-pentode Three (SG, D, Pen)	Oct. '33	WM337	
All-wave Three (D, 2LF)	Jan. '34	WM348	
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351	
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354	
Iron-core Band-pass Three (SG, D, QP21)	June '34	WM362	
1935 £6 6s. Battery Three (SG, D, Pen)	Oct. '34	WM371	
Graduating to a Low-frequency Stage (D, 2LF)	Jan. '35	WM378	

Four-valve : Blueprints, 1s. 6d. each.			
65/- Four (SG, D, RC, Trans)	—	AW370	
"A.W." Ideal Four (2SG, D, Pen)	16.9.33	AW402	
2 H.F. Four (2SG, D, Pen)	—	AW421	
Crusaders' A.V.C. 4 (2 HF, D, QP21)	18.8.34	AW445	
Pentode and Class-B Outputs for above : blueprints 6d. each	25.8.34	AW445A	
Quadradyne (2SG, D, Pen)	—	WM273	
Calibrator (SG, D, RC, Trans)	Oct. '32	WM300	
Table Quad (SG, D, RC, Trans)	—	WM303	
Calibrator de Luxe (S.G, D, RC, Trans)	Apr. '33	WM316	

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless" at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7d., and "Wireless Magazine" at 1/3, post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send, preferably, a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

Self-contained Four (SG, D, LF, Class-B)	Aug. '33	WM331
Lucerne-Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, Pen)	Feb. '35	WM381
The H.K. Four	Mar. '35	WM384
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	May '33	WM320
New Class-B Five (2SG, D, LF, Class-B)	Nov. '33	WM340
Class-B Quadradyne (2SG, D, LF, Class-B)	Dec. '33	WM344
1935 Super Five (Battery Superhet)	Jan. '35	WM379

Mains Operated.			
Two-valve : Blueprints, 1s. each.			
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403	
Economy A.C. Two (D, Trans) A.C.	—	WM286	
Three-valve : Blueprints, 1s. each.			
Home-lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383	
S.G. Three (SG, D, Pen) A.C.	3.6.33	AW380	
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399	
A.C. Pentaquester (HF, Pen, D, Pen) A.C.	23.6.34	AW439	
D.C. Calibrator (SG, D, Push-pull Pen) D.C.	July '33	WM329	
Simplicity A.C. Radiogram (SG, D, Pen) A.C.	Oct. '33	WM338	
Six-guinea A.C./D.C. Three (HF Pen, D, Trans) A.C./D.C.	July '34	WM364	
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	Nov. '34	WM374	

Four-valve : Blueprints, 1s. 6d. each.			
A.C. Melody Ranger (SG, DC, RC, Trans) A.C.	—	AW380	
A.C./D.C. Straight A.V.C.4 (2 HF, D, Pen) A.C./D.C.	8.9.34	AW446	
A.C. Quadradyne (2 SG, D, Trans) A.C.	—	WM379	
All Metal Four (2 SG, D, Pen)	July '33	WM320	
"W.M." A.C./D.C. Super Four	Feb. '35	WM382	
Harris Jubilee Radiogram	May '35	WM386	

SUPERHETS.			
Battery Sets. Blueprints, 1s. 6d. each.			
1934 Century Super	9.12.33	AW418	
Super Senior	—	WM256	
1932 Super 60	—	WM269	
Q.P.P. Super 60	—	WM319	
"W.M." Stenode	Oct. '34	WM373	
Modern Super Senior	Nov. '34	WM375	

Mains Sets : Blueprints, 1s. 6d. each.			
1934 A.C. Century Super, A.C.	10.3.34	AW425	
1932 A.C. Super 60 A.C.	—	WM272	
Seventy-seven Super A.C.	—	WM305	
"W.M." D.C. Super, D.C.	May '33	WM321	
Merrymaker Super, A.C.	Dec. '33	WM345	
Heptode Super Three, A.C.	May '34	WM359	
"W.M." Radiogram Super, A.C.	July '34	WM366	
"W.M." Stenode, A.C.	Sep. '34	WM370	
1935 A.C. Stenode	Apr. '35	WM385	

PORTABLES.			
Four-valve : Blueprints, 1s. 6d. each.			
General-purpose Portable (SG, D, RC, Trans)	—	AW351	
Midget Class-B Portable (SG, D, LF, Class B)	20.5.33	AW389	
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393	
Family Portable (HF, D, RC, Trans)	22.9.34	AW447	
Town and Country Four (SG, D, RC, Trans)	—	WM282	
Two H.F. Portable (2 SG, D, QP21)	June '34	WM363	
Tyers Portable (SG, D, 2 Trans)	Aug. '34	WM367	

SHORT-WAVERS.. Battery Operated.			
One-valve : Blueprints, 1s. each.			
S.W. One-valve	—	AW329	
S.W. One-valve for America	—	AW429	
Roma Short-Waver	10.11.34	AW452	
Two-valve : Blueprints, 1s. each.			
Home-made Coil Two (D, Pen)	14.7.34	AW440	
Three-valve : Blueprints, 1s. each.			
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355	
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.0.34	AW438	
Experimenter's Short-waver	Jan. 19, '35	AW463	
Short-wave Adapter	Dec. 1, '34	AW456	
Superhet, Converter	Dec. 1, '34	AW457	
The Carrier Short-waver	July '35	WM390	

REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

E. A. A. (Clapham).—The most suitable circuit according to the particulars you give would be the £5 Superhet, or the receiver described in this issue.

W. N. (Midlothian). You may have damaged the winders as these would not be intended to take the maximum output from the rectifier.

N. E. G. (Dudley). The lists may be obtained on application to the firms you mention.

L. D. (Finsbury Park).—The coil details are insufficient to enable us to identify them and we cannot, therefore, recommend a circuit. The makers of the coils may be of assistance to you, but we think that complete data would be required.

W. B. (Grayshott). You can make the cabinet to any design you choose as this will not affect the performance of the receiver. You may prefer to have the batteries self-contained or in a separate cabinet with the speaker, and so on.

H. S. W. (Thornton Heath). It would appear from your test that the condenser is faulty and is short-circuiting the speaker. Try a different condenser. The volume should definitely not be reduced.

Puzzled (Hove). We regret that we cannot now carry out station identification and have discontinued the Query Service relating to this type of problem.

D. B. (Hampton). The method of working has been described in *Practical Mechanics* under Neon Tubes. The effect is obtained by using a special gas filling in the tube.

J. J. D. (Belfast). We regret that we have no blueprints of such an ambitious receiver, nor do we know where such could be obtained.

F. S. (Birmingham). The Fury Four should be the ideal set for your particular requirements.

M. B. (Drogheda). The eliminator is useless for accumulator charging. Insufficient current is delivered and there is danger of damaging the rectifier if connected to an undischarged cell.

F. B. (Newry). If you use a separate G.B. battery a new battery lead must be attached to the receiver, and this should be attached to the H.T. negative circuit at any convenient point, and the lead inserted into the positive socket of the bias battery.

H. R. D. (Brussels 11). The four-valve set described in this issue, with which a blueprint is presented free, should be the very set for your particular requirements.

R. S. (Harringay). You will note that the list of blueprints is now subdivided into battery and mains receivers and this overcomes your objection. We have not described a battery double-diode-triode three.

J. S. (Kirkcaldy). The set should be quite suitable for use on an indoor aerial. We have not tried the valves you mention, and do not know whether they will prove as effective as the original valves.

J. F. (Co. Leitrim). You must obtain new cords and these should be attached as at present, by removing the ear cap and sliding off the diaphragm. The ends of the cord will be found secured by means of a screw and washer, and it is quite a simple job to replace them. Take care to slide away the diaphragm and slide it back into position in order to preserve the sensitivity of the magnets. The midget sets would not be of much use to you.

J. H. S. (Loughborough). Your circuit is quite in order and it should perform satisfactorily.

A. M. (Cowie). The back number in question is now out of print. The screening cans may be obtained from Messrs. Peto-Scott.

J. B. T. (Leicester). We cannot supply individual wiring diagrams. The details have been given in various issues of our journal and will no doubt be repeated in due course.

C. H. (Jubbulpore). Your receiver is probably not sensitive enough for your particular conditions, but we would suggest that you communicate with the suppliers in order to obtain their opinion. We did not describe the circuit in our paper.

A. P. (No Address). The length does include lead in, but in the case of the vertical aerial it should be all of one length and not divided into different materials and thicknesses. The valve is being over-run due either to too much H.T. or too little G.B. You will damage the valve if you go on using it in this condition.

O. R. (Brixton). You could not rewire the instrument, but could fit a shunt to double or treble the range. This is the most satisfactory method and a large resistance should be included in parallel and adjusted until the reading is half or one-third and the value of the resistance then noted. This may then be permanently incorporated.

H. L. H. (Handsworth). We have no blueprint of an A.C. receiver using this pack and have only used it in a battery-operated receiver and a D.C. set.

A. B. (Clapham). We regret that we have no details of the coil which was made to the design published in a contemporary.

T. R. A. (Liverpool 7). If you want the best quality and volume the Class B stage or ordinary push-pull should be adopted. The speaker must, however, be accurately matched for maximum results. We have several circuits which might suit you, but think the Hall-Mark 4 is about the most suitable. The firm in question is perfectly bona fide.

F. M. (Hyde Park). We have not described a receiver of the type mentioned by you.

C. A. S. (Hornsey). Your mains unit is probably responsible and this may be checked by using an ordin-

ary dry battery. If results are then satisfactory you will know that the D.C. unit is responsible.

E. L. M. E. (Portsmouth). We regret that owing to the crowding of your writing on the postcard and the handling by the postal authorities and stamp cancelling machine, the latter part of the query was indecipherable. Can you repeat the query, or alternatively as we gather that it concerns the connections to coils KBLC and KGR, write to Messrs. Colvern for a copy of their booklet in which circuits and connections are given.

W. P. (Thorpe Bay). As yours is a commercial receiver we suggest that you communicate with the makers who will be able to solve your difficulties.

G. M. D. (Ruislip). From your remarks the unit is obviously of an old pattern designed for use as a half-wave rectifier. Such valves are not now in the valve manufacturers' lists but one of the well-known firms may be able to supply one as a replacement. You could, if you wished, fit a small power valve which might function satisfactorily.

W. S. H. (Bridgend).—Quite possible to work the Superformer from an eliminator, providing the latter has suitable voltage tapplings and is capable of delivering the required current. You may purchase the kit of parts on the hire purchase system from Messrs. Peto-Scott, Ltd., 77, City Road, E.C., either completely or separately.

G. W. C. (Glasgow). There is no fault in the circuit and the tests do not reveal anything. If you disconnect your accumulator you will find that the readings will not be obtained, and the circuit was thus being completed through the accumulator—which is quite in order.

D. C. (Dalginross Comrie). There is no blueprint for this particular receiver.

W. A. (Riverstown). We would suggest a superhet for your particular needs, and the four-valve described in this issue should prove quite suitable.

H. W. (Tottenham). The only way is to connect the pick-up across the primary of the L.F. transformer, but the volume will naturally be rather poor.

J. D. (Swansea). It would not be practicable to make the change with a set of this nature.

W. M. H. (Belfast). We will bear your idea in mind and if found practicable an article will be given on the subject.

F. J. E. (Dulcote). You do not state the particular type of coil and a number of coils have been produced by this particular firm.

A. H. M. (Netley). Obviously a component is defective, but a careful test stage by stage with a meter will be necessary to trace it. Most likely it will be found in the Pentagrid or I.F. stage, and the valve should be tested as a first precaution. The switching is quite in order as you have no connection to the pick-up terminals.

W. I. (W. Kensington). You have obviously obtained a manufacturer's surplus component and this may be unsuitable for use in any but the receiver for which it was originally designed. We are sorry, therefore, that we cannot assist you.

K. K. P. (Stroud Green). An ordinary L.F. stage should be the simplest improvement, although if you desire greater range an H.F. stage might be incorporated.

T. S. (Manchester). The [directly-heated valve has the source of supply joined to the electron-emitting element, referred to as a cathode. The indirectly-heated valve has the source of supply joined to a length of wire (known as the heater) and this is surrounded by the cathode and thus emits the electrons under the influence of the heat from the heater. The A.C. supply is more useful than D.C. as the latter cannot be increased in voltage, whereas with A.C. you can step up the voltage by means of a transformer and thus even if your mains are only 100 volts A.C. you can obtain 1,000 volts if desired by means of a transformer.

W. T. H. (E. 9). The trouble may be due to lack of smoothing in the unit or L.F. instability caused by the common H.T. supply. In this case, of course, each stage must be decoupled and the maximum H.T. tapping on the unit employed.

B. H. (Gloucester). We cannot answer your question as you do not give the valve types. The total current from the H.F. detector, and L.F. stages must be added together, and then from this you can ascertain the voltage drop required. As you wish to obtain 250 volts from the 350 volt output you must drop 100 volts and the resistance will be found by dividing 100 by the current in milliamps and multiplying the answer by 1,000.

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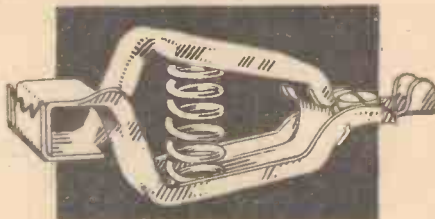
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COMPONENTS TESTED IN OUR LABORATORY

Goltone Bulldog Connector

THE experimenter finds numerous uses for a quick-release and good contact connector, and in addition to ordinary experimental hook-ups there is a need for such a connector in ordinary L.T. circuits. The clip shown in the illustration below is one of a range produced by Messrs. Ward and Goldstone, and it possesses a number of attractive features. The connecting lead may be soldered or anchored by means of the screw seen near the soldering lug at the right-hand side. The tension of the spring is such that although simple to operate, the grip exercised at the toothed jaws is sufficient to warrant a firm contact under even severe vibration. The teeth are sufficiently sharp to bite into soft metal, but ordinary wires may be held between the teeth without damage.



One of the Goltone Bulldog connectors.

In the smaller sizes, these clips are lead coated to protect them from corrosion, and they are made for use on circuits carrying 5 amps. up to 50 amps., the price varying from 2s. 3d. per dozen to 8s. per dozen. A special type clip is also obtainable in a larger size, which is cadmium plated and is acid resisting, and this costs 6d.

A New Philco Receiver

EYE-APPEAL and exceptionally good performance are the predominating features of an entirely new three-valve battery set at £7 10s. 0d., recently added to the notable 1936 Philco models already announced.

Known as Philco Model 234, the new receiver embodies many highly-advanced features. It employs three tuned circuits with a total of five stages, giving maximum selectivity with excellent audio response. The first two tuned circuits are coupled as a band-pass filter. The output circuit is designed to give maximum volume with economical upkeep, total H.T. consumption being no more than 8.5 milliamps. All the circuits are accurately tuned by a 3-gang condenser.

The arrangement of the three valves is as follows:—

- Screen-grid valve as H.F. amplifier.
- Screen-grid valve regenerative detector.
- Output pentode valve.

An important feature of the design is that it practically eliminates any overload distortion. Four controls are provided, one being a reduction-gear station selector, operating a swinging pilot light which illuminates the required station on a full-vision ivory dial. Metre calibrations for both medium and long waves are given in addition to important station names. This selector knob and the neat bezel, in chromium, strike a new and distinctive note. Another control is a wave-change switch, on the left of which is the regeneration control and, on the right, the combined volume control and on-and-off switch which automatically cuts out all batteries.

High sensitivity, pure tone, and excellent response are obtained from an 8in. auditorium speaker of the very latest permanent-magnet design, the magnet being of the newly-developed nickel-aluminium alloy. An external speaker or pick-up can easily be added.

Another noteworthy feature is the Philco easy plug-in battery with combined grid bias to eliminate any possible errors in connecting batteries. Ample provision is, by the way, made for a large battery and accumulator.

The polished walnut cabinet is of an entirely new and attractive horizontal design and measures 19in. wide, 14½in. high, and 8½in. deep. It has figured walnut panels and the harmonising control knobs are centrally disposed below the dial. The speaker opening, which spans the width of the cabinet, is fretted in graceful lines.

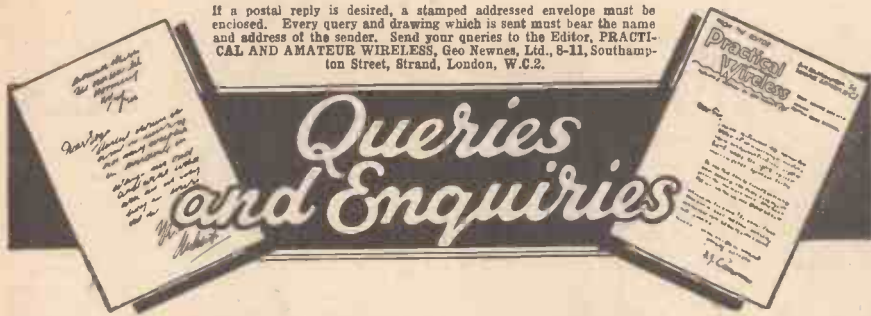
362 Super-power Valve

FOR power-address apparatus, or for the enthusiast who realises that a super-power valve is essential in the output stage if high quality at great volume is required, the new 362 PX50 valve will be found ideal. This is rated with an anode dissipation of 50 watts, and when fully loaded will deliver an undistorted output of 13 watts. In certain cases, however, the anode load may be modified so as to bring the output up to 15 watts. The full characteristics of this valve will be given, together with details of one or two other super-power 362 valves, in our issue next week.



The unusual design of the PX50

If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo Newnes, Ltd., 6-11, Southampton Street, Strand, London, W.C.2.



Queries and Enquiries

SPECIAL NOTE

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

Please note also that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

One-Valve S.W. Set

"Is it possible to build a one-valve set to get good short-wave reception? From the various articles I have read it seems that you need at least three valves. Have you any plans of a one-valver?"—R. Y. (Norwich).

A ONE-VALVER is certainly possible, and quite good results may be obtained. We have three blueprints of sets of this nature, numbers AW329, AW429, and AW452. The issues describing the construction of the first two are now out of print, but the last mentioned is described in AMATEUR WIRELESS, dated 10-11-34, and a back number together with the appropriate blueprint is obtainable from this office.

Superhet and Visual Indicator

"I have obtained a visual indicator and would like to use this with my battery receiver. This is the £5 Superhet recently described in your journal, and I should like to know the connections for the indicator and the best place in the circuit to fit it."—R. Y. (Southsea).

THE visual indicator will only operate when connected in that part of the circuit in which a change in current takes place due to the reception of a signal. Consequently, it may be inserted in the

anode circuit of an anode-bend rectifier, a grid-leak rectifier, or the anode circuit of valves of the variable-mu type which are controlled by an automatic-volume-control circuit. In the latter case, the instrument may, if of a certain type, also be included in the A.V.C. circuit, and so be operated by the change in voltage. In the £5 Superhet there is no A.V.C. and the second detector is of the Westector type, and consequently with this particular receiver there is no position in which the indicator may be used. If you add A.V.C. as explained in one of our issues, you could, of course, include the meter in the anode circuit of the pentagrid valve or the I.F. valve.

Defining a Wattmeter

"In a catalogue which I was perusing the other day I saw the term 'wattmeter,' and I am rather at a loss concerning this type of instrument. An ammeter, for instance, measures the amps. flowing, and a voltmeter measures the volts, but a watt is not a unit of the type which can be measured so far as I can see. Could you therefore explain what this instrument is and its use?"—B. D. E. (Gillingham).

THE average wattmeter is simply an ammeter which has been calibrated for use with definite voltages. Thus, knowing that the wattage consumption of a piece of apparatus is obtained by multiplying the current consumption by the voltage applied, it is a simple matter to draw up a scale in which the various current readings obtained are shown as watts for various voltages. As an example, a 2 amp. deflection could be marked to represent 200 watts if used with 100 volts, 300 watts for 150 volts, and 400 watts with 200 volts. It is, therefore, only a simple ammeter with special calibrations.

Universal Hall-Mark

"I believe that the push-pull stage in my Universal Hall-Mark receiver is defective, but I have been unable to trace the cause. Perhaps the following remarks will be of assistance to you. The speech is very screechy and there is a complete lack of bass.

When the local is tuned in there is terrible distortion and the volume has to be turned down to obtain anything like satisfactory quality. I have found that when one of the push-pull valves is removed, results are improved, and thinking that the valve may have been faulty, I have tried each of the push-pull valves individually in the push-pull stage, but they both give the same results when used one at a time in either of the push-pull sockets. Does this assist you in locating the trouble?"—G. P. (Harringay).

FROM the test you have conducted it is obvious that the voltage supply is too low, but you have probably overlooked a very serious point in your tests. The Universal receiver has the heaters wired in series, and therefore the removal of one of the valves of the push-pull stage should prevent any signals from being received. You have probably mistaken the wiring in the heater circuit, and may also have made some mistake in the H.T. circuit, but the heater circuit is obviously the first place to look for trouble.

Biasing a D.H. Output Valve

"Can you tell me the most satisfactory method of applying automatic grid bias to an A.C. directly-heated output valve. I have a mains transformer which has three separate L.T. windings, and if necessary I could feed the output valve with a separate supply as I shall not need all of the L.T. windings."—G. R. (Swindon).

AS you are able to supply a separate winding for the output valve the best method of biasing is to include across the actual heater terminals of the valve-holder a 50-ohm 'hum-dinger,' and to join the bias resistance between the earth line and the arm of the hum-dinger. The usual by-pass condenser should be joined across the resistance, and the speaker, which is no doubt filter-fed, should be joined direct to earth (H.T.—).

Coils for the £5 Superhet

"I am thinking of making up your £5 Superhet, but my dealer has been informed by his factors that the Telsen W.476 superhet coils are not now obtainable, as stocks are exhausted. Will you please inform me as to what alternative make of coil will be suitable? I have all the other parts on hand."—W. L. A. (Chesham).

IN this particular receiver you may use Ward and Goldstone, Varley, or Colvern coils, and wiring instructions for any of these coils were given on page 682 of our issue dated February 23rd, 1935.

The coupon on page 300 must be attached to every query.

BEFORE YOU DECIDE SEE HYVOLTSTAR UNIVERSAL

★ UNIVERSAL All Waves, All Mains A.C./D.C. Receivers. Acknowledged the most Advanced Radio on the market. The many new and exclusive features incorporated will greatly interest the technician. Working on 100 to 250 volts A.C. or D.C. without alteration. Covers all wave bands from 13-2,000 m. Push-pull output stage, providing undistorted output of 6/7 w. Adjustable selectivity. Automatic Silent Tuning. Extreme sensitivity. Automatic volume control and Fading Compensation on all wave bands, even on ultra-short waves. Two-speed tuning as easy on short waves as on medium or long.

HYVOLTSTAR PRICES:

- Hyvoltstar All-wave Straight Four... 13½ gns.
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- Hyvoltstar All-wave Superhet Six... 19 gns.
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- Hyvoltstar All-wave Superhet Ten... 35 gns.

In addition we offer you a Set "on approval" without obligation, to test and examine under your own conditions. Take advantage of this unique offer by sending to-day for details of the HYVOLTSTAR UNIVERSAL ALL-WAVES ALL-MAINS A.C./D.C. range of Receivers, Radiograms and Amplifiers. Available in chassis form if required. This enables intending purchasers to utilise their existing cabinets and speakers or use a cabinet adapted to their present furnishings.

UNIVERSAL HIGH VOLTAGE RADIO, LTD., Dept. P, 28-29, Southampton St., Strand, W.C.2. Telephone: Temple Bar 4985 and 8608.



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Equal to a 1936 Model, which can be constructed without huge expense or experience.

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- O.-G. Three Pentode 4-valve "All-Wave" 20-2000 m. Receiver £9/9/0
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- O.-G. 6-valve "All-Wave" 13.5-2000 m. Super Kit, £14/14/0.
- Short Wave Converter Kit £4/10/0



to-date models? O.-G. H.V. Valves give your set more sensitivity than any other valve. Write to Sole Agent and Distributor for details: EUGEN J. FORBAT (Dept. D), 28-29, Southampton St., Strand, W.C.2. Telephone: TEMple Bar 8608 and 4985.

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THE following Types, 5/6 each: 350 v., 120 m.a. full wave rectifiers, 500v. 120 m.a. full wave rectifiers, 2½ watt indirectly heated pentodes.

2-VOLT H.F., L.F., 2/3; power, low consumption power, super power, 2/9; screened grid, variable mu screened grid, 5- or 4-pin pentodes H.F. Pen., V.M., H.F. Pen., Class B, 5/-.

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PAPER Condensers. Dubilier 4mf. 500v. working, 4/-; ditto 700v., 5/-; ditto 800v., 6/-; Western Electric, 250v., working 1mf., 6d.; 2mf., 1/-; 4mf., 2/-.

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(Continued at top of column three)



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(Continued from foot of column one)

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5/- SPECIAL OFFER 1 gross box assorted all good sizes 1/2 Watt Resistances by Plessey.

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1/- BLOCK CONDENSERS, 1+1 mfd. 350 volt Working.

6/- H.T.8 MAINS TRANSFORMER by Standard Telephones and Cables; Input 200/250 volts, Output 250 volts 60 m.a., 4 volts 4 amps.

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All Orders under 10/- must be accompanied by a reasonable amount for postage.

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- W.R.C. Short-Wave Coils, 13-22 metres, 20-44 m., 40-90 m., 2/8 each, set of three 7/6. Four-pin type to fit standard holder. S.W. Chokes, 10-100 metres, 10d. Pye S.W. valve holders, 6d. Erie Resistances, all values to 2 meg., 6d. Plessey Resistances, 1-watt, mixed values, 3/- dozen.
- GROSVENOR 4v. A.C. Bandpass Sets, 1936 model, made by Ever Ready, Mullard Valves, iron cored coils, Rola Speaker, in original cartons, listed 12 gns. £6 10s. 0d., carriage forward.
- WATES Rotary Converter, 230 v. D.C. input, 230v. 60 watts A.C. output, brand new, £2 5s. 0d. Few only Wates 6-valve chassis, complete with valve holders, switch, and terminal strip, 2/- each. Coils for same, Bandpass, 2/- per set.

ALL goods as offered last week.

ELECTRIC soldering irons, 200-250v., boxed complete with flex and adaptor, copper bit, 1/11, post 6d.

W.R.C. Eliminators. Guaranteed 12 months. 150v. 30 m.a. Three positive H.T. Tappings. Westinghouse rectifiers. A.C. model, 21/- A.C. and trickle charger, 2v. 1 amp., 32/6, carriage 1/- extra.

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FERGUSON Universal Midget Receiver for AC/DC., 100-250 Volts. Moving Coil Speaker. Wonderful tone and outstanding selectivity. Limited number. 65/- Car. Paid. Send for latest list, hundreds of other Bargains. Pearl and Pearl, 190, Bishopsgate, London, E.C.2.

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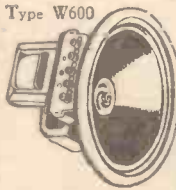
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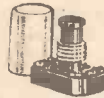
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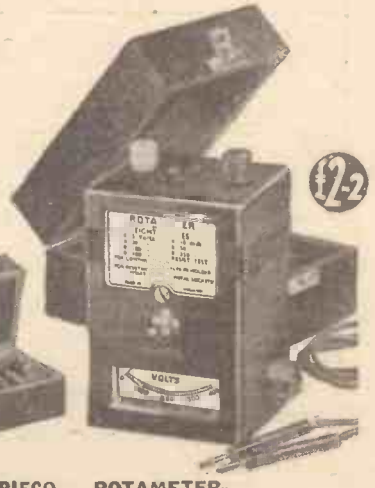
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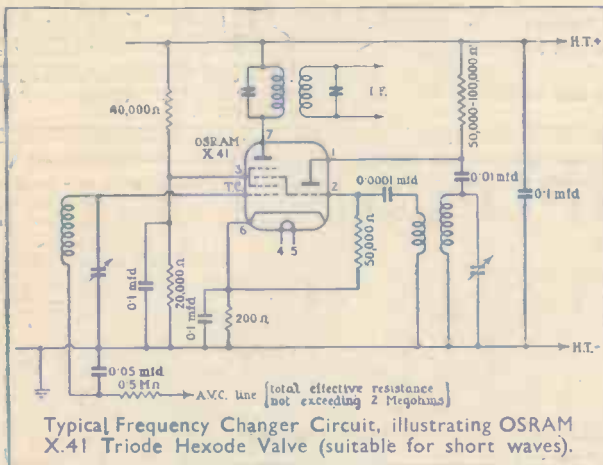
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