

SOUND RECORDING FOR AMATEURS

Practical and Amateur Wireless

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EVERY
WEDNESDAY

Edited by F.J. CAMM

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AND PRACTICAL TELEVISION



Building the "Magic Hand"

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By F. J. CAMM (Editor of "Practical Mechanics," etc.)

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SOME QUALITY CIRCUITS

SEE PAGE
511.

Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:

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

VOL. VIII. No. 202. August 1st, 1936.

ROUND *the* WORLD of WIRELESS

Radio Life-saving

EXPERIMENTS carried out in Kent have shown that an ultra-short-wave transmitter and receiver will form a valuable link between the pit head and the workings at the bottom of the mine. A wavelength of 4.5 metres was used in the tests, and two-way communication (telephonic) was carried out, the depth of the pit which was used being 2,160ft. It was also found possible to carry out conversations between the shaft bottom and workers situated 2,000ft. away in a remote part of the workings. The apparatus used weighed only 15lb.

Western Transmitter

THE B.B.C. propose to build a new Regional transmitter at Start Point, in Devon, to supply the Western counties. This transmitter will take the place of those now in use at Plymouth and Bournemouth. The present Western Regional transmitter will probably then be retained solely for the Welsh programmes whilst the new station will serve a much greater area than is now covered by the two relay stations just mentioned.

Dublin Interval Signal

DUBLIN is still waiting for its interval signal. It was proposed to use the first nineteen notes of the tune "O'Donnell abu," but when the apparatus arrived it was found that the tune was rather ineffective and, therefore, it has been sent back for lengthening. It is now unlikely that the tune will be on the air for at least another month.

New Detector Systems

ALTHOUGH the present method of detection is a relic from the very earliest days, there are several schemes now incorporated which may be regarded as modern inventions or improvements. From France, however, news now comes of a totally new system of detection, which is claimed to combine all the advantages of present systems and which promises to become standard practice in future designs. An interesting book dealing with another system of detection has also been issued in this country, and gives some interesting details of experiments carried out by a Mr. D'Arcy Ford.

Ulster Radio Show

IN view of the fact that the R.M.A. proposes not to support provincial radio exhibitions the Ulster Radio Wholesalers' Association have called a meeting and have decided to co-operate with other local bodies to organise a radio exhibition. If the resolution is carried the exhibition would probably be held at the Plaza, Belfast, for ten days, commencing September 14th next.

Television In Russia

TELEVISION is progressing in the U.S.S.R. and the Soviet Radio Committee have decided to put up three

RADIOLYMPIA

AUGUST 26th

TO

SEPTEMBER 5th

OUR STAND No. 10
GROUND FLOOR

SAME STAND—SAME SPOT!

television transmitters this year, in Moscow, Kiev, and Leningrad, whilst a mobile transmitter is also being built. It is also proposed to put up other transmitters to serve the districts of Khabarovsk, Novosibirsk, Tashkent, and so on. Television receivers are being designed and are to be put on the market, but no details are yet to hand concerning the wavelengths, picture definition, or other important data.

Believe It or Not

AMATEURS in this country are often intrigued by the names given to various American receivers, such as the "Go-Getter," and "Hotter Dog," etc., but a recent magazine from that country describes a Three-stage Tri-Tet Exciter with Regenerative Quadrupling Amplifier using Suppressor-grid Feedback!

Marconi-Ekco Company

THE Marconi Wireless Telegraph Company and Messrs. E. K. Cole, Ltd., are forming a jointly-owned company combining the manufacture and technical and research activities of the two companies for the production of measuring instruments, diathermy and electro-medical apparatus. The company is to be known as Marconi-Ekco Instruments, Ltd., with a nominal capital of £5,000.

Television at Olympia

AT the time of going to press we learn that the R.M.A. are considering the erection of ultra-short-wave aerials at Olympia to enable advantage to be taken of the television transmissions should they commence in time for the Exhibition.

Changes in the Band

CERTAIN contracts terminate this month, and the combination now employed by Henry Hall in his famous band will undergo some changes. Miss Vivienne Brooks is leaving, and the type of programme to be broadcast will undergo a revision. This, no doubt, promises to result in a general improvement in the dance programmes, as well as in the lighter types of broadcast.

Zeesen Short-wave Transmitter

A NEW transmitter is to be opened at Zeesen in order to enable the broadcast of the Olympic Games to be carried out in all possible languages. This new station is claimed to be the largest and best equipped in the world and is now nearing completion.

Bicycle Radio

A LIVERPOOL firm has produced a novel receiver for use on a cycle and the local Watch Committee has placed an order for eighty of these receivers for the use of the police force. Does the policeman wear headphones whilst riding? We cannot imagine a loudspeaker on the machine, and at the same time it would be rather risky riding through traffic whilst wearing headphones, but, no doubt, the makers have made suitable provision, and the apparatus must be very effective in view of the large initial order which has been placed for these machines.

THE PICK of the PROGRAMMES

Coldstream Guards Band

THE Band of His Majesty's Coldstream Guards has been broadcast several times in the Midlands, chiefly as outside broadcasts. On August 4th it will play from a Birmingham studio. The programme is to open with the first broadcast

MAKE THESE DATES
WITH YOUR RADIO

"Follies" broadcasting from the Arcadian Pavilion, Morecambe, and a variety act from the Winter Gardens.



ROY FOX LISTENS-IN

Roy Fox, the famous band leader, has a Pye All-wave receiver demonstrated to him by Mr. A. G. Waterkamp, manager of the Plymouth branch of Messrs. Godfrey & Co., Ltd., who installed this model in his dressing-room at the Palace Theatre.

performance of a March, "Stratheden," composed by Lieut. J. Causley Windram, the regiment's Director of Music, who will conduct. The Coldstream Guards have had an enlisted band since about 1783. For a number of years prior to that date it had civilian bands. Notable events in the band's recent history have been a Canadian tour and the fact that it represented British Army bands at the funeral of Marshal Foch.

Dance and Serenade

JEAN SALDER and his Serenaders, who have had a number of broadcasts this year, are to give a programme on August 5th, entitled "From the Hills." This band is engaged at a Birmingham hotel.

Tony's Red Aces

PAYNE'S Majestic Ballroom is known to everyone who has visited Llandudno. It has accommodated many celebrated dance-band leaders. The present band connected with the Majestic Ballroom is Tony's Red Aces, who will broadcast on August 1st. This band made its debut on the air from the Midland Regional in November, 1934, and since then it has broadcast over one hundred times.

Morecambe on the Air

ON August 6th Mark Sheridan's "1936 Follies" will broadcast twice from the Palace Theatre, Morecambe, once in the afternoon in the main Regional programme, and again in the evening as part of a special "Morecambe Night's Entertainment" for Northern listeners only. The latter programme will include the "Arcadian

Four Years of Broadcasting

ON August 2nd, in the North Regional programme, the orchestra of the New Victoria Cinema, Bradford, under the direction of Sydney Phasey, completes four years of regular weekly broadcasts. Mr. Phasey's team will continue to broadcast this season. It is interesting to recall that the director made his debut at the age of fourteen by playing violin solos at the Metropolitan Temple in New York.

SOLVE THIS!

PROBLEM No. 202.

Walton's superhet stopped functioning and although he suspected that the frequency-changing valve was not oscillating, he found that this valve showed continuity across its filament pins and passed anode current. What easy method could he have adopted to find whether the valve was oscillating? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 202 in the left-hand corner and must be posted to reach this office not later than the first post Tuesday, August 4th, 1936.

Solution to Problem No. 201.

320 ohms is the resistance specified by the manufacturers for the 41 M.P., but when two of these valves are used in push-pull, the value of the common bias resistance must be halved, as the current taken by the two valves is passed through it.

The following three readers successfully solved Problem No. 200, and books are accordingly being forwarded to them: M. B. Ember, 6, Clifton Bldgs., London, E.2; J. D. Morris, 17, Lynton Rd., Heaton Moor, Stockport; J. Harris, 635, Beanwood Rd. Beanwood, Birmingham.

Dance Band from Malvern

ON August 8th, in the Midland Regional programme, Billy Gammon and his Star Players, who are having their second summer at the Winter Gardens, Malvern, will be heard playing from the Festival Club there. This combination has had resident winter engagements at Cheltenham Spa since 1934.

Western Salon

THE second concert in the series "Western Salon" will be broadcast from the orchestral studio at Bristol before an audience on August 5th, when the artists will be the Bristol Chamber Music Players, who are Joan Allen (violin), Madeline Jacobi (viola), Olive Woodington (violoncello), and Winifred Davey (piano-forte), and they have taken the name of "Players" so that the combination can be augmented to a quintet or sextet if desired.

Variety from Hanley

STEFFAN'S Sixteen Singing Scholars are the principal item in the Midland Regional programme on August 4th, in a variety bill from the Theatre Royal, Hanley.

Evelyn Hardy and her Ladies' Band

THIS well-known all-ladies band will broadcast from the Manor Gardens, Exmouth, on August 3rd. The band broadcast last year from Crewkerne, and listeners have also heard it from Minehead.

An Ex-Cowboy's Experiences

IN the Midland Regional programme on August 4th, in the "Seeing Life" series of talks, B. K. Vallings is to relate his experiences as a cowboy and packer in Western Canada. Mr. Vallings, who is now in charge of the Shropshire campaign against the musk rat, has broadcast entertaining stories of rodeo in the West.

R.U.C. Band

THE Band of the Royal Ulster Constabulary, which is to broadcast on August 6th by permission of R. D. Harrison, O.B.E., Commissioner of Police, will be under the directorship of District Inspector George C. Ferguson. The band consists of thirty-six players recruited mainly from military bands, and representing twenty-eight separate battalions. The band may frequently be heard in the public parks in Belfast; it plays at many official functions and has broadcast on several occasions in the Northern Ireland programmes. The programme includes the "Ballet Egyptien" by Luigini, melodies from "Patience" and Allegro marziale (Nautical Moments), by Winter. There will be a baritone soloist, William J. Breakey, and Constable J. Orr and E. McKenna will play a duet for piccolo and clarinet.

Symphony Concert

H. FOSTER CLARK will conduct the B.B.C. Midland Orchestra in a Symphony Concert on August 7th. The works to be given are Symphony No. 29, in A, by Mozart, and "Job," a masque for dancing in nine scenes by Dr. Vaughan-Williams.

Building the "Magic Hand"

WHEN a valve is set in oscillation, its anode current changes. For instance, if a valve in a quiescent state passed 4 mA., putting it into violent oscillation by coupling tuned grid and anode coils may cause it to pass double or treble this current, say, 9 or 12 mA.

This current change is used in the device to be described. In the anode circuit of an oscillating valve is placed a relay that makes or breaks a following circuit according to whether 4 mA. or 10 mA. is passing through. This change of current is caused by affecting the valve's oscillation intensity by means of hand-capacity—well known as the bug-bear of ill-designed short-wave receivers.

It thus becomes possible to operate the relay, and hence any distant piece of apparatus connected with it, simply by approaching or withdrawing one's hand to or from a sensitive part of the oscillating

The Device Described in this Article Enables Distant Apparatus to be Controlled by "A Wave of the Hand." It is well within the Abilities of the Amateur Constructor.

By W. H. CAZALY

—it may be almost any 2 volt H.F. or detector type valve—is oscillating properly, some 10 or 12 milliamps of current will be passed. The coupling between the grid and anode coils should be adjusted, by carefully closing up or opening out the turns on one of the coils, until about this value of current is being passed. The adjustment could be done by adding preset condensers, of .0001 maximum capacity, one across each coil, and adjusting them by means of their screws, but the self-capacity of the coils is really sufficient, if care is taken over adjusting the turns spacing.

It will be noted, while making these adjustments, that as soon as either the grid or the anode of the valve is touched, or even if the hand is brought close to the coils, the anode current changes, since the intensity of oscillation is altered. This is exactly the effect we are aiming

at. When left to itself, with nothing of a conducting nature within three feet of it, the unit should pass about 10 mA. When the grid or anode is touched, the current should drop to about 4 mA. Various anode voltages should be tried, between 120 and 80 volts, until the most sensitive arrangement is found. It is the change of current that matters: it is better to drop from 10 mA. to 4 mA., which is a change of 6 mA., than from 20 mA. to 17 mA., which is a change of only 3 mA., or from 6 mA. to 4 mA., which is a change of only 2 mA.

The Relay

The relay is made out of an electric bell, which may be second-hand, if it is a good one. Cheap and nasty bells will not

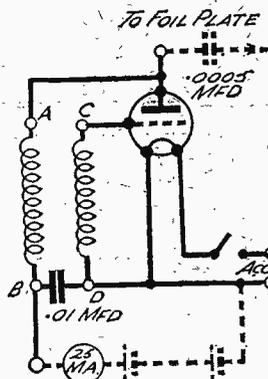
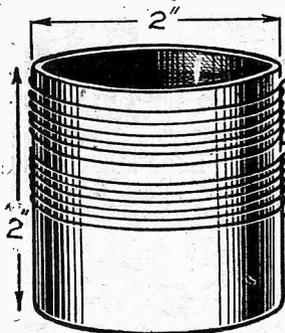
do, because their make-and-break contacts are usually of inferior metal merely plated with a resistant metal which is quickly burnt off in use, or is removed when attempts are made to clean these points.

The clapper is cut off short at the armature and the gong removed, as if the bell were going to be used as a buzzer. Then the bobbins are removed, the wire taken off, and 40-gauge enamelled wire wound on in its place, completely filling the bobbins. This is easily done with a hand drill or one of the simple winding gadgets that have been described from time to time in this journal. Care must be taken when joining the wires of the two bobbins that the sense of the windings is correct, otherwise the magnetism of the pole pieces will be incorrect. The direction of the windings is shown in Fig. 3, and the connections in Fig. 4.

Adjustments

When the oscillating unit and the relay have been constructed, they should be mounted together on a baseboard and linked up in accordance with the diagram in Fig. 5. The insulating condenser, non-inductive and of .0005 mfd. capacity, is mounted close to the valve anode and connected to it, and from the other side of this condenser a 12ft. length of 36 gauge enamelled wire is taken; the end of this wire is soldered to a plate of tin or copper foil. This plate is 3in. square. It can be placed anywhere out of the way, as long as it and the wire do not lie close to metal objects such as tools, pipes or iron work.

Now the oscillator is switched on. There should be about 10 mA passing through the relay magnetising coils; it may be necessary to plug in at 120 volts in the H.T. battery instead of at 100 volts in order to overcome the resistance of the relay coils. This should be enough to pull the armature to the pole pieces, (Continued overleaf)



Figs. 1 and 2.—Details of the coil, and the circuit which is employed.

valve unit. This sensitive part may be connected by a thin, unobtrusive wire to a concealed foil plate that provides the capacity effect, and the oscillating unit itself may be concealed, so that the whole business becomes very mystifying to anybody not "in the know." This is the principle upon which the apparatus works.

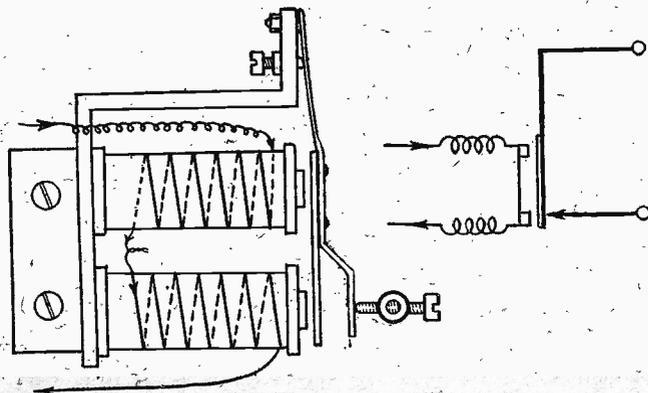
Constructing the Coils

The valve unit is made to oscillate at a high frequency, in the region of 40 metres wavelength. This is so that any hand-capacity effects become much more marked than they would be at a lower frequency: the susceptibility of short-wave receivers to hand-capacity is notorious but in this case useful.

The grid and anode coils consist of six turns each of 22-gauge enamelled wire on a 2in. diameter former, the turns being slightly spaced and the coils close alongside one another. Fig. 1 will make this clear. If one of those old 6-pin formers and its base holder are available, they will do excellently.

The other components needed are a non-inductive condenser of about .01 mfd., an on-off switch and a few terminals. They, and the coils and valve holder (4-pin) are mounted on a suitable baseboard and wired up as shown in Fig. 2.

This completes the oscillating unit. Preliminary adjustments are made, by connecting a 25 mA. meter and H.T. battery in the anode circuit, as shown by the dotted lines, and switching on. About 100 volts H.T. will be needed. If the valve



Figs. 3 and 4.—The relay and method of connection.

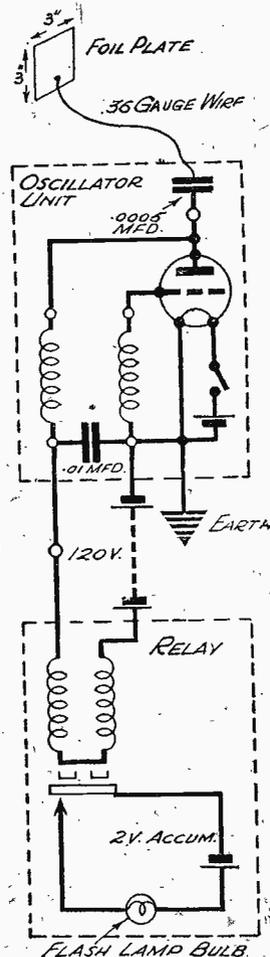


Fig. 5.—The completed apparatus.

BUILDING THE "MAGIC HAND"

(Continued from previous page)

thus breaking the circuit that lights the flash-lamp bulb. As soon as the foil square is touched, the armature should be released from the pole pieces, flying back and closing the flash-lamp bulb circuit so that it lights up. If this action does not take place properly, first try different tappings on the H.T. battery, and then carefully adjust the armature spring and the screw contact point against which it presses. It is sometimes a help to stick very thin paper—cigarette paper—over the ends of the pole pieces, so that the armature is only held very lightly with the 10 mA. passing, and quickly released when the current falls. This also prevents any residual magnetism in the poles or armature causing it to stick. These adjustments are carried out until it is sufficient only to bring the hand within half an inch of the foil square to make the armature fly back and close the light circuit.

It may be found that even when the action seems to be quite in order the flash-lamp bulb does not light up properly. This is due to poor contacts in the relay. They should be very gently cleaned with methylated spirit on a piece of card to remove grease and then very lightly rubbed with the finest of emery cloth.

Using the Relay

Having succeeded satisfactorily in switching on and off a flash-lamp bulb, many other amusing and mystifying effects can be produced with ingenious devices operated by the relay. The author had one of these hand-capacity relays working for weeks in a shop window, using an eliminator instead of a H.T. battery for economy sake.

The oscillator and relay were concealed behind show receivers and showcards and the wire and foil plate were taken behind side curtains to a cardboard "hand" stuck on the inside of the plate glass window. This "hand" consisted of two pieces of card stuck together with the foil between them. Passers-by were invited, by a notice above the "hand," to place their own hands over this "hand," outside the glass—and to listen. When they did

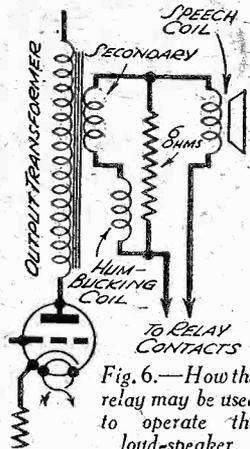


Fig. 6.—How the relay may be used to operate the loud-speaker.

this, a powerful mains receiver standing in the doorway abruptly emitted whatever programme it was tuned to. When the startled people removed their hands, it stopped, and mystification was complete.

This effect was obtained by making the relay close the speech-coil circuit in the mains receiver's loud-speaker, connections being made as shown in Fig. 6. The receiver was switched on all the time, so that it was unnecessary to wait for the valves to warm up, and the 6-ohm resistance was placed across the output transformer to provide a load to avoid damage to the receiver.

It should be noted that where the foil is to be mounted behind a shop window, and perhaps to be obscured by cardboard or other cut-outs between it and the glass, the capacity between the foil and the body of the operator will be considerably reduced, and therefore the initial adjustments should be carried out by providing a similar capacity change, rather than by actually touching the grid or anode. Such tests will avoid the possibility of failure when the apparatus is finally installed under the above conditions.

Strings of "fairy" lights, moving signs, working models driven by electric motors, gramophones, hooters, all sorts of apparatus of an amusing or useful kind can thus be operated simply by passing a hand across the foil square.

THE NEW FERRANTI "ARCADIA" RADIOGRAM

A New de-Luxe Superhet Radiogram Designed to Cover All Wavelengths and some Details of the New Magnascopic Dial

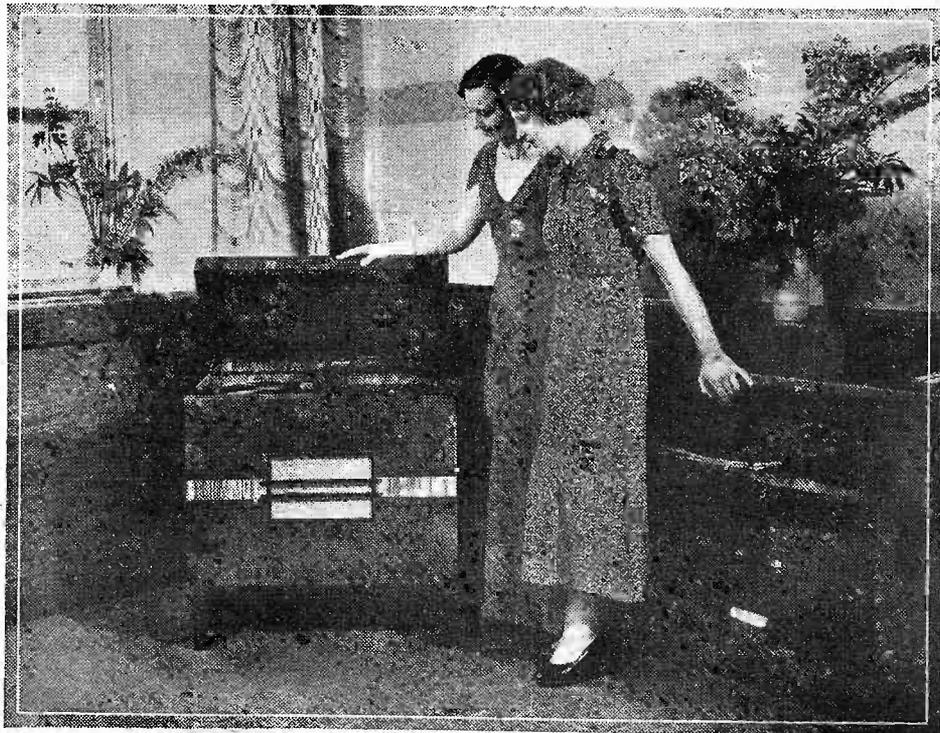
THE new season's Ferranti receivers possess some novel features, and the accompanying illustration shows the Arcadia radiogram which employs a superhet circuit covering the short waves in addition to the normal broadcast waves, and is fitted with a variable selectivity device. The superhet is of the 8-stage type and covers the short waveband from 19 to 51 metres, and the variable selectivity circuit which is fitted is of a patented type in which a self-resetting device is included, and this makes it impossible to retune the receiver except in its most selective state. As most amateurs are probably aware, the selectivity of a superhet may be varied by several methods, one of which is to modify the coupling between the primary and secondary windings of the intermediate-frequency transformers. If the coupling is increased so as to give maximum selectivity there would be a danger of forgetting that the adjustment had been made, and upon searching for a weak station it would be found impossible to pick it up until the coupling was increased. This renders it difficult to use such a receiver unless the user is fully aware all the time of the various changes which are made. The Ferranti device overcomes this defect and provides the listener with a fool-proof adjustment which may always provide maximum results, no matter in what direction they are required.

The Magnascopic Dial

A further new feature which is introduced in the new receivers, and which is intended to simplify tuning on the short waves, is in the form of a small additional dial situated above the main tuning dial. The effect of this new scale is to increase the length of the normal tuning dial to over 6ft., and this is carried out by an interesting system of mirrors and lenses. Attached to the main condenser spindle is a trans-

parent semi-circular scale of about the same size as the old-type tuning scale, and this is engraved with the wavelengths which are shown on the normal tuning dial and which range from 19 to 51 metres. The usual sub-divisions are, of course, included. The normal dial-illuminating lamp is so placed that its rays are concentrated by a lens on to the additional scale, and they pass through this and through a further lens on to a mirror inclined at 45° to the horizontal. This mirror is, of course,

immediately in front of the tuning condenser and it directs the reflection of the dial in an upward direction, where it strikes another mirror arranged at a similar angle which directs the reflection in a forward direction so that it strikes an opal screen immediately behind the additional aperture. Upon this the settings of the dial are then seen in a greatly magnified form, and thus one of the great bugbears of short-wave tuning is removed. This device is now fitted to all of the Ferranti superhets.



The 26-guinea Arcadia All-Wave A.C. Variable Selectivity High-Fidelity Radiogram.

Experiments in Unified Control

Various Components Which Form an Essential Part of the Modern Radio Receiver may be Linked Together to Reduce the Number of Controls. Some Suggestions are Given Here

By W. J. DELANEY

THE ganged condenser is now familiar to every listener, and it is common knowledge that the separate sections of this component are employed for tuning two or more separate coils. The actual

required difference at various wavelengths, whilst the condenser which tunes the oscillator section has the plates of a different shape, or the condenser for this particular purpose is used in conjunction with other condensers (fixed) to provide the required capacity variation.

Reaction Circuits

The normal tuned-grid circuits are not the only ones to which this device may be applied, although, owing to the difference in coils and circuits, it is not possible to purchase ready-made dual controls. When a standard broadcast receiver is examined, however, it will be found that there are several separate controls which may easily be removed if only some simple way of linking them with another control can be found. I am leaving out, for the purpose of this article, such items as ganged

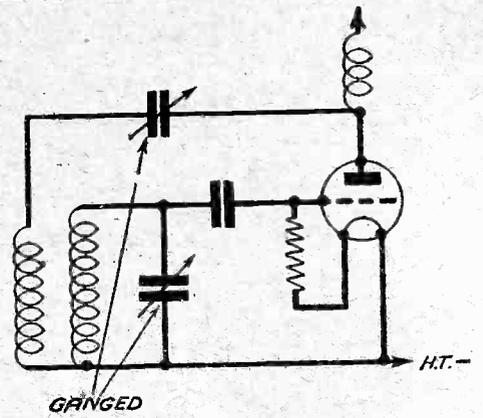


Fig. 4.—A reaction condenser ganged with the tuning condenser.

following details will, however, form the basis for experimental work by the keen amateur who is anxious to develop a receiver of a type which cannot be purchased, and it will be seen later that some very interesting tests may be carried out in an endeavour to remove one or more controls.

Dealing first with the reaction circuit as used in the normal grid-leak detector stage, it will be found in practically every receiver that as the wavelength to which the grid circuit is tuned is increased, so must more reaction be employed. That is to say, if the circuit is tuned to 200 metres and the reaction control advanced until the receiver is just off the oscillation point, upon tuning the circuit to 300 metres it will be found that the reaction control may be advanced a few degrees further before oscillation takes place. Thus, when searching for a station with the set in the position of maximum sensitivity, it is normally necessary to adjust both tuning and reaction controls together throughout the entire wave range.

Dual Resistances

A normal reaction condenser may be linked with a tuning condenser so as to provide this position of maximum sensitivity as a constant factor from minimum to maximum wavelength, but there are other more interesting methods of carrying out the same effect, as it will probably be found that with the correct capacity of reaction condenser the required coupling cannot easily be obtained.

Two-section resistances (or volume controls) are already on the market and are obtainable in various values. By adopting

(Continued overleaf)

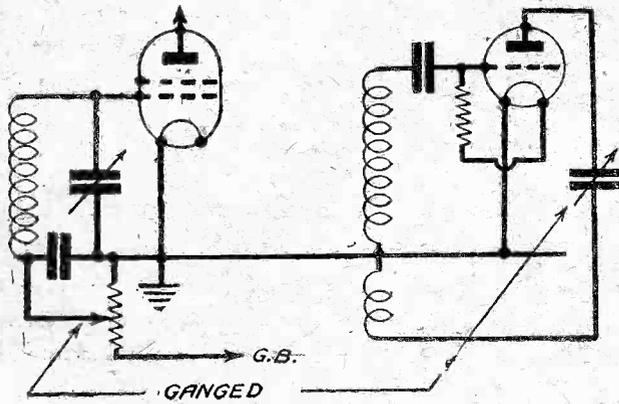


Fig. 1.—A circuit which has been tested and proved—The combination of an H.F. volume control and a reaction condenser.

process of tuning these separate circuits is a rather complicated one, especially when a superheterodyne receiver is considered, and the degree of variation at different parts of the tuning dial has to follow a complicated law. That the difficulty is not insurmountable is obvious from the fact that every modern superhet employs a ganged tuner, and in some receivers there are no fewer than four separate coils so controlled, each circuit varying throughout the scale. For the benefit of those readers who do not know how this process is carried out, it may be briefly stated that the end plate in each ordinary section of the condenser is split into a number of separate sections and these separate sections are individually adjusted by the manufacturers to provide the re-

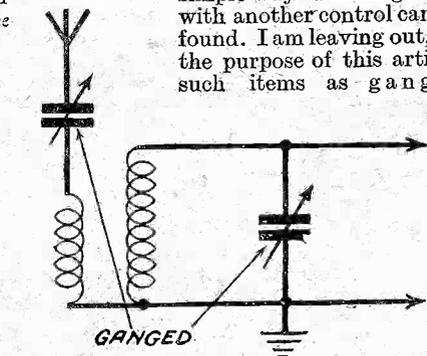


Fig. 2.—The aerial condenser may be ganged with the tuning condenser.

switches for radio and gram. change-over, and ganged on/off switches and volume controls, as these are now well known. The

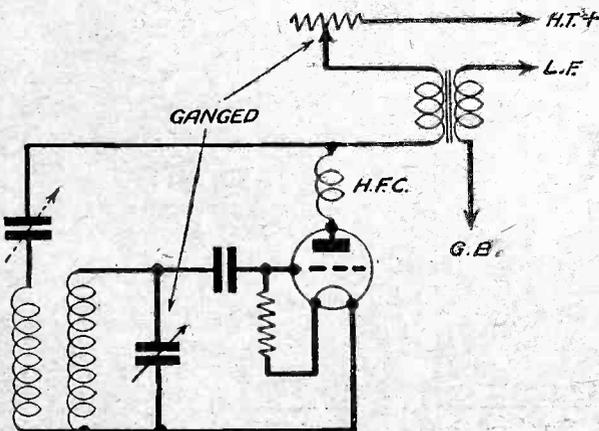


Fig. 3 (left).—In this circuit the reaction is pre-set by means of the condenser, and the H.T. feed is varied in conjunction with the tuning condenser.

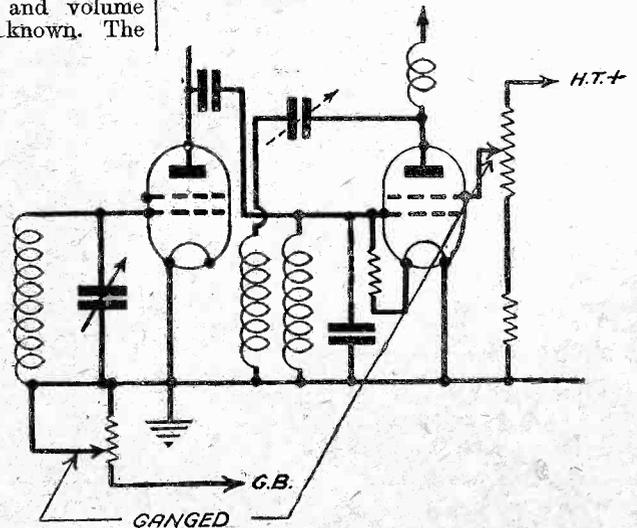


Fig. 5 (right). Resistance controlled reaction and H.F. volume control—a modification of Fig. 1.

EXPERIMENTS IN UNIFIED CONTROL

(Continued from previous page)

a resistance to control reaction a dual-purpose unit may be employed in a circuit of the type shown in Fig. 5, the remaining section of this unit being then employed for the variable- μ grid bias control in the H.F. stage. Other methods of using the resistance for the control of reaction are shown in Figs. 3 and 6, and in these the resistance may be ganged with the tuning condenser, provided that suitable components are chosen.

A Novel Arrangement

In Fig. 6 a novel arrangement is shown in which the control of reaction is carried out by means of a resistance and this is ganged with the tuning control, the degree of reaction being governed by the H.T., the size of the reaction condenser and its relation to the grid winding. The fixed condenser is inserted to prevent a short-circuit of the H.T. battery. The combination of the normal reaction condenser with a resistance to vary the H.F. grid bias has already been dealt with, and a dual unit for this purpose was employed in our Three Star Nicore, although, unfortunately, the dual component is no longer on the market.

The Aerial Input

The degree of damping which is exercised by the aerial-earth system varies according to the wavelength to which the circuit is tuned, and it will be found that by including

a variable condenser in the aerial circuit, maximum results may be obtained at every wavelength if the condenser is suitably adjusted. Thus this condenser may be ganged with the tuning condenser, although in this case it will be found that as the capacity of the tuning condenser is increased the capacity of the aerial condenser must be decreased, and thus the two components must be linked together with care.

In all of the schemes just outlined, experimental work is called for and no exact values can be given, as they will vary

for each individual circuit. Furthermore, in some cases it may not be found possible to obtain suitable components which may readily be converted for use in the dual arrangement, chiefly owing to the fact that components with double-ended spindles are not now generally manufactured. Certain short-wave tuning condensers are obtainable with spindles at each end and may be employed for reaction purposes, and Messrs. Varley manufacture variable resistances with a lengthened spindle for ganging purposes. In other types of volume

control it will generally be found that by removing the end cover the spindle may be found accessible, and in most cases provision will have been made by the manufacturers for the attachment of a switch, and this will enable the experimenter to carry out one or other of the above schemes. Coupling units are available from several firms, and in general are designed for two $\frac{1}{4}$ in. spindles and thus are not readily adaptable to every case. A little thought will, however, enable some device to be constructed to enable the ideas which have been given to be enlarged upon or tried out and will undoubtedly provide some hours of interesting experimental work.

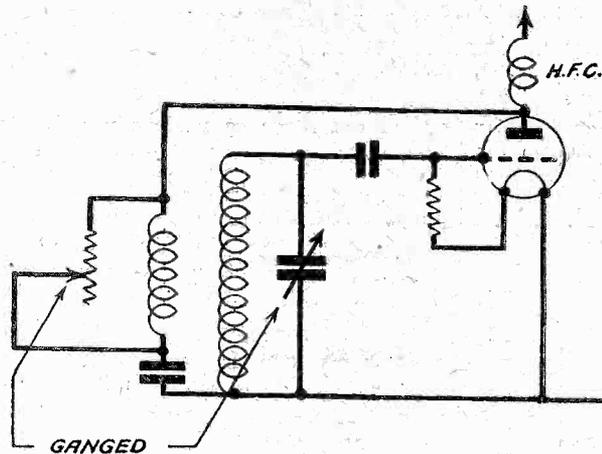


Fig. 6.—Another form of resistance-controlled reaction which may be operated with the tuning condenser.

CONDITIONS, unfortunately, during the past fortnight have not shown much improvement over the previous period, and atmospheric due to the numerous storms which have been raging over the continent of Europe have not made DX listening too pleasant. However, when fair spells have prevailed following the disturbances, the ether has been kinder on certain wavebands, and usually in the earlier hours of the night it has been possible to tune in distant transmissions without experiencing too disturbing a background.

On these occasions channels between 16 and 30 metres have been, by far, the best, and it is on this somewhat restricted band that most stations have been logged before midnight. In the early hours of the morning it is fairly safe to turn to wavelengths above 40 metres, and on some days interesting captures were made.

Sydney (N.S.W.)

For the months of July and August slight alterations have been made in the time-table of VK2ME, Sydney (N.S.W.), and you would do well to make a note of them. Broadcasts now take place between B.S.T. 06.00-08.00; 10.30-14.30; and from 17.30-19.30 every Sunday. In my case it is the first of these only which is well heard, although occasionally the last transmission has provided signals loud enough to permit identification, but of no programme value.

From Paris comes the news that a powerful short-wave station has been erected at Homs, which is situated to the north-west of Beyrouth in the French Levant, and that we may shortly hear tests of speech and music. So far, excluding the Beyrouth-Khaldé commercial stations, I have not been able to trace any transmitter in official lists destined to the broadcast of radio programmes from this region.

Zeese

Listeners who have opportunities of turning to their short-wave receivers in the morning hours will find that two of the

FROM THE LISTENING POST

most powerful transmissions on the ether are those provided by the Zeesen stations DJQ (19.63 m.-15,280 kc/s) and DJB, (19.74 m.-15,200 kc/s). They may be heard at excellent loud-speaker strength from the moment they come on the air at B.S.T. 09.55 until they close down at B.S.T. 14.00. During these broadcasts

which are mainly intended for Southern Asia, some excellent concerts are given. A relay of the same programme is also carried out by DJN on 31.45 m. (9,540 kc/s). Later, from B.S.T. 14.05 until 17.00, DJE on 16.89 m. (11,760 kc/s) joins in with DJA on 31.38 m. (95.60 kc/s), and a kind of "Letter Box" with verbal replies to correspondents through the mike, to listeners in the Far East, is one of the regular features of the programme. The German announcer must be congratulated on his remarkable knowledge of the English language.

RECORD MAKING.



Artur Schnabel and the B.B.C. Symphony Orchestra, conducted by Adrian Boult, are here seen making records in the His Master's Voice Studios.

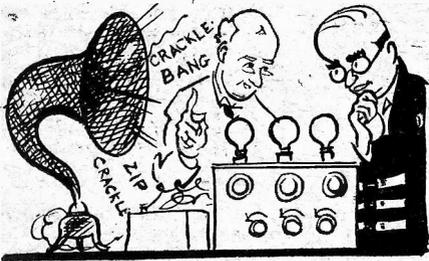
On Your Wavelength

Bad News for Crooners

EXTRACT the following from the dignified columns of the *Children's Newspaper* :—

"These miserable crooners, and all the people who make the air hideous with crude and barbarous noises, are in danger; there is a Daniel coming to judgment at Broadcasting House."

"He is Dr. R. S. Thatcher, Harrow's Director of Music, who has resigned his distinguished post there to become



Dust on the aerial.

Deputy Director of Music to the B.B.C.

"Many fine musicians are already in the service of broadcasting, but they pitilessly deliver us for long spells each day and evening to performances which, if attempted in the streets a few years ago, might have brought the perpetrators to the police court as public nuisances. For the modern style is exactly that of the begging street-singer, gobbling, scooping, out of tune, incapable of phrasing or of voice production."

"If any school child sang as these crooners do, howling, moaning, whining, mispronouncing words, affecting a horrible twang, offending every canon observed by teachers of music, the child would be forbidden to sing at all; yet the lowest depths of vocal degradation find sanctuary in the B.B.C. studios."

"But our spirits rise. Dr. Thatcher has as profound a loathing of these atrocities as we have, and has expressed himself in such terms as should suggest to B.B.C. crooners, 'All hope abandon, ye who enter here.'"

We shall see exactly to what effect Dr. Thatcher operates. I have said all I want to say about crooners and I would not dream of repeating that I think they are crazy, half-witted,

By Thermion

tintinnabulating, ululatory sob-voiced nitwits, and like a flock of third-rate sheep. Nor shall I repeat what I think of those who employ them. Watch any smug-faced crooner smiling as he delivers his tosh—probably laughing up his sleeve at the public who can applaud such drivel.

American Sets

I HAVE received a further letter on this subject from J. W. L., of Llandudno :—

"What I have heard and read about 'American Sets' is that their performance and selectivity is amazing. Just to show, here is a cutting about the selectivity of a well-known American receiver: . . . here in Chicago it can separate two of the world's most powerful broadcasting stations, namely, WGN Chicago, 50,000 watts, and WLW Cincinnati, 500,000 watts, and bring in WOR Newark, 50,000 watts, with no interference from WGN or WLW. No other receiver in the world offers a higher degree of selectivity. . . ."

"Now the questions I have been asked are :—

"Why don't we in England make sets with 24 to 36 valves?"

"Why don't we have amazing selectivity?"

"Why don't we in our sets have an output of 35 to 50 watts?"

"Well, my answer is, British radio engineers can do this, but the listener in this country does not want to pay big prices for his entertainment, and not mentioning the amount of electricity such sets will consume."

"Perhaps, dear Thermion, you could plonk a few words in your article sometime about these 'American Sets,' and perhaps more will 'Buy British,' or should I say, 'Construct British' 'P. and A.' Sets."

This reader hits the nail on the head. The American public differs from the English. Our race was old before theirs was born, and their tastes are where ours were 500 years ago. They like aborigine music; they like to exalt Harlem; their tastes are simple and easily satisfied;

what suits America does not suit England. Fortunately, there are a few intelligent Englishmen left who know what's what.

Black Magic

WAY back in the dim dark ages of 1922 a friend of mine, who was considered quite a Marconi in his district, persisted that the crackles and spits which we now call atmospherics were due to tiny particles of dust bombarding the aerial. His friends sat round, mouths aghast, eyes agog, nostrils distended, ears quivering, and goggled at him. Sounds ridiculous, farcical, laughable, side-splitting, ludicrous theory, don't you think? Or don't you? It will be interesting to know what this same expert says about atmospherics to-day. We shall be laughing in ten years' time at much of what is considered sound practice to-day. The theory of the ether has never satisfied me, although it happens to fit in. I am not at all sure about the skip effect and fading. I can't contradict because I have not a better theory. I don't like to believe that the earth is round, although everything indicates that it is. Still, we like to look back on these queer notions as part of the good old days.



Crystals on velvet.

The Good Old Days

AND talking of good old days, do you remember the colossal prices we were asked to pay for components? Cardboard tubes with 16 S.W.G. wound on, 17s. 6d., earphones £2 2s. a pair, crystals anything up to 5s. 6d. Can you recall the smashing advertisement for these latter? Crystals in boxes, crystals so valuable that they reposed on velvet; crystals in caskets, crystals on velvet cushions. Special

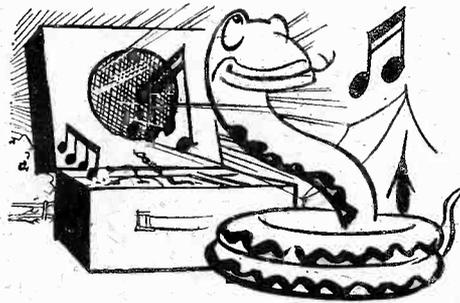
cat whiskers made of gold wire at 3s. 9d. per inch. What a pedigree they all had. Experience and expense are almost synonymous terms, and once you have gained experience you find it difficult to give away.

Great Snakes

ONE of the technical boys on this paper is a camping fiend, and took out the Midge Portable with him the other week-end. He rigged up the tent, turned on the radio, spread the cloth, and proceeded to kill the fatted calf, only to discover that he had not any milk (that wouldn't worry me, I prefer a corkscrew). On returning from the farm he found an adder sitting comfortably but inquisitively by the radio listening to some silky-voiced crooner. Snakes, as everyone knows, can be charmed with music, so this seems to be a compliment to the Midge only. Needless to say, great dubiety exists amongst the staff as to whether their colleague had really gone for milk.

Too-too Modern Sets

FOR my sins the other day I had to go to tea with some of my relations, who proudly exposed their new radio set to my view. They said it was "just too modern, don't you think?" I *did* think, and



Snakes are charmed.

to save further argument I simply said "Yes." It was a modernist's nightmare—constructed in almost white wood with bands of chromium plate sprinkled at angles. As the rest of their furniture was mahogany of the 1912 vintage, the combined effect was not too-too harmonious. It's this sort of thing that gets radio a bad name.

It is an unwritten law in the furnishing trades that you should not mix your woods, and nothing is more bizarre than bird's-eye maple in contiguity with walnut, mahogany, and oak. A radio set should be chosen to tone with the rest of the furniture as far as the colour is concerned, although it is practically impossible to select the receiver to match the *style*. Very few manufacturers are making receivers which will blend with a Jacobean, Tudor or Queen Anne style.



Notes from the Nest Bench

Ultra-S.W. Reception

THE receiver section used for reception of pictures in the television apparatus must be capable of passing a very wide band of frequencies, and therefore the intermediate-frequency amplifier must be specially designed for this purpose—it must be tuned to a much higher frequency than the normal amplifier used in broadcast receivers. The sound accompaniment of the picture can be picked up without using this special high-frequency I.F. amplifier, however, and if a frequency-changing valve can be obtained that will function satisfactorily on wavelengths between 5 and 9 metres the intermediate-frequency amplifier normally associated with sound receivers may be used.

U.S. Converter

AS in the case of 12 to 60-metre reception, a converter may be used, coupled to the medium-long-wave receiver and thereby forming an ultra-short-wave superhet. A converter of this type must be very carefully constructed, however; the frequency-changing valve must be carefully chosen, and the leads to the tuning condenser and coil must be kept very short—it is advisable to mount the coil on the condenser. Some frequency-changers will not function below about 15 metres, and when they are used in ultra-short-wave sets a triode valve has to be employed in conjunction with them in order to ensure efficient frequency-changing. Mains valves are generally more efficient than their battery counterparts and satisfactory results can be obtained without the additional triode if a modern mains changer is employed.

Correct Ganging

IT is often found that accurate ganging at all points on the tuning scale cannot be obtained when cheap coils of doubtful make are used. This is generally due to the coils not having the same inductance, and the addition of a few turns to a canned coil is usually a somewhat difficult task. The best method of overcoming a defect of this type is to fit a small variable trimmer condenser across the aerial tuning condenser—the fixed vanes of the trimmer to the fixed vanes of the tuning condenser and the moving vanes of the former to the moving vanes of the latter. This extra condenser can be mounted on the chassis with its spindle protruding through the front panel so that it can be operated in conjunction with the main tuning control. An alternative method is to substitute a tuning drive having a variable concentric trimmer attached for the straight drive in use. This type of drive-trimmer combination is very useful when it is particularly desired not to interfere with the disposition of the controls already in use. The use of an extra trimmer is sometimes advantageous even when reasonably well-matched coils are employed, as operation of the extra condenser often helps to cut out an interfering station either by bringing the two tuned circuits exactly into step, or, in some cases, by slightly detuning the circuit to which the trimmer is attached.

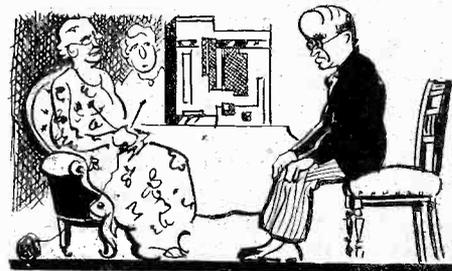
Of course, the bright young things who like to furnish in the ultra-modern style have no difficulty at all. They can select a set of almost surrealist appearance, such is the crazy tendency of modern times. If you can't sing you can make money as a crooner, if you can't draw you make a few daubs reminiscent of a child's first efforts with a box of crayons and become a surrealist, and my readers may retort if you cannot write you become a radio journalist. I thought I would make this crack myself to save my splanetic correspondents from doing so.

Cycle Radio

THIS from E. R. (Royston):—

"I'm very interested in the subject of cycle-radio, and I intend to try it myself. The idea of mounting the set on the handlebars is feasible, but has Mr. E. Hurran (his letter was published in a recent issue of PRACTICAL AND AMATEUR WIRELESS) found a loss in the leads to the accumulator? I should think that there is a loss which caused a good reduction of signal strength.

"Now about the suggested 'Readers' League.' I am, as are thousands more, interested in wireless as a hobby; it would be a very fine idea and should be launched as soon as possible. There is no club round here, and that's where a league would



Too-too modern set.

come in. We could swop experiences and ideas, and thus gain some first-class knowledge of an interesting subject.

"I agree with E. A. Elliott (Hertford), and think that you should be 'president' of the league. But what's it matter about a badge for you? Crooners give me a pain in the neck and they ought to be punished by making them stick a few hours of 'crooning.' Are we becoming Americanised in jazz now? One of our leading dance band leaders went to U.S.A. and came back with awful tunes, which are the craze of America. Good old Thermion, keep at 'em. Well, here's the best of luck to PRACTICAL AND AMATEUR WIRELESS, and may you live many more years to entertain us with your views on wireless and radio entertainment."

A PAGE OF PRACTICAL HINTS

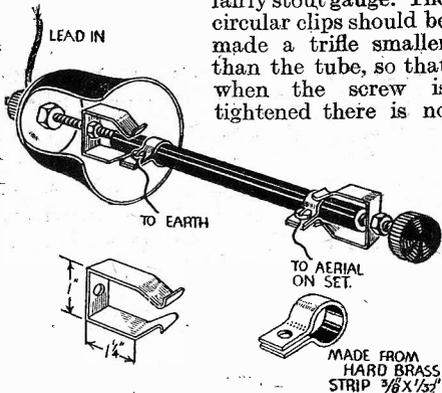
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Combined Lead-in and Earthing Switch

THE accompanying sketch shows how the conventional type of ebonite lead-in tube can be readily modified to form an efficient earthing switch by means of which the aerial is disconnected from the set and earthed without having to go outside the house. The device has the advantage of maintaining its insulation in the wettest weather. The ebonite tube is cut to the length required and two of each of the parts shown are then made from strip brass or phosphor bronze of a fairly stout gauge. The circular clips should be made a trifle smaller than the tube, so that when the screw is tightened there is no

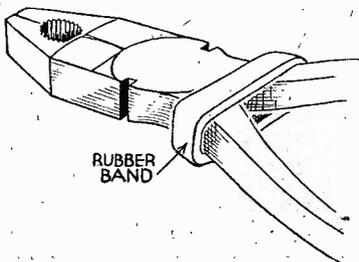


A weatherproof combined lead-in and earthing switch.

possibility of movement. The protective hood on the outside end of the lead-in tube is a bakelite picnic cup with the handle sawn off, and having a hole drilled in the bottom. When assembled, the switch should have about half an inch movement, and a small knob should be screwed to the inside end for operating purposes.—D. BESSANT (Mitcham).

A Useful Dodge

WHERE small articles such as nuts, bolts and screws have to be picked up out of awkward corners, the dodge illustrated in the accompanying sketch will be found useful. A strong rubber band is simply placed round the shoulders of a pair of pliers, as shown, to act as a spring. The pliers are opened in the ordinary way and the jaws placed over the article to be lifted, which remains gripped in the pliers when the pressure of the hand is released.—K. E. GAYLAND (Weybridge).



Adapting a pair of pliers for picking up small articles from awkward corners.

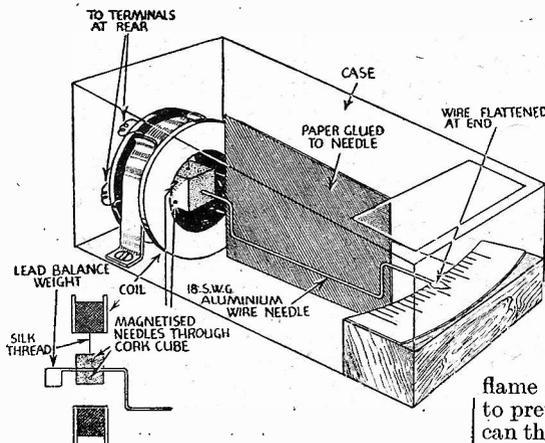
THAT DODGE OF YOURS!

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.

A Sensitive Galvanometer

THE accompanying sketch shows a sensitive centre-zero type galvanometer, which is easy to make and yet is not of too delicate construction. The essentials can be clearly seen in the diagram. The coil is wound from an old transformer, and the gauge and amount of wire is not critical; but, of course, the greater number of turns the more sensitive the instrument is. In some cases the transformer coils may be used without re-winding on a larger former, but usually the hole in the centre is too small to fit the suspended magnet assembly. The magnets are pieces of needle which have been magnetised and pushed through the cork cube in the same plane as that of the coil.

A paper sheet is glued to the needle to prevent it swinging too much. For best results the paper should be as large as



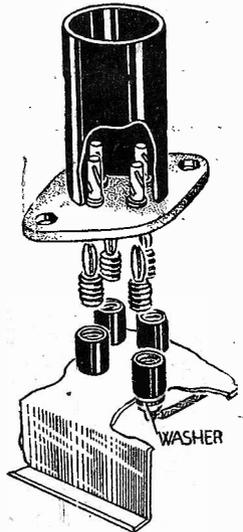
General view of a sensitive galvanometer, and details of coil and magnet suspension.

possible, and should have as little clearance as practicable between it and the top and bottom of the case.

The needle will normally come to rest in an E/W position, but it may be brought to the zero mark in any position by the use of a small magnet moved about the top of the box just over the suspended magnet. With suitable adjustment of the control magnet this instrument can be used as a visual tuning indicator. This simple instrument will give a full deflection with .04 mA.—R. B. MUTCH (Liverpool).

A Changeable Coil-former Assembly

THE simplicity of this idea is evident on referring to the illustration, and the only accuracy necessitated on the part of the constructor is in the marking out for drilling. The whole assembly comprises one ebonite tube 15/16ths-in. (outside diameter) of a length to suit the design of coil (the former used in this instance was obtained from an old power resistor); a chassis-mounting valveholder (ceramic or bakelite); four wander-plugs, with screws and nuts as shown, and four insulating washers.



A method of arranging a changeable coil-former assembly.

After securing the wander-plug casings to the chassis, and insulating with washers underneath, the plugs should be screwed home sufficiently tight to make contact with the fixing screw heads. The former and valveholder assembly are worked on to the plugs, wiring being effected from the screw, as shown. To make the former secure, place a screwdriver between each pair of valve-leg sockets, and prise slightly, then work the former into position.—W. R. HOBBS (Ilford).

Dip Soldering

WHERE a number of small parts have to be soldered, instead of using the soldering iron the work may be more speedily executed by melting a quantity of solder over the gas ring, with the flame turned low, using plenty of Fluxite to prevent the solder oxidising. The parts can then readily be tinned and held together. Use two pairs of tweezers and, after dipping, hold the parts together until the solder has chilled off. This method is very effective when soldering tabs to fine wires, as an iron tends to destroy the strength of the wire.

LATHE-WORK FOR AMATEURS

by F. J. CAMM

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Practical Television

August 1st, 1936. Vol. 3. No. 13.

D.C. Light

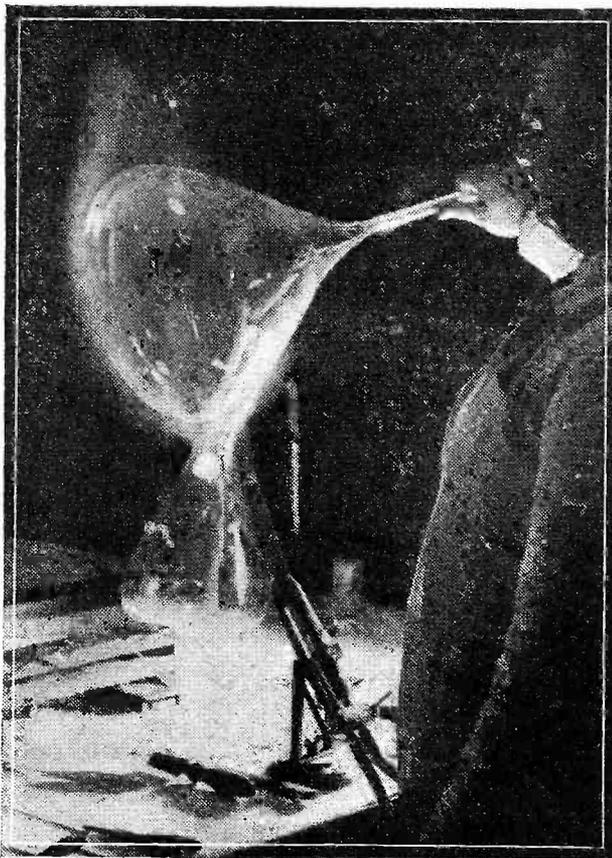
A CERTAIN amount of confusion still seems to exist with reference to the expression "D.C. light," which is now used so often when information is published concerning the forthcoming high-definition television transmissions. It concerns the *relative* degree of lighting used in the studio, or when televising exterior scenes. The form taken by the signal to be transmitted by each company at the Alexandra Palace is known to have a "black" carrier level of 30 per cent. for Marconi-E.M.I. and 40 per cent. for Baird's, and all carrier amplitudes below these figures are concerned only with the synchronising pulses which for distinction are said to occur in the "blacker than black" region. When the carrier wave of the ultra-short-wave radio transmitting station is on the air with L.F. and H.F. synchronising pulses only, the signal remains at this constant level. As soon as the picture comes on, however, the amplitude level of the carrier will rise into the region which gives a total gradation of from black to white. The continuous variations of the carrier level correspond to the degrees of light and shade in the televised picture, which, when retranslated at the receiving end, give the gradation that conveys to the eye the picture or scene which is transmitted. To quote an easily assimilated analogy this can be likened to the *varying* current in the output circuit of a standard radio set, which variation is converted by the loudspeaker into intelligible sound. In the output-valve circuit of the set, however, there is a steady current flowing, and although it has no real significance as far as the final sound is concerned, the presence of this steady state is well known.

Coming to any studio scene or outdoor shot, however, there is a steady state of D.C. lighting effect present—namely, the degree of overall lighting which is employed to illuminate the scene or subject. When we view scenes naturally by the eye, or watch cinema pictures, we can appreciate immediately whether the steady state is one of brilliant sunshine, artificial illumination, twilight and so on. To complete the pictorial effect of the televised pictures this overall lighting must be incorporated in some way in the signal, otherwise the *average* brilliance of the scene will remain unaltered from the level set by the receiver user at the beginning of the transmission. This is what happened in the earlier days of low-definition television, but with the advent of high-definition images the situation is changed completely. Both companies have agreed that the picture brightness component will be transmitted as an amplitude modulation. In this way the mean brightness of the D.C. light value of the picture is made implicit in the signal, or, in other words, there will not be any fixed value for the average carrier as this will vary according to the measure of lighting present in the transmitted picture. This adds considerably to the quality of the picture, but unless precautions are taken at the receiving end it will be lost. The average thermionic valve amplifier cuts off any D.C. component due to the presence of the interstage-coupling condenser. If the coupling ar-

range, however, is designed to have a large time constant, then this D.C. component will be operative, and the full beauty of the picture appreciated.

Frequency Band Involved

Would-be constructors of ultra-short-wave radio sets for tuning in the radiated television signals so that after amplification they can be made to modulate the picture-reproducing device, seem to display a little uncertainty as to the frequency band involved in the vision signal. Two separate standards are employed according to which



This is the most difficult operation in the making of cathode-ray tubes. Here you see an expert glass-blower in the television laboratories of the German Post Office in Berlin making the "front of the tube" as flat as possible. This portion of the tube later is to hold the screen, and it requires very special skill to produce an even surface.

company's equipment is being used (alternate weeks of use is the B.B.C.'s proposal at present, but this may be modified after experience when the service starts). In one transmission the definition is one of 240 line horizontal dissection repeated at 25 frames (and pictures) per second, the dimensions of the picture having a ratio of 4 horizontal to 3 vertical. Assuming equal definition both horizontally and vertically, therefore, the total number of tiny square elements in the picture is obviously $240 \times 240 \times \frac{3}{4}$, that is 76,800. The total number of elements scanned in one second, therefore, is this figure multiplied by 25, that is 1,920,000. Taking a limiting case of alternate black and white

elements, the frequency involved in the modulation is half this—namely, 960,000, since one complete cycle corresponds to a black and a white square. Roughly speaking, it is safe to say that the modulation frequency under these conditions is one megacycle, or the sideband involved in the radiated carrier wave is two megacycles (band width is always twice the maximum frequency). On the other hand, if the scanning equipment is worked to the limit so that the scanning aperture or spot *just* fails to differentiate between separate black and white elements, this condition will be met by reducing the length of each element in the direction of line scan to half the previous side. The maximum modulation frequency is then doubled to 2 megacycles, and the carrier sideband width to 4 megacycles, and this is the condition which will operate in practice. To take full advantage of the radiated picture under the initial standard mentioned, the vision radio receiver must be capable of accepting and amplifying a maximum modulation frequency of 2 megacycles without any amplitude distortion. That is to say, the characteristic of the amplifier must be horizontal (decibels plotted against frequency) up to the full 2 megacycles. This may seem a very arduous task after the standard of quality sound amplifiers, which were rated as first class if they passed a modulation frequency of 10 kilocycles, but it can be accomplished if a proper study is made of the new amplifier technique.

With the other picture standard, line definition is 405, complete pictures 25 and picture dimensions five to four. Calculating on the same basis as previously, the total elements in each picture for equal definition horizontally and vertically is $405 \times 405 \times \frac{4}{5}$, that is 205,031, and the modulation frequency becomes 2,562,900 (band width is twice this figure). Working to the limit, however, so that the scanner just fails to differentiate between black and white, the modulation frequency is doubled, and for all practical purposes can be taken as 5 megacycles, a figure more than twice that quoted for the other picture standard. Readers will appreciate from these calculations, therefore, that vision set design and layout are two factors which merit very careful attention if full advantage is to be taken of the radiated picture detail.

Not in Opposition

A representative of four hundred newspapers told the United States Federal Communications Commission that he did not believe that either television or facsimile broadcasting could in any way be regarded as an opposition to newspapers. Mr. Leinert gave details of a television system capable of producing full-size theatre screen pictures (24ft. by 18ft.) without any time delay factor. Similar principles were being developed to enable home television sets to give a picture about 3ft. wide, and yet sell for a sum not exceeding fifty pounds.

A Few Quality Circuits

Brief Descriptions are Given of Various Circuit Arrangements of Comparatively Simple Type which can be used when Good Reproduction is Desired at a Modest Cost By FRANK PRESTON

THE average keen constructor has long since learned that, for real and lasting enjoyment of broadcast programmes, good-quality reception is essential. His chief difficulty is, however, that he is frequently uncertain as to the method of ensuring such reproduction without going to considerable expense. He knows that an expensive amplifier with push-pull, paraphase or Duophase output would fulfil his requirements—but he also knows that his pocket is not deep enough for such

coil (of any good make) is used in the input circuit, and this feeds into a leaky-grid detector. This is coupled to the second valve by means of a resistance-capacity network, whilst coupling between the second valve and the output pentode is of the same type. Despite the fact that R.C. coupling is not as popular as it used to be, it is still better than any other when complete simplicity and absence of "snags," combined with cheapness, are the first considerations. The two anode-coupling

therefore shown in broken lines; if these connections are used care should be taken to use the smallest amount of reaction which suffices to sharpen tuning and give sufficient input to the detector. As to the power-supply system, this is as simple as possible, and an H.T.12 metal rectifier is used for half-wave rectification, whilst a Phillips type C.1 barretter is used as an automatic series resistance in the heater circuit; the set can be used on any mains having a voltage between 160 and 300.

Values of the principal components are indicated, and it should be added that the first two valves are Mazda, and the output valve a Cossor. All resistances can be of the 1-watt type, the smoothing choke should have a resistance of not more than 500 ohms, and the fixed condensers should be for not less than 300 volts working.

Push-pull

It would be possible to argue for a long time on the relative merits of the circuit shown in Fig. 1 and that in Fig. 2. The latter also employs three valves, but these are arranged as a detector valve followed by a push-pull stage. The output is not vastly different, but the second circuit is rather more costly and would perhaps not be considered quite as simple by constructors of modest experience. The second circuit is, however, shown in A.C. form, and provides an interesting alternative. One of the chief advantages of the Fig. 1 arrangement is that it provides a rather greater degree of amplification in spite of the similar maximum output. For that reason it can generally be used with a lower setting of reaction, and is more effective when the nearest transmitter is more than, say, 25 miles away. Again, the values of components are marked on the diagram, and further explanation need not be given.

There are many designers who consider that, even for a local-station "quality" set, a stage of high-frequency amplification is to be preferred. The pros and cons are apt to become rather involved, but the

(Continued overleaf)

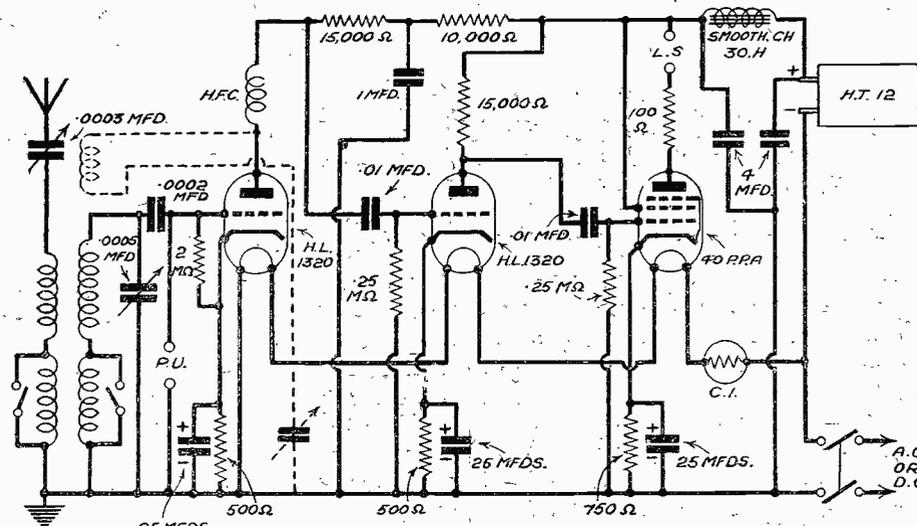


Fig. 1.—A simple Det.-L.F. "quality" circuit for universal mains working. An output of 2 watts can be obtained.

luxuries. In this article, therefore, it is not proposed to deal with circuit arrangements which can be considered as "the last word," but rather with comparatively simple ones which can be tried without any considerable expenditure.

Mains Operation Preferred

A few of the main points which have to be considered with regard to quality reproduction were outlined in the "Beginners' Supplement" last week, so it will be sufficient to proceed from the point at which that explanation was concluded. In order to obtain reception which is more than just "good," a mains-operated receiver is practically essential, although there are exceptions, as will be explained later. The average constructor does not want to be troubled with unusual and apparently complicated circuits, but would generally prefer to employ an arrangement which is as nearly as possible similar to those he has used before; the circuit shown in Fig. 1 is a typical example of what is meant. This circuit is the same in principle as the Det.-two L.F. circuit which has been popular for many years, but it is intended for really good reproduction of a few programmes. Selectivity is not a strong feature; long range is not intended; but good reproduction at ample volume is assured.

Detector-Two L.F.

It will be seen that the circuit is intended for universal mains working and that standard triode and pentode valves are incorporated. A simple two-circuit tuning

resistances have a value rather lower than the theoretically-correct one, but this has been purposely arranged so that the anode voltage is cut down as little as possible. A pentode is not always considered desirable in a quality set, but it is certainly the best in a universal receiver. In any case, if reproduction is rather on the shrill side it is a simple matter to connect a tone control between the anode of the output valve and earth.

Reaction is not strictly desirable in a circuit of this nature, and connections are

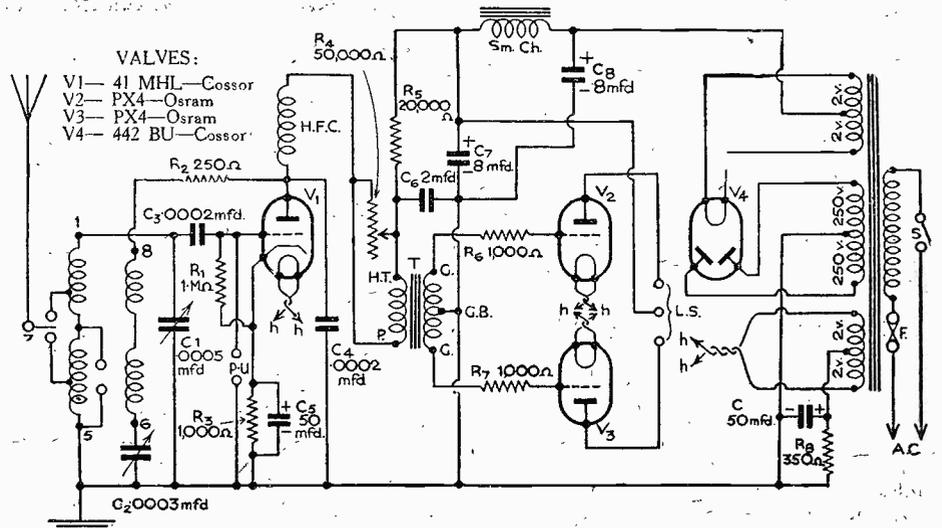


Fig. 2.—Another three-valve "quality" circuit—this time for A.C.—with push-pull output.

(Continued from previous page)

constructor who does not object to the slight extra complication of a receiver having a H.F. stage is advised to adopt it. One important reason for this is that it ensures that the detector valve can be fully loaded. As a result of this it might be possible to use rather less low-frequency amplification to obtain the same output, which in turn means that the L.F. side is simplified. On the other hand, it is probably true to say that—contrary to what is generally thought—a greater amount of distortion takes place in the H.F. than in the L.F. stage of most home-constructed receivers, unless built according to a complete published design.

Using H.F.

Another advantage of using H.F. amplification is that it can be followed by a diode detector. It is rarely satisfactory to connect a diode directly to the input tuning circuit since it produces too much damping and cannot be properly loaded. And it is safe to say that, in the hands of the average constructor, a diode gives better quality than a triode, even when the latter is used as a power-grid detector. Yet another point in favour of the H.F. stage is that it entirely obviates the need for reaction on stations up to 100 miles or so, and often makes possible the good reception of transmission over much greater distances. A simple, though very satisfactory circuit comprising an H.F.-pentode H.F. amplifier, a diode detector and two stages of L.F. amplification is given in Fig. 3. In this case the set is for A.C. operation, and it includes a mains transformer giving an output of 500 volts at 120 mA; this is necessary in order to feed the Mazda PP 5/400 output triode, which takes a maximum anode voltage of 400. The other two valves are Cossor, type 460 BU, the output of which is 520 volts at 120 mA. Actually, the maximum voltage is not applied to the output valve, since a 2,500-ohm loudspeaker field winding is used for smoothing purposes, but this merely means that the valve is not worked "all out," which is an advantage.

Component values are indicated, these applying to the valves indicated. It will be understood that all smoothing and by-pass condensers must be designed for working at not less than 600 volts; the resistances may be of the 1-watt type, excepting that used for biasing the last valve, which should be a 2-watt component. The output valve has a directly-heated filament, but the other two are indirectly heated; because of this it is most convenient to employ a mains transformer with separate

L.T. windings, each rated at 4 volts and not less than 2 amps.

Volume Control

Instead of using a variable- μ valve to control the input and prevent overloading on powerful signals, a differential condenser is used in the aerial circuit—a system which has previously been recommended in these pages for "quality" receivers. An unusual and simple method is adopted for feeding the screening grid of the H.F. pentode, for the double-diode triode and its anode decoupling resistance are used together as a fixed potentiometer. This circuit is

the excellent quality which it gives, but the connections shown in Fig. 4 make reproduction still better, and without detracting from the remarkable performance which the set is known to give. It can be seen that the first L.F. valve is a Cossor 215 P, and that it is connected to the output valve through a resistance-capacity coupling consisting of a .01-mfd. condenser and a 10,000-ohm resistance. The output valve is a 230 XP, which has a maximum undistorted output of 450 milliwatts and takes about 16 mA when using 120 volts H.T.

In order to ensure the best possible reproduction a slight degree of selectivity must be sacrificed by tightening the coupling between the windings of the I.F. transformers; even when this is done the set tunes very sharply and has the same long range of reception as before the alteration. The "West-ector" is just as good as a diode where "quality" is concerned, but is not generally to be recommended for a "straight" set unless preceded by a couple of H.F. stages.

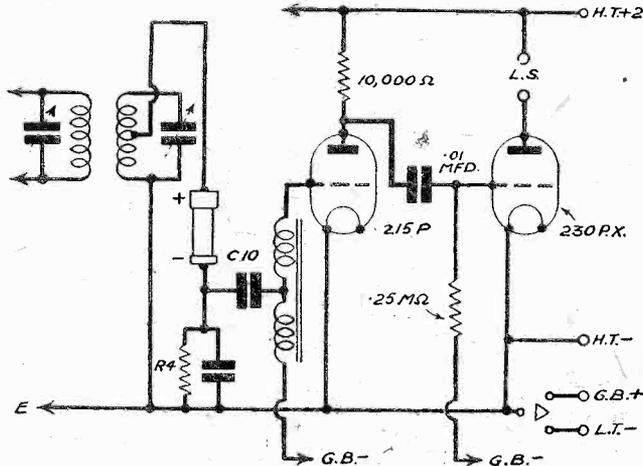


Fig. 4.—Showing how the pentode in the £5 Superhet can be replaced by two triodes in order to improve still further the quality of reproduction.

probably the best simple one that could be devised for really high-class reproduction, but care should be taken in the choice of the low-frequency transformer. This should be of the best quality obtainable, and should have a step-up ratio of 1:2 or 1:3. The principal objection is the high H.T. voltage required, but since standard components can be used, this need not introduce any complication.

Battery Operation

In the case of a battery set a circuit similar to any of those described above could be used by employing suitable valves, but the output could not be expected to exceed about 1 watt—and even then the consumption of H.T. current would be high. It is worth mentioning, however, that a receiver such as the £5 Superhet can easily be converted into a good "quality" instrument simply by replacing the output pentode by two triodes, as shown in Fig. 4. Those who have built this set can testify to

HERE and THERE

Motor-Cycle Championships

THE Bank Holiday motor-cycle championships at Donington Park, some eight miles from Derby, have now been recognised as Grand Prix Races. There are over a hundred entries this year. The distance to be covered is one hundred miles—about forty-five laps of the course, which is the same as for the Grand Prix Races for cars. On August 3rd three commentators will be engaged for the Midland relay, Graham Walker, Vernon Brook and F. J. Moore. The two first are well-known T.T. Race Commentators, while Mr. Moore has done commentaries for the crowds round the course at Donington Park,

Stories of Fifty Years Ago

A FEATURE of the Midland Children's Hour on August 3rd is an exchange of stories of fifty years ago between a townsman and a countryman. The former is Joe Gutteridge, the Black Country broadcaster; and the latter, Sam Ball, a Shropshire gamekeeper.

Soviet Programme

AS mentioned in previous issues, the Soviet government has extended its short-wave programme service for listeners overseas, and for this purpose has brought two new transmitters into action. Moscow RW96 on 19.76 m. (15,180 kc/s) gives an English programme every Sunday at B.S.T. 18.30 and on 31.51 m. (9,520 kc/s); a daily broadcast from midnight to 02.00 B.S.T. At other periods on the lower channel you will hear telephony as it is largely used for communication with other stations in the U.S.S.R. You will recognise the station by the announcer's reiterated da-da (yes-yes) or niete (knee-ett-aye), which is equivalent to our "No."

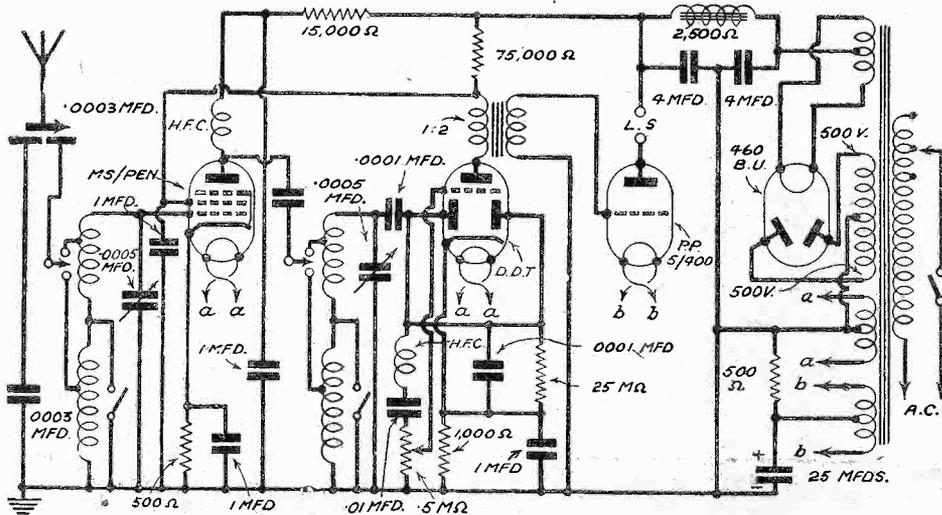


Fig. 3.—An H.F. receiver circuit with diode detection and capable of over 4 watts output.

SOUND RECORDING for the AMATEUR

By L. Ormond Sparks

A FEW years ago, home recording created a considerable amount of interest amongst those who wished to obtain a permanent or semi-permanent record of some particular vocal or musical item. Unfortunately, in spite of several manufacturers producing simple suitable apparatus, the interest did not last, and a very interesting branch of acoustics—so

section of a groove. It will be seen that the bottom of the groove is no longer level; the path of the needle being like a series of minute hills and dales, and it is worth noting, at this point, that the depth of the "dales" does not affect the width of the groove or track.

In this Article the Elementary Principles of Record-making are Explained, and Various Points to be Watched are Stressed

It is obvious that the stylus bar of a sound-box or pick-up will vibrate in a to-and-fro manner (Fig. 3) when the needle is following a lateral track, the diaphragm being at right-angles to the record surface, and that the maximum movement will be governed by the distance between grooves, i.e., the thickness of the walls. This governing factor has a great effect on the frequency response obtainable from a record using the lateral system;—for



Fig. 2.—The "hill-and-dale" method of record making.

example, the large zig-zag represents a low-frequency note, and it is possible that, say, a 100-cycle note would produce a track which would occupy the total permissible width of the groove. Therefore, any note lower than that frequency would have to be attenuated or, in other words, restricted, otherwise the walls would be broken down and the spiral track ruined.

With the "hill-and-dale" method, the needle is given an "up-and-down" motion

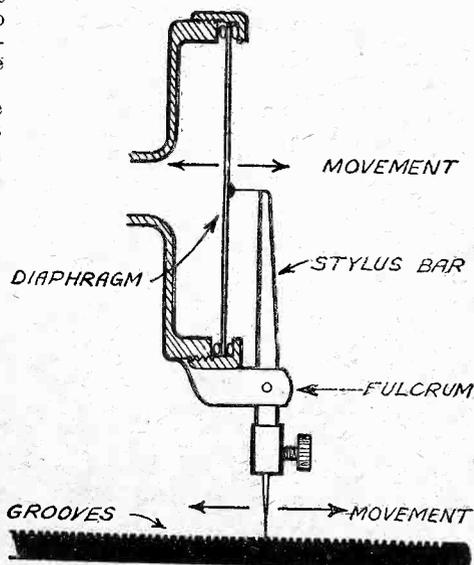


Fig. 3.—The ordinary sound-box is operated as shown here.

(Fig. 4), the diaphragm being fixed parallel to the record surface; therefore the low-frequency limitations do not apply, as the depth of the "dale" corresponding to a low note does not affect, as mentioned earlier, the width of the groove.

How the Track is Made

When records are made on a commercial basis, and many thousands have to be produced of one recording, it is usual for the following procedure to be adopted.

The sound to be recorded is converted into electrical impulses by suitably-designed and controlled microphones, whose output is amplified by specially-corrected amplifiers until sufficient power is obtained to operate what is known as the "cutting head." For simplicity, the "cutting head" can be likened to a pick-up whose operation is reversed, that is, instead of producing electrical currents by the vibration of its needle arrangement, it is made to produce vibrations by supplying it with electrical power like, one might say, a loudspeaker. The cutting head is connected to a mechanical drive which causes it to follow a predetermined spiral path across a disc of specially-prepared wax, the cutting needle engraving or cutting out the minute zig-zag track which forms the mechanical/electrical equivalent of the sound being recorded.

When the recording is finished, the wax record is treated with a super-fine conducting medium—something like graphite—

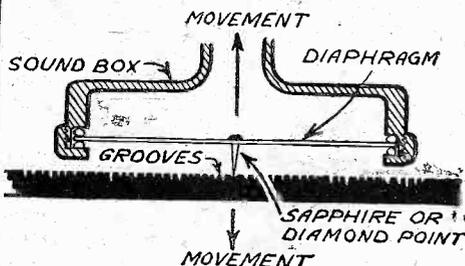


Fig. 4.—This shows how the diaphragm is operated in the "hill-and-dale" system.

and then immersed in a plating bath until a strong metal coating is deposited on the treated wax. This metal "positive" counterpart is used to produce "negative" metal plates which form—for want of a better name—a die to press out a composition into the familiar black discs. This is not the final stage, as the discs have to be given the finishing touches, their edges trued up and carefully examined for the most minute imperfections.

Home Recording

So much for the outline of the commercial process; now let us see what is necessary for the amateur record-maker, as it is obviously impossible for such complicated methods to be used in the home.

To overcome the problem of the wax disc, recording "blanks" have been made from aluminium, and while these have proved quite satisfactory from the recording point of view, they possess certain undesirable features when it comes to reproducing. However, they offer quite a good basis with which to start experiments but, if the matter is going to be tackled seriously, it

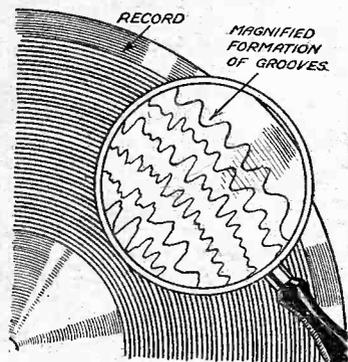


Fig. 1.—The standard gramophone record grooves as seen under a magnifying glass.

closely allied to radio—more or less faded away so far as the amateur was concerned. The probable reason for this was certain imperfections and snags which were then present, but, since its first introduction, home recording has made wonderful progress. There are, however, several points to be watched, and unless due consideration is given to these items, the amateur record-maker will become very disgusted with the results he obtains.

The purpose of this article is to stress the points to be watched and explain the elementary principles of record-making, so it is hoped that those new to this very interesting hobby will be able to avoid some of the pitfalls which can prove so annoying and disheartening.

Record-making

It can be said that the grooves or tracks on a blank record can be shaped to represent vibrations corresponding to sounds in two ways, one of which is known as the "hill-and-dale" system, and the other, the "lateral" method.

Both systems possess certain definite advantages, but for reasons which do not concern this article, the "lateral" system will be considered as the one most suitable for home recording.

If a record—using the lateral system—is examined under a microscope, it will be seen that the grooves which form the spiral track, are not smooth-sided channels as they appear to the naked eye. They have, actually, a zig-zag formation, as depicted in Fig. 1, which represents a plan view of some of the grooves—but more about that later.

The "hill-and-dale" method differs from the above, inasmuch that no lateral movement of the needle is produced, the zig-zag line across the record being replaced by one at right-angles to the surface of the record. This can be more readily understood if we think of the grooves in terms of the name given to the method, and refer to Fig. 2, which shows a side view of a

would be advisable to use one of the more modern processes.

Aluminium blanks should be cut with a sapphire cutter, and it is essential to use fibre trailer needles for replaying otherwise the useful life of the record is very short, say, six playings only with steel needles. Fibre needles are, of course, very satisfactory as regards quality and absence of surface noises, the only drawback being that they wear very rapidly, and once the contact surface becomes worn or distorted, objectionable snags are introduced.

While the term cutting has been used, this is not quite accurate when considering aluminium blanks, as the surface is actually indented and not cut like other substances. However, quite good results can be obtained, and the method has the advantage of being very cheap.

Before any recording can be considered, it is essential that some mechanical device is provided to cause the cutter head to traverse the record from edge to centre, as the blanks are free of all tracks or grooves. Such devices are known as "tracking" or "traversing" mechanisms, and they usually consist of a threaded rod, which is operated from the turntable spindle, and so arranged that it controls the movement of the cutter head carrier. Fig. 5 shows the fundamental principle where "A" represents the drive fastened to the turntable spindle, and "B" the simple gears to transmit the motion to the horizontal threaded rod "C" which actuates the cutter carrier "D" by means of the threaded contact piece "E." The pitch or number of threads per inch of the threaded rod plays a very important part, and it is absolutely essential for it to be a precision job, otherwise the distance between each groove will vary, the separating walls will differ in thickness and a true spiral will not be formed.

With commercial recording, it is usual to operate at 100 grooves to an inch, but for home purposes it is not advisable to cut more than, say, 80 to 90 per inch as there is always the danger, unless a very accurate check is kept on the cutter head input, of the cut of the low notes breaking down the walls of the grooves and completely spoiling the track.

It will be appreciated that to overcome the drag imposed by the cutter—especially with aluminium blanks, and the load of driving the tracking mechanism, a powerful motor is required, so particular attention must be given to that item. As a guide, it should be noted that a single spring or small double spring motor is not likely to be satisfactory; in fact, some of the small electric motors are not capable of driving a 10 or 12 inch blank.

Motor speed is a very critical item and use should be made of one of the many devices for checking this, otherwise the whole tempo and pitch of the recording will vary. To show how closely the question of speed is studied in commercial recording, it is interesting to note that "gravity" or weight operated motors are used in many of the studios.

One more item which calls for special attention in recording, is the weight of the cutter head, or rather the actual weight imposed on the cutter. If the weight or load is too light, the cutter may wander off its track or jump clear on some of the lower frequencies. Most of the cutter head carriers are fitted with an adjustable counter balance which allows very accurate adjustment to be obtained.

Cutter Heads

As the frequency response of a loud-speaker depends on its design, ignoring for

the moment the input, so will the quality of the recording depend on the characteristics of the cutter head. Therefore, it is no use providing first-class gear if attention is not given to this important item.

Special cutters can be secured from firms which specialise in this class of work or, on the other hand, any good make of electromagnetic pick-up can be used, providing the question of weight is considered, as mentioned above. Suitable cutting needles can also be purchased, and, while they can be made if so desired, it is really better to obtain them from the actual makers.

Power and Feed

For satisfactory results, the L.F. amplifier feeding the cutter should have an undistorted output of at least 3 watts, the output stage, for preference, being push-pull. If, however, this form of output circuit is not employed, a choke filter circuit, or output transformer, should be used, thus protecting the windings of the cutter head from D.C. current, and removing any possibility of L.F. instability.

The amplifier circuit should embody an efficient form of "high" and "low" note control, to allow adequate adjustment to be made to the overall frequency response.

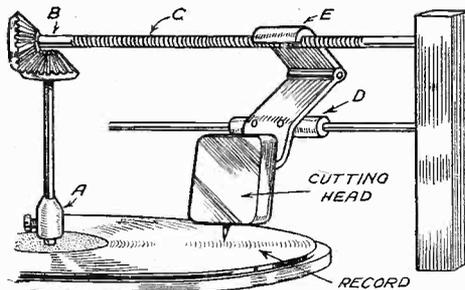


Fig. 5.—How correct tracking is obtained.

It may be necessary to attenuate the lower frequencies if the cutter input is too great, or if more than 80 grooves per inch are cut.

The input circuit of the amplifier should be arranged to suit the type of microphone in use, and, if possible, it is advisable to make use of a mixer circuit to allow speech and music or other combinations of sounds to be blended as desired, as very pleasing and, incidentally, very professional, effects can be so produced. As regards the

microphone, any good make of "transverse current" will be quite satisfactory, although if a moving-coil job is available, so much the better.

Blanks

As mentioned earlier, the aluminium blanks are not too satisfactory if long record life is required, or if serious work is to be undertaken, therefore, it is well worth while considering one of the more modern methods, and while there are several processes now in being, I do not think the amateur can do better than employ the system outlined below, which is handled by Messrs Musikon Ltd. They still employ an aluminium blank, but only as a base for a film or coating of a plastic substance very similar to bakelite. The nature of the substance allows recording to be carried out, in the normal manner, with a steel cutter, and owing to the nature of the surface, very little drag is imposed on the turntable. After cutting, the record can, if so desired, be replayed immediately, but this is not recommended, as the surface is too soft and must be hardened before use. The hardening process is carried out by the simple process of placing the blank in an oven—maintained at a certain constant temperature—for about three hours, after which a glass-hard surface is produced which allows steel trailer needles to be used.

The finished records have a remarkable frequency response, very long life, and surface noises are practically absent.

Important Pointers

Whichever system is used, never start recording and run a blank right through, without having previously made a test strip of the matter to be recorded. It is advisable to keep one blank for this purpose, and run off a few grooves, under operating conditions, to see if volume, speech or the placing of the microphone is all right. Make quite sure that no external interference is likely to be introduced into the microphone or amplifier circuits. Check up the time to be taken by the item to be recorded, and the time length of the blank, thus avoiding one finishing before the other. See that the input to the microphone is constant or, better still, have headphones in circuit and a proper volume control. And last, but by no means least, keep your eye on the speed of the motor.

A NEW TELEVISION "SERVICE"

THE other day a newspaper stated that a television service had at last started, but this was meant to refer to the bus service which has now been inaugurated as a regular afternoon journey between Broadcasting House and Alexandra Park. With the constant delays which have accrued, and so prevented the radiation of picture signals this sarcasm is perhaps excusable, but in suggesting dates for the initial service the authorities failed to realise the amount of work which had to be accomplished. Every effort is now being made to expedite the work, and in spite of the air of complete secrecy which surrounds the installation, at the summit of the steel lattice mast engineers can be seen perched very precariously while putting into position the radial arms which ultimately will hold the specially designed vision and sound aeri-als. Then it is known that the two large studios can be sectionalised by means of curtains on "railways" so as to apportion the

backgrounds according to the size of the scene it is intended to televise. The control engineers are above the studio floors, and anyone in that room can therefore see into the studio and watch the actual scene. Equipment assembly is proceeding apace, while quite recently a section of the new television staff paid a visit to the Alexandra Palace in order to see the film scanners in operation. This was part of the course of instruction which they are undergoing in order to become acclimatised to B.B.C. methods. No doubt in August their work will become more specialised in relation to television itself. It is also learned that physical exercises will be featured in the television programmes. Readers will no doubt recall that this was quite a popular item in the low-definition television programmes, but the scope was rather limited. Using the present forms of direct pick-up scanners, however, far more detail will be possible.

IMPRESSIONS ON THE WAX

By
T. Onearm

Two Famous Orchestras

OF the lighter overtures, one of the most popular is "The Merry Wives of Windsor." It has been recorded this month by the Berlin Philharmonic Orchestra, conducted by Dr. Karl Bohm on *H.M.V. DB 444*, a particularly fine record.

The "Blue Danube" waltz is always a favourite with Strauss admirers, and the Minneapolis Symphony Orchestra has made an extremely good rendering of it on *H.M.V. DB 2621*.

From the Films

JAMES MELTON, who appears in the film, "Stars over Broadway," has recorded "Where Am I?" ("Am I in Heaven"), and "Carry me back to the Lone Prairie" on *H.M.V. B 8444*. Both of these tunes are from the film.

Another new film, "Give us this night," is represented by "Sweet Melody of Night" and "My Love and I," which are attractively sung by Webster Booth on *H.M.V. B 8442*.

Sam Browne sings "Melody from the Sky," a popular tune from the new colour film, "The Trail of the Lonesome Pine," coupled with "Lost" on *H.M.V. BD 351*.

Musical Comedy Successes

SOME of the best known musical comedy successes are recalled in "Medley of Daly's Favourites," played by Reginald Foort on the organ of the Paramount Theatre, London. The number of the record is *H.M.V. BD 352*.

Derek Oldham sings two light numbers, "A little love, a little kiss" ("Un peu d'amour"), and "Nocturne" ("Song of Love") on *H.M.V. B 8446*.

Two songs of totally different category, but which offer pleasing contrast, are sung by Stuart Robertson (baritone) on *H.M.V. B 8445*. The titles are "Spanish Lady," and "Limehouse Reach."

A New Toscanini Record

TWO brilliant recordings by Toscanini and the New York Philharmonic Symphony Orchestra appear in this month's list. They are "Götterdämmerung"—Dawn and Siegfried's Rhine Journey, and "Lohengrin"—Prelude to Act 3, and are recorded on *H.M.V. C 2860-1*. Although Toscanini has retired from the New York Philharmonic Symphony Orchestra, he will still appear with them occasionally.

Dancing Time

ROY FOX and his Orchestra have recorded "Poor Little Angeline" and "Calling me Home" on *H.M.V. BD 5075*, also "My First Love Song" (from the film, Queen of Hearts) and "Would You" on *H.M.V. BD 5076*.

Joe Loss and his Orchestra contribute two lively dance numbers, "I like Bananas" and "Madame—ah! La Marquise—ah!" on *H.M.V. BD 5080*, also "Cuban Pete," and "At the close of a long, long day" on *H.M.V. BD 5079*. These records

are interesting in view of the recent publicity given to Joe Loss in connection with his dance tempo, which is considered to be ideal.

"Fats" Waller new recordings are "All my Life," from the film "Laughing Irish Eyes," and "Cabin in the Sky"—*H.M.V. BD 5077*. These tunes should please those who like rhythmic piano choruses.

In the Swing Music series, four records are released this month; of these, one of the most representative is "You Started Me Dreaming," and "Tormented," played by Wingy Mannone and his Orchestra, on *H.M.V. B 8451*.

Decca Records

ALEXANDER'S RAGTIME BAND and "Broken Doll," are two old tunes that are served up anew this month by Brian Lawrence and the Lansdowne House Sextet on *Decca F 5981*. "These Foolish Things," coupled with "Lights Out," on *Decca F 5987*, is the latest Greta Keller recording, and Danny Malone, the Irish tenor, sings "The Glory of Love" and "Poor Little Angeline," on *Decca F 5988*.

Jessie Matthews has recorded four numbers this month, from her latest film "It's Love Again." They are: "It's Love Again" and "Tony's in Town" on *Decca F 5982*; and "I nearly let love go slipping through my fingers" and "Got to dance my way to Heaven" on *Decca F 5983*. In the recorded version of "Tony's in Town" and "Got to dance my way to Heaven," you hear her tap-dancing as well as singing.

Brunswick Records

THE third "Show Boat" film is being presented in London, and before very long it will go the rounds of all the big picture theatres. Although it is a new film, so far as it was made quite recently, two of the original artistes appear—Paul Robeson and Helen Morgan. Those readers who would like to hear these two artistes should obtain the Brunswick "Show Boat" Album, which consists of four records, with an artistic album, which can be purchased for 16s.

Bing Crosby makes a new recording this month on *Brunswick O 2223*. For this record he has chosen "Would You" and "Robins and Roses."

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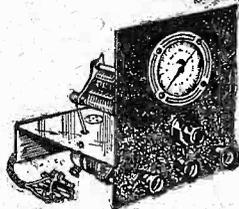
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Random Jottings

By JACE

Director of Staff Training

THE B.B.C. announces that Mr. G. C. Beadle has been appointed Director of Staff Training in the training reserve which will be formed on October 1st next. The Chief Instructor will be Mr. E. A. F. Harding, who is at present Northern Programme Director.

The purpose of the training reserve is to provide newly recruited staff with a training in broadcasting methods, to keep existing headquarters and regional staff in touch with the latest developments, and to create a small reserve of staff for emergency and holiday requirements.

Mr. Beadle, who is now Director of Programme Administration, will be succeeded in this position by Mr. R. J. F. Howgill.

Mendelssohn Concerto

MAURICE COLE will play the Mendelssohn Pianoforte Concerto in D minor on July 29th (National), and Clarence Raybould will conduct "Three Jewish Poems" of Ernest Bloch, "The Noonday Witch," by Dvorák, and "Variations on Three Blind Mice," by Joseph Holbrooke.

There will be a programme of light music conducted by Joseph Lewis the same evening (Regional), and on July 30th (National) Barbirolli will conduct an Elegy and Scherzo by Frederic d'Erlanger, and "Dances of Marosszek," by Kodály. On July 31st (Regional) Albert Coates will conduct a first performance in England of Symphony No. 2 of Dmitri Kabalevsky, as well as a first performance of his own Pianoforte Concerto in C, which will be played by Frank Lafitte.

Television Programmes

ALTHOUGH no definite programmes have yet been prepared for television, the Productions Department has already sketched out a number of plans for the first transmissions from Alexandra Palace in the autumn.

Apart from the "family" entertainment side, there is the question of "interest" features to be considered, these consisting of light programmes concerned with topics of the hour, people in the news, and general subjects of the "Magazine" type. Among the titles already suggested for these features are: "The Zoo To-day," "Cartoonists at Work," Travel, "Learning to Fly," "Radio Personalities" and "House Furnishing," "Games—Indoor and Outdoor," "Physical Training," and "World Affairs."

Broadcasts to Schools

FOR the seniors, aged eleven to fourteen, there will be a new music course, a series of concert lessons, "British History," "History in the Making," and topical events. Other items are dramatic readings from Shakespeare, book talks and experimental programmes of poetry and biography in the senior English Literature course, broadcasts on biology by famous biologists, a geography series on the New World by broadcasters who have known and lived in

the countries they describe, and the modern language broadcasts for French and German by E. H. Stéphan and H. Winter.

A new series for seniors on Friday afternoons will include feature programmes, broadcasts of actual events, topical talks and talks on films.

The Central Council for School Broadcasts now test under school conditions all sets submitted to them by manufacturers and publish a list of approved apparatus.

H.F. Mains Interference

ONE form of interference arises from the presence of high-frequency currents in the mains leads. An H.F. choke will, of course, prevent this trouble, but in view of the fact that the current passing is on the high side special chokes must be employed designed to withstand the high currents. Such components may be obtained from the various firms whose advertisements appear from time to time in our pages, and it is possible to obtain components rated up to 300 amps, although, of course, such components are very expensive. For the ordinary receiver, the cheaper type of choke rated at .6 amp and costing 3s. 6d. (Ward & Goldstone type) will be found quite suitable.

Speedy Repairs

IF a bias resistance breaks down in either an A.C. or an A.C./D.C. receiver and a replacement is not available, a battery may be used, connecting its positive socket to the valve cathode and its negative socket to the H.T.—line in exactly the same position as the bias resistance is normally joined. Alternatively, the cathode may be joined in the negative line and the bias battery connected between the grid leak or transformer secondary and the negative line in the same manner as in a battery set.

A Seasonal Overhaul

WHEN overhauling your set do not forget to examine flexible leads and their connections to see that no single strand is projecting and causing a short, or is so loose that such a short may occur later. See that wiring is well away from fixing screws or bolts, and in the case of faults which defeat your powers of detection ascertain that in no case have screws pierced the insulation of wires or coils. It is also a good plan to test the insulation of components to their metal cases, especially when the cases are earthed. An instance occurred recently of an L.F. transformer secondary being earthed to its case. Had this component been mounted on a wooden base with the case not earthed, the fault would not have been noticed; but the case being earthed the result was that the secondary winding was, in effect, connected as a shunt to the grid-bias battery

which accordingly ran down quickly and under-biasing the valve followed with consequent deterioration of quality, increased H.T. consumption, and damage to the valve itself.

Warm Work

IN 1924, recording was carried out at the "His Master's Voice" studios, at Hayes, Middlesex, the artist singing, or speaking into a horn. As the studio was kept at the temperature of soft wax, it was found very necessary to discard coats and vests and roll up shirt-sleeves before commencing operations.

Was recording more difficult in those days? Yes, because of the numerous technical difficulties with which we had to contend. Owing to space limitations, the principals had to sing the choruses in addition to the solos, as there was only a small horn in which to sing. Imagine what it was like!—perhaps ten people crowded together like flies round a honey-pot, bobbing down to sing choruses and jumping up for the solos. In the circumstances, it was a miracle that acoustic recording was so successful.

Chemistry in Radio

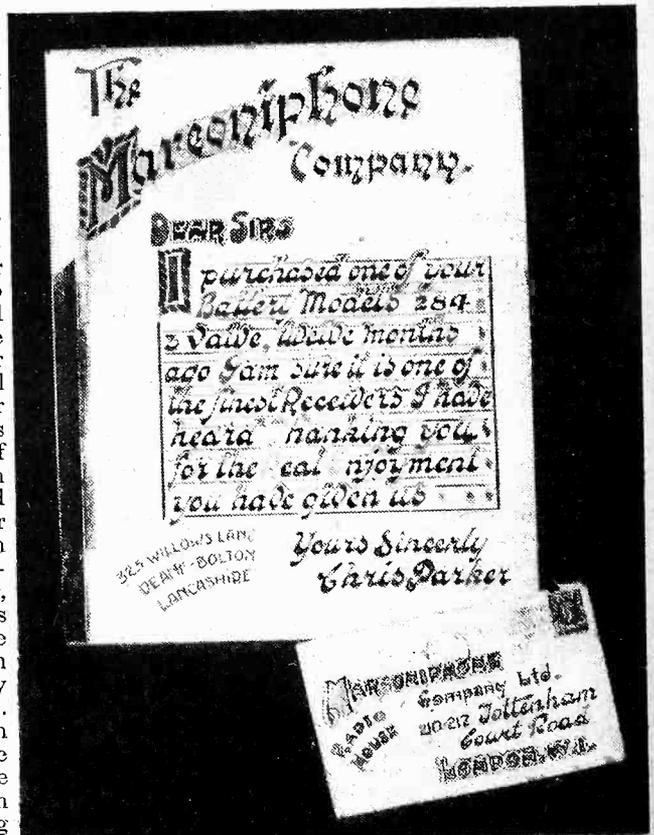
WHILST improved methods of making Ferrocart allow it to be "worked" by stamping and piercing, and it possesses lower eddy current losses than compressed powder cores, yet it has a comparatively low specific gravity, and hence a smaller permeability factor, owing to the lower iron content for equivalent bulk.

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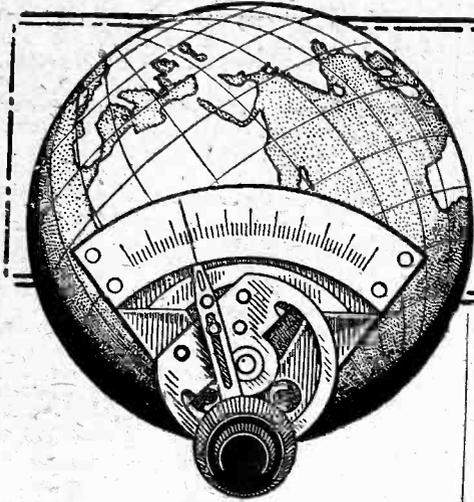


An unusual testimonial, sent to the Marconiphone Company by Mr. Chris Parker. The envelope shown contained the covering letter.

SHORT WAVE SECTION

QUALITY REPRODUCTION ON THE ULTRA-SHORT WAVES

The Wider Use of Ultra-short Waves Provides Many Schemes for Improving the Quality of Reception - By H. J. BARTON CHAPPLE, B.Sc.



ULTRA-SHORT-WAVE radio is very much to the fore at the present moment, for in addition to its use for various official services it has, as most readers know, been adopted as the vehicle for the forthcoming television transmissions—wavelengths in the region of 7 metres having been decided upon. But what is of greater interest to the listener, as distinct from the television enthusiast, is the fact that the sound accompaniment of the television programme is also to be radiated on an ultra-short wavelength, namely 7.23 metres.

This opens up boundless possibilities in many directions; new ideas and possibly a new technique in receiver design and in aerial arrays, both affording fresh interests for the amateur and the constructor as well as to the professional engineer. One of the most important points about the ultra-short wave sound transmissions, however, is the potentialities held out for vastly improved fidelity in tonal quality.

Four Links

High quality as applied to sound broadcasting depends upon at least four links forming a chain of circumstances, each of which must be favourable if high-class reproduction of the programmes is to be achieved. The first link is the actual transmission, and the practical requirement is that the modulation of the carrier as it leaves the transmitting aerial shall be a faithful replica of the actual programme. The second is summed up in the phrase "general reception conditions" and includes such factors as a consideration of the mutual interference between stations, and the absence or otherwise of various forms of electrical disturbance, either natural or man made. Third comes the question of set design, and last but by no means the least, the ability of the loud-speaker to reproduce faithfully the various musical frequencies present in the output from the set.

Although certain of these points have no specific relationship to the ultra-short waves, each must be dealt with, for such limitations as may be imposed by them have to be taken into consideration when assessing the extent to which the ultra-short-wave sound transmissions may improve the general standard of reproduction.

In the matter of transmission it may be said at once that microphone and amplifier design have now reached a standard at which it is possible to transmit, if desirable, a range of audio frequencies entirely adequate to do full justice to any class of sound—music, speech, or "effects." It is, therefore, possible to include in the carrier

modulation frequencies covering practically the whole of the audible spectrum, and it is only on account of the impossibility of receiving the higher audio frequencies under the present condition of ether congestion in the broadcasting wavebands that the actual frequencies transmitted are considerably curtailed.

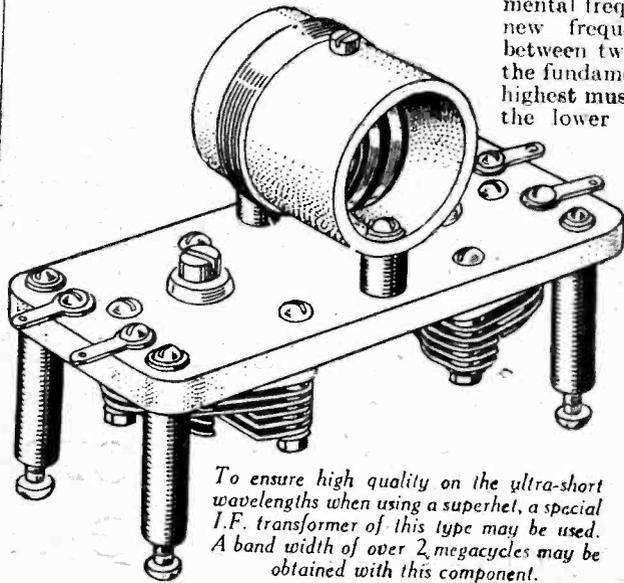
There is only one other matter in connection with transmissions which need be mentioned, namely, that, for technical reasons which cannot be explained in detail in this article, it is found necessary to adopt in the control room a process of "contrast compression" whereby the loudest sections of the programme are reduced somewhat and the softest sections amplified to a certain extent. The practical result is that the audible difference between

the various aspects of reception conditions that of mutual interference between stations is perhaps the most important. The causes of mutual interference have been described many times in these pages and are generally known, but in view of the fact that transmissions on the ultra-short waves will undoubtedly effect a great improvement in this direction it is advisable to deal with the matter from a slightly different angle. To begin with, the fundamental conception of wavelength must, for the moment, be put aside and the carrier wave considered as occupying a single fixed frequency in the broadcast spectrum—a frequency of, for example, one million cycles for a 300-metre wave and so on. When the carrier is modulated with sound the physical effect is to produce, on either side of the fundamental frequency of the station, a band of new frequencies consisting of values between two limits—the upper limit being the fundamental station frequency plus the highest musical frequency transmitted, and the lower limit being the fundamental station frequency minus the highest musical frequency transmitted. By reason of these "sidebands," as they are called, each station monopolises a band of radio frequencies equal in width to twice the highest musical frequency transmitted and, unless the fundamental station frequency of two programmes differ by at least this amount, their sidebands will overlap and interference will be experienced.

Now assuming that the highest audio frequency which it is decided to transmit is 10,000 cycles—a figure none too high for even reasonably good reproduction—it would

be necessary to select carrier frequencies for broadcasting stations at intervals of 20 kilocycles per second in order to avoid all risk of interference. The medium-wave broadcast band covers a width of just 1,000 kilocycles, and on the basis of a 20-kilocycle station separation contains room for only 50 channels. But according to the latest list of European broadcasting stations, there are, in actual fact, nearly 110 channels allotted in this band, corresponding to only 9 kilocycle separation and, moreover, these channels are shared by nearly 200 stations. Such a degree of congestion means two things. In the first place, receivers must be made so selective that they can separate stations operating on adjacent channels separated by only 9 kilocycles. This is done by so

(Continued overleaf)



To ensure high quality on the ultra-short wavelengths when using a superhet, a special I.F. transformer of this type may be used. A band width of over 2 megacycles may be obtained with this component.

fortissimo and pianissimo passages, that is the light and shade of the music, is not so marked when reproduced by the speaker as it would be if the original performance was heard in a concert hall. The necessity for this "mutilation" of the light and shade is, unfortunately, inevitable and will not really be removed by transmission on the ultra-short waves, but it may be noted in passing that devices have been developed whereby a special circuit in the receiver restores, to some extent, the contrast of the programme; these devices being applicable to any type of receiver, and for any waveband.

Reception Conditions

Reception conditions at present really represent the main source of limitation of the degree of tonal fidelity attainable. Of

SHORT WAVE SECTION

(Continued from previous page)

sharpening the tuning that all the side-bands are cut off above 4,500 cycles on either side of the station frequency so that no note or overtone above 4,500 cycles is reproduced. As quality reproduction depends upon the due reception and re-creation of these higher frequencies, quality reproduction of the ordinary broadcast programmes is impossible except in certain specially favourable circumstances to be explained later, or by manufacturing an artificial treble response in the set itself. The second result of ether congestion is that, since very little above 4,500 cycles is able to be reproduced, there seems little point in transmitting frequencies greatly in excess of this figure, so that the programmes put out from certain stations are not so perfectly transmitted as they might be.

Relative Field Strengths

There is another point in connection with the question of mutual interference between stations which ought to be explained because it plays a big part in the improvement which can be expected when ultra-short-wave transmissions become available. It is that the degree of such interference depends to a great extent upon the relative field strengths, at the point of reception, of two stations occupying adjacent or practically adjacent channels. If, by reason of a station's power or the geographical situation of the listener's aerial these field strengths are comparable, only the highest degree of selectivity, equivalent to the very serious cutting of the side-bands, will give reasonable interference-free reception of either, and even so there is a considerable risk of some of the higher harmonics of the unwanted programme obtruding themselves on the wanted programme as "side-band splash"—that annoying semi-whispering noise which sometimes mars reception.

It must now be shown how the selectivity difficulty is greatly eased, if not entirely removed on the ultra-short waves. It has been stated that for reasonable quality there is room for approximately fifty channels on the medium waveband, and this statement can be even qualified by saying that for really good quality

and the complete elimination of the risk of interference, the frequency separation of stations should be further widened, reducing the number of available channels to two or three dozen only, a matter which is impossible of achievement, having in mind the natural aspirations of the many different broadcasting stations. But on the ultra-short waves, the frequency range corresponding to the available band of wavelengths is much greater. For example, between wavelengths of 8 and 5 metres there is a frequency difference of no less than 22,500 kilocycles per second which, allowing for the very liberal frequency separation of 50 kilocycles between adjacent channels, gives room for 450 stations. Probably, such a wide separation would not be necessary, in which case the number of channels could be further increased. Moreover, 5 metres and 8 metres do not in any way represent the limits of the ultra-short waveband, and good results have been obtained on even 2 metres, so that between 1,000 and 2,000 channels can be accommodated.

Nor is this all, for the range of ultra-short-wave transmissions is more limited than for the medium waves; which means that the more distant stations will not interfere with those closer to the listener's aerial, even if the station frequency separation was not increased greatly beyond the present figures, so that still more stations could be accommodated without fear of mutual interference.

The Result

The practical implications of these facts are four-fold. In the first place frequency separation could be increased to values which would make mutual interference physically impossible; second, there would then be no reason for restricting the radiation of the widest possible band of audio frequencies, thus greatly improving the quality of transmissions; third, the limited range of ultra-short-wave radiations not only assists in avoiding the risk of mutual interference but offers possibilities of a wider choice of alternative programmes from local stations, either by way of separate performances or through relays from more distant stations. In this connection it is one of the disadvantages of high-quality reception at the present time that it must be limited to the reception of

a very few programmes, for in very few spots is it found possible to select more than some half-dozen stations—and usually not more than two or three, which are receivable under high quality conditions. Fourth, the need for highly selective circuits being eliminated, the performance capabilities of receivers, from the quality point of view, can be very greatly improved, and this brings us to the third factor in quality reception, namely the receiver.

There are two aspects of receiver design which mainly affect quality. The first is the consideration of selectivity. The wider channel separations permissible with ultra-short-wave transmissions, and the reduction of interference due to the more limited distances covered by the stations, will render highly selective circuits for ultra-short-wave reception unnecessary so that the full advantage of the complete audio band can be taken. The remaining limiting factor in the receiver is the fidelity of the frequency response in the circuits, and in this connection all that it is necessary to say is that it has been proved conclusively that a substantially flat response curve is attainable readily over the whole of the useful frequency range, and that no difficulty of any kind need be anticipated in the design and construction of high-fidelity sets.

The Loud-speaker

Finally, but still of major importance, is the question of the loud-speaker. It has been shown that from the points of view of transmission, reception conditions, and set design there is nothing to mar the chances of very high quality in ultra-short-wave programmes—but there remains the loud-speaker. Listeners must recognise the fact that it will be quite useless to attempt to obtain even noticeable improvement in quality, in spite of the wonderful possibilities of ultra-short-wave working, unless the speaker used is capable of reproducing a wide band of frequencies. A number of suitable instruments are available to-day, and even many of the less expensive "ordinary" speakers have frequency responses beyond the capabilities of highly selective receivers, and it is safe to say that the average standard of speaker response will be still further improved in order to take full advantage of ultra-short-wave possibilities.

Swedish Relays

SO far there has been no short-wave relay of the Swedish programmes, although roughly twelve months ago we were told that the Stockholm broadcasting authorities were planning the installation of a special transmitter for this purpose. You may shortly hear excerpts of the Stockholm-Motala radio entertainments on about 25 metres, as I learn that a Swedish amateur station, SM5SX, whose address is Artillerigatan, 77, Stockholm, proposes to carry out such tests shortly. It is reported that the experiments are being made in conjunction with the Royal Technical Institute of the Stockholm University.

New Transmissions

Two new transmissions of which you may care to make a note are KAZ, the 40-kilowatt transmitter of the R.C.A. (U.S.A.), which frequently relays programmes from the medium-waver "Radio Manila" (KZRM, Manila, Philippine Islands). The channel is 30.03 m. (9,990 kc/s) and the time at which this broadcast was heard was between B.S.T. 10.00-11.00.

Leaves from a Short-wave Log

W2XBG, Hicksville (N.Y.) on 46.67 m. (6,427 kc/s), is an experimental station installed by Press Wireless Inc. for the transmission of news bulletins "in clear." A search should be made for these signals between B.S.T. 02.00-04.00.

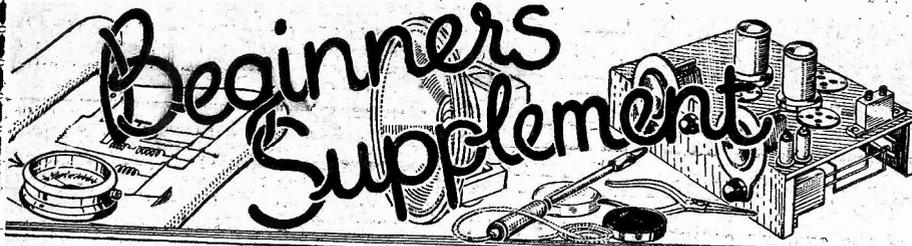
We may shortly expect to pick up tests carried out by VK6ME, Perth (W. Australia) on 30.15 m. (9,950 kc/s), although I understand that later it will use the same frequency as VK2ME, Sydney. The latest news states that it may be ready by August.

South Americans

H18Q, Ciudad Trujillo (Dominican Republic), which must still be considered a newcomer to the ether, does not yet appear to possess a regular schedule, but may be heard on some nights testing broadcasts

on 48.08 m. (6,240 kc/s). The call is Radio-difusora H18Q (phonetic: *achay-oono-otchecoo*), *Emisora Real*. Although no address is given, I understand that reports should be sent to Señores Abbes y Garcia, Trujillo City (Dominican Republic). Another South American broadcaster which has been logged

more frequently during the past few days is YV7RMO, Maracaibo (Venezuela), which was working at the beginning of the year on 51.46 m. (5,810 kc/s), and which is now found on 49.42 m. (6,070 kc/s) immediately below the reading of OXY, Skamlebaek. In its announcements it calls itself: *La Estación del Pueblo y Papa del Pueblo*, which I translate as the People's Station and the Father (?) of the People. Here again the transmitter does not seem to work to a regular schedule, but the broadcasts have been picked up between B.S.T. 02.00-04.00. Just below the condenser readings of JVN, Nazaki-Tokio (28.14 m.), you should try for CEC, La Granja, Santiago (Chile), which, operating on 28.12 m. (10,670 kc/s), with a power of 4 kilowatts is on the air nightly from 01.00-02.15.



METER SNAGS

The Beginner can Easily be Misled by the Use of Unsuitable Measuring Instruments and Some of the Pitfalls are Explained in this Article

THE amateur who is beginning to take a keener interest in his hobby of radio often realises that one of the first steps to a better knowledge is the acquisition of a meter or measuring instrument. He thereupon goes to the nearest radio shop and obtains one of the popular "dual range or double-reading voltmeters" which may be obtained for a sum as low as 10s. Armed with this he attacks his radio problems by commencing to test his H.T., L.T. and G.B. batteries, and if the particular meter is also provided with a milliamp. scale he includes it in some convenient part of the circuit and then perhaps proceeds to wonder why the current is so low, or why he gets such good results from an H.T. battery which reads only 50 or 60 volts instead of 100 or more as he expected. The old hand will realise the difficulties which the beginner will encounter if he proceeds to rely upon this type of instrument, but, unfortunately, the oft repeated advice to purchase a meter having a resistance of 1,000 ohms per volt is met with either derision or amazement, and it still appears that readers endeavour to rely upon the cheap type of instrument to enable them to put a receiver in working order.

What Resistance Means

There are many different types of meter upon the market, but we will first explain why the cheap double-reading meter may prove misleading unless used only for particular purposes. On some of these meters it will be found that one voltage range (generally 0 to 12) is marked in black figures, whilst the high range, generally from 0 to 120, is marked in red figures, and upon the face of the instrument will appear the letter R followed by a figure, on one side of the dial in black and on the other in red. These figures indicate the resistance of the meter on both ranges, and a typical cheap meter will probably be found to have values of 200 ohms on the low-voltage range and 2,000 ohms on the high-voltage range, and to many amateurs these figures may appear to be unimportant.

Applying Ohm's Law

However, from the familiar Ohm's Law, we know that current is relative to voltage and resistance, and therefore if we have a meter reading 120 volts with a resistance of 2,000 ohms we can see that the current passing through that resistance (the meter) will be 120 divided by 2,000, or 60 milliamps. How many small battery receivers have an H.T. consumption approaching that value? Yet this means that if the meter is joined across the H.T. battery sockets in order to test the voltage of it, a current of 60 mA will be drawn, and so in

a very few seconds you will be taking as much from the battery as your receiver would take in many hours of listening. Apart from this, however, you will not get a true idea of the state of the battery for the following reason. Suppose that the battery has been in use for some long time and is therefore in rather a poor state. Your receiver may consume, say, 10 or 15 mA, and the battery may be in such state that it can just about maintain this load for another week or so without the voltage dropping unduly. It is presumed, of course, that the reader is aware that current and voltage are related, and that as the current drain rises the voltage supplied will fall off, and vice versa. Well, then, when the meter is applied across such a battery, owing to the much higher current which is taken to drive the meter needle across the dial, the voltage which is indicated will be much less than the actual voltage of the battery. It may be argued that this will result in the user throwing away a battery which in any case is nearly exhausted, and is thus likely to give rise to trouble, but the main point is that the user is deprived of some hours of good listening due to the sudden load which has been imposed on the battery.

The Grid Battery

In the case of the grid-bias battery it must be remembered that no current is normally taken, and, therefore, if the cheap meter is used at frequent intervals an unnecessary drain is imposed and the life proportionately shortened. In the actual receiver circuit even more misleading results will be obtained, as in many cases the current taken by the meter will be added to that already taken in that part of the circuit, and thus will give either a lower voltage reading than is required, or will fail to give a reading at all. The latter trouble will occur if the voltage to the detector stage is measured, as in this stage the normal current is only of the order of 1 mA or so, and therefore the addition of a further drain of 60 mA will show its effect in the voltage dropped across the resistance in the anode circuit, in addition to which the detector valve may have a resistance of such a low value that it will also modify the current taken and so add to the trouble.

Measuring Anode Current

Suppose that the amateur wishes to know the anode current taken by the output valve. This may be about 9 or 10 mA for a good power valve, and normally included in the anode circuit will be a loudspeaker transformer primary having a D.C. resistance of perhaps 1,000 ohms, across which a drop of 10 volts would occur. If, now, a further resistance of 2,000 ohms is

included in series (as it would be to read the anode current), a further drop of 20 volts would occur, and this will naturally result in a wrong reading being shown.

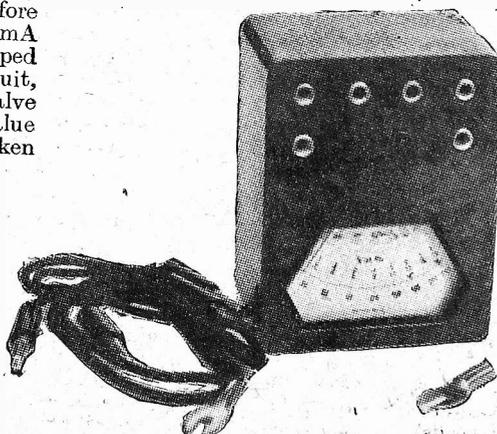
Versatility

Finally, the type of meter just referred to will only be suitable for instantaneous readings of voltage as delivered by the L.T. and H.T. batteries, and must therefore be placed in circuit and removed as quickly as possible, and beyond this they have no further application. On the other hand, if the amateur obtains one of the better-class of meters having a resistance of 1,000 ohms per volt, this may be used to test the batteries or to take actual readings whilst the receiver is working, and will give a true indication of the state of affairs. A better scheme, of course, is to obtain only a very low-reading milliammeter and to use this in conjunction with various resistances in order to take readings of voltage, current and other things, and this will give the amateur not only much better service, but will provide him with a device which will give many hours of interesting study in the way of showing how various components function, the effect of different methods of coupling, and so on. Practically all the large service-testing devices have as their basis a meter such as this, and the money required for such an item is well repaid.

H.T. SUPPLIES

IT may be noted that a transformer is connected between the mains leads and the rectifier; this serves the purpose of isolating the mains from the receiver and also drops or increases the voltage to that required by the rectifier. The choice of rectifier and transformer is important, and therefore the beginner is advised not to attempt the home-construction of an A.C. unit without consulting an experienced designer, or following a reliable published design.

The running cost of a mains unit is decidedly lower than that of batteries, and therefore if a mains supply is available it is advisable to use an eliminator. A possible draw-back of the eliminator as compared with the battery is the existence of mains hum, but if the unit is well designed this should not be sufficiently strong to affect reception materially.



A reliable A.C.-D.C. meter for all kinds of tests.



Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Midget Accumulators

READERS who are building miniature receivers and similar apparatus utilising the Hivac Midget valves and similar midget components will be interested to know that special midget accumulators are now available from the A.E.F. Manufacturing Co., of 17, Queensway, Ponders End, Middx. These accumulators are supplied with the jelly electrolyte and are fully charged ready for use. They should be given a re-charge when the voltage drops to 1.8 volts, or at least every three or four weeks, whether the accumulator has been in use or not.

To re-charge it is only necessary to remove the stopper, add sulphuric acid (1.200 Sp.G.) just sufficient to moisten the jelly and to charge at the rate specified on the label for approximately twelve to sixteen hours. After charge, and before putting the accumulator into service, all excess liquid should be drained off and the stopper replaced.

A range of 2 volt Midgets is given below, but the makers can supply any particular shape, size or capacity to special order.

TYPE	CAPACITY at 20 Hour Rate	Max. Discharge Rate, Amperes	Dimensions Overall in Inches			WEIGHT Charged, Ozs.	PRICE
			LENGTH	WIDTH	HEIGHT		
M 1	2	.2	1½	1	3	8	4/9
M 2	2½	.25	1½	1	3¾	9	5/-
M 3	2	.2	3¼	¾	2½	6	4/9
M 4	3	.3	2¾	1	2¼	10	5/6
M 5	4	.4	3¼	1	2¾	12	5/6
M 6	4	.4	3¼	1¾	2½	12	5/9
M 7	5	.5	2½	1½	3¾	15	6/3
M 8	7	.7	3¼	2¾	2½	17	9/9
CP 5	10	1	2¾	1½	5¾	24	7/6

New H.M.V. Receivers

ALTHOUGH details of the H.M.V. new range of instruments are not yet available, it is stated that it will be one of the most comprehensive planned by the company. Full details, with specifications, prices and descriptions, will be published on August 10th next, but it is announced that the models already released will be supplemented by a series of battery receivers, mains receivers and radio-gramophones based on a family of 3 valve, 4 valve, 5 valve and 6 valve all-wave chassis.

New Colvern Coils

TEN new types of "Colpak" tuning unit have now been added to the Colvern range, bringing up the total to twelve models, suitable for practically every need, and ranging in price from £1 19s. to £3 15s. 6d. These tuning units consist of a set of Ferrocart iron-core coils and a ganged condenser, ready wired and ready for inclusion in a receiver. Various circuit arrangements are employed, including the superhet, and the full range will be shown at Olympia, together with a large number

of the existing components which will be retained for the coming season.

Osram Gas-filled Relay

AN argon-filled relay, type GT1B, is shortly to be released by the General Electric Company. This is of particular interest in the construction of television time-bases and similar apparatus, and is provided with a heater rated at 4 volts 1.3 amps., and is fitted with a standard 5-pin base. The price is 20s.

Radio-meter Test Equipment

A NUMBER of new test instruments will shortly be introduced by Radiometers Ltd. and will be seen at the forthcoming Olympia exhibition. An adaptor and Allvalve Tester will appeal to the serviceman, as they enable all valves to be tested and include a 36 socket panel. A high-resistance moving-iron A.C. voltmeter with four ranges from 5 to 1,000 volts costing 3 guineas will also prove of value to set-testers and servicemen, whilst for resistance and capacity tests a special bridge with a directly calibrated scale suitable for measuring resistances from 100 ohms to 2 megohms and capacities from .00002 to 25 mfd. will be sold at 6 gns. A D.C. volt-milliamp-ohm meter with a resistance of 1,000 ohms per volt is also to be listed at 5 gns. and has ranges of 10, 25, 100, 250 and 1,000 volts, 25, 100 and 250 mA and 1 to 1,000 ohms.

Atlas Mains Units

MESSRS. H. CLARKE AND CO. (Manchester) Ltd. announce two new H.T. mains units both suitable for Class B and Q.P.P. receivers, and delivering 12 or 25 mA at 120 or 150 volts, according to the load. The first unit has three additional H.T. tapplings and costs £2 7s. 6d., whilst the second has a similar arrangement but incorporates in addition an L.T. trickle charger designed to deliver .5 amps., for 2-volt batteries. This unit costs £2 17s. 6d.

A Tropical S.W. Set

MESSRS. STRATTON AND CO., makers of the well-known Eddystone short-wave apparatus, announce that they will shortly be introducing a special battery superhet designed primarily for use in the tropics. Full details are not yet available, but it is stated that the receiver will cover all the more popular wavebands and will be known as the Eddystone All-world Eight.

Rothermel Tuning Unit

A NEW tuning unit is to be produced by Messrs. Rothermel Ltd., and is to be given the novel name of the "Radio Heart." This will consist of a tuning coil and condenser assembly, with the necessary switch and coupling components, valveholders, etc., ready wired and assembled for inclusion in a receiver. It will cover the short wavelengths from 16.5 metres upwards as well as the normal medium and long waves, and forms the nucleus of a superhet receiver, complete with oscillator section. The price will be £5 17s. 6d. ready aligned and calibrated, with an aeroplane dial.

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.

W. F. (Blackpool). The trouble may be due to the H.F. choke you are using or to the damping of the aerial and earth system. Have you tried a condenser in the aerial lead?

L. D. (Carlton). We cannot supply the blueprint and do not know where one could be obtained. There is no standard book on the subject for the amateur so far as we are aware.

F. C. W. (Henley-on-Thames). It is possible to do as you say, but results are not worth while. A lower-rated valve will give better results with the low H.T. voltage.

F. S. (Edmonton). We have described several eliminators of the type mentioned, but you do not state the current you wish to take. If you let us have further details we may be able to recommend a suitable circuit.

F. E. S. (Gaywood). We cannot supply a diagram to enable you to use up the old coils and components. If you wish to build the latest superhet we suggest that you dispose of the present set as it stands and buy the necessary new parts for the Superhet 4.

G. T. G. (Walworth). We do not advise you to attempt to bring the set up-to-date, but to find out what has gone wrong. It is obvious that some component has broken down and we suggest that you check the eliminator first, and then the L.F. coupling components. Is the speaker in good order?

K. J. R. (Edgbaston). As no current is indicated when the set "goes dead" it would appear that either the L.T. or the H.T. is interrupted. The switch would be the most likely cause of this and we suggest that you short-circuit the switch contacts with some bare wire in order to test whether or not this is faulty.

F. R. (Bookham). Try the H.F. choke. You will no doubt find that this is inefficient and may be dispensed with in this particular circuit.

H. V. B. (Norwich). The choke should not be included in the mains lead as it will not carry the current. Special chokes are obtainable designed for this purpose.

J. E. (Holloway). Write to the Westinghouse Company giving them full details.

B. A. (York). We cannot trace the firm and it would appear that they have gone out of business since the last exhibition.

N. I. S. (Conway). We cannot service the receiver as it is not one of our designs. A good local radio dealer should be able to solve the mystery in a very short time with suitable instruments.

A. E. (Perth). We cannot trace the manufacturers but suggest that you communicate with the A. E. F. Manufacturing Company, whose advertisement appears in this issue.

S. W. E. (Truro). We do not intend to issue any instructions until the transmissions commence. This will avoid disappointment due to insufficient working data.

G. T. (Bristol). Neither of the valves should be used. You should communicate with the makers of the receiver and obtain their advice as to the best type of replacement.

F. R. (Blackheath). The dial is not novel and we have seen several similar arrangements in commercial receivers. However, perhaps you would prefer to get into touch with some good patent agent with a view to obtaining a more "official" view.

M. A. F. (Coventry). If selectivity is your main consideration we suggest you consider a good superhet. A good dealer may be able to give you a demonstration which will enable you to judge the particular local conditions.

G. H. (Dundee). Types 80 and 81 are not interchangeable, as type 80 is a full-wave rectifier, whilst 81 is a half-wave rectifier. Type 59 is a power amplifier. Furthermore, type 50 and type 81 has a 7.5 volt heater, whilst type 80 has a 50-volt heater. Thus the valves are not suitable for replacement one with the other.

A. T. (Newton Ramsbury). Unfortunately your address was torn from your letter and we cannot therefore reply by post. We do not supply blueprints for commercial receivers, and suggest that you communicate direct with the General Electric Company, Magnet House, Kingsway, W.C.2.

A. H. (Worth). We cannot trace the set referred to, and cannot insert requests for readers to supply back numbers.

W. Y. (Birmingham). The trouble is probably in the transformer primary winding and this may be checked by short-circuiting the winding, when the noise should cease. However, communicate direct with the makers or their local service agent.

L. P. B. (Bovington Camp). The fuse connection is quite correct. The S.W. Adaptor-converter, blueprint P. W. 48A, should be quite suitable.

J. B. (Hawick). No blueprint is now available for the particular receiver mentioned by you.

C. S. O'B. (Dublin). We cannot recommend any of our blueprints for the parts listed. You do not give any coil types.

J. S. (E.9). A blue glow generally indicates that the valve is being over-run. This may be due to excessive H.T. or insufficient G.B. and, therefore, these points should be checked.

F. R. T. (Paignton). We have no blueprint of the particular receiver nor of any similar set, but next week hope to publish details of a small portable which may meet your requirements.

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).

An Amateur's Station

SIR,—As a regular reader of your very interesting short-wave section, I trust that the enclosed photo and details of my receiving station will be of interest. The small receiver to the left is a 1-v-1, the R.F. stage being untuned, and I use this entirely for reception of DX-CW with 'phones. Beside it is a 2-v-3, having two tuned R.F. stages, an R.F. pentode working as a detector, transformer-coupled to the A.F. stage, which in turn is transformer-coupled to two super-power valves in parallel. This set is entirely home constructed; even down to the metal chassis and tuning condensers, and is the outcome of nearly a year's experiments. Stations from all over the world are received at local strength, Europe coming in with absolutely no reaction, and also America, given fair conditions.

Trouble was at first experienced with selectivity, but I have cured this by making my own "iron cored" short-wave coils. Loss of signals, due to the iron cores is negligible, as the two R.F. pentodes provide ample amplification.

The total anode consumption of this set is rather hefty, being 54 milliamps, so I am working from wet H.T. cells. Regarding the DX here, all continents have been verified, and 57 countries, including such places as Hong Kong, Bolivia, Peru, Salvador, Korea, Alaska, Mauritius, Hawaii, Ceylon, Siberia, Japan, New Zealand, Australia, and Ascension Island, etc.

The antenna has a 30ft. top, 30ft. down lead, is 30ft. high, and points due N. and S.

Sincerely hoping that the above will be of interest to your many short-wave "fans," and wishing your excellent weekly every success.—S. HOPPER (Brighton).

A Reader's Circuit

SIR,—Re Mr. Parker's letter (July 4th issue) and those of Messrs. Barce, Smith and Thornton (July 18th), I have been working on such a set as they require, and have evolved a circuit which appears to be eminently suitable. It is a 5-valve superhet on s.-wave bands, and a 3-valve 0-v-2 on medium and long waves. The circuit is extremely simple, and suited to amateurs who have on hand spare components, as all components are quite standard, normal det. S.G. and L.F. valves being used. The switching is also very simple, i.e., one on/off switch and one 3-position wave-change switch. This latter brings in on s.-wave an extra 2 valves, making it a superhet. On M. and L. waves these 2 valves are cut out, giving L.T. economy.

The set, therefore, is cheap and easy to build, and if anything more ambitious is required extra stages could easily be added to my circuit, and more modern valves could be used. If anyone is interested in details of this receiver I should be pleased to supply them.

—CYRIL SALTER (Hayes).



Mr. S. G. Hopper's station (see letter on this page).

A Good S.W. One-valver

SIR,—I built one of your short-wave sets, a one-valver, last January, and have been amazed at the results.

Here are some stations received:—

Zeesen on 7 wavelengths, 2RO (25 and 31 m.), TPA2-3-4, HAS3, LRU, SPW, EAQ, LKJ1, PMN, OER2, RW59, CTIAA, ORK, OXY, HBP, VQ7LO, VK2ME, JVM, JVH, HVJ (19 and 50 m.), W3XAL, (16 and 49 m.), W2XAD, W2XAF, W2XE, W1XAL, W1XK, W3XAU, W8XK (19 and 25 m.). On the amateur bands:—

G2-5-6-8, W1-2-3-4-5-6-8-9, F3-8, LA, EA1-2-3-4-5-7-8, HB, PA, PL, CT, VE1-3, VO, EI, ON, OZ, SM, LY, OE, OK, I, LX, CO, PY, YN, HI, U, NY, VU, VP6, YV, SU. I have also heard many amateur and commercial morse stations.—N. L. PALMER (Thornton Heath).

CUT THIS OUT EACH WEEK.

Do you know

—THAT when inductances are connected in parallel the total inductance is equal to the reciprocal of the sum of the reciprocals.

—THAT instability when using a pick-up with long leads may often be overcome by including an H.F. choke in the lead from the grid with a by-pass condenser to earth.

—THAT the tuned-anode circuit provides the greatest degree of amplification, and upon this account is likely to provide most difficulty from the point of view of stability.

—THAT when using an output filter circuit the inductance of the choke will affect the response and must be carefully chosen.

—THAT ordinary flash-lamp bulbs are not suitable for dial lights in a battery receiver unless a switch is included to open-circuit them when a station has been located.

—THAT the reason for the above precaution is that the current consumption of the average bulb is equal to, and sometimes greater than, three ordinary battery valves.

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, George Neaves, 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.

BOOK RECEIVED

PROBLEMS IN RADIO ENGINEERING, by E. T. A. Rapson, A.C.G.I., D.I.C. etc. 103 pp. (Second Edition.) Published by Pitman, price 3s. 6d.

THIS book has been written to facilitate class-work in Radio Engineering and fully meets the requirements of students who are preparing for the Higher National Certificates in Electrical Engineering. It includes many problems and examples drawn from past examination papers of the City and Guilds of London Institute in Radio Communication, the Institution of Electrical Engineers in Electrical Communications, and the University of London in Telegraphy and Telephony. Forty-two separate subjects are dealt with, varying from capacitance and inductance to television, and all the test questions which are set in each section are referenced with regard to the examination paper from which they are taken. Ten pages are devoted at the back of the book to solutions to the examples given so that the student can check his answers. The book will prove invaluable to the student for either class or private study.

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 West London Radio Society

AT the Annual Ealing Hospital fête held in Walpole Park on Saturday, July 4th, this society provided a side-show which proved to be one of the most popular and attractive of the tents in the park. There was an interesting display of old wireless relics beside modern radio apparatus, of acorn beside transmitting valves, of crystal sets beside radio-gramophones, and many loudspeakers, amplifiers and microphones.

A "radio car," constructed by one of our members, which had to be steered over a winding course without the neon light striking, which it did when the car went off the road, was of great interest to the crowd. Gramophone records of one's own voice could be made in the same tent. An enjoyable day was spent by all members of the society who helped at this function.

Particulars of this radio society may be obtained from the hon. sec., H. A. Williamson, 22, Cambourne Avenue, West Ealing, W.13.

Irish Short-wave Radio Club

A LONG-FELT want has been filled by the inauguration of a short-wave club for those keenly interested experimenters who find that radio still holds a fascinating thrill if activities are directed on short waves and their ultimate possibilities. The value of such an association to the experimenter is incalculable in its scope for the advancement of ideas through experimental work, lectures, testing and examination of new apparatus, and general pooling of ideas gained from research. At the outset, work will be confined to reception only, but at a later date the transmission side will be dealt with, and it is planned to erect an experimental transmitter for members' benefit. In addition the services of two well-known Dublin amateurs will be available for lecture work. These are E.I.2.F. and E.I.8.D.

The terms of membership are: Entrance fee 2s.; weekly subscription, 6d.; country members, 5s. per annum. Meetings are held every Tuesday evening at 8 p.m. in the club's temporary premises, 47, Dolphins Barn St. Persons wishing to become members should call at the club room on any Tuesday evening at 8 p.m., or apply by letter only to the secretary. All communications should be addressed to the Secretary, Club Room, 47, Dolphins Barn St., Dublin. Secretary: J. O. F. James, 3, Clare Lane.

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS STRAIGHT SETS. Battery Operated. One-valve : Blueprints, 1s. each.

Description	Date of Issue	No. of Blueprint
All-Wave Unipen (pentode)	—	PW31A
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (trans.))	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Pow.)	—	PW35
Summit Three (HF Pen, D, Pen)	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow.)	—	PW41
Hall-Mark Cadet (D, LF Pen (R.C.))	16.3.35	PW43
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (trans.))	June '35	PM2
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.))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	—	PW64

Description	Date of Issue	No. of Blueprint
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
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)	—	PW46
F. J. Camm's Superformer (SG, SG, D, Pen.)	12.10.35	PW57

Description	Date of Issue	No. of Blueprint
Mains Operated.		
A.C. Twin (D (pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Power)	7.10.33	PW31
Selectone, A.C. Radiogram Two (D, Pow.)	—	PW19

Description	Date of Issue	No. of Blueprint
Three-valve : Blueprints, 1s. each.		
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)	—	PW29
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (pen), Pen)	28.7.34	PW36A
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	PW50
"All-Wave" 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	PW36

Description	Date of Issue	No. of Blueprint
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47

Description	Date of Issue	No. of Blueprint
SUPERHETS.		
Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three valve)	—	PW40
F. J. Camm's 2-valve Superhet (two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet	—	PW58

Description	Date of Issue	No. of Blueprint
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (three-valve)	—	PW43
D.C. £5 Superhet (three-valve)	1.12.34	PW42
Universal £5 Superhet (three-valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

Description	Date of Issue	No. of Blueprint
SHORT-WAVE SETS.		
Two-valve : Blueprints, 1s. each.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Power)	—	PW30A
The Perfect 3 (D, 2LF, RC and trans.)	8.2.36	PW63

Description	Date of Issue	No. of Blueprint
PORTABLES.		
Three-valve : Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable. (HF Pen, D, Pen)	16.5.36	PW65
Four-valve : Blueprints, 1s. each.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12

Description	Date of Issue	No. of Blueprint
MISCELLANEOUS.		
S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Description	Date of Issue	No. of Blueprint
Blueprints, 6d. each.		
Four-station Crystal Set	—	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450

Description	Date of Issue	No. of Blueprint
STRAIGHT SETS. Battery Operated.		
One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449

Description	Date of Issue	No. of Blueprint
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans.)	—	AW388
Full-volume Two (SG, Det, Pen)	—	AW392
Iron-core Two (D, Trans)	—	AW395
Iron-core Two (D, QPP)	5.8.33	AW396
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW388A
Lucerne Minor (D, Pen)	—	AW426

Description	Date of Issue	No. of Blueprint
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	2.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	—	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)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Coscor Melody Maker with Lucerne Coils	—	AW423
P.W.H. Mascot with Lucerne Coils (D, RC, Trans)	—	AW377A
Mullard Master Three with Lucerne Coils	—	AW424
£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) "Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple tune Three (SG, D, Pen)	June '33	WM327
Economy-pentode Three (SG, D, Pen)	Oct. '33	WM337
"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)	—	WM371
Graduating to a Low-frequency Stage (D, 2LF)	—	WM378
P.T.P. Three (Pen, D, Pen)	June '35	WM389
Certainty Three (SG, D, Pen)	Sept. '35	WM393
Minute Three (SG, D, Trans)	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM400

Description	Date of Issue	No. of Blueprint
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 (2HF, D, QP21)	18.8.34	AW445
(Pentode and Class-B Outputs for above : blueprints 6d. each)	25.8.34	AW445A
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, 2LF)	Feb. '35	WM381
The H.K. Four	Mar. '35	WM384

Description	Date of Issue	No. of Blueprint
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)	—	WM379

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 1/3d., 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.

Description	Date of Issue	No. of Blueprint
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW408
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)	Sept. '35	WM394

Description	Date of Issue	No. of Blueprint
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.	—	AW390
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
Mantovani A.C. Three (HF, Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401

Description	Date of Issue	No. of Blueprint
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	July '33	WM329
Harris Jubilee Radiogram	May '35	WM386

Description	Date of Issue	No. of Blueprint
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	Oct. '35	WM395

Description	Date of Issue	No. of Blueprint
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	10.3.34	AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	Apr. '35	WM385

Description	Date of Issue	No. of Blueprint
PORTABLES.		
Four-valve : Blueprints, 1s. 6d. each.		
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
Two H.F. Portable (2 SG, D, QP21)	June '34	WM363
Tyers Portable (SG, D, 2 Trans)	Aug. '34	WM367

Description	Date of Issue	No. of Blueprint
SHORT-WAVERS—Battery operated.		
One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (price 6d.)	—	AW320
S.W. One-valve for America	—	AW429
Roma Short-waver	—	AW452

Description	Date of Issue	No. of Blueprint
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	Feb. '36	WM402
Home-made Coil Two (D, Pen)	—	AW440

Description	Date of Issue	No. of Blueprint
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	Jan. 19, '35	AW463
The Carrier Short-waver	July '35	WM390

Description	Date of Issue	No. of Blueprint
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (HF Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valve Short-waver	Mar. '35	WM383

Description	Date of Issue	No. of Blueprint
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super	Nov '35	WM397

Description	Date of Issue	No. of Blueprint
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	Aug. '34	WM368
"W.M." Long-wave Converter	—	WM380

Description	Date of Issue	No. of Blueprint
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352

Description	Date of Issue	No. of Blueprint
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391

Description	Date of Issue	No. of Blueprint
MISCELLANEOUS.		
Enthusiast's Power Amplifier (1/6)	June '35	WM387
Listener's 5-watt A.C. Amplifier (1/6)	Sept. '35	WM392
Radio Unit (2v.) for WM392 (1s.)	Nov. '35	WM398
Harris Electrogram (battery amplifier)	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram	Mar. '36	WM443
New style Short-wave Adapter (1s.)	June '35	WM388
Trickle Charger (6d.)	Jan. 5, '35	AW402
Short-wave Adapter	Dec. 1, '34	AW456
Superhet Converter	Dec. 1, '34	AW457

QUERIES and ENQUIRIES



Burnt-out Volume Control

"I have built a three-valve A.C. receiver in which the first stage employs a variable-mu H.F. pentode. This has never worked really satisfactorily, and the control has been jumpy. Twice I have replaced the control, changing the value each time, but the control works too suddenly and two of them have burnt completely out. Is it possible to give any indication as to what is wrong?"—P. T. S. (Manchester).

If the wrong value of control has been chosen this will cause the erratic control. Normally the current flowing in this part of the circuit should no cause a burnt-out, and we therefore suggest that you have selected the wrong type of circuit. In an A.C. H.F. stage the usual arrangement is to include the volume control as part of a potentiometer across the total H.T. supply, tapping off a portion for the application of the screen-grid voltage. It would be possible to obtain the latter voltage and yet leave a very high current across the potentiometer which could cause a burnt-out, but we would imagine that you have selected the wrong values of resistance for the potentiometer in view of the erratic volume control. If components have been supplied as a kit, check the values of the resistances in the S.G. potentiometer feed, and if colour coded make quite certain that some "noughts" have not been missed out in calculating the values. If they are correctly colour coded or marked, perhaps it would be as well to test them in case they are wrongly marked, although this is hardly likely.

L.F. Distortion

"My four-valve battery set has been giving quite good results, but I have endeavoured to improve quality and have met with the following difficulty. The first L.F. stage was R.C. coupled, and the second transformer coupled, using a transformer. I wished to get better bass response and changed the second stage to parallel-feed, but now I find that quality is worse, bass response is not so good, and the volume also is less. Is there any reason for this that you can see from the details I have given you? My aim is better quality and more bass."—G. R. T. (Norwich).

The transformer you were using is a very high-grade component having a high inductance primary winding, and is fitted with a by-pass condenser internally mounted and joined across the primary. The high value of the inductance no doubt gave good matching with your previous direct method of connection, and the new arrangement has probably been adopted with a low-value anode resistance in order to permit ample H.T. to be applied to the valve. Consequently the matching is not so good and volume and quality have suffered. The condenser across the primary must also be taken into account in these particular circumstances. We think you will find that by transferring the transformer to the first stage, that is, so that the primary is included in the anode circuit of the detector valve, and by using the resistance-capacity

coupling in the second stage, the quality will be improved, but ample H.T. must be employed to permit the second valve to have an adequate working curve, or over-loading will take place and destroy the advantages otherwise gained.

Five- or Seven-pin Pentodes

"While looking through a valve book I found that pentode valves could be bought with either five- or seven-pin bases. I understand that there are three grids, one plate, and two filament connections in a pentode. One of the grids is connected to one side of the filament and so this leaves five connections. What I cannot understand is why have a seven-pin base if only five pins are needed? Are there more 'works' in a seven-pin pentode?"—F. R. (Longdon).

RULES

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.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

WE presume that you refer to the indirectly-heated H.F. pentodes, in which a combination of electrodes as mentioned by you is to be found. In the five-pin valve the control grid and the screening grid are joined to two pins whilst the heaters are also joined to two pins. The suppressor grid is then internally connected to the cathode which is joined to the centre or fifth pin, the anode going to the cap on top of the valve. In a seven-pin valve, however, the suppressor grid is brought out to a separate pin so that it may be joined direct to earth, as it will be realised that the cathode will be earthed through a biasing resistor and it may be found, under some circumstances, that the stability will be improved when the suppressor is earthed direct and not through the bias circuit. To ensure stability the seven-pin valve, when of the metallised type, also has the metallising brought out to a separate pin for a similar reason, and we think you will find that the five-pin pentode is now only supplied unmetallised, whereas formerly the metallising was connected direct to the cathode.

Experimental Coils

"As I wish to carry out some experiments on the short waves I should be glad to know what you consider the best method of arranging the tuning circuits. I am not yet certain what wavelength will be best for my experiments, and the new detector experiments I am going to carry out may introduce varying degrees of damping, etc.

Would you let me know what you think would be the best method of building the tuned circuits to cover wavelengths from about 5 to 20 metres."—B. L. (Leicester).

AS there is some doubt about the performance of the receiver we think it would be inadvisable to endeavour to use separate coils for aerial coupling, grid tuning and reaction. We do not know, of course, whether your proposed experimental circuits will incorporate a reaction arrangement, but in any case by building a single self-supporting solenoid with heavy gauge wire mounted on a low-loss base, you could fit clips to the various leads and tap these on to different parts of the coil in order to obtain the desired coupling and tuning range. Small clips may be made from springy brass and soldered to the various leads.

Ballast Lamp

"I am trying out a universal receiver with the D.C. mains type of valve. I have several on hand and am not certain regarding the permissible variations in voltage, etc., which may be used in a single circuit. Furthermore, for reasons of economy, I should like to use a standard electric lamp for voltage dropping and should be glad to know how to calculate the correct type of lamp for any particular circuit."—D. O. (Henley).

IT will only be possible to use different voltage ratings when two or more valves may be paralleled to obtain a similar rating to the remaining valves. The governing factor is not the voltage but the current which is passed, and thus the valves must be so arranged that the total current flowing through the heater circuit is correct for each valve, and different types may be used provided that parallel and series connections will enable this important point to be observed. The problem of selecting a suitable electric lamp was dealt with in our issue last week, and we refer you to that for more detailed observations.

A Live Chassis

"I have a home-built mains set in which I have used a chassis bought from a surplus store. This is painted with some kind of cream paint which is very hard, and I have scraped this away for earth connections. The set is unstable, however, and cannot be made to work properly, and, in addition, if I touch the chassis I get a tingling through my finger as though it is alive. Should this be the case, or does it indicate some fault? There is no actual shock, and even if I wet my finger the effect does not rise above a gentle tingling sensation which can be felt as far as the first joint of the finger."—G. B. M. (Finchley).

IF you are on D.C. mains, there is a possibility that a mild shock will be felt when the chassis is touched, owing to the return path to earth through your body. For this reason it is always essential to fit a fixed condenser in the earth lead to avoid blowing the mains fuse in the event of the mains plug being inserted a certain way round in the house socket. The chassis was probably cadmium coated, and it is essential that this should be entirely removed for sound earthing. Without further details, we cannot explain the reason why the set is unstable, but as you are probably on D.C. the above precautions should first be taken. With a set of this type it is also advisable to try the effect of using the receiver without an earth connection.

The coupon on cover iii must be attached to every query.

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," 8, Southampton Street, Strand, London.

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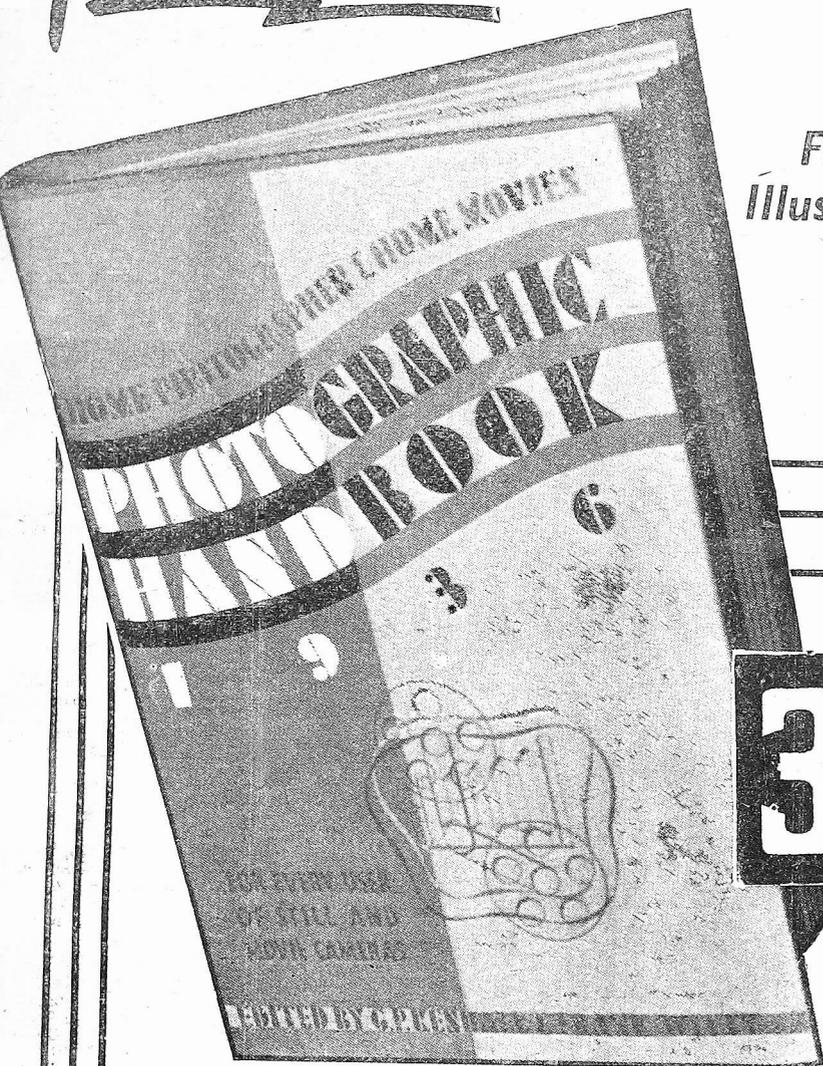
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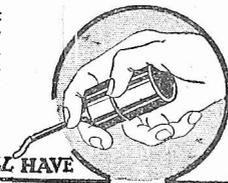
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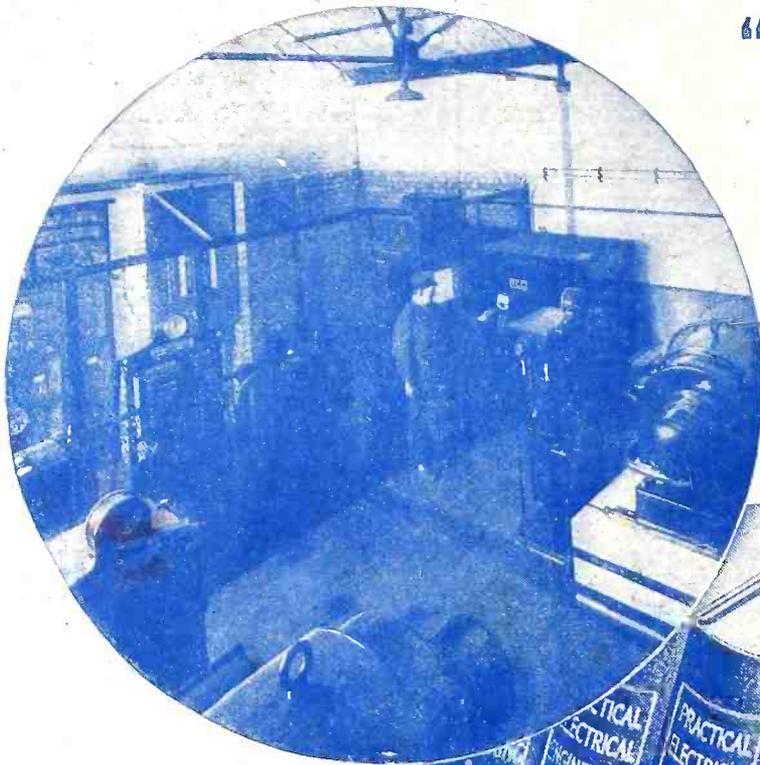
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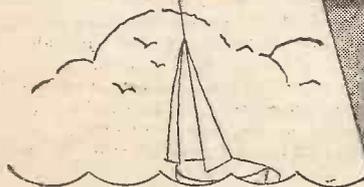


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EASY FAULT-FINDING—See page 527



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. VIII. No. 203. August 8th, 1936.

ROUND *the* WORLD of WIRELESS

All-wave Receivers

IN America a regulation has been introduced to ensure that the term "all-wave" is only applied to a receiver which tunes from 555 metres down to at least 16.65 metres. It is claimed out there that it is an unfair trade practice to describe any receiver as "all-wave" unless it embraces this particular band of wavelengths. What does "all-wave" actually mean? In this country we find receivers tuning down to 12 and some only going down as far as 19 metres, but in all of them there is a gap from 100 or so metres up to 200 metres. They are not, therefore, strictly all-wave, and it would appear that the term "four-band" would be much more descriptive of this type of receiver. Will the introduction of the television wavelengths lead to the inclusion of still lower wavelengths? If so, then another new term will, no doubt, be introduced.

A New Use For Radio

IN America a research worker has been busy with an elaborate type of radio receiver designed to assist him in studying the intelligence of rats and mice. He built a peculiar maze, having various doors which opened, and some which did not, and electrical equipment recorded the actual passage of the rodent through the winding corridors. It was found that after one journey through the maze the rodent did not again enter passages which had no outlet, thus putting their intelligence on quite a high plane.

New Stations For Greece

THERE is only one transmitter at present in Greece (so far as official records show), but we now understand that three stations are shortly to be built at Athens, Corfu, and Salonika, the idea being that Greek nationals in foreign countries should be supplied with news from Greece direct. No wavelengths have been mentioned, but as the transmissions are apparently to be of the long-distance type, no doubt the short waves will be utilised.

Overcoming Fading

IN commercial circles the elimination of fading has often been carried out by utilising the receiver on two or more aerials situated some distance apart, the idea being that the fading was at different

strengths in different localities and thus a combination of all signals would give a readable signal without fading. From America a new development of this scheme is announced, where two aerials are used and each is fed through a separate channel in the receiver. The circuits are so arranged that as the signal on one aerial fades the gain of the associated channel falls and *vice versa*. In this way, a better signal-to-noise ratio is obtained than in the case of straightforward reception of long-distance signals.

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*Same Stand, Same Spot as
last year, where we shall
be glad to meet all our
readers.*

Radio On Rails

AN improvement on the railway radio which has been tried in this country has just been tried out in France. The Nord Railway Company has installed a complete studio in a coach, with arrangements for talks, lectures and various musical items, and with special booths for the use of lecturers, artistes, and others who may be travelling on the train. In addition a powerful receiver is fitted and arrangements can be made to relay the received programmes to various parts of the train.

Welsh B.B.C. Education Officer

WALES is to have its own education officer, and the B.B.C. have just appointed Mr. D. W. Roberts to this position, the appointment dating as from September 1st next.

Interference Investigation

THE problem of interference with radio receivers by electrical apparatus has engaged the attention of the postal authorities for a long time. It was officially announced quite recently that there are 234 full-time engineers engaged in carrying out investigations in this particular direction.

Wireless in India

TO ensure reliability in air travel in India the Indian Government has issued a memorandum concerning wireless facilities for air transport in that area. All main aerodromes are supplied with medium-wave transmitters and receivers. The wavelength at present used is 900 metres, but if any great increase in the number of aircraft is experienced another channel will be necessary, and a short wavelength will then probably be used.

Radio Picture S O S

AN interesting example of the great utility of the wireless transmission and reception of a picture is afforded by the recent case of the broken submarine cable off the coast of South Africa. The cable repair ship proceeded to the vicinity, but had not the necessary chart to locate the break. To avoid delay, the chart, with all the essential information, was wirelessed from London to Melbourne, and thence to the cable ship, which was accordingly able to proceed to the spot and effect the necessary repairs.

Wireless and Flying Boats

THE new fleet of Imperial Airways Empire flying-boats will be fitted with a new type of radio equipment, experimental models of which are now being perfected at the Experimental Aircraft Establishment of the Marconi Company. The external wind-driven generators are eliminated, and dynamos and generators coupled direct to the engine (internally) are to be employed. The direction-finding loop aerial is also capable of being lowered through a trap-door in order to reduce wind resistance. In addition the wireless operator is to have a complete separate compartment with every form of modern equipment, immediately behind the control cabin of the Captain and First Officer.

THE PICK of the PROGRAMMES

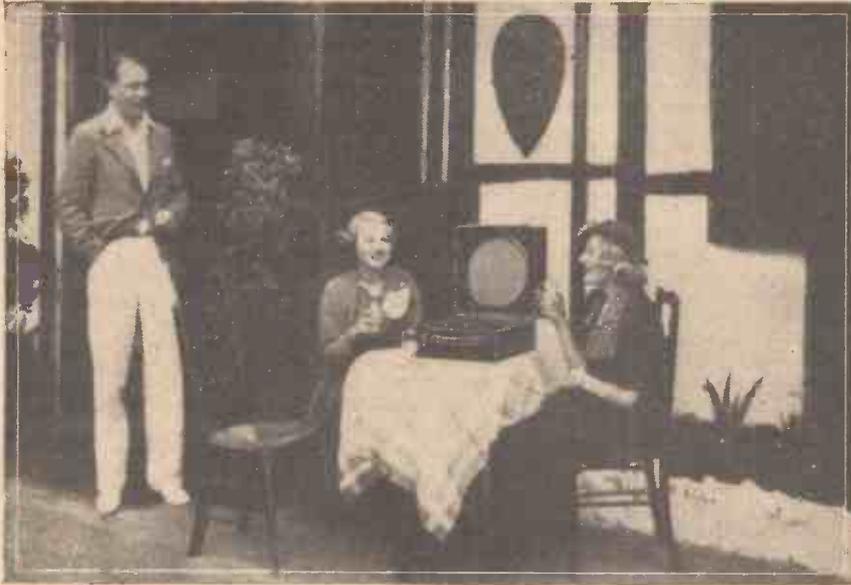
"Daventry Calling the British Empire"

AN electrical recording of a programme broadcast the previous day to Empire listeners will be given from the Midland transmitter on August 12th. This is described as "A Visit to the Empire Transmitters in Company with L. W. Hayes." It will include an historical and descriptive account of the scene. Empire test transmissions began at Daventry at

MAKE THESE DATES
WITH YOUR RADIO

world champion, Dr. Euwe, and three former world champions, Capablanca, Alekhine, and Lasker—as well as tournaments for players of lower grades. The Congress lasts till August 28th. On August 10th an eye-witness account of the opening

OPEN-AIR RADIO



This happy group, snapped in Oxfordshire, gives some idea of the joys of a good portable, in this case the latest McMichael.

the end of 1932, controlled by Mr. Hayes, and since the transference of the National and Midland transmitters to Droitwich, the Daventry station has been entirely devoted to Empire transmissions. The number of transmitters and aeriels has been increased, and the area covered has been extended. Mr. Hayes is Director of Overseas and Engineering Information at Broadcasting House. He was formerly the B.B.C.'s foreign liaison officer, and is its delegate to the Union Internationale de Radiodiffusion.

Berlin Olympic Games: August 1st to August 16th

THE special arrangements for the broadcasts from Berlin will be as follows:—

August 6th. Final of the 1,500 metres flat.

August 7th. Final of the 400 metres flat.

August 8th. Final of the 3,000 metres steeplechase.

August 11th. Swimming Final of the men's 4 x 200 metres relay, and the ladies' 200 metres breast stroke.

August 14th. Rowing. Final of the coxswainless fours and final of the eights.

August 16th. The closing ceremony.

During the broadcasting of commentaries by experts on specific events, it is hoped to give eye-witness accounts of events of general or particular interest that have just taken place, so as to tell a general story of the progress in the Olympic Games.

Chess Masters at Nottingham

NOTTINGHAM is holding a special Chess Congress in which there will be a Masters Tournament—including the

of the Congress will be broadcast from the Midland transmitter, and it is probable that some of the masters will speak. There will also be a critic's survey of the Congress at the close. The British Chess Federation are the official hosts; and the Nottingham Association the local hosts. The scene will be the University College.

The "Summer Revellers"

THE "Summer Revellers," presented by George Hay and Gordon Lane, will be broadcast in the West Regional programme, from "The Pavilion," Burnham-on-Sea, on August 13th, when the cast will include Betty Millar (soprano), Mildred Beaumont (comedienne), Ruth Brandon (soubrette), Reg Back (light comedian), Rupert Harvey (tenor), Edward Wellington (entertainer at the piano), and Bert Hollman (comedian).

"Top o' th' Tower"

"TOP O' TH' TOWER" is the title of the big Blackpool Night's Entertainment which is being presented by Victor Smythe for the benefit of Empire as well as North Regional listeners on August 13th. The dialogue has been specially written by Frank A. Terry, and the show will be compered by D. W. King. An intricate organisation of microphones will enable listeners to hear excerpts from shows in progress at the Tower, Palace of Varieties, Opera House, Empress Ballroom, Central Pier, Tower Circus, Tower Ballroom, South Pier, South Shore, and Pleasure Beach. Reginald Dixon, Larry Brennan's Band, Bertini's Band, and

George Lockhart (the famous Equestrian Director) are among those who will be taking part, and it is hoped that there will be contributions by Gracie Fields and George Formby.

From All Over the Region

A TRIPLE dramatic bill will be broadcast in the North Regional programme on August 10th. Manchester, Leeds, and Newcastle will be represented. Leeds' contribution is a Yorkshire comedy by Kit Higson, entitled "The Devil Was Sick." This will be produced by James R. Gregson and Arthur Spencer. From Manchester comes "The Moon," a short play by Dora M. Broom, produced by David Ormerod. Finally, Newcastle is represented by "Abigail Tysacke," "The Glass Blower's Daughter," or "The Miracle of St. Mary's Well," an old legend of the Ouse Burn, by Norman Veitch, produced by Jan Bussell.

Songs by German Campers

FOR the All-Regions Children's Hour on August 15th, there will be folk-songs by a group of German boys—members of the Youth Movement—who are camping near Bromsgrove, in Worcestershire. The same programme, which also includes a play, will be broadcast in the Empire Service earlier in the day.

To the Seaside and Back

NOT long ago three young people from the South Yorkshire coalfields were taken on a day's trip to the seaside resort of Bridlington, where they availed themselves of the usual holiday facilities for amusement—facilities with which, however, they were quite unacquainted. The lady who accompanied them took a note of everything that was said that day, both on the train journeys and at the seaside; and on August 9th Northern listeners will hear what is to all intents and purposes a literal transcription of some of their conversation. It should prove a surprising programme.

SOLVE THIS!

PROBLEM No. 203.

Jones complained to his technical friend that his battery set was consuming too much current from the H.T. battery, and was advised to fit an economy type pentode in place of the existing power pentode valve. When the substitution was made, however, he was disappointed to find that quality was very poor and volume much lower than with the old valve in use. Why was this? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes should be marked Problem No. 203 in the left-hand corner, and should be posted to reach this office not later than the first post Monday, August 10th, 1936.

Solution to Problem No. 202.

If the pentagrid valve was oscillating, a definite increase in H.T. current consumption should be registered by short-circuiting the oscillator reaction winding or by short-circuiting the grid leak of the oscillator section of the valve.

The following three readers successfully solved Problem No. 201, and books are accordingly being forwarded to them: J. Armstrong, 77, Earl's Court Road, London, W.8; Chas. Wright, 176, Sissons Road, Leeds, 10; F. Williams, 36, Adam Street, Cardiff.

Easy Fault-finding— Without Instruments

THE value of a good milliammeter or multi-purpose instrument has often been stressed in these pages, but it is surprising to find how many of the simpler types of fault can be traced without the use of any kind of meter. And when a meter is available it is often better to make a number of preliminary tests without using it—even the experienced service engineer does not take measurements until he has

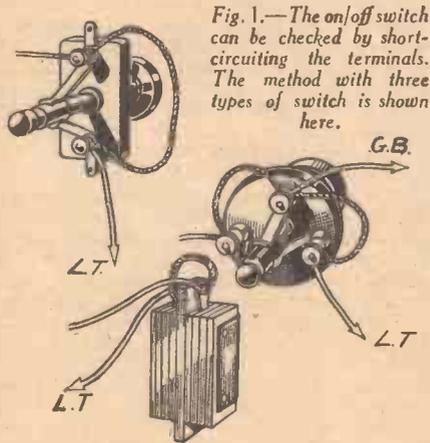


Fig. 1.—The on/off switch can be checked by short-circuiting the terminals. The method with three types of switch is shown here.

formed some kind of idea regarding the fault which exists. Moreover, all of the preliminary tests depend more upon common sense and a general knowledge of how the receiver operates than upon advanced technical knowledge. Even the beginner can find out a considerable amount by making simple and logical tests; if he is then unable to correct the fault he can more easily obtain the necessary information from a friend or from THE PRACTICAL AND AMATEUR WIRELESS Free Advice Bureau.

When the Set is "Dead"

In the first place, let it be assumed that a battery set which had previously behaved normally suddenly refused to "work." This must be due to a broken circuit at some point in the receiver: a valve filament might have burned out; a wire might have come adrift; one of the aerial, earth, or speaker leads might have broken or slipped away from its terminal; or a component might have developed a sudden fault. It is obvious that a start must be made by carefully examining the connections, preferably by gently "prodding" each wire with a pencil while the set is switched on. If that does not yield any result, the effect of switching the set on and off should be observed. There should be a click in the speaker when this is done; if not, the battery connection should be suspected, whilst the effect of removing and replacing the H.T. wander plugs should be tried. The accumulator terminals and connections should also receive attention, and any dirt or corrosion should be scraped away. See that the speaker leads are properly connected to the receiver and to the speaker, and try the effect of short-circuiting the terminals of the on/off switch with a short piece of wire, as shown in Fig. 1. If the latter causes signals to return,

it will be evident that the switch is faulty, and should be repaired by bending the spring contacts, or else replaced.

Start with the Last Valve

Should none of these tests give any indication of where the fault lies, and if there are no sounds from the speaker when the H.T. wander plugs are pushed into the battery sockets, it will be fairly safe to assume that the trouble lies with the last valve or with the loud-speaker itself. It is, of course, assumed that it is known that the H.T. and L.T. batteries are in fair condition—if they are not, it is unlikely that the set would become "dead" suddenly.

In order to test the valve properly, meters are required, but a good indication can be obtained by replacing it with one of the other valves in the set. Should it be found that the speaker then makes even a slight clicking noise when switching the set on and off, the valve can be suspected. Probably the local dealer will loan a new valve for the output stage so that a final check can be made. Assuming that there is still no response, the speaker will come under suspicion, and can be tested by connecting one lead to the positive terminal of the accumulator and touching the other lead against the negative terminal. If the speaker is in order there will be a fairly loud click both as the contact is made and broken; absence of sound suggests that

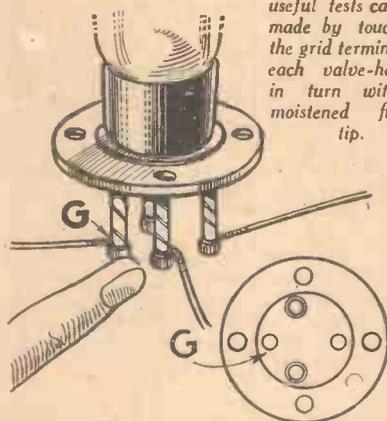


Fig. 2.—Many useful tests can be made by touching the grid terminal of each valve-holder in turn with a moistened finger tip.

the speaker is defective. A further test might be made, however, by replacing the accumulator with a 9-volt G.B. battery.

Systematic Grid Tests

Despite the absence of signals, it will often be found that a click is heard in the speaker when the set is switched on, or when the positive H.T. wander plug is

Some Simple Tests which you can Apply when the Set Ceases to Operate, when Signal Strength is Poor, or when there are Crackling Noises

inserted. It will then be evident that the fault is somewhere in the set prior to the anode circuit of the last valve. Moisten the finger-tip, and touch the grid terminal of the output valve (see Fig. 2). A noise should be heard in the speaker when this is done, but if not the transformer or grid condenser and leak connected to the grid (according to whether transformer or R.C. coupling is used) is probably at fault. Repeat this test by touching the grid terminals of preceding valves one at a time until a point is reached at which no sound whatever can be heard in the speaker. As soon as this valve is reached it will be known that the fault lies in the circuit of that valve; the valve or one of the components connected to it must be defective. The grid-circuit components can be eliminated from the test by removing the wire joined to the grid terminal and repeating the test. If it is found that a sound can then be heard, the grid-circuit components are known to be the cause of trouble.

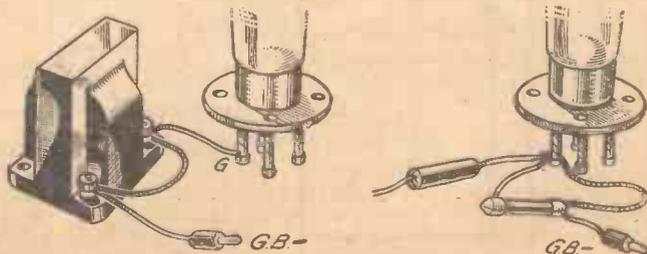
The tests described should make it possible to locate the faulty part of the set, so that assistance can be asked, or so that the suspected components can be tested separately or replaced one at a time. The necessary tests do not come within the scope of this article, but they have been fully described in previous articles in this journal.

Crackling Noises

Instead of the set being completely "dead," we might now consider the procedure when trouble is experienced due to crackling noises. Actually, most of the tests described can be applied in the first place, but others are necessary. The first should be to disconnect the aerial and earth leads and see whether the trouble ceases; if it does, the cause must have been interference from outside the set, when more thorough tests must be instituted. But should it be found that the disconnection has no marked effect, the set should again be examined for bad or loose connections. See that the valves are fitting tightly in their holders; gently press each from side to side to see if the valves are loose, or if the holders are damaged. Tighten up the terminals on all components, and clean any that appear dirty. Make sure that the H.T. wander plugs are clean and fitting tightly, and look for partial short-circuits between any two wires, between a wire and a screen, or between the metallised coating of a valve and a lead running close to it.

(Continued on page 538)

Fig. 3.—Progressive tests can be made by short-circuiting the grid circuits of different valves. Methods are shown for transformer and R.C. couplings.



A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

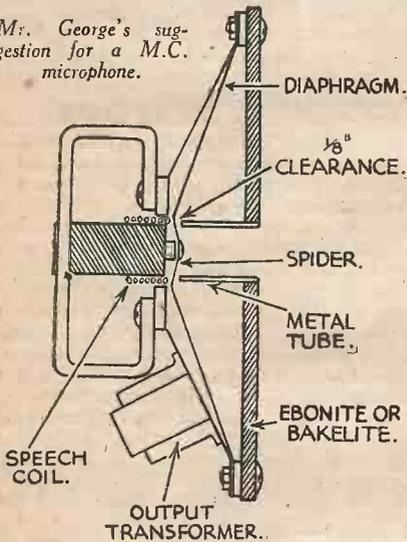
THE HALF-GUINEA PAGE

M.C. Speaker Microphone

HERE is a method of eliminating the "heavy" effect produced when a moving-coil loudspeaker is used as a microphone:

A sheet of bakelite is cut to cover completely the diaphragm of the loudspeaker. A hole is then cut at the centre, of which the diameter is equal to the diameter of the speech coil. A tube, made of metal or thick cardboard, is then inserted into the hole until it is $\frac{1}{4}$ in. from the spider or face of the speech coil, and it is then mounted firmly in position. The microphone is coupled to the receiver or amplifier by means of the output transformer on the loud-

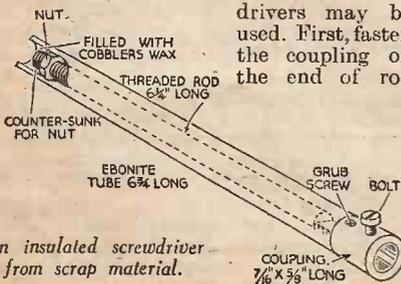
Mr. George's suggestion for a M.C. microphone.



speaker frame. Since the sound waves impinge upon the speech coil and are prevented from acting upon the diaphragm, the response is more natural and the "heavy" quality usually associated with this type of moving-coil microphone is absent.—J. M. GEORGE (Caerleon).

An Insulated Screwdriver

THE diagram shows how an insulated screwdriver can be made up out of materials found in the scrap box. The parts that I used were an ebonite tube, and a brass rod that I had used in the lead-in tube through the window, and a coupling off an old tuning dial. It will be seen that different sizes of drivers may be used. First, fasten the coupling on the end of rod



An insulated screwdriver from scrap material.

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.

where a flat is first filed, and then tighten the grub-screw. Next run the soldering-iron round (for those who cannot solder, I would advise two grub-screws). Next drop the nut in the ebonite tube where it is countersunk and screw the rod in it; fill the top in with cobbler's wax and it is completed. It would be as well to file a flat on the drivers so that they will not slip.—H. SCHOLES (Rochdale).

An Addition To the Test Gear

TO facilitate the servicing of sets where illumination is bad, and where under-chassis work necessitates a torch, with the detriment of having to hold or prop it in a suitable position, I constructed the apparatus as illustrated, and can vouch for its decided usefulness in the test gear.

The construction is very simple, as the drawing shows, and excepting that those who wish to make up this job may not have the "can," as shown (this having been procured from an old well-known binocular all-wave H.F. choke), no other difficulty should be experienced.

No doubt other modifications will suggest themselves, and I hope the model illustrated will prove of assistance.—W. R. HOBBS (Ilford).

An Extension Speaker Circuit

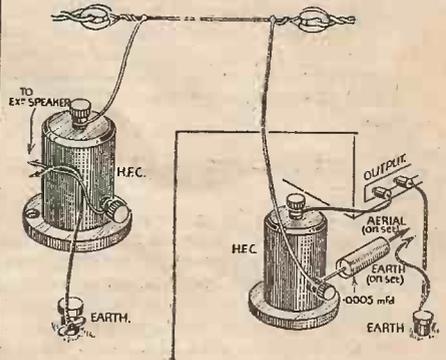
WISHING to use a speaker at some distance from the house, I hit upon the idea of using the aerial as a transmission line as well as for its normal use.

The circuit is quite simple and the speaker is fed from any part of the aerial or down lead, through an H.F. choke to earth, needing but one lead from the aerial and an earth spike.

At the set end, if transformer output coupling is used, one side of the output is earthed and the other fed through an H.F. choke to the aerial, the aerial being connected to the aerial terminal on the set by a small mica condenser of about .0005 mfd. If choke capacity output coupling is used, one side of the output is already earthed, it only remains to couple the other side to the aerial through the H.F. choke.

The H.F. chokes should be of low resistance; the speaker one can be an old 150 or 250 plug-in coil, but the one at the set end should be screened or kept well away from the set.

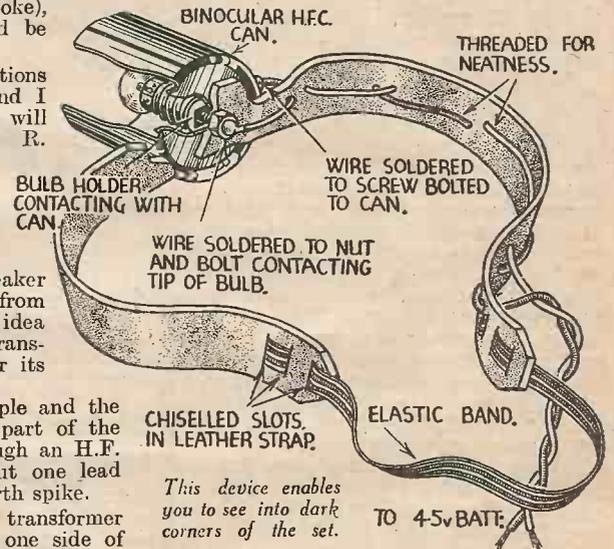
An input impedance of about 2,000 ohms is best, as this is a happy medium between cutting of high notes by the H.F. chokes



Using an aerial as an extension loudspeaker lead.

and condenser, and resistance losses in the H.F. chokes.

The impedance of the aerial coupling coil in the set being, at audio frequencies, only a few ohms, the aerial feed condenser is in parallel with the output, and both the H.F. chokes are in series with the output.



This device enables you to see into dark corners of the set.

Low-impedance speakers of about 3 ohms cannot be worked on this system as the resistance of the H.F. chokes would take all the power.—R. V. PARSONS (Gloucester).

PRACTICAL MECHANICS
6d. EVERY MONTH.

Practical Television

August 8th, 1936. Vol. 3. No. 14.

Television Announcers as Make-Up Models

THE new television announcers—Jasmine Bligh, Elizabeth Cowell and Leslie Mitchell—are to lend their faces to a group of make-up experts for experiments at Alexandra Palace in August, the idea being to discover just what combination of paint and powder are best suited to the television transmitter. In the course of the tests, which may last several days, the hostess announcers and their male colleague will have to submit to almost every type of facial make-up; and their ordeal will not be lessened by the fact that the two different television systems under test—Baird and E.M.I.—call for different colour treatment to get the best effects.

Television Staff Moved to Alexandra Palace

"ZERO Hour" in television really occurred last week, when Mr. Gerald Cock, Director of Television, and Mr. D. H. Munro, Productions Manager, took up their new quarters in Alexandra Palace. During this week, the remainder of the Productions staff will move to the television station.

One of the first problems to be tackled will be that of studio lighting, and Stephen Thomas, the well-known stage director, and now a television producer, will concentrate on this task in co-operation with the two newly appointed stage electricians. The dispositions of the studio lights and their general grouping will materially affect the quality of the televised picture.

Service

SERVICE in so far as it is related to radio is to-day becoming a very specialised subject demanding a thorough and up-to-date knowledge of measurements, fault location and problems of interference. The advent of television, especially during the initial stages, is sure to open up opportunities for service engineers with a training in television technique. The standard of reception will be raised and each set installation must be examined from quite a different angle than would be the case for aural radio. These points were referred to very forcibly during the recent presidential address to the Institute of Wireless Technology. As far as is known this is the only professional body of engineers which has a special examination in the subject of television in order to qualify for associate membership, while medals are also awarded for outstanding contributions to the field of television research. In any case it seems very desirable that television service as applied to the actual receiving sets should be undertaken only by fully qualified technicians, otherwise harm may be done to what is sure to prove a very flourishing industry.

A Private Television Demonstration

A FEW days ago the Radio Corporation of America gave an ambitious demonstration of television reception in New York to a large audience of radio manufac-

turers. Transmitter and receiver were separated by about a mile and an ultra-short-wave radio signal link was used. Iconoscopes formed the scanners at the transmitting end, while cathode-ray tubes functioned as picture reproducers at the receiving end. A very varied programme of entertainment was televised, including dancing, fashion displays, comedians and short film excerpts. No doubt this was to show the standard of performance reached with the R.C.A. equipment, but it was emphasised that no attempt is to be made this year to market television receiving sets for the American public.

IN BERLIN



This close-up shows the two dipole aerial arrays on the top of the Berlin Radio Tower. One is used for sound and one for vision, and it will be noticed that the aeriels are so arranged that the radiation is horizontally polarised.

An American Viewpoint

IT is interesting to note the points of view expressed by the American Radio Manufacturers Association recently as far as television is concerned, for they regard it simply as a logical future extension of radio. The association is endeavouring to formulate plans which will ensure a service capable of covering the needs of the whole nation as far as possible. Unlike this country, which is saddled with a double standard of definition and picture frame speed, the Americans are keen to find a single set of conditions so that any set is capable, without complication, of receiving

any transmission within range. The picture itself must be comparable with home-movie quality. This last named is claimed to require a picture dissection of at least 450 lines, although it is realised that the modulation frequency to give full measure to this is at least six megacycles. The R.M.A. are asking for an experimental television signal band of frequencies starting at 120 megacycles (2.5 metres). On this carrier no difficulty will be experienced in working the full modulation band, but peculiar effects may arise owing to the higher degree of absorption, while screening is more marked. A rather remarkable statement was made to the effect that television must be withheld from the public until it is full grown, as it could not feel its way through the early stages of commercial growth as was the case with aural radio. This conflicts very forcibly with the attitude of Farnsworth, who, as pointed out previously in this journal, welcomed the active co-operation of both the amateur constructor and the general public, being of the opinion that this would expedite growth and enable a satisfactory service standard to be achieved quickly.

German Enterprise

THE Germans are certainly sparing no effort in an endeavour to ensure the success of the Olympic Games now being held in Berlin. Apart from the athletic side of the games themselves, it is now announced that no fewer than twenty-five viewing centres are to be established in Berlin where those sections of the events that are televised can be seen on receiving screens by members of the public unable to secure seats in the arena. The picture reproducers are to be cathode-ray tubes, and the screen size and brilliance will be such that audiences of fifty people will be able to watch each set that is employed. The resultant Press publicity which this effort will bring about is sure to add considerably to German prestige as far as television is concerned. With this will be coupled the ambitious plans for large-scale demonstrations at the Berlin Radio Exhibition also opening in August, a striking contrast to the present proposals now made for our own Radiolympia.

Direct or Indirect?

WHEN the details of commercial television receivers become available it will be very interesting to see whether direct or indirect picture viewing will be the most popular. In the case of small size cathode-ray tubes whose length is not untoward, then it seems certain that the picture will be watched directly as it is built up on the fluorescent screen. The tubes can be mounted horizontally without making the set too deep for comfortable accommodation in the room where viewing is to be undertaken. With large diameter tubes, however, the resultant length of the glass bulb and neck where the electrodes are incorporated makes it rather awkward to house the tube horizontally. The best solution in this case seems to be that of vertical mounting. The picture traced out on the horizontal screen can then be seen by observing it as a reflection in a mirror inclined at an angle of 45 degrees. Care must be taken to ensure that the mirror is of good quality and not too thick, otherwise a measure of optical distortion will evidence itself; but apart from this the scheme seems a very sound one and enables the remainder of the receiver equipment to be mounted very conveniently in a cabinet standing no higher than a normal radiogram.

On Your Wavelength

Lost Chords

I WAS interested to read the other day that a band leader played a 'cello at Llandudno—made it sing, sob, throb, and then suddenly made it buzz, rattle and screech. He must have found the long lost chord, and he retired to investigate. Found his instrument full of glass—broken glass—a legacy from a motor-coach accident on the way down from London. Bram Martin was the man—the one who says that he will have nothing more to do with women crooners. The incident reminds me of an accident which happened some years ago at a motor-cycling Gymkhana. A motor-cyclist skidded into the orchestra, whereupon a flautist in his excitement swallowed several inches of his instrument, whilst the man with the big drum beat it.

I Split an Infinitive

G. H., of Bristol, takes me to task for splitting an infinitive in a recent note. By nature I am a purist and a pedant, and must



Lost chords.

apologise for my lapse. It is unfortunate, however, for my critic that in his letter he should be guilty of using a terminal preposition which, I think, is a worse crime. He thinks that the original Ford car and the Austin Seven were made famous by jokes and that if I continue to administer my calligraphic flagellation crooners, too, may become famous. He omits to notice the subtle distinction; both the Austin and the Ford are good cars and no joke can assail their merit. But crooners do not possess merit. This correspondent suggests as an interval signal a crooner trying to reach top C at the bottom of the sea. That's where they all ought to be—at the bottom of the sea.

By Thermion

Eye Bathing Banned

THERE are still a few creatures who think that by means of television we shall be able to spy into one another's homes at the most awkward moments. With many of these people the wish is father to the thought. Perhaps they think they can tune into Thermion, or the private lives of their neighbours. One dear lady with imagination and perhaps hope, remarked at last year's radio show that she really did not want the B.B.C. to broadcast her in her bath. I hope I am not shattering the hopes of thousands of my readers when I say that this cannot possibly happen. My readers will not be able to look in and see me some time. As some slight consolation to their thwarted desires I am therefore publishing a sketch of myself in liquidation. Those readers who are not my fans will, of course, not be such cads as to look at the sketch.

Anonymity

ONE of the questions recently before the B.B.C. concerned the announcement or otherwise of announcers' names. The problem is not an easy one to solve for various reasons, but how much more difficult it would become when television programmes start! If the B.B.C. consider it advisable still to enshroud their announcers in anonymity, how would they manage? For a face is as good as a name for identification purposes. I can only suggest that the gentleman who announces should wear a black silk domino and the ladies some attractive form of yashmak, but then I am too frivolous-minded to give the matter the serious attention it deserves. I have seen the two ladies who will announce the television programmes. I have had tea with them. I can assure you they are most charming, and have the essentials of youth and beauty. I always feared that the B.B.C. might pick a couple of frumps because they had written a thesis on the declining tendency of modern times; or selected a couple of angular females of the duenna type.

Ho Hum

I RECENTLY encountered a minor problem which almost had me completely stumped. A friend of mine (yes, I still have friends) recently removed to a new house, and discovered that his set had developed a hum rather annoyingly louder than that previously experienced. He wisely invited my counsel, and I, of my mere goodness and graciousness, condescended to help him. He explained that he had connected his earth wire to the main water pipe in the loft. I suggested that the earth was probably the trouble, and was he quite sure he was using the main water pipe. He said yes, he had asked the local plumber, and was quite satisfied on that point. "Try another earth," I said. "All right," he replied. He fixed up an outdoor earth with satisfactory results. Short time later he reported that the loft earth was now working O.K. but that the outside earth was giving rise to hum. Together we tried the two earths, but both were at fault. Eventually we discovered that the



Myself in liquidation.

trouble lay with the power point in the wall, the plug of which, being a standard two-pin plug, could be placed in the socket either way.

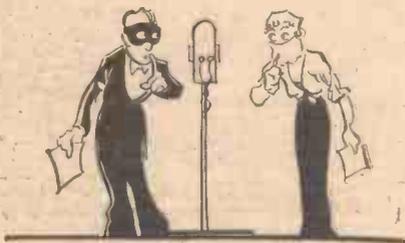
Radio Show

ALREADY the staff is busy preparing for the special Show issues. Olympia is upon us. It seems only a few weeks ago that I indulged in my annual peregrinations, quaffing the nectar, and strolling from bar to bar. This year's exhibition promises to be the most interesting in the whole series of the radio shows, for it will be the first in which television apparatus will be present with public appeal. Previously television apparatus interested but a com-

paratively small number of amateurs, but as we are *promised* television programmes some time this year, next year, the year after, or at some even more distant date, the public must this year become interested in it. When the programmes do start I foresee a great boom in home construction. It seems that the complete commercial television receivers will cost at least £50, and I estimate that it will be possible to make one for about £20. The staff of this journal have had in operation for more than a year a successful Cathode-ray Tube television receiver. I wonder if the design will be unloaded this year? The Editor in his wisdom refuses to invite his readers to spend money until some programmes are available. Note to intending visitors to the exhibition—please leave your autograph books; don't wait for me to sign them.

The Village Shop

IT is interesting to note that J. Breese Davies, a country shopkeeper from Dinas Mawddwy, will give the fourth talk in the series entitled "Hen Gymeriadau Gwledig" (Old Country Characters) on August 10th, when his subject will be "Siop y Pentref" (The Village Shop). The speaker is something more than a mere shopkeeper, for he has won numerous prizes at Eisteddfodau for essay writing, and has contributed many articles to periodicals and



Preserving anonymity.

magazines. One of his brothers is a minister in Sangareddi, and an authority on Telugu; another is head of the Copyright Department of the British Museum, and his sister also writes. J. Breese Davies was unfortunately debarred from a physically active career by an illness which caused him to be laid up for five years in a Thomas Splint. However, he has derived a great deal of profit and amusement from his daily work as a shopkeeper and in his talk on August 10th, he will describe some of his experiences, pointing out the changes which have come over his customers in later years, and showing how he and they



Phone Reception

IF reception is to be effected by means of headphones, a three-valve receiver using an untuned H.F. stage followed by a triode detector, resistance coupled to a small power valve, can generally be relied upon to give a very satisfactory performance. If a speaker is to be employed, however, transformer coupling should be used between the detector and output valves, or a fourth valve can be introduced in the form of an L.F. amplifier between the detector and the power valve. Resistance coupling should be used between the detector and the L.F. valve with a transformer between the last two valves.

Condenser Leakage

THE source of crackling noises in a set can generally be located by short-circuiting the grid circuits in turn, commencing with the output valve. For example, if the crackling stops when the grid circuit of the last valve is shorted, but not when the detector grid circuit is shorted, it can be assumed that the defective component is situated between the detector and output valves. A receiver was tested in our laboratory last week, however, which proved that this reasoning is not always correct. A very heavy crackling noise could be heard in the speaker which stopped immediately the detector valve was removed. It also stopped when the L.F. transformer windings were shorted, but continued after the detector grid had been disconnected from the detector-tuned circuit. This indicated a defective detector valve, but the same trouble was experienced when a new valve was fitted. The valve-holder was next suspected, but tests indicated that the sockets of this were making good contact with the valve pins. It was eventually found that the detector stage was quite in order, the crackling being picked up in the same way as external interference, from a leaky modulation hum by-pass condenser in the mains unit. The leakage was so small that it had no effect on current consumption and voltages, but was sufficient to produce minute spark discharges which were picked up by the sensitive detector valve.

adjust themselves to a changing world. This should be well worth listening to.

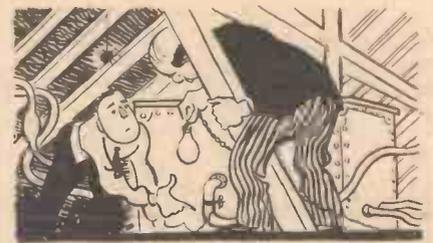
A Manchester Lecture

THE Northern Distributors of Ferguson receivers will hold a lecture at the Midland Hotel, Manchester, on Wednesday, August 12th, at 7.30 p.m., when Mr. J. B. Ferguson, who is in charge of the production programme of the Ferguson receivers, will give an address on "American methods of manufacture as compared with British."

Imaginary Biography: August 16th

MISS HELEN SIMPSON, well-known novelist, is going to the microphone to give some "Recollections of Dame Partington."

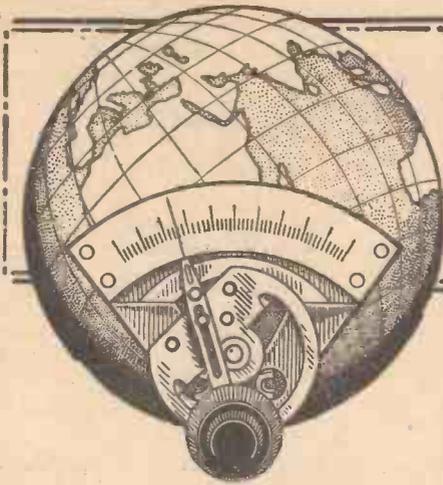
In October, 1831, the Reverend Sydney Smith made a speech at a political meeting at Taunton, in which he said: "The attempt of the Lords to stop the progress of Reform reminds me very forcibly of the great storm of Sidmouth, and of the conduct of the excellent Mrs. Partington on that occasion. . . . In the winter of 1824 there set in a great flood upon that town—the tide rose to an incredible height—the waves rushed in upon the houses. In the midst of this sublime and terrible storm Dame Partington was seen at the door of her house, with mop and pattens, trundling her mop, squeezing out the sea-water, and vigorously



Difficulties with the water-pipe earth.

pushing away the Atlantic Ocean. The Atlantic was roused, Mrs. Partington's spirit was up; but I need not tell you that the contest was unequal. The Atlantic Ocean beat Mrs. Partington. She was excellent at a slop or a puddle, but she should not have meddled with a tempest. Gentlemen, be at your ease—be quiet and steady—you will beat Mrs. Partington."

It is of the redoubtable lady mentioned in this speech (which, incidentally, is held to have done more for the success of the Reform Bill than anything else written or spoken in England that year) that Miss Simpson will speak.



SHORT WAVE SECTION

NOTES ON U. S. W. AERIALS

The Knowledge that the High-definition Television Signals are to be Radiated on the U.S. Waves has Made the Question of Aerials an Important One.

By H. J. BARTON CHAPPLE, B.Sc.

THE increasing activities in the ultra-short-wave band of wavelengths has been redoubled in anticipation of the service of signals which are to be radiated from the Alexandra Palace for the dual transmission of sound and vision. But no matter how efficient is the radio transmitting or receiving apparatus, unless the aerial systems used in conjunction with the equipment are efficient, signal strength will be lost and add considerably to the difficulties of maintaining a signal communication of true service value.

With the broadcast band of wavelengths the length of wire used for the receiving aerial proper is but a fraction of the wavelength employed, and recourse has to be made to "loading" in order that the complete system may resonate to the propagated frequencies. In the case of ultra-short waves, however—that is, those which have been fixed arbitrarily between the limits of one metre and ten metres—this condition does not operate. The antenna, as a rule, is made of such a length that it is a definite fraction of the wavelength used (or in some cases the average length of the range of

waves covered) without any loading in the same sense of the word.

The Dipole

Considering for the moment the question of television signals, and appreciating that interference of certain types can upset the resultant picture, the installation of the aerial for reception purposes becomes very important if the best results are to be achieved. As in the early days of aural radio the possible number of designs are sure to be legion, but as far as can be seen at the moment the dipole aerial is sure to loom prominently in the sphere of activities. As its name infers, this aerial has a length which is almost exactly half the wavelength of the station it is required to receive. Now, at Alexandra Palace two wavelengths are to be employed—6.67 metres for vision and 7.23 metres for the accompanying sound. These correspond to lengths of 21.9ft. and 23.7ft. respectively. If anyone desires to pick up the sound transmissions alone, therefore, the length of the aerial proper should be between 11ft. 6in. and 12ft., but when the dual transmission is required it is better to make the aerial (if only one is to be used) between 10ft. 6in. and 11ft. This is the length of the horizontal or vertical portion (see Fig. 3). Until it is stated what type of transmitting aerial is to be employed at the Alexandra Palace, it is not known whether the radiation is vertically or horizontally polarised, but, no doubt, it will be the former. If this is correct, then it is better to mount the aerial vertically, having it well insulated from any form of mast support.

Height

Stand off porcelain insulators are excellent for this work, the insulators themselves being mounted on a weathered wooden batten so that the aerial can be hoisted on the mast to any convenient height, with the halyard attached to the batten. Porcelain cleats can also be used as shown in Fig. 2, and the aerial is made up from heavy-gauge copper wire.

Neglecting the feeder for a moment, it is very essential to erect the aerial in as high a position as possible so that it is facing the transmitting station. It is known that ultra-short waves when radiated tend to exhibit the same characteristics as light waves and travel in straight lines to the point of reception. This accounts for the necessity of height, but another very important factor is involved in the same question—namely, interference. The worst type are the radiations from the ignition systems of motor-cars to which suppressors have not been fitted, and also

from high-frequency medical apparatus. Fortunately, the distance travelled by these interfering waves is, as a rule, fairly short—something of the order of 50 yards—so that by elevating the aerial it will be removed from the interfering zone.

The importance of this will be realised by those users of receiving apparatus situated near a main road where traffic is fairly heavy. If a mast on the roof is not possible, then it is better to have the aerial mounted on a pole at the end of the garden remote from the roadway. Before finally choosing the position, the reader is advised to carry out a few interference tests, for it is sometimes found that moving the aerial only a few feet is sufficient to ensure that interference is reduced to a negligible quantity, the aim being, of course, to secure the maximum signal-to-noise ratio. As an example of a well-stayed mast and aerial used for special experiments reference should be made to Fig. 1, for, although the site was in a densely-populated area, the



Fig. 1.—A good example of an aerial erection on a roof to secure maximum height.



Fig. 2.—A vertical dipole aerial supported by porcelain cleats, and fitted with a flex feeder.

evidence of roof tops shows that every effort has been made to obtain the maximum height under difficult conditions.

Feeders

Next comes the question of linking the aerial proper to the receiving set by means of a feeder. With the ordinary dipole this is quite a simple matter, for the aerial is made up from two spans whose total length is half the desired wavelength. These spans do not quite touch at the centre, and to the two wire ends is joined the feeder. In many cases, these need only be heavy-gauge twisted rubber-covered flex. Alternatively, the feeder can be lead-cased with the lead covering earthed, while yet another way of reducing or eliminating interference picked up by the feeder itself is to use cross-over insulators through which the feeder wires are led. If lead-cased cable is employed and the aerial is on a mast at the end of the garden, it is a very good plan to bury the cable in a trench so that it emerges from the ground at a point near to where attachment to the receiving set is to be made.

Coupling to the set is undertaken by one or more loops which induce a magnetic field in the tuning coil of the set. In addition, for optimum results, the twin wire feeder should be made of such a length that it is an odd multiple of half the aerial length—that is, 1, 3, 5, etc., times a quarter of the wavelength being radiated.

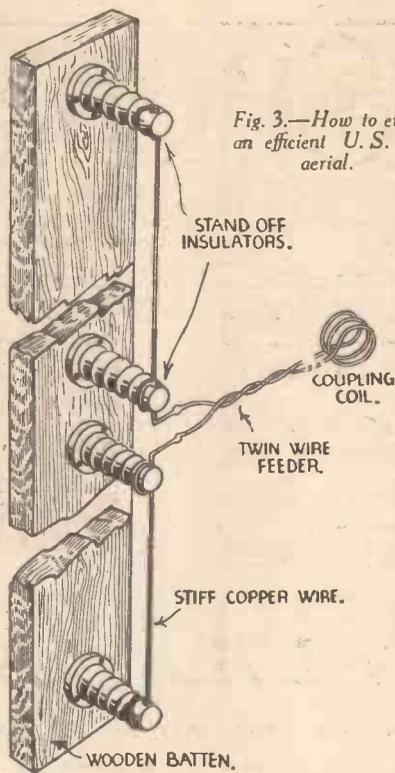


Fig. 3.—How to erect an efficient U.S.W. aerial.

Signal Strength

It is known that many important experiments are being conducted with a view to increasing the efficiency of the ultra-short-wave receiving aerial, especially from the point of view of reducing interference pick-up, and once the high-powered station has been established at the Alexandra Palace the results of this work will soon be made known. According to field strength figures which have been published for tests from other sites a signal of 1,000 micro-volts is sufficient to ensure a good-quality picture. Figures lower than this can still give good results, but more care may be necessary in aerial location and feeder runs. In addition, inside dipole aerials may be sufficient for providing adequate signal strength if the house is not badly screened by tall trees and buildings from the source of the radiated signal, but these points can only be settled completely after the sound and vision service has started. In the meantime, advantage can be taken of both the amateur transmissions in the ultra-short-wave region together with the B.B.C. test signals which are radiated quite frequently from the aerial on the roof of Broadcasting House.

NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

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Strand, W.C.2.

WEATHER conditions, although not so favourable as they have been, are not yet such that it is possible to tune in on any evening a desired station with the full assurance of securing good reception. For this reason I have been trying out at odd times during the day and night various sections of the different bands, and although this policy of indiscriminate searching is not one to be generally recommended, as it happens much interesting short-wave information has been collected in this manner.

U.S.S.R.

Apparently the U.S.S.R. is very rapidly extending its broadcasts, and a further channel has been added to the short-wave network. On roughly 15,150 kc/s you will find on Sundays an English talk between B.S.T. 16.00-18.00, RW96 on 15,180 kc/s (19.76 m.), following it up with another one at 20.30. The three wavelengths now used for these international broadcasts are: 19.76 m., 19.81 m. and 31.51 m., in addition to the regular transmissions on 25 m.

Another DX capture is HS8PJ, Bangkok (Siam), which has been broadcasting each Monday between B.S.T. 13.00-16.00 on 27.32 m. (10,980 kc/s). A correspondent informs me that this station has also been heard testing on 29.5 m. (10,165 kc/s), so possibly a new channel is being tried out.

Macao, China

For a really distant search it might be worth while to attempt to tune in CQN, Macao, China, a Portuguese station reported to be on the air every Monday and Friday between B.S.T. 13.00-14.30 on 31.49 m. (9,530 kc/s), and which has been asking for reception reports. Macao is about forty miles distant from Hongkong and eighty miles from Canton. Announcements are made alternately in the Portuguese and English languages. Reports should be addressed to Senhor Joaquim P. Estrella

Leaves from a Short-wave Log

de Oliveira, Administrator of Posts and Telegraphs, Macao, Portuguese China. I am informed that "veri's" will be sent if International Reply Coupon is provided.

COCQ, Havana

A call which I have picked up on two occasions which has greatly puzzled me is COCQ, Havana (Cuba), as I cannot trace it in any lists. The broadcast has been on the 31 m. band, in which so large a number of distant foreigners are now found. Although the frequency is regularly given out in Spanish, I have not heard it sufficiently clearly to translate and transcribe. I am of the opinion, however, that this must be a new Havana short-wave outlet of the programme of a medium-wave transmitter—possibly CMCQ, Havana. The address is: Calle Vista Alegre, 90, Vibora, Havana (Cuba). I would welcome any information any reader may possess or collect regarding this station.

Costa Rica

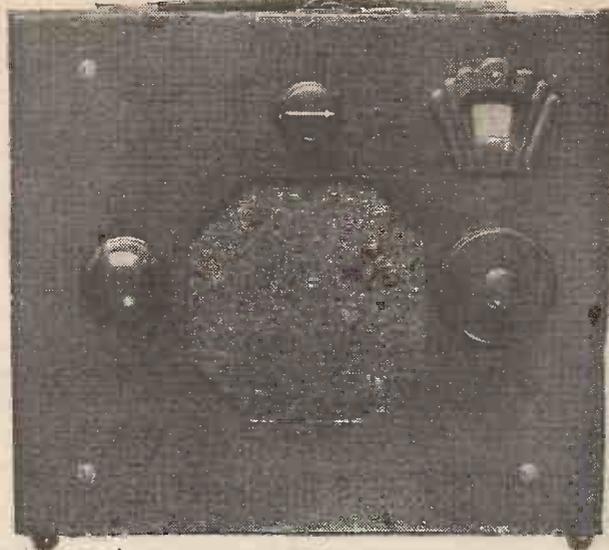
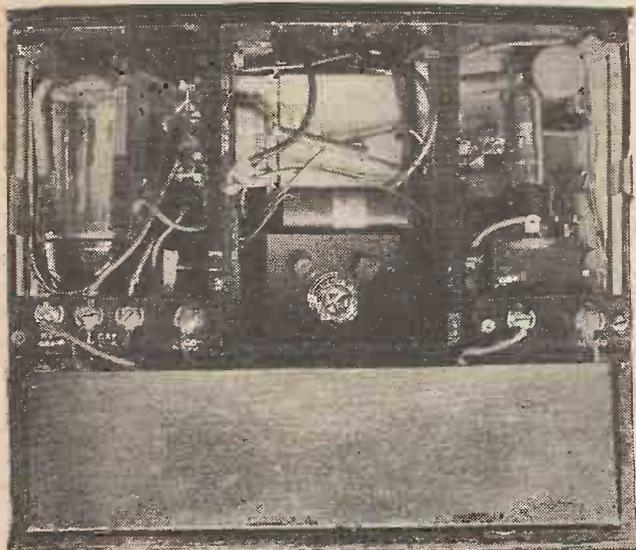
T12PG, La Voz de la Victor, San José (Costa Rica), so far working on 46.99 m. (6,385 kc/s), has been lately picked up on a much higher frequency, namely, 9,565 kc/s (announced), or 31.36 m., the VUB, Bombay, channel. No advice has been received to the effect that a change in wavelength was contemplated. If you hear the broadcast on the new frequency, write to: Casa Victor, Apartado Postal, 225, San José, Costa Rica.

A few days ago I was somewhat surprised to hear the PMN, Bandoeng (Java) programme on 15.93 m. (18,830 kc/s), as I was under the impression that PLE,

Bandoeng, the original possessor of this wavelength, had abandoned the programme broadcasts for commercial traffic. However, subsequent announcements made it quite clear that the transmission was on 18,830 kc/s (announced), and I gather that the station is on the ether every Tuesday, Thursday, and Saturday for thirty minutes from B.S.T. 16.00. The interval signal consists of several notes struck on gongs.

American Transmissions

Notwithstanding unfavourable weather conditions during the past few days, broadcasts from the U.S.A. on the 19 m. band have been received at great volume. The receiver must be tuned very carefully, as since DJQ, Zeesen, on 19.63 m. (15,280 kc/s), has taken to broadcast experimentally in the early evening, very little movement of the condenser is sufficient to swamp W2XE, Wayne (N.J.), relaying the Columbia system on 19.65 m. (15,270 kc/s). The 10-kilocycle separation is a very small one. Wayne, taking the WABC entertainments, gives out its call in about six different languages. W8XK, Pittsburgh (Pa.), the KDKA short-wave outlet on 19.72 m. (15,210 kc/s), is also a powerful signal and comes in well at dusk; also W2XAD, Schenectady (N.Y.), acting for WGY on 19.56 m. (15,330 kc/s), may be clearly heard from about B.S.T. 16.00 until it closes down at 20.00 B.S.T. LRU, Buenos Aires, on 19.62 m. (15,290 kc/s), when not swamped by DJQ can then be picked up, but as a rule it closes down before 21.00. It is an interesting portion of the band which in my experience during the past three weeks has been singularly free from atmospherics. Frequently when roaming around this section of the dial you will plunge into broadcasts by amateurs, and on most nights you may log CQ calls from fans not only in various parts of Europe, but also in the United States and South America.



A NOVEL MIDGET

A Reader's Two-purpose Unit which May be Used as a Portable Receiver or Extension Loudspeaker

THE receiver described in the following article was designed by the writer to fulfil two purposes, first, that of a really small battery-operated loudspeaker portable receiver, and secondly, that of an extension loudspeaker to operate from the main family receiver.

The finished apparatus, complete with a moving-coil loudspeaker, all batteries, frame aerial, etc., measures 9½ ins. × 8½ ins. × 4½ ins. wide and weighs about 9 lbs. If a pair of telephones are carried in the small compartment provided underneath the loudspeaker, then the weight will be slightly more, of course.

The receiver has a normal daylight range on the loudspeaker of 30 to 40 miles from a main B.B.C. station and some 80 to 100 miles from Droitwich on the long-wave band, although in North-West London, Radio-Normandie, Radio-Paris and Midland Regional can be picked up under favourable conditions. After dark a number of other stations can be received with a little care, the writer's best log being twenty-six stations in half an hour!

The Circuit

The circuit, shown in Fig. 5, comprises a conventional tuned-anode H.F. stage, followed by a detector and two transformer-coupled low-frequency stages. Hivac Midget valves, types X.S.G., X.D. and X.L. are used in the H.F., detector, and first low-frequency stages respectively, whilst a standard pentode such as the Hivac Y.220 is used in the output stage.

A small 7-amp. accumulator supplies the filament current and gives about 18 hours' use per charge. The H.T. current for the four valves is only 4½ mA at 80 volts and is supplied either from the Midget batteries now available or, as in the writer's case, from a battery made up from small "pen torch" cells, details of which are given later.

The receiver is quite stable in use provided the various decoupling components and by-pass condensers shown in the circuit diagram are used and the layout adhered to. It is completely free from hand-capacity

effects, which are a troublesome feature of most small portable receivers.

The Layout

A list of the components used is given at the foot of the centre pages of this issue. The makes specified should be adhered to as far as possible, as there is not much room for alterations which may be necessary if different makes are used.

Details of the chassis are given in the diagrams shown in Figs. 1, 2 and 4, whilst a wiring diagram is given in Fig. 3. Notice from these diagrams that the loudspeaker is not quite in the centre of the chassis, although the opening for the diaphragm in the front panel is, in order to balance the layout. The difference is slight but important. Notice also that the frame aerial tuning condenser C6 is set back from the panel about 1 in. and is operated by an extension rod in order to avoid hand-capacity effects.

The tuned-anode condenser C7 is mounted on an Ormond tuning dial. The latter is one of the dual type and has a second knob, concentric with the main tuning knob, which operates the reaction condenser C5. Unfortunately this dial is no longer a standard product, but if any difficulty is experienced in obtaining it, then it may be omitted and the condensers C5 and C7 can be mounted direct on the panel and operated with plain knobs or small geared dials. If the Ormond dial is used a spacing washer of brass or ebonite, about ¼ in. thick, should be inserted between it and the front panel, so that the friction dial clears the rim of the loudspeaker, which it overlaps.

The positions of the three transformers, T1, T2 and T3 are rather important and should not be varied. Notice that T3 has been removed from the loudspeaker chassis and mounted in a vertical position with the aid of a small brass bracket, so that its core is parallel to the panel, but at right angles to the other two transformers.

The H.F. choke, which should preferably be screened, is mounted underneath the

coil L2, and has its axis at right angles to the baseboard.

The positions of the components have been chosen with a view to reducing interaction with each other and also with the frame aerial to a minimum, and should be adhered to if instability is to be avoided. Only the principal dimensions of the chassis are given in Figs. 1, 2, and 4. The exact positions of the various parts are not critical provided the general layout and spacing is adhered to.

The Frame Aerial

It will be observed from figures 1 and 4 that the frame aerial is wound round the chassis. The upper part of the frame-aerial support, together with its uprights which form the accumulator compartment, is screwed into position and the frame windings put on after the various other components have been wired up.

For the medium-wave winding commence at the back of the chassis and put on 20 turns of 22 gauge enamelled wire in one layer, turn touching turn. Then leave a gap of about ¼ in., and for the long-wave winding put on about 50 turns of 30 gauge d.s.c. wire, also in one layer and closely wound.

The Anode Coil

This coil, L2 in Fig. 5, is a Formo Sensity iron-core coil which has been rewound. The base and terminals have been removed and the coil bolted to the front panel with the aid of a small brass bracket soldered to the base of the screening-can assembly.

Leads are taken direct from the windings to the components concerned. Details of the coil windings are given below:—

Slot on Coil Former	Turns per Slot	Wire	Remarks
1 and 2	30	Litz from the old coil.	Medium-wave band.
3	10	36 S.W.G. enamelled.	Reaction winding.
4	50	ditto	ditto
5 to 9	62	38 S.W.G. enamelled.	Long-wave band

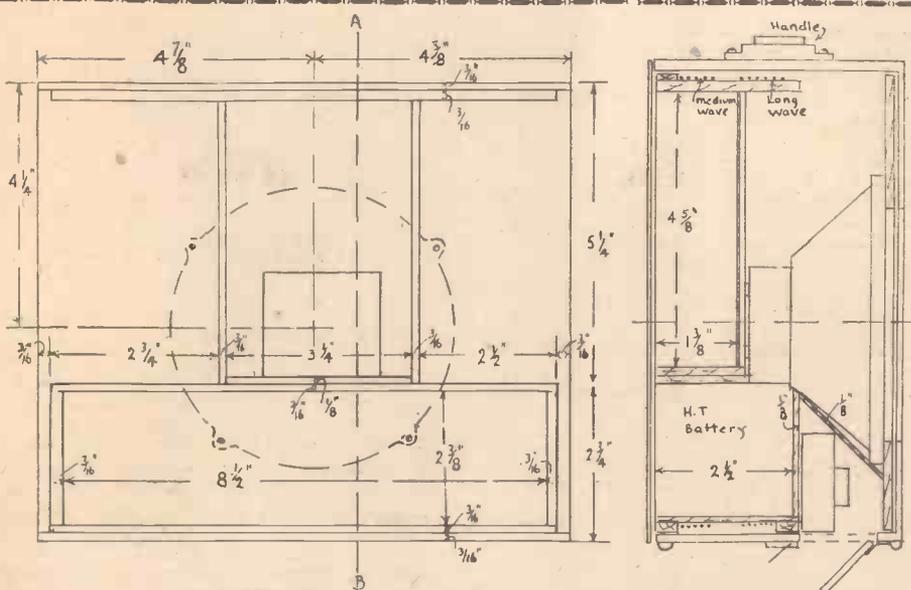


Fig. 1.—Constructional details of the carrying case, showing the drop flap to the compartment for the headphones.

The slot numbers commence from the base of the coil former.

It will be noticed that the reaction winding is split into two sections, in order to ensure smooth reaction control on both wavebands. No part of this winding is switched out on either waveband however. All the windings are in the same direction and are connected as follows: The beginning of the medium-wave winding goes to the anode of V1, the other end goes to the beginning of the long-wave winding and also to one side of the wave-change switch S2. The remaining end of the long-wave winding goes to the other side of the wave-change switch S2. The beginning of the reaction winding goes to the anode of the detector valve V2, and the other end goes to the fixed plates of the reaction condenser C5.

It is important to notice that the switch contacts, S2, for the anode coil carry the full H.T. voltage, and care should be taken, therefore, to see that the connecting wires are well insulated. This switch is, of course, one section of the three-pole three-position switch referred to in the list of components, the remaining pairs of poles being switches S1 and S3.

Valve Screens

Owing to the close proximity of the X.SG and X.D valves to the frame-aerial windings, both these valves are fitted with copper screening covers made from thin copper sheet. These screens are arranged to fit tightly over the bayonet cap valve holders and are, of course, earthed. The end of the screen for the X.SG valve should be left open, of course, so that access to the cap of the valve can be obtained, but the lead to the cap should be screened with metallic braiding and also earthed.

Sundries

The fixed condensers C1 and C2 each consist of two .5 mfd tubular condensers connected in parallel, as it was found that the .5 mfd condensers would fit into odd spaces on the chassis more easily than the larger 1 mfd size.

Both the L.F. transformers T1 and T2 are of the R.I. parafeed type with "high-mu" cores and are quite satisfactory for

direct feed provided the current is limited to a maximum of 1 mA.

It will be noticed in Fig. 3 that the transformer T1 has the valveholder for V3 bolted to the top of the bakelite casing. To do this it is necessary for the transformer to be removed from the casing first, otherwise the drill might damage the transformer windings. The casing of the transformer T2 has been removed in order to economise in space, the transformer being secured to the baseboard with clamps made from thin sheet iron. No trouble should be experienced from low-frequency howling, but should this occur, then the secondary windings of one of the transformers should be reversed.

Using Headphones

Headphones can be carried in the small compartment in the base of the cabinet formed by the space between the loud-speaker chassis and the H.T. battery as shown in Fig. 1. They are brought into circuit with the aid of the change-over midget jack. The latter is wired up so

LIST OF COMPONENTS FOR

- Two .0005 "Litlos" variable condensers (Graham Farish).
- One .0002 Ormond No. 8 bakelite reaction condenser. Type R504.
- Three bayonet-cap Midget valveholders (Bulgin).
- One five-pin baseboard valveholder (W.B.).
- One three-pole three-position miniature rotary switch (Wearite).
- One "Formo" Sensity iron core coil (Graham Farish). See text.
- Two R.I. "Parafeed" transformers.

FIXED CONDENSERS.

- Two .0001 mfd. tubular fixed condensers (T.C.C., type 300).
- One .0003 mfd. tubular fixed condenser (T.C.C., Type 300).
- Two .01 mfd. tubular fixed condensers (T.C.C., Type 300).
- One .1 mfd. tubular fixed condenser (T.C.C., Type 300).
- Two .5 mfd. tubular fixed condensers (T.C.C., Type 300).
- One 1 mfd. fixed condenser with tag terminals (T.C.C., Type 65).

FIXED RESISTANCES.

- One 5,000 ohm half-watt (Erie).
- One 10,000 ohm half-watt (Erie).

that the internal loudspeaker is automatically disconnected when the jack is inserted.

Extension Loud-

speaker

Two leads are taken from terminals on the output transformer T3, to two small screw terminals mounted on a strip of bakelite at the rear of the chassis, so that the loudspeaker can be used as an extension speaker in conjunction with the family receiver. The transformer is provided with several terminals for matching purposes and the appropriate ones

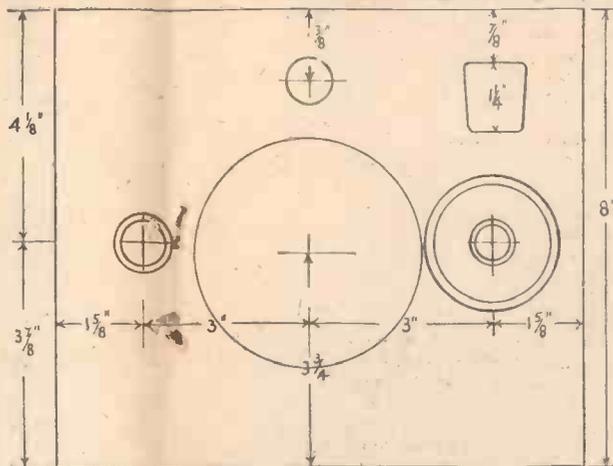


Fig. 2.—Panel-drilling dimensions.

should, therefore, be selected to match the output of the family receiver. Alternatively, if it is not intended to use headphones, the jack referred to above can be used instead. An ordinary two-spring jack will be necessary instead of one of the change-over type specified. Needless to say, the portable receiver should be switched off before attempting to use it as an extension speaker.

The Case

The case is made from any suitable

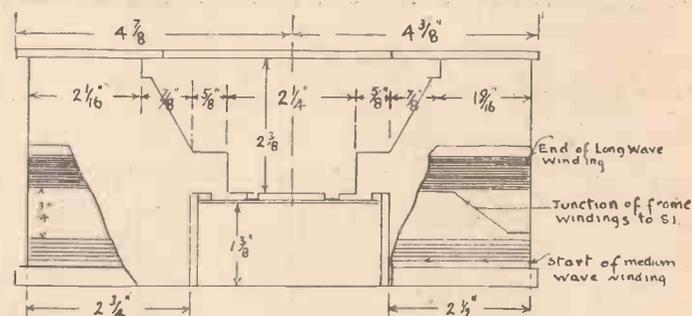


Fig. 4.—Frame aerial and other important data.

hardwood about 1/4 in. thick, the joints being dovetailed and glued together for strength, as there is no room to use the usual blocks which would be necessary with ordinary butt joints. The front of the case is of 1/4 in. plywood, in which the loudspeaker openings, etc., are cut before gluing and nailing into position. The back is also 1/4 in. plywood and is fitted with hinges and a small catch. If a telephone compartment is to be provided, it is necessary to cut out a small "trapdoor" in the base of the cabinet with a fret-saw before assembling the case. A simple and effective finish is to be provided, it is necessary to cut out a small "trapdoor" in the base of the cabinet with a fret-saw before assembling the case. A simple and effective finish (which, incidentally, hides all traces of doubtful carpentry) is to cover the case with black leatherette cloth as used for cameras. This can be obtained through most stationers for about 1s. a yard. Ordinary flour paste makes an excellent adhesive. It should be applied to the leatherette cloth and not to the box. The cloth should be put on to the case with the aid of a photographer's squeegee roller in order to eliminate any wrinkles or air bubbles. A pleasant semi-glossy waterproof finish can be obtained when the box is dry.

The High-tension Battery

The Midget high-tension batteries are now available in various shapes and sizes and suitable units can be joined together to provide about 80 volts H.T. Alternatively, the latter can be made up from pen-torch cell batteries. This is a fairly simple but rather monotonous job. Twenty-eight fountain-pen torch

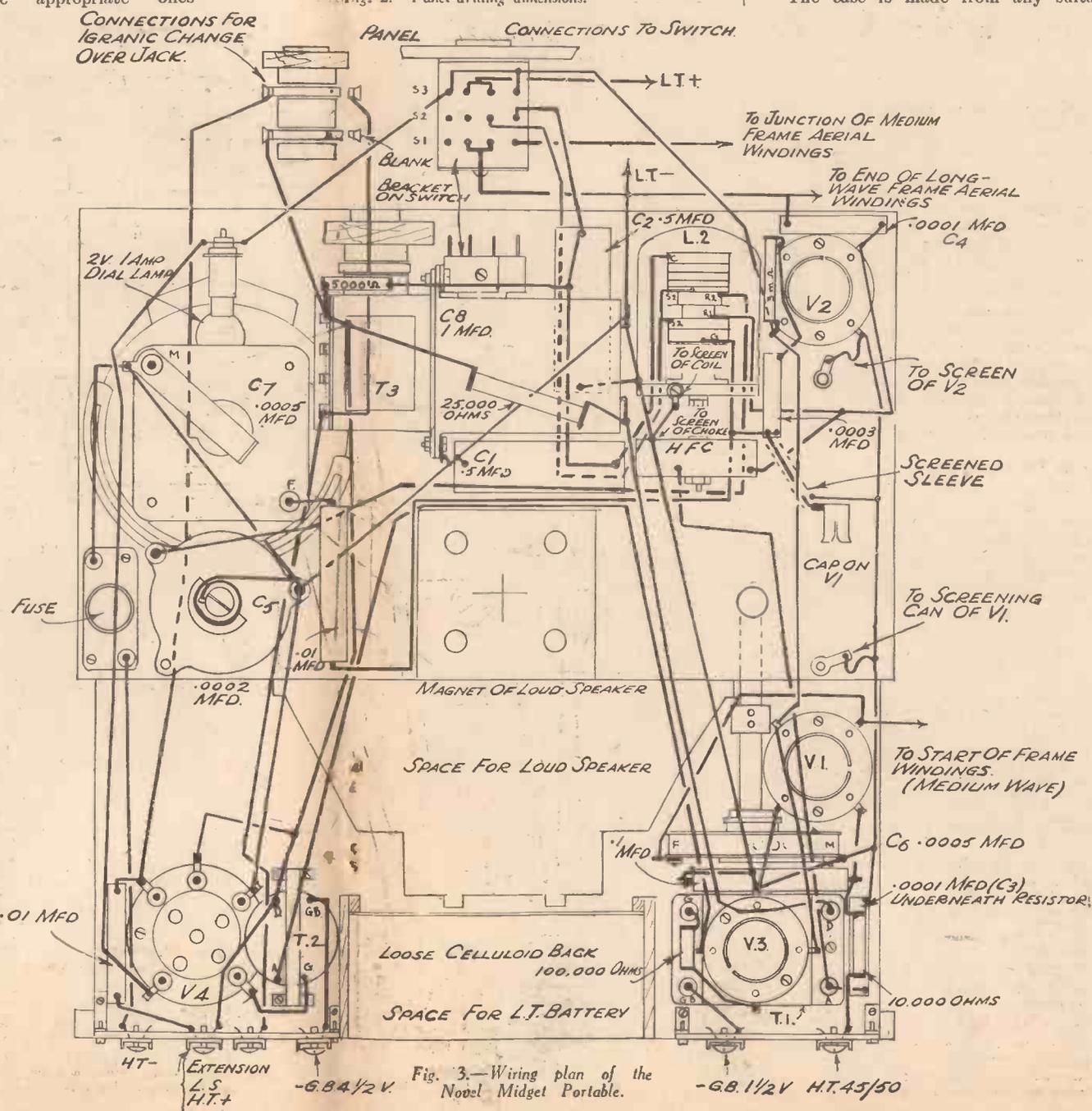


Fig. 3.—Wiring plan of the Novel Midget Portable.

THE NOVEL MIDGET

- One 25,000 ohm half-watt (Erie).
- One 100,000 ohm half-watt (Erie).
- One 3 megohm half-watt (Erie).
- One H.F. choke. Disc type (Graham Farish).
- One 60 mA. fuse and holder (Bulgin) F5.
- One Midget jack and plug. Change-over type. (B.T.S. or Igranic).
- One Ormond Vernier dial. Dual type (see text) or one miniature geared dial (Ormond).
- Six small screw terminals (Bulgin Captive screws).
- VALVES.**
- One each: X, SG, XD, XL and Y.220 (Hivac).
- One 7-amp. accumulator.
- One pair telephones (Ericsson). Optional.
- One W.B. Stentorian Speaker. Type 36M.
- One Midget 84-volt H.T. battery (Exide "X" series) or 28 pen-torch cells, type 6008. (See text).
- SUNDRIES.**
- "Systoflex" sleeving, connecting wire, screened sleeving, wood for case, screws, wire for frame aerial, copper sheet for screening cans, etc.
- Bakelite strip for terminal mounts. One 1/4 in. bore extension shaft coupling and short piece of 1/4 in. rod.



LOW-FREQUENCY TRANSFORMERS

A Simple Explanation of the Function of these Components, their Methods of Construction and Connection.
By FRANK PRESTON

EVERY constructor is familiar with both the appearance and use of the many types of L.F. transformer, but there are few who have more than a vague idea as to its precise function. It is, of course, used to couple one valve to another and to increase the degree of amplification which can be obtained from the valves. As all wireless valves are what is known as voltage-operated devices, it follows that if the transformer is to increase the amplification it must increase the signal voltage; this is exactly what it does.

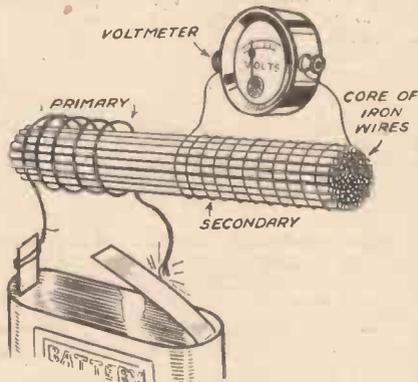


Fig. 1.—This shows the principle of a simple transformer. If one lead to the primary is rapidly touched against the battery terminal a voltage is developed across the secondary winding.

In Its Simplest Form

In order to understand how it does it we must consider the simplest possible form of construction of a transformer. It consists, essentially, of an iron core on which are wound two coils of wire, as shown in Fig. 1. One of these coils is called the primary, and the other the secondary, and it is usual to wind the component so that there is a greater number of turns on the secondary than on the primary. Suppose, then, that one end of the primary winding were connected to one terminal of a battery, the other end being rapidly touched against the other terminal. If a suitable meter were connected to the two ends of the secondary winding it would be observed that a higher voltage appeared here than that of the battery.

Theoretically, the voltage would bear the same ratio to that of the battery as do the numbers of turns on primary and secondary windings. Thus, if there were 500 turns on the secondary and 100 on the primary, and if the battery were of 3 volts, the voltage developed across the secondary terminals would be 15 volts. In practice the latter would be slightly lower, due to the device not being 100 per cent. efficient.

More Voltage—Less Current

It should be explained quite clearly that if there were permanent connections to the primary—instead of the connection being rapidly "made" and "broken"—the effect above described would not be observed; in fact, there would not be a secondary voltage at all. The transference of energy from one winding to another is by "induction," or electro-magnetism, and it is only when the primary circuit is completed or disconnected that a voltage surge takes place in the secondary. When the circuit is made the secondary current flows in one direction, and when it is broken it flows in the opposite direction. In other words, the current is what is known as alternating. Incidentally, the very same effect can be produced by applying alternating current to the primary winding, because this acts in just the same manner as interrupted direct current.

The critical reader will ask how it is

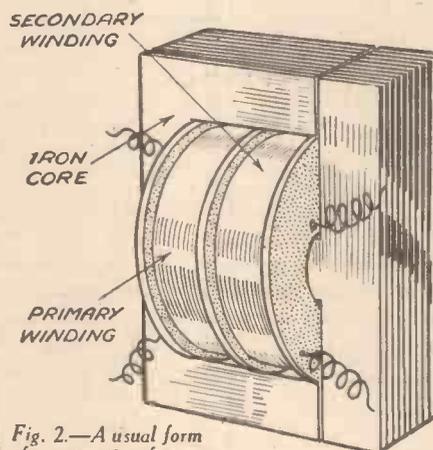


Fig. 2.—A usual form of construction for an L.F. transformer.

possible that the voltage can be increased, since surely the transformer cannot of itself generate any electricity? In answer, it can be explained that, although the voltage is increased the current is reduced. Thus, if in the example mentioned above, the primary current were 1 amp. the secondary current would be only 1/5 amp.—or rather less due to electrical losses.

It can now be understood that if a suitably-designed transformer were taken and the primary winding connected to the output (anode circuit) of one valve and the secondary connected to the input (grid circuit) of another, magnification or voltage amplification would take place, and this is exactly what is wanted of a low-frequency transformer.

Details of Design

It remains only to consider how a "suitably designed" instrument can be made. There are several methods, but a usual one is that shown in Fig. 2, where two windings are placed side by side on insulating spools which are fitted on the centre limb of a set of T- and U-shaped iron or iron-alloy stampings. First, the primary winding must consist of sufficient turns to be of high inductance, or high resistance to alternating currents. This might involve the use of 5,000 or more turns, which must, obviously, be of very thin wire if they are to be accommodated in the small available space. Then the secondary winding must have a still greater number to ensure the required "step-up." It would seem that any

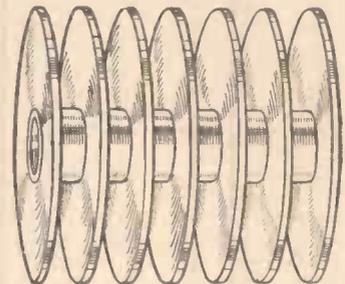


Fig. 3.—A divided winding spool for minimising the capacity of the windings.

degree of voltage increase would be possible simply by increasing the number of secondary turns. In fact, a ratio of 1 to 400 is quite usual in the transformer used in coil-ignition systems on motor-cars. But there are stricter limits in the case of a wireless transformer, because if the number of secondary turns is made very great the capacity between them is correspondingly high, the result being the same as that accruing from the use of a fixed condenser joined in parallel with the secondary winding. The practical limit determined by this factor is a ratio of about 1 to 7.

To use a ratio as high as this with any degree of satisfaction great care has to be taken to reduce the capacity of the windings. There are different methods of doing this, the simplest being to interpose strips of waxed paper or oiled silk between every few layers of wire. Another method is to divide the winding spool into a number of sections by means of insulating washers, as shown in Fig. 3, and another is to use one of various forms of "skeleton" former by means of

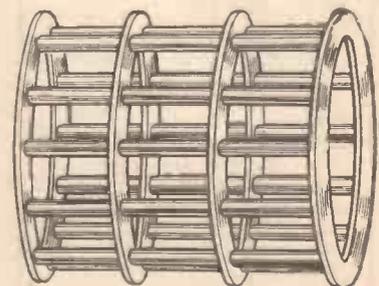


Fig. 4.—A special winding spool designed to minimise capacity.

which the winding is split up into various sections; see Fig. 4. It is interesting to note, in passing, that the primary and secondary windings may be placed either
(Continued overleaf)

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BEGINNERS' SUPPLEMENT

(Continued from previous page)

side by side or one on top of the other; the effect is the same in either case.

Importance of the Core

The designer has to consider many other points before a good transformer can be made. This is because the primary induc-

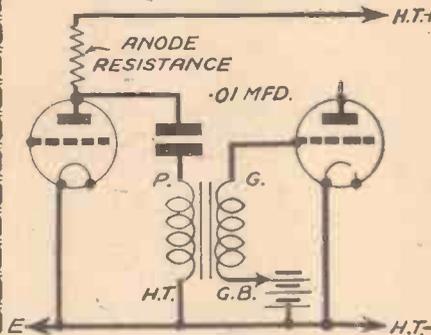


Fig. 5.—A small transformer can be used satisfactorily in the circuit shown here, because the primary does not have to carry any direct (H.T.) current.

tance, and thus the number of turns required to produce it, depends upon the size of the ferrous core and upon the actual metal of which it is made. Generally speaking, the same inductance can be obtained by using half as many turns on a core of twice the cross-sectional area, whilst the number can also be reduced by using special alloys which are more efficient, magnetically, than is ordinary iron. Another important point is that the primary inductance becomes less as the direct current passed through it is increased. In fact, when more than a certain current is passed the transformer is useless because the core becomes magnetically "saturated." With an expensive transformer—large core and large number of primary turns—currents up to 7 or 8 mA may be permissible, whilst with a small, inexpensive transformer the maximum current might be only 2 mA.

Systems of Connection

A method of using a small, modern transformer effectively when the anode current required by the preceding valve is comparatively high is to connect it on the so-called parallel-feed system, as shown in Fig. 5. In this case the direct current is passed through a fixed resistance and the transformer has to deal with the alternating signal currents only, which are passed to it through the fixed condenser shown. A large and expensive transformer could also be used satisfactorily in this manner, but a small transformer could not be used in a circuit such as that shown in Fig. 6, where the primary winding has to carry the anode current of the valve. This will explain the reason for the wide variety of prices at which transformers are sold. If, therefore, you propose to use a small and inexpensive component, connect it as shown in Fig. 5; if for any reason the component has to be connected as in Fig. 6, it will pay to buy the best transformer you can afford.

Both systems of connection can be

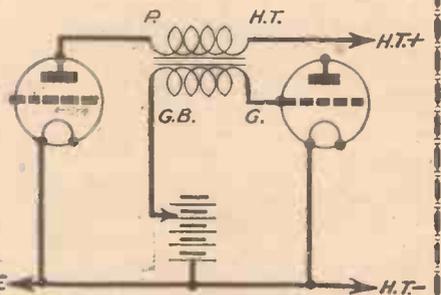


Fig. 6.—When using this circuit it pays to employ a large and fairly expensive transformer.

equally effective, but the connections given in Fig. 5 involve a fairly high voltage drop between the H.T. terminal and the anode of the valve. The other connections cause only a very slight loss of voltage, because the resistance of the transformer primary to direct current is not likely to exceed about 500 ohms.

NEW SOUND-RECORDING SYSTEM IN B.B.C. STUDIOS

THE Philips Laboratories have evolved a new method of sound recording which has just been installed at the Maida Vale studios of the B.B.C. It is an entirely new system which combines the advantages of mechanical recording and optical reproduction without making any changes necessary in existing theatre equipment. The recording equipment has been developed to a pitch of perfection which has been described by experts as "perfect response capability."

Instantaneous playback, and direct-monitoring from the finished sound-track are only two of the important features in this equipment. All flutter is eliminated because the 17½ mm. wide Philimil tape is perforated along one edge only. The actual recording takes place on a plain untoothed roller to which the film is fed through a differential mechanism, and the perforations serve only to synchronise with the picture film.

The entire film path is visible during

recording because it is non-light sensitive, and twin heads permit simultaneous or continuous recording, also re-recording and duplicating. The film requires no processing whatsoever.

The Philips-Miller system has a linear response of 30/10,000 cyc; and a technical line up as follows:

Philips ribbon microphones and three amplifiers as used for public-address equipment;

A four-position mixing desk, for control, filter networks, and meter and switching circuits, rack mounted recording and reproduction amplifiers, test equipment and power supply units.

The chief object in developing this system was to utilise the obvious advantages of mechanical over optical recording.

Of Interest to Every Short-Wave Enthusiast!
**THE BRITISH LONG-DISTANCE
LISTENER'S CLUB**
See Next Week's Issue for an Interesting Announcement.



IMPRESSIONS ON THE WAX

By
T. O'nearm

The Aldershot Tattoo

A RECORD made at Aldershot during an actual performance is rather unique, for it has faithfully reproduced the roar of an aeroplane which passed over the arena while the massed bands of Aldershot and Eastern Commands, conducted by Leslie Seymour, were recording "The Lost Chord." This remarkable recording of "The Lost Chord" is perhaps only equalled by "With Honour Crowned"—processional march—which the bands render with considerable realism on *H.M.V. C 2843*.

Another record by the above bands includes a stirring march, "Mechanised Infantry," which is conducted by the composer, David McBain. A particularly fine fanfare, followed by the Traditional "Minstrel Boy" and concluding with "Watch Tower," which is considered one of the best martial melodies in the Tattoo—occupy the reverse side. These three items are conducted by Leslie Seymour on *H.M.V. B 8455*.

Striking incidents of the Tattoo, including most of realistic "noises off," are recaptured on two *H.M.V.* discs—*H.M.V. C 2844/5*.

"Silly Symphony"

WHO has not heard of Walt Disney's "Silly Symphonies"? Mickey Mouse fans flock regularly to the cinema to see the latest sound cartoon by Disney. *H.M.V.* have now secured permission to record, exclusively, a series of records made from the actual Walt Disney-Mickey Mouse sound films and the first of these is "Who Killed Cock Robin?"—*H.M.V. BD 358*.

Frances Day sings two new film hits on *H.M.V. BD 356*. The numbers are "A pretty girl is like a melody" (from "The Great Ziegfeld") and "I don't want to make History" (from "Palm Springs"). Miss Day is accompanied by an orchestra conducted by Carroll Gibbons.

Peter Dawson's New Recording

H. S. PEPPER, the composer-pianist, wrote "The Shepherd Boy's Song," which Peter Dawson sings, with "A Song for you and me," on *H.M.V. 8456*.

The latest contribution of Reginald Foort, organist of the Paramount Theatre, London, is a medley of catchy tunes from the film "The King Steps Out," on *H.M.V. BD 355*.

Molly Picon, a young comedy artiste who made her first record last month, makes another record this month: "A New York Symphony" and "What People Make a Living From," on *H.M.V. B 8460*.

Dancing Time

ROY FOX and his Band make two excellent records this month with "A pretty girl is like a melody" and "You" on *H.M.V. BD 5082*, and "Stars in my eyes" coupled with "At the Café Continental" on *H.M.V. BD 5083*. "But Definitely" and "When I'm with You," two tunes from the film "Poor little Rich

Girl," are Ray Noble's contribution this month. Al Bowlly vocalises.

Syncopation is the keynote provided by "Fats" Waller and his Rhythm in their rendering of "It's a sin to tell a lie" and "It's no Fun" on *H.M.V. BD 5087*.

Dance enthusiasts, particularly those who demand music in strict ballroom tempo, will appreciate these four new numbers by Joe Loss and his Orchestra. The titles are "The Scene Changes" and "Got to dance my way to Heaven" on *H.M.V. BD 5084*; also "Sweetheart, let's grow old together" and "When the swallows nest again" on *H.M.V. BD 5085*.

The Ballyhooligans have a flair for presenting old numbers in a new guise. Hear them play "Tea for Two" from "No, No, Nanette"—which is being revived at the London Hippodrome—and "Avalon" on *H.M.V. BD 5086*.

Decca and Brunswick Records

THE Street Singer, whose records are always popular, makes two new records this month. They are "Robins and Roses" and "On the Beach at Bali-Bali"—*Decca F 6012*, and "All my Life" coupled with "We'll rest at the end of the Trail"—*Decca F 6013*.

Although only eight years old, Bobby Breen, the screen's latest discovery, makes an interesting record this month. He sings "It's a sin to tell a Lie" and "Let's Sing Again" on *Brunswick O 2246*.

Grace Moore, the well-known film star, accompanied by an orchestra conducted by Joseph Pasternack, sings four tunes from her new film "The King Steps Out." They are "What shall Remain" and "The End Begins" on *Brunswick O 2233* and "Stars in my eyes" coupled with "Learn how to lose" on *Brunswick O 2234*.

Other records just released are "Rhythm saved the world" and "Shoe Shine Boy" by the Mills Bros. on *Brunswick O 2245*, "The Hills of old Wyoming" and "I don't want to make History" by Frances Langford on *Brunswick O 2242*, and "On the Beach at Bali-Bali" coupled with "I met my Waterloo" by Connie Boswell on *Brunswick O 2235*.

Decca Polydor Records

ALBAN BERG, who died a few months ago, one of the most prominent pupils of Schönberg, is one of the most adversely criticised composers of our day by reason of the fact that he is the staunchest exponent of what is called atonal music. The "Lyric Suite," the first recorded performance of which is now presented on *Decca Polydor CA 8244/7* is regarded as being Alban Berg at his best.

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Random Gottings

By JACE

Raciest Sports Commentator

LISTENERS who tune in to Radio-Luxembourg at noon on Sundays will have the opportunity of hearing Bob Bowman, former ace B.B.C. commentator, give a series of thrilling commentaries on historic sporting events.

Among the subjects to be featured in the future are the Dempsey-Carpentier fight, and the dramatic international football match at Ibrox Park, Glasgow, on April 5th, 1902, when a stand collapsed and twenty-three people were killed and 245 others injured.

The first broadcast in this "Calvert Cavalcade of Sport," as this programme is known, took place on Sunday, July 19th, when Bowman gave a vivid picture of the 1913 Derby during which a suffragette threw herself in front of the King's horse and was killed.

Bob Bowman sprang into fame as a radio commentator when he broadcast an eye-witness account of the Olympic Ice Hockey matches from Garmisch early this year. His vivid and racy style made him immediately popular with the listening public, who promptly cried out to hear more of this enterprising young man, whose style is so unusually vivid.

Rathlin Island

ON August 10th a programme will be broadcast from Rathlin, the lonely island off the coast of County Antrim. The island has 250 inhabitants, and tradition says that it was here that Robert Bruce saw his famous spider. Wrecks around its coasts have been frequent, for the Atlantic batters against its northern shores; and its people live a very primitive life, having few of the amenities of modern civilisation. There are no proper roads, no lighting, no pipe water supply and no industries. Gaelic is still spoken by the older people and agriculture and fishing provide the livelihood of the people. The programme on August 10th will be a simple one, consisting of short interviews with some of the people in the island who will tell about their life. One of these will be the district nurse, whose work is lightened by the absence of infectious disease in the island, such diseases as mumps and measles having never been heard of. Communication with the mainland is carried out by means of fishing boats, and is often exceedingly difficult. The programme is being carried out by wireless link, and if the weather is calm there will be no difficulty in getting to and from the island, but if the wind sets the wrong way it is possible that the engineers and staff may find themselves marooned on Rathlin.

Promenade Concerts, 1936

THE B.B.C. announces that among the artists engaged for the eight weeks' season of Promenade Concerts, which opens at Queen's Hall on Saturday, several will be making their first appearance at these concerts. In this category comes Nicolas Medtner, the distinguished Russian composer-pianist, who will appear on two

occasions—first on September 11th, when he will play the Beethoven Pianoforte Concerto No. 4 in G, and again on September 24th, when he will be the soloist in his own Concerto in C minor. The programme of this concert—an all-Russian one—will also include a group of songs by Medtner, sung by Tatiana Makushina, accompanied by the composer.

Medtner has recently settled in London, where he has a faithful public who admire his great gifts both as a composer, who has something to say in his own idiom and who is not concerned with being "modern," and as a pianist of the first rank. It is in this double rôle that he will make his bow to the Promenade audiences in September.

Another newcomer to the Proms is Arthur Rubinstein, who will play John Ireland's Pianoforte Concerto on September 1st—a graceful tribute from an inter-

equipped with sixty-nine pianos, which fall into three classes: those from 6ft. to 7ft. 6in., from 7ft. 6in. to 9ft., and over 9ft.

All piano makers were invited by advertisement to submit their instruments for the tests, which are being carried out under conditions of strict anonymity. Neither judges nor pianists are told which make is under consideration.

A Two-valve Short-wave Converter

SEVERAL readers have asked for further details of the Converter shown on page 770 of our issue dated February 29th last. This is a two-valve converter of efficient design, for battery use. A pentagrid is used for frequency changing, but the aerial circuit is aperiodic, containing only a short-wave choke. The oscillator circuit is tuned in the usual way by means of a short-wave oscillator coil (in nearly every instance an ordinary short-wave aerial coil can be used) and .00016-mfd. condenser. Parallel feed is used for the oscillator reaction circuit, a 50,000-ohm coupling resistance being used for H.T. supply to the anode. A Bulgin S.W. 50 I.F. coil is used with a .0003-mfd. pre-set condenser for tuning the anode circuits of the

HOW RADIO CABINETS ARE MADE



This illustration shows a corner of the cabinet-polishing shop in the Moston Works of the Ferranti company. The highly-finished surfaces of the Ferranti cabinets are due to the large amount of hand labour which is employed in this particular section of the factory.

nationally-famous pianist to an outstanding English composer—and the Beethoven No. 3 on September 4th.

The Best Piano?

THE B.B.C. will shortly continue the series of tests begun last month for comparing various makes of piano under broadcasting conditions. The last tests were carried out several years ago, since when the introduction of the ribbon microphone and other factors have altered and improved the transmission of music. The new tests will be judged by a panel drawn from outside expert sources and from the B.B.C. staff. Two members of the Music Advisory Committee will be included, while the Piano Manufacturers' Association and the Federation of British Industries have been invited to nominate representatives. It is hoped that one well-known pianist will also serve.

The Corporation's studios are at present

two valves, and a lead is taken to the aerial or grid terminal of the superhet through a .0005-mfd. fixed condenser. The I.F. circuits suggested tune from about 1,200 to 1,800 metres, and so the broadcast superhet must be tuned to a wavelength between these two extremes. If any interference is experienced at one wavelength setting the receiver and I.F. pre-sets can be re-tuned to another point. It will be understood that once the broadcast receiver has been properly tuned to the frequency provided by the I.F. circuits of the converter it can be left alone, all short-wave tuning being carried out by means of the .00016 mfd. condenser in the converter. This experimental circuit is one which is well worth trying by those in search of high sensitivity and "something different."

THE CYCLIST
2d. Every Wednesday

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 West London Radio Society

FOLLOWING the success of the 5-metre river day held on Sunday, June 14th, the above radio society organised a similar outing on Sunday, July 19th. The success of this meeting was even greater than that of the previous one, the attendance being considerably greater. Interesting experiments were made throughout the day on the 5-metre waveband.

Members of the society were asked to invite their friends, many of whom came and thoroughly enjoyed their day on the river.

The Honorary Secretary would be very pleased to hear from anyone in the West area of London who is interested in any line of radio:—H. A. Williamson, 22, Cambourne Avenue, West Ealing, W.13.

analogy how the splitting up of the light ray into its component colours through a prism may be likened to the demodulation of a wireless signal. He quotes from various publications to show that his ideas have at least some substantiation with modern theories, and some of the experiments which are given will no doubt provide interesting topics of conversation amongst keen radio amateurs. Working circuits are shown to enable the reader to carry out trials for himself, and they will bear out the author's statements. A patent has been applied for in respect of the principle of using two or more detector circuits as referred to in the book, but the author makes the inventions public property and gives full permission for them to be used freely.

input voltage? An adapter cannot be connected to the pick-up terminals, but must be used in place of the detector stage. A converter may be joined to the aerial terminal, and is the better proposition.

G. W. H. (Rotherham). It is impossible to compare the two coils as there is no standard of connection. If you can trace out the connections to your coil it should be possible to use this to replace the coil referred to, but we cannot give you equivalent terminal numbers. The L. F. transformer will be quite satisfactory.

J. B. M. (Glenalmond). We have no particulars of reception conditions in the Isle of Skye. We think the H. F. Pen-Det-Output circuit would be quite suitable, but do not think that either band-pass or A.V.C. would be essential.

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.

J. S. (New Park). We can only suggest that the 4-pin coils are wrongly wired, either to the actual pins or to the coil-holder terminals. Sometimes a resistance in the reaction circuit will help by removing parasitic oscillation.

B. L. (S.W.11.). It is very seldom that one can build a receiver so that the control may be set as you state and the tuning control then adjusted throughout the entire range. If you will refer to our issue dated August 1st you will see some suggestions for overcoming this trouble by ganging the controls.

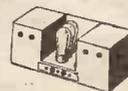
A. S. (Hastings). We have no receiver with the particular coils you mention, but they could be included in any S. G. Three type of receiver.

R. A. L. (E. 10). Send the coils back to the makers for their test and report. It would appear that they are wrongly connected.

G. W. W. (H.M.S. Barham). Local conditions may be bad in the part of the world referred to, or the receiver itself may be faulty. Does the receiver get sufficient

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SHORT WAVE LISTENERS!

Have you seen the August issue of the "BRITISH SWL REVIEW"? It's a SPECIAL NUMBER! This magazine, so amazingly popular with the SWLs, contains this month the circuit and description of a fine SG-V-Pen, designed by Radio G6PD. There is also G6LX's article "Technical Topics," all the very latest SW News, a "Blacklist," announcement of the "Stephen Giggell" DX Contest, the popular "Amongst the Amateurs," by R. D. Everard. Readers Calls Heard, and many other fine features. Buy your copy now from W. H. Smith's, price 6d., or 6d. post free from the B.S.W.L., Ridgewell, Hailstead, Essex.

BOOK RECEIVED

A NEW THEORY: Inventions and Experiments in Wireless and Television, by D'Arcy Ford. 44 pp., 14 line illustrations. Published by the Author, price 1s.

THIS book deals with some interesting experiments carried out by the author in relation to the detection or demodulation of wireless signals. He compares the wireless signal with ordinary light and shows by

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Processing Matters. A Beginner's Guide to Enlarging—The Improvised Dark-Room, etc.
Money-making Photography. Making Prints for Reproduction—Newspaper Photographic Competitions—Prints in a Hurry—Pictures for the Press, etc., etc.



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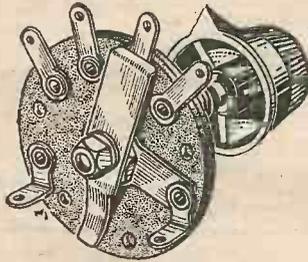
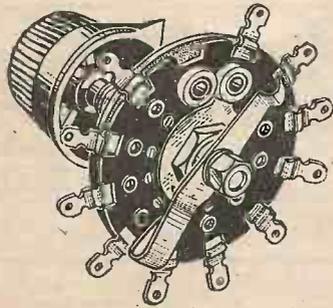
Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

New Brimar Prices

SOME price reductions have been effected in the Brimar range of valves and some of the main reductions are shown below. These valves are manufactured by Standard Telephone and Cables, Ltd., and a comprehensive catalogue dealing with all the types, including the Tunograph, a visual tuning indication consisting of a modification of a cathode-ray oscillograph tube, may be had upon request.

BATTERY VALVES			
4215A ..	10/-	Pen.B.1 ..	11/-
4-VOLT A.C. VALVES (Indirectly Heated)			
H.L.A.2 ..	9/6	9A.1 ..	12/6
P.A.1 ..	12/6	8A.1 ..	12/6
15A.2 ..	15/-	7A.2 ..	13/6
11A.2 ..	12/6	7A.3 ..	13/6
4-VOLT A.C. VALVES (Directly Heated)			
Pen.A.1 ..	13/6		



Two useful rotary stud switches manufactured by Messrs. Bulgin. These may be used in many experimental pieces of apparatus.

UNIVERSAL VALVES (A.C./D.C.)			
15D.1 ..	15/-	7D.3 ..	13/6
11D.3 ..	12/6	4D.1 ..	9/6
9D.2 ..	12/6	7D.6 ..	13/6
8D.2 ..	12/6	7D.8 ..	13/6
RECTIFIERS (Universal)			
1D.5 ..	10/6		
RECTIFIERS (Indirectly Heated)			
R.1 ..	10/6	R.3 ..	15/-
R.2 ..	10/6	1A.7 ..	10/6

Bulgin Rotary Stud Switches

A SERIES of very neat switches may be obtained from the Bulgin range and will be found invaluable in the construction of certain experimental apparatus. There are two types, one having 10 contacts, and the other available with either 3, 4, or 5 contacts. In each type a disc of bakelite has soldering tags firmly eye-letted in position round the periphery, and in the ten-contact type a further bakelite disc is attached and has small portions cut away in proximity to the tags, so that the tip of the rotary contact arm will drop in and, in addition to making good contact, will form a positioning indication of the "click" type. In the smaller model holes are drilled in the bakelite disc opposite the contacts and the end of the contact arm is embossed, the projection dropping into the recesses to form location points. In the small model the contact arm is sufficiently wide to bridge adjacent contacts during rotation, but in the large model the tip of the contact arm passes across the overlaid bakelite disc and thus prevents short circuits. For wave-change purposes, tone-controls, and various other similar pieces of apparatus these switches will be found extremely useful and will give a long period of service. The 3-way

model costs 1s. 6d., the 4-way costs 1s. 9d., and the 5-way 2s. The 10-way type (in which the shaft is alive and insulated bushes are provided for mounting purposes) costs 2s. 9d., and the contacts are silver-plated.

Vidor S.W. Converter

WE have now had an opportunity of testing the converter which was referred to in our issue dated June 27th last. This useful piece of apparatus may be connected to the broadcast receiver and to the H.T. and L.T. batteries, and may be instantly switched out of circuit when broadcast reception on the normal wavebands is required. For this purpose an on/off switch is included on the side of the cabinet, as may be seen in the accom-

panying illustration, and this automatically transfers the aerial connection from the converter to the broadcast receiver. The converter was left connected to the broadcast receiver during our test, and when the switch was operated it was found that there was no interaction of any sort between the two pieces of apparatus, and no losses were encountered due to the leads feeding the converter. The sensitivity was high, and the combination tested was perfectly stable throughout the entire range whilst tuning was very smooth due to the efficiently geared control knob on the converter.

The chart which is printed on the top of the converter was found quite useful and will appeal to many amateurs until, of course, the wavelengths of the stations are changed. The scale calibration in megacycles will also be found valuable when amateurs are heard, or when some reference is given to this particular range of frequencies and the user cannot readily convert them into wavelengths in metres, as the dial has the two types of calibration on the same scale. The broadcast receiver used in the tests was adjusted to quite a wide band on the long-

wave scale and the actual intermediate frequency was not found too critical to prevent the inexperienced amateur from finding the correct adjustment, whilst the manipulation of the reaction control in the receiver also was not too critical. It was found that it required to be set just off the oscillation point, and the exact setting may be heard in the loud-speaker just as in a simple receiver. The calibrations on the dial were substantially correct. The price is 47s. 6d. complete. It covers from 13 metres to 50 metres.

New Marconi-Osram Triode

THE use of a valve for voltage measurements purposes is now well known, and the valve voltmeter forms one of the most valuable pieces of test equipment that the service engineer can possess. A special triode valve for use in such apparatus has now been produced by the Marconi-Phone Company and the General Electric Company, and this has a 4 volt 1 amp. heater, and is designed for a maximum H.T. of 250 volts. The amplification factor is 6 and the impedance 3,000 ohms. The type reference is A577 and the price 60s.

Hunt Interference Suppressors

A SERIES of devices for the suppression of interference from the mains is being introduced by Messrs. A. H. Hunt, Ltd. These are designed for inclusion in flexible lead connectors, and for inclusion in standard apparatus, the latter models being housed in metal containers with feet for attachment purposes. These are effective on all wavelengths from 2,000 down to 13 metres, and are designed for a maximum voltage working of 250 volts. One model is rated at 3 amps and the other at 5 amps, the prices being respectively 15s. and 21s. The lead models are priced at 2s. 6d. and 5s., the smaller model being used when interference is not very serious, and the larger model when more trouble is experienced. Further details may be obtained on application to the makers.

New Varley Coils

SOME interesting new coil units are announced by Messrs. Varley, and these include superhet ganged units and I.F. transformers. There is a 2-gang 465 kc/s unit at 13s. 6d., and a 3-gang 110 kc/s unit at 21s. In addition a straight 3-gang unit comprising a band-pass filter is obtainable at 21s. A 2-gang straight unit costs 13s. 6d. and a 465 kc/s I.F. transformer with Litz-wound coils and mica trimmers costs 8s. 6d. The coupling in this transformer is fixed.



The Vidor Short-wave Converter.

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).

"Elf" Portable Results

SIR,—I thought you may be interested to know the results that I have got out of the "Elf Portable" that I have just finished making.

Using it in conjunction with my outside aerial and earth, I can get the two locals and Paris, and sometimes Luxembourg, which I think is very good from such a small set.

With about twenty feet of wire placed about fifteen feet high, and the earth wire soldered on to a nail stuck into the ground, I can get both the locals at good strength. I have also tried the set, using the spring of my bed as an aerial; the results were just the same. I bought the kit of parts from Peto-Scott, Ltd., who served me very well. I have made a few modifications to suit my own requirements: firstly, I drilled two holes in the right-hand side of the cabinet about one inch from the rear, so that I could screw two sockets into them, then I connected the aerial and earth leads to these sockets, then I put banana plugs on to my throw-out aerial and earth, so it is an easy matter to connect and disconnect the aerial and earth—simply plug in, then, when finished, pull out and roll up. I have also made a box to take the accumulator; this consists of a box one inch high, and just big enough to take it. I have screwed this box into the base of the cabinet.

Also for connecting the leads to high-tension battery I have used crocodile clips, as these grip the terminals much better, and by placing rubber bands over the clips and battery there is no fear of them touching and causing a short.

I am looking forward to seeing you at the Radio Exhibition this year.—E. GARWOOD (Watford).

Don't Forget Postage

SIR,—I have just received a Q.S.L. card, photo, and letter from W8ANO, and by his letter it seems that a lot of amateurs forget to send postage when sending reports.

Here is an extract from his letter:—"Write to some of your S.W.L. magazines and put in a plea for S.W.L.'s to include postage if they want answers."

I would like you to publish this in your paper, so that other S.W. fans, who do not send postage with reports, will read it, and benefit by W8ANO's letter. Wishing PRACTICAL AND AMATEUR WIRELESS every success.—E. BARR (Andover).

Podebrady's Wavelength

SIR,—As you report in your excellent paper that the new Czech short-wave transmitter at Podebrady was likely to be heard testing on a number of channels between 13.50 metres, I beg to report that I heard this station testing to-day at approx. 11.15 B.S.T. Its call was "Hello! Hello! This is Radio-Podebrady Czechoslovakia, broadcasting and testing on a wavelength of 19.698 metres, 15,230 kc/s. We are shortly going over to 25.51 metres, 11,760 kc/s." There was then a Czech announcement and the transmission closed down.

Tuning up to approx. 25 metres, I picked up the other transmission, which was coming in at a good R3 strength, free from

interference. The English announcer said that they were actually broadcasting on 11,883 kc/s, but were returning to 11,760 kc/s later. The programme, which con-

A Straight Tip to Dealers

DEAR Mr. Camm,—I have a postcard before me from one of your readers who states that he has tried six dealers—reputable wireless dealers—to obtain a Tutor Coil and has been told by the dealers that they "cannot obtain them."

This is not an isolated instance that has come to our notice; we are frequently receiving similar communications and it seems to us to give the impression that the manufacturers who are specified are unable to supply the dealers. This is, of course, entirely contrary to the facts and we can only assume that the so-called dealers are in some cases becoming lazy and are refusing to stock or are not troubling to obtain individual components from the makers.

This is most discouraging to the home-constructor, who was in the past the mainstay of the dealer.

This present attitude of some of the dealers is a very poor return for the constructors' support.

We shall be pleased to hear from any customer or readers who may make a similar complaint to you.

Yours faithfully,

BRITISH TELEVISION SUPPLIES, LTD.
(Russell Scott, Sales Director).

CUT THIS OUT EACH WEEK.

Do you know

—THAT a neon lamp may be used to construct a buzzer device for test purposes.

—THAT miniature cathode-ray tubes will be seen at the Radio Exhibition, designed for tuning indicating purposes.

—THAT D.C. mains receivers, giving full A.C. performance by means of a built-in D.C.-A.C. converter will also be prominent next season.

—THAT a safety-spark gap in the aerial lead should be totally enclosed to prevent leakage of signals due to dirt or wet.

—THAT interference with radio receivers by vacuum cleaners may be completely removed in the near future by the introduction of cleaners fitted with suppressor devices.

—THAT a leaky electrolytic condenser can be the source of much trouble in a mains receiver, owing to the difficulty of locating this type of breakdown.

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, George Newnes, 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.

sisted of gramophone records, began at 08.00 B.S.T. and was ending at 20.00, and the wavelength was being changed every half-hour.

Reports should be addressed to Radio-Podebrady, Czechoslovakia.—A. G. WILLFORD (Northampton).

Swedish Experimental Station

SIR,—Please accept my congratulations on the quality of your articles in your excellent paper. I am a newcomer to the "Short waves" and was at first put off by the remarks of sceptical friends, but "try anything once" is one of my mottoes, and, by Jove, the short-wave pudding is well worth the eating! My set is an 0-v-2, home constructed, using a 45ft. horizontal outdoor aerial. I have logged the Swedish Short-wave Experimental Station on the 20-metre band at 11.30 a.m. (G.M.T.), and should be glad to hear from any of your readers who heard him testing. The address given is "The Swedish Short-wave Experimental Station, Technical University, Stockholm, Sweden."—ROBERT DENNIS (Petersfield).

The One-valver Again

SIR,—I have seen published in your pages a one-valver 40-m. log from A. P. L. Casling, of Cheshire. Thinking that it might interest other readers, I enclose my log, made up between the 13th and 18th of July. My receiver is the single-valver of PRACTICAL AND AMATEUR WIRELESS dated March 21st, 1936.

My aerial is 45ft. on top, and a 35ft. lead-in.—STUART D. KEEBLE (Midlothian).
[This log showed eighty-two English amateurs, and four Irish.—ED.]

The One-valve Short-waver

SIR,—I was very interested in the single-valve logs sent in by Mr. Casling and Mr. Holmes, which, I believe, are the best you have published for such sets. However, I should not be surprised to see a reader produce a log which is even better. Anyway, just to keep the ball rolling, and as you have not published a S.W. log from Leeds, here is mine. The set, of course, is an 0-v-0, and the aerial used is 20-25ft. long, its greatest height from the ground being 8ft. approx.

W2XAD, W2XAF, W8XK, DJA-B-D-N-Q, TPA4, HAT4, HBI, 2RO, LKJ1, EAQ, CT1AA, RW59, and the new stations from Sweden and Czechoslovakia.

20-metre amateurs: PY2BA, PY2EJ, NY2AE, HI4F, HH2B, VO1I, VO1J, VE1-CR-CD-CI, CO2KY, CO8WC?, VP3BG, W1-DYA-ESU-QA-AXA-CHG-MX-DIC-UH-GBE-IGX, W2-APF-HFS-ELO-BSD-GJK-EUG-CR-AMD-MJ-JOA-ICU-DH-BCR-JO-HFI, W3-DPC-MD-PC-EXC-BBB-ENI, W4AEV, W4AJA.—CHAS. WRIGHT (Leeds).

From Ireland

SIR,—As I have not yet seen a report on short-wave reception from this district, I beg to offer mine, as follows:—

On loudspeaker: CT1AA, CTIAH, DZH, EAQ, EI3J, F8DC, F8II, HB98, IDU, LAIG, OZ1D, ORK, PCJ, PHI, PY2EJ, RKI, RW59, SUICH, SUIRO, SUI5U, SM5SX, SPW, W1XAL, W2XAF, W2XAL, W2BSD, W8XK, WQP. Most of the Zeesen, Daventry, Radio-Colonial (Paris) stations and both the I2RO transmitters.

Also: A score or so "G" stations—EA7AI, HI4F, W-1ARC, 1ACQ, 1GED, 1DAL, 1DSM, 1IED, 1SZ, 2AKK, 2ICU, 2KR, 9DB, 9CLH. Average R3-6.

These were all "bagged" on an 0-v-Pen.—T. L. FOLLEY (Cork).

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS STRAIGHT SETS. Battery Operated.

One-valve: Blueprints, 1s. each.

Description	Date of Issue	No. of Blueprint
All-Wave Unipen (pentode)	—	PW31A
Two-valve: Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve: Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (trans.))	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Pow.)	—	PW35
Summit Three (HF Pen, D, Pen)	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen)	22.0.34	PW39
Hall-Mark Three (SG, D, Pow.)	—	PW41
Hall-Mark Cadet (D, LF Pen (R.C.))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (trans.))	June '35	PM2
Cameo Midget Three (D, 2 LF (trans.))	8.0.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (R.C.))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	—	PW64

Four-valve: Blueprints, 1s. each.

Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
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)	—	PW40

Mains Operated.

Two-valve: Blueprints, 1s. each.

A.C. Twin (D (pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Power)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.)	—	PW19

Three-valve: Blueprints, 1s. each.

Double-Diode-Triode Three (HF Pen, D, D.T., Pen)	10.0.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
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	PW50
"All Wave" A.C. Three (D, 2LF (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. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF Pen, D, Push-pull)	9.2.35	PW47

SUPERHETS.

Battery Sets: Blueprints, 1s. each.

£5 Superhet (Three valve)	—	PW40
F. J. Camm's 2-valve Superhet (two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet	—	PW58

Mains Sets: Blueprints, 1s. each.

A.C. £5 Superhet (three-valve)	—	PW43
D.C. £5 Superhet (three valve)	1.12.34	PW42
Universal £5 Superhet (three valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.30	PW60

SHORT-WAVE SETS.

Two-valve: Blueprints, 1s. each.

Midget Short-Wave Two (D, Pen)	15.0.34	PW39A
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Three-valve: Blueprints, 1s. each.

Experimenter's Short-wave Three (SG, D, Power)	—	PW30A
The Prefect 3 (D, 2 LF, RC and Trans.)	8.2.36	PW63

PORTABLES.

Three-valve: Blueprints, 1s. each.

F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
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Four-valve: Blueprints, 1s. each.

Fenherweight Portable Four (SG, D, LF, Cl. B)	—	PW12
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MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)

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AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Blueprints, 6d. each.

Four-station Crystal Set	—	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450

STRAIGHT SETS. Battery Operated.

One-valve: Blueprints, 1s. each.

H.B.C. Special One-valver	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW440

Two-valve: Blueprints, 1s. each.

Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG., Det. Pen)	—	AW392
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
A Modern Two-Valver	July '36	WM409

Three-valve: Blueprints, 1s. each.

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)	—	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)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cosser Melody Maker with Lucerne Coils	—	AW423
P. W.H. Mascot with Lucerne Coils (D, RC, Trans)	—	AW337A
Mullard Master Three with Lucerne Coils	—	AW424
£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) "Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple tune Three (SG, D, Pen)	June '33	WM327
Economy-pentode Three (SG, D, Pen)	Oct. '33	WM337
"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)	—	WM371
P. T. P. Three (Pen, D, Pen)	June '35	WM389
Certainty Three (SG, D, Pen)	Sept. '35	WM393
Minute Three (SG, D, Trans)	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM400

Four-valve: Blueprints, 1s. 6d. each.

65/- Four (SG, D, RC, Trans)	—	AW370
"A.V." Ideal four (2SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2SG, D, Pen)	—	AW421
Crusaders' A.V.C. 4 (2HF, D, QP21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: blueprints 6d. each)	25.8.34	AW445A
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, 2LF)	Feb. '35	WM381
The H.K. Four	Mar. '35	WM384
The Auto-Straight Four	April '36	WM404
The Request All-Waver	June '36	WM407

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 Quadrydne (2SG, D, LF, Class B)	Dec. '33	WM344
1935 Super Five (Battery Superhet)	—	WM320

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 1/3d., 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.

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
Unicorn A.C./D.C. Two (D, Pen)	Sept. '35	WM394

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.	—	AW390
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
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401

Four-valve: Blueprints, 1s. 6d. each.

All Metal Four (2 SG, D, Pen)	July '33	WM329
Harris Jubilee Radiogram	May '35	WM386

SUPERHETS.

Battery Sets: Blueprints, 1s. 6d. each.

Modern Super Senior	—	WM375
Varsity Four	Oct. '35	WM395

Mains Sets: Blueprints, 1s. 6d. each.

1934 A.C. Century Super A.C.	10.3.34	AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	Apl. '35	WM385

PORTABLES.

Four-valve: Blueprints, 1s. 6d. each.

Midget Class B Portable (SG, D, LF Class B)	20.5.23	AW380
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
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 converter (price 6d.)	—	AW320
S.W. One-valve for America	—	AW429
Roma Short-waver	—	AW452

Two-valve: Blueprints, 1s. each.

Ultra-short Battery Two (SG det, Pen)	Feb. '36	WM402
Home-made Coil Two (D, Pen)	—	AW440

Three-valve: Blueprints, 1s. each.

World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	Jan. 19, '35	AW463
The Carrier Short-waver	July '35	WM390

Four-valve: Blueprints, 1s. 6d. each.

A.W. Short-wave World Beater (HF, Pen, D, RC, Trans)	—	AW456
Empire Short-waver (SG, D, RC, Trans)	—	WM213
Standard Four-valve Short-waver	Mar. '35	WM383

Superhet: Blueprint, 1s. 6d.

Simplified Short-wave Super	Nov. '35	WM397
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Mains Operated.

Two-valve: Blueprints, 1s. each.

Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.	Aug. '34	WM363
"W.M." Long-wave Converter	—	WM380

Three-valve: Blueprint, 1s.

Emigrator (SG, D, Pen) A.C.	—	WM352
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Four-valve: Blueprint, 1s. 6d.

Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391
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MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6 (1s.))

June '35	WM387
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Listener's 5-watt A.C. Amplifier (1/6)

Sept. '35	WM392
Nov. '35	WM398

Radio Unit (2v.) for WM392 (1s.)

Dec. 1, '34	AW456
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Superhet Converter

Dec. 1, '34	AW457
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B.L.D. L.C. Short-Wave Converter (1s.)

May '36	WM405
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Wilson Tone Master (1s.)

June '36	WM406
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The W.M. A.C. Short-Wave Converter (1s.)

July '36	WM408
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QUERIES and ENQUIRIES

A Change of Address

"I have a straight three set and I have moved to another house, about a mile from my old address and higher up on the hill. I used to be able to get foreigners quite easily, but now I can only get the local station. Could you let me know the cause of this trouble and how I could rectify it?"—M. P. (Walton-on-the-Hill).

AS the receiver originally worked satisfactorily, and provided that no damage has been sustained during the move, it may be regarded as not responsible for the failure now to get the distant stations. Therefore, the cause of the trouble must be your new aerial-earth system or the particular atmospheric or physical conditions of the new district. Firstly, we suggest you endeavour to erect the new aerial in the same direction as the original one as this may play quite an important part. Secondly, endeavour to improve the earth connection, and try different types of earth in case the soil is of a different material in the new place. Finally, inquire of local people or a local dealer and find out whether the type of set you are using gives good results in this particular part.

A One-valve Set

"I want to construct a one-valve set, and should be glad to receive details of the one-valve sets you have designed. I am only eleven years of age, and should like something simple."—D. N. B. (Felsted).

YOU will see from the Blueprint Service list on page 546 that we can supply three blueprints for standard types of one-valve set, and three blueprints for short-wave one-valve sets. You should therefore decide whether you require a short-waver or a broadcast set, and also whether you will buy ready-made coils or make your own. In the case of the short wavers all the coils are home-made, but in the broadcast sets only one utilises a home-made coil. The most powerful of the broadcast one-valvers is the twenty-station loud-speaker one-valver, but this employs a special dual valve, and is, in effect, a detector push-pull set using the reflex principle. The All-wave Unipen employs a pentode valve, but covers the short-wave in addition to the broadcast wavebands.

Winding a Soldering-iron

"I have made a very useful size soldering-iron, complete with a full 3/4 in. hole bored down its centre. Having tried several pieces of resistance wire for an element, and blown equally as many fuses, I have come to the conclusion that I had better seek your advice. My ambition is to wind an element on a former about 2 in. long by 1/4 in. to 3/8 in. diameter, thus allowing for a covering of mica to make a snug fit into the bit. I should like to attain a soldering heat with as low a consumption as practicable; supply 230 to 250 volts, 50 cycles."—E. C. J. (West Croydon).

AS the iron is apparently a small one, a loading of about 45 to 50 watts should be ample, and could not be con-

sidered too expensive to run. You would need for this approximately 800 ohms resistance running at approximately a quarter of an amp.

A suitable gauge of nickel chrome wire to give a temperature of 400 deg. C. at this rating would be No. 40, and for the total resistance mentioned you would need approximately 100 yards. The wire is very fine, and you should be able to accommodate it in the space mentioned, any excess space being filled up with asbestos string as a packing.

Increasing the Output

"I built the Wireless League 3 about eighteen months ago and am very pleased with it indeed. The present output is about half a watt, from a Cossor P.T.2 pentode,

RULES

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.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

but I should like about 1 watt from the same set without adding another valve. My H.T. is obtained from an eliminator, so that I need not worry about that. If you can tell me of another valve could you also tell me what valve resistance I shall need, as I have an automatic grid bias?"—R. B. (Sherborne).

THE P.T.2 is a Marconi-Osram valve, not a Cossor, and we presume you have simply given the wrong maker's name, and not the wrong reference type number of the valve. However, an output of 1,000 mW (1 watt) is given by the Cossor 220PT, and 230PT, the Hivac Z220, the Lissen PT240 and PT2A, the Mazda Pen 220A, the Mullard PM22C, and the 362 Valve Company's ME2 and ME2A. You could, therefore, use any of these valves, and will find that the filament consumption will vary with different valves from .1 to .3. The bias resistor will also vary with individual valves in view of the differences in anode current, and, therefore, you should decide upon the valve, and the maker's data sheet will give the anode current and grid bias, from which the value of the resistor may be ascertained by dividing the voltage by the current in milliamps and multiplying by 1,000.

Break-through

"I have a home-made three-valver in which the majority of the parts have been made by hand, and although results are very good indeed there is one difficulty which I have not been able to overcome. At

practically every part of the dial it is possible to hear the local station faintly, and it does not seem as if this will tune out. The tuned circuits are quite all right, as I can get dozens of foreigners. Is there any reason which you can suggest for the trouble and a suitable cure, or is it some local peculiarity?"—F. C. (Walthamstow).

THERE are one or two suggestions which we can make, but we think that the trouble is quite definitely due to break-through owing to some part of the complete equipment resonating at the particular frequency of the interfering station. This may be the actual aerial-earth system, one of the coupling coils in the circuit, an H.F. choke, or some similar circuit. If you have wound the tuning coil with an aperiodic aerial coil, or an H.F. transformer with an untuned primary winding, this may be the solution, and may be verified by connecting a condenser across it so that it may be tuned to a high wavelength (together with the secondary) in order to confirm that the station is eliminated on that particular wavelength. You can test the chokes either by removing them entirely and using resistors in their place, or by substituting different windings.

Faulty Padding Condenser

"I have been using the £4 Superhet, but now cannot get satisfactory results on the long waves. I have spent hours trying to get this ganged satisfactorily, and I can get Droitwich, but the padding condenser does not make the slightest difference. Is it possible to do this any other way?"—C. E. (Howgate).

ALTHOUGH there may be a possibility of faulty matching in the coils or I.F.s, we note that you have spent hours trying to gang the receiver, and therefore there is a possibility that the padding condenser has been damaged. These components function by means of a springy plate which is depressed when the screw is tightened, and if you have repeatedly screwed and unscrewed this adjustment, the plate may be remaining now in the maximum position and not returning when the adjuster is unscrewed. Try another pre-set, and if you still cannot gang the circuit, it would be advisable to have the coils tested.

The Best Detector

"I should like to fit to my receiver the very best type of detector, and do not know whether the diode is best, or the power-grid. Perhaps you can help me to make a decision?"—P. H. (Crewe).

WHEREVER possible, that is to say, where ample pre-detector amplification is available, use a diode detector by reason of its distortionless operation. If diode detection is impracticable, use a good power-grid detector. For maximum results for a minimum expenditure of battery power, use the conventional leaky-grid detector, keeping the anode voltage at the lowest value which provides sufficient reaction, if reaction is used.

The coupon on page 548 must be attached to every query.

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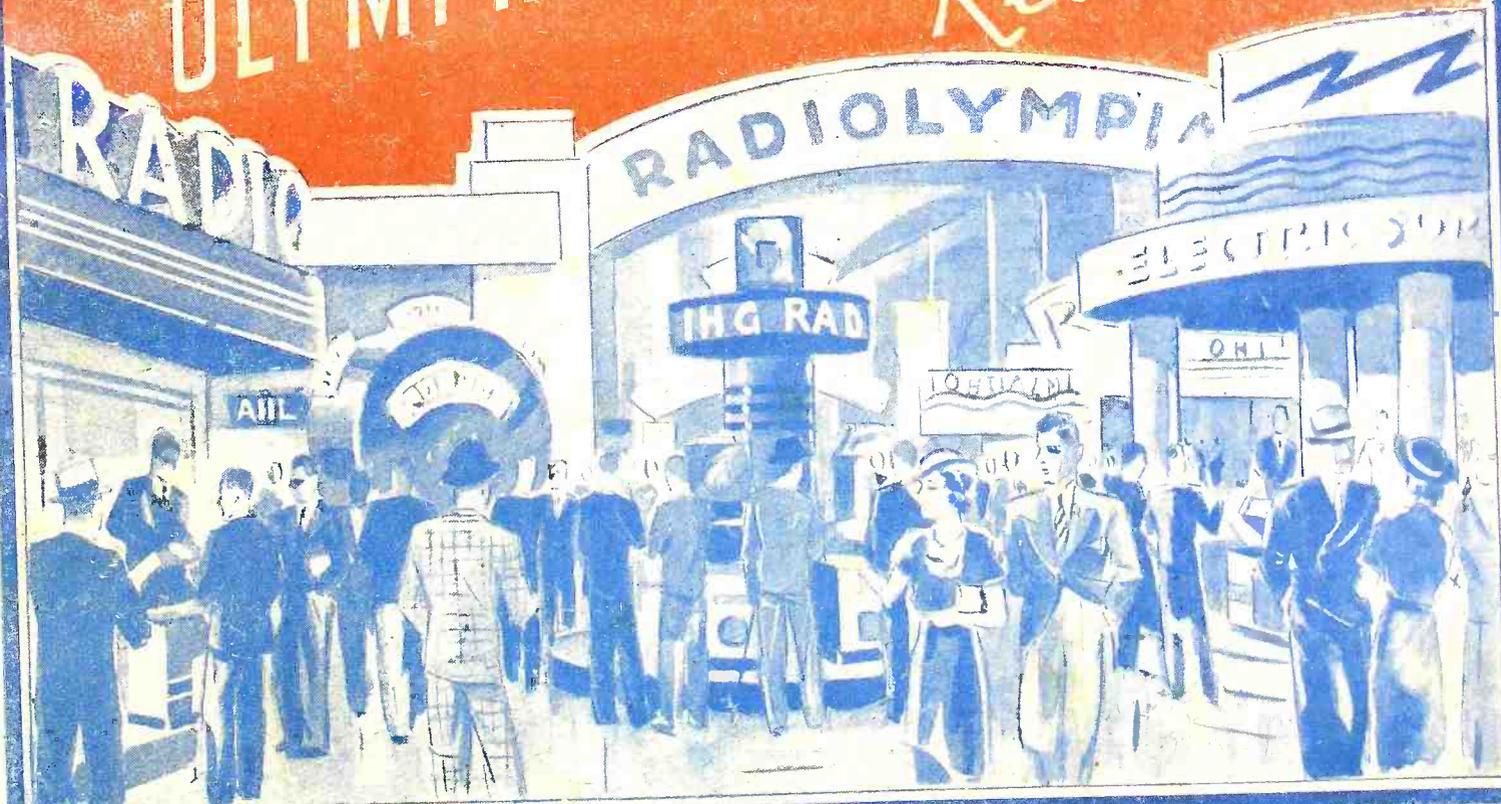
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Vol. 8. No. 204.
August 15th, 1936.

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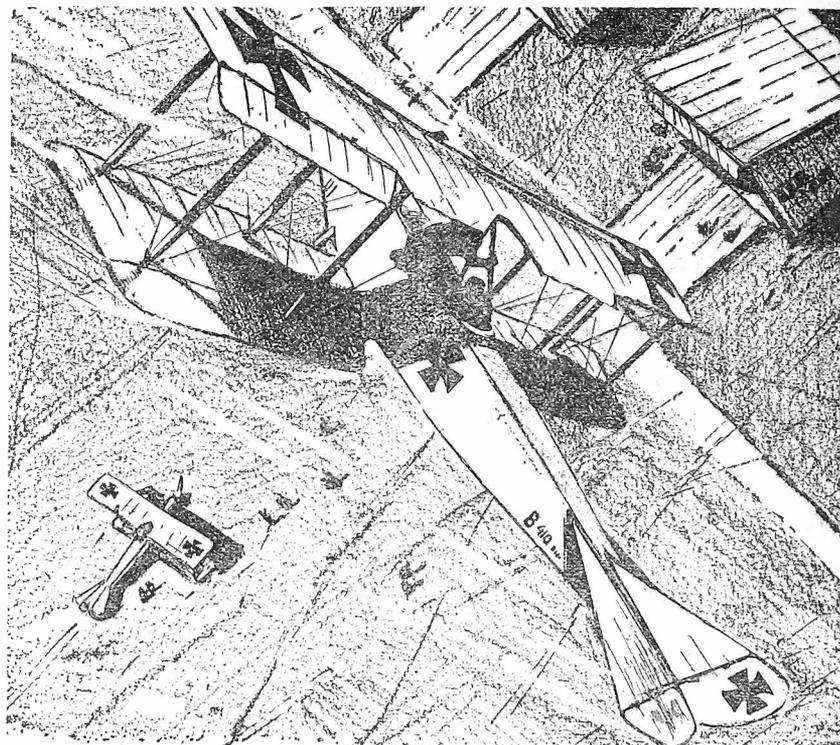
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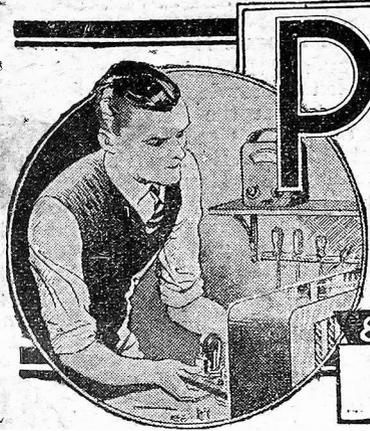
Practical and Amateur Wireless

Edited by **F. J. GAMM**

Technical Staff:

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

VOL. VIII. No. 204. August 15th, 1936.



ROUND *the* WORLD of WIRELESS

VK6ME Australia

A FAVOURITE amongst short-wave listeners, this Australian station is being re-designed and rebuilt. A new transmitter is to be installed at Perth, and is now undergoing tests at Sydney. This link with the Dominions forms a very good receiver test for the simple short-wave receiver, and, no doubt, the new station will be even more reliable than the old one.

America Leads

THE latest returns from the International Broadcasting Union show that America still leads the way so far as the number of listeners is concerned. There are, of course, no official records from the U.S.A. owing to the fact that no licences are issued, but the official estimate gives the number as 25,632,000 receiving sets. Next to this total comes Great Britain with a total of 7,695,452 licences, followed closely by Germany with 7,599,252. The figures for France are 2,929,000, after which comes Japan, with 2,474,413.

Irish Broadcast Records

AN announcement has been made that the broadcasting authorities will in future make sound records of important events in Ireland, but that unlike standard types of record, these special recordings will play from the centre outwards. They will be made only of notable happenings in the country and will be stored in a special sound library at Radio Headquarters.

Automatic Tuning

THERE have been one or two suggestions for the automatic selection of a wireless programme, from the separate time-selector to the automatic-tuning indicator, but from California comes a new suggestion. The device is claimed to be capable of selecting as many as fourteen stations at five-minute intervals so that any number of separate items may be picked up automatically during the evening. As so far explained, the device consists of a roll of tape which may be "punched" by the listener, the punch marks coinciding with the times and stations which are required. This roll is then inserted into the receiver and passes through a selector which switches the set on or off and tunes to the pre-selected stations.

Liverpool Police Radio

FURTHER details have now been received concerning the police cycle radio mentioned in our issue dated August 1st. Our informant states that the 1924 Armstrong super-regenerative circuit is employed so that the noisy background which is heard when no signal is received will enable the policeman to know that the set is still working. This device obviates the use of expensive relays and enables the

NEXT WEEK!

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officer to be released from the task of switching on and off and remaining otherwise alert for signals. The carrier from H.Q. biases the first valve sufficiently to cut out the noises, and this gives the officer the necessary warning to enable him to record the message.

Netherlands Indies Broadcasts

THE NIROM started broadcasting officially in the Netherlands Indies on March 31st, 1934, and now have twenty-two stations. Sixteen of them receive their programmes over telephone lines from the Batavian key station, and the remaining six broadcast local native programmes. The wavelengths used are all below 200 metres owing to unfavourable atmospheric conditions, and the power of the main Tandjong station is 10 kW.

Vatican's New QSL Card

THE card sent out by the Vatican to acknowledge reports of reception has been re-designed, and the new card shows two different views of the aerial system and the transmitting gear of the station.

Athlone's Increased Power

IT is hoped that the power of the Athlone transmitter will be increased from 60 to 100 kW by the end of September. This is, of course, the maximum power allowed by international agreement, and will enable the station to cover a much larger area.

A Demonstrator

A MARCONI recording instrument was recently described in these pages, and a similar device has also been used recently in America. In the case of the American apparatus a thermometer-like chart was suspended in view of everyone, and a microphone in a parabolic collector picked up sounds from every part of the auditorium. The sounds were passed through an amplifier and caused a rise or fall in the "liquid" in the thermometer, and at the same time made a permanent record in the form of the standard graph.

Radiated Power

FROM America again comes news of an epoch-making invention, this time the wireless transmission of power. The invention is attributed to Nikola Tesla, the well-known inventor, but the full details of the invention are as yet unknown. One report of the invention states that the time is now not far distant when cars, trains and similar machinery will be able to operate by means of power picked up on microscopic aërials, micro waves being employed, and the received power being ample for such purposes.

"Wans"

"WANS," for those who are anxious, is almost an Irish equivalent of "ain folk." And when our besom man Mat Mulcaghey from County Tyrone comes to the microphone again on August 24th he will tell his crony, Sam Sweedlepipe, all about "Mulcaghey's Wans." However, listeners are not likely to take Mat as seriously as Sam Sweedlepipe does... but that is anticipating the programme.

THE PICK of the PROGRAMMES

Baseball in Lancashire

ONE of the most surprising developments in the world of sport this year has been the growth of baseball clubs in this country, and nowhere has this been more marked than in the North. Baseball has already received notice in the Northern programme, but on August 15th listeners will hear the first Northern running commentary on a baseball match. The match will be between Rochdale Greys and Oldham Greyhounds at Willbutts Lane, Rochdale, and the commentator will be E. Landless Turner, Secretary of the Manchester County Baseball Association.

"The Bunch of Roses"

DIANA MORGAN and Michael Sayer, who collaborated in the musical play "Bertie" last year, have written another musical show with a strong note of burlesque entitled "The Bunch of Roses." The play, which will be produced by Cyril Wood in the National and Western programmes on August 12th and repeated in the National programme on August 14th, is set in the West Country, and "The Bunch of Roses" is the name of an inn where a mixed collection of people gather, including commercial travellers, an inn-keeper, highway robbers, Surrealists, a detective and a young waitress. Two of the songs, "Roses" and "Midnight Magic," were recently broadcast in "Music Into Play."

A Welsh Religious Service

ELFED, the only surviving ex-Archdruid, will preach at a religious service in Welsh to be broadcast from Tabernacle Congregational Church, Fishguard, on the Sunday following the National Eisteddfod. The Rev. H. Elvet Lewis, who is the minister of King's Cross Church, is well known as a preacher, a hymn-writer, and a poet of no mean ability.

Spinnle Climbs His Monkey Puzzle

PEOPLE who are curious about their genealogy and have searched the records do not always return from their study with a glow of pride. That intrepid old gentleman, A. Spinnle Shanks, who broadcasts his experiences for the benefit of Scottish listeners on August 14th, is unlikely to be more fortunate than the rest of us. Indeed, there is a suggestion that his family tree is of the genus Monkey Puzzle. Both ascent and descent of the species are likely to be amusing to the rest of us.

Later in the evening an excerpt from Harry Kemp's Summer Show will be broadcast from the Barrfields Pavilion, Largs. Taking part are Dave Bruce, Elsie Prince, Percy Manchester, Jack E. Raymond, Ann Doel, The Saxon Girls and Harry Carmichael and his Band.

Hare Broth

HOWARD THE HARE, beloved by listeners to the Aberdeen Children's Hour, will offer another plate of Scotch Broth on August 15th. As may be expected when a hare turns cook, the ingredients are bound to be unusual. What Howard apparently does is to bring a collection

MAKE THESE DATES
WITH YOUR RADIO

of gramophone records to the boil and then—all this does not sound very palatable, but those who have already had servings of Scotch Broth will know that they are good.

SANDY POWELL AND PYE



Pye's latest release, battery portable type T.61, is here seen providing Sandy Powell with a little light entertainment in his dressing room. He is dressed for the rôle of coffee shop proprietor.

"Crowded Moments"

THE fourth of the series of impressions, entitled "Crowded Moments," will be broadcast from the Bridgwater Band Festival at Blake Gardens, Bridgwater, on August 15th (West Regional Programme). After hearing the Massed Bands play, listeners will hear Hedley Goodall introduce the Mayor of Bridgwater. This will be followed by a summary of the results by the adjudicator who will present the conductor of the winning band. The conductor will then conduct his band in the test piece.

"Wings Over Westralia"

"WINGS Over Westralia" is the dramatised story of the epic flight of two young German aviators in May, 1932, from Cologne to the North Coast of Australia. They got lost over the Timor Sea and landed some hundreds of miles away from their objective, which was Darwin. They were lost in the bush and very nearly died of starvation, but behaved with considerable fortitude. The action of the play consists largely of the search for them.

The author, Gordon Ireland, is an Australian, and Lance Sieveking has, in order to get the correct accents, cast the play entirely with authentic Australians with the exception of the two Germans themselves, who will be as nearly German as can be managed, the narrator, who will be English, an aboriginal and two Spanish Mission fathers, who will be cast in the usual way. It is hoped that the general dramatic effect of the whole story will be much enhanced by the freshness of the unfamiliar cadences and accents of the cast. It has been a very difficult matter to get hold of the requisite number of Australians, because most of those who have lived here any time have lost their Australian accent and so are rendered ineligible. The programme will be heard from the National on August 12th.

SOLVE THIS!

PROBLEM No. 204.

Cousens bought an eliminator for supplying H.T. to his S.G.3 receiver, but found that it was not provided with an S.G. screen tapping. What method should be adopted for supplying the screen? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Nownes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes should be marked Problem No. 204 in the left-hand corner, and should be posted to reach this office not later than the first post Monday, August 17th, 1936.

Solution to Problem No. 203.

The grid-bias voltage applied to the power pentode would be approximately 9 volts, and as this would be excessive for the new economy type pentode signals would be weakened and quality of reproduction would deteriorate.

The following three readers successfully solved Problem No. 202, and books are accordingly being forwarded to them: John Surtees, 31, Spencer Street, Heaton, Newcastle-on-Tyne 6; H. Pegg, 146, Lawford Road, Rugby; P. G. Skane, Beverley, Royston Avenue, Prittlewell, Essex.

Concert Party

FROM the Jephson Gardens Pavilion at Leamington Spa a concert party entertainment by the Kit-Kat-Kits, presented by Bert Brownbill, will be relayed from the Midland on August 21st. This Company of seven bright young people was founded in 1931, and in that year began at Newquay, in Cornwall, a series of seaside engagements which has extended to many of the most noted resorts. Mr. Brownbill, who is comedian as well as producer, was for a long time with Julian Wylie productions. The soprano, Agnes Hirst, was at the Gaiety and Adelphi in London; Lena and Follie are dancers and duettists; Olaf Kossen is the light comedian and dancer; Leslie Childs is the entertainer, and Jack Lawton the pianist.

Violin and Pianoforte Recital

PAUL BEARD, who is to be the violinist for this recital on August 22, has recently been appointed to succeed Arthur Catterall as leader of the B.B.C. Orchestra. His grandfather was a Birmingham singer, his father a violinist and viola player. For several years he was leader of the City of Birmingham Orchestra. The pianist will be Margaret Ablethorpe, who is Midland Regional's accompanist.

Voltage and Current Tests

Some Notes on the Use of Meters for Fault-finding and Receiver Testing and Checking. By FRANK PRESTON

ALTHOUGH it is possible to locate the source of many forms of trouble without the use of instruments, the matter is generally simplified when a good multi-range meter is available. And since such an instrument, of quite good quality, can now be bought cheaply enough it is worth while for every constructor and

First of all we want to know the voltages of the high- and low-tension supplies. It seems quite obvious that all that has to be done is to connect the two prods or leads of the meter to the positive and negative terminals respectively. If this were done without the set being switched on the readings would probably be entirely false: an H.T.

The reason is that the voltage varies according to the "load," and it is only under working conditions that a useful reading can be ensured.

L.T. and H.T. Voltages

After measuring the voltage at the input terminals to the set, apply the prods to the filament terminals of each valve holder in turn, as shown in Fig. 1. If the voltage at any pair of terminals is less than that at the input terminals either the switch is faulty or there is a bad connection in one of the leads. Next, after suitably adjusting the meter, measure the voltage between the anode terminal of each valve holder and earth, as in Fig. 2. In any case the reading will be rather less than the actual voltage, due to the increased load provided by the meter—which is in parallel with the valve—but the difference should not be great except in the case of a detector valve passing a very small current and having a high value of resistance in its anode circuit. If any valve does not appear to be receiving its correct voltage, make further tests at the points marked A, B and C in Fig. 3. (Two different circuits are given, one applying to an H.F. valve, and the other to a detector or L.F.) There should be a progressive increase in H.T. voltage when the positive prod is moved in turn to these points, although the difference might be negligible as between the two ends of the H.F. choke or primary winding of an H.F. transformer.

Should it be found that there is no indication of voltage between earth and, say, point A, although a reading is obtained by moving to B it will be evident that the component situated between these two points is defective. In the same way, if the voltage difference is very pronounced it might indicate that the component has a higher resistance than it should have.

G.B. Tests

It is not always easy to measure the grid-bias voltage which is being applied to the valve, for the reason shown in Fig. 4. If the meter were connected between the grid and filament of the valve it might be impossible to obtain a reading, whilst if one were obtained it would be considerably lower than it should be. This is due to the resistance of the transformer or grid leak which would be in series with the G.B. supply, and also due to the fact that the meter partly short-circuits the grid-filament

(Continued overleaf)

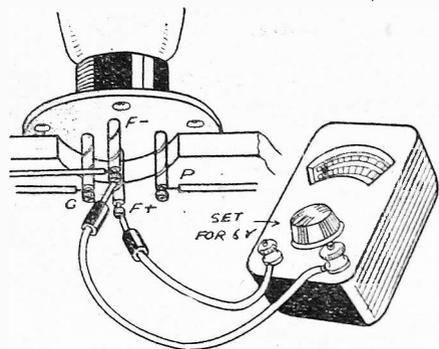


Fig. 1.—The filament voltage of each valve should be checked by connecting the voltmeter as shown here when the set is switched on.

experimenter to invest the few shillings required. Do not buy an unbranded meter—that might be worse than useless—although it is not necessary for normal tests to spend more than about two pounds, for which price a moving-coil unit with up to ten ranges can be obtained. It is, of course, possible to buy a meter for little more than half this price, but it could not be relied upon for any other than very rough checks. On the other hand, you can spend up to ten pounds for a high-grade unit with a guarantee of accuracy of about one per cent.; that price would not be justified, however, in the case of the usual home constructor.

High-resistance Voltmeter

See that the meter to be bought has a reasonably high resistance, because otherwise it cannot be accurate for many of the measurements which it will be required to make; a figure of about 500 ohms per volt for the voltage scales is reasonable. This means that the meter will not pass more than 2 mA when the voltage of, say, a high-tension battery is being taken. A cheap, low-resistance meter might take as much as 20 mA, with the result that the voltage registered might be appreciably less than that of the battery. Additionally, the meter would soon run down the battery if used frequently. The milliampere portion should have a low resistance—and all reputable makes of moving-coil meter can be relied on in this respect.

Under "Load"

But even the best meter obtainable is useless if the owner does not know how to use it. Our correspondence shows that there are many readers who have bought a meter, or even who have made a multi-purpose one from details published in these pages, who have no idea how it should be employed for testing and checking. Let us deal with the principal readings which have to be taken when a set is being tested.

Fig. 2.—Check anode voltages by connecting the meter as shown here.

battery which was badly in need of replacement might show almost full voltage; a run-down accumulator might register 2

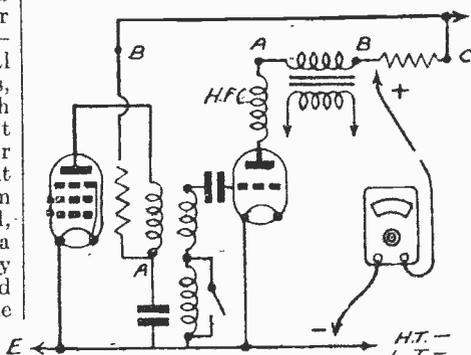


Fig. 3.—Besides testing for anode voltage, as shown in Fig. 2, it is often wise to test between earth and the points marked A, B and C in this skeleton circuit.

volts; and the voltage from a 150-volt eliminator might appear to be 250 or more.

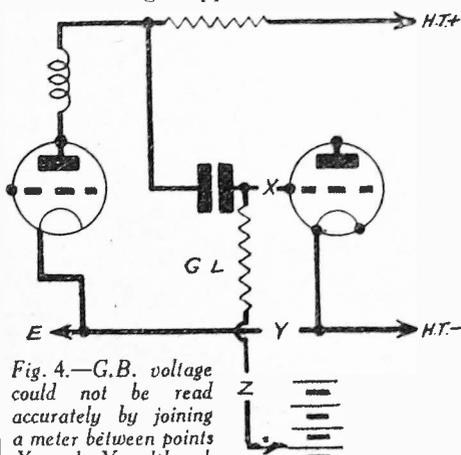


Fig. 4.—G.B. voltage could not be read accurately by joining a meter between points X and Y, although a fairly accurate reading would be obtained by connecting it to the points Y and Z. This assumes G.L. to be in good condition.

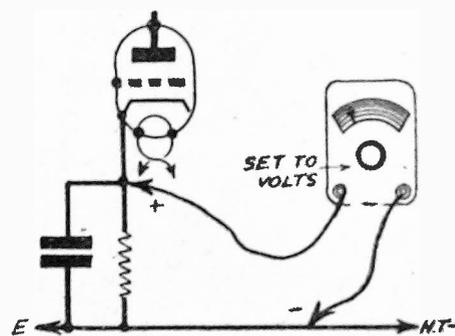


Fig 5.—A fair, though not quite accurate, test of G.B. voltage is possible as shown here.

(Continued from previous page)

circuit of the valve. One method of measurement is as shown in Fig. 4, where the meter is connected between earth and the G.B. negative lead to the transformer, grid leak or coil. The reading obtained even in these conditions might not be perfectly accurate when a variable G.B. voltage is being applied to an H.F. valve through a potentiometer, but if the voltage

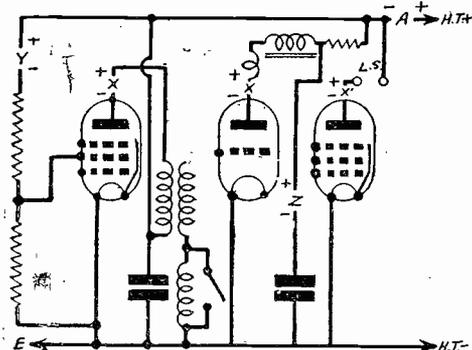


Fig. 6.—Total anode current should be checked by connecting at A and this compared with the sum of the readings at the three points marked. A leaky by-pass condenser can be checked by inserting the meter at Z and the current taken by an S.G. potentiometer by inserting the meter at Y.

varies smoothly as the potentiometer is operated it will be sufficient evidence that the circuit is operating correctly.

In the case of a mains receiver the difficulty is still greater, because the only really simple method of measurement is by connecting the meter between the ends of the bias resistance, as shown in Fig. 5. When this is done the meter is in parallel with the resistance, so that the effective value of the latter is reduced. Nevertheless, provided that the voltage is rather lower than that required, the test will be sufficient for most

purposes. The absence of a voltage reading would show that the resistance was either short-circuited by a defective by-pass condenser or open-circuited due to the component being faulty.

Anode Current

The anode current passed by all the valves together, and also by each individually, should be checked and a comparison made. That is, if the meter reads 20 mA when connected as shown at A in Fig. 6, and only 3, 1, and 9 mA when inserted at the points marked X, it will be clear that there is a partial short-circuit somewhere. Before concluding that some component or connection is faulty, however, make quite sure that a screening-grid potentiometer is not used, or if it is that this does not account for the extra 7 mA, by inserting the meter at the point marked Y in Fig. 6. In making this test, see that the variable-mu volume control (where fitted) is set to the same point during the taking of all measurements. Incidentally, the best method of measuring the current to each valve is by using a split-anode adapter, as shown in Fig. 7, and by connecting a .1-mfd. fixed condenser in parallel with the meter, as shown; this is to prevent self-oscillation which might otherwise arise due to the resistance of the meter.

When any component such as a by-pass condenser is suspected of being faulty so that it passes current, an easy check can be made by inserting the milliammeter at the point marked Z in Fig. 6. There should be no reading in this case; if there is the condenser must be at fault, unless there is a partial short-circuit between two leads joined to it.

Caution

A warning should be given that the receiver should be switched off every time the meter is to be changed from one point to another. Additionally, it should be made

quite certain that the meter is properly attached, and that there are no bare leads or loose wires which might come adrift. Lack of caution in this respect might result in the battery or the valves being permanently damaged. Still more care should be taken where a mains receiver is concerned, because a short-circuit might "blow" a main fuse, and accidentally touching an H.T. point might result in a

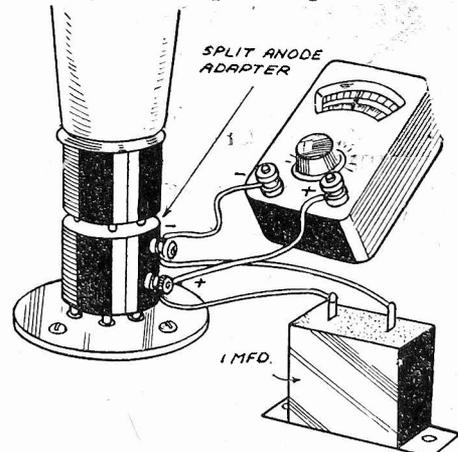


Fig. 7.—This shows how a split-anode adapter can be used to measure the anode current in any valve.

severe shock. Remember that it is not always sufficient to switch off the set, because fixed condensers might store quite enough current to give a nasty "kick" if the terminals are touched. To be on the safe side it is well to short-circuit each large-capacity condenser after switching off and before connecting the meter. This can be done by holding a small screwdriver by the wooden handle and simultaneously touching the two terminals with the bare blade; no need to be alarmed if a fat spark is seen when the terminals are bridged.

AUTUMN PROMENADE CONCERTS

IT is announced by the B.B.C. that new English works will be performed for the first time during the present season of Promenade concerts, which began at Queen's Hall on Saturday, August 8th.

On August 13th, there will be a first concert performance of "Salute to Gustav Holst," by John Greenwood, who is well known as the composer of the music for the films "Man of Aran" and "The Constant Nymph." Then on August 29th comes a first performance in its orchestral dress of John Ireland's "Overture," originally written for Brass Band. The theme is a musical version of the word "Piccadilly," suggested to the composer on hearing a bus conductor calling out the word with varying intensity for the information of his passengers.

"Three Scottish Dances"

Ian Whyte, whose "Three Scottish Dances," conducted by the composer, will receive their first concert performance on August 31st, is the B.B.C. Director of Music in the Scottish Region. Professor Granville Bantock's new Comedy Overture "The Frogs" will be played for the first time on September 9th, the composer conducting. Apart from the fact that this Overture contains a brief allusion to Aristophanes (The Croaking Chorus), it might serve, in the words of the composer, as an

introduction to any Greek play. It carries no special programme, and is a complete musical work in itself.

Five foreign composers will be represented by new works to be performed for the first time in a concert hall in England during the "Proms" season. One is a Russian (Vladimir Vogel); one a Hungarian (Ernst von Dohnanyi); one a Finn (Jan Sibelius); one a Frenchman (Jacques Ibert); and one a Belgian (Armand Marsick).

Vogel's "Ritmica Ostinata," to be played on August 18th, was broadcast from a B.B.C. studio under Dr. Boult's direction in June of this year; but the "Proms" will see its first concert performance in England. It is one of three studies for orchestra, the other two "Ritmica Funebre" and "Ritmica Scherzosa," having been performed at the Oxford-London Festival of the International Society for Contemporary Music, in 1931. It is based on a marching song, and was originally composed for a Brass Band.

The "Minutes Symphoniques" by Dohnanyi (September 4), whose music is familiar in this country, were also broadcast last season, but have never previously been given in a concert hall in England. Nor has "The Ferryman's Bride" by Sibelius (September 10), although this is a comparatively early work, being his Opus 33. It is described as a "Ballad" for Mezzo-

soprano and Orchestra, and is based on a Finnish legend.

"Concertino"

Jacques Ibert, composer of the "Concertino" for Saxophone and Orchestra (September 12th), is a contemporary of Milhaud and Honegger, and one of the best-known French composers of their generation. Like so many composers he was once a naval officer, but in 1919 he won the Prix de Rome for composition, and since then has written operas, ballets, concertos for 'cello and flute and much orchestral and chamber music. While in Rome at the Villa Mediceis he composed music to Oscar Wilde's "Ballad of Reading Gaol." The Saxophone Concertino was first performed at the International Society for Contemporary Music in Barcelona last April.

Armand Marsick whose "Tableaux Grecs" will be performed on September 29th, is one of the leading figures in contemporary Belgian music, conductor of the Liège Symphony Orchestra, and Professor of Harmony at the Liège Conservatoire. Marsick was formerly Director of the Conservatoires of Athens and Bilbao, and is looked upon as the Ambassador of Belgian music abroad. His compositions include "Symphonic Poem, La Source," and three operas—"L'Anneau Nuptial," "Lara," and "La Jane."

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

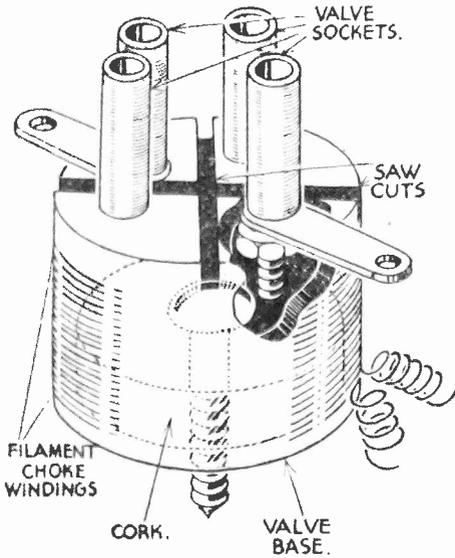
THE HALF-GUINEA PAGE

Combined U.S.-W. Valve-holder and Filament Choke

FILAMENT chokes improve the working of many ultra-short-wave circuits and are essential for some of those of the "long line" or lecher wire type. To be effective the chokes must be as close to the valve as possible.

An efficient combination of U.S.-W. valve-holder and filament chokes can be made from a valve-base—one with parallel sides and of good material is required.

The pins are extracted and four valve sockets fitted in their place. The grid and plate sockets have a small strip of brass clamped or (preferably) soldered under them for the attachment of lecher wires or



An idea for a combined U.S.-W. valve-holder and filament choke.

coils. Two deep saw-cuts are made at right angles to each other and between the sockets to interrupt the leakage path and reduce dielectric hysteresis.

The chokes themselves are wound in "bi-filar" manner—i.e. the two wires are wound together, side by side—about fifteen double turns are suitable for from 2½ to 10 metres. The top ends of the chokes are taken through a small hole drilled in the side of the valve-base, and of course soldered to the filament sockets. This holder may conveniently be mounted by being pressed on to a suitable cork screwed to the baseboard.

A further advantage of this arrangement is that the valve is kept away from the baseboard, and at a level suitable for the direct attachment of coils, etc.—R. H. McCrE (Balham).

A Valve-tester

I HAVE seen several valve-testers in PRACTICAL AND AMATEUR WIRELESS lately, but none of them will detect high-resistance inter-electrode shorts, which are serious in H.F. valves. I think this tester overcomes that difficulty.

THAT DODGE OF YOURS!

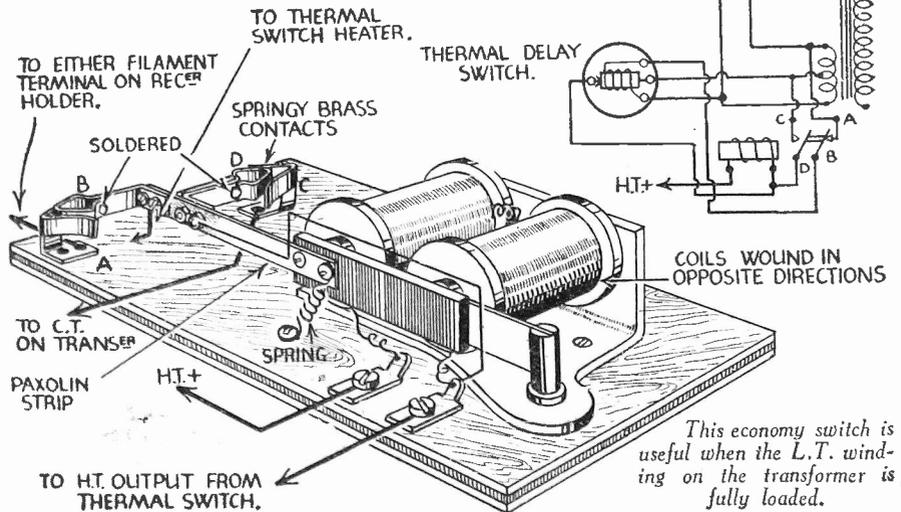
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account 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.

Should the note of the oscillator circuit not be heard when the switches are as shown, the filament is broken. Should it not be heard when the switches are at P, the tester is not functioning.—R. J. Wood (Leigh-on-Sea).

An "Economy" Switch

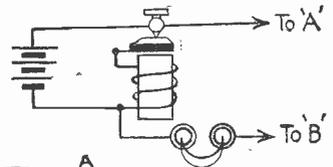
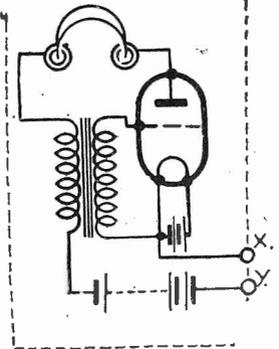
THIS switch will be of interest to many constructors using a high-voltage H.T. supply obtained from a directly-heated rectifier, and who would like to incorporate a thermal delay switch in their set but have not sufficient current to operate it. The fundamental idea in this switch is that the S.P.C.O. switch AB, CD cuts out the heater winding on the thermal switch as soon as H.T. current passes through the operating coil, at the same time shorting out the H.T. contacts of the switch and allowing the H.T. current to flow direct from the C.T. on the rectifier winding, via the operating coil, which keeps the contacts CD closed whilst the current is flowing through it.

When the set is switched off a weak spring pulls the armature back, joining contacts AB and opening CD. Points to note in the construction of the switch are:



This economy switch is useful when the L.T. winding on the transformer is fully loaded.

1, The coils must be wound to include opposite polarity in the pole pieces; 2, The moving contacts B and D must not stick in the fixed contacts A and C; 3, The strength of the electro-magnet must be sufficient to overcome the spring, which must be able to pull back



Mr. R. J. Wood's suggestion for a valve-tester.

the armature. An old electric bell will do excellently but the coils must be rewound with about 3,000 turns on each; any gauge wire may be used, but the finer the wire is the less current it will carry and the greater its resistance. Also, a new arm must be fixed to the armature to carry the moving contacts, the leads from which should be attached to the arm by a few turns of cotton at various places.—A. M. WILDING (Wallasey).

2 new MAZDA BATTERY PENTODES

V.P. 210

A variable- μ screened H.F. Pentode for use in battery receivers.

The valve is specially constructed for use under conditions where freedom from microphonic noise is required.

The anode-grid capacity is only 0.004 mmfd.

RATING

Filament Volts - - - 2.0	Filament Current - - 0.1
Max. Anode Volts - - 150	Max. Screen Volts - 150
Mutual Conductance - 1.4*	
*at $E_a 120v.$ $E_s 60v.$ $E_g 0$	

The bulb is metallised and fitted with a 7-pin standard base.

PEN. 231

A high slope output pentode for use in battery receivers with a self-biased circuit.

RATING

Filament Volts - - - 2.0	Filament Current - - 0.3
Max. Anode Volts - - 150	Max. Screen Volts - 150
Mutual Conductance - 5.3*	
*at $E_a 100$ $E_s 100$ $E_g 0$.	

TYPICAL OPERATING CONDITIONS

Anode Volts - - - - 120	Screen Volts - - - 120
Grid Bias - - - - 2.5	Anode Current - - - 5.0
Optimum Load - - - 19,000	

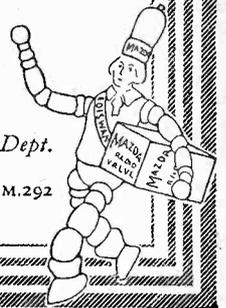
The valve is fitted with a standard 5-pin base.

EDISWAN

Full details of these valves and others in the MAZDA range can be obtained on application to the Technical Service Dept. Mazda Radio Valves are manufactured in Great Britain for The British Thomson-Houston Co. Ltd., London and Rugby, and distributed by



THE EDISON SWAN ELECTRIC CO. LTD., 155 CHARING CROSS ROAD, LONDON, W.C.2 R.M.292



This is one of the famous Newnes Home

Mechanic Books

HOUSE DECORATION AND PAINTING

There are those who think that to paint the garden gate all one has to do is to buy a pot of paint and a brush. Only when they try do they find out how much more there is to it. Disasters that have befallen the unwary whitewashing ceilings would fill two volumes of *Punch*!

But there is no reason why one should not save time and money and develop a fascinating hobby in home decorating and painting with the help of this modern and practical little volume. Each section has been carefully thought out and arranged by an expert from the initial choice of colours to the mixing of the paints, from the buying of the brushes and other materials to the final application. It is expounded in the simplest and most detailed language, so that the merest novice should produce a workmanlike job.

The illustrations are not mere decorations but an essential amplification of the instructions of the text. The book is the most comprehensive on the subject at the modest price of 1/- and is a triumph of compact compilation. Each paragraph and section is clearly "indexed" for quick and easy reference.

Contents :

Painting Interior Woodwork : The Decoration of Ceilings : Relief Decorations for Walls and Ceilings : Stencilling in Decoration : Decorating a Bathroom : Painting a Kitchen : Painting a Front Door : Painting Ironwork : Painting the Outside of a House : Varnish and Varnishing, Graining : When and How to Use Enamel : Practical Methods of Distemping : Paperhanging on Walls and Ceilings

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A HOME MECHANIC BOOK



On Your Wavelength

Is Our Radio Feeble?

A CORRESPONDENT who wishes to create a modern Tower of Babel says that the voice of Britain should be heard all over Europe. He thinks that the low power of our stations is ridiculous when compared with that of Russia, Germany, and France. The selectivity problem is sufficiently acute in England, he says, for us to give the foreigners a taste of their own medicine. This individual must live in a detached house surrounded by a moat. Like most other human beings, I have neighbours, some of whom like to operate sets with at least 5 watts output, so that I seldom have to use my own set. Most people with a good set are very proud of it, and like to let the neighbours hear how loud it is. If the B.B.C. increased the power of the stations this correspondent would be the first to complain of swamping,



Radioads.

and he would probably write a "snorter" to the B.B.C. asking them to buy him a new set.

Radioads

NOTICE that a radio feature in a daily paper is headed "Daily Double." It deals with a couple of selected programmes which it recommends to the attention of its readers. Now I think the racing correspondents should retaliate by heading their dead cert. nap "Short Waves from the Course," or "Variety Programme at Epsom."

The boxing correspondent might head his page "Round the Dial," and the tennis correspondent "All for Love." The Rugger writer would write under a feature heading entitled "I've Got a Hunch."

Ber-lud and the B.B.C.

TOD SLAUGHTER likes a spot of melodrama when he treads the stage. Some few months ago, you

By Jhermion

will remember, he broadcast the "Crimes of Burke and Hare." At that time many nice people thought it was lacking in good taste to deal with the famous case of body snatching. Now it appears that when Tod Slaughter wished to give "East Lynne" the Empire producer demanded "horror," and suggested the "Crimes of Burke and Hare." Apparently there is still a public for the old style of melodrama in which the red blood flows, like "Maria Marten, or the Murder in the Red Barn."

Speakers and Speakers

PAYING a social call, recently, I was invited into a tastefully furnished lounge containing a large radiogram oozing decibels and phons. There were six or seven other guests present and there were three separate and lively conversations being carried on at the same time. The speakers had to shout in order to make their voices heard. No one paid the slightest attention to the radiogram. This ordeal lasted during the full period of my visit—some thirty minutes. I wanted to ask my host the reason, but I could not summon up the breath necessary for the stentorian bellow required to make myself heard.

Radio in Shanghai

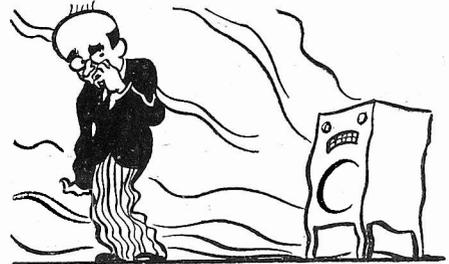
I HAVE received the following most interesting letter from Mr. G. A. Kemp, of Shanghai:—

"I have often wanted to write to you, and now, as I am having my summer holidays, I am getting down to the task of writing you a long screed. Firstly, allow me to praise you for your article which appears each week under the title of 'On Your Wavelength.' I have been a regular subscriber to PRACTICAL AND AMATEUR WIRELESS for the last year or so and am of the opinion that it is one of the best papers on wireless that can be bought here. Contrasting it with other magazines, I find that it is vastly better than, for instance, the majority of the American magazines which nearly everyone here buys who is interested in wireless. Your

paper costs me 40 cents a week, and the American papers are 1 dollar per month. And are they worth it?

"Coming to your article again, and not having had the pleasure of writing to you before, I might say that I wholly agree with you and what you say about crooners. In China, where stations broadcast records most of the time, we get crooners of every sort. How do you like Hawaiian music? Awful, isn't it? I'll tell you a whole heap about local broadcasting right now.

In Shanghai, about two years ago, there were ninety-eight broadcasting stations registered. About fifty of them operated every day at the same time. There were no laws about overlapping each other, nor about keeping to any set frequency. You can imagine what it was like. Most of the Chinese stations did not have their signals modulated at all, and their great aim was to get out the rowdiest signal



B.B.C. and Ber-lud.

they possibly could. Now it is better. There are only about thirty-seven stations on daily between 206 and 516 metres; there are seven European stations and the rest are Chinese. The strongest are only 1 kilowatts. You do not have to have such a thing as a licence here, although the Government tried to get people to register their receivers (and this was only partly successful), but stations are run on the American system of having sponsored programmes. As I said before, gramophone records are the mainstay, but there are also relays from the local dance-halls, from churches, and, very occasionally, from abroad. It is supposed to be compulsory for every station to relay the Nanking Government station between 8.30 and 9.35 at night, but there was a row about that. Many station owners said that this was the most important hour of the day for them, and if they complied with this order

no one would sponsor the hour and they would go broke pretty quick. The foreign stations did as they were told, with the exception of one which carried on in the same way as before, and said 'So what!' Nothing was done about it!

"If you are a short-wave enthusiast you may have heard some of the stations at Shanghai which are used for telephone work. There is a short-wave station at Nanking on approximately 31.6 metres. He is usually on about 12-14 hours G.M.T. Hong-Kong (ZCK) is on daily, but the times are somewhat bewildering. In G.M.T. they are as follows. Daily, 4.30-6.00. Mon., Wed., and Friday, 9.00-12.00. Tues., Thur., Sat., Sunday, 11.00-



Speakers and speakers.

3.00. Also on Sundays, 2.30-6.00. Wavelength 34.29 metres. Address: Post Office, Box 200, Hong-Kong.

"As regards sets and parts here, I impart the following. Receivers are about 95 per cent. American. There are many Japanese as well as Chinese sets on the market. A Japanese 5-valve superhet, all-mains, can be bought new for as little as 15 dollars, or at the present rate of exchange about 18 shillings. Hold that one! Then there are parts. English parts are expensive, but they are worth every cent of it. For instance, a Ferranti push-pull transformer costs 41 dollars. I bought an ordinary Japanese L.F. transformer for 45 cents.

"It works O.K., but I should be very interested to see this thing go through a test that our makes have to go through. Resistors can be got for 1d. Variable direct drive condensers for 5d. Soldering irons for 11d., mains transformers for 10s., 30-amp. accumulators for 2s. 6d., and coils can be made for 2½d. Some of the stuff is not to be laughed at, although it would not be of any use in a short-wave set. Recently I went down Peking Road (noted for its rows of second-hand shops) and came across a Polar .00025 mfd. condenser. It was absolutely new, and, knowing that they cost 8 dollars here, I asked the man how much he wanted for it. He said \$2.50. I didn't wait long, but snaffled it up, knowing jolly well it would be years before a Polar was sold at that price again. Either the



Notes from the Nest Bench

S.W. Receivers

THE S.G. valve does not provide a very high degree of amplification below 100 metres, but the inclusion of an S.G. H.F. stage in a short-wave receiver is, nevertheless, an advantage. It smoothes the reaction control considerably and also improves the selectivity. In a set intended for short-wave reception only, it is, therefore, advisable to use a tuned aerial circuit followed by an S.G. H.F. valve coupled by a second tuned circuit to the detector valve. When the set is to be used for all-wave reception, however, the use of two tuned circuits complicates the switching and consequently introduces instability unless very great care is taken with the layout and wiring. The advantages of using a tuned aerial circuit are therefore counterbalanced by disadvantages. This does not mean that it is an impossibility to obtain optimum results from a receiver using two tuned stages for covering the short and broadcast bands, but experiments indicate that this type of receiver is difficult to design. With an aperiodic aerial circuit in use instability is not experienced and a certain amount of H.F. amplification is still obtainable.

Speaker Energising

MAINS-ENERGISED moving-coil speakers generally provide better results than a permanent-magnet type. This is due to the fact that the flux density in the gap is greater with the mains type if the correct value of energising current is used. The expensive permanent-magnet models have a very high density, of course, and compare favourably with the mains-energised type, but their price is rather more than most constructors care to expend. If D.C. mains are available a mains type speaker can be cheaply energised by connecting its field winding leads across the mains leads. Great care must be taken to choose a component having the correct field resistance to suit the mains voltage, however. When this is between 220 and 250 volts a field winding resistance of between 4,500 and 6,500 ohms should be chosen if the speaker is of the medium-priced 5-10 watt type. If a speaker having a resistance of 2,500 ohms is available, the winding may be connected in series with a 2,500 ohm 10 watt resistance.

chap stole it from somewhere or else bought it at an auction (even new parts are sold for a mere song)."

Teacher Pays

WHERE wireless sets are installed in schools so that the scholars can "listen-in" to school broadcasts it is often the teachers themselves who pay for the set and its upkeep.

An investigation just completed by the Staffordshire County Association of the National Union of Teachers shows that only 81 out of 490 schools possessed wireless sets, and that in only five cases had the local education authority paid for the set.

"Teachers themselves," the investigators report, "have been largely



"Personally, I have neighbours."

responsible for the expense attached to the provision of a set either by using funds accumulated from some school activity, or by providing the money themselves, or by loaning the set to the school. In a few cases some interested person outside the immediate school organisation has provided a set."

No Funds for Repair

WITH regard to expenditure involved in maintenance of the sets, or in the purchase of a licence or of pamphlets, the local authority gave assistance only to half the schools where sets had been bought or lent.

A number of schools where sets had been installed by the teachers or through the efforts of scholars had been forced to discontinue broadcast talks, owing to lack of funds for repair or the provision of pamphlets.

The threat of the broadcast lesson to the teacher is largely discounted.

"School broadcasts," the report states, "require the active co-operation of the class teacher and they cannot displace his class-room work."

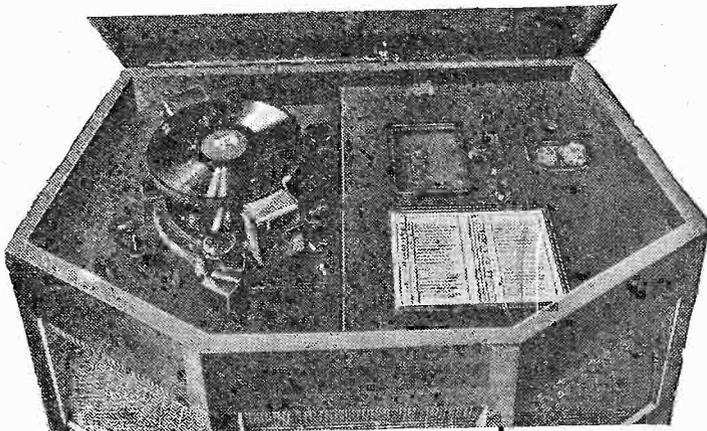
Mr. I. Badger, of Stourbridge, was chairman of the Inquiry Committee, and Mr. H. H. Cartwright, of Dudley, who is on the N.U.T. executive, was one of the members. Mr. Cartwright has taken an important part in the development of school broadcasts and is a member of the B.B.C. Central Council for School Broadcasting.

Some OLYMPIA Secrets Revealed

Although Full Details Have Not Yet Been Released by all the Manufacturers, One or Two Secrets Have Been Revealed by Certain Firms, and Some Details are Given Here

THE amateur and experimenter are already becoming Olympia conscious, and not many weeks now remain before the doors will be opened and the vast range of new season's goods will be on view. What will be the trend of design this year? What new lines shall we see developed for the home-constructor? Will television components be available for the home construction of television receivers? These are only a few of the many questions which constructors are now asking, and it is too early to answer them all. The information which has come to hand so far shows several interesting developments, and no doubt one of the most important is the perfection of the single-knob control. There have been many attempts in the past

where a single knob is employed and the rotation of this knob turns the pointer with maximum speed (which is very fast indeed), but as soon as the user arrives at approximately the tuning point required, a slight backward movement is made and the drive is then through a reduction gear, which is again ex-

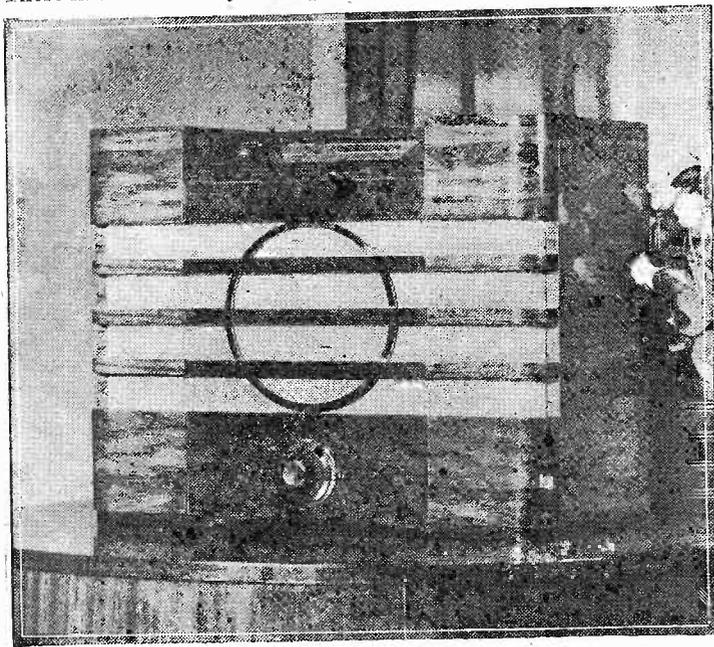


similar device, which is operated from the L.T. accumulator, and with very little extra drain on the supply will develop the necessary high-tension voltage. Messrs. Ekco have perfected the device, and it will be seen fitted to some of their battery receivers; how successfully we shall see later.

Above — the control panel of the H.M.V. receiver shown below. On the left, a new Philips receiver showing the new "Mono" knob control.

Good News for D.C. Users

The listener who only has D.C. mains facilities has, in the past, been forced to use the D.C. type of valve or use a Universal type receiver, but has had the limitation of the mains-supply voltage. Whilst this is, in the majority of cases, ample to provide good reception under all conditions, the user is debarred from obtaining the same high performance which is characterised by the better type of A.C. mains operated receivers. In these, of course, there is the advantage



to reduce the number of controls, but generally the reduction simply consisted in the elimination of one or two controls which, whilst not essential were nevertheless of great value in obtaining maximum performance, or two or more controls were ganged together and operated by concentric knobs.

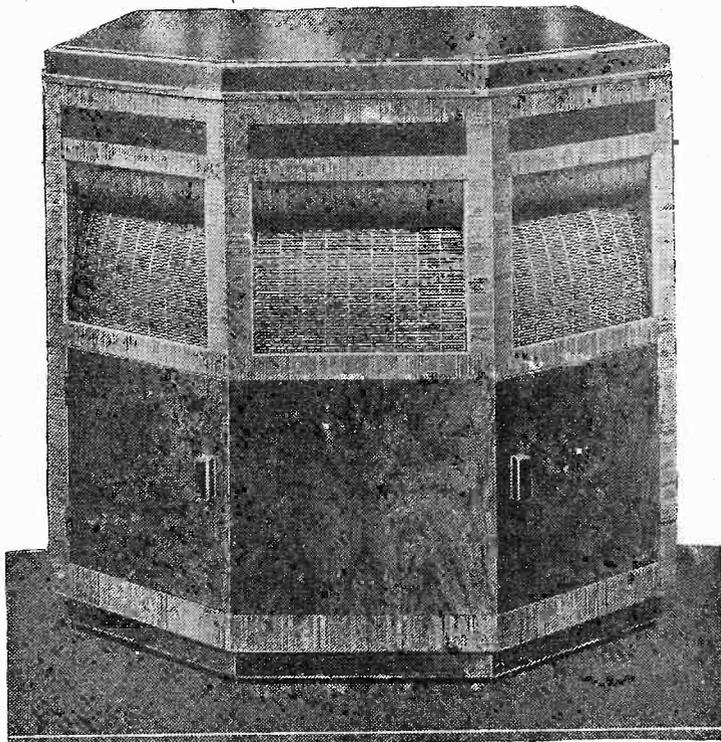
In the Philips receivers will be seen the latest in single-knob control, where only one knob is employed, but that knob controls tuning, volume, tone, and selectivity. The knob may aptly be referred to as a radio joy-stick, for it consists of a small knurled bakelite knob working in a universal ball-joint movement, and through the medium of bowden leads it actuates the various separate controls. The knob itself may be rotated, whilst the entire assembly is moved in the ball-and-socket joint, the rotation of the knob effecting the tuning, and the direction in which the knob is moved controlling the remaining effects.

tremely slow. After a few turns the gear again picks up and movement may be carried out rapidly.

Eliminating the Battery

The drawback of the battery user, namely, the continual replacement of the high-tension battery is now claimed to be removed entirely, by the adoption of the vibratory converter or some

On the right is the latest H.M.V. Auto-radiogram, employing three loud-speakers.



Two-speed Tuning

In the Philips receivers, too, will be seen a novel development of the two-speed drive,

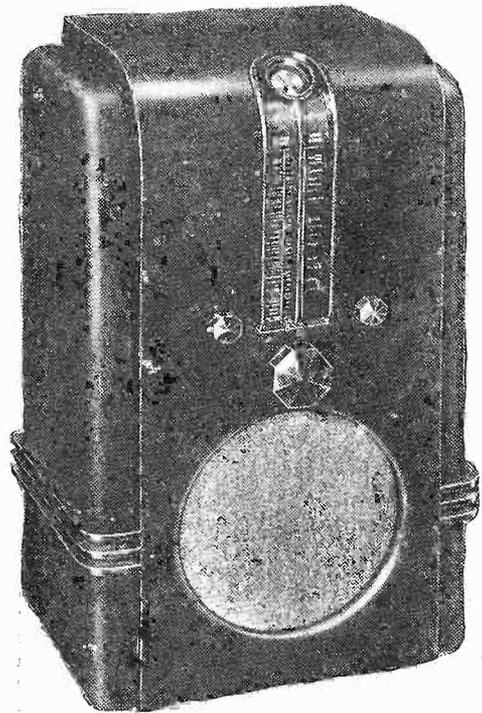
SOME OLYMPIA SECRETS REVEALED

(Continued from previous page)

of a very high voltage, obtained from a suitable input step-up transformer, and the valve types available are, in the main, more efficient. Philips have developed a converter which is now fitted as standard to all their D.C. mains receivers, and it converts the D.C. into A.C. and thus the receiver becomes, in effect, an A.C. set. The converter is built in the form of a unit so that it may easily be removed should the mains supply be changed.

New Constructor Components

Messrs. A. F. Bulgin, the well-known suppliers of component parts, announce that over seventy new items will be introduced this season. Full details of all of them are not yet revealed, but they will include clock-face tuning dials with double-ended pointers behind glass fronts, television



The "Electric Eye"—a novel tuning indicator fitted to an Ekco receiver.

apparatus, including a two-part control knob which is designed to prevent the user's fingers from coming into contact with high-voltage points. Other high-voltage protecting devices will take the form of a special top cap for rectifier valves, cathode-ray tube holders, etc.

In the Wearite range, many of the already popular components will be reduced in price, the reduction in some cases being very substantial. This, in conjunction with the recent reduction in the price of valves, will prove of great advantage to the home-constructor and will enable him to enjoy much greater benefits this winter from his hobby. Some new parts are also to be introduced to the Wearite range, and some details of these are given on another page in this issue.

Colvern Components

In addition to Colvern coils of the Ferrocart type, made in various combinations and also as complete tuning units (with the necessary variable condenser, etc.), Messrs. Colvern are introducing some potentiometers, strip resistances, short-wave coils and short-wave components. For the construction of multi-valve receivers some special aluminium screens for valves and coils are also to be introduced, and a special aerial, to be known as the

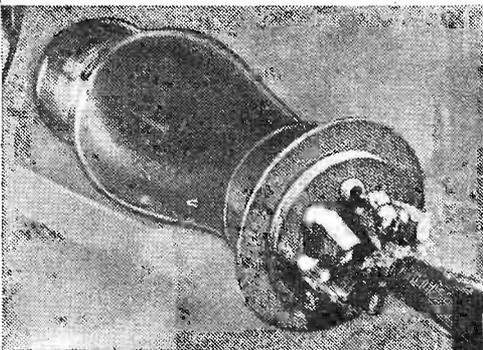
"Selectanet Aerial," designed for indoor or outdoor use, will also be a new line.

Television Components

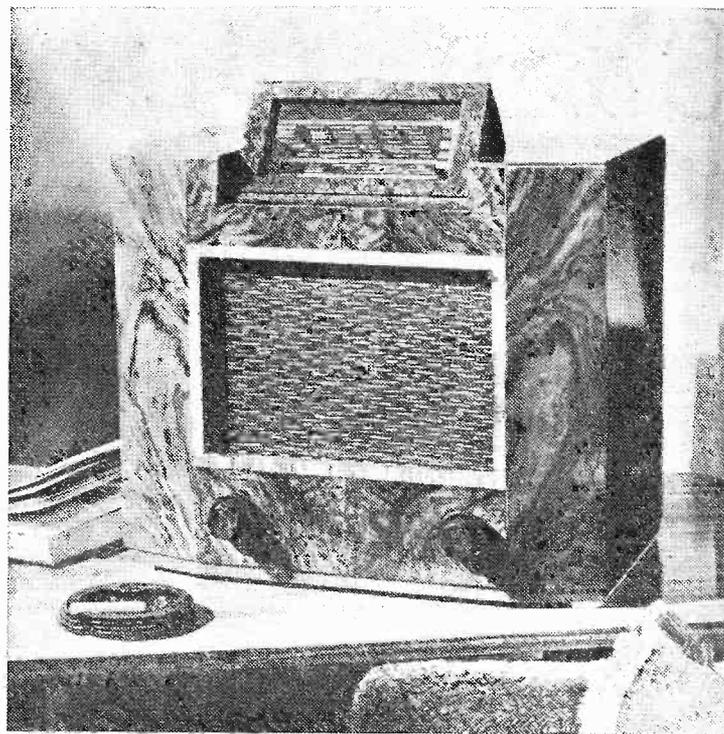
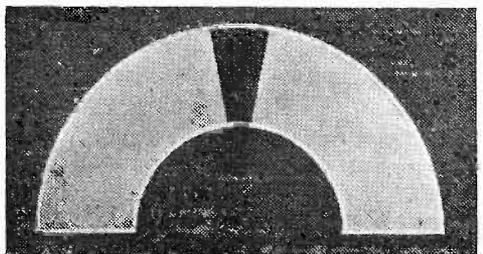
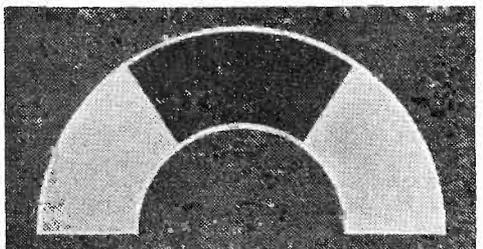
Television should soon be an accomplished fact, although the continued delays have proved very disappointing for the constructor and experimenter, as well as the general public. However, the possibility of building television receivers in the coming season has created a demand for special components, designed either for high-quality reception or for use in high-voltage circuits. The Bulgin components have already been mentioned, and in addition to these the Westinghouse Company are introducing two new rectifiers, types "H" and "J."

They are designed for the supply of H.T. and G.B. for cathode-ray tubes and for the bias in a time base unit, and we understand that a typical power pack incorporating these devices will be exhibited at Olympia.

Messrs. Cossor are introducing some



The tuning indicator fitted to the H.M.V. receivers is operated by the cathode-ray tube device shown above, and below is seen the actual indicator on the panel, showing the "in tune" and "off tune" indications.



To enable the tuning indicator to be read easily the Philips receivers employ this type of adjustable scale. It may be raised and lowered to the most convenient position.

cathode-ray tubes for television purposes, and, in addition, some test equipment in which this type of apparatus forms the major part. They will include such items as a ganging oscillator and a portable oscillograph.

A new twelve-inch cathode-ray tube will also be introduced by Ediswan, in addition to the present 5in., 7in. and 10in. models.

A Portable Amplifier

Messrs. Heayberd, makers of the well-known mains apparatus, are this year introducing a portable amplifier, including speaker and microphone. This is a 6-watt unit, designed for connection to A.C. or D.C. mains without alteration. It is extremely compact and light in weight and is entirely self-contained, including a 20-yard length of mains cable. The input arrangements allow for the use either of a pick-up or microphone, and a single fader control is fitted, with a definite centre stop, and the only other controls are for volume and tone. In addition to this unit, Messrs. Heayberd will show some interesting developments of the well-known mains components, including transformers, chokes, condensers, etc.

Noise-free Aerials

Several firms are specialising in the production of aerial systems designed for the elimination of man-made static. These are now designed for use on all-wave receivers and are equally effective whether used on the short waves or on the long waveband. The Belling-Lee Eliminoise aerial system will be sold as a complete kit of parts for one receiver, without cable, for 35s. This particular arrangement is highly suitable for the feeding of a number of receivers, and from eight to ten receivers may be satisfactorily fed from it. Additional "Eliminoise" transformers may be obtained for each receiver for 17s. 6d., and the special cable is sold at 8d. per yard. With this device each receiver fed from the aerial may be tuned to a different wavelength without any inter-action between the separate receivers.

Practical Television

August 15th, 1936. Vol. 3. No. 15.

Not a Flat Face

SOME readers have asked why it is not possible to make the screen end of a cathode-ray tube a perfectly flat face. The prime reason for the slight curvature arises from the bulb shape which has to be adhered to in order to allow the finished tube to withstand the enormous stresses and strains which arise as a result of pumping the tube interior clear of all traces of gas. The whole bulb has to be specially shaped to prevent the glass cracking and so rendering the tube useless. Another point to note in this same connection, however, concerns the change of focus which would occur as the spot of light traced out the complete raster of lines with a flat faced screen. The beam of electrons emitted from the cathode is deflected in the final neck portion of the tube so that it has a combined horizontal and vertical motion. The beam is therefore "tied" to some extent at that portion, and if the screen face was not curved the length of the beam would alter as it moved from side to side. This would alter the focus of the spot and make each line fan out at the ends if the focus adjustment was made to be correct at the centre of the tube. This could be corrected either electrically or magnetically, but only introduces an additional complication in the initial setting up of the tube in the television receiver.

Terms and Definition

It is understood that the British Standards Institute is engaged on the question of finding satisfactory terms and definitions which can be applied to the science of television. This is especially important now that receiving equipment is coming into more common use, and if their recommendations are accepted it will do much to remove the confusion that at present exists among engineers, manufacturers and writers. For example, with cathode-ray tubes the electrode to which a high positive potential is applied for the purpose of accelerating the electrons in a stream towards the screen so that by their impact the screen at that point is rendered luminous, is referred to as the gun, the anode, the accelerator, etc. Again, the electrode to which is transferred the modulating signal whose characteristic is to be converted into terms of light is called Wehnelt cylinder, modulator, grid and so on. If at this early stage in television's development it is possible to secure unanimity in the industry insofar as terms and definitions are concerned it will eradicate much of the difficulty which was experienced under similar conditions with radio.

On the Programme Side

It is known that the programme and production side of the B.B.C.'s television staff have been in residence at the Alexandra Palace as from the early part of August. This may be the signal for the completion of the first section of the programme arrangements which have been in the planning process for some time. One important factor which needs careful study is the question of make-up and

clothes. This is due to the colour sensitivity of the different types of scanners which will be employed, with the result that certain colours, particularly red, appear as white on the television screen showing the reproduced pictures. It is conceivable that in time this factor will be remedied, but at present precautions are necessary in order to counter the effect. It is certain that feature or interest items will figure largely in the programmes, especially when related to topical items. Furthermore, talks will take on an added interest, for the lecturer will be able to illustrate his remarks with models or sketches. This is rather reminiscent of several of the low-definition programmes. With the high-definition spotlight scanner which the B.B.C. will use, similar studio scenes will be enacted except that the scanner will be in a separate room with the "flying spot" projected through a suitably positioned window. It is understood that dancing, fashion parades, lessons in various forms of sport such as tennis, golf, cricket, etc., people in the news, physical exercises, and so on, will all be featured, this being quite distinct from the entertainment side in which films, cabaret shows, vaudeville and short playlets will be shown.

A Pioneer's Death

Nearly forty years ago Mr. Will Day gave public shows of the first animated pictures, as they were then called. A pioneer in the film world, he became interested also in the early television experiments and assisted Mr. Baird both financially and technically with his first experiments. Unfortunately, he withdrew his support before developments had materialised to a substantial stage, but lived long enough to see the birth of really high-quality television pictures which contrasted greatly with the postage stamp efforts of ten years ago. His recent death at the age of sixty-three removes yet another pioneer to whose efforts this country owes much for its technical progress in many directions.

Another German Effort

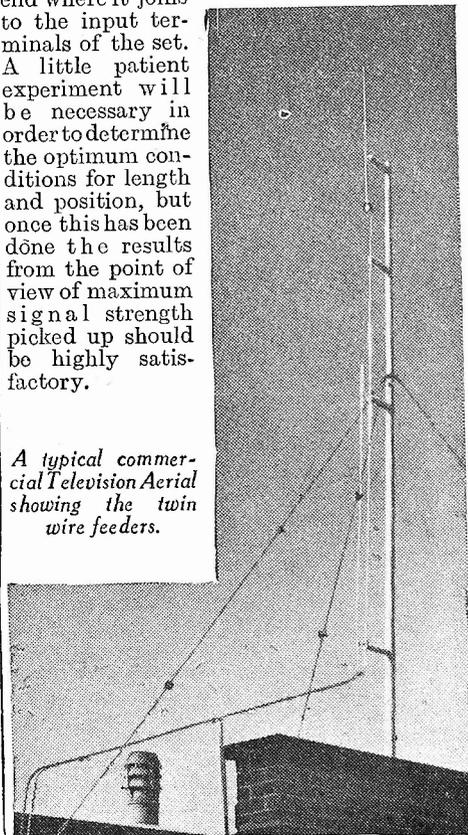
A few days ago the Telefunken Company staged an important demonstration at a Berlin Exhibition. This was a projection television receiver capable of reproducing pictures on a screen four feet wide by three feet high. The German standard of 180-line definition was employed, and the pictures were sufficiently large and bright to enable an audience of three-hundred people to watch in comfort. Good quality pictures were claimed to be obtained, but the distance of the nearest observer was twenty feet from the screen. Not only is this screen to be used for showing the public the television broadcasts from the Witzleben station, but the events televised from the big stadium at the Olympic Games were also shown on this same equipment.

Aerial Importance

Although no data is yet available concerning the field strength of the

Alexandra Palace ultra-short-wave radio transmitter for the vision signals, it is known that this will vary very considerably over the area which can be regarded as the extent of the service. Within a few miles, the strength of the received signal is likely to be so high that a relatively inefficient aerial and feeder system will suffice for connecting to the set itself. Anyone situated near the border of the service area, however, is likely to have to pay more careful attention to his installation. Any loss of signal strength in the aerial equipment will be reflected in the quality of the reproduced picture, for instead of the signal to interference ratio being high the reverse will be the case. It is certain that quite efficient aerial systems will be designed and made available to purchasers or constructors of television sets, but if the installation is an amateur one certain precautions must be taken. Height above ground level is one factor coupled with the maximum distance from any source of interference such as the ignition systems of motor-cars on a main road. Whereas an inside aerial of approximately half the wavelength of the vision station connected direct to the aerial terminal of the set, or a simple doublet, may suffice for those close to the Alexandra Palace, an outside aerial would seem to be necessary in other cases. The mast itself, when possible, can be positioned on the house roof clear of obstruction. To the lower end of the aerial a two-wire feeder should be joined, but only one wire is connected electrically to the aerial end. The second one is left quite free and runs parallel to the feeder wire over the whole of its length. The distance between the wires must be kept approximately the same—about two inches is quite satisfactory—and to ensure a parallel run over the whole length it is necessary to insert insulating distance pieces at regular intervals. Keep this double feeder as clear as possible from buildings, and, furthermore, the feeder must be tuned, a process effected very simply by lengthening or shortening the feeder at the set end where it joins to the input terminals of the set. A little patient experiment will be necessary in order to determine the optimum conditions for length and position, but once this has been done the results from the point of view of maximum signal strength picked up should be highly satisfactory.

A typical commercial television aerial showing the twin wire feeders.



Bridge Measurements

NO keen experimenter would think of carrying out any detailed experiments or tests without the use of some kind of measuring instrument, and in these days of low-priced test equipment every worth-while amateur has at least one type of meter. We have often described the construction of measuring devices in which the main item is a milliammeter, and this is employed in conjunction with resistors to enable various measurements

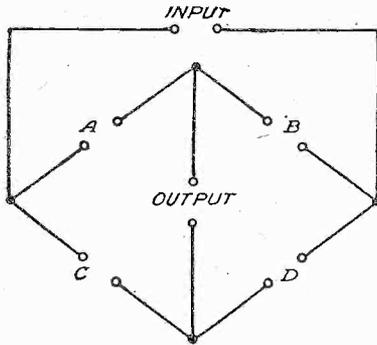


Fig. 1.—The fundamental arrangement of the bridge circuit.

and calculations to be made. But there is another type of measuring device which is very cheap to construct, and which enables some important tests to be carried out, and the results of the tests may be used to operate either a visual or an audible indicator. The basis of this type of device is the Wheatstone Bridge, but there are a number of modern modifications which are actually only elaborations of the device, introduced to simplify certain laboratory calculations, and they will not interest the ordinary amateur. In its simplest form the bridge will be found of the utmost simplicity to operate, and the basis of the arrangement is shown in Fig. 1.

How it Works

It will be seen that there are four arms, as they are called, represented by the points A, B, C and D. Across two of the arms is the input circuit, and across the other two there is the output circuit. The full theory concerning the currents present in these four arms and the method of working out the various values will not be dealt with in this article, but it will be sufficient to state that when the four arms are "balanced," and a voltage is applied to the input circuit, no current will flow in the output circuit. But the moment the arms are "unbalanced," a current will flow in this circuit, and this may be used to operate the indicating device.

Across the points A, B, C and D the known and the unknown components are connected, but if the instrument is to be used for very accurate measurements, reliable and tested comparators must be employed. The component for measurement is connected at point A, and the remaining components adjusted until the device is balanced, when the value of the unknown component is read off from the calibrated scales attached to the comparators, or otherwise calculated from the known values.

Input Devices

The input supply is known as the power source, and the output arrangement is known as the null indicator. From the latter term it will be obvious that when balanced nothing will be present at the

A Bridge-measuring Device Enables Capacities, Resistances and Inductances to be Measured with a High Degree of Accuracy, and the Principle is Explained in this Article - - - By W. J. DELANEY

output, although this ideal may not be reached by the home-made apparatus. For certain measurements special impedance matching transformers will be required in order that the power source and null indicators may be accurately matched, and these must obviously be well screened and prevented from affecting the balance of the arms.

A standard L.F. oscillator may be used at the input, a buzzer may be employed, or a simple dry battery, the exact source depending upon the component being measured. Such items as a beat-frequency oscillator will only be needed for valve tests and similar high-class arrangements.

Output Devices

For the output (when a D.C. input is employed) the simplest device is a galvanometer, but when an A.C. input is used,

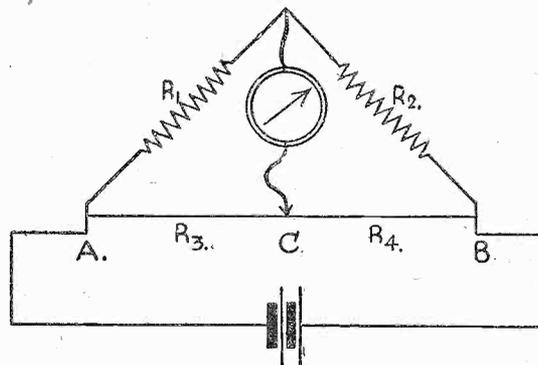


Fig. 2.—A simple bridge for resistance measurements in theoretical form.

a pair of ordinary headphones may be employed, connected through a suitable transformer, or the two output terminals may be joined to a valve amplifier to operate a loudspeaker or other powerful indicator. It will generally be found that headphones form the most reliable form of indicator because the ear is so sensitive to slight changes and to the differentiation between

fundamental tones and their harmonics. A valve voltmeter may also be employed, but is not so sensitive.

Standards or Comparators

For standards by which the unknown components are measured, ordinary commercial components may be used, and the normal standard of accuracy of modern components will be found suitable for all ordinary purposes. Where a higher degree of accuracy is required the makers of resistors, condensers, etc., will supply components guaranteed to 1 per cent. plus or minus at a slight extra cost. The keen experimenter will obtain a few resistances of low values and build up a decade or similar box with a ten-point switch such as the Bulgin component reviewed last week, so that the required values may easily be ascertained. A high-class variable condenser with a 0 to 100 scale firmly attached to the spindle will serve for condenser measurements, and a suitable laboratory type instrument may be obtained at a very reasonable figure from Electradix Radios. This firm can also supply ex-Government resistance boxes which will enable various ranges to be obtained very simply.

Standard inductances are not so easy to obtain in the smaller ranges, but a series of small plug-in coils may be built, and the standard formulæ will enable the desired ranges to be obtained, although for this type of measurement it will generally be found that ordinary commercial components may be used, as exact inductance values are not usually required by the ordinary experimenter.

Accuracy

The accuracy of the bridge depends, of course, upon the accuracy of the standards which are used, and if the three arms, and the input and output circuits are so arranged that no interaction takes place a most efficient test instrument will be obtained.

A simple Bridge for resistance measurements is shown in Figs. 2 and 3, and the balance is obtained when $R1 \text{ over } R2 \text{ equals } R3 \text{ over } R4$. A length of resistance wire is stretched between points A and B with a metre rule alongside. The values of the resistances $R3$ and $R4$ will be proportional to the points A C and C B and thus may easily be calculated. By inserting the unknown resistance between points G and R and a known resistance between G and R2 the value of the unknown resistance may be calculated from the formula mentioned above.

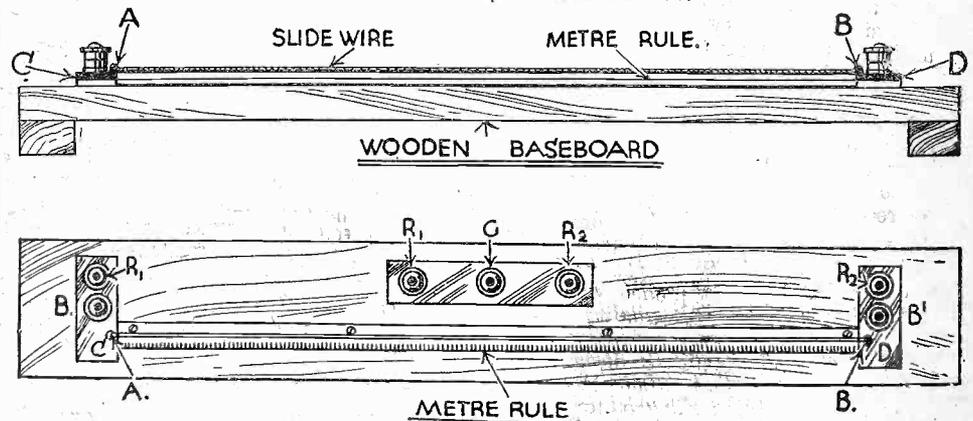
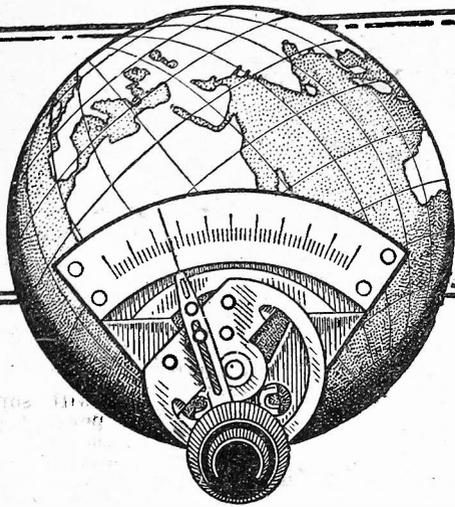


Fig. 3.—The practical arrangement of Fig. 2.



SHORT WAVE SECTION

Artificial Aids to Quality on the U.S. Waves—Part 1

This Article makes Special Reference to Ultra-Short-wave Reception Using a Home Set in Conjunction With an U.S.W. Adapter or Converter

By H. J. BARTON CHAPPLE, B.Sc.

It is now generally understood by listeners that the average domestic receiver cannot reproduce programmes exactly as transmitted. This is due partly to the fact that in order to achieve the necessary degree of selectivity the sidebands have to be more or less severely cut, thus producing attenuation of the treble response, and partly because certain components, for example, loudspeakers, do not have a truly linear response to all frequencies in the

correct proportioning of the circuits and the use of a really good speaker. No doubt, large numbers of enthusiasts will produce ultra-short-wave sets of this type during the coming season.

In General Terms

But for every amateur who builds a special ultra-short-wave quality set there will be many who, at first, will content themselves with an ultra-short-wave adaptor or converter connected on to the normal home set. This set may not be a quality receiver in the true sense of the word, but rather one designed to reproduce a reasonably large number of medium-wave and long-wave stations. It would be a great pity if such listeners were debarred from testing the joys of good quality reproduction as made possible by the ultra-short-waves, and it is therefore desirable to examine the question with a view to suggesting means whereby the home set can be adapted for quality reception in connection with an U.S.W. adaptor or converter. The number of different types of set is so great that explicit instructions which are of universal application cannot be given, but by discussing typical examples it will be possible to show the owner of any set of average type how he can approach the problem.

There are really two main types of problem to be discussed, the first being that confronting the listener who intends using an ultra-short-wave adaptor, and the second that which faces the user of a converter. The former, being the simpler, and being also applicable to the owner of a converter, will be tackled first. As most amateurs are aware, a short-wave or ultra-short-wave adaptor is a radio-frequency unit, either a simple detector or a high-frequency and detector combination, operating at short or ultra-short wavelengths, the output of which is intended to be applied to the detector output of a domestic radio set, so that only the low-frequency amplifying section of the domestic set is used for ultra-short-wave reproduction. Since the design of the ultra-short-wave unit is not within the scope of this article, it will be assumed

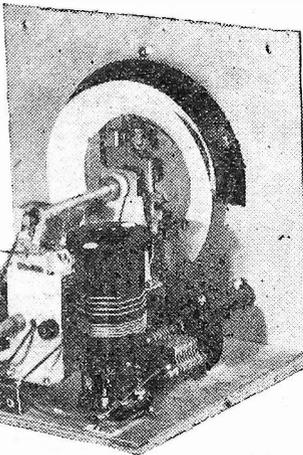
that the adaptor to be used is such that the sidebands are not suppressed to a degree which will mar reproduction so that, other things being equal, the quality obtained will depend entirely upon the design of the L.F. side of the domestic set and upon the characteristics of the speaker.

On the L.F. Side

The problem, therefore, resolves itself into deciding what improvements the listener should make in the L.F. section of his receiver in order to permit it to take advantage of the quality possibilities of ultra-short waves. Generally speaking, the low-frequency stages of domestic receivers have little wrong with them from the point of view of design. The main point to consider is—does the set, as at present constituted, give really good quality on gramophone reproduction? If the answer is in the affirmative then apart from one or two small details the user should be content. In the first place it is necessary to disconnect any device, such as needle scratch filter which may have been embodied in the L.F. side, as the presence of this will deprive reproduction of part of the all-important upper register. Then, if a tone control, consisting of a condenser and variable resistor is connected across the output, this should be turned to full "brilliant," i.e., with the resistance portion all "out." It is not wise to remove this control entirely, as the presence of the condenser is a safeguard against high voltage surges in the pentode circuit in the

(Continued overleaf)

When using a converter—the broadcast receiver must receive attention to improve quality.

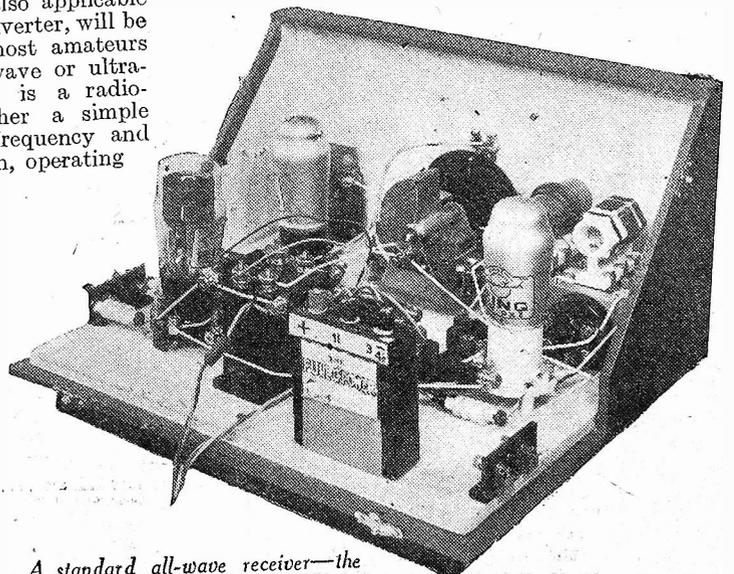


audible range. It is also realised that in many receivers, mainly of the commercial type, these deficiencies are compensated for in a greater or less degree by "tone correctors," whereby the parts of the register which are below par are boosted, or those which are too prominent are toned down.

The normal problem, then, for the listener who wishes to doctor his set with the object of obtaining better reproduction, is to devise a form of synthetic quality on these lines, in order to undo some of the harm done by excessive selectivity and the lack of uniformity in audio-response in various parts of the set.

But, as has been explained in previous articles, the ultra-short-wave sound accompaniment to the television programmes will, in due course, provide opportunities for those possessing the necessary equipment to receive sound broadcasts under conditions which do not necessitate undue cutting of the sidebands in the cause of selectivity, and in consequence will offer great possibilities for real quality reproduction.

It is not really difficult to design and build a quality receiver when reception conditions do not impose the need for a high degree of selectivity, and success in this direction depends almost entirely upon



A standard all-wave receiver—the Graham Farish Multiwave Three.

SHORT WAVE SECTION

(Continued from previous page)

event of the speaker being inadvertently disconnected. Another point which would militate against good quality is small output, and this applies more particularly to battery sets where economy in H.T. supply is important.

In this connection, it would be a good plan to replace an ordinary power triode or pentode with one of the new high-sensitivity pentodes which, while giving a much greater output for a given signal, are particularly economical. In any case, for quality reception it is recommended that the H.T. voltage to the output be raised to the maximum rating of the valve, making sure that the grid-bias is adjusted to suit, and to be fairly liberal in the matter of anode current. Remember that this not only improves the quality of the output, but that most speakers give better reproduction on fairly large outputs than when starved of operating power.

The Speaker

This brings us to the speaker itself, and whatever adjustments are made to the set

itself the final result is often limited to the performance characteristics of the speaker. The average small speaker built into the cabinet of a receiver gives very little response above 5,000 cycles, while its cramped position usually means poor bass reproduction and the substitution of true bass by box resonances. If a good quality speaker is available, connect it to the extension terminals of the set and mount it in a good baffle not less than three feet square or a properly-designed cabinet with narrow sides. If no extension circuit is fitted to the set, now is the time to arrange one, and when doing so it is as well to fit a switch to enable the internal speaker to be cut out of circuit.

If, however, in spite of these things, the L.F. side of your set is not really satisfactory, it is advisable to go over the circuit to see where improvements can be made. It may be assumed that a straightforward low-frequency amplifier, using good components of the correct values, introduces very little distortion. Without knowing what the actual circuit happens to be, full instructions cannot be given, but the following few hints may help. A small L.F.

transformer, especially if of old type, should be resistance-fed. R.C. coupling should be checked to see that the anode resistance is of the correct value—say, three times the impedance of the previous valve. Try varying the value of the coupling condenser in such stages. In some commercial battery sets the L.F. stages are deliberately somewhat overbiased in order to reduce H.T. consumption, and the adjustments mentioned above will produce considerable improvement. Distortion is sometimes introduced by the presence of high-frequency currents in the L.F. side of the set, and an H.F. filter or a grid-stopper resistance between the detector and the output stage will probably make a lot of difference.

Finally, the best quality input and the best quality output will be spoiled if there are unwanted noises superimposed, and in the interest of quality any measures which you had promised yourself to apply to avoid electrical interference should be applied now, and in addition the receiver should be given an overhaul to discover any bad joints or other small defects liable to introduce noise.

(To be concluded)

WITH the Civil War raging in Spain, the possession of radio stations is a valuable asset to both parties, and much use is made of them. Tune in to the short waves after B.S.T. 21.00 and you will pick up one or two broadcasts on unfamiliar wavelengths over and above those to which we have been accustomed on the regular channels. On about 31 metres I have heard a news bulletin given out in English, Spanish and Portuguese, and from the announcement I gathered that the Radio Club of Tenerife (Las Palmas), previously working on 41.61 m., has adopted a more favourable wavelength. This station is on the air nightly at G.M.T. 23.00. If you want all the news every night—although, as you will see, you will get different versions of the same incidents—tune in Moscow (25 m.) CT1AA, Lisbon (31.09 m.), and EAQ, Madrid (30.43 m.). Both Moscow and Madrid give you English translations of their news bulletins, as does Tenerife.

Listeners now report the reception of broadcasts from Addis Ababa (Ethiopia). I doubt very much whether they are being picked up direct, although as the station is now in Italian hands and has been entirely reconstructed to give it a power of 10 kilowatts, there is always this possibility. Of the four transmitters, two have been converted for both radio telegraphy and telephony. You may care to note particulars—namely, ETA, 25.09 m. (11,955 kc/s) now IUC and ETA, 39.37 m. (7,620 kc/s), bearing the call-sign IUB. Tests have been recently made in both speech and music with a view to a relay of native entertainments for rebroadcast by Rome and other Italian medium-wave stations. Possibly they have been heard through IBR, San Paolo (Rome) on 20.89 m. (14,360 kc/s), 15 kw., which is the channel used for the wireless link. The call heard was "Addis Ababa per Radio San Paolo," and the tests were preceded by a series of notes on oscillating valves, a signal which is now being adopted by a number of commercial transmitters. One of this kidney which may puzzle you in the vicinity of 12RO Rome (25.4 m.) consists of four notes (G, B, D, G), and which repeated *ad lib.* may last some five or ten minutes before speech is picked up. It emanates from PPQ, Sepetiba (Brazil), on 25.71 m. (11,670 kc/s), working a radio-

Leaves from a Short-wave Log

telephony service with Europe. A simultaneous transmission is made through PPU, on 15.58 m. (19,260 kc/s), where the same interval signal is heard. When calling, the woman operator informs you that it is RIO (de Janeiro).

Radio Podedrady (OLR) is on the air. If the name sounds mysterious, let me tell you that it is the Prague short-wave transmitter to which many references have been made during the past few months. The station is a 34-kilowatt capable of being boosted up to 56 kilowatts, and destined to relay the main Czech programmes for overseas listeners. So far tests of speech and gramophone records only have been carried out on 19.58 m. (15,320 kc/s); 25.54 m. (11,740 kc/s) and 49.06 m. (6,115 kc/s), but the station is also authorised to use 13.99 m. (21,450 kc/s), 19.70 m. (15,230 kc/s); 25.26 m. (11,875 kc/s); 25.51 m. (11,760 kc/s); and 31.57 m. (9,504 kc/s), so you may occasionally pick up trial broadcasts on these channels. The announcements are made in several languages, including English, and the

quality of the transmissions is excellent.

Another newcomer recently logged is Batavia (Java), on 19.80 m. (15,150 kc/s); it is a transmitter owned and operated by the N.I.R.O.M., which runs the PMN and other regular Netherlands East Indies short-wave and medium-wave broadcasters.

From Geneva comes good news for both medium- and short-wave listeners, to the effect that the first all-world concert arranged by the U.I.R. will be furnished by the United States of America on September 20th at G.M.T. 21.00. It is to be a star programme to which both the N.B.C. and C.B.S. organisations jointly contribute. On this occasion, as an introductory note, I understand, European listeners will be given an opportunity of hearing the roar of the Niagara Falls. The entertainment which follows is to be relayed to a number of Old World stations.

In this connection, as regards the service for overseas listeners, it is interesting to learn that a new method of recording wireless programmes was recently demonstrated at Washington (U.S.A.). Although the system used is one which employs a species of sound-film, it is claimed by the inventors that an entire day's programme from a broadcasting station can be recorded on a reel the size of an ordinary spool of thread, and that the cost is an exceptionally low one.

BRITISH LONG-DISTANCE LISTENERS' CLUB

ENROLMENT FORM (See announcement on page 563).

I wish to enrol my name as member of the British Long-distance Listeners' Club, it being clearly understood that no financial obligation is thus incurred. I am interested in long-distance listening and have* a short-wave receiver at present in use. I am especially interested in {medium-wave* } listening. {short-wave* } {ultra-short-wave* } I have not

Full Name (Block letters)

Address

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Optional

Please forward me pads of 50 log-book sheets price 1s. 6d.

..... badge price 1. each

..... pads of 50 verification forms price 1s. 6d.

for which I enclose cheque for £.....

postal order

.....

The British Long-



This handsome Badge, in red, blue, and gold, may be obtained by Members for 1s. post free.

Distance Listeners' Club



AN IMPORTANT ANNOUNCEMENT TO EVERY READER

In the interests of long-distance listening, and especially for the development of short-wave world-wide reception, we are taking over the British Long-distance Listeners' Club which was inaugurated by the Wireless Magazine. The following details concerning this club are given for the benefit of those new readers and others who are not already familiar with this great community of long-distance listeners, and all who find enjoyment and thrills in the searching out and reception of long-distance transmitters should join the club and take advantages of the many benefits which form part of the scheme.

THE purpose of the Club is solely to bring together all those listeners who specialise in the reception of stations situated in distant parts of the world. It is intended to form a community of kindred minds; and its aims are the encouragement of DX reception, mutual help, and comradeship.

The B.L.D.L.C. has no commercial aims. *Membership is free.* Members can, therefore, still belong to all other similar associations with similar aims without incurring any additional financial responsibilities through their membership of the B.L.D.L.C. In order to give members the opportunity of exchanging ideas, the services of the entire technical staff of PRACTICAL AND AMATEUR WIRELESS are placed at the service of every member. PRACTICAL AND AMATEUR WIRELESS, furthermore, will set aside in this periodical a special section in which, besides reports of reception, instructive articles, information, etc., the internal affairs of the Club will be discussed.

To enable listeners to make systematic records of their listening hours, the Club has had special log-book forms printed. These contain spaces for all details necessary for serious reception and will provide the listener in after years with a very valuable record. Furthermore, to aid Club members in

the compilation of their verification reports and to enable comprehensive records of such reports to be kept, special forms have been designed for the purpose.

Useful Stationery

In addition to these two forms, the publishers are also issuing stationery which, like the log-book and verification report forms, can be obtained at a very low cost.

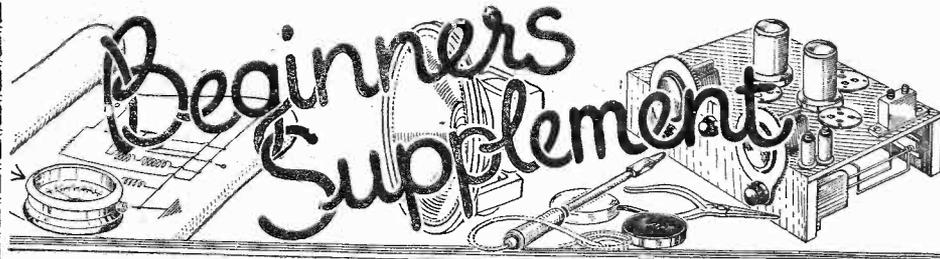
If you are keen on short-wave searching, or even if you only listen on the medium-wave band and are interested in the reception of long-distance stations, you should join the Long-distance Listeners' Club and take advantage of all its benefits. By wearing the neat badge you will be able to recognise other members, and this will afford its own introduction and enable you to discuss matters to your mutual advantage.

All readers interested should fill in immediately the application form on page 562 of this issue and post it to us. We would point out once again that membership of this Club is *entirely free*. Address your letters to:—

Advantages of Membership

- | | |
|---|---|
| (1) No enrolment or membership fees. | (6) Members in same district placed in touch with one another when desired. |
| (2) Organisation centred in Great Britain. | (7) Special meetings and visits to be arranged. |
| (3) Standardised log-books and verification sheets and badges available for members at reasonable prices. | (8) Regular problems for short-wave listeners. |
| (4) Regular report in "Practical and Amateur Wireless." | (9) Members' competitions and numerous other advantages to be announced. |
| (5) Interchange of ideas with fellow members. | |

The Secretary,
British Long-distance
Listeners' Club,
8-11, Southampton
Street, London,
W.C.2.



HIGH-FREQUENCY AMPLIFICATION

An Explanation of the Purpose of an H.F. Amplifier and of the Systems of Inter-valve Coupling.

IN dealing with low-frequency transformers last week it was explained that wireless valves are voltage-operated devices, their purpose being to increase the voltage of the signals received. In doing this, they amplify the signal. But whereas the low-frequency stages amplify the low-frequency voltage which

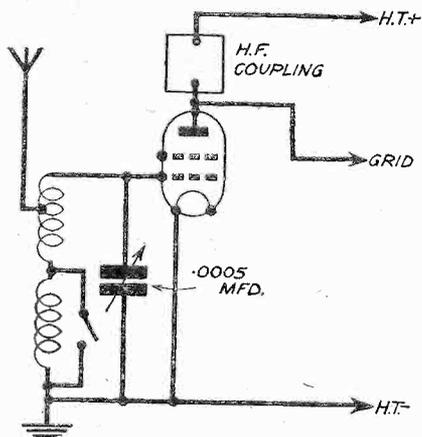


Fig. 1.—Diagrammatic circuit showing the H.F. coupling.

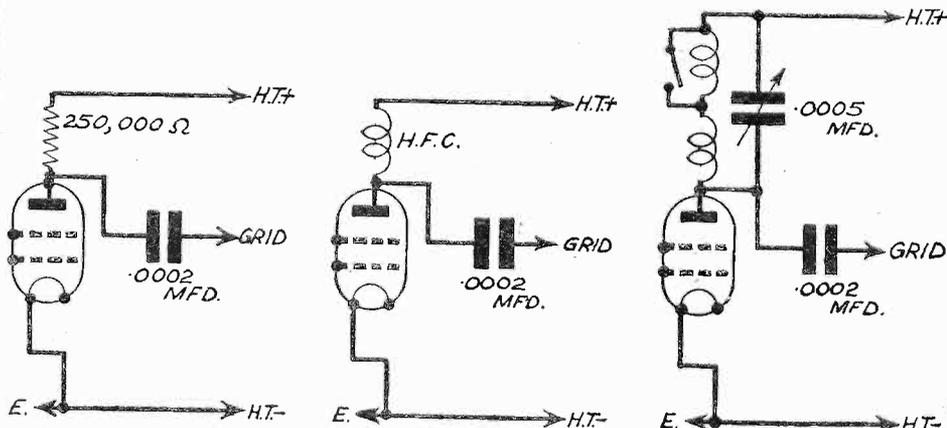
comprises the actual sound impulses, the H.F. stages amplify the combined low and high-frequency voltage in the form in which it strikes the receiving aerial. For present purposes it can be considered that the impulses "handled" by the H.F. valves are of high frequency only, since the low-frequency (or modulation component) is so completely and thoroughly mixed with the so-called carrier wave.

Extending the Range

The L.F. section of the receiver serves to increase the volume of reproduction by magnifying the low-frequency voltage, but the H.F. amplifier does not necessarily provide greater volume, but increases the range of the set. The reason for this is that the detector cannot operate at full efficiency unless the signal voltages fed to it exceed a certain minimum figure. Thus, if the input to the detector were below that minimum, satisfactory reproduction could not be obtained however much low-frequency amplification were provided. It is for this reason that the high-frequency amplifier is so useful in extending the range of the receiver; it increases the strength of weak or distant signals to such an extent that they can allow the detector to function. Of course, in the case of signals which are above the minimum required by the detector and below the maximum "handling capacity" of the detector, H.F. amplification does provide a certain increase in signal strength. This is a point which is not always fully appreciated.

The Inter-valve Coupling

Let us consider the circuit arrangement of an H.F. amplifying valve, such as that shown in Fig. 1. It can be seen that a tuning circuit is connected between the aerial and earth, and that a lead from this is taken to the grid of the screen-grid valve shown. In the anode circuit of the valve is shown a simple rectangle, this representing the coupling between the first and second valves. Before dealing with the form which this coupling can take, let us consider its purpose. In the first place it must offer a very high impedance to the signal, because if it did not signal currents would simply pass through it, through the high-tension supply, and back to earth



Figs. 2, 3 and 4 (left to right).—Resistance-capacity, choke-capacity, and tuned-anode couplings.

In other words, they would be "lost" and would not be passed on to the second valve. The coupling must also provide another function—that of preventing the high-tension voltage from being applied to the grid of the following valve in the form of a very high bias voltage.

Forms of Coupling

The coupling can comprise a fixed resistance, an H.F. choke or a tuned circuit, as well as a condenser and grid leak as shown in Figs. 2, 3 and 4. It will be seen that all of these are very similar, but they produce different effects. In the first place, the resistance causes a pronounced voltage drop, especially if it has a sufficiently high value to provide a barrier to the H.F. currents, and, therefore, it is impracticable. The choke is much better, because it provides the required impedance to H.F. currents, whilst offering a resistance of only 100 ohms or so to the direct, or high-tension, current. But it is by no means perfect, due to the fact that its impedance varies according to the wavelength of the signal

being received, and is at a maximum only at one particular wavelength or frequency. It is for this reason that so-called aperiodic or untuned coupling is not very efficient, although it can be used with moderate success, especially when it is not required to apply reaction.

A Tuned Circuit

The tuned circuit, shown in Fig. 4, is theoretically ideal, because its impedance is practically constant at all wavelengths to which it is tuned. Moreover, the impedance of a high-frequency circuit is almost infinity to the frequency to which it is tuned. This is the basis of most high-frequency coupling circuits, although the actual connections shown in Fig. 4 are modified in the practical arrangement. The most important alteration concerns the connections to the tuning condenser, which is joined between the anode of the valve and earth, instead of to H.T.+. By using these connections it is possible to employ a gang condenser of which all the moving vanes are earth connected. The alteration does not affect the behaviour of the tuned circuit in most cases because there is a complete circuit from the earth line through to the H.T.+ end of the tuned-anode coil by way of the high-tension supply. In many instances this circuit is made to have a still lower resistance due to the connection of a large-

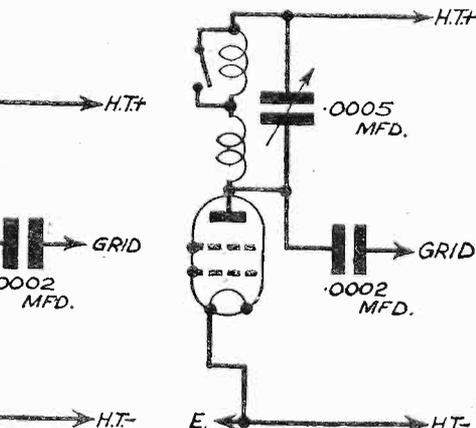


Fig. 5.—A practical modification of the tuned anode circuit shown in Fig. 4.

capacity fixed condenser between earth and H.T.+, as shown in Fig. 5.

Tuned Grid

A modification of the Fig. 5 circuit is shown in Fig. 6, where the choke coupling is combined with a tuning circuit joined between the grid of the following valve and earth. This arrangement is known as

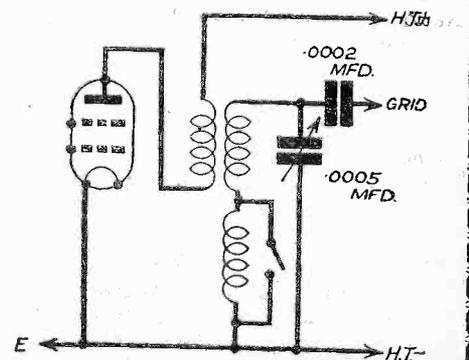


Fig. 5.—A practical modification of the tuned anode circuit shown in Fig. 4.

tuned-grid coupling, due to the fact that the tuning coil and condenser are actually in the grid circuit. The H.F. choke acts as a barrier to high-frequency currents, thus diverting them to the tuning circuit. Theoretically, this method of coupling is not quite as efficient as the tuned-anode

winding is included in the anode circuit of the valve. The secondary circuit is tuned by means of one section of the gang condenser and feeds into the grid of the following valve. It will be clear that by having a greater number of turns on the secondary than on the primary winding, a step-up effect would be produced. And since the secondary must be of such a size that it tunes to the wavelength of the signal being received, the number of turns is definitely regulated. Thus, the step-up effect must be secured by reducing the size of the primary. Because of this there is a limit to the degree of step-up which can be obtained, although by careful design a small extra degree of amplification can be obtained by using fewer turns on the primary than on the secondary winding. The difference in results which can be obtained in this manner is small, and there is little practical difference in efficiency between the amplification obtained when using tuned-grid, tuned-anode, or tuned-transformer coupling.

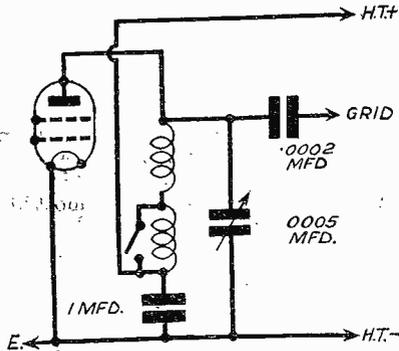


Fig. 6.—The popular tuned-grid circuit, which is a combination of the arrangements shown in Figs. 3 and 5.

system, but it has the practical advantage of being more stable; that is, unwanted oscillation is not as readily provoked. In this case it must be observed that when the following valve is a leaky-grid detector, two fixed condensers are required: one between the anode of the H.F. valve and the end of the tuning coil, and another between the coil and the grid of the detector

The High-Frequency Transformer
Another modification of the basic circuit is shown in Fig. 7. Here the choke and tuning coil are replaced by a double-wound coil, or high-frequency transformer. In many respects this behaves like the low-frequency transformer which was described last week, and the primary

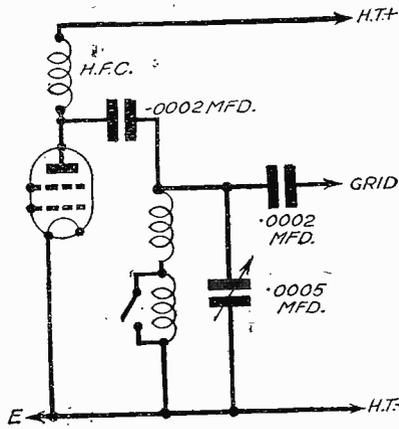


Fig. 7.—Tuned H.F. transformer coupling.

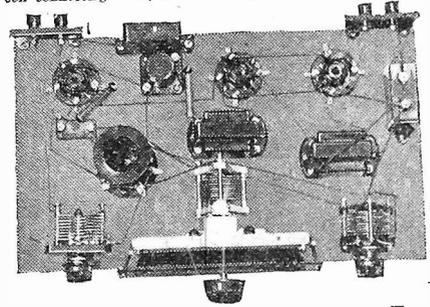
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Recommended by Mr. F. J. CAMM

WAVE RANGE 12-2,000 metres. This Kit will enable you to build a set that will receive the whole wide world direct, for a very small outlay. Includes everything for immediate assembly, including 1 Slow Motion Dial; 3 6-pin Coils, 12/26, 260/510, and 1,000/2,000 metres; 1 6-pin coil base; 3 4-pin baseboard mounting valholders; 1 short-wave H/F Choke; 3 variable condensers, .0001, .0002, and .00016 MFD; 2 Terminal mounts; 4 terminals; 2 L.F. Transformers; 2 fixed resistances; 3 fixed condensers; 3 component brackets; 1 switch, 1 metal-sprayed baseboard; 1 coil connecting wire; 1 wiring diagram.



CASH or C.O.D. CARRIAGE PAID **37/6**
Less Valves

Set of 3 recommended British valves, 10/- Recommended full-size permanent magnet M/C speaker, 10/- Extra coils for intermediate wavelengths, as follows: 9/14, 22/27, 41/94, 76/170 metres, 2/- each. 150/325, 480/1,000 metres, 2/6 each.

N.T.S. SHORT WAVE ADAPTOR KIT

UP-TO-DATE CIRCUIT

Listen to America and all the World DIRECT for only 15/- COVERS 12-94 METRES. Complete Kit of parts to build a reliable short-wave adaptor for use with any BATTERY set.

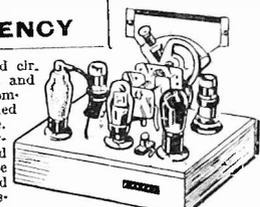
Kit comprises all parts for instant assembly, including metal-sprayed baseboard, 2 variable condensers, .00016, .0001 MFD, 2 baseboard mounting 4-pin holders, short-wave H.F. choke, grid leak, fixed condenser, adaptor coil, terminal mount, two terminals, 3-4 pin plug-in coils, 12/26, 22/27, and 41/94 metres, 1 component bracket, slow motion drive, Trimming condenser, connecting wire and Cash or C.O.D. wiring diagram. Built in one evening. Carriage paid.

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SIMPLICITY EFFICIENCY

Comprises a newly-developed circuit, modern to the minute and using tested and matched components, each specially selected for efficient performance. The Kit includes 2-gang air-spaced condenser of advanced design; Knob dial; wave wound coils on bakelised formers; super L.F. Transformer; solid dielectric reaction condenser; complete with ready-drilled chassis and all necessary valve holders, small condensers and resistances. (Blue-print showing How to Build the Marvel S.G.3 supplied FREE with each Kit.)



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PROGRAMME NOTES

"Filmusic"

THE fifth in the series of six gramophone recitals featuring the best-known tunes from films of the past seven years will be broadcast on August 21st.

"The Tune You Heard"

MARTYN C. WEBSTER will present a programme under this title for the National programme on August 18th. It will consist of a selection of original tunes from recent Midland productions. The vocalists will be Marjery Wyn, Webster Booth and the Southern Sisters, with Reginald Burston conducting the Revue Orchestra. The Southern Sisters had their first broadcast in a Martyn Webster production from London.

Broadcast from the Zoo

IT is Scotland's turn on August 22nd to entertain all listeners to the Children's Hour in Scotland, England and Northern Ireland. A number of microphones will be set up in the Zoological Park, Corstorphine, Edinburgh, to receive the familiar voices

and strange language of Sundra, the elephant; Meek and Mild, the hyenas; Susan, the seal; a regiment of penguins; the Ape Family, and a chorus from the lions' den.

Ulster Grand Prix

AS in past years, this thrilling race, which is the grand finale of the British Motor Cycle racing season, and one of the most important events in the calendar of sport, will form the subject of a broadcast commentary on August 22nd. The race is run over the famous Clady Circuit, which is 20½ miles in length, and must be covered twelve times by the 500 c.c. machines, eleven times by the 350 c.c.'s and ten times by the 250 c.c.'s.

From the start the course is slightly downhill and practically straight for six miles; then comes a right-angle bend at Thorn Cottage, followed by a left-and-right at Aldergrove. Three miles of fast bends lead to the most difficult corner on the course—at Greenmount, where riders enter an extremely narrow and somewhat rough road.

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- WIRELESS ENGINEERING
- EXAMINATION (state which)

Name Age

Address

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.

D. B. (Mill Hill). The receiver is of American origin and we do not know of any firm who can supply a blue print in this country.

J. H. (Marsh). Your earth connection is probably inefficient. Experiment with different earths in an endeavour to improve conditions.

A. W. (Slaithwaite). We cannot understand why you experienced the difficulty mentioned, unless you selected the wrong type of valve. You must make certain that the different makes of valve have exactly the same characteristics, and your guide in the particular case mentioned is the Mutual Conductance.

A. T. A. D. (Walmer). The valve is an obsolete type. At 150 volts on anode and screen and with 15 volts grid bias, the anode current is 14 mA and the screen current 2.7 mA. The A.C. power output is only 400 milliwatts, and the optimum load is 10,000 ohms. Is your 22D valve overloaded? This would account for the other trouble mentioned.

D. E. (No address). No, you should certainly include the Driver valve for best results. The circuit is otherwise quite in order.

G. H. (Norwich). We regret that we cannot follow your remarks, and should be glad to receive a wiring diagram or theoretical circuit, together with your complaints.

J. A. (Dublin). Any flex may be used, but the material usually fitted by the makers is made up of a metal foil interwoven with cotton threads. You should at least hear two stations on the set referred to, Dublin and Cork. Belfast and other stations may be heard under favourable conditions.

G. H. (Dorking). If the eliminator will deliver 30 mA it is suitable. A similar output would be required for the push-pull circuit mentioned.

D. G. B. (Berkhamsted). Generally speaking the device is not very efficient. If a good coil is obtained quite good results may be obtained provided that the required current is of a low order. Otherwise, a special induction coil must be used, and these are not obtainable. In the case referred to a special unit has been made for the purpose.

P. T. B. (Cattford). We do not recommend the procedure outlined by you. The difficulties of running from one cell on the accumulator may be overcome by using a series resistance from the entire battery, or by using each cell in turn to level up the discharge rate.

J. McC. (Lurgan). The valve may be used and follows normal practice. The additional pins are for connection to the suppressor grid and the metallised surface, and these should be joined direct to earth.

R. C. (Belfast). The volume control may have a value of .25 or .5 megohms.

J. G. R. (Ipswich). We have no blueprints of such a receiver in a modern form. The four-valve midget published last week may prove suitable, or the Midget Class B Portable, Blueprint A.W. 389, which employs a class B stage, may prove suitable. The latter is not so compact as the latest receiver, but there is no blueprint for this particular set.

J. F. (Cardiff). We cannot suggest improvements for a commercial receiver, and if it proves unsuitable and is not up to specification, you should communicate with the makers.

F. G. S. (Rubery). We have several circuits of the type mentioned, but none with the particular condenser and coil named. You may be able to select a suitable circuit from our blueprint list and incorporate your own coils, but we cannot give you instructions for carrying out such modification.

D. O'C. (Twickenham). The coils used in the Leader Three were two Universal (Wearite) components, and the condenser was a double Nugant, Type A, made by Jackson Bros.

G. R. (King's Lynn). It is possible to use certain rectifiers in the manner outlined, but this is not in accordance with the recommendations of the I.E.E. The output from the set in question (when the output valve is fully loaded) is 3 watts.

E. G. C. (N.W.2). In view of your proximity to the London transmitters we suggest a superhet. As your present components would not then be suitable we advise you to dispose of the present receiver and obtain the new parts for a modern superhet such as the £4 Superhet, for either battery or mains operation.

J. A. (Gwernymynydd). The trouble is fairly common and is known as L.F. instability. A reversal of the connections to either the primary or secondary generally cures the trouble by making the two signals out of phase. It is, of course, better to prevent the trouble by correct design and operation than to cure it by this device.

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 West London Radio Society

At the committee meeting held on July 24th it was decided that no further meetings should be held by the Society until a later date in August, as the attendance at such meetings would probably not be as good as it has been up till the end of July.

It was also agreed that in future more field days should be held on land than on the river, as they have been during June and July.

Any communication should be addressed to the hon. sec., H. A. Williamson, 22, Cambridge Avenue, West Ealing, W.13.

CATALOGUES RECEIVED

To save readers trouble, we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue," PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

FERRANTI RADIO VALVES

The latest copy of the Ferranti valve list, No. R.115, is just to hand. Twenty-seven pages (9in. by 6in.) are devoted to the various types issued by Ferranti, and in addition to the essential characteristics of the various types, typical circuits are given for every individual valve. Characteristic curves are included, and in the case of the output valves the dynamic characteristics are shown. The catalogue includes a diagram of base connections, table of pin connections, complete list of the valves and prices, and a table of valve equivalents. The catalogue may be obtained free on application either direct to Messrs. Ferranti or to us.

COSSOR RECEIVERS

BOOKLET B.30 has just been issued by Messrs. A. C. Cossor, and gives all details of the new range of receivers. These range from the popular Melody Maker, a battery three-valver at £5 19s. 6d., to Model 537, a console radiogram at 16 gns. There are table radiograms, superhets and straight sets in various cabinet types to suit all requirements, and sepia-toned illustrations of each model are given in the catalogue.

I.S.W. CLUB NEWS LETTER

The International Short Wave Club, London Chapter, have sent us a copy of their monthly publication the News Letter. This gives various details of the forthcoming club features, late station news, and a short-wave review. The July issue contains an article on the Frequency Monitor, in the series "How to become an Amateur Transmitter." A copy of the News Letter will be sent to readers on application to the secretary, A. E. Bear, 10, St. Mary's Place, Rotherhithe, London, S.E.16, if they will enclose 1d. stamp.

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LETTERS FROM READERS

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



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

"Sound Recording for the Amateur"

SIR,—The article by L. Ormond Sparks on "Sound Recording for the Amateur" in the August 1st, 1936, issue must have been welcomed by many experimenters in this work, which in recent months has experienced a great revival of interest.

As one who is devoting much of his time to the subject, may I offer a few miscellaneous hints, and a correction of a slight error?

It is usual to make first test recordings on aluminium, or aluminium-alloy blanks, as they are cheap and easy to obtain, but it is advisable to cover the blanks with a lubricant. This can be, say, paraffin oil, shoe cream or a good wax polish, and a thin layer should be smeared over the blank before cutting. The object is to fill in the "pores" of the blank, thus making the surface more homogeneous and also reducing the frictional resistance to the recording stylus. In the article referred to one particular blank is recommended but, in addition, I would like to draw readers' attention to the "Simplat" blanks of the V.G. Manufacturing Co., Ltd., and a flexible type invented by Dr. C. G. Lemon. The former consist of a glass base, with a black surface coating of a gelatinous composition which, after cutting, is hardened and polished by fluids. The latter are made of a cellulose material, which is thin and transparent, and are softened, hardened and polished with fluids. These blanks are not yet marketed, but will shortly be available at an inexpensive price.

Another serious difficulty that will be met with is fluctuation in recording turntable speed; this trouble must be avoided as it will introduce objectionable "wows" into the reproduction. An electric motor with a high torque is necessary, and a suitable model just released is the Simpson Heavy Duty Electric Turntable, which is a synchronous type, priced at five guineas. Remember that a stroboscope, or stroboscopically marked turntable rim, when illuminated by a neon lamp working off A.C., will enable the speed constancy, or otherwise, to be checked.

Finally, regarding the error. On page 513, column 3, paragraph 3, line 6, the term "positive counterpart" should read "negative counterpart." This will be realised, as when the copper "master" is stripped off the recorded wax blank, which is positive, the grooves appear as ridges, or, one might say, in relief. The correct order in processing is as follows: recorded wax blank, or "filled blank" (+), copper "master" (-), series of copper "mothers" (+), and required number of stampers, working matrices or dies (-), and the pressed disc (+).—DONALD W. ALDOUS, M.Inst.E. (Ilford, Essex).

SIR,—I was very interested to read the article by L. Ormond Sparks on "Sound Recording for the Amateur," having studied the subject for some years, but I feel I must question the statement concerning the distance between groove walls being governed by frequency. Surely the amount of side swing of the

stylus is dependent upon amplitude and not frequency, which only governs the shape and number of fluctuations per given distance.

Admittedly, with most amateur recording systems, if there is any tendency to "over modulate," and consequently cut through the walls of the groove, it is at the lower frequencies that this occurs.

There is a reason for this inasmuch as the popular cutting head or, in many cases, a converted pick-up has a marked rising bass characteristic.

Wishing continued success to your splendid paper.—CECIL L. APPLEBY (Shortlands, Kent).

Modifying Coil Connections

SIR,—Wanting to try the 2-valve circuit on page 445 of PRACTICAL AND AMATEUR WIRELESS dated July 11th, and having no six-pin coils, I hit on the following dodge. The low potential ends of all three coils are connected to one pin, on a 4-pin former, and the other three pins take the high potential ends, thereby doing away with both 6-pin former, and the base. The use of such a coil has one snag, viz., the reaction condenser has to be placed at the live end of the coil; it also necessitates bushing the panel if it is a metal one.

There is no disadvantage in having one end of the aerial in common with one end of the grid coil, as both would normally go to earth, and leave the reaction winding to connect in the normal manner. In that case the aerial would go to the loose end of the aerial coil.—H. FIELDING (Oldham).

CUT THIS OUT EACH WEEK

Do you know

- THAT in a modern testing laboratory the individual circuits of a receiver are ganged by means of cathode-ray tube indicators.
- THAT an ordinary A.C. voltmeter may be used to measure the audible output of a receiver and may be calibrated to show the gain or loss in decibels.
- THAT the maximum theoretical amplification of an H.F. stage cannot be obtained as instability occurs before the maximum gain is reached.
- THAT special valveholder spacing is adopted for high-voltage power-output valves, and a special base is employed.
- THAT although the core of the modern transformer is extremely small compared with older models, the inductance is just as high owing to the use of special metals for the core.
- THAT high-efficiency coils in some modern receivers are wound on glass formers, and litz wire is employed for the winding.

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, George Newnes, 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.

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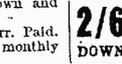


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Random Gottings

By JACE

Radio in Italy

DURING the next "Fiera del Levante," the great Radio Exhibition will be inaugurated, in a special stand of enormous proportions. The most important Italian firms will be represented and will exhibit their latest models.

The firm Allocchio and Bacchini has constructed a portable carbon microphone (model 1864), fitted with a holding device or handle, cord and plug connection, destined to all uses which call for a high output whilst avoiding great amplification, and for which a very critical response curve is not absolutely indispensable.

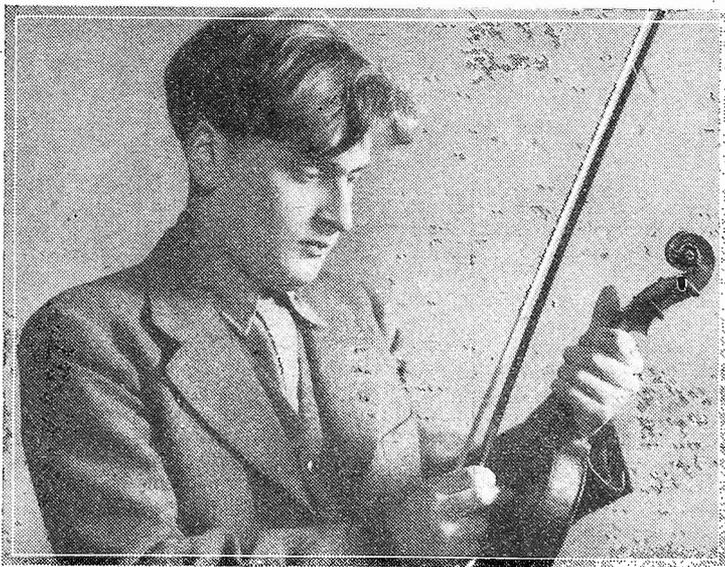
The "Soc. Scientifica Radio Brevetti Ducati" has presented a complete series of appliances for the elimination of radio noises, both at the receiver and in the appliances. This is claimed to be the first series of such silencing devices which has been produced in Europe.

The latest novelties in sound-film technique will be demonstrated in the Open Air Cinema installed in the "Giardino delle Fontane Luminose," at the fourth Cinema Exhibition at Venice, which is being held from August 10th to August 31st. The most interesting exhibit will be cinematographic stereophony, i.e., the perspective reproduction of sounds, which gives the impression of listening to music performed by a large orchestra. This differs, in its Italian realisation, from what has been done until now abroad. In the Open Air Cinema some ten loud-speakers will be employed, four large-cone giant dynamics, for the reproduction of low notes, two snail-shaped giant exponential horns for the reproduction of the central scale, and, lastly, four direct special type exponential horns for the reproduction of high notes (up to 12,000 cycles). This tri-phonic ensemble, based on the three wave scales (low, medium, high), includes three amplifiers (one for each scale), which allows of the complete selecting and amplifying independence of each scale. In the three amplifiers, a special tone control allows of controlling the breadth of the three acoustic bands transmitted to the three groups of loud-speakers, and this follows exactly the phonic characteristics of the film in connection with the ambient stereophonic effects.

Shrewsbury Floral Fête

THE Shropshire Horticultural Society is in its sixty-second year and the Show it will hold in the beautiful Severnside park known as "The Quarry" will be its fifty-sixth (there was a gap during the War years and 1919). In that period the total takings have been £353,851, and donations totalling £25,639 have been made to various societies, chiefly concerned with the beautification of the town of Shrewsbury, and for the purchase of the old Castle. There are one hundred and seventy-five classes and a number of valuable cups, including the £100 Perpetual Challenge Trophy, presented by Alderman Charles Aveling, of Southport, in recognition of help received by Southport Show from the Shropshire Society. C. H. Harvey, a former Mayor of Leominster, and Honorary

Secretary of the Horticultural Section of the old Leominster Show, will give an eye-witness account of the Shrewsbury Fête on its first day, relayed from the Midland transmitter, August 19th. On the second day (August 20th) the concert by the Massed Bands of the Irish Guards, the Welsh Guards, and the Royal Air Force will be broadcast in the National programme, the conducting being shared by Flight-Lieut. R. P. O'Donnell, M.V.O.; Lieut. J. L. T. Hurd; and Major Andrew Harris, M.V.O. (Senior Director of Music of the Brigade of Guards). For nearly forty years Massed Bands have been the distinctive feature of the musical entertainment at Shrewsbury Fête.



Yehudi Menuhin, the brilliant young violinist, is now away in California and will not be heard again for two years. The only music which you can hear, therefore, is from gramophone records, the latest of which is "Schön Rosmarin" and "Tambourin Chinois."

Ulster Grand Prix

ONCE more the time of the Ulster Grand Prix is coming round; the time when Northern Ireland is for a few days the motor cyclists' Mecca. It was in 1928 that the Ulster Grand Prix was won at an average speed of more than eighty miles an hour, and it then sprang into fame as the world's fastest motor-cycle race. It began in 1922 as a small amateur affair and it has had a romantic rise to fame during the last fourteen years, until to-day it is an exciting and thrilling event in which the whole of Ulster seems to take a keen, almost personal interest. From Belfast, as from other centres in Northern Ireland, there will again be a great exodus of people in almost every kind of conveyance, all bound for the course on August 22nd.

The B.B.C. arrangements for broadcasting of running commentaries on the race are now almost complete. This year there will again be two commentators, but the second commentary point is to be moved from Muckamore to Aldergrove corner, a sharp bend just before the course passes the Royal Air Force station. Here Graham Walker, himself a former well-known Grand Prix rider, and winner of many motor-cycle events, will be stationed

in a raised box on the inside of the bend. He will be able to see the machines approaching the corner down a gentle incline at very high speeds; rounding the corner, and roaring away past the aerodromes. Aldergrove Corner is one of the particularly exciting points of the course, and Graham Walker will have plenty of material on which to exercise his powers of graphic description. Raymond Glendenning will give the commentary from the Grand Stand near the famous hairpin bend at Clady Corner. From this point he will describe the general scene, the start, and the finish, as well as the passage of machines during the race.

The commentary is to be broadcast on the National as well as the Northern Ireland wavelength, from 1.45 to 2.30 and again from 4.15 to 5.15. Listeners will also be interested to know that on the Friday evening before the race—that is August 21st—D. A. Boyd is to give a short talk, "Ulster Grand Prix Prospects."

Promenade Concerts, 1936

REFERENCES have been made in the Daily Press to the collective subscription system, or season-ticket pool, which enables a group of people to club together to buy a season-ticket for the Promenade Concerts. This system has met with universal approval, which is not surprising when one reflects that a season-ticket for forty-nine concerts costs only £1 17s. 6d. (i.e. 9d. per concert, instead of 2s.) so that six people sharing, and dividing the ticket among themselves, can each go to one concert a week throughout the season at a total individual cost of 6s. 3d.

It is incorrect to say that the B.B.C. looks upon the scheme with disfavour; on the contrary, on the principle of "the more the merrier," it welcomes it as being calculated to increase considerably the sale of season-tickets.

THE NORTHERN POLYTECHNIC

THE next session at this institute opens on September 7th, and in the latest prospectus received from the institute we note that the Radio Technology section may be attended both by day students and evening students. This section works in conjunction with the Music Industries Council, the Wireless Retailers' Association, and other influential musical and associated bodies, and provides a very complete series of lectures covering all branches of radio and television. Students are prepared for the diplomas of the Music Industries Council and the Institute of Wireless Technology.

Full particulars of the course, fees, etc., may be obtained on application to the Polytechnic, Holloway, London, N.7.

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

New Goltone Lines

MESSRS. WARD & GOLDSTONE announce some interesting new lines for the coming season, several of which will appeal particularly to the home constructor. We have already reviewed the Bulldog connectors (see our issue dated November 16th last), and although these have universal application for the experimenter, when being used in high-voltage circuits such as may become quite common when television apparatus is being dealt with, there will be a risk of severe shocks being felt unless the clip is protected. Small rubber cowls are therefore being produced, designed especially to fit over the three sizes of clip. They slide over the body of the connector, are flexible, and respond to the movement of the springs and thus act as a protection not only against shock but also against corrosion. A hole is provided for the entry of the cable or connecting lead. Prices range from 2d. to 4½d.

Another interesting item is the double-pole 2-pin fused plug designed for any small electrical appliance such as a wireless receiver, electric clock, etc. These plugs are interchangeable with B.E.S.A. standard 5-amp. 2-pin plug bases, and incorporate a cartridge fuse in each pole. These blow at approximately 2 amps., thus saving the house fuse and avoiding a sudden plunge into darkness in the event of a breakdown during the evening. The plugs are available in round or oblong patterns, the price of each type being respectively 1s. 4d. and 1s. Spare fuses cost 3d. only.

Electro-dynamic Converters

THE Electro Dynamic Construction Co. announce that they have carried out much research with a view to finding suitable anti-interference filters for use with converters and the new ultra-sensitive short-wave sets. As a result they have produced a filter which is satisfactory for all wavebands from 10 to 2,000 metres. In future this filter will be fitted as standard to all their converters without extra charge, and the machines will be designed so that they will be suitable for tropical use.

Magnum Multi-contact Switches

THE range of Magnum silver-contact multi-point switches has now been extended and includes eleven standard types, having from 2 to 12 pairs of contacts. These are available with two, three, four, five or six positions and the prices range from 2s. 6d. to 6s. Special short-wave models are available at slightly increased prices, varying from 3d. in the case of the small model to 1s. for the large model. In addition to these standard lines, the switches may be obtained in any desired combination to order, and double-sided switches are available at an extra cost of 10 per cent. on the above prices. For special combinations a chart is available on request and the user may indicate the details required in an unmistakable manner. The makers are Messrs. Burne-Jones & Co., Ltd., Magnum House, 309-317, Borough High Street, S.E.1.

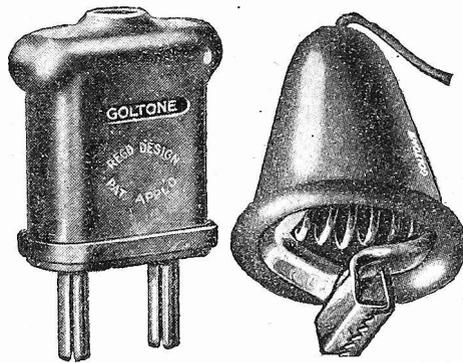
Marconiphone 3-Valve Battery Set

A NEW 3-valve battery receiver was released on the 4th of this month by Marconiphone, and the model will be known as Model "294." This is of the T.R.F. type, similar in many ways to Model "282," but has a much greater measure of efficiency and incorporates a very greatly improved cabinet. The appearance of this receiver leaves nothing to be desired and reveals a further development of the metal frame wooden cabinet which has proved so popular of late. The list price of the receiver is 7½ guineas and it may be obtained on convenient hire purchase terms.

The main circuit details are as follows: S.G. H.F. valve transformer-coupled to a triode detector, auto-transformer coupled to a high-efficiency pentode valve, with a special tone-correcting circuit. Three controls—tuning, volume and master switch, with a supplementary sensitivity control. Tuning scale marked in wavelengths in metres, provision for extra speaker and pick-up. Maximum undistorted output 400 mW., with a H.T. and L.T. consumption of 8 mA and .4 amps. respectively.

New Mazda Pentode

MESSRS. EDISON SWAN announce a new battery valve to be included in the Mazda range. This is a battery pentode of the high-slope type, with a 2 volt .3 amp. filament. The maximum anode and screen voltage is 150, and the normal working values are 120 volts for anode and screen, 2.5 volts grid bias, anode current 5 mA. The optimum load is 19,000 ohms, and the price is 11s. The base is of the standard 5-pin type.



The new Goltone plug and rubber cowl for the Bulldog connectors.

New Polar Components

SOME new lines are to be included in the Polar range of components, and a new type of ganged condenser has been tested by us. This is known as the "Bar" type, and is much smaller than the usual ganged unit. It is not entirely enclosed, but is fitted with end plates and a solid bar running through the unit at top and bottom. The entire framework is of steel, but the vanes are of aluminium. The minimum capacity is very low, and it was found that when the unit was screwed down, even when the screw holes were deliberately made out of line, the structure

did not pull out of truth and thus cause fouling of the vanes. The sections were found to be very accurately matched, and the trimmers are conveniently placed on top. In the standard models bakelite insulation is provided, but when desired special models may be supplied with ceramic insulation. The prices for a two-gang straight or superhet standard model is 12s., and for a three-gang straight or superhet 17s. 6d. The prices for the special ceramic model are 14s. and 20s. respectively.

The remaining new lines include a single-type ball-bearing condenser, a mica-dielectric trimmer and midget condensers in the ordinary and compax types.

New Ferranti Valves

TO the Ferranti range two new mains valves are now to be added. One is a double-diode triode of the universal (A.C.-D.C.) type, with a 5 volt .3 amp. heater, type SD, and the other an A.C. variable-mu pentode, type VPT4B. The double-diode is intended, of course, for use as a combined detector and automatic volume control valve, the separate type of valve providing an undistorted signal free from interaction with the L.F. section, and permits the use of a high delay voltage without a reduction of the available anode voltage at the output valve which occurs when the diodes are operated from the output valve cathode.

The VPT4B has a 4 volt 1 amp. heater, and is rated for 250 volts on the anode and screen voltage up to 100 volts. It has a higher slope than the VPT4 valve and a shorter grid base. The price is 12s. 6d.

The Fuller Accumulator

FULLER Accumulators announce a new high-capacity accumulator of the 2 volt type, rated at 24 A.H. at the 20-hour rate. This is of the standard Fuller type, having dimensions of 3½ins. by 3½ins. and is 7½ins. high. The type reference is FMG, and the price is 10s. The range of H.T. dry batteries made by this firm is to be greatly extended for the coming season, and a number of special models intended as replacements in standard receivers will be included.

Wearite Components

A NEW volume control potentiometer is announced by Messrs. Wright and Weaire, and some of the older components have now been improved and modified. The new volume control is of the carbon element type, and is available in various values from 5,000 ohms to 2 megohms. It may be obtained with or without a switch, and the price is 4s. or 5s. The coils types P, Q, R, S and T, are also improved and reduced in price, costing only 7s. now. Short-wave coils, types A, B and C, are reduced to 2s. 6d., and a new model, type D, covering from 97 to 200 metres, is now introduced. The H.F. choke, type HFJ, is now available with a pig-tail connection and costs 2s. 6d., whilst type HFO is reduced from 4s. 6d. to 3s. 6d. Short-wave choke, type H.F.3, is also reduced in price, and now costs only 2s. 6d. The remainder of the popular coils, transformer switches, etc., are still continued, and in the range of test instruments a new signal generator is to be introduced, but at the moment of going to press no details are available. No doubt this unit will be produced in time for the Radio Exhibition.

THE BEST WEEKLY FOR CYCLISTS
THE CYCLIST
2d. WEEKLY

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS STRAIGHT SETS. Battery Operated.

Date of Issue.	No. of Blueprint
One-valve : Blueprints, 1s. each.	
All-Wave Unipen (pentode) ..	PW31A
Two-valve : Blueprints, 1s. each.	
Four-range Super Mag Two (D, Pen) ..	11.8.34 PW36B
Three-valve : Blueprints, 1s. each.	
Selectone Battery Three (D, 2 LF (trans.)) ..	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.)) ..	2.12.33 PW34A
Leader Three (SG, D, Pow.) ..	PW35
Summit Three (HF Pen, D, Pen) ..	18.8.34 PW37
All-Pentode Three (HF Pen, D (pen.), Pen) ..	22.9.34 PW39
Hall-Mark Three (SG, D, Pow.) ..	PW41
Hall-Mark Cadet (D, LF Pen (R.C.)) ..	10.3.35 PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three) ..	13.4.35 PW49
Genet Midget (D, 2 LF (trans.)) ..	June '35 PM2
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.)) ..	31.8.35 PW55
The Monitor (HF Pen, D, Pen) ..	8.2.36 PW61
The Tutor Three (HF Pen, D, Pen) ..	21.3.36 PW62
The Centaur Three (SG, D, P) ..	PW64

Four-valve : Blueprints, 1s. each.	
Fury Four (2 SG, D, Pen) ..	PW11
Beta Universal Four (SG, D, LF, Cl. B) ..	15.4.33 PW17
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) ..	PW46

Mains Operated.

Two-valve : Blueprints, 1s. each.	
A.C. Twin (D (pen), Pen) ..	PW18
A.C.-D.C. Two (SG, Power) ..	7.10.33 PW31
Selectone A.C. Radiogram Two (D, Pow.) ..	PW19

Three-valve : Blueprints, 1s. each.	
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) ..	PW29
A.C. Leader (HF Pen, D, Power) ..	7.4.34 PW35C
D.C. Premier (HF Pen, D, Pen) ..	31.3.34 PW35B
Ubique (HF Pen, D (Pen), Pen) ..	28.7.34 PW36A
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 PW50
"All Wave" A.C. Three (D, 2LF (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. Fury Four (SG, SG, D, Pen) ..	PW20
A.C. Fury Four Super (SG, SG, D, Pen) ..	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull) ..	PW45
Universal Hall-Mark (HF, Pen, D, Push-pull) ..	9.2.35 PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.	
£5 Superhet (Three valve) ..	PW40
F. J. Camm's 2-valve Superhet (two-valve) ..	13.7.35 PW52
F. J. Camm's £4 Superhet ..	PW58
Mains Sets : Blueprints, 1s. each.	
A.C. £5 Superhet (three-valve) ..	PW43
D.C. £5 Superhet (three valve) ..	1.12.34 PW42
Universal £5 Superhet (three valve) ..	PW44
F. J. Camm's A.C. £4 Superhet 4 ..	PW50
F. J. Camm's Universal £4 Superhet 4 ..	11.1.36 PW60

SHORT-WAVE SETS.

Two-valve : Blueprints, 1s. each.	
Midget Short-Wave Two (D, Pen) ..	15.9.34 PW38A
Three-valve : Blueprints, 1s. each.	
Experimenter's Short-wave Three (SG, D, Power) ..	PW30A
The Prefect 3 (D, 2 LF, RC and Trans.) ..	8.2.36 PW63

PORTABLES.

Three-valve : Blueprints, 1s. each.	
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) ..	16.5.36 PW65
Four-valve : Blueprints, 1s. each.	
Featherweight Portable Four (SG, D, LF, Cl. B) ..	PW12

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve) ..	PW48A
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AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Blueprints, 6d. each.	
Four-station Crystal Set ..	AW427
1934 Crystal Set ..	AW444
150-mile Crystal Set ..	AW450

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.	
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) ..	AW392
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
A Modern Two-Valver ..	July '36 WM409

Three-valve : Blueprints, 1s. each.	
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) ..	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) ..	AW419
Lucerne Ranger (SG, D, Trans) ..	AW422
Coscor Melody Maker with Lucerne Coils ..	AW423

P.W.H. Mascot with Lucerne Coils (D, RC, Trans) ..	AW387A
Mullard Master Three with Lucerne Coils ..	AW424
£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) ..	AW449

"Wireless League" Three (HF Pen, D, Pen) ..	3.11.34 AW451
Transportable Three (SG, D, Pen) ..	WM271
£6 6s. Radiogram (D, RC, Trans) ..	WM318
Simple tune Three (SG, D, Pen) ..	June '33 WM327
Economy-pentode Three (SG, D, Pen) ..	Oct. '33 WM337
"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) ..	WM371
P.T.P. Three (Pen, D, Pen) ..	June '35 WM389
Certainty Three (SG, D, Pen) ..	Sept. '35 WM393
Minutube Three (SG, D, Trans) ..	Oct. '35 WM396
All-wave Winning Three (SG, D, Pen) ..	Dec. '35 WM400

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 (2HF, D, QP21) ..	18.8.34 AW445
(Pentode and Class-B Outputs for above : blueprints 6d. each) ..	25.8.34 AW445A
Self-contained Four (SG, D, LF, Class B) ..	Aug. '33 WM331
Lucerne Straight Four (SG, D, LF, Trans) ..	WM350
£5 6s. Battery Four (HF, D, 2LF) ..	Feb. '35 WM381
The H.K. Four ..	Mar. '35 WM384
The Auto-Straight Four ..	April '36 WM404
The Request All-Waver ..	June '36 WM407

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 Quadradynic (2SG, D, LF, Class B) ..	Dec. '33 WM344
1935 Super Five (Battery Superhet) ..	WM379

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 1/3d., post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." 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.

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
Unicorn A.C./D.C. Two (D, Pen) ..	Sept. '35 WM394

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. ..	AW390
A.C. Triodyne (SG, D, Pen) A.C. ..	19.8.33 AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C. ..	23.6.34 AW430
Mantovani A.C. Three (HF Pen, D, Pen) A.C. ..	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen) ..	Jan. '36 WM401

Four-valve : Blueprints, 1s. 6d. each.	
All Metal Four (2 SG, D, Pen) ..	July '33 WM329
Harris Jubilee Radiogram ..	May '35 WM388

SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.	
Modern Super Senior ..	WM375
Varsity Four ..	Oct. '35 WM395

Mains Sets : Blueprints, 1s. 6d. each.	
1934 A.C. Century Super A.C. ..	10.3.34 AW425
Heptode Super Three A.C. ..	May '34 WM359
"W.M." Radiogram Super A.C. ..	WM366
1935 A.C. Stenode ..	Apl. '35 WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.	
Midget Class B Portable (SG, D, LF Class B) ..	20.5.33 AW339
Holiday Portable (SG, D, LF, Class B) ..	1.7.33 AW393
Family Portable (HF, D, RC, Trans) ..	22.9.34 AW447
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 converter (price 6d.) ..	AW320
S.W. One-valve for America ..	AW429
Roma Short-waver ..	AW452

Two-valve : Blueprints, 1s. each.	
Ultra-short Battery Two (SG det, Pen) ..	Feb. '36 WM402
Home-made Coil Two (D, Pen) ..	AW440
Three-valve : Blueprints, 1s. each.	
World-ranger Short-wave 3 (D, RC, Trans) ..	AW355
Experimenter's 5-metre Set (D, Trans, Super-rogen) ..	30.6.34 AW438
Experimenter's Short-waver ..	Jan. 19, '35 AW463
The Carrier Short-waver ..	July '35 WM390

Four-valve : Blueprints, 1s. 6d. each.	
A.W. Short-wave World Beater (HF, Pen, D, RC, Trans) ..	AW436
Empire Short-waver (SG, D, RC, Trans) ..	WM313
Standard Four-valve Short-waver ..	Mar. '35 WM383

Superhet : Blueprint, 1s. 6d.	
Simplified Short-wave Super ..	Nov. '35 WM337

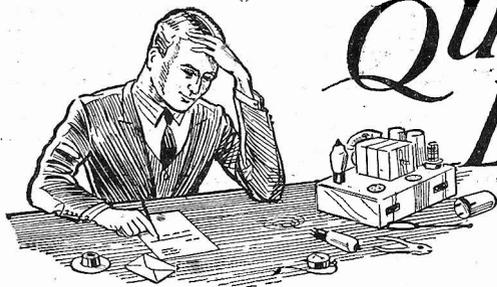
Mains Operated.

Two-valve : Blueprints, 1s. each.	
Two-valve Mains Short-waver (D, Pen) A.C. ..	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C. ..	Aug. '34 WM368
"W.M." Long-wave Converter ..	WM380

Three-valve : Blueprint, 1s.	
Emigrator (SG, D, Pen) A.C. ..	WM352
Four-valve : Blueprint, 1s. 6d.	
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	Aug. '35 WM391

MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6) ..	June '35 WM387
Listener's 5-watt A.C. Amplifier (1/6) ..	Sept. '35 WM392
Radio Unit (2v.) for WM392 (1s.) ..	Nov. '35 WM393
Harris Electrogram (battery amplifier) ..	Dec. '35 WM399
De-Luxe Concert A.C. Electrogram ..	Mar. '36 WM403
New style Short-wave Adapter (1s.) ..	June '35 WM388
Trickle Charger (6d.) ..	Jan. 5, '35 AW482
Short-wave Adapter ..	Dec. 1, '34 AW456
Superhet Converter ..	Dec. 1, '34 AW457
B.L.D. L.C. Short-Wave Converter (1s.) ..	May '36 WM405
Wilson Tone Master (1s.) ..	June '36 WM406
The W.M. A.C. Short-Wave Converter (1s.) ..	July '36 WM408



QUERIES and ENQUIRIES

All-wave Set

"I have a commercial all-wave set (6-valve superhet) which works perfectly on M.W. and L.W. On the short waves, however, it will work perfectly up to about 35 metres, and then the remainder of this band is absolutely silent. The 48 to 150 metre band works perfectly up to about 110 metres. The silence does not always occur from 35 metres upwards. Sometimes it starts at 45 metres and at the opposite point on the 135 metre band. If the needle is rotated into the silent area, the set turned off for a while and then turned on again, sound is heard for a moment and almost immediately dies away. I wonder if you can suggest the cause of the trouble."—S. B. (Stamford Hill).

WE do not as a rule like to suggest the causes of faults in commercial receivers, as this generally leads the user to attempt to cure the trouble and, if unsuccessful, the set is then returned to the makers and the result is that they do not care to undertake the work after the set has been tampered with. Furthermore, the cost of repairs will be increased as damage may be done through ignorance of the exact circuit details. It is always desirable in the case of a commercial receiver to return it to the makers or take it to their nearest service agent so that it may be attended to. In this particular case, however, the fault is an interesting one and it is interesting to note that the trouble can be removed by switching off. As signals are heard for only a very short time the inference is that either a resistance is faulty and varies in value when a certain current is passed, and this results in a voltage drop preventing oscillation at a certain point; that a leaky condenser forms a similar loss, or, what is more probable, that the oscillator fails to function at a certain temperature due to faulty windings on the coils. However, it would be preferable to have the set tested by a good service agent if you cannot approach the makers direct.

Mains Breakdown

"My three-valve A.C. set has broken down and I am at a loss as to the cause. When I switch on there is a hum from the speaker, not so loud as it used to be. All the valves get hot, the rectifier unusually so. I only have a small two-range voltmeter, but when I put this to the terminals of the heaters on any valve in the set the needle vibrates. Is this A.C.? When I put it from earth to any of the H.T. positive points it jumps a very little bit but comes back to 0. Is it possible to make any suggestion to locate the trouble?"—S. W. (Hampstead).

AS hum is heard from the speaker and the needle of your meter vibrates or quivers on all heater terminals, the indication may be regarded as acquitting the heater winding on the transformer. The slight flick when the H.T. circuit is measured may be due to condenser discharges, but some indication should be given of the approximate voltage even

with your cheap meter, and the failure to obtain this, together with the failure of signals would indicate an interrupted H.T. circuit. This may be due to the transformer winding, the choke, the rectifying valve, or a bypass condenser which has broken down and is short-circuiting the H.T. supply. If the transformer winding failed the rectifier would only receive the normal heater voltage supply and would not, therefore, get very hot. If the H.T. was applied to the valve and it was in order, but the choke had broken down, the valve would still only rise to a temperature slightly above normal. Similarly, if the H.T. negative return was interrupted no undue rise should be observed. Therefore, the fact that the rectifier gets unusually hot would indicate that it is being seriously over-run, and as no H.T. can be detected in the receiver the H.T. must be short-circuited in the mains unit. The smoothing condensers should therefore be removed one at a time, when signals will be restored

RULES

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.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

as soon as the defective condenser is removed, although hum will, of course, be experienced. Alternatively, you can remove the condensers and test them in the usual way, although in the case of electrolytics it is rather difficult to locate an excessive leakage of current which may cause a breakdown of the type mentioned in your case.

Making a Superhet

"I am rather keen to build a superhet, but as expense is an important point I want to cut down to the very minimum the parts needed. I have several odds and ends at home, but I should like a really efficient circuit. What may be regarded as the minimum number of valves to build a super-

het of the type I require? Is your £4 Superhet 4 the best in this respect?"—I. L. A. (Hampton).

THE minimum number of valves to employ the superhet feature is one, and a circuit showing the arrangement was given in our issue dated February 8th last. We have also described a two and a three-valve superhet. None of these employed A.V.C., however, and as you are anxious to build the most efficient type of circuit you may wish to include this feature. In that case three valves could be used, and the first could be the frequency changer and mixer (using either a pentagrid or triode-pentode or similar type of valve) and the intermediate-frequency stage could utilise a pentode. You could then utilise Westectors for 2nd detector and A.V.C., followed by a pentode output valve, or a double-diode-pentode for these three purposes.

Short-wave Damping

"I have built a home-designed two-valve short-wave set, in which I am using coils wound on commercial coil formers. I find, however, that when I tune to 20 metres I seem to have reached the lower limit of working on this set as nothing of any kind can be heard below this, no matter what coil I plug in. The aerial is 20ft., horizontal, seven-strand cable, thoroughly insulated, and the earth wire is 5ft. long, joined to a four-by-two sheet of copper gauze. I do not know how to improve this, but should like to get lower down the scale. Can you help me, please?"—B. R. (Salisbury).

THE trouble may be due to the design of the tuning coils you are using. No matter how efficient the aerial-earth system, the damping imposed on the grid coil may easily prevent the valve from oscillating. Even when a pre-set condenser is joined in series this may not prove effective, and a loose-coupled aerial coil winding should be adopted. Even a single turn may prove effective and will enable the valve to oscillate and thus produce the desired result. Try different types of winding, arranged in different positions on your coil until you obtain the desired result, but generally speaking the coupling should be quite loose.

Control Knobs

"I have built your £4 Superhet and am delighted with the performance, but not with the appearance. The components which were specified and which are mounted on the panel are all supplied with different knobs, and in one case I have a walnut colour and in the others they are black. Is it not possible to standardise these parts or can I get new knobs so as to make the set look neat from the panel?"—D. G. F. (Perth).

IT is not possible to standardise control knobs as various people have different ideas as to the best type. However, your difficulty may be overcome quite easily by obtaining replacement knobs from Messrs. Bulgin. If you obtain a copy of their catalogue you will see reproductions of twenty-eight different knobs and will no doubt find a pattern which will suit your particular cabinet or other furnishings. The knobs range from simple walnut round models to black and chromium domed types.

THE WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA

By F. J. CAMM 4th Edition 5/- net
(Editor of Practical and Amateur Wireless)

Wireless Construction, Terms and Definitions explained and illustrated in concise, clear language.

From all Booksellers, or by post 5/6 from George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

The coupon on cover iii must be attached to every query.

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RECEIVERS, COMPONENTS AND ACCESSORIES
Surplus, Clearance, or Secondhand, etc.

RADIOMART (G5NI)
SHORT-WAVE SPECIALISTS

Everything a constructor requires. Lowest prices. No junk. Catalogue 14d. shows thousands of bargains. During summer, few only shown below.

- RADIOMART.** Utility 2-gang unknob and dial, 3/11, 1,500 vt. Tubular condensers, 6d.; Helsby electrolytics 8 mf. 500, 2/11, 4 x 4 mf. 1/6, 25 mf., 25 v., 1/-, etc.
- RADIOMART.** Smoothing chokes, 20 by 120 ma., 3/11; 100 ma., 2/11; 40 ma., 1/11. Telsen Ace transformers, 1/11. Radiogrand, RG48, 2/9. BTH speaker, 2/11.
- RADIOMART.** Varley iron-cored, 10/6. Bifocal dual-range coils. Very selective, 2/11; matched pair, 5/3.
- RADIOMART.** Pushback wire 6 yds. 6d., heavy 9d.; 2 gross solder tags, 6d. Resincored solder, 9ft., 6d.
- RADIOMART.** Centralab pots, all sizes, 1/6; switched, 2/-. Tubular glass fuses, 2d.
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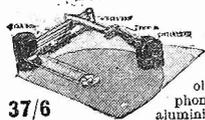


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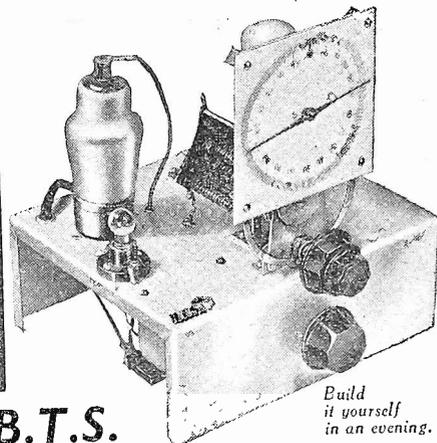
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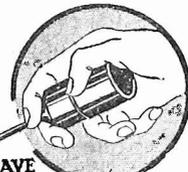


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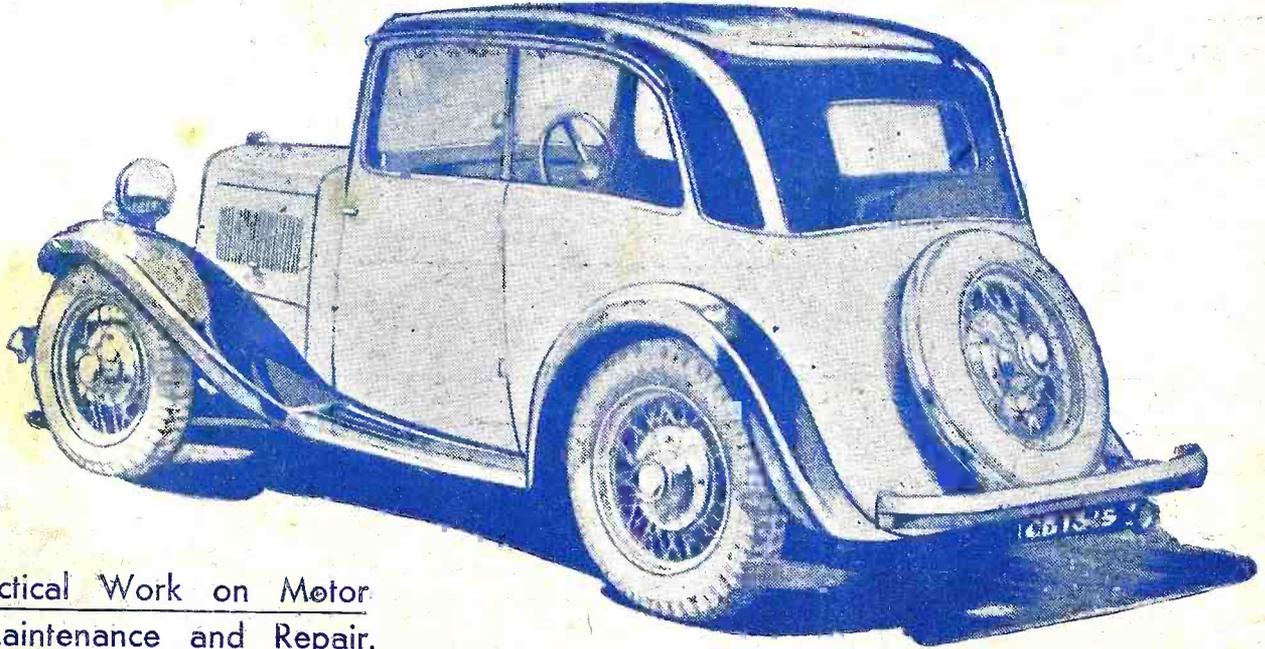
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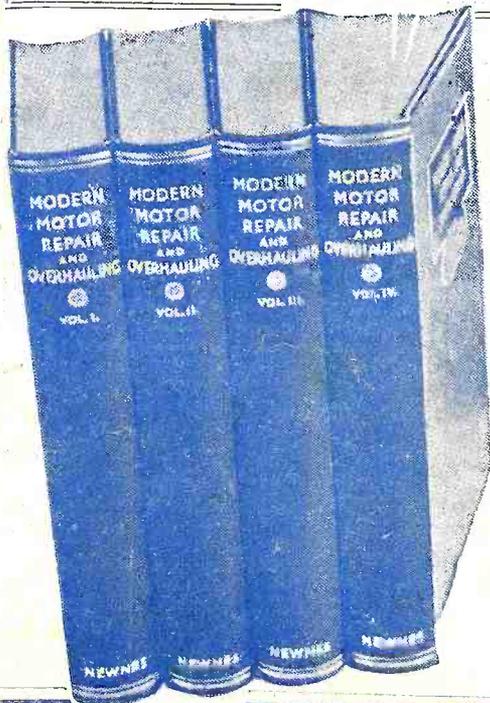
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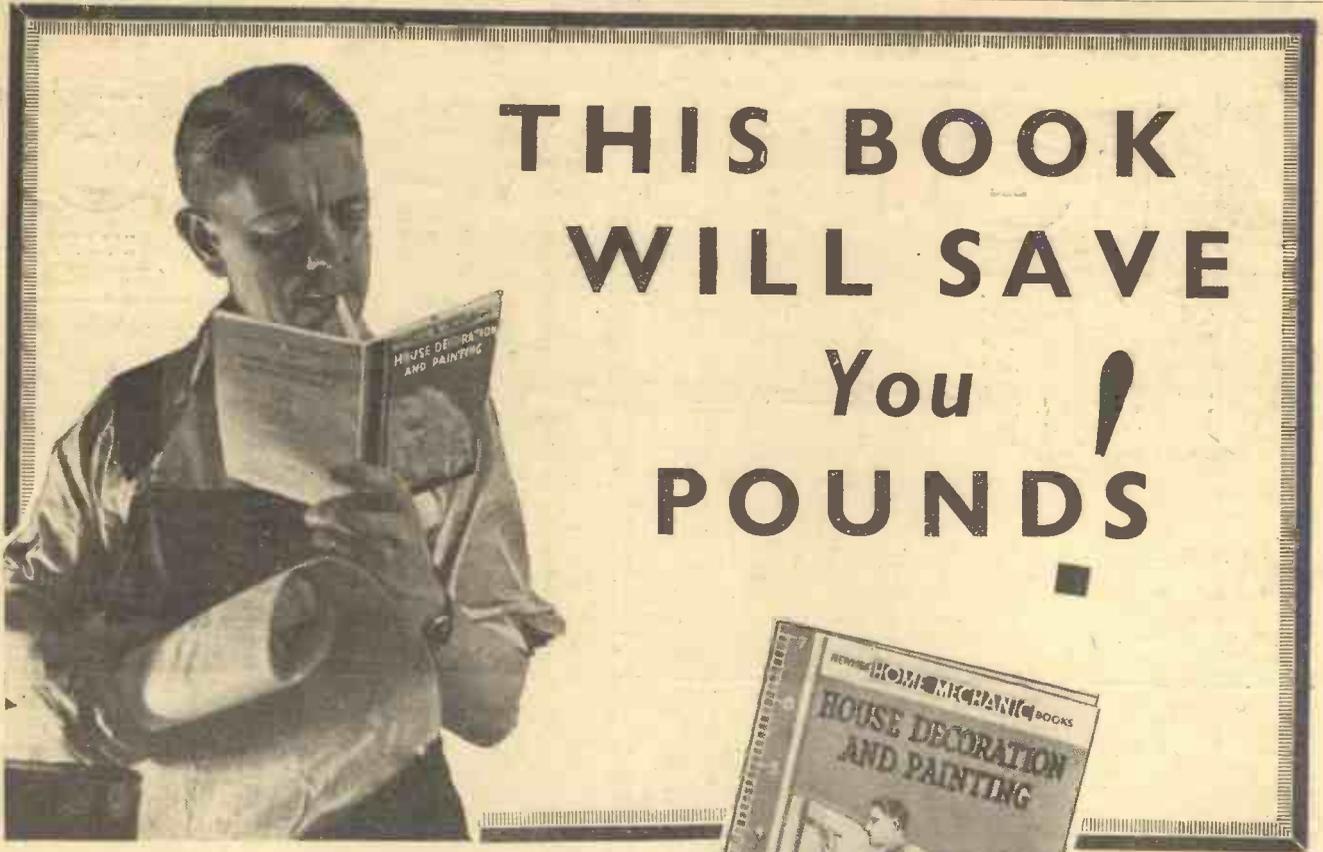
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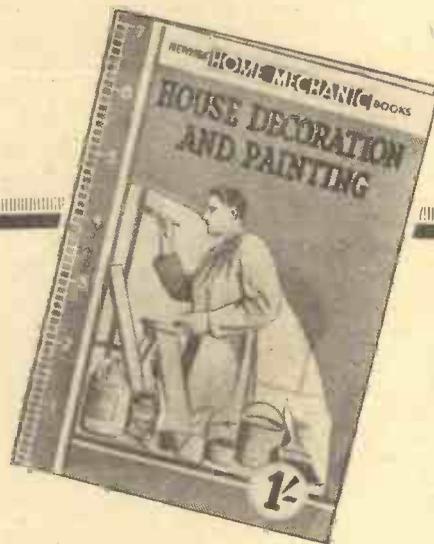
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NEXT WEEK: COMPLETE GUIDE TO THE SHOW.



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. VIII. No. 205, August 22nd, 1936.

ROUND *the* WORLD of WIRELESS

Television Sound Transmissions
HAVE you heard the television sound broadcasts yet? These may be heard at odd times during the day on a wavelength of 7.23 metres, various musical and speech items being used. Although as yet only experimental, it will be found that the musical quality is distinctly different from the normal broadcast items. When a simple straight circuit is employed the items will appear more brilliant, but if a really well-designed "quality" circuit is used these items take on a completely different air. At the time of writing no vision transmissions have been picked up.

Belfast Radio Show
THE date of the Belfast Radio Show has now been fixed, and it will be held at the Plaza, Chichester Street, Belfast, from September 9th to 16th inclusive. In view of this new selection of dates the exhibition will overlap the Dublin Radio Show.

All-language News Bulletins
WHAT station holds the record for the largest number of languages used for its news broadcasts? The Belgrade short-wave station, on 49.17 metres, probably heads the list as it broadcasts a news bulletin in French, Italian, German, Turkish, Greek, Magyar and Albanian, as well as in English. The station closes down at midnight with good-night greetings in practically every tongue.

Television in S. Africa
THE forthcoming Johannesburg Empire Exhibition will feature television, for which purpose a private order has been placed in this country for the supply of a transmitter and five receivers. A standard of 90 lines will be used and a picture size 8in. by 7in. In addition to a demonstration of modern television broadcasts, visitors to the show will be able to have their faces televised and viewed in another part of the exhibition by their friends.

B.B.C. Empire Transmissions
MR. HOWARD ROSE has been appointed Empire Production Director, and it is proposed to improve the short-wave transmissions for Empire listeners. The Government has not authorised the use of foreign languages in B.B.C. broadcasts, and, therefore, the standard of Empire broadcasts is to be raised. Mr. Rose is the senior dramatic producer at the B.B.C.,

and has produced at least 600 radio plays, including "Dr. Abernethy," "The School for Scandal" and "Bulldog Drummond."

NEXT WEEK

Fully illustrated
**Guide to the
 Radio Show**

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OUR STAND No. 10,
 GROUND FLOOR

From the U.S.A.
ANOTHER unusual application of radio comes to hand from U.S.A., this time in connection with the death of an American citizen who wishes to safeguard himself against burial alive. He had ordered that a microphone be installed in the coffin, connected to an amplifier and loudspeaker installed in the cemetery guardian's house.

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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. Newnes, 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.

The apparatus is to be supplied with power continuously for a year so that should he revive he can immediately call for assistance. To test the apparatus during the year a small bell is to be installed in the coffin.

Radio on the Coffee Plantations
IN certain colonies where large plantations are cultivated, such as the coffee plantations in Kenya, etc., telephones, and sometimes primitive native signals have been used for communications between the overseer and head office or between various working parties on the plantation. Portable short-wave transmitters and receivers are now being employed for this purpose, however, and more reliable working and reduced costs are claimed to be effected by this modern method of communication.

S.W. Equipment for Finland
THE Public Schools Expedition to Finland is being equipped with some special short-wave gear made by the Short-Wave Radio Society of Cambridge with the assistance of Pye Radio. The equipment includes six two-valve battery receivers, each weighing 19lbs. with batteries. The wavebands covered are 20, 40, 80 and 600 metres, and the expedition will keep in touch with the Admiralty on 8,630 kc/s. The transmitters are of the crystal-controlled type for telegraphy only and are designed for the 20, 40 and 80-metres bands. The call-sign of the Short-Wave Society's station is G5JO.

Indian Broadcasting
AS we go to press it is announced that Mr. C. W. Goyder has been appointed Engineer-in-Charge of All-India radio. Experimenters will remember that Mr. C. W. Goyder was the first amateur to hold two-way radio conversations between England and New Zealand, and he followed this feat by several other short-wave achievements, and all whilst he was still attending school.

All-Wave Sets
IT is interesting to note, after our recent comment regarding the short-wave ranges covered by "all-wave" receivers, that at Radiolympia for the first time this type of receiver will be on view covering the short-wave ranges down to 7 metres. These are H.M.V. products, and are the first British or American all-wave receivers to cover such a low wave-range.

THE PICK of the PROGRAMMES

B.B.C. Midland Orchestra

THE guest conductor for the concert on August 21st is to be Anthony Bernard, who is music director at the Stratford-upon-Avon Memorial Theatre. He is in charge of the music during the Shakespeare Festival there, and broadcast in the recent production of "Much Ado About Nothing," for which he wrote the incidental music.

Concert from Torquay

WALTER GLYNNE (tenor) will be the vocalist at the Concert by the Torquay Municipal Orchestra, conducted by Ernest W. Goss, to be broadcast from The Pavilion, Torquay, on August 25th.

A Tango

Programme

HARRY ENGLEMAN'S QUINTET have with them Schofield Earl (piano accordion) for the tango programme from the Midland Regional on August 24th. Harry Engleman is the son of Joseph Engleman, the composer.

Florence Oldham

MISS OLDHAM has been a Midland radio favourite since the early days of broadcasting. She is to give a fifteen-minute programme of songs at the piano on August 25th.

Autumn Dance Band Programmes

GERALDO and his Orchestra will be heard in a new type of programme every other week starting in the week of October 5th.

Jack Payne with his Band will broadcast on September 29th, and on October 1, 2, 8 and 9.

Once a week for thirteen weeks from September 28th, Van Phillips will bring a special orchestra of picked musicians to the studio for a programme lasting half an hour.

With the title "Evergreens of Jazz," George Scott-Wood and his Orchestra will present three programmes, the first on August 25th, the second on September 10th, and the third in the week of September 20th.

Carroll Gibbons and his Orchestra will broadcast every other week from the week commencing October 5th, and Peter Yorke and his Band will be heard on November 18, 20 and 21.

Arctic Explorer's Talk

ON August 21st, in the Midland Regional programme, A. W. Moore, of Loughborough, who was in the Oxford University Arctic Expedition with Edward Shackleton, will give a talk in the "Seeing Life" series on a winter spent in the far North. He has also had experience of tropical exploring, for he was a member of an expedition to Sarawak, Borneo.

MAKE THESE DATES WITH YOUR RADIO

A Pianoforte Trio

THE Stephen Wearing Piano Trio is to broadcast Schubert's "Trio in B

RADIO IN THE KITCHEN



Cookery talks on the radio are invaluable to the modern housewife. Here is the new McMichael lightweight portable all handy for the morning's work.

flat" from a Manchester studio on August 23rd. The Trio consists of Stephen Wearing (piano), of Liverpool, Leonard Hirsch (violin), of Manchester, and Haydn Rogerson (cello), also of Manchester. Messrs. Hirsch and Rogerson are both prominent members of the Hallé Orchestra; Mr. Hirsch is also the leader of the well-known Hirsch Quartet, of which Mr. Rogerson was formerly a member. The Trio is not a new combination, but it has never broadcast before.

Light Entertainment from Paignton

THE ADELPHI REVELS, presented by George Hay and Gordon Lane, will broadcast from the Adelphi Gardens, Paignton, on August 25th.

Military Band Concert

AMONG the bands which have engagements at the Jephson Gardens, Leamington Spa, is that of the 9th Queen's Royal Lancers. A. J. F. Allen will conduct a popular programme on August 27th, closing with the Regimental Slow March "Men of Harlech"—adopted because the regiment was raised in 1715 by General Owen Wynne, who was Welsh.

Concert Party from Troon

ANOTHER excerpt from Harry Kemp's Show will be broadcast from the Concert Hall, Troon, on August 27th. The artists will include Pete Martin and Charlie Holbein; Ina Harris; Donald Reid; Alex Finlay and Rita Andree; Jack Rowlands; Wilson, Rogers and Taylor; and Louis Freeman's Band, conductor, Jack Ansell. The production is by Julian Rose.

The Elite Dance Band

THE St. George's Hotel Elite Dance Band, led by T. W. Robinson, will give a short programme of dance music from the St. George's Hotel, Llandudno, on August 28th. The Elite Band are the present holders of the North Wales Dance Band Championship.

"Up North This Week"

DOROTHY STANTON, the well-known soprano, is returning to her native Newcastle on August 26th when, as an "Up North this Week" artist, she will broadcast a recital from the local studios. Miss Stanton was a pianist before she took up singing; in the latter capacity she made her debut with Sir Hamilton Harty and the Hallé Orchestra.

Summer Revue from Newquay

"**WHITENOTES**," a Summer Revue presented by Simrose and Watney, will be broadcast from the Summer Theatre, Newquay, on August 20th. The guest artist of the evening will be Renara.

Gilbert and Sullivan Concert

CONDUCTED by Alfred Barker, the B.B.C. Northern Orchestra will broadcast a Gilbert and Sullivan concert on August 21st. The programme will include selections from "The Mikado," "Patience" and "The Pirates of Penzance." Alfred Barker is normally the leader of this orchestra.

SOLVE THIS!

PROBLEM No. 205.

Bowen bought a kit of parts for a mains three-valve receiver, but after wiring had been commenced he found that the heater windings of his mains transformer were not provided with centre taps. What was the easiest method of providing the required centre taps? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Envelopes must be marked Problem No. 205 in the bottom left-hand corner, and must be posted to reach this office not later than the first post Monday, August 24th, 1936.

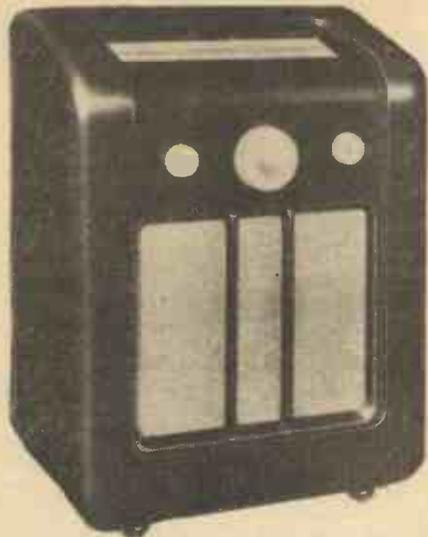
Solution to Problem No. 204.

Cousens should have obtained a fixed resistance of approximately 30,000 ohms and a variable potentiometer of approximately 50,000 ohms. One end of the fixed resistance should be connected to the H.T. 120/150 terminal of the eliminator, the other end to one of the end terminals of the potentiometer, the other end terminal of the latter to H.T.—of the eliminator, and the centre terminal to the screening grid lead of the S.G. valve.

The following three readers successfully solved Problem No. 203, and books are accordingly being forwarded to them: G. Weldon, Hillside, Upper East Hayes, Bath; J. W. Wilson, 36, Cardiff St., Manchester 9; A. L. Aymer, Croy House, Croy, Ayrshire.

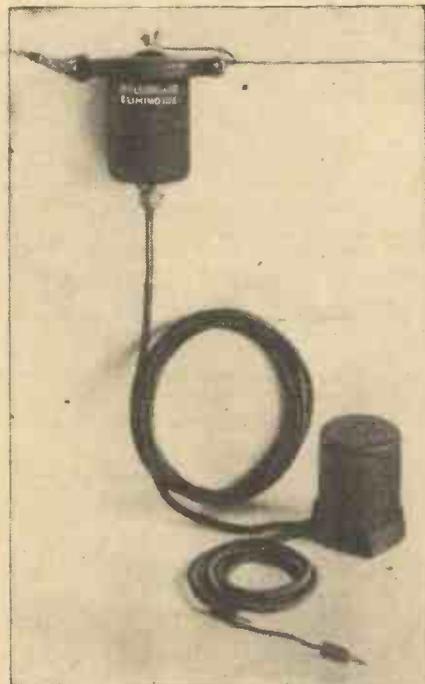
ADVANCE SHOW

DETAILS



A new note in cabinet design. The ivory and black Ekco model.

AN analysis of the information so far received from the various exhibitors at Olympia this year shows that there is to be a marked increase in the development of short-wave apparatus. This is due partly to the forthcoming television transmissions (which are to be carried out in the ultra-short wavelengths) and also to the increased entertainment which listeners are finding on the short-wave bands. Here, in addition to the enjoyment afforded by the actual broadcasts,



An aerial system designed to avoid man-made static—the Belling-Lee Eliminoise Aerial Kit.

there is the added pleasure of station hunting, and until one has tried out a short-wave receiver, one does not realise the thrill which is experienced when a long-distance short-wave station is logged. True,

Some Notes of Interest Regarding a Few of the Exhibits which will be Seen at Radiolympia, which Opens Next Week.

many of the stations fade severely, or are interfered with by local electrical interference, but there are now various schemes for overcoming these defects.

In the latter connection, we shall see this year at Olympia several noise-free aerial equipments, developed by various firms but all having in common the same aim and method of development. In certain districts trolley buses, electric signs, and other equipment is found within a short distance of the listeners' aerial, and consequently this gives rise to interference. On the ordinary broadcast waveband the trouble is not always sufficiently bad to warrant the attempt at its elimination. On the short-waves, however, it will be found that many signals are unreadable unless some form of interference-eliminating device is fitted, and one simple scheme is to erect the aerial right away from the source of interference. This would obviously lead to an excessive length of leading-in cable and would thereby give rise to losses. The trouble is overcome by utilising a special matching transformer attached to the aerial, with a similar component attached to the wireless receiver, and the two linked together by a length of special screened cable. One such aerial system is illustrated in the first column on this page, and is a Belling-Lee product. Messrs. Ward and Goldstone, B.T.S., and many other firms will be showing a similar arrangement, with their own development of the transformer, the screened lead or both.

Gramophone Attachments

Another aspect of radio entertainment which is proving of increased popularity is gramophone record reproduction, but there are still a number of receivers in use in which no provision has been made for the use of the pick-up. Even when a modern table-model radio set is in use the pick-up may be attached, but there is no convenient method of arranging the actual turntable and pick-up. Many listeners will

construct their own gramophone motor-board, but the apparatus may be built up in a more tidy manner if one of the special "add-on" turntable units is employed. A well-known unit of this type,



For the measurement of capacities this new Avo Capacity Meter will be found ideal.

which has now been on the market for some considerable time, but which will appear this year in a new design, is shown on the next page, and is the well-known Cosmo-cord Unigram Playing Desk, Model 84. This may be obtained in a figured walnut cabinet and a powerful induction motor is fitted, together with the latest type Cosmo-cord pick-up, volume control and speed

(Continued on next page)



The Vidor Portable, which possesses some interesting features.

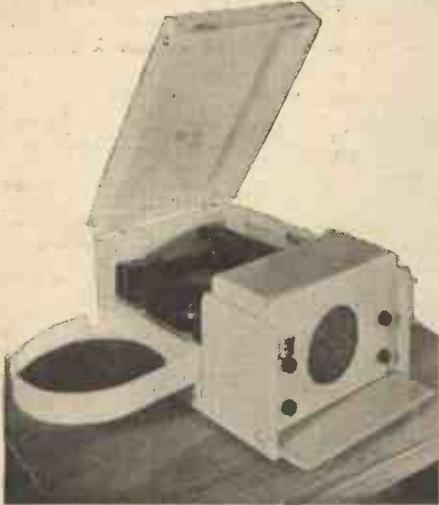
ADVANCE SHOW DETAILS

(Continued from previous page)

regulator. It is obviously only suitable for use on A.C. mains (50 cycles), and the price is 4 guineas.

Double Speakers

Last year we saw some attempts at improving reproduction by the fitting of two or more speakers, and the R.G.D. was the most ambitious of these receivers, utilising in the larger models three separate speakers. This year the H.M.V. company will be showing an entirely new design of cabinet in the Model 801 auto-radiogram in which three of the new elliptical speakers are employed. Amongst other firms who are utilising multi-loud-speaker reproducer



A Portable Auto-radiogram in a real leather case. This is a product of the Self-changing Gramophone Company.

are Burndept, and their Model 201 is shown at the foot of this page. This has twin speakers arranged to direct the sound at an angle from each side and provides, in addition to a high quality of reproduction, a neat appearance in the cabinet. A special stool is provided for this particular receiver and enables it to take its place in the home in a neat and orderly manner.

Cabinet Design

In the range of cabinet designs we shall see some more startling changes from customary practice, the H.M.V. receivers probably providing the most interesting examples. One particular model was shown in our issue last week, and, in addition to this, they will be exhibiting a receiver designed on the lines of a writing bureau, and the method of curving the "silk" covering for the loud-speaker opening presents an entirely new note and lends to the complete apparatus a much more tasteful aspect. It is very pleasing to notice this complete departure from the "fretwork and silk" which so often adorns the loud-speaker opening, and the new material used by H.M.V. adds its quota in improving reproduction. In the Ekco designs the receivers are now following a new design, although bakelite is still employed in place of the customary timber. On page 575 the latest black and ivory model is shown and it is noted that this design is the work of Serge Chermayeff. The importance of the tuning scale, without detracting from the appearance of the cabinet, is very noticeable in this particular model, and practically the entire top of the cabinet, is occupied by the scale.

The other Ekco cabinet at the top of this page is designed to provide very high-

class reproduction and it will be noted that the sides of the cabinet are cut-away and provided with gauze, whilst the loud-speaker is of the wide-range exponential type, claimed to provide an extended frequency range of 30 to 10,000 cycles, with level response from 50 to 8,000 cycles. This model is a nine-stage superhet with all refinements, such as tone-compensated volume control, etc., and costs 22 gns.

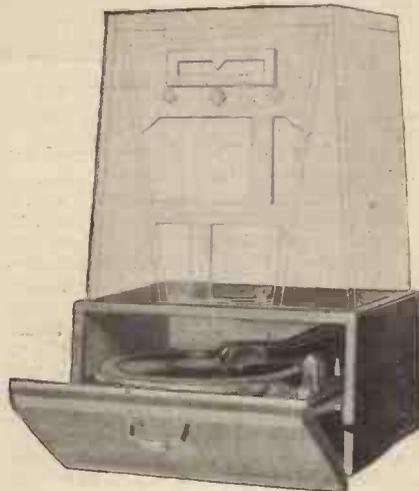
Measuring Instruments

Much more space will be devoted this year, too, to measuring instruments of all types, and every constructor and service engineer will find this side of the hobby of absorbing interest. A new capacity meter is to be shown by the makers of the popular Avo range of instruments, and this particular model is shown on page 575. This instrument measures all capacities from 0 to .1 mfd. in six separate steps, the actual capacity being shown on the scale in the bottom right-hand corner of the instrument. No external standards are required, and the accuracy is of a very high order. The only additional power required for the measurements is a 45-60 volt H.T. battery and a 2-volt accumulator.

Weston Electrical Instruments will include a new output meter having A.C. voltage ranges of 2, 10 and 50, and a self-contained condenser for output measurements. The price of this component is £5 15s.

Portables

Portable receivers this year are still smaller and the Burndept is a remarkably



The new Cosmocord Playing Desk, Model 84.

good illustration of the compactness which may be obtained in an instrument of this nature. Some of the principal new features

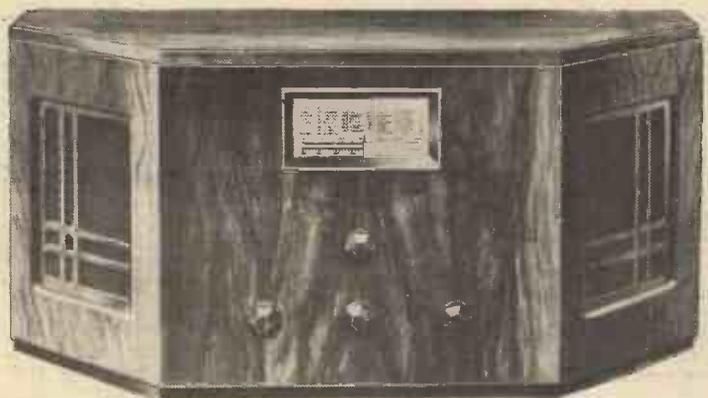


For better reproduction: This Ekco cabinet contains an exponential loudspeaker, giving very realistic results.

in this section of receiver design are the incorporation of new Midget components and valves, and the cutting away of the lid of the containing case in order to permit the sound to issue from both sides and thus avoid "boxiness" and to enable the programme to be heard when the receiver is closed up. A portable radio-gramophone on new lines will be shown by Self-changing Gramophones, Ltd., and on this page is a reproduction of it. The case is of real leather, and an automatic record changer, playing from 1 to 8 10in. records with rejects at will, is incorporated. The price is 28 guineas for the Universal mains model (190-250 volts) and 29 guineas for the D.C. model (190-250 volts). A separate double-pole mains switch is fitted to this particular instrument so that it is rendered completely "dead" no matter to what type of mains supply it is connected.

An interesting novelty is incorporated in the Lissen portable, where the loudspeaker is mounted in a separate section of the cabinet (which is of the standard "suitcase" type), and this separate section is connected to the lid by means of metal arms. When the lid is raised the speaker is brought into a semi-raised position and the sound is thus directed in a more convenient manner towards the listener. This method of construction enables the case to be made neater, as the lid then only contains the frame aerial.

At least one transportable will be on view, and this takes the form of a standard console model, fitted with a substantial carrying strap so that it may be conveniently carried from one room to another. It is not, of course, intended for use in the open air in the same manner as a portable.



Messrs. Burndept have produced this model, in which two loudspeakers are incorporated.

GAIN CONTROL

In this Article the Various Kinds of Gain Control and Their Application are Dealt With. By G. V. COLLE

IN a recent article in this journal the writer made a statement to the effect that a "gain" control was one which allowed for bass-frequency compensation, and the information given might lead one incorrectly to assume that gain control has application only to L.F. circuits. Whereas its chief use is in audio-frequency (A.F.) amplifiers, it is, nevertheless, employed in R.F. and I.F. systems, although to a smaller extent.

To avoid ambiguity, let us analyse the word "gain." A literal translation would be "to increase" or "to add." In the strictest sense of the word, therefore, a "gain" control could easily be called "volume" control!

Those receivers which incorporate a gain control invariably include a volume control of some description, hence, unless the former finds duplication in the latter, which is most unlikely, the gain adjustment can be considered to fulfil a different function of which we are as yet unaware.

Before we proceed to analyse the various types it would be as well to explain that some considerable looseness exists in the naming of gain controls. The Americans appear to be both the originators and violators of the terms, although some slight justification would appear to exist for naming a control "gain" in sets in which the term does not strictly apply, but which cannot be confused with a similar device in the same receiver.

Various Types of Control

An "I.F. gain" control has application to a superhet, and obviously covers the intermediate-frequency gain or amplification. It is equally obvious that this control is manually operated. In early superhets, and long before the word "gain" was applied to radio-set adjustments, the amplification of the I.F. valves was controlled by means of a wire-wound poten-

tiometer connected across the H.T. supply, the slider feeding the screen-grid circuits.

For numerous technical reasons which need to be enlarged upon here, control of the screen-grid voltage was rejected in favour of variable grid-bias. No doubt the adoption of variable- μ H.F. screen-grid and pentode valves was responsible for the change, but the fact remains that these valves cover present-day practice. For the most part I.F. valves are now controlled automatically with a grid-biasing voltage which is generated at the second detector and which varies with the carrier-wave strength of the received transmission.

Superficially, the use of an I.F. gain control would seem to be a retrograde step, in as much as the idea of A.V.C. was to dispense with unnecessary knobs. Actually the I.F. manual-gain control is, in those sets in which it is fitted, augmented by the usual A.V.C. action, one or the other being employed by the movement of a switch. Even so, these refinements will not be found in inexpensive sets, but in the more ambitious all-wave outfits, such as large radiograms and professional receivers in the Rothermel-Hammarlund "Super-Pro" category.

Manual Control

Reverting to the action of the manual I.F. gain control, it is feasible that readers of an inquiring turn of mind will want to know why it cannot be classed as a volume control in view of its action in adjusting the I.F. valve amplification. The explanation is that as the second detector, usually a diode, is arranged to have a limited action, rotating the I.F. gain control to maximum will not allow the volume to increase beyond a defined limit. There is, of course, the possibility of the I.F. valves becoming unstable due to excessive amplification, but ruling out that effect, there must be a recognised high second-detector input,

which will be just or slightly more than sufficient to load the output valves when the true L.F. volume control is at "maximum."

Justification for the manual control can be discovered in the tendency for the sensitivity of the signal-tuned circuits and valves to drop on the ultra-short wavebands. The gain control allows the last ounce to be extracted from the valves (within the limits of stability), not only to make up for the loss of sensitivity due to the fall in amplification, but to receive any weak transmission above the prevailing noise level.

Gain Control in a Superhet

A similar R.F. (radio-frequency) gain control as an alternative to an A.V.C. action (on a superhet the switch mentioned above would control the I.F. stages simultaneously) in the signal tuned circuits allows the operator to demonstrate in convincing fashion the advantages of a high signal-to-noise ratio. In other words, it is a desirable feature in a superhet to provide a good measure of amplification before the first detector, so that the following I.F. and L.F. stages may not be called upon to work "all out" and thereby create a noisy background due to valve hiss. Variable R.F. and I.F. controls provide that flexibility of adjustment by which, at all times, the background noises may be reduced to a minimum consistent with the desired programme volume, especially from weak transmissions.

In the hands of a beginner the addition of these controls is apt to defeat their purpose. There is no reason, on the other hand, why one experienced member of the household should be debarred from their definite advantages provided A.V.C. is fitted as an alternative, and the extra controls relegated to a part of the set which is close at hand.

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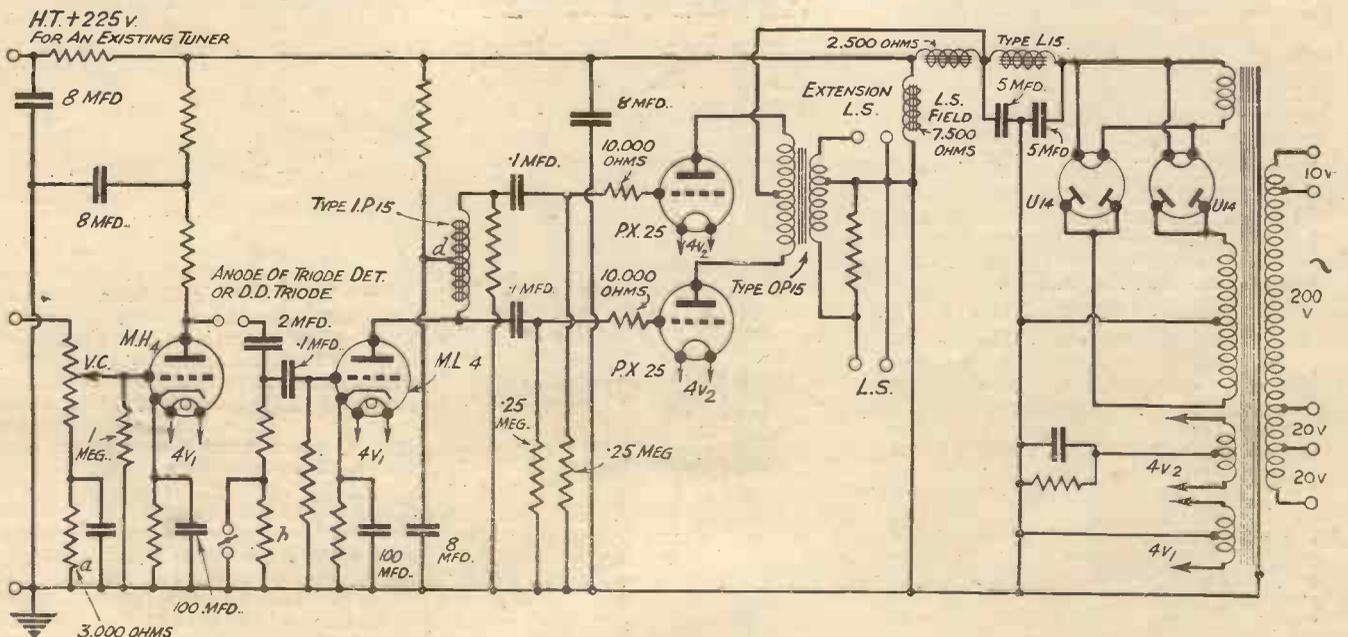


Fig. 1.—A fixed form of L.F. gain control as used in a super-quality 14-watt amplifier. The gain control is shown at "b" and a tone correction resistance-condenser system at "a."

(Continued from previous page)

Whether gain control for the R.F. and I.F. valves is justified in a superhet covering medium and long wavelengths only depends on the action of the 2nd detector. The usual action of this valve when generating A.V.C. voltages is to limit the sensitivity so that only signals above a certain level are accepted. Should the circuit arrangement be such, however, that on the absence of a carrier-wave the sensitivity rises to the possible maximum, then gain control will offer no real advantages. There is, of course, always the possibility of gain controls under these latter conditions providing a slightly better balance of R.F. to I.F. amplification than is possible with A.V.C.

As previously explained, the description "A.F. gain" control has no logical place in our technical dictionary. An "audio-frequency" gain control is an L.F. volume control or merely a plain "volume" control where no other exists on any single receiving-set. The word "gain" as applied to the low-frequency amplifier in this country usually applies to a method of increasing the bass response. Where provision is made for increasing high notes in addition to low, and by separate controls, such knobs would be labelled "gain controls," "bass" and "treble," or even "tone" controls.

Unlike tone controls, those of the L.F. "gain" type are not intended to reduce high notes so as to emphasise bass, or vice-versa. Their chief function is to raise bass or treble, and to do this without directly affecting the remainder of the sound spectrum. The scope of "L.F. gain" can be increased by arranging the bass and treble knobs to reduce as well as increase, although here again the effect is not quite the same as with most tone controls.

L.F. Amplification

If full provision is to be made for all forms of L.F. gain, it is highly desirable that ample L.F. amplification is provided. That is to say, the overall magnification

should be considerably greater than required, in order to provide a source or "sink" into which the A.C. signal impulses can be poured, filtered and finally passed out suitably "dressed." One of the valves early in the L.F. chain will inevitably be made a passenger, giving little amplification, or, alternatively, sufficient to be diverted for the purpose of frequency correction.

tone control is that it is difficult to gauge the setting where the frequency spectrum is level. Few listeners are really competent to judge "balance," and clearly defined "level" points on the gain control knobs rule out errors of balance on those transmissions which do not require correction.

If these facts are borne in mind, there is no technical reason why set constructors

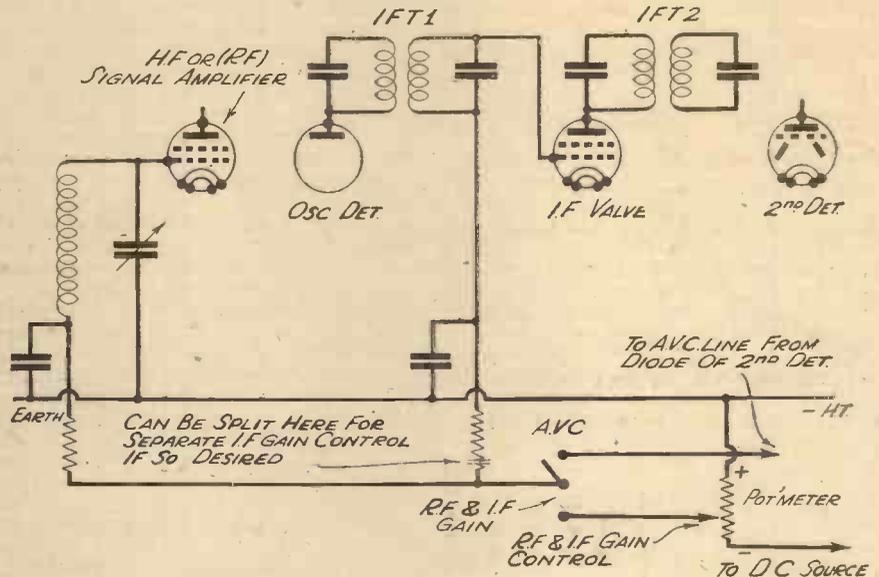


Fig. 2.—One method of manually controlling R.F. and I.F. stages with the alternative of A.V.C. A D.C. source for gain control as shown can be obtained from a tapping in the H.T. supply, from a separate rectified voltage source (giving only about 10mA) or from a battery.

A desirable feature is that those gain controls taking care of the L.F. response as mentioned should be clearly marked by means of scales and pointers. It is particularly essential that the "level" response is indicated, that is, where the circuit constants provide a uniform frequency curve.

One of the disadvantages of the usual

should not indulge their ideas as to modifying the L.F. amplifier characteristics, to provide, say, for high-note losses in the tuned circuits, and imperfection in the loudspeaker response. Should none of the modified circuit constants prove satisfactory, it is then an easy matter to revert to the standard arrangement merely by turning the L.F. gain switch or switches.

"Musical Mixture"

MERVYN SAUNDERS (tenor), Norma Dursley (banjo) and the Bristol Accordion Club Band conducted by Percy C. Sullivan will broadcast in the second number of the series "Musical Mixture" on August 29th in the Western programme.

Recital from Cheltenham College

MARIE HALL, the famous violinist, and Philip Taylor, the Cheltenham Organist and Director of Music at Cheltenham College, are to give a recital from Cheltenham College on August 27th.

New Farce by John Dighton

JOHN DIGHTON, whose blandly inconsequent burlesques of "Limehouse Nights," "Raffles" and "The Scarlet Pimpernel" proved so popular with listeners, has now turned his attention to straight-forward farce. "Straight-forward" is not perhaps the word to use, as "Cracked Ice," this clever young man's latest effort, which is to be broadcast on September 14th, is a wildly complicated affair, in which a retired Chicago racketeer and his socially ambitious wife figure in a series of diverting situations. It is only necessary to add that "cracked ice" is gangster slang for diamonds to enable listeners to have a very fair idea of the plot. The producer will be Max Kester, and details of the cast will be announced later.

PROGRAMME NOTES

"The Squirrels' Cage"

THIS radio play will be performed by the Northampton Repertory Company and produced by Owen Reed on August 23rd. The author, Tyrone Guthrie, was formerly a B.B.C. producer, and then returned to the theatre; he is to produce at the Old Vic next season. His other radio play, "The Flowers are not for you to pick," has already had a Midland production. The Northampton Repertory has been running for ten years; its producer, Bladon Peake, went there from the Abbey Theatre, Dublin, and was formerly at the Crescent, Birmingham. The Company's last studio play was "Caesar's Friend."

B.B.C. Scottish Orchestra

ON August 27th, the B.B.C. Scottish Orchestra, led by J. Mouland Begbie, and conducted by Ian Whyte, will broadcast the Suite for Orchestra, "Straloch," by Erik Chisholm, the Tone Poem, "Villon," by William Wallace, and the Overture "In Autumn," Op. 11, by Grieg; while George Fleming (bass baritone) will sing with Orchestra "Si tra i ceppi" (Berenice), by Handel, "When the King went forth

to War," by Koene-man, and, without orchestra, "The Ballad of Sommerwater," by Armstrong Gibbs, "When Lights go rolling round the Sky," by John Ireland, "Invictus," by Hahn, and "Old Clothes and fine Clothes," by Martin Shaw.

"Morlais Castle Day-dream"

"MORLAIS CASTLE DAY-DREAM," a dramatic feature by Jack Jones, author of "The Rhondda Round-about" and "Black Parade," will be broadcast on August 26th. Morlais Castle, a crumbling ruin, overlooks the stricken borough of Merthyr, a borough which to-day has fourteen thousand unemployed. Morlais Castle stands a reminder to the suffering population of the borough of the days when their forefathers suffered under Norman misrule. Reminiscent of even earlier times are the Roman roads and remains, and the parish church of Merthyr, standing on the spot where the martyr Tydfil suffered death at the hands of the pagans, takes us back many hundreds of years. The two chief characters in Jack Jones's dramatic feature are Dai and Ianto, two unemployed men, into whose dreams come several visions of the town's past. This programme will be produced by T. Rowland Hughes.

Firstly

everyone taking an intelligent interest in radio will find much of interest in the Westinghouse products shown on Stand 36, Radiolympia. The exhibit includes Westinghouse Metal Rectifiers for both H.T. and L.T. Supplies, Rectifiers for High Voltages such as are used for Television, and Westectors for Distortionless Detection and A.V.C.—each representing the most economical, efficient unit for its particular purpose.

and Secondly

every keen student of radio should make a point of getting a copy of "The All Metal Way, 1937." It is recognised as the standard handbook on metal rectification as applied to radio. Contents include chapters on A.C. Mains and Universal Radio, Trickle Charging, Energising Moving Coil Loudspeakers from A.C. Mains, the use of Westectors for Distortionless Detection, A.V.C., and Battery Economy circuits, etc., etc. If you cannot visit Radiolympia send direct to Dept. PRA for your copy, enclosing 3d. in stamps.



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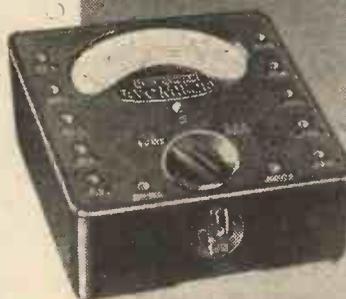
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0—250 "	0—500 "
0—500 "	0—1000 "
MILLIAMPS	RESISTANCE
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0—5 "	0—100,000 "
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0—500 "	0—5 "
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Developing the Detector Stage

This Article Gives Details of the Various Types of Rectifier with Their Advantages and Disadvantages By IDRIS EVANS

DISTORTION in a receiver is commonly associated with the output valve, but the fact should not be overlooked that distortion can also occur in one of the earlier stages—especially in the detector stage. It is now recognised that detector distortion is governed to a great extent by the percentage modulation of the transmitter, and therefore a brief explanation of this little-understood term will be given.

stage, and consequently a good deal of experimental work has been done in connection with various types of detector during the last two or three years, with the result that the best of the present-day detectors can be relied upon to give practically distortionless rectification.

Triode Detectors

Detectors can be separated into three

damping effect on the preceding tuned circuit.

The leaky-grid detector, on the other hand, is used extensively in battery-operated sets, and also in many mains sets. When correctly adjusted this type of rectifier can give practically distortionless rectification. In a battery set slight distortion is to be expected, as sufficient voltage cannot be applied to the valve

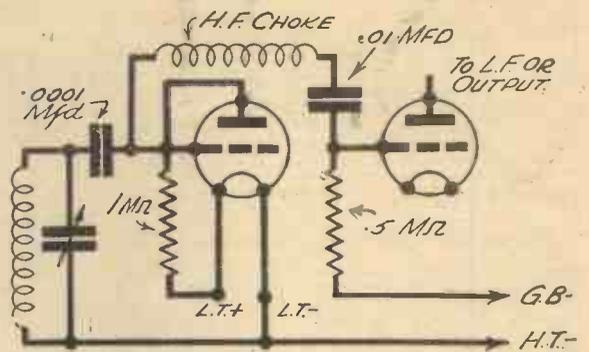


Fig. 2.—Showing a battery-type triode used as a diode.

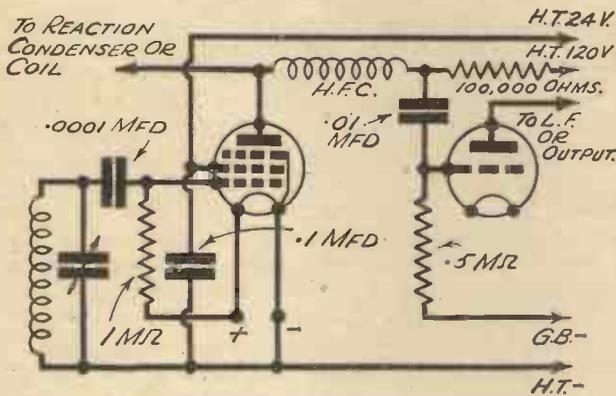


Fig. 1.—An H.F. pentode used as a detector.

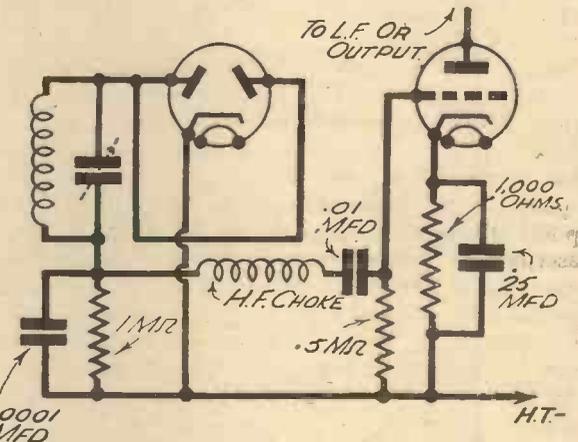


Fig. 3.—The circuit arrangement of a mains double-diode valve.

Percentage Modulation

Most readers are aware that telephony transmitters use a carrier wave of high frequency for carrying the electrical equivalent of the sound waves set up by the speaker's voice or musical instrument in the studio. The sound waves are superimposed on the carrier wave so that the current amplitude of the latter rises and falls in accordance with the pressure changes of the sound wave. In order to avoid transmitter distortion the increase in the carrier current due to the superimposing of the sound wave must be less than the normal amplitude of the carrier current, and the ratio of the current increase to the normal current is referred to as the percentage modulation; with 100 per cent. modulation the increase is equal to the normal current amplitude. When the transmitter employs a modulation of 100 per cent. the input to the receiver detector must vary between twice the normal carrier amplitude and zero. Up to the present, however, no detector has been found which has a straight curve from zero to maximum, and therefore distortion must occur when 100 per cent. modulation is used. A few years ago it was customary to use a modulation depth of 50 per cent., and therefore detector distortion was not so prevalent as it is to-day, when the depth of modulation is generally about 80 per cent. This increase in the modulation percentage has necessitated greater care in the design of the detector

main types, namely, triodes, diodes, and the metal type. The triode type can again be divided into two classes—anode bend, and leaky grid. The anode-bend detector, commonly used in the old days, is seldom employed nowadays owing to the fact that it has been found to distort more than the other types. It has the advantage over the other types, however—it does not materially affect selectivity as it imposes a very low

anode in most cases, but when a mains supply is available and a mains triode is used, the leaky grid rectifier will give a very satisfactory performance—sufficiently good for use even in a "quality" receiver.

The circuit arrangement of the grid detector is very simple, and is well known to most readers, but the required component values are not so well known. In order to obtain good results the anode resistance must be over four times that of the valve. This, of course, necessitates the use of a high H.T. voltage, and accounts for the difficulty in obtaining really good results from a battery-operated valve. It is also necessary to keep the input within certain limits, and therefore a pre-detector volume control is essential. Distortion can occur due to the use of too low an input, as well as to an excessive input, and it is advisable to connect a milliammeter in the anode lead of the valve in order that the correct input can be checked. A valve should be chosen which has an anode current consumption of approximately 6 mA.

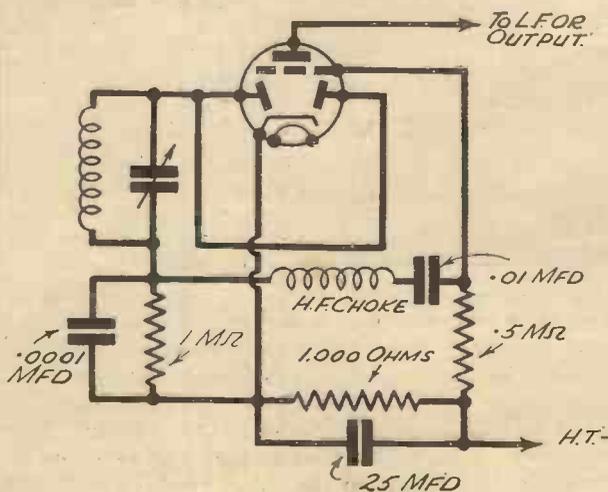


Fig. 4.—The circuit arrangement of a mains double-diode-triode.

(Continued on page 593)

On Your Wavelength

Some Amusing Extracts

I WAS somewhat amused as well as surprised to read in one of the dailies which boasts of a "technical" radio feature an article dealing with some of the new wireless receivers. I learn that one of these new receivers has "a super-inductance circuit which empowers the receiver for use on A.C. or D.C. mains." I read on a little further and then discovered that another remarkable feature of this new set is that it has "iron-covered coils," which are "more selective than air-covered coils." The choice bit was, however, to come. "Sensitivity was of a very high degree, a mere twist of the switch cutting one station out and bringing its neighbour in cleanly and easily." I do not know who was responsible for writing this tosh which unfortunately, or fortunately from the point of view of the printer, cannot be ascribed to printer's errors. I do not know what the manufacturers of the particular receiver under review thought of it, but they must have had their legs severely pulled as a result, or else they have been pulling the legs of some journalist who obviously is not a technician. Even though they were printer's errors it would be a case of careless proof reading, but even this must be ruled out.



By very kind permission—

I have often thought that our daily papers do not take their radio, motoring, and cycling features sufficiently seriously. They do not seem to care what tosh goes in, nor do they always select their contributors with that care which the subject demands. I often try to imagine what style of man it is who can get away with the sort of stuff I sometimes read, particularly when it is supposed to be technical and authoritative. In

By Jhermion

the early days of wireless any sort of contributor could persuade some gullible editor that he was an expert, but nowadays there is no excuse for that. I thought that all the unskilled writers in radio journalism had been discovered and put "on the list" a long time ago.

A Readers' League

MR. GERALD McCAFFIE thinks that the recently mooted idea of a Readers' League would be excellent if put into effect. He thinks we ought to have a badge so that readers can recognise one another, and form a link between home constructors all over the British Isles. He thinks we ought to have the Editor in it, too. I shall have to speak to him about it. My correspondent invites me to live in Killarney for a bit so that I can learn something about junk shops, or rather forget about junk shops, for he says that there are none in Killarney. For the most part, he tells me, you have to make your own parts, or pay a ridiculous price for them due to tax. He also invites me to spend my holidays in Killarney, an invitation I must accept next year, for I have never been to Ireland. He says that Ireland is a backward country as far as radio is concerned and the Irish would know very little of radio but for this journal, and Mr. Camm's fine books, all of which he has secured by paying a tax of 50 per cent. Much obliged for your interesting letter, Mr. McCaffie.

Too Much Kind Permission

THIS film racket business is getting worse than the crooning affair. You will remember that some time ago I gave all readers and mankind generally my opinion of the film industry, in which the author of the film is mentioned last of all and then merely by a flash of very small type. You will find that Josh Levisky produced the film, that Ike Cohenvitch directed it, that Ima Damfrost takes the lead, that the film was photographed by Abe Stinkski, that the

office boy was Tiny Timpski, and so on. Nowadays this system is percolating through to the radio. I listened-in to a musical comedy the other day, and was overawed by the fact that Miss Dimplechin was appearing by kind permission of the Bunk Film Corporation in conjunction with Mr. Pimp. Imagine my unbounded rapture when I was also informed that another artist was going to use her larynx by kind permission of the Scream and Screech Films Inc., and Mr. Pomp. These credit titles, although they are quite uninteresting to the public, are apparently insisted upon in order to give publicity to nonentities. When I purchase a house I do not wish to know the name of the bricklayer, but I do like to know the name of the architect; I like to know the author of a film, and not the name of the Director, who after all is only in the same position as the bricklayer. In radio I am interested in the singer or the artist; I do not care two hoots who has given her permission to appear; I do not wish to know the name of the owner of a theatre; I am only interested in the people who appear on the stage. In the film and entertaining industries you will find the human parasites and barnacles who batten themselves upon the entertainers and wax exceeding fat. Each

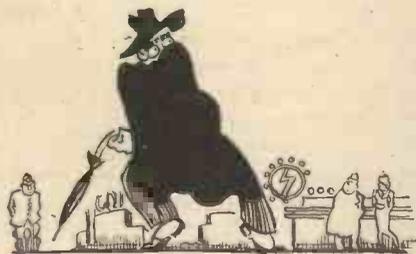


Chaos reigns supreme

entertainer has to earn the living of about six other people, including the agent. When you hear of an artist earning £500 a week you must remember that by the time all these other parasites have had their picking he is lucky to have about £10 clear. The most ignorant section of the public can be found in the production side of the film industry. You have all heard the story of the film magnate who called together his staff to see

what ideas they had for the next film. One of them suggested "Macbeth." "Who wrote it?" asked the magnate. "William Shakespeare" was the reply. "I have never heard of him," said the magnate, "but send for him at once." That sums up the intelligence of the average person connected with film production.

No advertising matter is allowed to be broadcast by the B.B.C. of course!



I shall be heavily disguised

The Eighth Wonder

EACH year I pop in to Olympia on the night before the Radio Show opens, and each year I find the stands in the same state of incompleteness, the same gang of workmen feverishly endeavouring to squeeze two hours' work into one. Packing cases seem to be strewn everywhere, painters paint madly, char-ladies char frantically, barmen are busy barring, and even in the restaurants the waitresses are waiting. Chaos reigns supreme. Whilst I am sleeping, however, miracles seem to be performed, for when I arrive in the morning every stand is spick-and-span.

No Bloodhounds, Please!

EACH Radiolympia time I realise how many friends and enemies I have made during the previous year. Readers come along to the PRACTICAL AND AMATEUR WIRELESS stand and want to have a chat with Thermion, please. I have stood beside them while they have made the request, and although I have not actually seen the smoking bombs protruding from their pockets, I have often caught a rather ominous glint in their eyes. Really, dear readers—my very gentle dear readers—your Uncle Thermion may have trodden on your very pet corn in print, but remember, my very charming readers, that kindness turneth away the wrath. Bunches of flowers for me may be left on the stand, but all cases of whiskey, boxes of cigars and motor-cars should be wrapped up, sealed and marked "Confidential." I shall be there again this year, quite incognito, of course—and heavily disguised!



Notes from the West Bench

Push-pull Transformer

MOST "quality" receivers and amplifiers are fitted with a push-pull output stage, as it is generally recognised that this type of circuit provides a practically distortionless output if the correct valve types and components are used. As most of the available push-pull transformers are somewhat expensive, and two valves are required in place of one, the majority of constructors have adhered to the single output circuit arrangement. With the reduction in the price of valves it is probable that the push-pull amplifier will become more popular, however. The initial outlay can be further reduced by using a straight transformer in place of a push-pull type.

Reducing Cost

REASONABLY good transformers of the straight type are available for about 10s., and if a component having a step-up ratio of about 4:1 is chosen this may be centre-tapped by means of resistances. Two resistances of reliable make having a value of approximately 250,000 ohms should be obtained. One of these should be connected to the G. terminal of the transformer and the other to the G.B. terminal, the free ends of the two resistances being then joined together and connected to G.B.—in the case of battery-operated sets and to the H.T.—line in mains sets, with the G. and G.B. terminals connected to the valve grids. This type of circuit cannot be expected to give quite as good results as one using a well-designed expensive centre-tapped transformer, but the quality is, nevertheless, exceptionally realistic.

Condenser Voltage Ratings

THE haphazard choice of condensers often gives constructors a good deal of trouble. It is not sufficient to choose the correct capacity values—the condensers must also have the correct voltage rating. It is fairly easy to decide the required rating when designing a battery operated set, as the maximum voltage in the set is known to be 150 volts or less. The condensers used should, therefore, have a working voltage rating of 150 volts or higher. In a mains-operated receiver, however, a good deal of calculation is often necessary.

Taproom Topics

WAS touring round the other day and dropped into a country pub which I used to visit many, many moons ago. In those days the favourite topic of conversation was beer and turnips, and the second favourite topic was turnips and beer. Imagine my surprise therefore when a modern yokel, complete with old school kerchief, came in and asked for a Gin and It. Old Harry, who is now ninety-four,



With old school kerchief

dropped in, and although he still stuck to beer his conversation betrayed the influence of higher education. He was keenly interested in our chances in the Olympic Games and gave me his private views on the political situation in both the Near East and the Far East. The whole village had been modernised by the B.B.C. and I imagine that all meetings of the parish council are carried through on the strictest Parliamentary lines.

Voltage Surges

IF a metal rectifier is used in conjunction with indirectly-heated valves the smoothed voltage during the time the valves are heating up is decidedly higher than normal; for example, with an H.T.8 rectifier the no-load output will be approximately 450, and therefore smoothing condensers and anode by-pass condensers having a working voltage rating of over 450 must be used. High voltage surges can also be experienced in a receiver having a high-resistance smoothing choke or speaker field winding in the common H.T. supply lead. During the time the indirectly-heated valves are heating up the current passing through this high resistance will be very low, and therefore the voltage drop at this point will also be low, and consequently the voltage applied to the valve anodes will be high. In a receiver of this type the voltage rating of the condensers must be higher than the normal anode voltage. The voltage surge in this case could, of course, be avoided by using one of the indirectly-heated rectifying valves.

A FOUR-PURPOSE UNIT

A Simple-to-build Device Which May be Used as a Crystal Set, a Wavetrapp, a Wavemeter, or a Second-channel Whistle Eliminator
By W. J. DELANEY

ALTHOUGH designed primarily for the beginner, the novel unit described in this article will be found of great value by many listeners, as it may be put to so many different uses. As explained above, it can be used as a self-contained crystal set, or as a wavemeter for the location of stations (or the identification of unknown stations) on any waveband, and also as a wavetrapp for the elimination of an unwanted station which intrudes upon a wanted programme. For those listeners with a simple superhet receiver in which trouble from second-channel interference is experienced the device may be equally as well employed as an eliminator of this trouble, and the change from one piece of apparatus to the other may be carried out in a second or two.

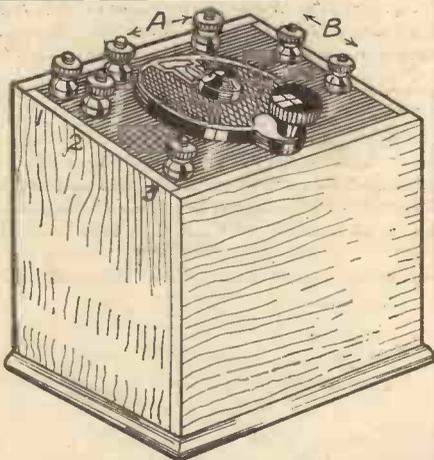
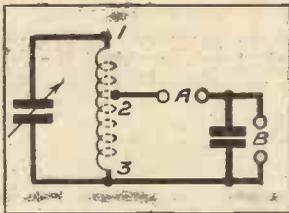


Fig. 1.—General view of the four-purpose unit and the theoretical circuit which is employed.

In Fig. 1 the main essentials of the unit are shown in both a pictorial and a theoretical form, and it will be seen that a tuned circuit provided with a tapping point forms the basis of the device, with two pairs of terminals arranged across the tapped portion of the circuit. The coil is home-made, and it is suggested that the constructor makes a complete set of these coils to cover all wavebands in order that the device may have universal application. Across one pair of terminals (marked B in Fig. 1) a small fixed condenser is connected, the value most suitable being .001 mfd., but any value near to this may be used if the constructor has one handy.

The Construction

An important component is the tuning condenser, and if the unit is to serve mainly as a wavemeter the condenser

should be of the best make the constructor can afford. Furthermore, a really good slow-motion dial should be fitted, and should be of the type which may be locked firmly in position so that no change in calibration can occur. The condenser is mounted on a small ebonite panel which should be of such a size that it will enable the terminals to be neatly spaced round it—in practice it will probably be found that a piece 6ins. square will prove adequate. A box should then be constructed to contain the condenser, and again a depth of six inches will enable the unit to take on a useful size, so as to accommodate the largest of the tuning coils. The wiring to the seven terminals and the tuning condenser is shown in Fig. 3, and the coils are made up as shown in Fig. 2.

Lengths of ordinary cabinet moulding are used for the coil formers, and the general shape of this moulding is shown in Fig. 2. The moulding is about 1½ins. in width, and the two end sections are raised above the moulded portion. The wire is wound in the latter, and when finished a length of gummed brown-paper tape (such as is now used for sealing parcels) is stuck across the moulding to give a neat appearance and keep the wire from moving and upsetting any calibrations which are made. The tape may be obtained for 3d. a box at the popular stores.

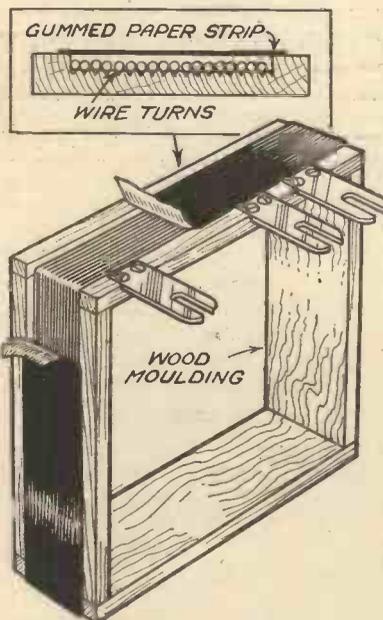


Fig. 2.—Details of the coils used in the unit.

The Coils

For the largest coil the former should be made with sides to fit the sides of the box, and if the above dimensions are followed, six inches will be sufficient. The pieces of moulding are nailed together with brass nails, and may be glued or seccotined if desired. The three brass arms attached on one side should be spaced to agree with the three terminals shown on the left of

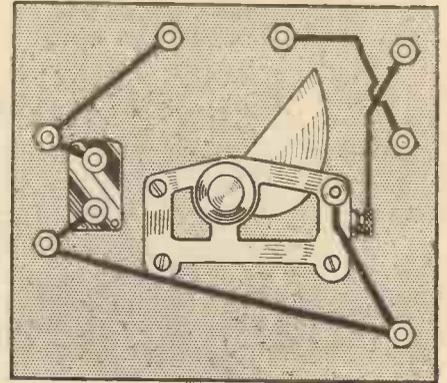


Fig. 3.—Wiring diagram showing the few simple connections.

the panel, and it will be noted that the tapping connector is placed to one side so as to ensure that the coil is always placed in the correct relative position and cannot be reversed. For the medium-wave band 24 turns of 22 gauge D.C.C. wire should be wound round with the tapping point 8 turns from one end. For long waves, 120 turns of fine wire will have to be put on, and if you have some wire by you which is of such a thickness that it cannot be accommodated in a single layer the wire may be pile wound in sections. For the shorter wavelengths various coils may be made up, and as the number of turns will be so few the size of the former may be reduced, and this will, incidentally, enable the various coil formers to be nested one inside the other for storage purposes.

The Plug-on Units

To enable the unit to be used as a crystal set or wavemeter, a crystal, a buzzer, and a battery are required, and these are all mounted on small panels of plywood to which two brass arms, as in the case of the coils, are fitted. These arms must, of course, be spaced to correspond with the spacing of the terminals on the panel. To one panel the crystal detector is mounted and this may be of any type preferred by the constructor. The permanent type is naturally more reliable and is less troublesome to adjust. The buzzer, to give best results, should be of the special high-note type, provided with a shunt, and a suitable low-priced unit may be obtained from Electradix Radios for 6s. A disused electric-bell movement may be adapted, but is not so useful nor so neat. The battery may be a standard 4.5 volt flash-lamp battery, held to the appropriate panel by means of a strip of thin brass, as shown in Fig. 4.

Using the Unit

In Fig. 5 the various connections for using the unit are given. When it is required as a crystal set the aerial is attached to terminal No. 1, the crystal is plugged to the pair of terminals at the side, and the 'phones are connected across the terminals opposite the coil. An earth lead should be attached to terminal No. 3. The crystal is adjusted for maximum sensitivity, and the tuning condenser is operated in the usual way.

(Continued overleaf)

A FOUR-PURPOSE UNIT

(Continued from previous page)

When used as a wavemeter, the buzzer is plugged in place of the crystal, and the battery in place of the 'phones. The aerial and earth leads are not, of course, then required. The buzzer will com-

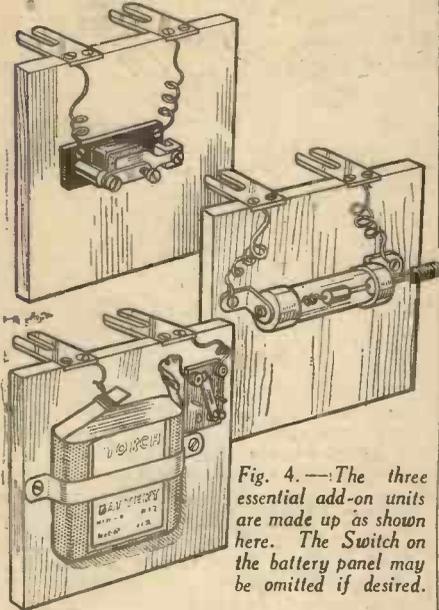


Fig. 4. — The three essential add-on units are made up as shown here. The Switch on the battery panel may be omitted if desired.

mence to work the moment the battery is connected if there is no switch, but it may be stopped by removing the battery from the terminals, or alternatively a small switch may be mounted on the battery

panel for the purpose. The appropriate coil is plugged in, and the wavemeter must then be calibrated. To do this a known station should be tuned in on your broadcast receiver, and the wavemeter should then be placed close to the aerial lead to the receiver and the buzzer set into action. The dial on the wavemeter should then be turned until the noise from the buzzer is heard in the loudspeaker. If a critical setting cannot be found the wavemeter should be moved farther away, until a position is found where the buzz is tuned in and out in a fraction of a degree. This point is then noted and the dial may be marked or a graph may be drawn up on squared graph paper.

A number of known stations are similarly tuned in and the resultant positions marked off on a chart so that the exact wavelength for each degree on the dial is shown.

Then, if an unknown station is located, the wavemeter is brought into operation and its exact wavelength may be ascertained. Alternatively, if a station is required and the wavelength is known, the wavemeter may be set into operation and tuned to that wavelength, after which the receiver controls are operated until the buzz is heard. You will then know that the receiver is adjusted to the correct wavelength.

As a Wavetrap

To use the device as a wavetrap there are three separate alternative connections, each of which should be tried in turn to find the most suitable for your particular local conditions. The aerial may, for instance, be attached to terminals Nos. 1, 2 or 3, and terminals Nos. 3 or 2 may then be attached to the broadcast receiver. Thus, all signals have to pass through the

unit before reaching the tuned circuits of the receiver, and in the event of a station causing interference the wavetrap condenser is simply adjusted until the interference is removed. The receiver may then need slight re-tuning to obtain maximum volume.

To eliminate second-channel whistles the same procedure as mentioned above is adopted, and the wavetrap is adjusted until the station causing the whistle is eliminated. This will generally be the powerful local, although when there are two powerful local stations such as are found in most parts of the country, it is possible that whistles may be set up by both, and therefore, for the complete elimination of the whistles, two such traps will have to be arranged in series in the aerial circuit.

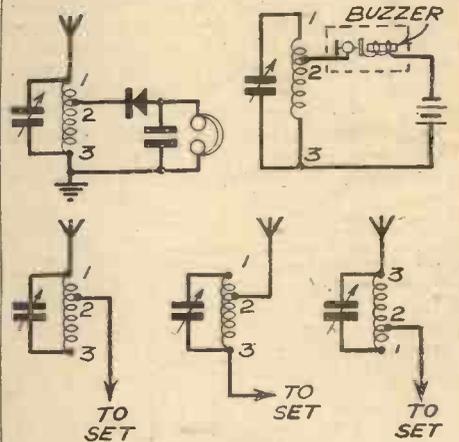


Fig. 5. — The various uses to which the unit may be put are illustrated above.

5-METRE TESTS ON SNOWDON

A NUMBER of North Wales amateur transmitters, Messrs. G. A. Massey (G6YQ), F. J. E. Starkey (G6KY), J. H. Wood (G5YP), and A. K. Cardwell (2AKD), are climbing to the summit of Snowdon on Sunday, August 23rd, to conduct a series of 56 Mc. test transmissions. Two transmitters with inputs up to 10 watts, equipped for 'phone and modulated C.W., will be used, operating under the call-sign G6YQP, between the hours of 9 a.m. (09.00 B.S.T.) and 6 p.m. (18.00 B.S.T.).

Schedules have been arranged with distant transmitters with a view to increasing, if possible, the present record for two-way communication on the 56 Mc. band. Numerous tests with different radiating systems will be made, and to each test will be assigned a check number. All stations reporting reception are particularly requested to include the reference number and time in their reports.

Messrs. Stratton and Co., of Birmingham, through their station G6SL, and Mr. E., Menzies (G5MQ), of Liverpool, have signified their willingness to co-operate with G6YQP. Mr. W. Jones (G6OK) will also be operating a transmitter from the top of The Great Orme, at Llandudno.

It is hoped to have transmitters also in operation on the "Cat and Fiddle," near Buxton, "Ashurst Beacon," near Ormskirk, Lancs, and in the Isle of Man. It is also understood that two Irish transmitters, EI6F and EI8G, will be operating portable 56 Mc. transmitters near Dublin, on

August 23rd, and Mr. D. S. Mitchell (G6AA) is attempting to achieve two-way communication with these stations from the top of Holyhead Mountain, in Anglesey.

All reports of reception of G6YQP should be forwarded as early as possible to Mr. J. H. Wood, "Deepdale," Marine Road, Prestatyn, Nth. Wales. The organisers of these tests hope that interested listeners and amateur transmitters throughout the country will assist by reporting all 56 Mc. signals, either from G6YQP, or any station heard calling him on that day.



Short-wave amateur transmitters carrying their apparatus to the summit of Mount Snowdon for tests carried out recently.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

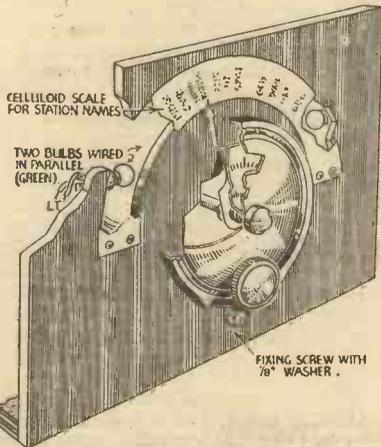
THE HALF-GUINEA PAGE

A Dial Improvement

MY S.W. set was fitted with a good reduction drive on the tuning condenser, but no provision was made for writing on station names. I therefore made the following alteration to enable these to be inserted. The dial was raised from the panel by a 1/16 in. washer, and a pointer was fixed to the central spindle, as indicated in the sketch. Behind this a scale, cut from a piece of white celluloid, was attached by means of round-headed screws, after an opening had been cut in the panel to enable the scale to be illuminated by two green 4.5v. bulbs, which are fed from the L.T. supply.

The set was calibrated, and the names were then marked in blue ink.

This device, which is very easily made, has proved very useful on my S.W. set.—J. P. BRITAIN (Sunbury-on-Thames).



A method of improving a dial by the addition of an illuminated station indicator.

Remote Control Relay

FOR some time being inconvenienced when using a speaker in another room by walking to and from set to switch it off, I made the following control.

Obtain one old bell movement, less contact-breaker, and one "mechanical replacement indicator movement." File an elongated hole in end of arm of indicator movement and bend striking arm of bell movement to engage with this, first, of course, removing ball on end; also solder short piece of brass on end of arm if necessary to close contacts.

Three separate wires or three-wire cable is run from control board to remote position, where two miniature bell pushes are fixed.

One push energises this indicator movement, causing "trip" to fall and switch on set. The other push energises bell movement, which switches off set. The diagram, I hope, will explain itself. One flash-lamp battery lasts about eighteen months. Don't forget to leave switch of set on.—G. FAULKNER (Cobham).

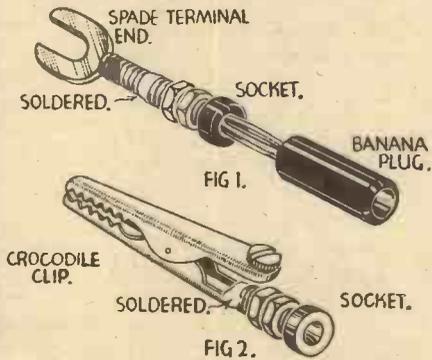
THAT DODGE OF YOURS!

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.

Handy Fitments for the Test Bench

I HAVE found these assemblies very useful in making different tests.

The construction is clearly illustrated in each case by Figs. 1 and 2, and the sim-



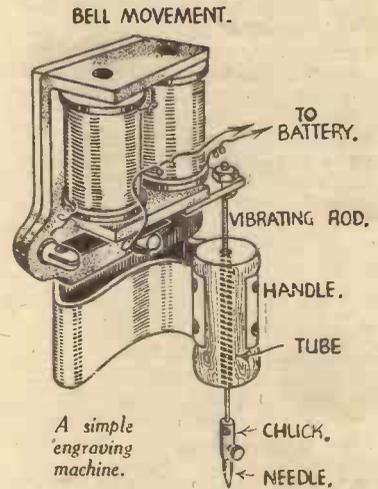
Interchangeable spade and crocodile ends.

plicity of assembly is evident, the only necessities being soldering utensils, and a pair of pliers. When soldering, hold the iron touching the underneath of the joint to

remove excess solder, and leave a "finished" appearance. It will be seen that the spade and crocodile ends are quickly interchangeable.—T. COPPS (Ilford, Essex).

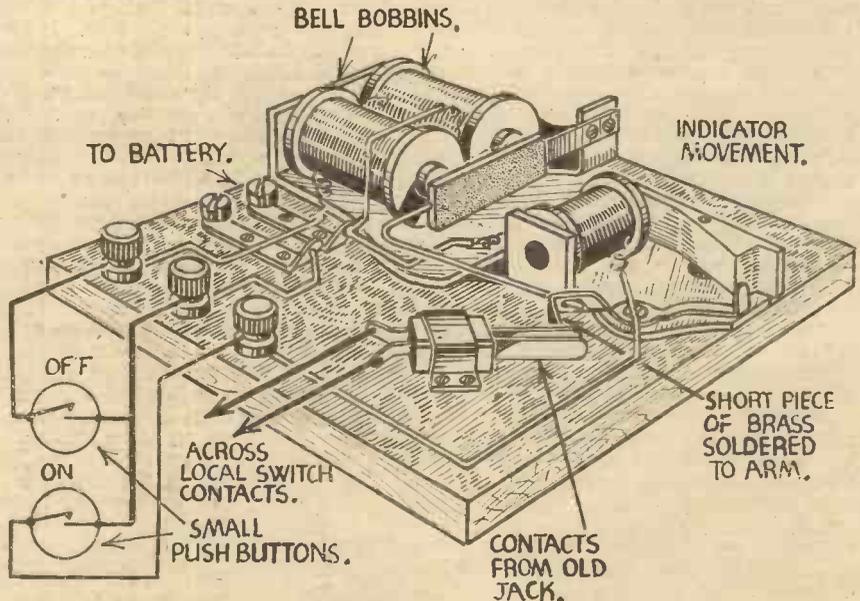
A Small Engraving Machine

THE accompanying diagram, which is self-explanatory, shows a small engraving machine made with an electro-



A simple engraving machine.

magnet and armature taken from an old electric bell. A wooden handle, drilled to take the armature rod, is fixed to a bracket, as shown. By using gramophone needles the engraving point can easily be changed, when required. If used with a bell transformer, a 2-mfd. condenser should be connected across the "make and break" of the armature to reduce sparking at the contacts.—S. RUNDLE (Doncaster).



An easily-made remote control relay for use with an extension speaker.



SHORT WAVE SECTION

Artificial Aids to Quality on the U.S. Waves—Part 2
Points to be Considered when Using a Converter, and Hints on Tone Correctors are Given in This Article. By H. J. BARTON CHAPPLE, B.Sc.

AS distinct from an adaptor, a converter comprises a frequency-changer and sometimes a radio-frequency amplifier in front of it, operating on the ultra-short waves, which is intended to be connected to the aerial and earth terminals of the domestic set, so that it then acts as the intermediate-frequency amplifier plus detector and L.F. sections of an ultra-short-wave set. The problems of adjusting the home set for high quality reproduction in such circumstances are greater in number and complexity than those associated with the use of a simple adaptor. Obviously, it is important that the low-frequency side shall be above suspicion, and all the points noted in the first article on this subject apply equally to the operation of a converter. But, in addition, a great deal can be done to the earlier stages of the set.

Conversion

A receiver to be used in conjunction with a converter must have at least one valve prior to the detector—that is to say it must either have one or more radio-frequency stages or it must be a superhet. In the case of the straight set with one or two radio-frequency stages, these stages act as the intermediate amplifiers of the ultra-short-wave combination, and the home set must be tuned to an appropriate frequency for this purpose. If, however, the home set is already a superhet, there will be a double frequency change, one from the ultra-high frequency to the intermediate frequency of the converter, and another from this value to the intermediate frequency of the home set. In both cases the combination will have an intrinsic degree of selectivity equal to or even considerably greater than that of the home set and this, as has already been pointed out, is already too great for really good quality. The problem confronting the listener, then, is to counteract the poor quality engendered by super selectivity, and this may be done according to two plans. The first is to manufacture a spurious quality by an adjustment of the values of circuit components, boosting the treble where possible, and partially suppressing the bass. The second is to reduce the overall selectivity of the combination.

Relative Merits

Now with regard to the relative merits of the two systems. Synthetic quality is really not the most satisfactory for three

reasons. In the first place, boosted top depends upon producing resonant circuits tuned to the higher audio-frequencies, and these are naturally more effective at certain frequencies than at others. The top boost, therefore, is not an overall boost, but a peaking at certain frequencies, and can always be recognised as such by the music-lover. Second, suppression of the bass to level up the audio-frequency response curve

Adjustments

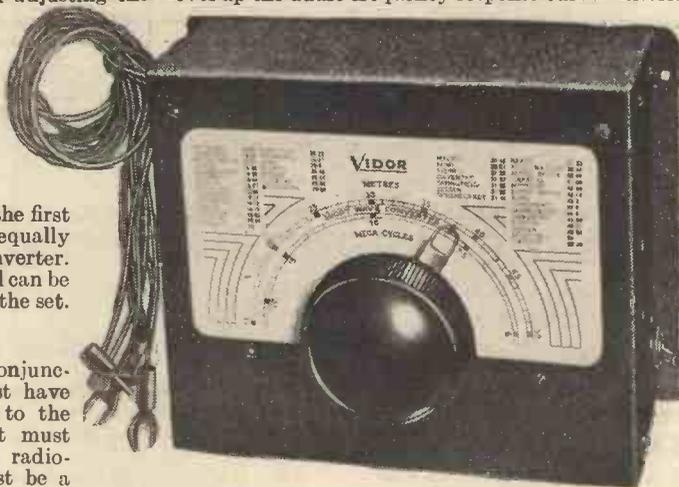
If the domestic set which is being used in conjunction with a converter is a straight three, having only one radio-frequency stage, the initial selectivity may not be too great for quality reception if it is of the two-tuned circuit type. Naturally the reaction control, if any, must be turned to a minimum, and, if desired, a slightly wider intermediate-frequency waveband can be obtained by a slight variation of one of the trimmers—not sufficiently to produce a very pronounced double hump. Some three-valve sets of this type have one band-pass circuit, which is usually adjusted to pass only $4\frac{1}{2}$ kilocycles on either side of the tuning frequency. It is sometimes possible to readjust such filters to pass a wider band by altering the values of the coupling components.

Another point worth investigating is the normal selectivity of the domestic receiver at various points on its tuning range. Many sets incorporate ingenious circuit arrangements designed to render the selectivity uniform throughout the tuning range, but in some instances tuning is flatter in some parts than at others. If, as often happens, the design of the converter is such that the intermediate frequency generated can be adjusted to almost any

reasonable value, it may then be worth while to tune the domestic set to a point corresponding to the last selective part of its range, and to adjust the intermediate frequency of the converter to suit.

With a Superhet

If the home set is a superhet, all the points already enumerated may also receive attention. But when the best has been done in this connection, the ultimate selectivity may be governed by the selectivity of the intermediate-frequency transformers. Now it is possible to broaden the band width here by altering the trimming of the I.F. transformers, but in view of the tricky nature of the job of re-trimming afterwards when it is required to revert to normal listening, this practice is not recommended, at any rate, in the case of a commercial set with sealed trimmers. With a home-constructed set, and particularly one having easily accessible trimmers, the experiment might be made by turning one trimmer through a definite amount, remembering just how much this amount is so that the set can be retrimmed without difficulty, or by replacing the existing I.F. transformer in one stage by one embodying variable band-width adjustment.



A useful commercial converter—the Vidor Battery Model, covering the Band from 13 to 50 metres.

means an overall reduction of output, which is not only wasteful but prevents the speaker from giving of its best. It introduces losses in all parts of the low-frequency range, although the losses are greatest at the bass end, but the whole thing tends to sound artificial and unsatisfactory. Third, the fitting of the necessary correctors and filters means alterations to the circuit—all of which must be withdrawn in order to reinstate the receiver for normal wave reception. Now since the use of the converter may represent quite a small portion of the time during which the set is in service, it does not seem worth while to fit these devices, and to remove them every time it is desired to revert to the medium or long waves, as otherwise whatever residual side-band splash gets through the early stages of the set will be unduly amplified in the L.F. stages. However, as some readers may wish to experiment on these lines, a few general hints for doing so will be given later.

The idea of reducing the overall selectivity for ultra-short-wave reception is much sounder from a radio engineering point of view, gives infinitely better quality in the long run, and the set can be reinstated for selective reception of the standard waves without much trouble.



IMPROVING THE DET.-L.F. RECEIVER

Several Suggestions for Modernising an Old Set, and for Interesting Experiments that can Easily be Carried Out.

IN spite of the growing popularity of superhets and similar advanced circuits there are thousands of constructors who still prefer the popular detector-L.F. arrangement of valves. A set using this circuit is of the simplest possible kind, is easy to tune and does not call for any special skill in connection with preliminary adjustment. Additionally, of course, it is inexpensive and was once the most popular of all. Many readers

fair selectivity on the medium-wave band, but it is not good enough on long waves when it is wanted to separate, say, Luxembourg, Droitwich, Radio-Paris and Hilversum. Much better results can be obtained by using a coil with separate aerial and tuning windings, such as that shown in Fig. 2. The coil actually shown is the Wearite "Uni-Gen," but there are similar types in other makes which will prove similarly satisfactory.

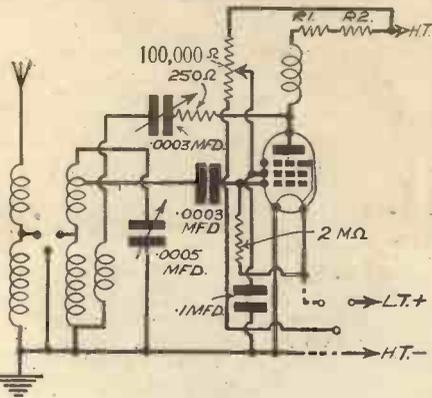


Fig. 3.—A further development of the circuit shown in Fig. 2, where an H.F. pentode (e.g. Cossor 210 S.P.T.) is used for detection. Notice the use of a 3-point on-off switch to disconnect the potentiometer when the set is out of use.

windings on both aerial and tuned-grid coils. Another point to notice is that there is a tapping on the grid winding to which the grid condenser can be connected when maximum selectivity is required. The reaction circuit shown in Fig. 2 is also modified from that in Fig. 1, due to one end of the reaction winding being permanently connected to the lower end of the grid winding. A 250-ohm fixed resistance is also shown in series with the reaction condenser, and although this is not essential it is generally valuable in smoothing reaction control.

The next alteration concerns the detector-anode reaction circuit, for instead of using a separate H.T. tapping, as in Fig. 1, a decoupling resistance and condenser are added so that the detector valve may take its H.T. supply from the same wander plug as that used for the other two valves.

(Continued overleaf)

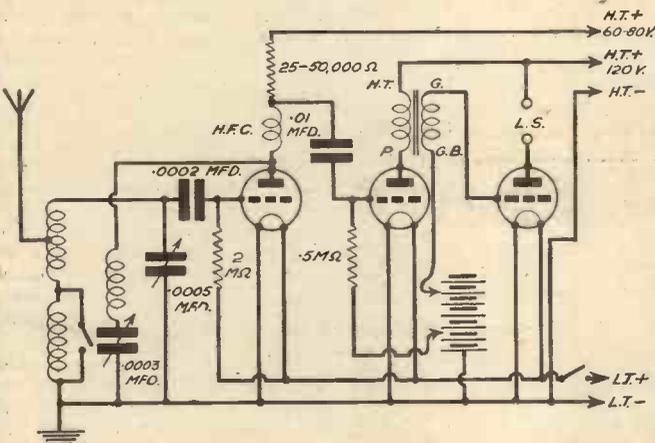


Fig. 1.—A typical det.-L.F. circuit, of the type which was popular a few years ago, and which is taken as an example when dealing with refinements.

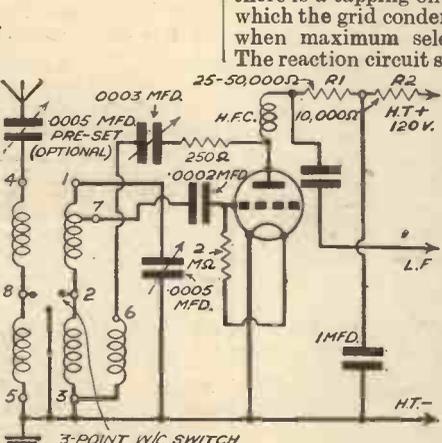


Fig. 2.—Showing the use of a more selective tuning coil, an improved reaction circuit and decoupling.

who built an instrument of this type a few years ago have found it so satisfactory that they are loath to scrap it, even when it is decided to build another and more modern receiver. Because of this, it might be considered worth while to spend a few shillings in order to improve the set by adding a few modern refinements; these will certainly make the set more sensitive and give it a degree of selectivity more in keeping with present-day requirements.

Better Reaction

In order to use the new coil (if it is not fitted with built-in wave-change switch) it is necessary to replace the existing two-point switch by one having three contacts; this serves to short-circuit long-wave

of using a separate H.T. tapping, as in Fig. 1, a decoupling resistance and condenser are added so that the detector valve may take its H.T. supply from the same wander plug as that used for the other two valves.

The Tuning Circuit

Let us, therefore, consider the improvements which can be made without altering the main characteristics of the "old friend." We must deal with the question in fairly general terms, because small variations must occur even in sets of the same type. As an example, however, the circuit given in Fig. 1 can be taken as representative of the popular three-valve, non-H.F. receiver. Resistance-capacity coupling is used between the detector and first L.F. valves, whilst a transformer couples together the two low-frequency stages.

The first and most important alteration should be in the tuning circuit, since the coils made to-day provide far better selectivity than did their counterparts of a year or two ago. In the circuit shown, the aerial is joined to a tapping on the medium-wave winding, and this does give

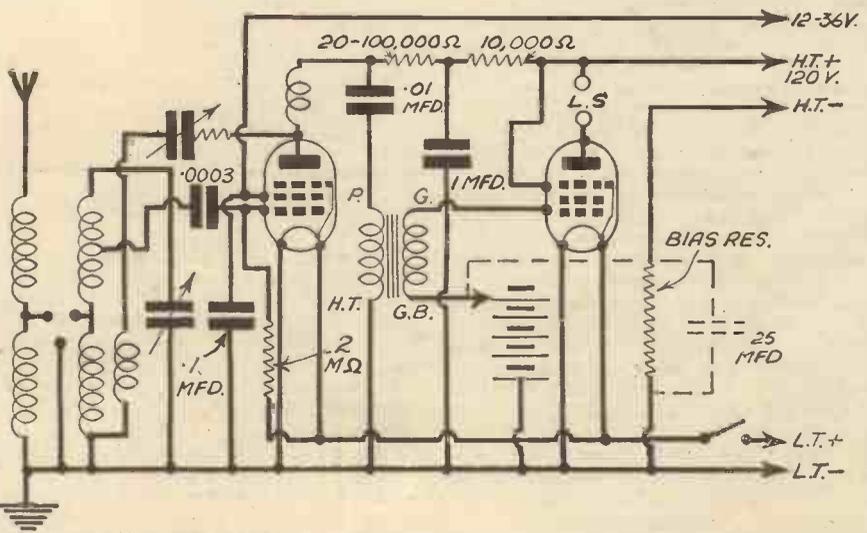


Fig. 4.—A very modern two-pentode circuit evolved from the original three-valve arrangement shown in Fig. 1. Connections for automatic G.B. are shown in broken lines.

BEGINNERS' SUPPLEMENT

(Continued from previous page)

Additionally, of course, this decoupling circuit prevents instability when the H.T. battery is running down, and permits the detector to operate more efficiently. The values of condenser and resistance shown are not critical, but are average ones which suit most receivers.

H.F.-pentode Detector

In the majority of cases it will not be necessary to alter the low-frequency part of the set, but one or two refinements in this direction will be mentioned later. An improvement which is definitely worth while is the replacement of the triode-detector valve by one of the H.F.-pentode type, as shown in Fig. 3. In this circuit the screening-grid is shown as being fed from a 100,000-ohm potentiometer, but expense could be saved by taking the lead from the S.G. terminal of the valveholder directly to a low-voltage tapping on the H.T. battery. But the potentiometer is very useful, because it can be used as a subsidiary reaction control. The alteration in valveholder connections when changing to the H.F.-pentode valve are simple enough, and consist only of taking those leads which previously went to the anode terminal of the valveholder to a flexible lead which can be attached to the anode terminal on top of the new valve, and making the screening-grid connection to what was previously the anode terminal of the valveholder.

The Anode Resistance

Theoretically, the anode coupling resistance, marked R1 in Fig. 2, should be of a very much higher value than before if it is to match the impedance of the new valve, but in practice it is often found that the same resistance can be used without there being any serious loss in efficiency. Nevertheless, the constructor is advised to try one or two alternative resistances with values up to 250,000 ohms. It might be found that reaction cannot be obtained when the value is more than, say, 100,000 ohms, in which case this value will have to be used. In any case, it might be noticed that for best results the voltage applied to the screening grid must be reduced to a voltage much lower than that normally recommended—say, 12 to 36 volts. The reason is that the anode voltage also is appreciably below the maximum for which the valve was designed. For best results with this circuit a 120-volt H.T. battery should be employed, when a total resistance of 250,000 ohms for R1 and R2 can nearly always be used without adversely affecting reaction.

Working on this assumption, it is a good plan—either experimentally or permanently—to replace R1 and R2 by a 250,000-ohm potentiometer connected as shown in Fig. 5. The potentiometer must be a good one, capable of carrying up to 1 mA, and the portion on the right of the slider is used for decoupling, whilst that on the left is for coupling. A suitable "balance" can easily be found by trial, after which further adjustment will be unnecessary.

Using a Separate Reactor

Those who do not feel prepared to go to the expense of a new H.F.-pentode detector might be interested to try the effect of using a separate reactor valve, as shown in Fig. 6, where the first L.F.

valve is used as detector, the normal detector being used for providing reaction only. The main alteration is that of changing the .01-mfd. grid condenser and .5-megohm grid-leak for values of .0002-mfd. and 2-megohms respectively, and including an H.F. choke in the anode circuit of the second valve; in addition, the grid condenser is joined to the tuned coil instead of to the anode circuit of the

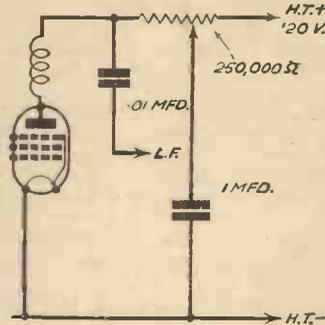


Fig. 5.—A potentiometer used in place of resistances R1 and R2 shown in Fig. 2.

first valve. When using this arrangement the volume will not generally be as good as before, but it might be found that the range of reception is noticeably increased. The volume could be brought

for both detection and low-frequency amplification. This can be done by eliminating the second valve and changing the three-valve into a two-valve, using the circuit shown in Fig. 4. All of the existing components are used with the exception of the second valve and holder, and the L.F.-valve grid-leak. The transformer connections are modified, so that parallel-fed coupling is used between the valves. Despite the loss of one valve, it will be found that reception is improved, in addition to which current consumption is less than before, especially if a high-efficiency pentode, such as a Cossor 220 H.P.T. is used for L.F. Although bearing little resemblance to the circuit in Fig. 1, that in Fig. 4 is formed in simple stages, without any change of "key" components, and without altering the general construction of the set. Thus, the same cabinet can be employed, and the method of operation is almost the same as before. The change is truly representative of "new sets for old."

Automatic Grid Bias

A still further improvement to this two-valve arrangement might consist of using automatic grid bias, by means of which the correct bias is always obtained regardless of the condition of the H.T. supply. All that is necessary is to include

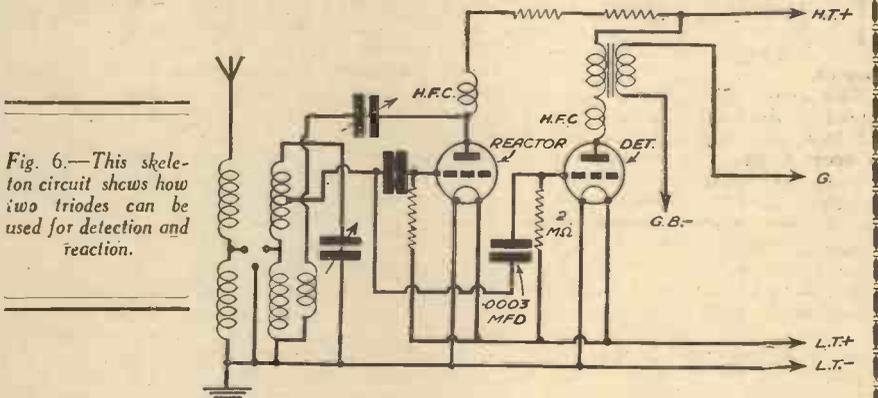


Fig. 6.—This skeleton circuit shows how two triodes can be used for detection and reaction.

back to normal by using a pentode in place of the triode-output-valve. This simply means that the existing four-pin valveholder must be changed for a five-pin component, and that the centre terminal must be joined to the main H.T.+ lead.

A Two-pentode Circuit

There may be some readers who would like to "go all modern" by using pentodes

a fixed resistance in series with the H.T. — lead (shunted by a 25-mfd. electrolytic condenser), and to change the G.B.— connection from the L.F. transformer, as shown in broken lines in Fig. 4.

The value of the resistance must be calculated, but the method is not difficult. The best method is to find the total H.T. current required by the set, by inserting a milliammeter in the H.T. — lead, divide this into the G.B. voltage required (4.5 with the valve mentioned above), and multiply the result by 1,000 in order to obtain the value in ohms. As an example, suppose that the valves together take 8 mA, the resistance required is 4.5/8 multiplied by 1,000, or nearly 600 ohms. In this case, a 500-ohm and a 100-ohm resistance could be used in series. As the value is not very critical, it would actually be satisfactory to use the 500-ohm resistance alone, although when this were done the H.T.-current consumption would be increased by about 1 mA. Another method would be to use a 1,000-ohm variable resistance and to adjust this to the highest value consistent with good quality reproduction, remembering that the higher the resistance the lower the high-tension consumption.

THE WIRELESS CONSTRUCTOR'S

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IMPRESSIONS ON THE WAX

By
T. O'nearm

Two Newcomers

A NEWCOMER to the Columbia lists this month is Paul Kaul, the distinguished French violinist. He has chosen for his record Beethoven's "Romance in F" which was originally composed for violin and orchestra. The number of this fine recording is *Columbia LX 514*.

Another newcomer to the list is Tino Rossi, a Corsican, who is extremely popular at the moment in France. His fame has now spread to this country and Columbia, in response to many requests, issue his first record this month. He sings "Reviens, Chérie" ("Come Back, Dearest") and "Des Peines d'Amour" ("The Pangs of Love") both in French on *Columbia DB 1649*.

Sandler's "Carmen"

THE Albert Sandler Trio, to be heard on the 1s. 6d. Columbia series, are forging ahead with the lighter classics.

This month they play a finely arranged fantasy of airs from "Carmen" on *Columbia FB 1430*, and judging by the great interest in opera to-day, this selection should find a ready appreciation.

Turner Layton's contributions for this month are "When Evening Comes" and "Lonely Street" on *Columbia FB 1457*, and "I'm a fool for loving you," coupled with "Au Revoir, but not Good-bye" on *Columbia FB 1458*.

King's Piano Favourites

THE two Viennese pianists, Rawicz and Landauer, who recently played before the King, present two of their own arrangements in the new Columbia issue. They are "Schubert Time" and "Waltz Memories from Vienna" on *Columbia FB 1431*.

Selmar Meyrowitz, the French conductor who was awarded "Hors Concours" for his Liszt "Faust Symphony" recording in the gramophone "Grand Prix," is a prominent figure in the Columbia list for this month. He has chosen Wagner's "Siegfried Idyll" for his work. The music is brief but fascinating, and is made up of four themes from the opera "Siegfried" and an extract from an old German cradle song. The "Siegfried Idyll" is on two Columbia 12-inch records—*DX 739-40*, in the 4s. series.

"Electric" Guitar-Organ Tone

THE Spanish "electric" guitar record, issued by Columbia a month or two ago, has proved a success as well as a novelty. It demonstrated, too, a triumph of British recording as over the American, which failed in its attempt to record this new instrument, and the reception accorded it has brought a sequel in the Hawaiian "electric" solos played by Len Fillis in this month's list. "Sweet Honolulu" and "Lover, Come back to me" are the titles which appear on *Columbia FB 1432*.

Another "Spot of Bother"

IN a variety broadcast last month Clapham and Dwyer perpetrated a "spot of bother" that had far-reaching results. It was their "Surrealist" alphabet and it raised such laughter that they were inundated with demands for records of it, so Columbia issue it this month, coupled with "A spot of Fishing" on *Columbia FB 1465*. The "Surrealist" concoction, with its A for horses, B for Mutton, C for Highlanders, etc., is well worth hearing.

Novelties in Variety

H EADING the 1s. 6d. variety records in the latest supplement are the Rocky Mountaineers, singing in their breezy style, "It Ain't Nobody's Biz'ness," "Oh Susannah," and "We'll Rest at the End of the Trail," on *Columbia FB 1433*. They are accompanied by the Bunk House Boys.

An all-marimba band is a rarity and this month appears Ring's Marimba Band in "Marimba Classico" and "Thanks for a Beautiful Day" on *Columbia FB 1436*.

On two pianos, Carroll Gibbons and John W. Green—staunch friends—play a clever fantasy entitled "Two Friends in Harmony." Gibbons thinks he can do better in Green's "Living in Dreams" than the composer himself. Green returns the compliment with Gibbons' "On the Air" and both artists therefore play their own versions with ingenious results. *Columbia FB 1437*.

Take Your Pick

W ITH his Boy Friends, Carroll Gibbons plays two tuneful hits from the film musical "The Great Ziegfeld." The titles are "You" and "You Never Looked so Beautiful" on *Columbia FB 1459*.

The organ finds a place in this list with Sidney Torch on the London Regal Cinema organ playing "The Organ Grinder" and "The Cuckoo in the Nest" with brilliant effects—*Columbia FB 1439*.

Debroy Somers and his band essay a couple of well-liked marches in "Sons of the Brave" and "El Abanico" on *Columbia FB 1440*, while Les Allen and his Canadian Bachelors sing "At the Close of a Long, Long Day" and "A melody from the Sky" on *Columbia FB 1456*.

Regal-Zonophone Releases

G RACIE FIELDS, the ever popular comedienne, records two very old favourites in her latest record. The titles are "I'm a Dreamer (Aren't we all)," and "If I had a Talking Picture of You"—*Regal-Zonophone MR 2134*.

George Formby contributes, in his usual style "The Pleasure Cruise" coupled with "Wash-house at the Back" on *Regal-Zonophone MR 1952*, whilst Leslie Sarony sings two typical Sarony numbers in "When the Territorials are on Parade" and "If Everyone did a Good Turn every Day" on *Regal-Zonophone MR 2147*.

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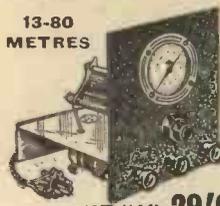
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Name Age

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Random Jottings

By JACE

B.B.C. Stands at Radiolympia

AS in past years, the B.B.C. will have two stands in the Main Hall during the National Radio Exhibition at Olympia, which opens next week. Apart from a comprehensive show of the Corporation's publications, there will be four special feature exhibits which should prove of interest to all listeners. The first of these will consist of a series of six revolving globes showing, by suitable colouring the areas served by the various Empire transmissions. Another exhibit of unusual interest to listeners of long standing will be the original dramatic control panel that was in use at Savoy Hill for very early drama productions. The primitive appear-

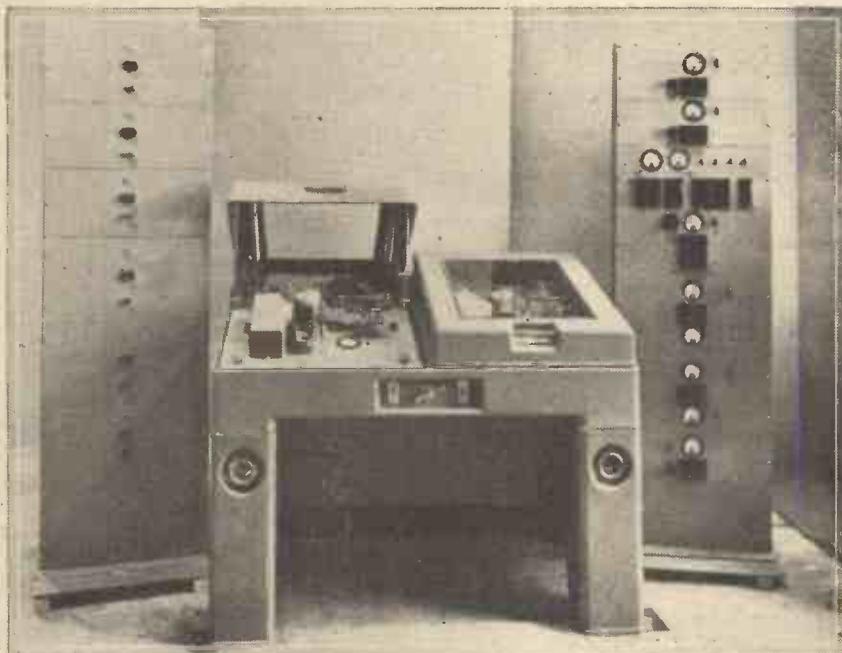
Leonard Henry, the Western Brothers, Nosmo King, and Les Allen and his Canadian Bachelors. Broadcasts will be on August 27th, 31st, and September 5th.

There will be in addition two broadcasts during the Children's Hour, on August 31st and September 1st. The well-known radio, personalities appearing on the former date will be Commander Stephen King-Hall, David Seth-Smith (the Zoo Man), Mabel Constanduros and John Rorke, Ronald Gourley, and, of course, "Mac" (Derek McCulloch). On September 1st the programme will consist of a "Toy Town" production, and music by the Gershom Parkington Quintet, in addition to Derek McCulloch.

Music-Hall

ERNEST LONGSTAFFE, ever on the look-out for typical radio talent, presents a strong cast of music-hall artists

A NEW SOUND RECORDER.



The new Philips-Miller recording outfit, which has now been installed at the B.B.C. Maida Vale studios. This apparatus was described in our issue dated 8th August.

ance of this gallant relic will be enhanced by its juxtaposition to a large photograph and explanatory diagram of one of the latest stream-lined dramatic control panels at present in use at Broadcasting House. There will be a large chart showing the astonishing growth each year of the number of licences issued from 1923 onwards. And finally visitors to the stands will see three large double-sided revolving discs; on each disc will be mounted photographs of B.B.C. studios, masts and microphones of various types, B.B.C. programme personalities—the men behind the broadcasts—and famous radio stars.

Radiolympia

IT is announced that there will be several broadcasts from the Theatre at Olympia during this year's Exhibition, and among the artists whom listeners may hear are Stainless Stephen, Navarre, Tollefsen, Clapham and Dwyer, the Carlyle Cousins,

for his programme on August 22nd. Two acts make their first appearance before the microphone on this occasion. The first is Ray Meux, who is at once a comedian and something of a mystery. He has, under different names, played leading rôles in plays by Sheridan, Shakespeare, and Molière, as well as by contemporary dramatists, and has written, produced, and starred in revue and cabaret. His real identity is known only to Mr. Longstaffe, who has lately been engaged in giving him much the same process of secret grooming for radio stardom as is undergone by newcomers of exceptional possibilities in Hollywood. The second act consists of Tom Katz and his Six Saxophonists. Well known on the music-hall stage in London and the Provinces, they present an attractive combination of personal dexterity and clever arranging.

1st Big Show Number—Next Week!

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).

Good Results with an H.F. Unit

SIR,—A few weeks ago you published details of an H.F. stage suitable for use with an S.W. set.

Immediately on publication I made up the unit, and used it in conjunction with a 0-v-Pen. S.W. battery set, with considerably improved results. You will recall the unit had two aerial connections, and after considerable experimenting I found I got the best results by using *both*. No. 1 aerial is 25ft. of 3/20 V.I.R. cable, 20ft. high at one end and inclined at 45 degrees, with approximately an east and west direction. No. 2 aerial is similar in size, but in a horizontal position approximately north and south. Both aeriels lead into the set through about 8ft. of twisted flex. The results from this arrangement are really remarkable, especially as the aeriels are screened by the high building, and the set is in the basement.—F. G. H. MACRAE (London, W.).

Proposed Amateur Sound Recording Society

SIR,—In discussing home recording with one or two fellow enthusiasts, it was suggested that there must be many more of us who would welcome the opportunity of joining our discussions and exchanging ideas and experiences.

The outcome of this "gathering together" was a proposal to form the first Amateur Sound Recording Society with the object of arranging visits to places of interest; of hearing each other's results and generally working together to improve the standard of results obtained from this fascinating hobby.

Interested readers are invited to write to me with a view to arranging a meeting to further the project.—JAS. F. BUTTERFIELD, 1, Manor Road, Beckenham, Kent.

Reports and Postage

SIR,—I have just read in the Correspondence section of your admirable paper a letter from E. Barr (Andover), containing a request from W8ANO, with regard to SWL's sending return postage with their reports.

Whilst on this subject, I have the converse complaint to make. In March last I sent reports to SM5SI and SM1SX, both of Stockholm, and also to SUICH of Cairo. Each report contained an International Reply Coupon, the one to Cairo being sent Air Mail to save time. Yet in each case my time and trouble (and money) has been wasted, since none of these gentlemen has deigned to reply.

It would seem that W8ANO has been the recipient of reports from SWL's who have also had this same experience.—GEO. MILLER (West Ealing).

SIR,—It is time the question of QSL cards was taken up by amateurs and explained to the general public.

Firstly, the side of the transmitter must be explained. Most of these amateurs are only too pleased to receive reports on their experiments and contacts, and here a word should be said with reference to the cost. Say a station puts out a test call, it is

possible for over a hundred people in different parts of the country, or even the world for that matter, to hear the test, and perhaps 75 per cent. of those who heard the test send in their reports. Can you imagine what the cost will be to reply to all these?

Most transmitters do their best to answer as many reports as they can, but there are a lot of reports left unanswered, because of the great amount of work and the expense it creates.

So much for the transmitter. Now comes the worst part of the QSL business, the S.W.L. or BRS stations. There are a great number of these who make it their hobby to collect QSL cards, and in many cases when they require a return in exchange for theirs they send stamped addressed envelopes for same, but to date I have received no less than thirty-seven cards from Australia and New Zealand, saying, here is my card, what about yours? These thirty-seven cards have arrived within the last four weeks, and at the rate they are increasing it is going to be difficult to deal with them in the future unless one employs a secretary to write out the replies. If they do not get a card in return some of them may take it the wrong way and think we amateurs are a stand-offish lot of fellows, but I think if this letter is published, and comments on the question asked for, it would help very much in clearing up the matter, and save a lot of time and money on all sides.—W. T. COOPER (Walthamstow).

Transmissions from W2XAD

SIR,—It may interest short-wave listeners to know that W2XAD recently increased its daily schedule of operation by one and three-quarter hours. This station now operates daily, including Sundays, from 4 p.m. to 9.45 p.m. G.M.T.

When I received a letter from Schenectady a short while ago I was told that W2XAD had a power of 18 kW, and W2XAF 27 kW. The maximum for which they are licensed is 25 kW for W2XAD and 40 kW for W2XAF.—S. JAMES (Croydon).

CUT THIS OUT EACH WEEK

Do you know

—THAT a number of cathode-ray tuning indicating devices will shortly be on the market for the use of the home-constructor.

—THAT the high-note response of a loud-speaker may be improved by stiffening the centre portion of the cone.

—THAT the response curve of an L.F. transformer may be modified or flattened by connecting a resistance across the secondary winding.

—THAT soft copper wire for connecting purposes may be stiffened by stretching until it "gives."

—THAT even very thin wire will remain rigid over a considerable length when stretched in the above manner.

—THAT ordinary rock salt buried round the earth plate will improve its efficiency.

—THAT all joints in the outdoor aerial system should be given a coat of paint or otherwise protected against corrosion.

A First Attempt

SIR,—I should like to thank you for the book which I have received in connection with Problem No. 201, and at the same time to convey my appreciation of PRACTICAL AND AMATEUR WIRELESS, which in its sphere is second to none.

However, I would like to see a larger short-wave section, and perhaps you could feature amateur DX in the "Leaves from a Short-wave Log" column. Through your short-wave section I became interested in reception on the high frequencies, and learnt enough to make a one-valver. Nothing very wonderful, I will admit, but I get fairly good results, considering it is my first attempt.

I have recently logged a list of stations on 20 metres, as follows:—

W1AIQ, W1BDS, W1IF, W1ZD, W1EBO, W1AAK, W1IDB, W1DMB, W2BFB, W2CMT, W2HFI, W3IR, W3EKU, W3CZW, W3ABJ, W3NK, W3FIH, W8IKE, W8IRK, W9TB, W9BBU, W9JLR, CO7HF, HI7G, VE2EE, VE2BG, and VE3HC.—C. WRIGHT (Leeds).

A Suggestion for B.L.D.L.C. Members

SIR,—I have been thinking over a new idea, and I wonder how many short-wave enthusiasts would care to help in this new venture? The suggestion is that a number of short-wave enthusiasts should send their reports of a certain long-distance station (over a certain period) to one short-wave amateur, who will sort out the data in the reports and forward the information from them to the station in question (if possible, the data to be sent in the shape of a graph), a copy of the results to be published in PRACTICAL AND AMATEUR WIRELESS. The question is, who will do this? I will undertake the job of sorting and forwarding the data if interested readers will kindly send me their reports. Here is the first attempt:—

All short-wave reports of W8XK, 19.72 m., 15,210 kc/s, for the month of July, 1936, will be welcomed at the address given below. Please give the following particulars: Type of Rx (receiver), antenna, signal strength in the R1-9 code, fading (QSB), interference (QRM), headphones or loudspeaker. The time in B.S.T. (twenty-four hour system), and last, but not least, the address (QRA). I hope this will prove successful, and, if so, we will continue with reports on other stations.—E. BARRS (4, King's Road, Enham, Andover, Hants.).

Reception of American Amateurs

SIR,—I recently received the following U.S.A. amateurs very clearly on the loud-speaker. W1CHG, CCZ, ESU, BTL; W2BED, DH, CBT, ELO, MJ, BSD, ATV, CT; W3BOP, SAY; W4FM (Jacksonville, Florida); W8BGF and W8ANO.

All stations were received between 23.00 and 00.00 on 20 metres, using an 0-v-1 transformer coupled to the pick-up terminals of a commercial 5-valve superhet. This arrangement provides plenty of volume, and is far more enjoyable than listening on 'phones.

W2BSD, usually so strong, was surpassed by 2DH and 4FM, which came in R9 at times; in fact, I had to turn the volume control on the mains set right down, to receive it at comfortable volume.—A. NEEDHAM (Grantham).

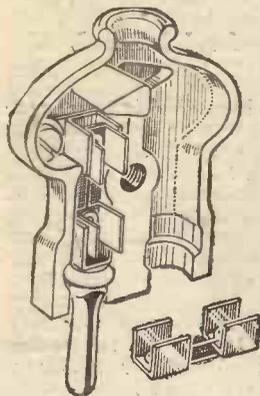
Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

New Midget Accumulators

IN our issue dated August 1st last we gave full details of the range of midget accumulators manufactured by the A.E.F. Manufacturing Company. This range has now been extended by the addition of three new types, known as CP5, WJ7, and BU7. The first is a 10AH type having a maximum discharge rate of 1 amp., and the price is 9s. The second is a 15AH type with a discharge rating of 1.5 amps. and costs 10s. 6d., whilst the third is of the 12AH type rated for a discharge of 1.25 amps. The price of this model is also 10s. 6d. A complete list of all types and prices may be obtained on application to the manufacturers at

17, Queensway, Ponders End, Middlesex.



This sectional drawing of the new Clix plug shows the method of construction.

New Clix Fuse Plug

THE development of connecting plugs already fitted with fuses is well exemplified in the new Clix plug which is illustrated on this page. As will be seen, in outward appearance this is very similar to the standard

5-amp. type of pin-plug, but internally small clips connect the pin with the leading-in cable. Between these two points a fuse is inserted and the fuses provided are of the clip-in type, fitting into the clips inserted in the plug, and they thus form the link between cable and connecting pin. The latter is of the well-known Clix non-collapsible type and a firm and noise-proof contact is obtained in the standard 5-amp. socket. The case of the plug is of brown moulded bakelite, and the two halves are held together by a single screw thus facilitating quick repairs in the event of the fuse blowing. The price is 1s. 8d., complete with two fuses.

Visual Tuning Indicator by Mullard

THE Mullard Wireless Service Company, Limited, will shortly be releasing a new visual tuning indicator which will be known as the TV.4. It operates on the electron beam principle and, possessing no appreciable inertia, its action is instantaneous.

The TV.4 consists of a small triode directly coupled to a cathode-ray device. When no signal is being received the illumination of the screen is confined to a green cross-shaped figure which spreads over the surface of the screen as a station is tuned in.

A compact size has been attained by fitting the tube with the Mullard side contact base. In this case the 8-contact type is used. The TV.4 is listed at 17s. 6d., but

the actual date of release has not yet been announced.

New Avometer

A NEW Avometer test instrument is shortly to be produced by the Automatic Coil Winder and Electrical Equipment Company, Ltd. This is a forty-six range model, embodying a protective cut-out and temperature-compensating device. The movement is of the moving-coil type, but it is stated that it will not supersede the thirty-six range Universal Avometer which is already on the market. No prices or other details are yet released.

A new signal generator is also announced and is of the continuous range type, covering from 3,000 to below 20 metres on fundamentals. It may be modulated, either internally or externally, or may be adjusted to give a pure radio-frequency signal. It is supplied complete with broadcast and short-wave dummy aerials, valves, and batteries, and the price is 15 guineas.

Aerialite Batteries

SOME new batteries are shortly to be introduced by Aerialite, Ltd., and the prices of existing models are being reduced. The new prices are as follows: 120 volt, 5s. 11d.; 108 volt, 5s. 1d.; 60 volt, 3s. Previously the prices were 6s. 6d., 5s. 9d., and 3s. 6d. respectively.

Percolite batteries are still on sale as before at 5s. 6d. for 120 volts and 2s. 10d. for 60 volts.

362 Valve Price Reductions

FIVE of the valves in the 362 mains range are to be reduced in price, and these are the ACME4a, ACME4b, ACME4, and ACSV4, the prices of which are now 10s. 6d. The ACSV4 is reduced to 12s. 6d. Full details of the 362 range of battery and mains valves may be obtained on application to the company at Stoneham Road, Upper Clapton, E.5.



The new "Voluphone" produced by Wharfedale Wireless Works.

Wharfedale Loudspeakers

THE Wharfedale Wireless Works are producing some new models for the forthcoming exhibition, including a "Standard" at 23s. 6d., a "Bronze" at 35s. and a "Golden" at 55s. The two former models are of the 8in. diaphragm type, and the "Golden" is a 10in. model. Six extension speakers are also announced at prices from 30s. to £7. All these models, with the exception of the cheapest one, have a "Truqual" volume control fitted. An interesting unit is the "Voluphone," which is a moving-coil unit for holding in the hand. It has been designed primarily for those listeners who are hard of hearing, and is supplied in a blue rexine case lined with velvet. The speech coil has a resistance of 2 ohms and a transformer will be supplied where desired at an additional cost of 7s. 6d. A volume control is fitted. A unit on similar lines, but modified for use as a microphone is also available at 25s.

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.

F. S. (Edmonton). There is, unfortunately, no blueprint of a unit of the type you desire, and the only issue in which the construction of such a device was described is now out of print. We regret that we are, therefore, unable to be of assistance to you in this particular case.

R. S. (Patna). When you adjust the long-wave tuning you are only modifying the intermediate-frequency of your superhet combination and this accounts for the effect mentioned by you.

R. O. S. (Tettenhall). We have not described a receiver of the type mentioned, and do not think the ordinary constructor would be prepared to go to the expense of building such a set.

F. J. G. (Gatterick Camp). A defective valve can give rise to the effect mentioned. The exact cause may be ascertained by including a milliammeter in each anode circuit in turn, when the fuse out will be accompanied, no doubt, by a drop in anode current in the appropriate stage, and the exact cause may then easily be located.

J. McM. (Darlington). Our 1s. Home Mechanic book, entitled "Accumulators—Charging, Maintenance, and Care," will, no doubt, prove of use to you. We do not know of any book dealing with the other subject mentioned.

E. G. W. (S.E.5). The Cossor 210 DET and 220 H.P.T. would prove suitable.

H. S. (Halifax). You appear to have tried all the normal tests and, therefore, the trouble may be outside the set, such as the microphonic response of some ornament in the room, or a loose screw in a component, or vibration of a layer or portion of a layer of wood in a plywood panel used in the cabinet.

J. N. (Doncaster). We have not reviewed the receiver in question, and can give you no details concerning it.

L. P. (W.6). We publish no handbooks on the subjects mentioned, and do not know of any on the English market.

F. G. (Horsham). It is not possible to give you the information, as the capacity depends upon the area of overlap and the spacing of the plates. Therefore, the size of the plates must be given and the space between them before the capacity can be calculated.

D. M. (Bellgrove). We are sorry that we cannot identify the transformer from the details given. A good radio dealer should be able to trace out the connections or test it, and give you the various voltage tappings.

M. C. (Birmingham). The Data Sheets may still be obtained, price 3s. 6d.

E. H. N. (Norwich). As the volume control affects the H.T. consumption, it will naturally have some effect upon the reaction control. But the details given by you point rather to H.F. instability, due either to interaction between the H.F. stage and the detector stage, or between inter-stage wiring.

W. A. C. (Leix). The apparatus shown is an ordinary S.W. adaptor, and therefore should have been used in place of the detector stage in the £4 Superhet 4. To connect before the aerial you require a S.W. converter, and this will give much better results. The adaptor shown by you could be modified to act as a converter, but we cannot give full instructions for doing this in this section of the paper.

W. T. (Homerton). We have no blue print of an amplifier of the type mentioned. Some A.C. amplifiers will be found at the end of our blueprint list.

E. P. A. (Sherborne). The frame aerial has the advantage of being directional. That is to say, it will prove more selective than the indoor aerial arrangement mentioned by you. The addition of an H.F. stage will increase the number of stations heard, but the addition of a further L.F. stage will give very little increase in the number of stations, although the volume of existing stations will be greatly increased.

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 West London Radio Society

THIS Society has now been in existence for nearly a year, and the progress made through the perseverance of its members has been remarkable in such a short space of time.

During the winter there were several lectures and demonstrations of sets given, but in the summer months, however, field and river days were found to be very popular. Regular meetings for talks and debates are held, and a committee meeting once a week. Following the success of the 5-metre river day held on Sunday, June 14th, the Society organised a similar outing on Sunday, July 19th. The success of this meeting was even greater than that of the previous one, the attendance being considerably increased. Interesting experiments were made throughout the day on the 5-metre band. Members of the Society were asked to invite their friends, many of whom came and thoroughly enjoyed their day on the river.

The Honorary Secretary would be very pleased to hear from anyone in the West area of London who is interested in any line of radio.—H. A. Williamson, 22, Cambourne Avenue, West Ealing, W.13.

DEVELOPING THE DETECTOR STAGE

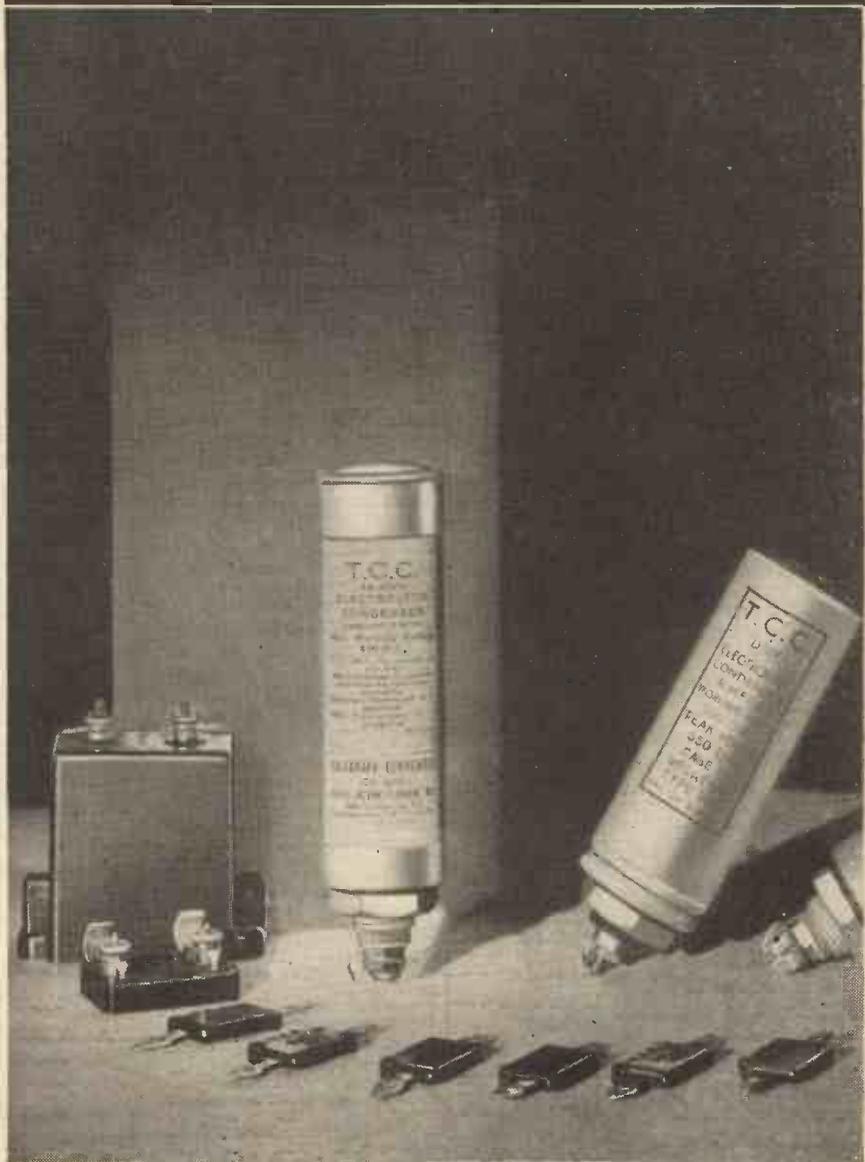
(Continued from page 580)

when no signal is being received, with an anode resistance of about five times the value of the valve resistance; most mains triodes having a resistance of about 8,000 ohms are suitable. To obtain distortionless rectification the input must then be regulated by means of the H.F. volume control so that the reduction in the detector anode current reading when a signal is being received is approximately $\frac{1}{2}$ amp. When these operating conditions prevail excellent reproduction can be obtained. Fig. 1 shows an H.F. pentode used as a leaky grid detector.

The Diode

The diode rectifier was superseded in the early days by the triode owing to the higher amplification obtainable from the latter, but when the quality of transmitted programmes improved and search was being made for a better form of rectification, it was found that the diode possessed advantages as compared with the triode. A diode will produce distortion when the input is too low, but it is practically impossible to overload it, and therefore it is very suitable for use in multi-valve receivers. Fig. 2 shows a triode used as a diode, and in Fig. 3 is shown a special mains operated diode. It will be noted that the two circuit arrangements are very much alike, and examination of Fig. 4 indicates the similarity between the circuit arrangement of the double-diode-triode, and the diode used in conjunction with a separate triode L.F. valve. In valve booklets and receiver designs the double-diode-triode circuit arrangement looks very complicated, and therefore the components in Fig. 4 have been so arranged to clarify what is actually a straight-forward two-valve circuit.

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Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (trans.))		PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Power)		PW35
Summit Three (HF Pen, D, Pen)	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow.)		PW41
Hall-Mark Cadet (D, LF Pen (R.C.))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (trans.))	June '35	PM2
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.))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)		PW64
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)		PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
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)		PW40
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (pen), Pen)		PW18
A.C.-D.C. Two (SG, Power)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.)		PW19
Three-valve : Blueprints, 1s. each.		
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)		PW29
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
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	PW50
"All Wave" A.C. Three (D, 2LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.3.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)		PW20
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)		PW45
Universal Hall-Mark (HF, Pen, D, Push-pull)	9.2.35	PW47
SUPERNETS.		
Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three valve)		PW40
F. J. Camm's 2-valve Superhet (two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet		PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (three-valve)		PW43
D.C. £5 Superhet (three-valve)	1.12.34	PW42
Universal £5 Superhet (three valve)		PW44
F. J. Camm's A.C. £4 Superhet 4		PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60
SHORT-WAVE SETS.		
Two-valve : Blueprints, 1s. each.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Power)		PW30A
The Prefect 3 (D, 2 LF, RC and Trans.)	8.2.36	PW63

PORTABLES.

Three-valve : Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
Four-valve : Blueprints, 1s. each.		
Featherweight Portable Four (SG, D, LF, Cl. B)		PW12

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)		PW48A
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AMATEUR WIRELESS AND WIRELESS MAGAZINE

CRYSTAL SETS.		
Blueprints, 6d. each.		
Four-station Crystal Set		AW427
1934 Crystal Set		AW444
150-mille Crystal Set		AW450

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
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)		AW392
B.B.C. National Two with Lucerne Coil (D, Trans.)		AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)		AW388A
Lucerne Minor (D, Pen)		AW426
A Modern Two-Valver	July '36	WM409

Three-valve : Blueprints, 1s. each.

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)		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)		AW419
Lucerne Ranger (SG, D, Trans)		AW422
Cossor Melody Maker with Lucerne Coils		AW423
P. W. H. Mascot with Lucerne Coils (D, RC, Trans)		AW377A
Mullard Master Three with Lucerne Coils		AW424
£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)	3.11.34	AW451
Transportable Three (SG, D, Pen)		WM271
£6 6s. Radiogram (D, RC, Trans)		WM318
Simple tune Three (SG, D, Pen)	June '33	WM327
Economy-pentode Three (SG, D, Pen)	Oct. '33	WM337
"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)		WM371
P.T.P. Three (Pen, D, Pen)	June '35	WM389
Certainty Three (SG, D, Pen)	Sept. '35	WM393
Minutube Three (SG, D, Trans)	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM400

Four-valve : Blueprints, 1s. 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 (2HF, D, QP21)	18.8.34	AW445
(Pentode and Class-B Outputs for above : blueprints 6d. each)	25.8.34	AW445A
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, 2LF)	Feb. '35	WM381
The H.K. Four	Mar. '35	WM384
The Auto-Straight Four	April '36	WM404
The Request All-Waver	June '36	WM407

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)		WM379

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 1/3d., 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.

Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.0.33	AW403
Economy A.C. Two (D, Trans) A.C.		WM286
Unicorn A.C./D.C. Two (D, Pen)	Sept. '35	WM394

Three-valve : Blueprints, 1s. each.		
Home-lover's New All-electric		
Three (SG, D, Trans) A.C.		AW333
S.G. Three (SG, D, Pen) A.C.		AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW430
Mantovani A.C. Three (HF Pen, D, Pen) A.C.		WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401

Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	July '33	WM329
Harris Jubilee Radiogram	May '35	WM380

SUPERNETS.

Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior		WM375
Varsity Four	Oct. '35	WM395
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	10.3.34	AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super A.C.		WM366
1935 A.C. Stenode	Apl. '35	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
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
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 converter (Price 6d.)		AW329
S.W. One-valve for America		AW429
Roma Short-waver		AW452

Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	Feb. '36	WM402
Home-made Coil Two (D, Pen)		AW440

Three-valve : Blueprints, 1s. each.		
World-range Short-wave 3 (D, RC, Trans)		AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW433
Experimenter's Short-waver	Jan. 19, '35	AW463
The Carrier Short-waver	July '35	WM390

Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (HF, Pen, D, RC, Trans)		AW436
Empire Short-waver (SG, D, RC, Trans)		WM313
Standard Four-valve Short-waver	Mar. '35	WM338

Superhet : Blueprint, 1s. 6d.

Simplified Short-wave Super	Nov. '35	WM397
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Mains Operated.

Two-valve : Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.		
"W.M." Band-spread Shortwaver (D, Pen) A.C./D.C.	Aug. '34	WM368
"W.M." Long-wave Converter		WM380

Three-valve : Blueprint, 1s.

Emigrator (SG, D, Pen) A.C.		WM352
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Four-valve : Blueprint, 1s. 6d.

Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391
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MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6)		
Listener's 5-watt A.C. Amplifier (1/6)		
Radio Unit (2v.) for WM392 (1s.)	Sept. '35	WM392
Harris Electrogram (battery amplifier)	Nov. '35	WM393
De-Luxe Concert A.C. Electrogram	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram	Mar. '36	WM403
New style Short-wave Adapter (1s.)	June '35	WM388
Trickle Charger (6d.)	Jan. 5, '35	AW462
Short-wave Adapter	Dec. 1, '34	AW456
Superhet Converter	Dec. 1, '34	AW457
B.L.D. L.C. Short-Wave Converter (1s.)	May '36	WM405
Wilson Tone Master (1s.)	June '36	WM406
The W.M. A.C. Short-Wave Converter (1s.)	July '36	WM408



QUERIES and ENQUIRIES

Automatic Bias and the Monitor

"I wish to add automatic grid bias to the Monitor first stage, and want to know if this is advisable. Also could you tell me what type of mains transformer and valve rectifier are required for making an A.C. eliminator for the Monitor?"—G. B. (Leytonstone, E.11).

To include automatic bias the H.T. negative lead (lead No. 39) should be removed from the E terminal on the L.F. transformer. From this latter point one side of a 700 ohms resistance should be connected, and the H.T. lead should then be attached to the other end of the resistance. A by-pass condenser (2 mfd.) should then be joined across the resistance. For the mains unit we would suggest a Heayberd Type W20 transformer in conjunction with an H.T.5 Westinghouse rectifier.

Modifying a Meter

"I have a good voltmeter which reads from 0 to 150 volts. How can I convert it so that it will read up to 5 volts? Also, as each degree on the scale means a rise of 6 volts, what will each degree mean when the meter has been converted?"—J. B. (Edington, Nr. Bridgwater).

THE meter is wound to a certain resistance, and when a voltage of 150 is applied to the meter the resultant current flowing through the windings just turns the coil sufficient to carry the pointer to the end of the scale. Consequently, when applying only 5 volts, the current will be too small to deflect the needle to the end of the scale or to give reasonable deflection. If, therefore, you wish the needle to give a full scale deflection at only 5 volts, you must increase the current flowing through it at that voltage, and this can only be done by modifying the internal construction, and we do not advise this. A meter may easily be modified to give a higher reading by the use of external resistances, but it cannot be modified to give a reduced reading without getting to the inside of the meter, and this procedure is not advisable unless you are fully aware of the changes you make.

Band-spread Tuning

"I am making a three-valve short-wave set with band-spread tuning and enclose my layout herewith. I have only one short-wave condenser at the moment, and should like your recommendation regarding the extra band-spread condenser. I have not yet bought this component and am not very particular regarding price. Can you suggest any other improvements to the set?"—V. C. O. (Barking).

WHILST an ordinary condenser could be used for the purpose you would find tuning slightly complicated owing to the various combinations of the two condensers which can be obtained. A well-calibrated dial firmly locked to the spindle will avoid this, but as you have not obtained the component yet we suggest that you consider the special band-spread tuning

outfit supplied by Messrs. Stratton and Co. This consists of a .00015 mfd. condenser with a dividing plate divided into ten sections.

These are located by means of a spring-loaded ball and a dial is provided with the condenser and is marked from 0 to 10. A small capacity trimmer is provided with a 9 to 1 reduction drive dial, and this combination greatly simplifies tuning as various settings are easily re-found due to the two dials and the relative capacities of the two components. The price is 12s. 6d. the pair, 6s. for the tank condenser, and 6s. 6d. for the bandspread condenser.

RULES

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.

If a postal reply is desired, a stamped-addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

Eureka Resistance Wire

"I have a bobbin of Eureka resistance wire handy, but the only data which I can now find is the diameter which is .006. I want to wind some resistances for experimental work and should be glad if you could give me any details concerning the resistance of this particular gauge of wire and any other useful data."—G. B. (Bristol).

THE wire would be 38 S.W.G., having a resistance of 23.8 ohms per yard. The length per ohm of this particular gauge is 1.5 inches, which is a very convenient length for winding various types of resistance, and it will, of course, wind 118 turns to the inch approximately if it is double silk covered.

Mixer-fader Control Box

"I am building the public-address adjunct described in your issue dated July 25th, but I am only going to use two input circuits for the moment. These will be pick-up and microphone. Later on I may add a second pick-up input, but then the same difficulty as I now experience will arise. I want to set both mike and pick-up to a zero position so that neither will be heard, or so that an

equal volume will be obtained from each. It will be difficult to juggle with each potentiometer to get the necessary balance, and I wondered whether any fixed resistor could be brought into parallel by means of a switch to do the trick. What should the value be, if this idea will work?"—B. L. S. (Dover).

IF you are only going to employ a double input circuit, the simplest idea is to dispense with the two separate potentiometers mentioned in the text and to use in their place one of the Dubilier Fadover controls. This consists of two equal elements and a central position is indicated by a locating stud which may easily be felt when the control is operated. One half of the control would then be joined across the pick-up and the other half across the mike, providing a smooth change from one to the other, with the "off" position at the centre. Additional circuits could be similarly wired.

Quenching Coils

"I am trying out some short-wave circuits and should like to try the one-valve super-regenerative arrangement shown in your Short Wave Section for July 4th. All values which matter are given on this diagram, but no details of the quenching coils are shown. Could you give me this information, please?"—S. M. (Newcastle).

THE simplest way of making up the coils is to obtain three 2in. diameter discs of ebonite and mount these on a short length of studding or a long bolt (brass, not iron). They should be separated by two 1 in. diameter discs one-eighth of an inch thick. The two bobbins thus provided should then be wound with 36 S.W.G. enamelled wire, 500 to 600 turns being employed. The frequency of the quenching oscillation may be adjusted by means of the parallel condensers. Alternatively, you can obtain a ready-made quenching coil unit, although these components do not seem to be readily obtainable to-day.

Metallised Valves and Chassis

"I have been trying to metallise my valves and the chassis, and although fair results have been obtained with tinfoil shellacked in position, it is not perfect. Can you tell me how to carry out the process satisfactorily at home? I do not want to use a sheet of foil over the baseboard as I find that this tears and interrupts the continuity."—F. T. (Edgware).

THERE is no satisfactory way of carrying out the process of metallising valves or other components at home. A chassis may be covered with aluminium or copper foil, or even a thin sheet of metal with satisfactory results, but a valve cannot be so covered. Foil provides a partial degree of screening, but when using shellac or similar material for sticking this may run between adjacent layers or in the joints and insulate them, thus breaking the continuity. The process used on valves and the chassis specified for our receivers is intricate, and the material used is zinc. This is melted in a crucible, and a Bunsen type flame keeps the metal molten whilst it is sprayed upon the component by means of compressed air at a pressure of 60-75 pounds per square inch. This air is pre-heated and the metal is atomised, the resulting layer generally being about four thousandths of an inch thick.

The coupon on cover iii must be attached to every query.

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," 8, Southampton Street, Strand, London.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, or Secondhand, etc.

RADIOMART (G5NI) SHORT-WAVE SPECIALISTS

Everything a constructor requires. Lowest prices. No junk. Catalogue 1/4d. shows thousands of bargains. During summer, few only shown below.

RADIOMART. Utility 2-gang uniknob and dial, 3/11, 1,500 vt. Tubular condensers, 6d.; Helsby electrolytics 8 mf. 500, 2/11, 4 x 4 mf. 1/6, 25 mf., 25 v., 1/-, etc.

RADIOMART. Smoothing chokes, 20 by 120 ma., 3/11; 100 ma., 2/11; 40 ma., 1/11. Telsen Ace transformers, 1/11. Radiograns, RG48, 2/9. BTH speaker, 2/11.

RADIOMART. Varley iron-cored, 10/6. Bifocal dual-range coils. Very selective, 2/11; matched pair, 5/3.

RADIOMART. Pushback wire 6 yds. 6d., heavy 9d.; 2 gross solder tags, 6d. Resincoated solder, 6d.

RADIOMART. Centralab pots, all sizes, 1/6; switched, 2/-. Tubular glass fuses, 2d.

RADIOMART. Igranic midjet jacks, 3d. Milliammeters, 25 ma. upwards, 5/9; super 6/9.

RADIOMART. Telsen H.F. chokes, 1/11; screened 1/11. Utility 1936 SL wavelength dials, 3/11.

RADIOMART. Lissen 3-gang superhet kit coils, two I.F.'s ganged condenser, ditto Bandpass, ditto 2-gang all wave, 10/- kit.

RADIOMART. Traders' monster bargain parcels, value 4/10/0 for 10/-; also 5/- parcels.

RADIOMART. Famous continental A.C. valves, 4/6. American Durtron, etc. All types, 3/6. Battery from 2/3.

RADIOMART. Utility 3/6, microdial dials, 3/11. Radiophone .00016 short-wave condensers, 3/6. Series gap twin, 3/9.

RADIOMART. Ceramic all brass microvariables, 15 mmfd., 1/4. 40 mmfd., 1/7. 100 mmfd., 1/10. Short-wave H.F.C., 9d.

RADIOMART. Orders 5/- post free. Get our bargain catalogues. General, 1/4d. Short-wave, 1/4d. 44, Holloway Road, Birmingham. Tel.: MID 3254.

ALL goods previously advertised are standard lines, still available. Post card for list free.

Vauxhall Utilities, 163a, Strand, W.C.2. Over Denny's the Booksellers. Temple Bar 9338.

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, improved type, 120 watts output, at £2/10/0. Send for our comprehensive list of speakers, Resistances and other components.

WARD, 40, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

TRANSCEIVERS 1, 2 and 3 Valve Battery Models £3, 25 2s. 6d., £6 7s. 6d. AC Mains, 4 Valve, £9., 300 mile range, complete with valves and cabinets. Write for illustrated leaflet.

2 1/2 565 Meter 5 band, 5 valve communications receiver.

AC/DC. MC Speaker, Bandsread, etc., £9 17s. 6d.

ALL goods guaranteed satisfaction or money refunded.—Radiographic Ltd., 66, Osborne Street, Glasgow, C.1.

ALCO ELIMINATORS AND CHARGERS. 4 H.T. taps, 120/150v., 20/30 m.a., 18/-, with charger, 25/-; charger alone, 7/6; 1/2 amp., 11/- Year's guarantee, details free.—P. and D. Radio Service, 1, Gooding Road, N.7.

BANKRUPT Bargains. List free. G.E.C. battery compact, 3v. with valves and M.C., 42/6. Alba 3v. H.F. pentode sets with BVA valves, M.C., and batteries, 87/6. Ekco 15 gn. car radios, 12v., £7/10/0. Corsor D.C. 3v. M.C. BVA valves, 77/6. Ultra 13 gn. 1936 D.C. superhet, 7 gn. Also Pilot and Ferguson allwave. Many other receivers and large stock replacement valves and components. All new goods.—Butlin, 6, Stanford Avenue, Brighton.

MISCELLANEOUS

TELEVISION.—Newnes Television and Short-wave Handbook, by F. J. Camm, deals authoritatively with Scanning Systems (Drums, Mirror Screws, Discs, etc.), Neon Lamps, The Cathode-Ray Oscillograph, How to Build Short-wave and Ultra-short-wave Receivers. Fully illustrated. 3s. 6d. net. From your bookseller.—George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

PREMIER SUPPLY STORES

ALL POST ORDERS should be addressed to—**JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5.**

'Phone Amherst 4723 (Private Branch Exchange) Callers, as usual, to 20-22, HIGH ST., CLAPHAM, S.W.4. (Macaulay 2381)

and 165 and 165A, Fleet St., E.C.4 (next to Andertons Hotel). (Central 2833.)

NOW READY! Send 4d. in stamps for **NEW ILLUSTRATED GIANT CATALOGUE AND VALVE LIST.**

SHORT WAVES.

SHORT-WAVE COILS 4 to 6-pin types. 13-26, 22-47, 41-94, 78-170 metres, 1/9 each with circuit. Special set of 3 S.W. Coils, 14-150 metres, 4/-, with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/-.

COIL FORMERS, in finest plastic materials, 1 1/2 in. low-loss ribbed 4- or 6-pin, 1/- each.

CONDENSERS, super ceramic S.L.F. .00016, .0001, 2/9 each; double-spaced .00015, .00025, .00035, 3/- each. All brass with integral slow-motion .00015 tuning, 3/9; .00015 reaction, 2/9.

SHORT-WAVE KIT for 1 valve receiver or adaptor, complete with chassis, 3 coils 14-150 metres, condensers, circuit diagram and all parts, 12/6. **VALVE GIVEN FREE.**

2-VALVE S.W. KIT, complete with valves, 19/6.

3-VALVE S.W. KIT, S.G. Det. and Pen., complete with valves, 40/-.

BAND PASS KIT, 14/6 the lot. Lissen 3-gang coil unit. Utility 3-gang condenser and disc driver, 4 valve-holders, chassis and wiring diagram.

SPEAKERS, K.B. 8" P.M.s. 9/6, Goodman 7" P.M.s. 9/6.

MAINS TRANSFORMERS. Premier wire-end M type with screened primaries.

H.T. 8 & 9 or H.T.10 with 4v. 4a. C.T. and 4v. 1a. C.T., 8/6.

250-250v. 60 ma., 4v. 1a., 4v. 2a. and 4v. 4a., all C.T., 8/6.

350-350v. 120 ma., 4v. 1a., 4v. 2a. and 4v. 4a., all C.T., 10/6.

500-500v. 150 ma., 4v. 2-3a., 4v. 2-3a., 4v. 2-3a., 4v. 3-4a., all C.T., 19/6.

Any of these transformers with engraved panel and N.P. terminals, 1/9 extra.

AUTO TRANSFORMERS, step up or down, 60 watts, 7/6, 100 watts, 10/-.

MAINS VALVES, famous Europa 4v. A.C. types, 4/6 each. H.L., L., S.G., Var-Mu-S.G., H.F. Pens., Var.-Mu.-H.F. Pens., 1, 3, and 4-watt A.C. directly-heated output Pentodes.

Full-wave rectifiers, 250 v. 60 ma. A.C./D.C. types, 20-volt, 18 amp. S.G., Var.-Mu.-S.G., H., H.L., and Power.

Following Types all 5/6 each. Full-wave rectifiers 350v. 120 ma. and 500 v. 120 ma. 2 1/2 watt indirectly-heated Pentodes. Frequency Changers. Octodes and Heptodes.

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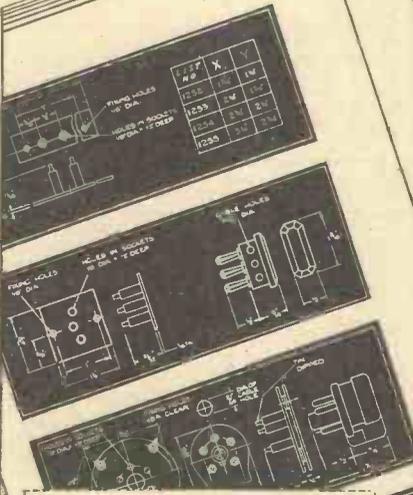
Table listing advertisements and their page numbers: Automatic Coil Winder (579), Belling & Lee, Ltd. (Inside Back Cover), British Institute of Engineering Technology (589), Electradix Radios (Inside Back Cover), Exide (Back Cover), International Correspondence Schools (590), London Radio Supply Co. (589), Peto-Scott Co., Ltd. (589), Premier Supply Stores (596), Telegraph Condenser Co., Ltd. (593), Varley, Ltd. (Inside Back Cover), Westinghouse Brake & Signal Co., Ltd. (579).

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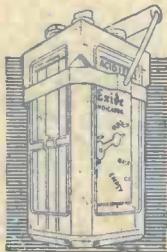
0.7% with L.T. consumption under 0.3 amperes
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It will be seen that over 90% consume 0.4 amperes or more. It shows that modern battery sets consume more L.T. current. This is owing to the use of more valves and of illuminated dials. That fact is highly important. It means that the popular thick-plate type of battery, while being excellent for small sets, is not suitable for the majority of modern sets.

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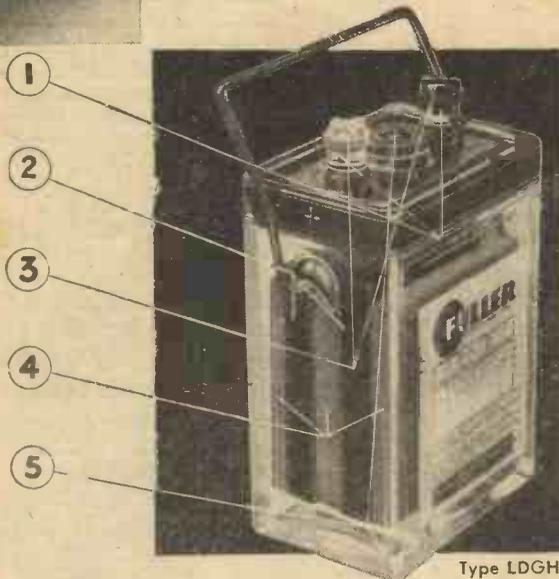
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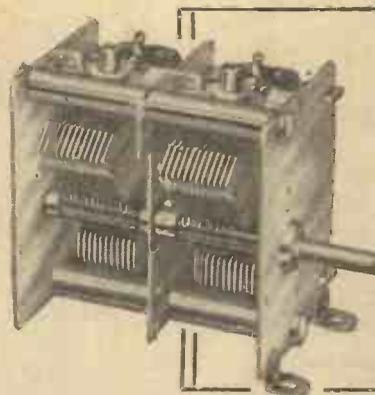
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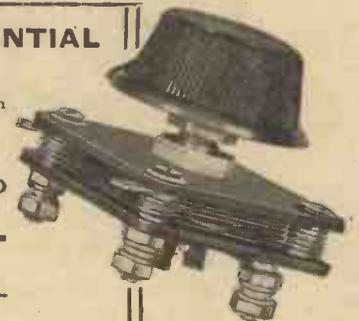
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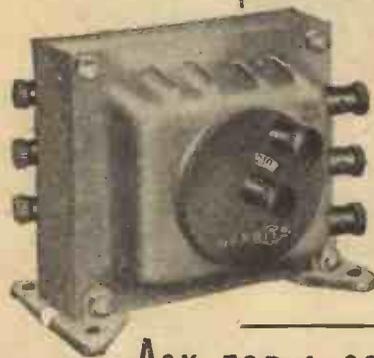
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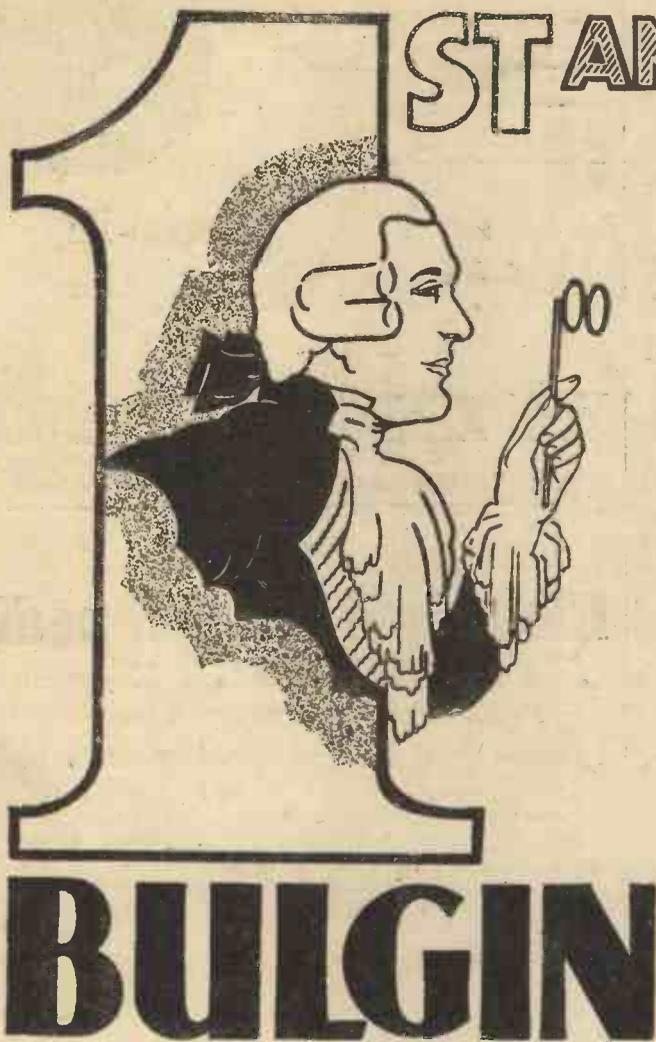
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NEXT WEEK: STAND-TO-STAND REPORT

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. VIII. No. 206. August 29th, 1936.

India's Five-Year Plan

ACCORDING to a recent announcement India has decided on a Five-Year Plan involving a number of low-power stations which are to be erected in a number of towns in the country. Short-wave transmitters are to be installed at Delhi, and one in Madras, and the present scheme also provides for nine medium-wave stations to be located in various parts of India. The Controller of broadcasting, who was recently on tour through the rural parts of the country, has informed the Government the nature of the material for broadcasting in rural areas and the suitable hours of transmission. The director is of opinion that the villager likes his own music, his own dialect and plenty of dialogues. Rural service, therefore, will be arranged on a "five-minute" basis with music and occasional dialogues and talks. Village musicians and story-tellers will be engaged for the purpose.

Micro-wave Transmitter at Bolzano

THE recently opened Italian station at Bolzano, which works on 20 kW, is connected not only by cable but also has a micro-wave transmitter to ensure a good relay in the event of interference or other technical troubles which may cause a breakdown in the link with its studios in the city.

New Mexican Stations

ACCORDING to a recent report the end of the present year will witness the beginning of the wireless expansion scheme in Mexico. Besides the construction of twelve new transmitters for the transmission of programmes to the neighbouring states,

Bologna as a Key Station

THE 50-kilowatt Bologna (Italy) transmitter has now adopted definitely the wavelength 245.5 m. (1,222 kc/s), which is the channel hitherto used by Trieste. It will act as the key-station of the North Italian network, and broadcast the Milan, Trieste, Turin, and Florence programmes. Occasionally it will also transmit the Rome radio entertainments.

ROUND the WORLD of WIRELESS

it is proposed to add three short-wave stations to the strong Mexican network.

Another Stratosphere Height Record

A REPORT issued by the U.S.S.R. Aerological Institute at Slutsk, near Leningrad, states that a specially constructed gas balloon fully equipped with radio apparatus was recently released in Francis Joseph Land and attained the record height of 36,000 metres (118,800 feet).

Tests on 75 centimetres

IT is reported that at a recent radio exhibition at Geneva demonstrations were given of transmitters working on 75 centimetres, and using a little over half a watt input. Signals were clearly received at a distance of ten miles. Power was obtained from a car battery, the voltage being stepped up by means of a vibrator and transformer in the usual manner.

25 W.B. Speakers as Prizes.

Elsewhere in this issue appear details of an interesting competition, free for all to enter, in which 25 W.B. Speakers are awarded as prizes. The competition is of such a nature that every reader stands an equal chance of winning one of the splendid 1937 Stentorian Speakers. Read the details now, and make up your mind that one of those speakers is going to be yours. The Editor of this journal will act as judge in conjunction with the W.B. Engineers, and the result of the competition will be published shortly after the closing date.

Sunday Evening Concert from Torquay

IN the National programme on August 30th the Torquay Municipal Orchestra, conducted by Ernest W. Goss, will give a concert from The Pavilion, Torquay, when Harold Williams (baritone) will be the vocalist.

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THE PICK of the PROGRAMMES

"From the Esplanade"

THE fourth programme in the series entitled, "From the Esplanade," will be broadcast from the Western Regional on August 31st, when the Band of His Majesty's Royal Air Force College (Cranwell, Lincs.) (by kind permission of Air Vice-Marshal H. M. Cave-Browne-Cave, C.B., D.S.O., and Officers), conducted by A. E. Sims, will play from the Bandstand, Paignton. The Band, which was formed in 1920, is one of the two official Bands of the Royal Air Force, and A. E. Sims has been the conductor since 1932.

Marches and Waltzes

THE exhilaration of the Military March and the lilt of the waltz have as wide and as irresistible an appeal as any other kind of music. The programmes of marches and waltzes which have been broadcast in the past have invariably evoked public appreciation, and there will be many listeners who will welcome another of these programmes which is to be broadcast on September 5th by the B.B.C. Northern Ireland Orchestra, conducted by Philip Whiteway. The programme is to include such popular marches as "The Spirit of Pageantry," "Marche Pompeuse," and the Highland Patrol, "The Wee MacGregor"; the waltzes in the programme include Johann Strauss's "Stories of the Vienna Forest" and Eric Coates' "At the Dance" from the suite "Summer Days."

Concert from Torquay

THE Torquay Municipal Orchestra, conducted by Ernest W. Goss, will be heard in a concert from The Pavilion, Torquay, on September 1st, when the solo artists will be Frederick Harvey (baritone) and Audrey Piggott (violin cello).

"Collecting the Mail"

THIS is the title of the third actuality programme in the series "In Passing," which will be broadcast from Bangor on August 31st. Twice a day, the Irish Mail, running from Holyhead to London, picks up the mail bags at various points en route. Outside certain stations, special gadgets have been constructed so that the mail can be picked up as the train rushes along. There are also receptacles for receiving the mail bags which are dropped from the train. Most people in North Wales know that this happens day after day, but very few know how it is done. The train passes through Bangor at about 12.40 in the day time and about the same time in the early morning. These times make it impossible to broadcast the incidents as they take place, so that a special recording will be taken for the benefit of listeners, a day or so earlier. Post Office officials will be interviewed during the actual recording of the incidents.

The Bounty Mutineers

OWEN RUTTER (who recently published a book on the subject) and Cyril Nash have collaborated to produce a

MAKE THESE DATES WITH YOUR RADIO

radio play about the Mutiny on the *Bounty*. A recent film treated this theme somewhat

TELEVISIONING THE OLYMPIC GAMES



A television camera transmitting one of the events during the Olympic Games in Berlin.

imaginatively, but the play is based on material collected from authentic sources such as Admiralty records, Bligh's log and the contemporary journal of James Morrison. In 1787 there was a mutiny on board H.M.S. *Bounty* soon after she had left England. The captain, Bligh, and eighteen of the crew were set adrift, and after undergoing almost incredible perils and hardships eventually landed in England. The mutineers, led by John Adams, settled on Pitcairn Island in the Pacific and mingled with the natives to form a civilised community. Their descendants later settled in Norfolk Island. This romantic story, which should make a highly dramatic radio play, will be heard by Regional listeners on September 2nd.

Students' Songs

SEVERAL broadcasts have shown that Harold Casey (baritone) and the B.B.C. Midland Singers, with Victor Hely-Hutchinson at the piano, make a strong team. They have been heard in Songs of the Sea, Marching Songs, Soldiers' Songs and Students' Songs, and will be heard again on September 3rd.

Musical Comedy from Midland Regional

ON August 31st Reginald Burston will conduct the Revue Orchestra—the B.B.C. Midland Orchestra being on holiday this week—in a programme of numbers drawn from musical comedies. The Revue Orchestra consists of sixteen players, and the leader is Norris Stanley. The vocalist for this programme will be Marjorie Westbury (soprano).

"Snappy" and "Happy"

A PROGRAMME which should prove unusually entertaining has been devised and written by Michael Carr, of "Red Sails in the Sunset" fame, and Harry Saville. Its full title is "Snappy" and "Happy" take a Stroll through Tin Pan Alley." There is no real story running through it. "Snappy" and "Happy" are two song writers trying to get a song published. They meet various other writers, and wisecracks are exchanged, leading to the introduction of the latest numbers by these writers. Some of the numbers will be played by Harry Saville and his Band, while others will be played by the composers themselves. Other song writers who will take part include Jimmy Kennedy, Tolchard Evans, Harry Leon, Box and Cox, Ralph Butler, Tommy Connor, Hamilton Kennedy, Stanley Damerell, Leo Towers, Paddy Roberts, Eddie Lisbona and Rodd Arden. The production will be by A. W. Hanson. It is interesting to note that Harry Saville, who has assisted in writing and devising this programme, is not related in any way to the Harry Saville whose band will provide the music. This broadcast will be given in the National programme on August 28th.

SOLVE THIS!

PROBLEM No. 206.

The voltage output from the mains unit of Brandon's receiver was 300 volts instead of 250 volts. The normal H.T. current consumption of the receiver valves and their associated potentiometers was 50 m.a. What value in ohms should the required dropping resistance have, and what should be its wattage rating? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Envelopes must be marked Problem No. 206 in the left-hand corner, and must be posted to reach this office not later than the first post Monday, August 31st, 1936.

Solution to Problem No. 205.

The centre tap could have been provided by means of a centre-tapped resistance of 30 to 50 ohms connected across the two ends of the L.T. winding.

The following three readers successfully solved Problem No. 204, and books are accordingly being forwarded to them: W. Wassell, Edge View, The Compa, Kilver, Nr. Stourbridge; A. G. Arthurs, 1, Emlyn Gardens, May Hill, Swansea; J. Robertson, Auckergill, Wick, Caithness.

To Our Readers— And the Trade

Gentlemen,

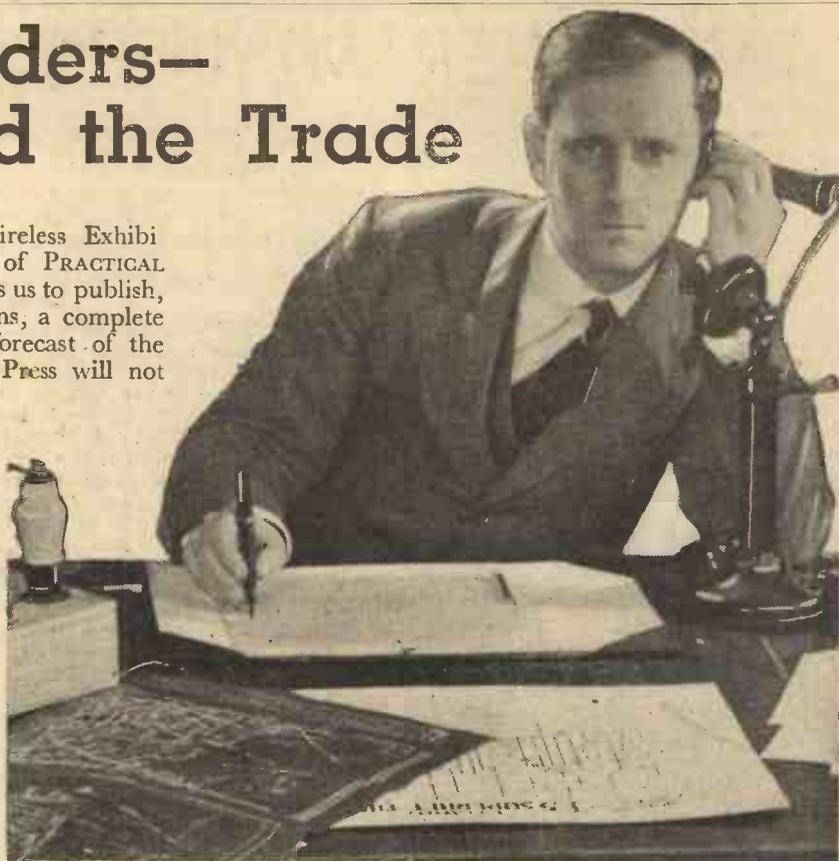
IT is fortunate that the opening of the Wireless Exhibition coincides with the publishing day of PRACTICAL AND AMATEUR WIRELESS because it enables us to publish, hours before the Exhibition actually opens, a complete guide to the Show and an illustrated forecast of the exhibits on each stand. The technical Press will not indulge in the panegyrics of the daily Press, which can always be relied upon to make startling news out of the most meagre material. On this occasion, however, we can excuse them if they indulge in their usual flights of fancy and make their usual mistakes in dealing with a scientific exhibition. Whatever they have to say about our Show will be an appreciated relief from their usual caterwaul about politics and the European situation, for which each of them has its own panacea.

We know that the Press will be unanimous in their praise of this Exhibition; they will all tell you that the attendance figures are up, that orders have beaten all previous records, and that the receivers are better than ever before. I am, however, addressing those who know how much reliance can be placed upon these effusions, and it would be idle for me to adopt those methods. You will not mind, therefore, if during this Exhibition period when hopes run high I bring you back to earth, and discuss the Exhibition, and the prospects for the ensuing year in the cold light of things present, basing my remarks about the prospects of the future on the experience of the past.

I tell you that the public will be bitterly disappointed with the very poor show of television receivers at the Exhibition, and that home constructors will not fail to notice that there will be very little, if indeed anything, on show which specifically caters for them, from the television point of view.

It is as well that I should tell my readers that trade interests have consistently opposed the commencement of the television programme, and that the programmes could have commenced more than a year ago had the trade wished them to do so. I may tell my readers, and you cannot deny it, that you do not wish the home constructor to build television receivers, and it is indeed unfortunate for you that in spite of your blockade they will be enabled to do so because of the many new firms who will spring up to cater for their needs, and because of the co-operation of such firms in the component industry who are not tied by the fact that they cater for both markets. For two years you have succeeded in stifling television, and this year you have accorded but a tardy welcome to the new science and the new industry which it will support. I am aware that the patent situation is by no means a simple one, but the Television Committee anticipated this by making provision for compulsory arbitration in cases where inventors and owners of patents sought to extract unconscionable rewards in the form of royalties. Everyone is aware of the colossal sums still extracted from the public to pay royalties; whilst we are in the hands of patentees you are helpless.

Your attitude has been directly responsible for the fact



that five firms will reap the business from the sale of television receivers whilst you as passive resisters have been too busy passively resisting to investigate the possibility of entering the television market yourself.

I am glad to be able to report that this journal continues to be the leader in its field, that it has the largest net sales in that field, and that its considerable circulation consistently maintained over the past year should indicate to you that the constructor market is by no means dead. Such a market is worthy of more attention than you have given to it. You built your businesses in the early days from the home constructor market. They were the experimenters who were responsible for the perfection of radio; they were the recruiting ground from which you drew your experimental departments, your salesmen, and your designers. It is true that having founded your business in this way you have endeavoured to destroy that which created you by introducing the competition of the cheap, and in some cases nasty, commercial receiver. You really should have known better, because the constructor is a discerning individual who knows that you cannot buy a really satisfactory wireless receiver for a few pounds.

The evidence of our circulation should satisfy you on that point, for very few genuine constructors have deserted our ranks. It is not too late for you to make amends; the market is there, and it can be developed. When there is little to sell, there will be few to buy, although thousands are waiting to do so.

This journal has done its share in maintaining interest in the hobby, and since its inception, when it leapt to the forefront of wireless journals, where it has remained, we have striven to hold readers' interest by making no charge of any sort for answering readers' letters, by producing at considerable expense satisfactory designs and by producing at nominal cost wireless handbooks for reference purposes. Yours has been the job to supply the parts for those designs. In a few cases thoroughly

(Continued on page 622)

AN EXPERIMENTER'S TEST BENCH

Details for a Useful Distribution Board and Test Panel by Means of Which All Battery Voltages and Currents can be Read by Means of a Single Meter While the Set is in Operation By The Experimenters

EXPERIMENTAL work is far more fascinating, besides being of much greater utility, if results can be checked quickly and conclusively by means of test meters. It is, therefore, an excellent plan to have a bench equipped with a suitable terminal board and meters, which acts as a main distribution panel between the batteries and the receiver; where mains equipment is used it might be possible to arrange the panel between a standard

Use of Plug and Jacks

An alternative and better scheme, if it could be adopted, would be to use a single multi-range meter and to make provision for quickly applying it to any one of the eight points. Actually, there is little difficulty in this if the meter is fitted with a plug, and if jacks of suitable type are included in the wiring. The meter might be one of the many good types now available for about two pounds, and

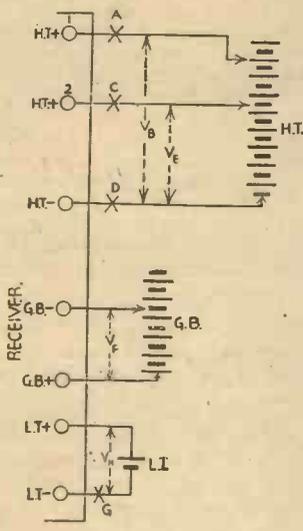


Fig. 1.—This diagram shows the point at which voltage and current readings have normally to be taken.

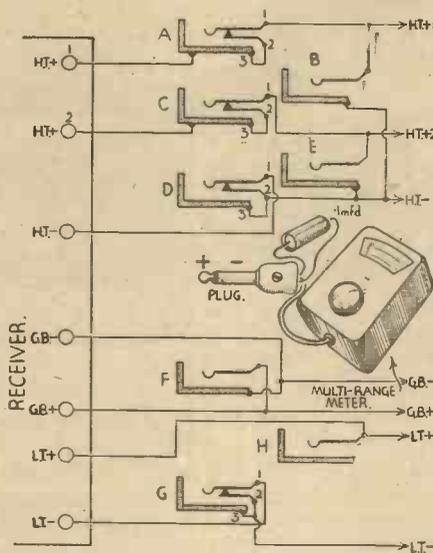


Fig. 2.—This illustration shows the connections to the jacks at the same points as indicated in Fig. 1.

supply unit and the set, but there are more difficulties in this respect.

The bench itself can be quite a simple affair, consisting of an old table about 3ft. high, the top of which is covered with green baize or even light-coloured oilcloth. As to the distribution panel, this may be as simple or complex as desired, but details will be given of an arrangement which is fairly inexpensive, although combining all of the most important features. First requirements are that rapid and accurate measurements can at any time be taken of the H.T. voltage applied to a particular set tapping, of the current taken at any point, of the L.T. voltage and current, and of the G.B. voltage. Fig. 1 shows the points at which measurements frequently need to be taken, the points at which current readings are required being indicated by crosses, and those between which voltage measurements are needed being marked by arrows and a letter V. This is the simplest arrangement of battery leads, and yet no less than eight meters would be required if simultaneous readings were to be taken at every important point. It would obviously be an expensive matter to buy eight reliable and accurate meters, besides which they would occupy a considerable amount of space.

four single-circuit and four closed-circuit jacks are required. Single-circuit jacks are used for the voltage readings, the others being for taking current measurements. The reason for using the latter is that the circuit must be broken when the meter is connected and remade when the meter plug is removed.

Jack Connections

The idea will more easily be understood

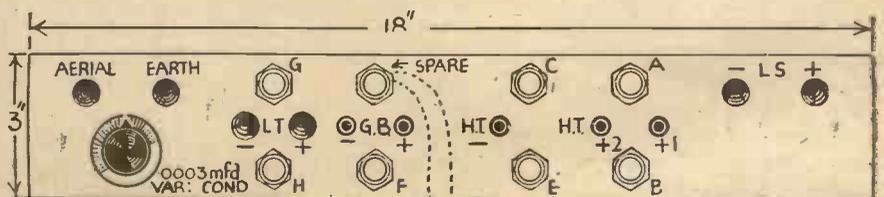


Fig. 4.—A suggested layout for the distribution panel described. The jacks are lettered in the same order as in Figs. 1 and 2.

by referring to Fig. 2, where the jacks are shown in pictorial form. It can be seen that there are three connections to the closed-circuit jacks used for current

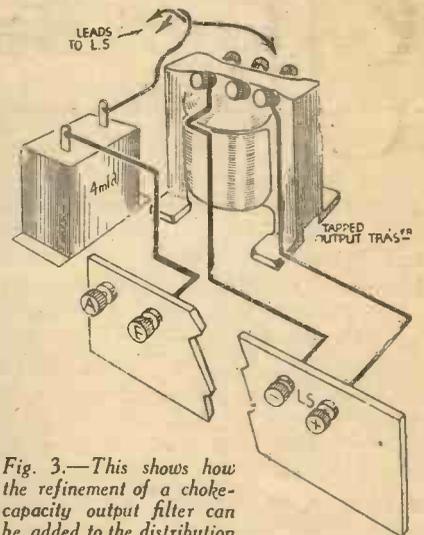


Fig. 3.—This shows how the refinement of a choke-capacity output filter can be added to the distribution panel.

readings, and that when the plug is not inserted points marked 1 and 2 are short-circuited due to the spring contacts. The other jacks have only two terminals, these being joined one to each point between which the voltage is to be measured; thus, the jacks have no effect when the meter is not connected.

Suppose now that it is wished to measure the voltage being applied to the terminal marked H.T.+1, all that is necessary is to set the meter to read up to, say, 150 volts and to insert the plug into the jack marked B. Similarly, the voltage to H.T.+2 is found by inserting the plug into jack E. The current passing to H.T.+1 lead is found by adjusting the meter to read in milliamps and placing the plug into jack A. In the same manner the G.B. voltage can be found by using jack F, the L.T. voltage by using jack H, the L.T. current by using jack G, and so on.

In connection with the wiring of the jacks, it should be noticed that the leads to jacks D and G are the opposite way round to those connecting jacks A and C. This is because these are in the negative leads, and it is important that the correct polarity of the meter be employed. With the wiring shown, the tip of the plug should be connected to the positive terminal of the meter, and the main arm to the negative lead.

Panel Layout

The method of arranging the jacks is not important, but a panel such as that shown in Fig. 4 is very convenient. This is made from a strip of ebonite, and is

(Continued on page 645)

The ALL-WAVE year

It was evident at the time of last year's Show that interest in short-wave—and more particularly all-wave—reception was rapidly increasing. Since that time all-wave reception has come into still greater prominence and popularity. The reason is not difficult to find, for there are by now literally hundreds of interesting programmes regularly broadcast on wavelengths between, say, 12 and 60 metres. Not only is the choice of programmes wide, but reception over world-wide distances on short waves is generally possible on even an inexpensive type of receiver. It is probably because of the improved entertainment value of short-wave transmissions that increased attention is being paid to this aspect of reception, but there are other reasons, chief among which is that transmissions of all nations are available, whilst the listener can keep in touch with aeroplanes, Atlantic liners, and even small craft exploring in the Arctic.

Long, Medium, Short, and Ultra-Short

Another reason for the greater interest in short-wave listening is no doubt due to the shortly-forthcoming television transmissions, which will take place on wavelengths below 10 metres. As yet there are but few commercial receivers which can be used on long and medium waves as well as on short waves down to 6 metres, but there are some. The constructor, however, need have little difficulty in making an all-wave set with an unlimited wavelength range. In this respect the constructor is in the happy position of having "new fields to conquer," and short waves are undoubtedly giving a flip to home construction, as well as to the use of receivers of every kind.

A year ago the public paid close attention to a commercial all-wave set (although this was by no means new to the constructor); special note was made of receivers which covered more than the two "standard" wave bands. This year the position has changed to such an extent that there are as many all-wave models as there are of those designed for medium-

and long-wave reception only. By next year two-band receivers will probably be rare. Much of the pioneer work in developing the use of short waves has been done

was one of the first publications to offer to its readers thoroughly sound, guaranteed and tested all-wave receivers; the latest of these designs is described in this issue and it marks a real forward step.

It is interesting to observe the various methods which have been adopted in producing designs for all-wave receivers, for they differ appreciably in many instances. One of the simplest, which can be adopted when using a "straight" H.F.-Det.-Pen. type of circuit

is simply to arrange a switch to bring into use a short-wave tuning circuit in the inter-valve circuit, leaving the aerial circuit aperiodic, as shown in Fig. 2. This has the advantage of complete simplicity and the absence of multi-way switches, but it cannot be fully effective due to the fact that the first valve is little more than a "passenger" on short waves. Nevertheless, the system is valuable in that it obviates the need for special trimming and adjustment, besides which it is inexpensive.

Another method which is better, although slightly more complicated, is that shown in the skeleton circuit, Fig. 3. In this case both broadcast (medium- and long-wave) coils are included in both the aerial and inter-valve circuits. In addition to the wave-change switches built into the broadcast coils, two other change-over switches are used to bring the short-wave coils into circuit. The same gang condenser is used for tuning, and must, therefore, be provided with a really good slow-motion drive. The change-over switches should be placed near to the coils, and they can best be of the chassis-mounting Q.M.B. type with a common operating spindle.

So Great Has Been the Interest Shown in All-wave Reception in the Past Twelve Months that 1935-36 Can Truly be Called The All-wave Year. The Principal Systems of All-wave Tuning are Described By FRANK PRESTON.

Special Components

Some of the early all-wave models were by no means reliable; they were frequently difficult to operate, and were often only moderately efficient on any one band. This is certainly not true now, for the experimenter, in conjunction with the more-

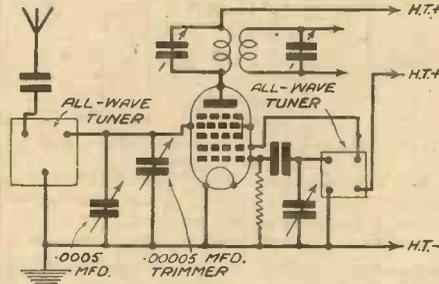


Fig. 1—Skeleton circuit of a superhet pentagrid frequency changer using a pair of all-wave tuners.

progressive manufacturers, has produced receivers which cannot justly be considered as being a compromise. Manufacturers have produced several excellent examples of all-wave tuners, tuning condensers, and other components of special short-wave type which can be used efficiently on any wave-band, and the constructor has ample choice. Let us hope that he will take full advantage of this, and continue to set the pace. PRACTICAL AND AMATEUR WIRELESS has endeavoured to foster this spirit, and

An Interesting System

An arrangement which is often better is that shown diagrammatically in Fig. 4. In this case a special three-gang condenser is used; one section has a capacity of .0005 mfd., and the other two have a capacity of .00025 mfd. each. A third change-over switch is required to place the two latter sections in parallel or to connect one to

(Continued overleaf)

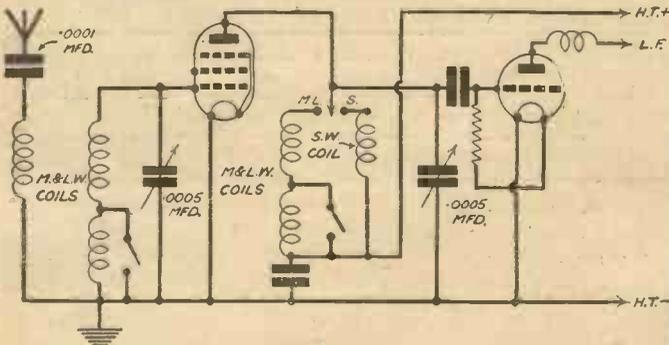


Fig. 2—Skeleton circuit of a simple all-wave set of the H.F.-Det.-L.F. type. The aerial circuit is aperiodic on short waves.

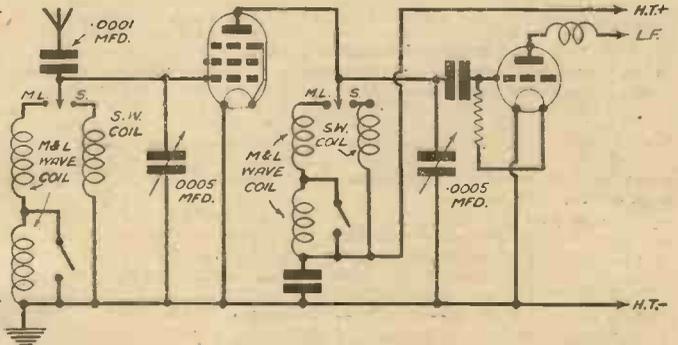


Fig. 3—This is a modification of the circuit shown in Fig. 2, and here both circuits are tuned on all wavelengths.

(Continued from previous page)

each of the two short-wave coils. Thus, for long- and medium-wave reception the condenser acts as a two-gang .0005 mfd. condenser in the normal manner, whilst the two smaller sections are used as a two-gang .00025 mfd. condenser on short waves. Somewhat better tuning is often possible by using this system, but much depends upon the design of the set as a whole. That the extra complication is by no means essential if the set is accurately designed is proved by the fact that it was found unnecessary in the "Gladiator" all-waver described on other pages. Nevertheless, the idea is interesting, and many readers may care to try it.

A simple modification of one of the systems described can be applied to a Det.-L.F. type of receiver, and an example is given in Fig. 5. In this case the reaction circuit has been added, and the same connections could, of course, be used in the circuits previously described; it has been omitted only for simplicity of illustration. It will be seen that a pair of ganged change-over switches is used, but in this case it would generally be satisfactory and convenient to use one double-pole change-over switch without the need for unduly long connecting leads. A single .0005 mfd. variable condenser is used for tuning on all wave-bands, whilst one .0003 mfd. condenser is used for reaction. Both condensers are connected to the appropriate coil simply by rotating the double wave-change switch.

Various alternative reaction-switching arrangements are possible, and it is, in fact, possible to obtain proper reaction control on both wavebands by eliminating the reaction switch entirely and using the novel system employed for the "Gladiator."

Complete Tuners

Those constructors who prefer to build a receiver in the simplest possible manner will wish to use a complete all-wave tuner fitted with built-in switches. This component has been brought to a high degree of

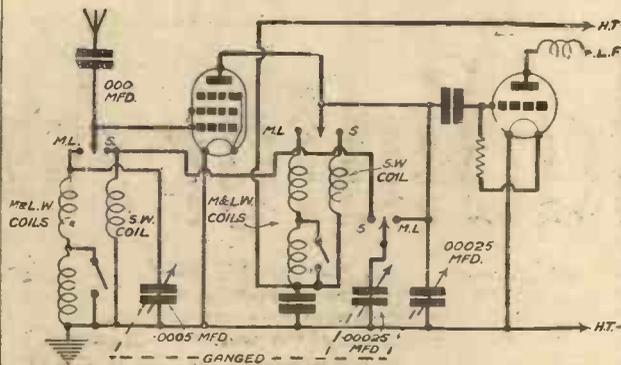


Fig. 4.—An unusual all-wave tuning circuit in which a special three-gang condenser is used.

efficiency, and can be used in almost any circuit as a replacement for an ordinary tuner intended for broadcast reception only. It was used in the popular "All-Wave Three" previously described in this journal, and the circuit looks exactly the same as that of an ordinary medium- and long-

wave receiver. As the switches are made integral with the unit and require no external connections, they can be ignored by the constructor, for they do all that the multiple switches shown in the accompanying circuits can do.

Superhet Systems

When all-wave tuning was first used experimentally it was found that many difficulties occurred when building a superhet, but these have been completely removed. This is partly because of the introduction of pentagrid and triode-hexode valves, and partly due to the development of 465-ko/s intermediate-frequency transformers. The simplest method of all-wave tuning with a superhet is to leave the aerial circuit untuned on short waves, either by leaving the normal broadcast coil in circuit or by switching a short-wave H.F. choke or a .25-megohm resistance in its place—and by tuning the oscillator circuit only. This can easily be arranged by tuning an all-wave coil for tuning the oscillator circuit, or by using connections based on those shown in Figs. 1, 2 and 3.

An alternative, and rather better method is to use broadcast and short-wave coils in both input and oscillator circuits and to fit a .00005-mfd. trimming condenser in parallel with the aerial-tuning condenser, as shown in Fig. 5. The extra condenser can be set to its midway position on the medium and long waves, and used for final tuning on short waves. Of course, there are many other possible systems, one of which is to use a special condenser designed on the same principles as that shown in Fig. 4. In that case the larger section would be "graded" to suit the oscillator circuit

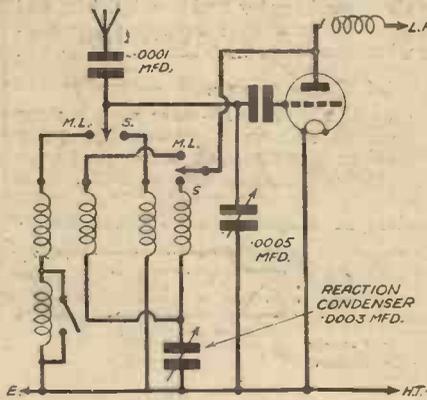


Fig. 5.—Additional switching for the reaction circuit. This system can be used on either set—L.F. or H.F. receivers.

25 W.B. SPEAKERS FREE

IN A SIMPLE FREE-FOR-ALL COMPETITION!

This year we again give every reader a splendid opportunity of obtaining one of the new W.B. Stentorian speakers entirely FREE OF CHARGE. The competition is extremely simple, and there is no entrance fee. Every entrant has an equal chance of winning one of the 25 speakers of the latest 1937 type, and illustrated on page 619 in this issue.

The simple and straightforward rules are as follow :

1. On the right is given a list of important features of present-day loudspeakers. You are asked to answer in the space provided, each of the six questions. For simplicity, you should insert the letter a or b in reply to questions 1, 2, 3 and 5; write "yes" or "no" in reply to questions 4 and 6.
2. Choose the three points included in the series of questions which you consider should receive greatest attention, and place them in order of importance in the space provided. For example, if you think that quality of reproduction is most important, sensitivity next, and the inclusion of a "tweeter" next, you should write: 3, 4, 6.
3. After filling in the coupon, complete it with your name and address in block letters in the space provided, and post in a sealed envelope addressed to: The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.
4. Mark the word COMPETITION in the top left-hand corner of the envelope, and post to reach us not later than September 12th, 1936.
5. Readers may send in as many attempts as they like, in one envelope, provided that each attempt is completed on a separate coupon, bearing the full name and address of the sender.
6. Only one speaker can be awarded to any one reader.
7. The result will be published in our issue dated September 26th, 1936.
8. The Editor's decision is final and legally binding, and this is an express condition of entry. No correspondence of any kind can be entered into regarding this competition.

WHAT ARE THE MOST IMPORTANT POINTS IN CONNECTION WITH A SPEAKER?

1. What output do you require—under (a) or over (b) 3 watts?
2. Do you prefer a mains-energised (a) or P.M. (b) speaker?
3. Is "mellowness" (a) or natural reproduction (b) preferred?
4. Should the speaker have a high degree of sensitivity?
5. Is a single (a) or double (b) unit preferred?
6. Should there be a built-in "tweeter"?

I consider the three most important items are:—

.....

Name

Address

.....

The Gladiator ALL-WAVE 3

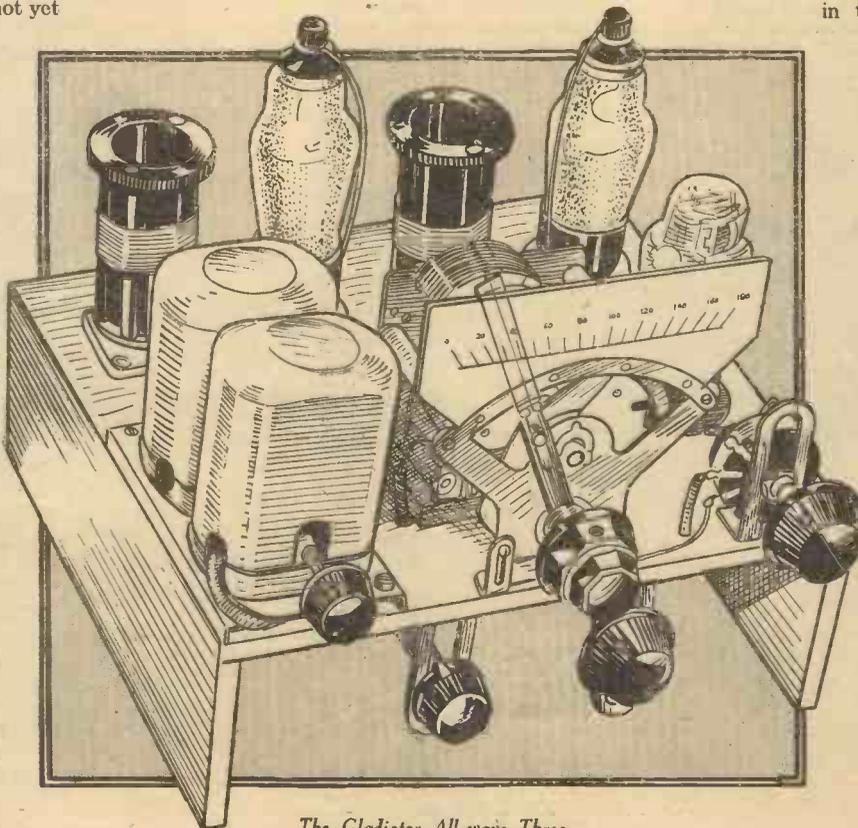
A Super-efficient Receiver Incorporating Some New Principles of Design, Giving a Remarkably High Degree of Selectivity and Sensitivity. Wave Ranges are from 18 to 55 Metres, 200 to 550-

THE 1936 Season closes and automatically opens the 1937. We are on the threshold of remarkable developments, when vision will be superimposed on the sound programmes. Gradually, but none the less certainly, listeners are evincing greater interest in that fascinating band below 100 metres, where programmes may be received from incredible distances and provide entertainment of a higher order than that which results from the medium and long-wave bands. You may listen to the gay chatter of amateurs and the quaint programmes from foreign countries and from some of the American stations. If you have not yet listened on the short waves, a new experience awaits you and a new thrill in receiving some hundreds of stations of which you have never previously heard.

But short-wave technique differs from that required for the normal and long-wave bands, for short waves are by no means so easy to receive; there are certain times and certain periods in the year when reception is better than others. If you wish, therefore, to listen on the short-wave bands you may do so by means of a short-wave adaptor or converter, by means of a special short-wave receiver, or by means of what is now known as the all-wave receiver. There are those who prefer a short-wave receiver only, but many thousands wish to combine in one set the features required for ordinary listening on the medium and long-wave bands and



By F. J. CAMM



The Gladiator All-wave Three.

-Metres, and 850 to 2,050 Metres. The Receiver is Extremely Simple to Build and Operate, and the Kit of Parts is Low in Cost. Its Construction is Here Described

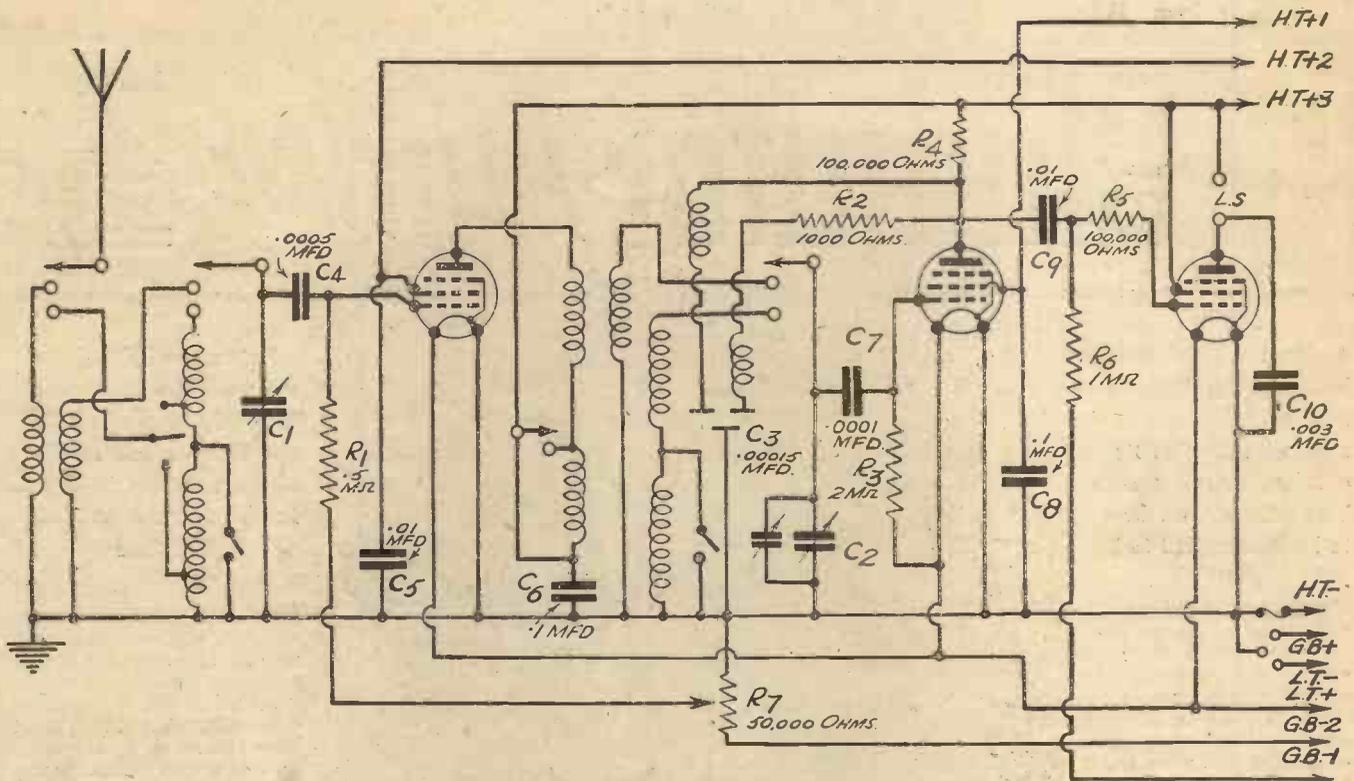
those of an efficient short-wave set ready at a turn of the switch to transport them to the fascinating realm of the short waves. Few people are so situated that they can have two receiving stations in one house. Most have not the space for one thing, and owing to the wide range of components now available there is now no need to build two separate receivers if you do not wish to do so.

There is an inconvenience of disconnecting one receiver and connecting the other when two separate sets are used for all-wave listening. Short-wave stations are best heard late at night or in the early hours of the morning. In the combined receiver therefore you are able quickly to change from one wave band to another, at a time when you would not be inclined to juggle about with two sets.

A Step Towards the Ultra-Shorts

Let me therefore introduce you to the Gladiator All-Wave Three, with which I inaugurate the 1937 season for home constructors. With the advent of the television programme, sooner or later you will have to become acquainted with ultra-short waves, and if you have not experience of the short waves—a useful stepping stone—you will encounter difficulty.

The Gladiator has been the subject of careful experiment in the PRACTICAL AND AMATEUR WIRELESS Laboratories for the past three months, and in the form in which



Theoretical circuit of the Gladiator All-wave Three.

it is here presented it is perfect, on all wavebands. It is not a compromise giving you efficient service on one waveband, by subtracting something from the efficiency of the other wavebands. Examine the theoretical circuit. Here you will observe that whilst it is a perfectly standard three-valve straight circuit, it employs three pentodes—one H.F. pentode for H.F. amplification, one H.F. pentode as a detector, and an L.F. pentode in the output stage. The use of three pentodes in this manner has distinct advantages which I shall deal with later.

Two Tuned Circuits

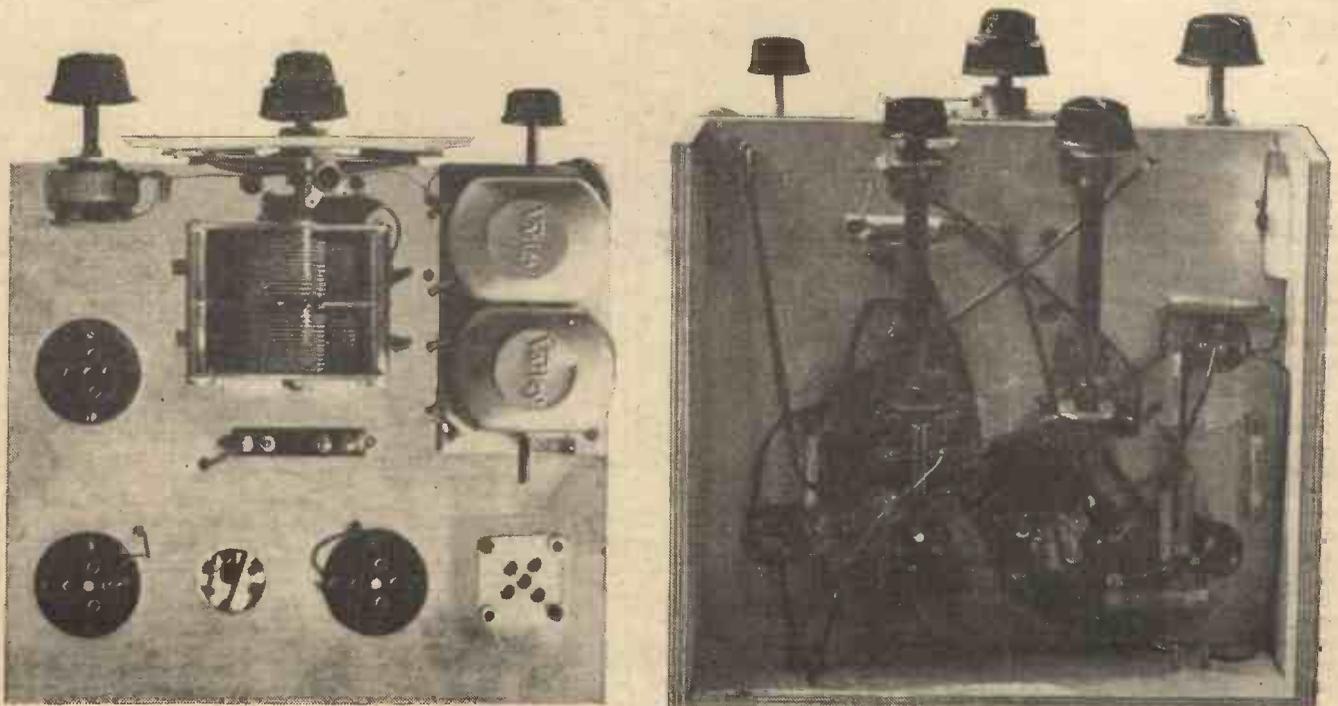
Contrary to usual practice of using an untuned H.F. stage for short waves, two tuned circuits are used on all wavebands of the Gladiator, thus extracting the very last drachm of efficiency which it is possible to obtain from such an arrangement of components. For, in very truth, the Gladiator functions just as satisfactorily on the short waves as it does on the other wavebands. Tuning is delightfully simple, and the usual fierce reaction and delicate tuning associated with the short-wave receiver is markedly absent. Another

important point which you will notice is that iron-core coils are used on the medium and long waves, thus giving a high degree of selectivity, plus a high degree of sensitivity.

Usually you can only obtain selectivity at the price of sensitivity and vice versa. I tried many arrangements of components to avoid this, and the circuit you see here with achieves that very desirable result.

Notice that resistance-capacity coupling exists between detector and output valve, thus maintaining the efficiency owing to

(Continued on page 611)



Top and sub-chassis views of the Gladiator.



491 AC
All-Wave Superhet 13½ Gns.



481 AC
All-Wave Superhet.
5 wave bands 18½ Gns.



"HIS MASTER'S VOICE"



482 AC
All-Wave Superhet. New
type Fluid Light 16 Gns.



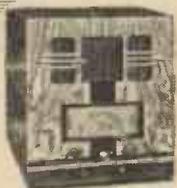
486 AC/DC
Universal All-Wave
Superhet 13½ Gns.



149
All-Wave Battery
Receiver 9½ Gns.
(Including
Batteries)



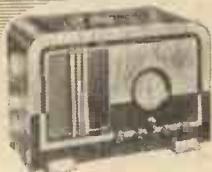
445 AC
Station Selector Ray
Superhet 13 Gns.



381 AC
Superhet with Spot
Light Tuning 12½ Gns.



159
Battery Receiver 8 Gns.
(Including
Batteries)



480 AC
All-Wave Superhet.
4 wave bands. 17½ Gns.



No. 9
Filing Cabinet. Holds
400 Records (10"
or 12") 6 Gns



801 AC
All-Wave High Fidelity
"Concert" Autoradiogram.
10 valves, 5 wave Bands.
8-record Changer. New type
Fluid Light. Clock, 3
Speakers, Record Cupboards
and 5 Albums 80 Gns.



581 AC
All-Wave
"Bureau"
Superhet
Auto-
radiogram
5 wave Bands.
8-record Changer, Record
Cupboards. 6 Albums. 48 Gns.



425 AC
Superhet with A.V.C. 11 Gns.



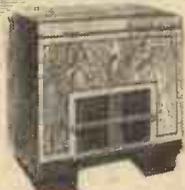
545 AC
Station Selector Ray
Superhet Radiogram 22 Gns.



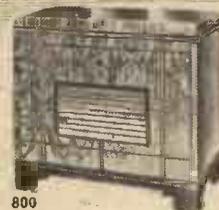
488 AC
All-Wave Superhet
Radiogram. 5 wave
Bands 28 Gns.



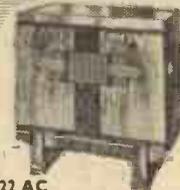
183
Wide Angle
sound
Distribution
Speaker
£5.17.6



485a AC
All-Wave Superhet Autoradio-
gram. 5 wave Bands. 8-record
changer. 36 Gns.



800
All-Wave High
Fidelity Autoradiogram. 15
valves. 5 wave Bands. 4 Range
Selectivity device. 8-record
Changer, Fluid Light, 2
Speakers, Clock. 110 Gns.



622 AC
Superhet Radiogram
with Spot Light
Tuning 22 Gns.



11
Pick-up and volume
control with screened
leads 32/6

All-Wave Anti-static aerial
37/6

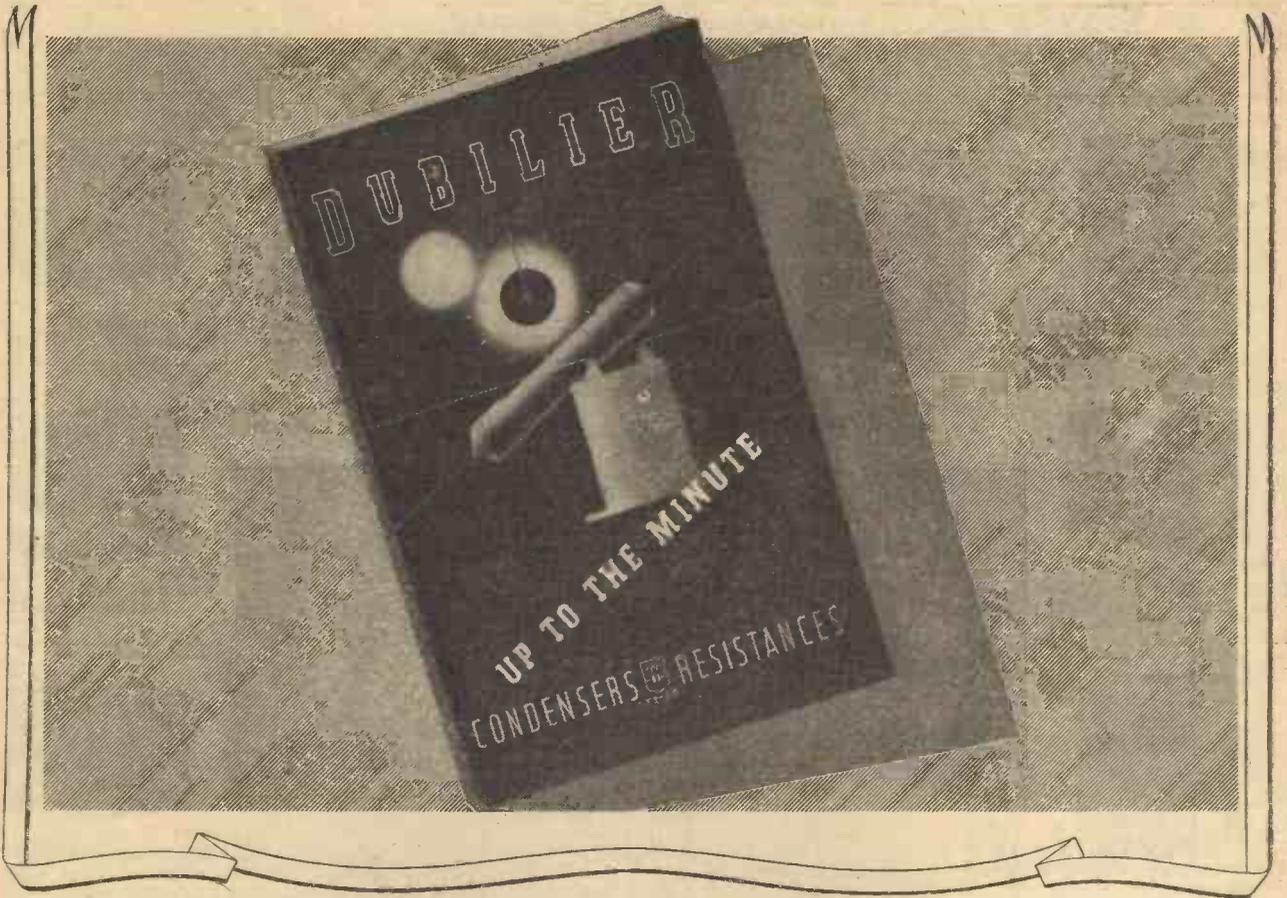


For
Quick Reference

The 38 years' experience which "His Master's Voice" Engineers have had in the design of sound-reproducing instruments enables them to present a range of instruments unexcelled for faithful reproduction. From 8 gns., or by hire purchase.

The Complete New Range of
"HIS
MASTER'S VOICE"
Including All-Wave Radio

"HIS MASTER'S VOICE"
98 108, CLERKENWELL ROAD, LONDON, E.C.



Your new catalogue is ready

It isn't our policy to produce, by hook or by crook, something "amazing" for the Show. This is principally because our laboratory is making improvements and advances so frequently that we've just ceased to be amazed.

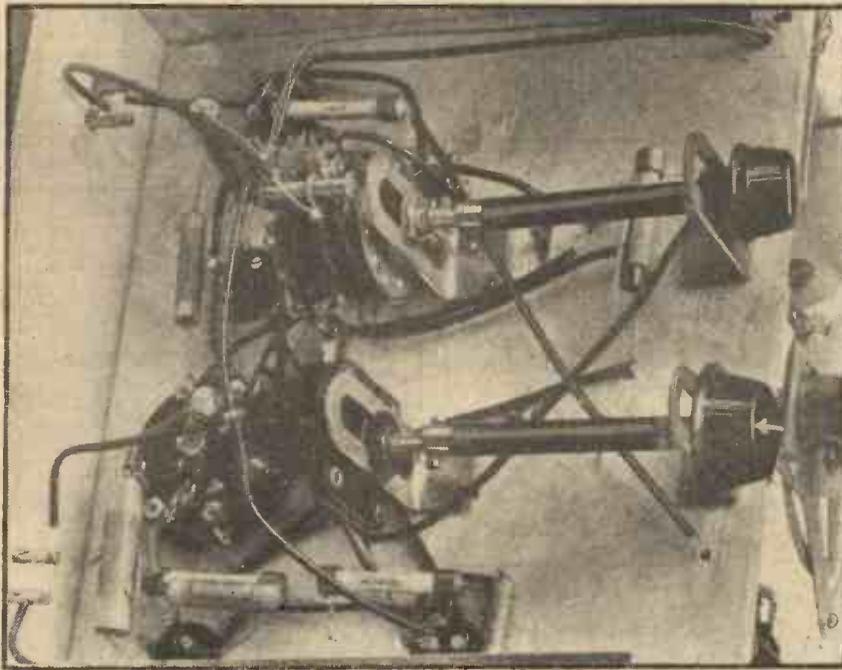
Besides, we feel confident that you know just where you can find details of the very latest developments both of condensers and resistances in this country. The new Dubilier catalogue is now ready and we shall be very pleased to send you your copy. Then you'll be right up to the minute.

DUBILIER

CONDENSERS



DUBILIER CONDENSER CO. (1925), LTD., DUCON WORKS, VICTORIA ROAD, NORTH ACTON, LONDON, W.3.



View of the wave-change switch and reaction control of the Gladiator All-wave Three.

(Continued from page 608)

the use of H.F. pentode detector, which is more sensitive than a triode detector transformer coupled to the output valve. A more important point, however, is that R.C. coupling in this stage ensures freedom from that great drawback threshold howl.

An External Trimmer

Another feature which the reader will appreciate is that a trimmer is attached externally to the gang condenser and provided with a knob, so that minute final adjustments can be made on all wavebands without having to remove the chassis from the cabinet and to toy around with insulated screw-drivers.

The wave ranges covered are 18 to 55 metres, 200 to 550 metres, and 850 to 2,050 metres, and it is particularly necessary to adhere very carefully to the layout and to the specification in order to achieve satisfactory results. Our standard system of construction has been employed using a metallised chassis. The construction itself calls for very little comment, for it follows the practice we have described so many times in this paper.

Blueprints Available

The receiver is built up on a Metaplex chassis measuring 10in. square, and I recommend readers to enlarge the scale wiring diagram given herewith so that the components occupy the same relative positions as in my receiver. If they prefer it we can supply a full-size blueprint for 1s., and orders should be addressed to Blueprint Dept., Geo Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2. It is most important that you should not alter the position of the components in any way, for the whole circuit has been carefully balanced and the stability of the receiver depends upon the components being placed exactly as in the original.

In drilling the holes for the valveholders it is important to drill a clearing hole so that the legs are not shorted by the Metaplex covering. Messrs. Peto-Scott Co., Ltd., supply the chassis ready drilled, and if you purchase from them you will be relieved of the responsibility of drilling the holes and of spacing the components.

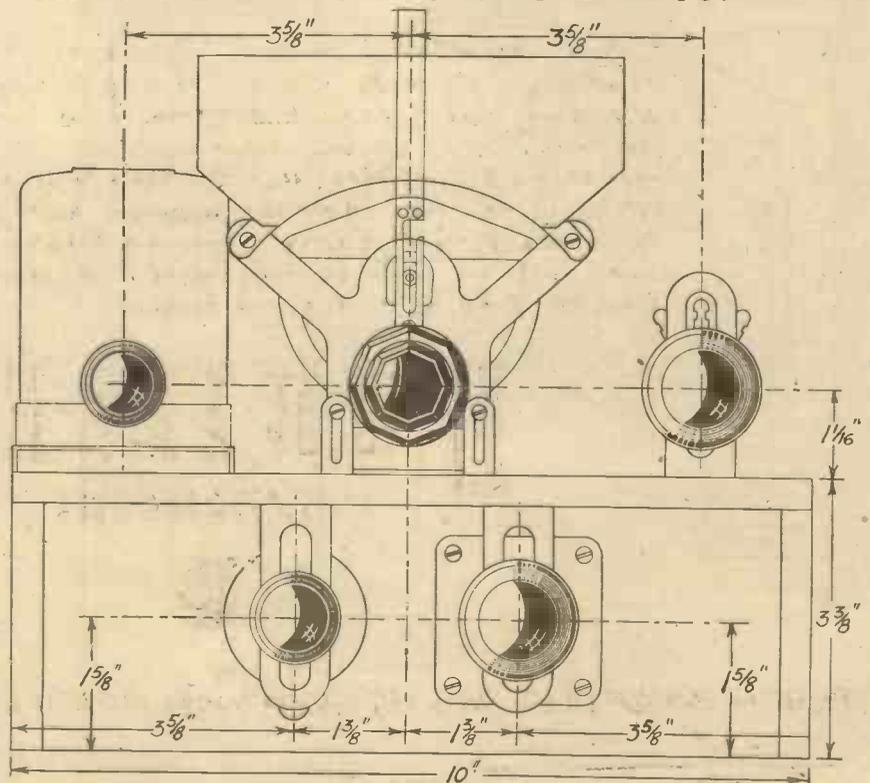
The Switch

The switch connections need to be carefully studied, and to make the matter quite clear a separate switch connection diagram appears on page 612. This, in conjunction with the theoretical circuit, should remove all difficulties.

VISIT OUR STAND

No. 10

GROUND FLOOR



Cabinet-drilling diagram of the Gladiator All-wave Three.

Carefully adjust the extension rods so that the switches move freely, and make sure before wiring up that positive contact is being made in all positions. Keep the leads as short as possible, and ascertain that no loose ends can make contact with the metallised chassis. Where it is necessary to pierce the chassis to receive a wire, make sure that the insulation is perfect. Quite often I have found that failure to obtain results has been due to fraying of the insulation which has been chafed bare when being passed through a rough hole.

Packing the Condensers

Notice that the variable condenser is mounted on a packing piece in order to centralise the driving spindle with the condenser drive, as the J.B. horizontal drive with trimmer (not supplied by the makers of the variable condenser) does not pair up with the variable condenser. Select a piece of wood of such thickness that the drive pushes on without strain. It is true that vertical adjustment of centre height is provided on the drive, but it is insufficient to align with the condenser spindle. The packing piece of wood is supplied with the chassis when this is obtained from Messrs. Peto-Scott.

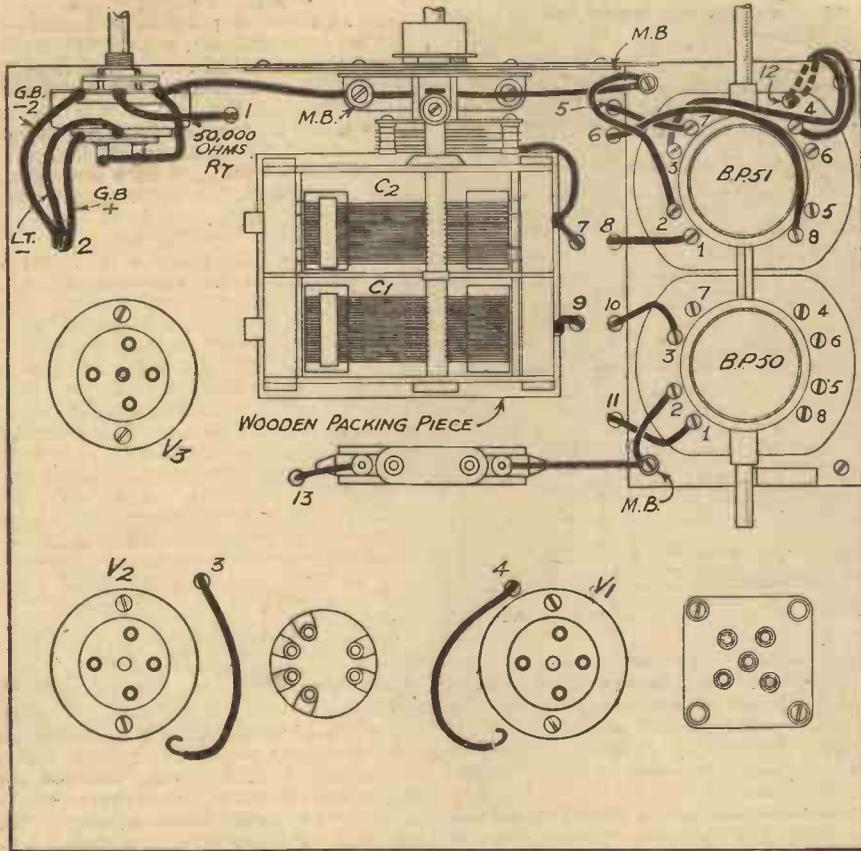
The Speaker Lead, Speaker Sockets, etc.

The speaker lead which connects to V3 must be kept well away from V2, as shown in the sub-chassis wiring diagram. The aerial and earth and loudspeaker socket strips should be carefully fixed and holes for the sockets should be of clearing size so that the metallised covering does not short-circuit them. It is always safe to scrape away the metallised coating for an area which completely clears the rectangular pieces of insulating material to which the sockets are attached.

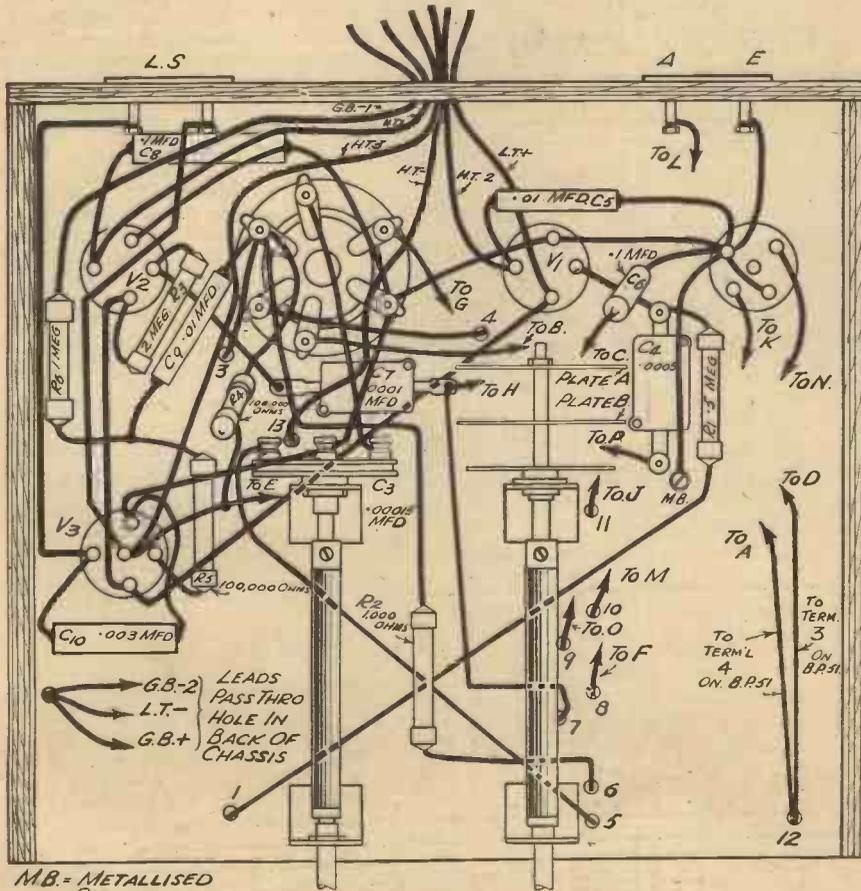
The Controls

The relative positions of the controls will be apparent from the cabinet-drilling diagram given on this page, and the com-

WIRING DIAGRAMS OF THE GLADIATOR ALL-WAVE THREE

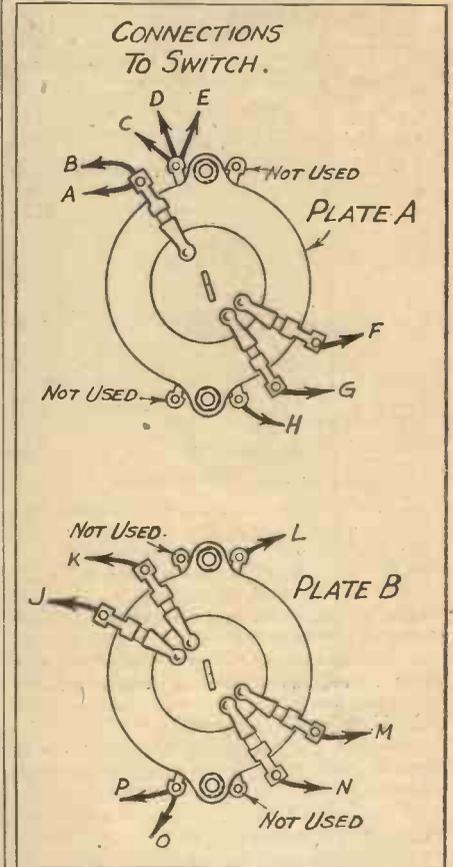


M.B. = METALLISED BASEBOARD.



M.B. = METALLISED BASEBOARD.

ponent-mounting brackets should be fixed in the positions shown to give a symmetrical layout. In order to drill the cabinet the knobs are removed, a spot of ink is applied to the centres of the spindles, and the chassis pushed in to the cabinet. The spots of ink will be transferred to the inside of the front of the cabinet and thus



Connections to the Switch Unit.

clearly mark the hole centres. Drill a small hole through from the back and then open out the holes to the correct size from the front. In this way you will avoid splitting the polished front of the cabinet.

LIST OF COMPONENTS FOR THE GLADIATOR ALL-WAVE THREE

- One 2-gang coil unit (BP50, BP51) (Varley).
- Two short-wave coils (special) (B.T.S.).
- One 2-gang condenser (C1, C2) (Polar)
- One two bank multi-switch (B.T.S.).
- One .00015 mfd. differential reaction condenser (C3) (Polar).
- One horizontal drive with trimmer (SL9) (J.B.).
- Three valve-holders (two 4-pin, one 5-pin, V3 (Clax).
- Two coil holders (one 4-pin, one 6-pin) (B.T.S.).
- Two extension rods (E.H.2) (Bulgin).
- One volume control, 50,000 ohms, with 3-point switch (R7) (Erie).
- Six fixed resistances: .5 meg. (R1), 1,000 (R2), 100,000 (R4), 100,000 (R5) 2 meg. (R3), 1 meg. (R6) (Dubilier).
- Seven condensers: .1 mfd. (C6), .1 mfd. (C8), .01 mfd. (C5), .01 mfd. (C9), .0005 mfd. (C4), .0001 mfd. (C7), .003 mfd. (C10) (T.C.C.).
- Five component brackets (P. Scott).
- Two terminal strips: A.E. and L.S. (Clax).
- One 100 m.a. fuse and holder (Microfuse).
- Three valves: 210V.P.T., 210S.P.T., 220H.P.T. (Cossor).
- One Metaplex chassis 10in. by 9in. by 3in. (P. Scott).
- One speaker (37) (W.B.).
- One cabinet (P. Scott).
- Seven plugs: H.T.1, H.T.2, H.T.3, H.T.—, G.B.—, G.B.—1, G.B.—2 (B. Lee).
- Two spades: L.T.—, L.T.—. (B. Lee).

A PAGE OF PRACTICAL HINTS

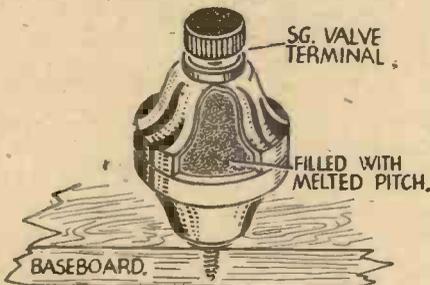
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Improved Pillar Insulators

USEFUL pillar insulators, suitable for supporting bare H.T. wires or aerial lead-in, can be constructed from the



Easily made pillar insulator.

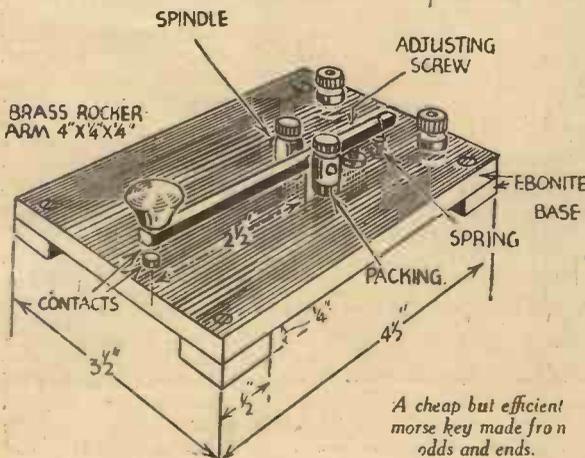
"caps" of "dud" screened-grid valves. Fill two caps with melted pitch, place the two filled caps together whilst the pitch is hot and hold firmly until the pitch cools. One end of the pillar may now be secured to a wood or metal baseboard by the threaded screw, and the insulated terminal at the other end used to secure the H.T. or aerial wire. These pillars are particularly useful for short-wave sets.—F. C. EDWARDS (Derby).

An Efficient Morse Key

THOSE who are learning morse or who are amateur transmitters need an efficient key. The accompanying sketch shows how I made one at a cost of about 6d. First cut a piece of ebonite sheet to a convenient size for the base (4½ in. by 3½ in. by ½ in.), and then cut four ebonite feet for the base and screw them on to it, one at each corner.

Now take a piece of brass rod 4 in. by ½ in. by ½ in. and at ¼ in. from one end drill a hole and put through it a round-headed bolt and hold it fast with a nut. On to the end of the bolt fasten a knob.

At 2½ in. from the knob end, drill a hole at 90° to the first one and through it put a piece of rod, about 1½ in. long. By means of two telephone terminals fastened to



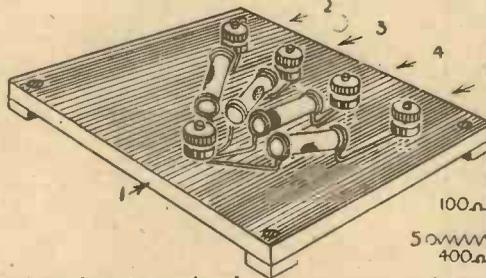
A cheap but efficient morse key made from odds and ends.

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.

the ebonite base, support the arm of the key by passing the rod through the holes in the terminals and the arm. At the other end of the arm fasten one end of a coiled spring, and fasten the other end of the spring to the ebonite base, by means of a nut and bolt. Between the spring and the pivot put an adjusting screw to vary the size of the contact gap.

The contact gap consists of the bolt on to which the knob is fastened, and another bolt fastened on the ebonite base directly beneath it. For good results a small piece of silver should be soldered on to each of the contacts.



A simple resistance board.

A wire is taken from the bottom contact and another from the pivot. These wires go to two terminals situated at the end of the ebonite base remote from the knob.

I have used this key for morse practice for some time and have found it very efficient.—R. Q. MARRIS (Exeter).

A Resistance Board

THE accompanying sketch shows a resistance board of a similar design to the capacity board described on this page in PRACTICAL AND AMATEUR WIRELESS for July 25th, 1936. It consists of four fixed resistances and five terminals mounted on an ebonite base. By taking a connection from terminal 1 and another from a wire joining terminals 2, 3, and 4, a resistance of 54.5 ohms is obtained. Thirty-five different fixed resistances between 43

and 700 ohms can be obtained from this device by making the connections shown by the following table:—

Resistance.	Connections.	Resistance.	Connections.
43	1-2, 3, 4, 5	271.4	2-4, 5
54.5	1-2, 3, 4	275	3-2, 4
57.1	1-2, 3, 5	280	3-2, 5
63.1	1-2, 4, 5	300	1-4
66.6	1-2, 3	357.1	4-2, 3, 5
75	1-2, 4	366.6	4-2, 3
80	1-2, 5	371.4	3-4, 5
92.3	1-3, 4, 5	380	4-2, 5
100	1-2	400	1-5
120	1-3, 4	433.3	4-3, 5
133.3	1-3, 5	454.5	5-2, 3, 4
171.4	1-4, 5	466.6	5-2, 3
192.3	2-3, 4, 5	475	5-2, 4
200	1-3	500	5-3, 4
220	2-4, 3	520	5-3, 4
233.3	2-3, 5	600	3-5
238	2, 3-4, 5	700	4-5
263.1	3-2, 4, 5		

—R. HOLDEN (Blackburn, Lancs.).

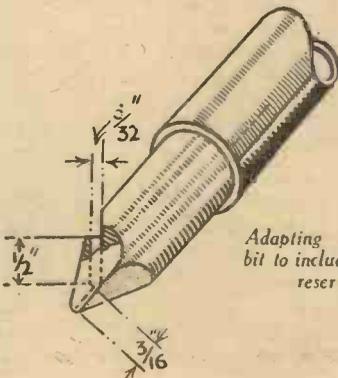
A Solder Reservoir for an Electric Iron

ANY electric soldering iron not having a thin bit, can very simply be adapted to include a solder reservoir. The bit should be drilled and filed as shown in the sketch, the ¼ in. hole being carefully drilled first, and the 1/32 in. hole then being drilled through to it from a centre-punch mark on the point of the bit.

The position of this hole is very important, as the under-surface of the bit should continue right to the point, beneath it, although the bottom of the hole should be as low as is possible.

The ¼ in. hole should hold sufficient solder for use on radio work, but a heavier iron for bigger work could well have a ⅜ in. reservoir. The 1/32 in. feed hole may not always be sufficient, but it is wiser to start with this size, and enlarge if necessary.

The bit must be well tinned before use, and the tinning should never be allowed to become burnt away round or in the reservoir hole. The feed hole should occasionally be cleaned with a piece of fine wire, which can be kept in the hole when the reservoir is being used for wire tinning.—D. L. JOHNSTON (Brighton).



Adapting a soldering bit to include a solder reservoir.

Practical Television

August 29th, 1936. Vol. 3 No. 16.

AT last the Alexandra Palace television station has begun to radiate high-definition signals. A few days ago both companies completed their chain of equipment—scanners, modulation amplifiers, and ultra-short-wave radio transmitters—and as soon as the B.B.C. aerial installation was finished the aerial feeder was linked up and pictures broadcast. The Baird Company were the first on the air and a number of standard talking film reels were televised, the results judged from the point of view of detail and synchronism being most praiseworthy for the first effort. The next day the Marconi-E.M.I. Company brought into commission their Emitron camera (the iconoscope developed originally by Zworykin) and actual studio and exterior scenes were televised with most promising results. At the moment no form of service is contemplated, the companies concerned devoting the whole of their energies to ensuring that the radiated pictures reach full efficiency. The fact that television pictures are available may alter the whole situation as far as the Radio Exhibition is concerned, although at the time of writing it is not yet known officially whether demonstrations will be featured, the atmosphere of uncertainty which has prevailed right up to the last minute has made it difficult for manufacturers of receiving equipment to come to any decision, and there now seems little likelihood of any large-scale demonstrations being effected on lines comparable to those which characterise each year's Berlin Show. The most pleasing feature, however, is that a start has been made, and it is certain that little time will now be lost in bringing the first B.B.C. high-definition television station into full commission, so that those interested in reception can have full scope for their capabilities, whether use is made of home-constructed equipment or commercially made receivers. It is learned that the two television receiver models will be shown on the H.M.V. stand, and a similar number on the Bush Radio stand, which company is marketing the Baird sets.

From the U.S.A.

David Sarnoff, who is chief of the Radio Corporation of America, is in this country with the express purpose of seeing the most recent developments in television. Associated with every form of modern entertainment and responsible for the elaborate television equipments now being conducted from the Empire State building in New York, as detailed in previous issues of this journal, he is anxious to see whether Britain is very far ahead of what is being undertaken in the U.S.A. After that, a visit to Germany is contemplated to investigate the work done in that country, where an experimental service has been radiated for such a long time.

In Cinemas

Ambitious plans for the installation of television in cine-

mas are now being made with the object of bringing this newest scientific development to the notice of patrons by picture reproductions on screens almost as large as those employed for the

NEWS OF THE LATEST
TELEVISION RECEIVERS ARE
GIVEN ON PAGES 630 and 631

standard talking film projection. One Paddington cinema has already had the plans passed for this work, the system to be used being that of Scopphony. This uses the well-known mechanical methods, it being stated that the two dimensional scan brought about by the stixograph associated with a



The new wireless mast at Alexandra Palace, the home of the first official television station in London, which is to be opened in the near future.

brilliant light source, and signal modulator, is capable of giving pictures at the moment which fill a twelve-foot screen. This is direct projection, and differs very materially from the intermediate film method which has already shown itself capable of giving satisfactory results. Yet another scheme is associated with the latest form of projection type cathode-ray tube, and with these and other methods already being tried it seems certain that television in the cinema will be an accomplished fact very soon after the successful establishment of a television service for the home.

The Olympic Games

Very elaborate plans were made at the Berlin Stadium for televising the Olympic Games this year. Two mobile intermediate film scanners and three iconoscopes were brought into service, these being positioned at points of vantage in the ground. Both vision and sound signals were radiated for three periods daily; namely, 10 a.m. to noon; 3 p.m. to 7 p.m.; and 8 p.m. to 10 p.m.; the main events forming the subject matter of the pictures. While this is not the first time that outdoor sporting events have been televised, it is the first time that such a big scale test has been made. The standard of definition was one of 180 lines, 25 frames (and pictures) per second, and a total of thirty viewing rooms were opened so that members of the public unable to visit the Stadium could see the happenings under conditions never before attempted. The total accommodation approached 3,000 and, since admission was free, the viewing rooms were always crowded. In addition to standard type cathode-ray tube receivers being installed at the receiving points, two of the theatres had larger screens employing cathode-ray projection equipment. As was to be expected, the results were far from perfect and varied from period to period. Many of the sporting events were recognisable, however, and the information obtained by the engineers during the fortnight's work will be invaluable for organising future outside television broadcasts.

Woman Make-up Expert

The problems associated with questions of colour when televising studio subjects at the Alexandra Palace are so important that the B.B.C. have appointed a woman make-up expert (Miss Mary Allen) to advise artists and announcers what to use and also supervise the wardrobe. Very broadly, it is found that colours can be divided into three categories; namely, blacks and blues, which appear black; grey, dark brown and dark green, which appear grey; and white, red, light brown and most pale colours, which look white. Clothes which are relieved by contrasting colours will be featured so as to secure the best effects from the pictorial point of view and do justice to whatever performance is being featured from the television scanners.

The problem is made somewhat more complicated by the fact that the electron cameras need different colour treatment from the intermediate film scanner, but once a complete schedule of colour effects has been drawn up the results should be quite satisfactory.

A Manchester Test

It is stated that in Manchester a secret invention for showing television pictures in theatres and cinemas has been demonstrated. This was undertaken in

(Continued on page 651.)

Three New

COSSOR SUPERHETS

for

BATTERY
A.C. MAINS &
D.C./A.C. MAINS
OPERATION

WHETHER you use Batteries or whether you have A.C. or D.C. Mains, you can now have all the advantages which up-to-date Superhet practice brings. These models, with their Full Automatic Volume Control, their Variable-mu H.F. Pentode Stage, their Super-selective Coils and, very important, their Distortionless Detector, ensure really life-like reproduction at ample volume. Hear and judge them for yourself at any good wireless shop.



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MODELS 375 and 375U

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BATTERY MODEL 376B
with CLASS 'B' OUTPUT

Brief Specifications:

BATTERY MODEL 376B (Class "B" Output)

(5 VALVES)
Compensated Anti-fading Circuit, with Pentagrid Frequency Changer, Var.-mu H.F. Pentode I.F. Amplifier, Double Diode Triode 2nd Detector, Power Driver and Class "B" Output. Full Vision Dial with station names. Combined Volume Control for Radio and Gram. 8" M.C. Speaker. Provision for Extension Speaker and Pick-up. Full accommodation within Cabinet for Batteries.

8½ GNS

Hire Purchase Terms: 12 months 14/- deposit and 12 payments of 15/9.
18 months 14/- deposit and 18 payments of 11/3.

A.C. MAINS MODEL 375

(5 VALVES INCLUDING RECTIFIER)
Compensated Anti-fading Circuit, with indirectly heated Pentagrid Frequency Changer, Var.-mu H.F. Pentode I.F. Amplifier, Double Diode Triode 2nd Detector/Amplifier, Directly heated Power Pen. Output, Heavy Duty Rectifier, Full Vision Illuminated Dial with station names. Single-knob Tuning. Combined Volume Control for Radio and Gram. Tone adjustment. 8" M.C. Speaker. Magnificent Walnut Cabinet. Provision for Extension Speaker and Pick-up. A.C. Mains 200/250 volts (adjust.) 40/100 cycles.

9½ GNS

Hire Purchase Terms: 12 months 17/6 deposit and 12 payments of 17/3.
18 months 17/6 deposit and 18 payments of 12/6.

D.C./A.C. MAINS MODEL 375U.

(5 VALVES INCLUDING RECTIFIER)
Universal model generally similar to above. For D.C. 200/250 volts (adjust.) and A.C. 200/250 volts (adjust.) 50/100 cycles.

10 GNS

Hire Purchase Terms: 12 months 18/6 deposit and 12 payments of 18/-.
18 months 18/6 deposit and 18 payments of 12/9.

Prices do not apply in I.F.S.

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



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Longer life - brilliant performance -

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On Your Wavelength

By THERMION

The Glorious Eleventh

THE publication of this issue coincides with the opening of the eleventh Radiolympia. I do not know whether the Radio Manufacturers' Association have selected that one-day-in-the-week when we have sufficiently recovered from Monday morning ennui to anticipate the relaxation of the week-end and be in the mood to visit an Exhibition, or whether they feel that it would be best to open the Exhibition on the one red-letter day in the week for wireless enthusiasts—that on which the leading wireless weekly, PRACTICAL AND AMATEUR WIRELESS makes its appearance. I am necessarily writing these lines some days before the Exhibition opens, for time, tide and printers wait for no man, Association, or exhibition, and I must gaze into the cerulean blue, embark into the realms of vaticination and in a word indulge in ballyhoo.

In sinning thus I do so in good company. I know exactly what will be in next Wednesday morning's newspapers. The daily paper "experts" will tell me that this is the most marvellous exhibition ever. I shall be told that never before in the whole history of radio has such remarkable value, such outstanding quality of achievement, such stunning cabinet work, such omniscient ingenuity been staged for the benefit of the listener. In Thursday morning's newspaper I shall read that most of the manufacturers during the first hour of the Exhibition sold their entire output for the next three years. You will read last year's Show Report dished up with a few more superlatives to provide the topical note. It is a strange thing that manufacturers who have sold their entire output for the next three years continue to exhibit, since most of them told me this story three years ago and,

towards the end of each wireless season that sets are being sold in the junk shops at half manufacturer's prices! Perhaps, my reader, you can enlighten me on these things; it may be that I cannot see the wood for the trees; it may even be, with that obtuseness which causes me to fail to perceive music in crooning, or melody in dance music, that my cerebellum cannot appreciate the finesse of these things. I have a poker face, and can play a good hand of Bridge. I can pot the red with unfailing regularity. If you can remove some of the furrows from my brow by explaining why, each year, manufacturers make more and more sets, sell more and more sets, dispose of their entire output in an hour and are still able to make the same receivers at half price for the junk shops, do please drop me a line or two on a postcard. A picture postcard for preference—I collect them.

Ballyhoo

AND yet, in my unwisdom perhaps I know that I like a certain amount of ballyhoo. It provides the right atmosphere, that mystic thing which originally emanated from the stage and the glamorous precincts of the theatre. I know, also, that the night before the Show I shall visit Radiolympia, and wonder how on earth the Exhibition can open on the following day. I shall have that same schoolboyish feeling of anticipatory pleasure on Tuesday night, and, in spite of the fact that years of listening have jaundiced my outlook and maybe warped my reasoning, I shall enjoy my daily visit. I have no secrets to pass along to you, for I honestly believe that this year the mixture will be very much as before. There will be the so-called improvements, wonderful tuning systems, which tell you when you are receiving a station you ought to get but can't. There will

with that perspicacity for which I am renowned, I observe each year

be fresh shapes to old objects; the attractive damosel to ogle the doubting purchaser. There will be the same good sets, and the same bad sets in equally tempting exterior cabinet work; the same tired and harassed crowd.

The Cabaret or the Show?

I KNOW in advance that all records for attendance is going to be broken, and I shall make my usual estimate that seven-tenths of the people who visit Radiolympia in the evening enter its hallowed portals for the base purpose of seeing the cabaret! They will kill time by looking at exhibits they have no intention of purchasing, in the same way as you visit Whipsnade to see the giraffes, or the antics of the simians. Only the discerning will be able to separate the wheat from the chaff, the good from the bad. Only the knowledgeable enthusiast will fail to be misled by a tastefully engraved tuning dial, containing hundreds of station names which beguile you into thinking that those are the stations which the set will receive. The shock comes when you find the local spreading over half of them.

Build Rather Than Buy.

OF course, no reader of this journal comes within that category. They build rather than buy, not because of pecuniary considerations but for the joy of building. This enthusiastic band has, in my opinion, always been badly catered for at Radiolympia. I have always felt that the component section of the Exhibition should be segregated. As it is, you find components mixed up with sets, in the case of those firms who cater for both markets. The number of firms specifically catering for the home constructor has, it will be observed, shrunk to meagre proportions. It is nice to know that many of the leaders remain. The fact that so many firms have fallen by the wayside does not indicate a commensurate shrinkage of interest on the part of the consumer.

In all new industries there are those firms who jump in and jump out, who have no knowledge of the requirements of the public, and are prepared to sell the merest trash by blatant advertising and mis-statements. When the public is unaccustomed to the wares of the new industry it is easy to do this. As soon as the public develops a sense of value and accumulates a nodding acquaintance with the science such firms fail and rightly so.

Television This Year, Next Year . . . ?

IN this refining process the good firms suffer hurt, and they have to await their just reward. That time has just arrived, particularly with the dawn of the nebulous television service.

The television industry arrives at a time when the public is radiominded and not to be so easily caught. I do not anticipate that there will be the same influx of mushroom firms, and we shall not arrive at a satisfactory stage after several years of scandalous exploitation as we did with radio; but you never can tell! Pride of possession is always likely to blind our acumen. As soon as Mrs. Brown tells Mrs. Smith next door that Mr. Brown has bought a television receiver the pangs of jealousy are aroused, and Mr. Smith will be in for a harassing time until his spouse is on an equal footing with Mrs. Brown. Mr. Brown will thereupon dash out and buy anything which looks like a television receiver, only to regret after having seen one built by, say, a reader of this journal, that he did not wait a little longer.

I cannot promise you that television receivers will preponderate at Radiolympia. As far as I can see, only about four firms will exhibit such receivers, and it is not known at the moment of writing whether a public demonstration will be staged at Radiolympia. In any case it would seem that such a venue would not be suitable because of the electrical interference.

No one knows when the television service will start, in spite of the fact that it is nearly two years since the Television Committee issued its famous report that "the moment was ripe for a public television service." If the moment was ripe two years ago it must be particularly putrid now, for it has long passed the over-ripe stage!

And speaking of television, some year or so ago a certain well-known radio publicist stated that television receivers would require at least 30 valves. I challenged him on this, because his remarks were widely



Notes from the Test Bench

Superhet Selectivity

THE selectivity of superhets designed for an intermediate frequency of 110 kc/s is usually greater than that of receivers employing a higher frequency. It is possible, however, to improve the degree of selectivity in high I.F. superhets by making the I.F. valve oscillate when the H.F. volume control is at its maximum setting. This can be done in several ways, the easiest being to bring the grid and cap leads of the I.F. valve near each other. This has the same effect as the application of reaction in a straight receiver. Sensitivity is also improved when this is done, but quality of reproduction generally suffers in the same way as it does when reaction is applied to the straight set detector.

C.W. on Short Waves

THIS dodge can also be made use of in short-wave superhets. Most morse transmissions are made on C.W. (continuous wave), and these cannot be picked up on the normal short-wave superhet. It is necessary to use a reacting straight set or to provide reaction in the I.F. or second detector stage of a superhet before C.W. transmissions can be received. If the I.F. valve is made to oscillate in the manner explained above, the number of stations picked up will be more than trebled. When telephony programmes are to be received the valve must be in a non-oscillating condition, of course, and the oscillation must therefore be controllable. If the bias voltage type of H.F. volume control is fitted, this can easily be done.

Operating D.C. Sets from A.C.

WHEN the consumption of the D.C. receiver is not more than about 60 watts, the easiest method of supplying it from A.C. is by means of a transformer—metal rectifier combination. Two rectifiers of the H.T. 11 type should be used, connected in bridge formation; that is, positive to positive, negative to negative, with the secondary leads of the transformer connected to the A.C. terminals of the rectifiers. The positive input lead of the D.C. set is then connected to the juncture of the two rectifier positive terminals and the negative input lead to the rectifier negative terminals.

quoted. What does he say now when it is known that the number is down to 20, and in one case to 14? Of course, he made his remark with his tongue in his cheek, fearful lest the industry which he represented should lose sales of ordinary wireless apparatus. I say that it is largely due to the attitude of the wireless industry itself that television has not been available at least a year ago.

Television has provided the priceless example of one industry trying to circumvent another. Still, the main thing is that the industry thrives; its output grows each year, and it is absorbing more and more of the unemployed.

Radiolympia

IT is the one opportunity which the listening public has of visiting the entire industry under one roof. It is the one opportunity provided for me to meet my friends and enemies, and we should view the exhibition in the same light as a holiday at the seaside, when we spend foolishly and act foolishly and in a manner which we should not do when at home. Get the holiday spirit and loosen the purse strings when you visit Olympia! And good hunting to you.

The Teacher Pays

COMMENTING on a report, Mr. A. E. Henshall, secretary to the education committees of the National Union of Teachers, told a Press representative in London:

"Broadcasting is a new and valuable education development and is recognised as such by most teachers, and the more enlightened local education authorities.

"Yet there is little doubt that the conditions outlined in the Staffordshire report give a fair indication of what is happening throughout the country.

"Enterprising teachers seek the aid of 'broadcast' talks for the better training of their scholars, but frequently they have no option but to buy the wireless set themselves or organise school concerts or other activities to raise funds.

"In short, it is the teacher or the already over-burdened parent who pays for this new branch of 'free' education.

"We, as teachers, feel that it is becoming increasingly incumbent on local authorities to provide this excellent 'mechanical aid' to present educational equipment.

"Fortunately, a small proportion of authorities are already leading the way."

25 W.B. Speakers Given Free!

See page 606.

"A MARKED ADVANCE ON PREVIOUS MODELS"



Says Mr. F. J. Camm

W.B. Engineers are proud that an authority of Mr. Camm's standing should immediately and so emphatically endorse their opinion of the new 1937 Stentorian. Mr. Camm's message, reproduced below, gives sure proof that W.B. research in the past year has by no means been in vain:—

"Once again I can confirm the claims of your engineers to have enhanced even further the already enviable reputation which your speakers enjoy. The 1937 Stentorian, which I have submitted to a thorough test, represents a marked advance on your previous models. If anything, your claims are too modest, for my curves show a greater degree of frequency response at both ends of the register. Last year I asked, 'Can there be a better speaker?' Your 1937 Stentorian Speaker supplies the affirmative answer. All listeners, and particularly constructors, owe a debt of gratitude to the indefatigability of your research engineers."

F. J. Camm

You should hear this latest W.B. product. Like Mr. Camm, you will at once realise that here indeed is another milestone in loudspeaker progress.

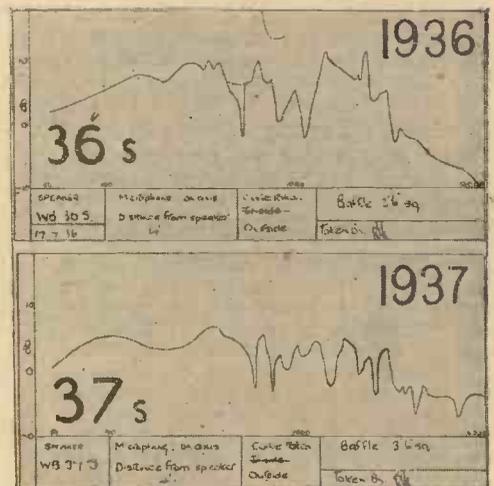
SEE THEM AT RADIOLYMPIA STAND 66



1937 STENTORIAN PRICES

Cabinet Models	Chassis Models
37 SC (Senior) - 63/-	37 S - 42/-
37 JC (Junior) - 49/6	37 J - 37/6
37 CC (Cadet) - 39/6	37 B - 23/6
37 BC (Baby) - 29/6	37 M - 17/6
Duplex - £6 6 0	EM/W - 70/-
	Duplex - 84/-

To the understanding eye the curves reproduced here (taken from 1936 and 1937 Stentorian Senior models respectively) will convey more graphically than any words the great stride forward this new design represents. Each, in a commercial speaker, is a remarkable achievement; but a study of the 1937 type's improved top response, absence of harsh resonances, and remarkable levelness leaves no room for doubt as to the magnitude of this year's improvement. Whether you are building a new receiver or wish to revolutionise the performance of your present set—hear the 1937 Stentorian and know what 1937 reproduction can be.

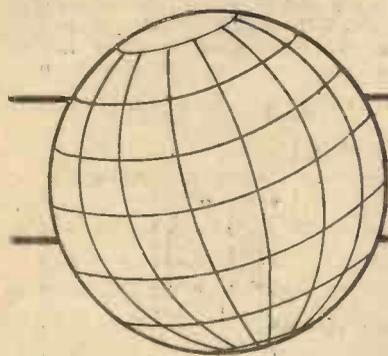


YOU MAY NOW BUY THE STENTORIAN SENIOR ON HIRE-PURCHASE FROM YOUR DEALER! ASK HIM!



1937 STENTORIAN

WHITELEY ELECTRICAL RADIO CO. LTD., MANSFIELD, NOTTS
Sole Agents in I.F.S.: Kelly & Shiel, Ltd., 47, Fleet Street, Dublin



The BANDSPREAD

Short-Wave Three

Preliminary Details of an Efficient Three-valver Specially Designed for Short-wave Reception

DURING the past six months an increased interest has been taken in short-wave reception. This is mainly due to the fact that the television transmissions are to be made on an ultra-short wavelength. The construction of a television receiver is too expensive a proposition for the average reader at present, but thousands of our readers who have taken no interest in short-wave listening are now anxious to try their luck on the short-wave bands as a forerunner to television experiments. We therefore decided to produce two receivers capable of receiving transmissions on wavelengths below 50 metres. One, the Gladiator, is an all-wave model for the readers who want to make up an efficient receiver which any member of the family can operate with ease. It was thought, however, that the short-wave enthusiast would require a set specially designed for short-wave listening, having a band-spread tuning unit for easy reception of amateur transmissions.

The Circuit Arrangement

After experimenting with several circuit arrangements, it was decided that an efficient three-valve design would meet the requirements of most listeners. A fourth valve would certainly increase the volume, but this increase would also be accompanied by intensified background noise. An examination of the theoretical circuit arrangement will indicate that three pentode valves are used, one of the H.F. variable mu type for H.F. amplification, a straight H.F. type as detector, and an L.F. type for the last stage.

Bandspread Tuning

Some readers may not approve of the use of an untuned aerial stage. As band-spread tuning was considered to be essential, however, the use of two tuned circuits would tend to make the receiver too complicated for beginners. The loss in efficiency due to the use of an aperiodic aerial stage instead of a tuned stage is not pronounced as the amplification provided by the H.F. valve is very low on wavelengths below 50 metres. By using one tuned stage tuning can easily be effected by means of the bandspread condenser operated in conjunction with the special tank condenser. Readers who have not heard of the Eddystone tank system of band spread tuning will appreciate a few details. The bandspread condenser C2 has a capacity of approximately 20 m.mfd., and is continuously variable. Its fixed and moving vanes are connected across the fixed and moving vanes of a semi-variable condenser having a capacity of 140 m.mfd. variable in steps of 14 m.mfd. A patented stop mechanism is incorporated so that the

minimum capacity can be set to a predetermined value, the maximum capacity being then determined by the position of the low capacity variable bandspread condenser. This variable is provided with a 9-1 slow motion drive, having a remarkably smooth movement. The smoothness of the control and the ease of tuning with this system has to be tried to be appreciated fully.

Intervale Coil

The coupling between the H.F. valve and the detector constitutes an H.F. transformer coil. The lower end of the primary winding of this coil is connected to the earth end of the grid winding, and, therefore, a four-socket holder can be used, the H.F. valve cap being connected to the top terminal of the coil. The cap lead of the valve could, of course, be joined to the coil terminal joined to the fixed vanes of the tuning condenser, but better results are obtainable when the coil is used as an H.F. transformer with the top terminal in use. A .1 mfd. non-inductive condenser is joined between the earth end of the grid winding and the metal chassis so as to provide an effective path to earth and to the moving vanes of the tuning condenser.

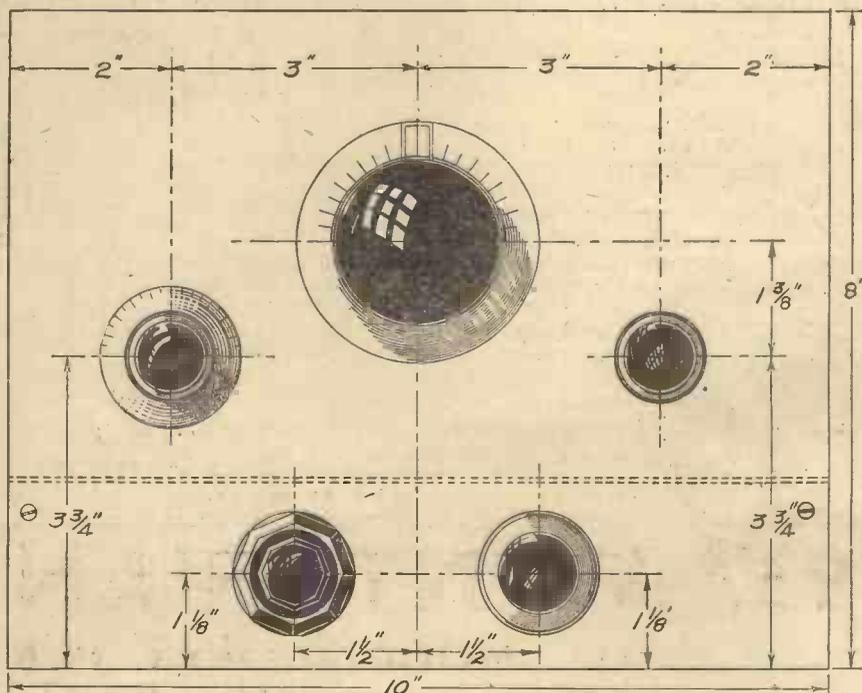
Reaction Circuit

It is customary to use a screen voltage reaction control when an H.F. pentode is used as a detector, but experiments indicate that it is difficult to obtain a potentiometer that has a sufficiently silent movement to ensure the absence of slight crackling when the control is operated. Some makes were found to be quite satisfactory, but it is probable that even the best ones would get noisy after a few months' use. The condenser control, on the other hand, is silent in action, and if the voltage applied to the screen of the detector valve is carefully chosen, very smooth reaction control can be obtained.

L.F. Coupling

Resistance capacity coupling is used between the detector and the output valve as the high efficiency of the pentode detector renders the use of an L.F. transformer unnecessary. Resistance coupling has the advantage of providing a more silent background, and eliminates the common short-wave bugbear of threshold hold—a very great advantage when using headphones.

Constructional and operating instructions for this fascinating receiver will be given



Panel layout of the Bandspread.

next week. In the meantime there are, no doubt, many who will prefer to commence work right away.

The Chassis

The chassis is of the all-metal type, and may be obtained ready-drilled and prepared from Messrs. Peto Scott, together with the special metal panel. Unless you are experienced in metal work it will be wise to obtain this complete chassis, as the bending of the chassis and the cutting of the large diameter holes for the valve-holders require some care and the use of special tools.

All components which are attached to the chassis, as well as the metal panel, are held in position by short bolts and nuts, and these may be obtained complete with the kit. It will be noted from the wiring diagram on this page that the metal chassis is employed as an "earth return," that is to say, the H.T. negative supply to the receiver passes through the safety fuse and is then joined to the chassis. The negative filament leg of each valve-holder is then joined to one of the bolts which hold the valve-holders in position, and in this way the circuit is completed back to the H.T. negative lead. This type of connection is not safe when using a wooden chassis of the metallised type, but when a substantial metal chassis is employed the disposal of the various connecting wires not only greatly simplifies the constructional work, but also results in some slight gain in efficiency due to the improved screening and the shortness of certain earth leads. This is particularly noticeable in the case of H.F. decoupling circuits, and where a long lead to earth might result in some instability due to coupling with other leads or components, the direct earthed connection to the chassis avoids this trouble.

Wiring the Receiver

When all the components have been mounted in the respective positions the

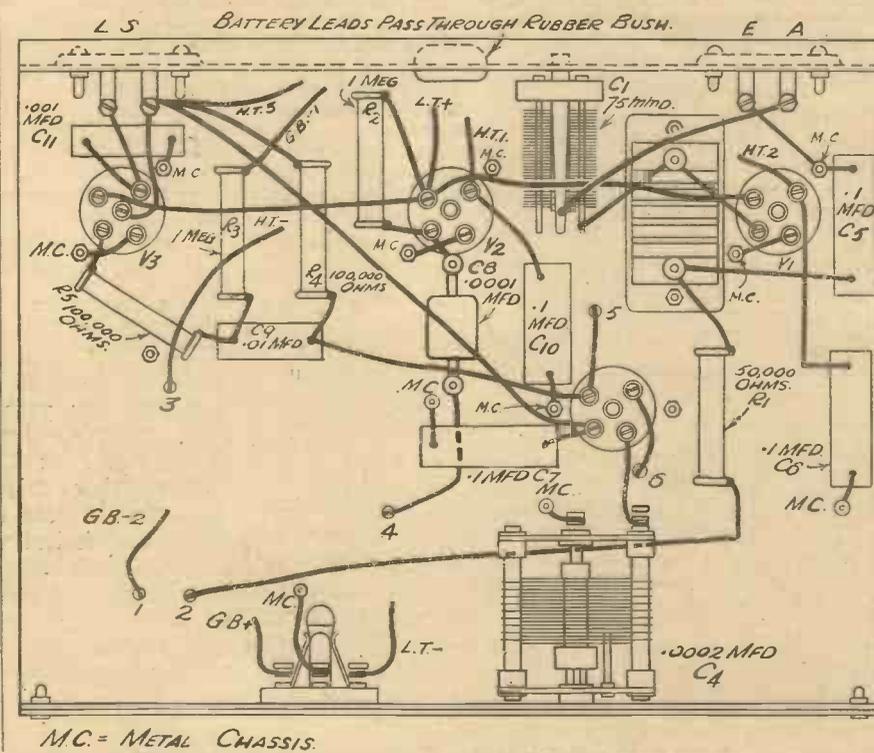
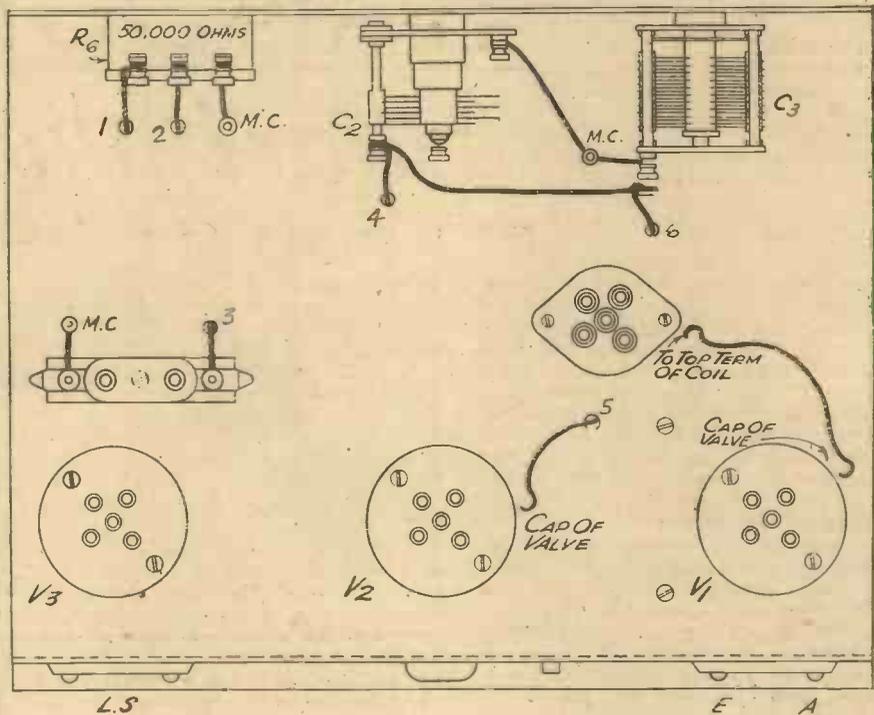
LIST OF COMPONENTS FOR THE BANDSPREAD S.-W. THREE.

- One short-wave coil, type B (Wearite).
- One bandspread tuning outfit C2, C3 (Eddy-stone).
- One 50,000 ohm potentiometer R6 (B.T.S.).
- One air-dielectric pre-set condenser, Type SW.87 C1 (Bulgin).
- Five fixed resistances (1 watt type) (Erie).
50,000—1 R1. (Erie).
100,000—2 R4, R5. (Erie).
1 megohm—2 R2, R3. (Erie).
- Seven Fixed Condensers:
One .0001, Type 685 C8 (Dubilier).
One .001, Type 4501 C11 (Dubilier).
One .01, Type 4501 C9 (Dubilier).
Four .1, Type 4503 C5, C6, C7, C10 (Dubilier).
- One 3-point on/off switch (B.T.S.).
- Four chassis-type valve-holders, 3 four-pin, one 5-pin (Clix).
- Two terminal Strips, aerial and earth and loud-speaker (Belling-Lee).
- Seven wander plugs, H.T.—, H.T.1, H.T.2, H.T.3, G.B.—, G.B.1, G.B.2 (Belling-Lee).
- Two spade connectors, L.T.— and L.T.+ (Belling-Lee).
- One S.W. H.F. Choke, Type H.F.3 (Bulgin).
- One Type RC32 reaction condenser (B.T.S.).
- One loud-speaker, Type 37M. (W. B.).
- One pair headphones (Ericsson).
- One Microfuse with Holder (100 m/A).
- One Bandspread Three Cabinet Peto-Scott
- One metal chassis 10in. by 7½in. by 2½in. (Peto-Scott).
- Three valves, Types HP211, HP210 (4-pin), PP222 (5-pin) (Tunggram).

wiring may be commenced. Use a fairly heavy gauge wire, and either the "slip-back" type or one of the glazed cotton-covered wires will be found suitable. The

former is the simpler, as it is only necessary to cut off the necessary length and push back the insulated covering in order to make the connecting loop. With the glazed type

WIRING DIAGRAM OF THE BANDSPREAD SHORT-WAVE THREE



1937 STENTORIAN

ALL MODELS OVER 39/6 ARE AVAILABLE ON H.P. TERMS FROM YOUR DEALER

of wire, the covering must first be scraped away, and in the past we have found many causes of breakdown due to the manner in which this has been carried out. If a very sharp knife is used and is run round the wire with much pressure, not only will the insulated covering be cut through, but the knife will also penetrate the actual wire for a short distance. The result is that when the wire is anchored beneath the screw-head or terminal, after a very short while the wire will break right through, although it may be held in position. The result will be noises and perhaps a complete breakdown in this part of the receiver. Therefore, when scraping away this covering use the knife in a more flat position, and any loose cotton ends which may remain may easily be removed by the simple expedient of burning them off with a match. The insulated covering is heat proof and a neat end to the lead will be obtained free from "whiskers."

If a loop is made for insertion beneath a terminal head or nut, make quite certain that the loop is made in a clockwise direction. If this precaution is not taken the loop will open when the nut is tightened. As a further precaution in this connection, the loop may be "sandwiched" between two washers.

Soldered Connections

The resistors and condensers used in the receiver are of the wire end type, and the actual wire ends are employed for connecting purposes in most cases. These may be cut down where necessary in order to keep the component in position, and in one or two cases the wire must be lengthened. When soldering the additional lead to the resistor do not leave the soldering iron in contact for too long a period or the value of the resistor may be modified. Similarly, the leads to the condensers may be loosened by a long application of the iron, and although the lead may not come away, an internal disconnection will prevent the receiver from functioning in certain cases. Condenser C8 is suspended in the wiring, and the metal ends of this must be prevented from coming into contact with the chassis. A stiff and very short length of wire joined to the grid terminal of the valve-

holder of V2 will assist in this direction, and the lead which passes through hole No. 4 may be taken-over condenser C7 to assist further in this direction.

Operating Instructions

It is not intended to give full operating instructions this week, but for those who



The completed Bandspread Short-wave Three.

have sufficient of the components handy or who are able to obtain the parts at once and complete the receiver, the following brief details will enable the receiver to be put into commission. First of all; the aerial to be used should be of the type designed for good short-wave reception. Good insulation is one of the main features, and the length may also be found critical in some cases. Experiment will enable a suitable arrangement to be found. When the receiver is switched on the main tuning is carried out by adjusting condenser C3 to the first of the "stops" on the control knob, and then turning condenser C2

through its entire range. Reaction should be kept advanced to such a position that it is just off the oscillation point. If no station is heard when condenser C2 is returned to its original position, the control on C3 should be turned to the next stop and

the same procedure again gone through. It will thus be seen that at each stop or section of C3 the condenser C2 is employed as a vernier device and divides up the tuning scale into a further narrow band. It is due to this effect that the term "band-spreading" is employed. If the reaction control (C4) is advanced too far the receiver will fall into a state of oscillation, and it will not be possible to hear telephony signals. C.W. or continuous-wave morse signals would then be heard, however, and these will appear in the form of a loud whistle or chirrup.

TO OUR READERS—AND THE TRADE (Continued from page 603)

unsatisfactory components have been issued to the public, and it is my fervent hope that this will not be the case in the ensuing season. A beginner who is disappointed in this way deserts home construction, and you have lost a customer, we a reader.

Each year a new generation of home constructors springs up, and we endeavour to produce designs satisfactory in performance, but simple in construction, to supply their needs. It is not unreasonable to ask you to encourage their interest by taking the greatest possible precaution to see that unsatisfactory components do not reach the market.

To new readers may I say that this is not a normal issue. Many of our regular features have been unavoidably held over because of the justifiable claim upon our space made by the Show Report. Normal issues contain a fair blending of every radio interest—a short-wave section, a beginners' supplement, summary of our blueprint service, an up-to-the-minute news section, the very latest news from the field of television, constructional articles on coils, transformers, chokes, and other components, constructional details of receivers perfected in our laboratories, free gift blueprints at regular intervals,

interesting replies to readers' letters, and a wide variety of general radio subjects.

This journal has been responsible for the great revival in home construction which has taken place during the past four years. It has introduced some radical changes, such as metallised chassis, transfer print wiring diagrams, service data sheets of our receivers, free replies to readers' questions, the specification of only those parts which were used in our original designs; our series of technical volumes, many of which have been translated into several languages, have a sale far greater than any other volumes of similar character—the sales running into millions. It is a matter of gratification to us who serve your interests that we have earned the reward of your continued loyalty to this paper. The memorial stones to this are those of our contemporaries who have fallen by the wayside.

During the season which follows we shall introduce many new features and surprises of far-reaching effect. May I add that I shall welcome on our Stand No. 10 on the ground floor any reader who calls upon me; my staff will also welcome you. It is the one occasion in the year when readers, staff, and Editor may meet on common ground.

Yours faithfully,

THE EDITOR.



AERIALITE, LTD., Junction Mills, Whittington Street, Ashton-u-Lyne. Stand No. 9
 THE specialities exhibited on this stand will consist of aerial accessories, such as the 7-strand and 11-strand Super Aerial Wire, and the "Trapeze," and Di-pole aeriels. A special interference-free matched di-pole aerial kit will also be seen, together with many accessories for the erection of neat and

Complete Guide to the Exhibits

In some cases details of exhibits have not been released at the moment of going to press.

Some new lines will include special high-voltage, low-amperage mains transformers for feeding cathode-ray equipment, and also some high-fidelity amplifiers giving 10 watts output. Special components designed for tropical use will also be on view.

ARMSTRONG MFG. CO., 100, King's Road, Camden Road, N.W.1. Stand No. 224.

AUTOMATIC COIL WINDER AND ELECTRICAL CO., LTD., Winder House, Douglas Street, S.W.1. Stand No. 31

THE mains portion of the exhibits on this stand will consist of measuring instruments of all types.

a 27-guinea A.C. automatic radiogram. The latter model possesses several novel features and is a neat and attractive piece of cabinet work. The circuit employed consists of an 8-stage superhet with a wave-range from 19.5 to 2,000 metres, the lower range ending at 50 metres. The large tuning scale is also featured in the Alba receivers, and to indicate tuning positions the "Searchlight" tuning device is fitted, and a cut-off switch is provided for switching off the light when the receiver is tuned in the battery models, in order to avoid an undue drain on the battery.

BARRATT & ROBINSON, LTD., 288, York Road, King's Cross, N. Stand No. 226.

BEETHOVEN RADIO, LTD., Chase Road, North Acton, London, N.W.10. Stand No. 34

THE Baby Portable will attract considerable attention on this stand, as it is one of the smallest commercial portables to be produced. Measuring only 9ins. by 8ins. by 5ins. and weighing only 10lbs., this interesting little receiver comprises a standard 4-valve circuit (using full-size valves) and incorporates a 70-volt H.T. battery and an accumulator giving twenty hours service per charge. It costs £0 6s. In addition there will be several other portables on view, as well as the all-valve superhet radiogram in a two-tone French Walnut cabinet costing 25 gns., which is shown on this page.

BELLING AND LEE, LTD., Cambridge Arterial Road, Enfield, Middx. Stand No. 98

IN addition to the multitude of small accessories such as wander plugs, connectors, leads, etc., featured by this firm, there will be many interesting



The neat speaker opening and single external control employed in Beethoven Model RS. 327.

efficient aerial systems. In addition, trickle chargers, eliminators and loudspeakers will also be shown, whilst some special Short-wave Adaptors, for either battery or mains use will be a prominent feature.

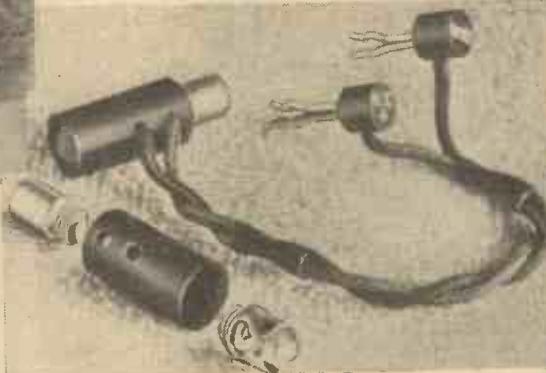
AERODYNE RADIO, LTD., Aerodyne Works, Tottenham, N.17. Stand No. 74

AN interesting range of receivers will be shown here, running from a simple battery three-valver to a super-sensitive 5-valve mains set. Most of the models are of the all-range type, covering the short wave-bands in addition to the normal broadcast bands. Model 54 will prove attractive on account of the unique Spear-o-lite tuning indicator which is fitted and which indicates by means of an illuminated arrow the exact station and wavelength to which the receiver is adjusted. The large tuning dial which is fitted to the Aerodyne receivers greatly simplifies tuning and gives the receivers a very attractive appearance.

AERONAUTICAL AND GENERAL INSTRUMENTS, LTD., Purley Way, Croydon. Stand No. 30.

ALL POWER TRANSFORMERS, LTD., 8a, Gladstone Road, Wimbledon, S.W.19. Stand No. 206

AN extensive range of mains accessories, including transformers and chokes, will be featured by this company. In addition, output and intervalve transformers, employing special core materials, will also be on view. The production of television equipment and high-powered public address equipment has also led to a demand for high-voltage mains accessories, and many of these will be on show on this stand.



A new split anode circuit connector produced by Messrs. Belling and Lee.

These will include the very popular Avometer and Avoniur, as well as some new instruments such as the Capacity Meter and a new 46-range Universal Avometer. An improved Signal Generator will also be seen for the first time, and Service Engineers and advanced experimenters will be interested in this and the Avo-Oscillator, which are valuable adjuncts to the testing of receivers. A new machine designed for the simultaneous winding of coils with paper insertion and final parting off on completion will also be shown, and this has variable speeds from 500 to 3,000 r.p.m. and winds up to 12 coils at a time.

BALCOMBE, A. J., LTD., 52-58, Tabernacle Street, London, E.C.2. Stand No. 41

THE Alba receivers to be seen on this stand will range from a 6-guinea 3-valve battery set to

Floor Plan appears on page 627.
 Bus and other Transport Facilities page 629.
 "Stand-to-Stand" Report next w ek.



The novel tuning indicator on this Beethoven Model 99 receiver greatly simplifies tuning.

Suppressing devices for use in connection with the elimination of mains noises. These cover practically every type of interference and may be applied to practically every piece of apparatus or wireless receiver. A new aerial kit for the suppression of noises introduced



"PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



from the aerial side of the receiver will also be exhibited, and a special exhibit will consist of the Interference Measuring Set, which has been built by Messrs. Belling and Lee to Post Office Specification and which measures the interference voltage and enables the precise eliminating equipment to be chosen.

BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, Tottenham, London, N.17. Stand No. 91.

UNDOUBTEDLY the main attraction on the Benjamin stand will be the new Duode loudspeaker. This is a high-quality speaker and the inventor will be in attendance to describe its main features and to answer questions in relation to its performances, etc. Other Magnovox speakers will also be shown, and in addition many of the small Benjamin products such as valveholders, switches, transformers, chokes, etc., which have for a long time proved very popular with the home-constructor.

BRIDGER & CO., LTD., R.O., No. 4, Factory, Shelford Place, Church Street, N.16. Stand No. 211.

BRITANNIA BATTERIES, LTD., Union Street, Redditch, Worcs. Stand No. 71

THE main portion of the exhibits on this stand will consist of Pertrix batteries. These are of the non-sal-ammoniac type, and in addition there will be some neutral electrolyte refill batteries for flash lights, cycle lamps and torches, Pertrix accumulators for L.T. purposes, as well as a full range of Bulldog (Sal-ammoniac) dry batteries for H.T. purposes. It is interesting to note that as each commercial receiver is produced a new Pertrix battery is also produced specially designed to fit it. There is thus always a Pertrix battery available for the popular makes of receiver.

BRITISH N.S.F., CO., LTD., Waddon Factory Estate, Croydon, Surrey. (See Wingrove & Rogers).

BRITISH G.W.Z. BATTERY CO., LTD., Falmouth Road, Trading Estate, Slough. Stand No. 69.

BRITISH PIX CO., LTD., Pix House, 118, Southwark Street, London, S.E.1. Stand No. 209

THE Pix Indoor Aerial is, of course, already very popular and will be well displayed on this stand. In addition the various other aerial accessories, such as the Grippon fitting, which is illustrated below,



The novel Grippon Aerial device to be shown by British Pix, Ltd.

and the lightning arrestor and selectivity device will also be well featured. Pix Valves, the Pix Metallised Earth, the Hydrolyte Earth Conductivity Compound, and the Modula Armchair Control are other accessories which will go to make up a very attractive display, and they are all accessories which will appeal to the listener who is out to get the best from his receiver.

BRITISH ROLA CO., LTD., Minerva Road, Park Royal, N.W.10. Stand No. 93

THE display of loudspeakers on this stand will include no fewer than eighteen separate models, ranging from the miniature model suitable for the lightweight portable, to the large 12in. diameter G.12 fidelity speaker shown on this page. This particular

model will take pride of place and will attract everyone who is looking for the latest in loudspeaker design. Another outstanding model in the Rola range is the Roma (also illustrated), specially designed to cover all extension speaker requirements. This is an 8in. speaker housed in a handsome walnut cabinet, and fitted with two low- and two high-impedance terminals. By placing a wander plug in the correct socket exact matching with any receiver can be secured. If desired, the speaker used in this model may be obtained without the cabinet.

BRITISH TUNGSRAM RADIO WORKS (GT. BRITAIN), LTD., 72, Oxford Street, W.1. Stand No. 33.

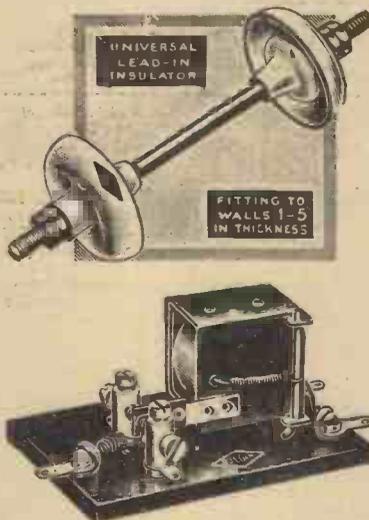
A FULL range of valves including some novel power valves for mains use will be seen on Stand 33. A new Universal vari-mu H.F. pentode will be shown as well as a new triode-hexode.

BROWN BROS., LTD., Gt. Eastern Street, E.C.2. Stand No. T8.

THIS will be purely a wholesaler's exhibit and representative models of various well-known makes will be seen.

BULGIN & CO., LTD., Abbey Road, Barking, Essex. Stand No. 1.

THE name of Bulgin needs no introduction, and there will probably not be another stand in Olympia with such an extensive range of components designed for the home constructor. Ranging from a selection of



Two of the many new Bulgin accessories which will be on view on Stand No. 1

control knobs costing only a few pence each, this extensive range will embrace such items as tuning coils, condensers, resistances, transformers, connectors, chokes, fuses, solder, instruments, neon lamps, aerial kits, etc. The two illustrations on this page show new lines which will be seen at Olympia for the first time and these include pre-set condensers, Vibrator type H.T. transformers, midjet split-secondary transformers, chokes, Meter Push controls, lead-in insulators, flexible shaft couplings, valve-holders, and Relays.

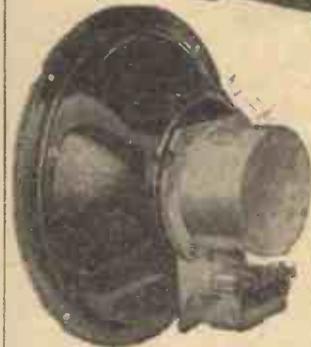
BURGOYNE WIRELESS (1930), LTD., Great West Road, Brentford, Middx. Stand No. 75.

FOR the first time Messrs. Burgoyne Wireless will be showing all-wave receivers, and some striking all-wave receivers and radiograms will be exhibited. A five-valve superhet tuning down to the S.W. band from 19 to 55 metres will form an attractive centre-piece for the remaining battery and mains receivers, and the straight circuit incorporating four-valves with Litz wound coils will also prove very interesting. An interesting point with regard to the Burgoyne superhet is that the intermediate frequency which has been selected is 473 kc/s.

BURNDIPT, LTD., Light Gun Factory, Erith, Kent. Stand No. 65.

THE twin-speaker Ethodyne will form an important exhibit on the Burndipt stand, and will be backed up by various battery and mains receivers, at prices ranging from £5 18s. 6d. to 13½ gns. and

cover a three-valve portable, four-valve band-pass receiver and the A.C. Mains Max-Specification 2-Band superhet. Two new all-wave receivers are introduced under the title of Four-band band-pass and it should be



The new Rola G.12 Speaker and Roma Extension model

noted that only two very narrow bands are omitted from the complete coverage from 13.5 to 2,000 metres. One receiver is for battery use and the other for Universal mains.

BUSH RADIO, LTD., Woodger Road, Shepherd's Bush W.12. Stand No. 50.

AMONG the Bush receivers will be a seven-stage superhet with nine tuned circuits covering four separate wavebands. The same chassis is included in model R.G.33, which is a radio gramophone fitted with a 12in. moving-coil speaker. Various other interesting models will be shown, and a feature of the Bush sets is the double pointer on the rectangular tuning scale, which shows every setting of the tuning condenser. In the radiograms the lid is split so that either half may be raised at will, and thus when only the radio is required it is unnecessary to uncover the turntable.

CADISCH & SONS, R., 5-6, Red Lion Square, W.C.1. Stand No. T10.

THIS also will be a wholesale exhibit showing representative commercial receivers.

CELESTION, LTD., London Road, Kingston-on-Thames. Stand No. 24.

THE display on this stand will consist of a complete range of permanent and energised magnet-type loudspeakers. These will include cabinet and chassis models, together with one new cabinet speaker which will be known as the Junior 8 model. This is fitted with a fully universal transformer and a constant impedance volume control. The cabinet is of figured walnut, and the tapings on the transformer make it possible to match this speaker to any receiver or amplifier.

THE WIRELESS CONSTRUCTOR'S ENCYCLOPAEDIA

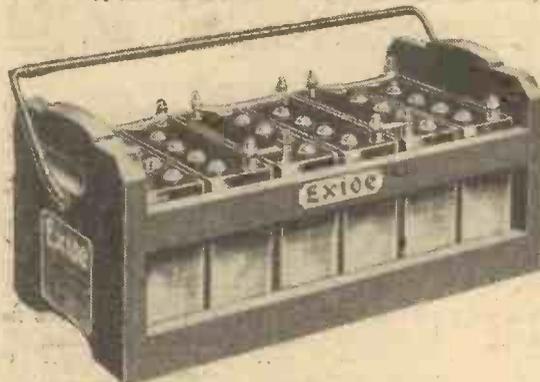
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Wireless Construction, Terms, and Definitions explained and illustrated in concise, clear language.

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CHLORIDE ELECTRICAL STORAGE CO., LTD.,
Exide Works, Clifton Junction, Nr. Manchester.
Stand No. 32.

An extensive range of batteries for all purposes will be shown by the speakers of the popular Exide and Drydex components, and the latest development in



An H.T. accumulator unit from the Exide range.

L.T. accumulators is the Exide "Hycap" cell, an illustration of which appears on this page. This battery has been designed to cope with the increased current consumption of the modern high-power receiver. The popular visible charge indicator is incorporated. A stack-type wood crate has also been produced this year for the H.T. accumulators, and an illustration of this is also given. There are now more than 150 different types of Drydex dry battery, and these will form an attractive display.

CITY ACCUMULATOR CO., LTD., 18-20, Norman Buildings, Central Street, E.C.1. Stand No. 18.

In addition to the various receivers to be seen on this stand, an interesting item will be the all-wave set of coil units, complete with screens, wave-change switch, I.F. transformers, I.F. and local station filters, etc. These are supplied ready with the necessary fittings for inclusion in a normal chassis and will greatly simplify the construction of an all-wave superhet. The two new receivers include the "Coronation" model shown on this page, which is a six-valve A.C. receiver, incorporating scanning-disc tuning

COLE, E. K., LTD., Ekco Works, Southend-on-Sea. Stand No. 53.

The chief attraction on the Ekco stand will undoubtedly be the "batteryless" battery receiver. In this, by means of a novel device, the H.T. battery has been dispensed with, and the necessary high-tension supply is obtained from the L.T. accumulator. Other interesting details concern the moulded cabinets, and the interesting designs of Serge Chermayeff in black and ivory will no doubt set a new note in receiver design. High fidelity is also an important feature of the Ekco receivers, and a special filter is now incorporated in the Ekco receivers to prevent interference from two neighbouring stations, and an extremely responsive speaker gives improved reproduction.

COSSOR, A. C., LTD., Cossor House, Highbury Grove, N. 5. Stand No. 55.

In addition to an extensive range of complete receivers, the Cossor stand will undoubtedly feature valves, cathode-ray tubes, and similar equip-

ment. The complete range of Cossor valves will be made into an attractive display, and the cathode-ray tube, owing to its increased popularity due to television, will attract considerable attention. A Ganging Oscillator, a Portable Oscillograph, and some complete television equipment will also be exhibited, and the ingenious design of the complete stand (following the lines of a Moroccan Palace) will make this exhibit a most attractive one.

CRYPTON EQUIPMENT, LTD., North Acton Road, Park Royal, N.W.10. Stand No. 202

A COMPLETE range of battery chargers will form this exhibit and will appeal chiefly to the dealer and service man. Rotary transformers, switchboards, rectifiers and all allied equipment will be included.

COSMOCORD, LTD., Cambridge Arterial Road, Enfield, Middx. Stand No. 78.

The neat Unigram Playing Desk, illustrated last week, is a modification of the unit which has already been seen before and which has proved very attractive. It converts any table-type receiver into an



The Hycap Exide Model C. F. G. 4.

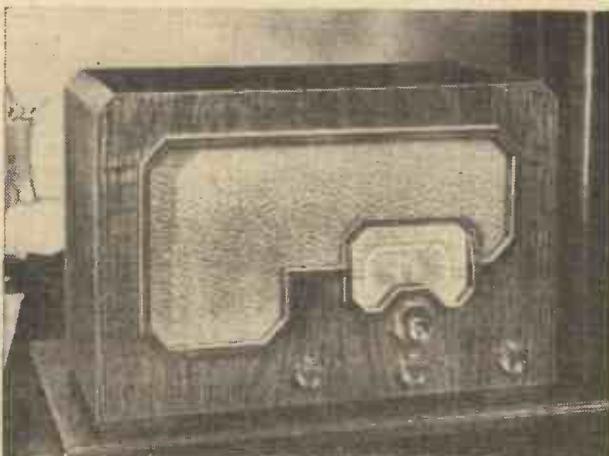
efficient radiogram and is designed for use with A.C. mains. It comprises a powerful induction motor, new Cosmocord pick-up, volume control and speed regulator, and it will be shown, together with the separate Cosmocord components, on this stand.

COLLARO, LTD., Culmore Works, Culmore Road, Peckham, S.E.15. Stand No. 70.

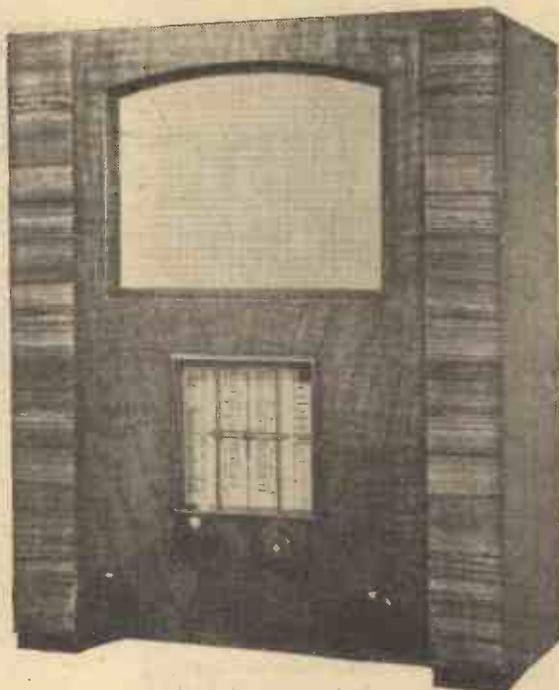
TURNABLES, pick-ups and applied gramophone apparatus will be exhibited on this stand, and a new automatic record changer will form the most important feature. In addition, a new A.C. induction motor, and a Universal motor, will be included, together with some complete radiogram units. For those with no mains facilities, some spring gramophone units will be on view, and these will appeal to every enthusiast who wishes to build a radiogram.

DALLAS & SONS, LTD., J. E., Dallas Building, Ridgmount Street, London, W.C.1. Stand No. T23.

THE exhibits on this stand will cover all the popular makes of complete receivers, valves, batteries, components, etc., and as factors, Messrs. Dallas will provide an attractive comprehensive display.



Cossor's popular receiver, has an interesting cabinet design.



Note the novel tuning scale on this 4-band Bush receiver.

DAVIS & TIMMINS, LTD., Brook Road, Wood Green, N.22. Stand No. 210.

D. M. DAVIES WOODWORK, Trading Estate, Slough, Bucks. Stand No. 17.

DECCA GRAMOPHONE CO., LTD., 1-3, Brixton Road, London, S.W.9. Stand No. 44.

THE range of Decca receivers extends from a simple battery three-valver to an elaborate A.C. mains auto-changer radiogram with six valves. The range of instruments will also include a mains portable radiogram and a mains gramophone attachment. Many of the new models incorporate the Selectorlite dial, a new feature to simplify tuning.

DENT, R. H. (Ardente), 309, Oxford Street, W.1. Stand No. 3.

A COMPLETE range of the latest and most advanced designs in public-address equipment will once again be on show at this stand. One of the most outstanding attractions on view will be the new Ardente Dynamic Ribbon microphone. This attrac-



One of the new 1937 C. A. C. receivers with Scanning Disc tuning.





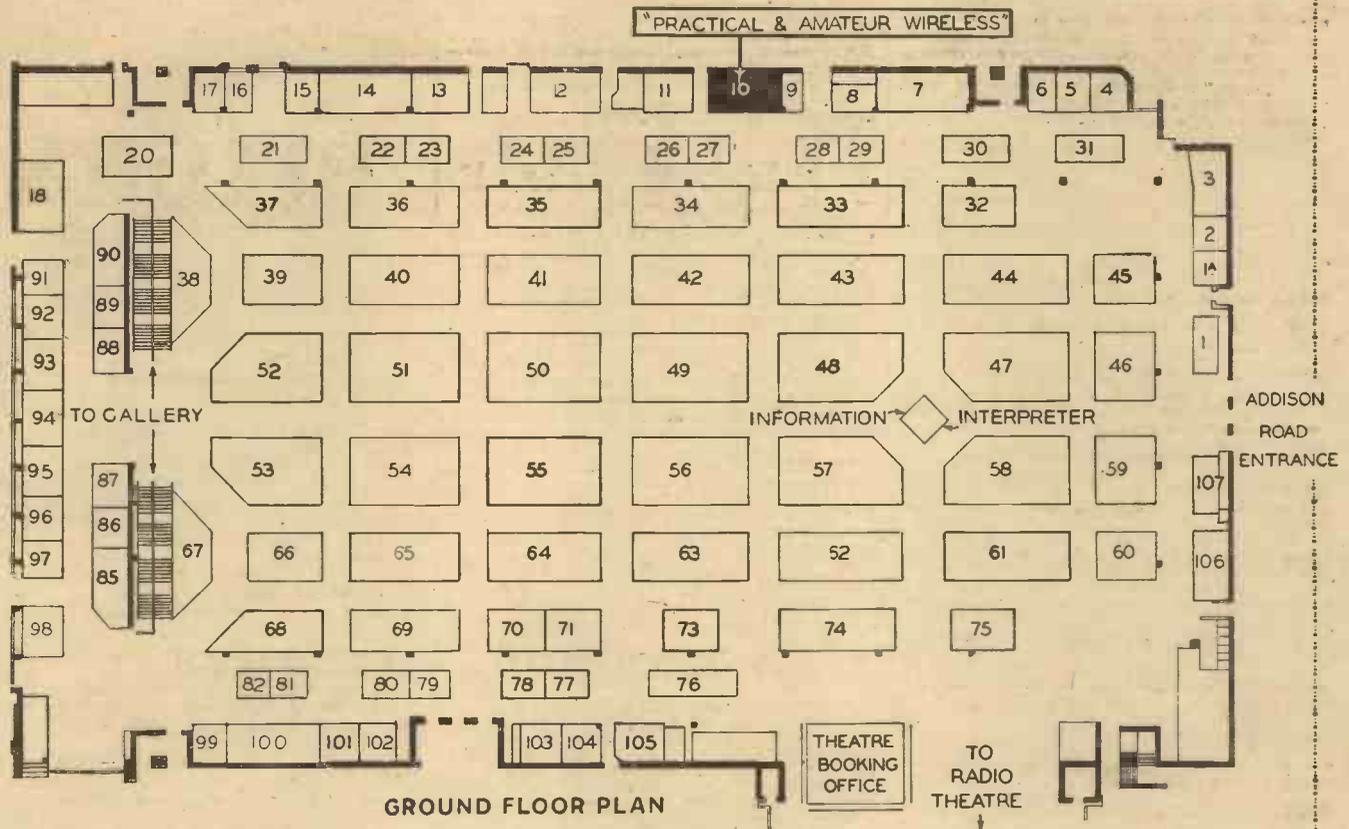
Full List of Exhibitors arranged in Alphabetical Order, with Addresses and Stand Numbers.

GUIDE TO THE EXHIBITORS

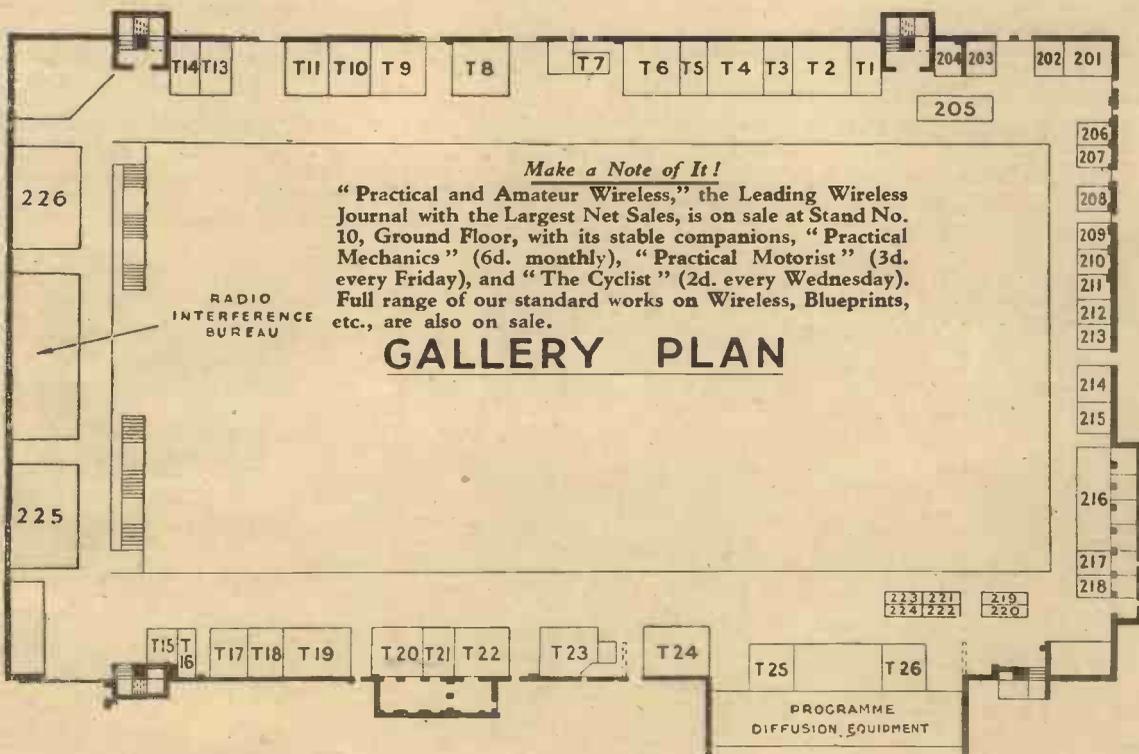
NAME	ADDRESS	STAND NO.	NAME	ADDRESS	STAND NO.	NAME	ADDRESS	STAND NO.
Aerialite, Ltd., Junction Mills, Whitlington Street, Ashton-u-Lyne		9	East London Rubber Co., Ltd., 29, Great Eastern Street, E.C.1		T9	Multitone Electric, Ltd., 95, White Lion Street, Islington, N.1		86
Aerodyne Radio, Ltd., Aerodyne Works, Tottenham, N.17		74	Eavestaff Co., Ltd., Autoplayer Factory, Ashfield Road, N.4		225	New London Electron Works, Ltd., East Ham, E.6		22
Aeronautical & General Instruments, Ltd., Purley Way, Croydon, Surrey		30	Econasign Co., Ltd., 92, Victoria Street, S.W.1		222	Newnes, Ltd., George, 8-11, Southampton Street, W.C.2		10
All Power Transformers, Ltd., 8a, Gladstone Road, Wimbledon, S.W.		206	Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2		42	Partridge Wilson & Co., Ltd., Evington Valley Road, Leicester		107
Armstrong Mfg. Co., 100, King's Road, N.W.1		224	Efficiency Magazine, 87 Regent Street, W.1		221	Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2		43
Automatic Coil Winder & Elec. Equipment Co., Ltd., Winder House, Douglas Street, S.W.		31	Ensign, Ltd., 88, High Holborn, W.C.1		T22	Plessey Co., Ltd., Vicarage Lane, Ilford, Essex		27
Balcombe, Ltd., A. J., 52, Tabernacle Street, E.C.2		41	Epoch Reproducers, Ltd., Aldwych House, Aldwych, W.C.2		94	Primographic, Ltd., 40-44, Chipstowe Street, W.1		223
Barratt & Robinson, Ltd., 288, York Road, King's Cross, N.		226	Ever Ready Co. (G.B.), Ltd., Hercules Place, Holloway, N.7		58	Primus Mfg. Co., Ltd., Primus House, Willow Street, E.C.2		1A
Beethoven Radio, Ltd., Chase Road, North Acton, N.W.10		34	Everett Edgcombe & Co., Ltd., Colindale Works, Hendon, N.W.9		213	Prism Mfg. Co., California Works, Brighton Road, Belmont, Surrey		80
Belling & Lee, Ltd., Cambridge Arterial Road, Enfield		98	Farrex Radio, Rear of 543, Holloway Road, N.19		218	Pye Radio, Ltd., Radio Works, Cambridge		48
Benjamin Electric, Ltd., Brantwood Works, Tariff Road, N.17		91	Ferranti, Ltd., Radio Works, Moston, Manchester 8, 63, 216		4	Radio Gramophone Development Co., Ltd., 18-20, Frederick Street, Birmingham		56
Bridger & Co., Ltd., R.O., No. 4 Factory, Shelford Place, Church Street, N.16		211	Film Industries, Ltd., 60, Paddington Street, W.1		210	Radiometers, Ltd., Dunbar Works, Dunbar Street, West Norwood, S.E.27		203
Britannia Batteries, Ltd., Union Street, Redditch, Worcs.		71	Flinders (Wholesale), Ltd., 14-20, St. Peter's Street, Ipswich		T16	Radio Resistor Co., Ltd., 1, Golden Square, Piccadilly, W.1		16
British Broadcasting Corp., Broadcasting House, W.1		38, 67	Fuller Accumulator Co., Ltd., Woodland Works, Chadwell Heath, Essex		101	Radio Society of Great Britain, 53, Victoria Street, S.W.1		214
British G.W.Z. Battery Co., Ltd., Falmouth Road, Trading Estate, Slough		69	Garrard Engineering & Manufacturing Co., Ltd., Newcastle Street, Swindon, Wilts.		37	Rawiplug Co., Ltd., Rawiplug House, Cromwell Road, S.W.7		79
British N.S.F. Co., Ltd., Waddon Factory Estate, Croydon, Surrey		96	General Electric Co., Ltd., Magnet House, Kingsway, W.C.2		40, 51	Reproducers & Amplifiers, Ltd., Frederick Street, Wolverhampton		92
British Pix Co., Ltd., 118, Southwark Street, S.E.1		209	Gilbert & Co., Ltd., C., 73, Arundel Street, Sheffield		T14	Rists Wires & Cables, Ltd., Fremantle Road, Lowestoft		208
British Rola Co., Ltd., Minerva Road, Park Royal, N.W.10		93	Goodmans (Clerkenwell), Ltd., Broad Yard Works, Turmill Street, E.C.1		87	Rothermel, Ltd., R. A., Rothermel House, Canterbury Road, N.W.6		89
British Tungsram Radio Works, Ltd., West Road, Tottenham, N.17		33	Gorst Electrical Co., Ltd., Portadyne Works, Gorst Road, N.W.10		46	Selecta Gramophones, Ltd., 81, Southwark Street, S.E.1		T11
Brown Brothers, Ltd., Great Eastern Street, E.C.2		T8	Gramophone Co., Ltd., 98, Clerkenwell Road, E.C.1		54	Self-Changing Gramophones, Ltd., 11, Berkeley Square, W.1		59
Bulgin & Co., Ltd., A. F., Abbey Road, Barking, Essex		1	Grampian Reproducers, Ltd., Station Avenue, Kew Gardens, Surrey		21	Shaftesbury Microphones, Ltd., 24, Aldersgate Street, E.C.1		99
Burgoyne Wireless, Ltd., Great West Road, Brentford, Middx.		75	Hacker & Sons, H., Perfecta Works, Ray Lea Road, Maidenhead		20	Siemens Electric Lamps & Supplies, Ltd., 39, Upper Thames Street, E.C.4		60
Burdnpt, Ltd., Light Gun Factory, Erith, Kent		65	Harmer & Simmons, Ltd., 223, Hoe Street, Walthamstow, E.17		217	Sound Sales, Ltd., Marlborough Road, Upper Holloway, N.		70
Bush Radio, Ltd., Woodger Road, Shepherd's Bush, W.12		50	Harries Thermionics, Ltd., Avenue Chambers, Vernon Place, W.C.1		2	Stratton & Co., Ltd., Eddystone Works, Bromsgrove Street, Birmingham		23
Cadisch & Sons, R., 5-6, Red Lion Square, W.C.1		T10	Haynes Radio, Queensway, Enfield, Middlesex		13	Tannoy Products, Canterbury Grove, W. Norwood, S.E.27		45
Celestion, Ltd., London Road, Kingston-on-Thames		24	Heayberd & Co., F. C., 10, Finsbury Street, E.C.2		25	Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, W.3		68
Chloride Electrical Storage Co., Ltd., 417 Battersea Park Road, S.W.11		32	Henderson's Wholesale Electrical & Radio, Ltd., Electric House, Queen's Road, Brighton		T17	The 362 Radio Valve Co., Ltd., Stoneham Road, Upper Clapton, E.5		207
City Accumulator Co., Ltd., 18, Normans Buildings, Central Street, E.C.1		18	Henley's Telegraph Works, Co., Ltd., W. T., Holborn Viaduct, E.C.1		28	Thompson, Diamond & Butcher, 34, Farringdon Road, E.C.1		T4
Cole, Ltd., E. K., Ekco Works, Southend-on-Sea		53	High Vacuum Valve Co., Ltd., 113, Farringdon Road, E.C.1		26	Tucker Byelet Co., Ltd., George, Cuckoo Road, Birmingham, 7		106
Collaro, Ltd., Culmore Works, Culmore Road, Peckham, S.E.15		70	Hillman Brothers, Ltd., 123, Albion Street, Leeds		T3	Ultra Electric, Ltd., Western Avenue, Acton, W.3		52
Cosmocord, Ltd., Cambridge Arterial Road, Enfield, Middx.		78	Hobday Brothers, Ltd., 21, Great Eastern Street, E.C.2		T20	Union Radio Co. Ltd., U.R. Works, Aurelia Road, Croydon		20
Cossor, Ltd., A. C., Cossor House, Highbury Grove, N.5		55	Invicta Radio, Ltd., Parkhurst Road, N.7		35	Varley, Cambridge Place, Burrage Road, S.E.18		77
Crypton Equipment, Ltd., North Acton Road, Park Royal, N.W.10		202	Ismay Distributors Ltd., Sterling Works, Dagenham		73	Vidor, Ltd., West Street, Erith, Kent		61
Dallas & Sons, Ltd., John E., Dallas Building, Ridgmount Street, W.C.1		T23	Jackson Brothers, Ltd., 72, St. Thomas Street, S.E.1		81	Waterhouse, Ltd., Frederick, Stanley Works, Edward Street, Dudley Hill, Bradford		201
Davies Woodwork, D. M., Trading Estate, Slough, Bucks.		17	Kingsway Electricals, Ltd., 3-9, Dane Street, W.C.1		88	Webber & Co., Ltd., J. M., 39, Great Eastern Street, E.C.2		T13
Davis & Timmins, Ltd., Brook Road, Wood Green, N.22		210	Kolster-Brandes, Ltd., Cray Works, Sidcup, Kent		57	Westinghouse Brake & Signal Co., Ltd., 82, York Road, Kings Cross, N.1		36
Decca Gramophone Co., Ltd., 1-3, Brixton Road, S.W.9		44	Lectro-Linx, Ltd., 79a, Rochester Row, S.W.1		82	Weston Electrical Instrument Co., Ltd., Kingston By-Pass, Surbiton, Surrey		215
De La Rue & Co., Ltd., Thos., 90, Shernhall Street, E.17		6	L.E.S. Distributors, Ltd., 15, Alfred Place, Tottenham Court Road, W.C.1		T21	Wharfedale Wireless Works, 62, Leeds Road, Bradford		204
Dent, R. H. (Ardente), 309, Oxford Street, W.1		3	Lingnaphone, Ltd., 24-27, High Holborn, W.C.1		106	Whiteley Electrical Radio Co., Ltd., Victoria Street, Mansfield, Notts		66
Dew & Co., Ltd., A. J., 33, Rathbone Place, W.1		T6	Lissen, Ltd., Worpole Road, Isleworth, Middlesex		64	Wingrove & Rogers, Ltd., Arundel Chambers, 188, Strand, W.C.2		95
Dibben, Ltd., Horace, 34, Carlton Crescent, Southampton		T15	London Electric Appliances, Ltd., 62, Glengall Road, Old Kent Road, S.E.15		212	Wright & Weaire, Ltd., 740, High Road, Tottenham, N.17		97
Diggle & Co., Jane Street, Rochdale		16	Lugton & Co., Ltd., 203, Old Street, E.C.1		T5			
Dubiller Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, North Acton, W.3		39	Manufacturers' Accessories Co. (1925), Ltd., 85, Great Eastern Street, E.C.2		T7			
Dulcetto-Polyphon, Ltd., 2-3, Newman Street, W.1		T19	Marconiphone Co., Ltd., 210, Tottenham Court Road, W.1		49			
Dyson & Co., Ltd., J., 5, Godwin Street, Bradford		T2	McMichael Radio, Ltd., Danes Inn House, 265, Strand, W.C.2		47			
Eastick & Sons, J. J., 118, Bunhill Row, E.C.1		T24	Milnes Radio Co., Ltd., Church Street, Bingley, Yorks		205			
			Mullard Radio Valve Co., Ltd., Mullard House, Charing Cross Road, W.C.2		62			

FINDING YOUR WAY ROUND RADIOLYMPIA

Floor Plans Showing Positions and Numbers of Stands



GROUND FLOOR PLAN



GALLERY PLAN



"PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



live instrument, which has been tested and highly praised by many authorities, is claimed by the Ardenite laboratories to be the greatest advance ever made in microphone technique.

The "heart" of the new microphone, which ranks ahead of all other types for sound amplification, is a metal ribbon only a quarter of a thousandth of an inch thick.

Ardenite will also display more than twenty varied examples of their amplifier units, the majority of which will be housed in black ripple cases with chrome fittings, together with loudspeakers, microphones, etc.

DE LA RUE & CO., LTD., T., 90, Shern Hall Street, E.17. Stand No. 6.

THIS exhibit, being of a Trade nature, will consist of moulded articles designed especially for manufacturers, and will form a very interesting display.

DEW, A. J. & CO., LTD., 33, Rathbone Place, W.1. Stand No. T6.

DIBBEN, HORACE, LTD., 34, Carlton Crescent, Southampton. Stand T.15.

THIS exhibit is of a wholesale type, featuring commercial receivers of well-known makes.

DIGGLE & CO., Jane Street, Rochdale. Stand No. 15.

DUBILIER CONDENSER CO. (1935), LTD., Ducon Works, Victoria Road, North Acton, W.3. Stand No. 39.

AMONG the many interesting condensers and other accessories to be seen on this stand will be two new types of moulded mica condenser. These are moulded by a special process which provides perfect sealing and protection. A new range of paper condensers with solder tag connections will also be seen, as well as non-inductive tubular paper condensers, condenser blocks, wet electrolytic condensers, dry electrolytic condensers, and electrolytic condenser blocks and various types of resistances.

DULCETTO POLYPHON, 2 and 3, Newman Street, Oxford Street, W.1. Stand No. T19.

ALL the exhibits on this stand will consist of well-known commercial products, and it will be a purely wholesale exhibit.

DYSON & CO., LTD., J., 5, Godwin Street, Bradford. Stand T.2.

ONLY well-known commercial receivers will be seen on this stand.

EASTICK & SONS, J. J., 118, Bunhill Row, E.C.1. Stand T.24.

EAST LONDON RUBBER CO., LTD., 29/33, Gt. Eastern Street, E.C.2. Stand No. T9.

A GAIN, as wholesalers, the products on this stand will consist entirely of well-known lines and no products of the East London Rubber Co. will be shown.

EAVESTAFF CO., LTD., Autoplayer Factory, Ashfield Road, N.4. Stand 225.

ECONASIGN, CO., LTD., 92, Victoria Street, S.W.1. Stand 222.

EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, W.C.2. Stand No. 42.

A COMPLETE range of Mazda valves will be featured on this stand, and this will be augmented by a display of cathode ray tubes and special valves, and the B.T.H. pick-ups and similar accessories. In addition the full range of Edison Extra Life Accumulators and the Tungar Radio Battery Chargers will be seen. In connection with the latter some new models will be

seen for the first time and these include models suitable for home use as well as for those operating large battery charging stations. The latest B.T.H. pick-up is the Minor model, which now costs only 17s. 6d. complete with self-contained volume control.

EFFICIENCY MAGAZINE, 87, Regent Street, W.1. Stand 221.

ENSIGN LTD., 88, High Holborn, W.C.1. Stand T.22. ONLY exhibits of a wholesale nature will be shown here.

EPOCH REPRODUCERS, LTD., Aldwych House, Aldwych, London, W.C.2. Stand No. 94.

A NEW super-cinema loud speaker will be shown on this stand; and existing models such as the Domino Model 101½ and D4 speakers will be seen in improved designs. A new suspension material is now being employed on the outside edge of the cone and this has increased the frequency response of the models. A P.M. super-cinema model is also being introduced and is capable of handling 30 watts of undistorted speech. A new range of horns for use with speaker units and an improved microphone will also be seen.

EVER-READY CO. (Gt. Britain), LTD., Hercules Place, Holloway, N.7. Stand No. 58.

IN addition to a full range of batteries of all types, The Ever-Ready Company will also be exhibiting a complete range of receivers, including portables, transportables and table model superhets.



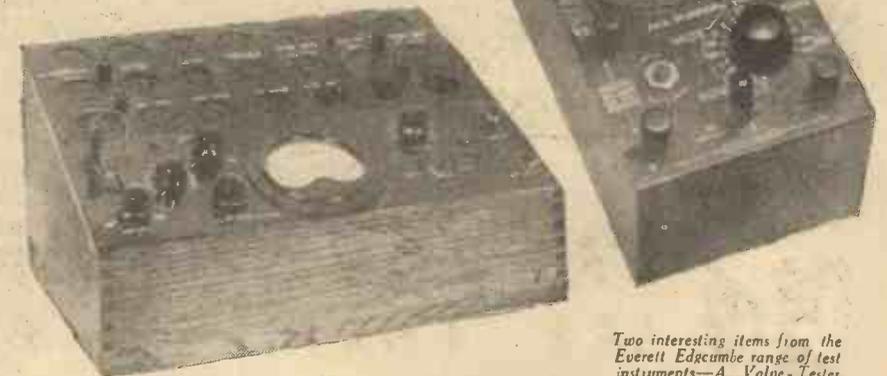
One of the Grampian P. A. Loudspeakers.

EVERETT, EDGUMBE & CO., LTD., Colindale Works, Hendon, N.W.9. Stand No. 213

THE complete range of meters and test equipment to be seen on this stand includes some useful equipment for the experimenter as well as for the service engineer. An all-purpose tester, a visual valve tester, and a service valve tester have all been improved this year, and the illustrations on this page show the first two of these exhibits.

FARREX RADIO, Rear of 543, Holloway Road, London, N.9. Stand No. 218.

THE range of apparatus to be seen on this stand will include All-Metal Converters, a Universal Power Pack, a Dual-Micro Converter, Public Address Equipment and Power Units. The public address equipment will embrace microphones, projection speakers and amplifiers, and certain models have been developed to render them suitable for television purposes.



Two interesting items from the Everett Edgumbe range of test instruments—A Valve-Tester and All-Purpose Tester.



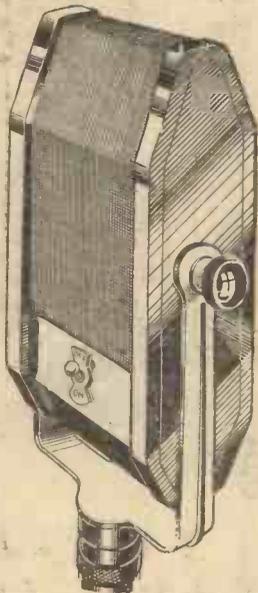
The latest Fidelity Auditorium Type Goodman Speaker.

FERRANTI, LTD., Radio Works, Moston, Manchester 10. Stand Nos. 8, 63, 216.

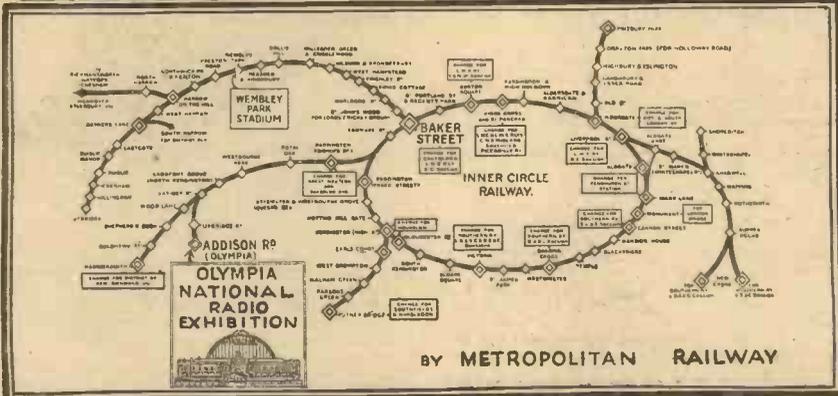
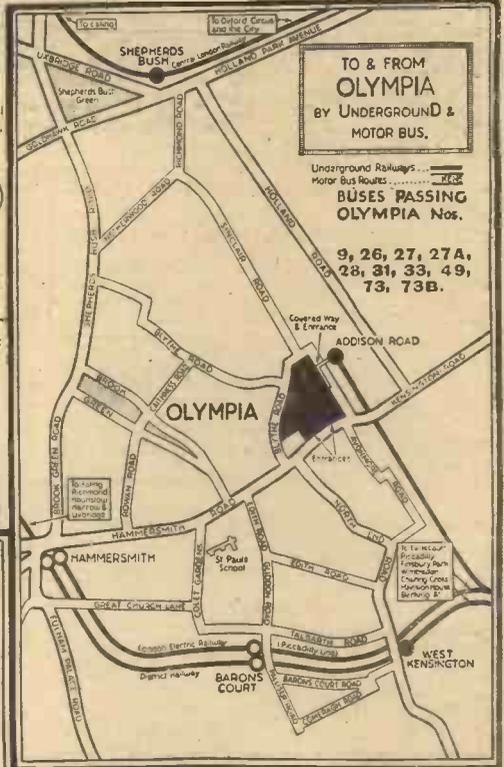
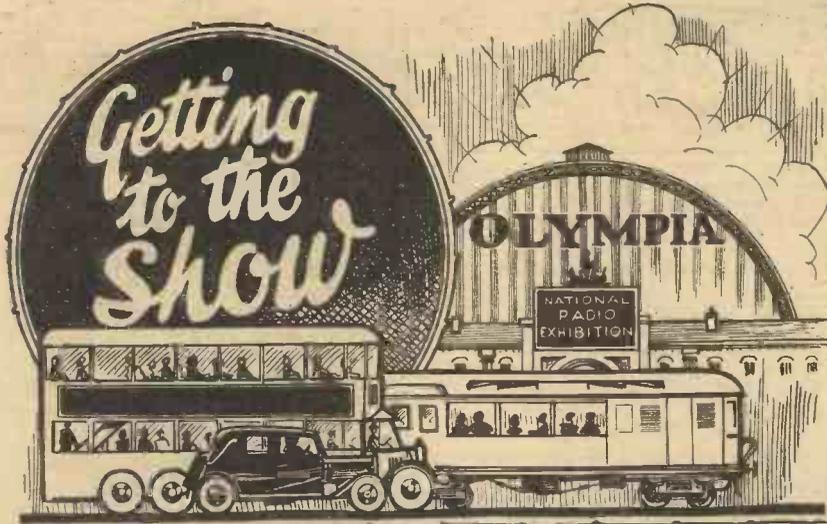
THE main Ferranti stand will be utilised solely for the purpose of showing the new all-wave range of receivers, radiograms, and extension speakers. The receivers include various all-wave models, and an interesting feature is the ingenious tuning scale which is incorporated to simplify tuning on the short waves. A separate small stand will be devoted to the display of a very comprehensive range of 2½in. moving coil, A.C. rectifier electrostatic and thermal instruments, whilst in addition a variety of components, including transformers, chokes, condensers, resistances, speakers and similar items will be on view.

FILM INDUSTRIES LTD., 60, Paddington Street, W.1. Stand No. 4

PUBLIC Address apparatus will form the bulk of this exhibit, and the apparatus displayed will include loud-speakers of both the cone and the horn type. Microphones, amplifiers and special school radio equipment will be seen, the latter taking the form of a neat portable equipment mounted on castors, and designed to deliver sufficient power to supply up to eight extension loud-speakers. The small "Baby" P.A. equipment employs a battery-operated amplifier with a Class B output stage and will no doubt prove of considerable interest as it feeds a 40in. all-metal horn-type loud-speaker.



A new Fidelity Ribbon-Type Microphone developed for P. A. work by Grampian.



FLINDERS (WHOLESALE), LTD., 14-20, St Peter's Street, Ipswich, Stand T.16.
 THIS exhibit, also, is of a wholesale type.

FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex, Stand No. 101.
 A NEW accumulator, type FMG (illustrated on this page) will be an attraction on the Fuller stand and will take its place amongst the vast range of Sparta



The new FMG model Fuller accumulator.

dry batteries and other multi-plate accumulators. The range of H.T. dry batteries has been considerably extended and it is now possible to select a battery for practically every commercial receiver which is manufactured.

GARRARD ENGINEERING & MFG. CO., LTD., Swindon, Wilts. Stand No. 37.

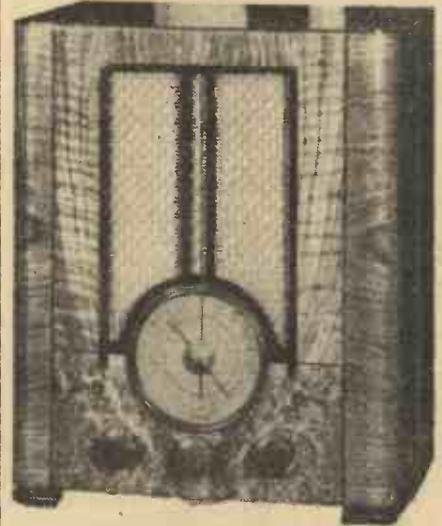
IN addition to the already popular range of gramophone accessories of Garrard make, a new Automatic Record-changer will be seen this year. This includes a pick-up and arm and is supplied completely ready for fitting in position in the cabinet. This changer will play automatically and consecutively

eight 10in. or eight 12in. records of any make provided they have the central run-off or eccentric groove. When the last record has been played the changer automatically stops and switches off the electric current. A rejector control is fitted.

GENERAL ELECTRIC COMPANY, LTD., Magnet House, Kingsway, W.G.2. Stands Nos. 40 and 51.
 STAND No. 51 will attract attention by the artistic lines of its layout and the original lighting effects which form part of it. The display has been designed to give leisurely inspection of the complete range of receivers ranging from a simple battery 3-valver utilising a straight circuit to an all-wave record-changing radiogram. On Stand No. 40 displays of valves and public address and relay equipment will be given, one of the most interesting items being a piece of apparatus illustrating the functioning of the cathode-ray tube. Another working model which will attract attention is that illustrating clearly the effect of overloading various types of power valve.



The Magnoscopic dial on the Ferranti receivers is clearly seen in this illustration.



Gerst Radio will be showing this Portadyne receiver.



1937 STENTORIAN

SEE THEM AT RADIOLYMPIA
 STAND 66



"PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



GILBERT & CO., C., 73, Arundel Street, Sheffield. Stand T14.

GOODMANS INDUSTRIES, LTD., Lancelot Road, Wembley, Middlesex. Stand No. 87.

AMONG the loud-speakers to be exhibited on this stand will be the 12in. auditorium high-fidelity speaker which is illustrated on page 628. An entirely new model, a 10in. auditorium model designed for a



The New Garrard Auto-record Unit.

power output (6 watts) will also be seen, and among the remaining models is an 8in. chassis model, continued from last year, and the 24B semi-projector model with a 24in. flare. This model is fitted with an entirely new unit, and still costs £10. The new model Airflo extension walnut cabinet loud-speaker, complete with volume control, will also be seen.

GORST ELECTRICAL CO., LTD., Portadyne Works, Gorst Road, North Acton, London, N.W.10. Stand No. 48.

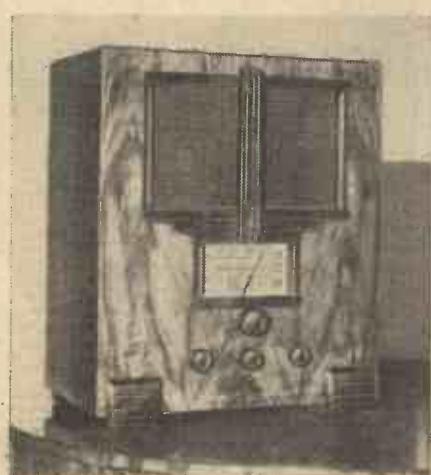
THE complete range of Portadyne receivers will be seen here, and these will include Model A.64, shown on page 629. This is a 6-valve superhet covering four wave-bands (including the short waves from 16 to 50 and from 50 to 150 metres). An important feature of these receivers is the inclusion of the "Porta" aerial and tone control.

GRAMOPHONE CO., LTD., 98, Clerkenwell Road, E.C.1. Stand No. 54.

THIS exhibit consists of seventeen receivers and radiograms, and two new Television receiving instruments. One of the latter is illustrated on this page and will no doubt attract considerable attention in view of the forthcoming transmissions. There are two television receivers, one of which has a fixed-tuned sound section to simplify operation, and the other has a standard radio-section. An important point regarding the standard radio receivers is that in some of the all-wave models the lower wavelength covered has been reduced to 7 metres so that the sound portion of the television transmissions may be heard. The novel cabinet designs will also prove interesting and some radical changes from orthodox practice will be seen and will no doubt form the topic of considerable discussion among the visitors to the exhibition.

GRAMPIAN REPRODUCERS, LTD., Kew Gardens, Surrey. Stand No. 21.

THE majority of the apparatus on this stand will consist of public address equipment and this will embrace microphones, loud-speakers and amplifiers.



Invicta Radio are showing an ordinary Battery Three in addition to some elaborate special sets.

For big outdoor events, the model 25 amplifier, delivering a 25 watt undistorted output, will attract attention, and is stated to have a frequency characteristic which is linear within 3 db. up to 10,000 cycles. Other items include the moving-coil microphone and projection speaker designed to handle 12 watts.

HACKER & SONS, H. Perfecta Works, Ray Lea Road, Maidenhead. Stand No. 29.

MESSRS. HACKER will be showing a range of high-fidelity radio-gramophones and receivers under the name of Dynatron. This year there will be four completely new models the Victor, Viking, Valkyrie, and Vulcan. The Ether Empress is an all-wave 16 valve automatic radiogram, a complete high-fidelity instrument for the music lover.

HARMER & SIMMONS, LTD., Electra House, 223, Hoe Street, Walthamstow, E.17. Stand No. 217.

THE apparatus shown here will consist of special output rectifiers for use with all types of apparatus requiring direct current. In addition there will be other mains equipment including rectifiers, eliminators, and gas-filled valve rectifiers for use on a 400 volt 3-phase supply for battery charging.

HARRIES THERMIONICS, LTD., Avenue Chambers, Vernon Place, W.C.1. Stand No. 2.

HAYNES RADIO, LTD., Queensway, Enfield, Middlesex. Stand No. 13.

AS in previous years, the exhibits on this stand will consist of high-quality receivers and radiograms. Some interesting amplifiers will also be shown, and these include the Duophase method of L.F. coupling invented by Mr. F. H. Haynes. The receivers will attract attention on account of the fact that the visual tuning indicator which is fitted consists of a standard milliammeter, in contrast to the various ingenious "thermometers" and other devices which are used on other receivers. The Haynes Loud-speaker, a heavily-built quality component, will also be shown.

HEAYBERD & CO., F. C. 10, Finsbury Street, London, E.C.2. Stand No. 25.

THE major portion of this exhibit will consist of mains accessories, such as transformers, chokes, etc. In addition to these, some complete mains units will be seen in company with various chargers, both for the amateur and for the service engineer. This



Simpson's Synchronous Turntable will again be featured on Stand No. 88.

year a new amplifier of the portable type will be on show, and will attract attention in view of its novel design and low price.

HENDERSON'S WHOLESALE ELECTRICAL & RADIO LTD., Electric House, Queen's Road, Brighton. Stand T17.

HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, London, W.C.1. Stand No. 28.

THIS stand will be devoted almost exclusively to the Solon electric soldering iron, which is now one of the most popular irons amongst home constructors. In addition, many manufacturers employ the larger model of the Solon iron, which is available with a 240-watt dissipation. A new pencil-point bit will be seen this year and will prove very useful for making connections in the latest types of small and compact receivers.

HIGH VACUUM VALVE CO., LTD., 113, Farringdon Road, E.C.1. Stand No. 26.

MOST interesting range of valves will form the main portion of this exhibit and the midjets will no doubt attract the greatest amount of attention in view of the present popularity of the midjet type of receiver. The special valves for short-wave use and other specialities will also make this an attractive exhibit.

HILLMAN BROS., LTD., [123, Albion Street, Leeds, Stand T3.

Two of the new Solon Electric Soldering Irons, showing the new Pencil-point bit.

HOBDAY BROS., LTD., 21, Gt. Eastern Street, E.C.2. Stand T20.

THIS is a wholesale exhibit.

INVICTA RADIO, LTD., Parkhurst Road, London, N.7. Stand No. 35.

A POPULAR range of receivers will be seen here, ranging from a three-valve battery model at



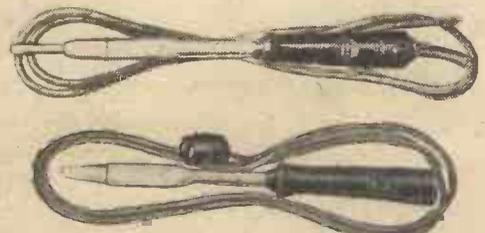
One of the first Television receivers to be produced for Olympia—This is an H.M.V. model.

£6 5s. (C.W.37) to a 22-guinea all-wave mains radiogram. The range includes a special Fisher-man's set which is a three-waveband receiver designed especially to withstand the effects of sea spray and other climatic extremes met with in a yacht or fishing vessel. The cabinet is of Bermuda teak and the cost is £9 19s. 6d.

ISMAY DISTRIBUTORS, LTD., Sterling Works, Dagenham. Stand 73.

JACKSON BROS. (LONDON), LTD., 72, St. Thomas' Street, London, S.E.1. Stand No. 81.

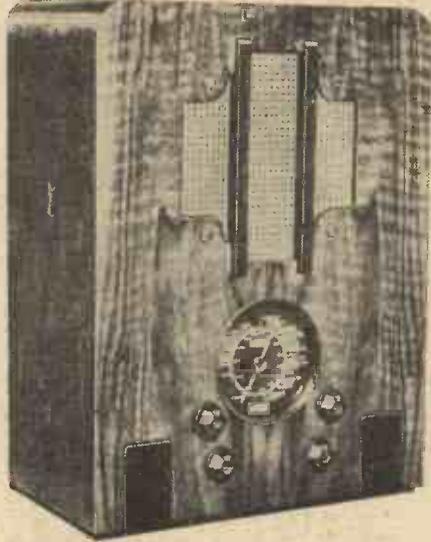
THE main part of this exhibit will consist of variable condensers and drives, and these extend from a simple single short-wave unit to ganged units of four separate sections designed for use in commercial superhets. The range of drives will prove especially attractive and these may now be obtained with wave-length calibrations designed for use with modern coils. Control knobs and similar smaller items will also be seen, together with some special complete tuners in which the coils are also included.



Win a W.B. Speaker!
Turn-to page 606.

KINGSWAY ELECTRICALS, LTD., 3 to 9, Dane Street, London, W.C.1. Stand No. 88.

THE Simpson electric turntable is the main feature here, and in addition a number of component parts manufactured to special orders will also be seen. It will give some idea of the wide range of components which can be made by this particular firm.



The Airplane Type dial is featured in the Lissen set shown above.

KOLSTER-BRANDES, LTD., Gray Works, Sidcup, Kent. Stand No. 57.

AMONG the many receivers to be shown on this stand the principal new features to be included are known as the "Supermagnidyne" device, which is the name given to receivers incorporating special tuning coils wound with multi-strand Litz wire; the "Phototune" tuning dial; the "K-Beacon" cathode-ray visual tuning indicator; and the differential tone control. In addition, of course, the well-known Rejectorstat feature will be prominently displayed.

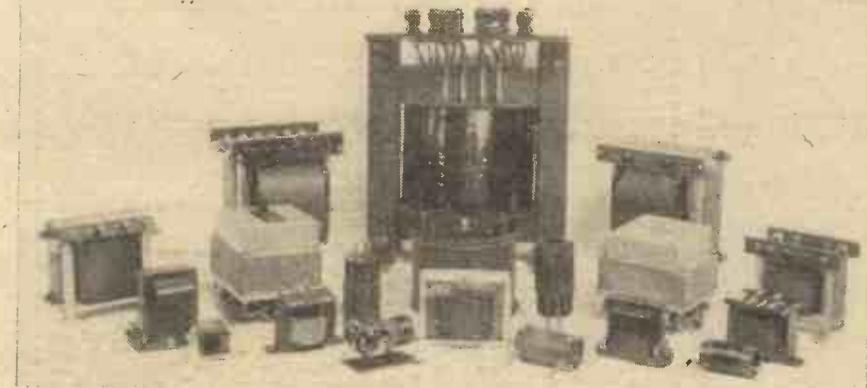
LECTROLINX, LTD., 79a, Rochester Row, London, S.W.1. Stand No. 82.

THE home-constructor will find this stand of particular interest in view of the many small components which will be featured. These include valveholders, connector strips, plugs, sockets, and similar items. New items this year will be the fuse plugs, a loud-speaker control panel with "plug-switch," and the skeleton valve adaptor.

L.E.S. DISTRIBUTORS, LTD., 15, Alfred Place, Tottenham Court Road, W.C.1. Stand T21, T26.

LINGUAPHONE, LTD., 24-27, High Holborn, London, W.C.1. Stand No. 106.

FOUR radio-grams will be seen here, the smallest a recording gramophone which, although little larger than a portable set, has an 8in. internal energised moving-coil speaker. The largest model is an "All



Just a few of the many specialised components produced by Kingsway Electricals.

World" recordiogram costing 50 gns. and employing 8 valves with a push-pull output stage feeding a duode speaker. This set covers four separate wavebands and full provision is made for making gramophone records.

LISSEN, LTD., Worple Road, Isleworth, Middx. Stand No. 64.

AN extensive range of receivers, batteries, and valves will be seen on this stand, and the portable with the novel loud-speaker mounting will no doubt prove the most interesting in view of the departure from normal design. This particular receiver is illustrated on page 642 and the method adopted may clearly be seen.

LONDON ELECTRIC APPLIANCES, LTD., 62, Glengall Road, Old Kent Road, S.E.15. Stand No. 212.

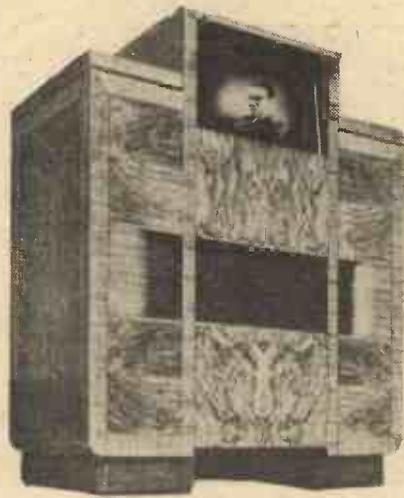
AMONG the receivers to be shown here are the Junior, Senior, Major, and the Grand. These are all 4-valve portables, and the Major is fitted with detachable handle and turntable. These receivers all incorporate the Hivac midjet valves and a further novelty fitted in the Grand is a battery economiser circuit.

LUGTON & CO., LTD., 203, Old Street, London E.C.1. Stand No. T5.

ALTHOUGH the main portion of this exhibit will be of a wholesale nature, representative of all the well-known models, the Maxitone accumulators and other specialities of Messrs. Lugton will be on view.

MANUFACTURERS ACCESSORIES CO. (1928), LTD., 85, Gt. Eastern Street, E.C.2. Stand No. T7.

THIS exhibit will also be of a wholesale nature, featuring well-known receivers for which Manufacturers Accessories are acting as distributors.



Marconiphone will also be showing a Television receiver and this illustration shows how the screen has been mounted

MARCONIPHONE CO., LTD., Tottenham Court Road, London, W.C.1. Stand No. 49.

AMONG the many new receivers to be seen here the Television receiver will undoubtedly create the greatest interest. Other important features which



An extremely efficient Portable—The Wayfarer "Grand" produced by London Electric Appliances, Ltd.

will identify the Marconiphone sets are the special material used for the loud-speaker opening, the novel manner in which the latter has been developed, and the unusual cabinet designs. The new tuning indicators will also strike a novel note, and the special giant display models will give the stand an attractive appearance.



One of the Linguaphone Recording Radiograms.

"CONSTRUCTORS OWE YOU A DEBT OF GRATITUDE"

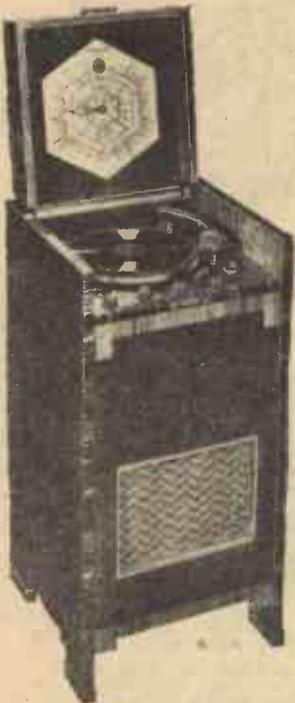
Says Mr. F. J. Camm



"PRACTICAL & AMATEUR WIRELESS"
GUIDE to the SHOW

McMICHAEL RADIO, LTD., 205, Strand, London, W.C.2. Stand No. 47.

TEN new models will be on view on this stand, and the makers claim that this will be the most comprehensive programme which they have ever offered to the public. The receivers include six mains and four battery models and the novel tuning dial which has been included in Model 306, actually mounted and recessed into the underside of the cabinet lid, will prove a great attraction and greatly simplifies tuning.



Tuning in simplified in this McMichael receiver owing to the Grant Tuning Dial which is fitted inside the lid and which is operated by the normal controls.

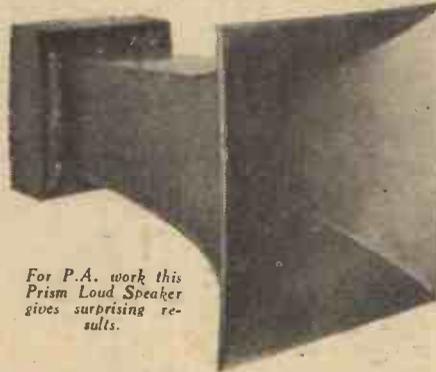
MILNES RADIO CO., LTD., Church Street, Bingley, Yorks. Stand No. 205.

THE H.T. Supply Unit will continue to be the most prominent feature on this stand, and the design and price remains unchanged. Two new lines to be seen for the first time will be the SP. 60 Charging Battery and S/P switch. The former is a 6-volt L.T. accumulator with plates of the car starter type, and each cell is provided with separate screw terminals instead of the

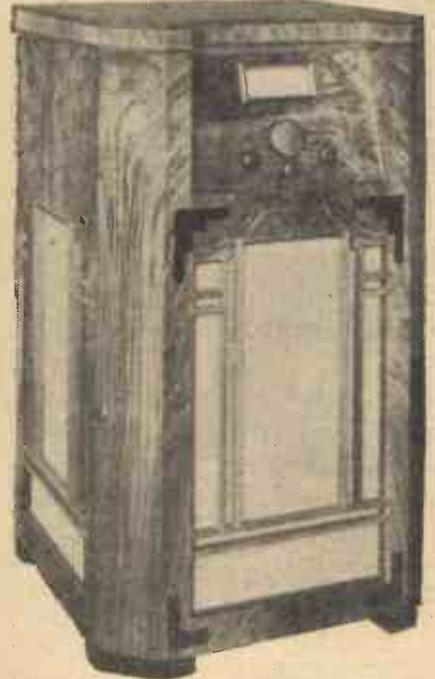
customary bus-bars. The switch is designed to screw at the end of the mains unit and enables the three cells to be connected in series or parallel for charging and valve supply purposes.

MULLARD RADIO VALVE CO., LTD., Mullard House, Charing Cross Road, W.C.2. Stand No. 62.

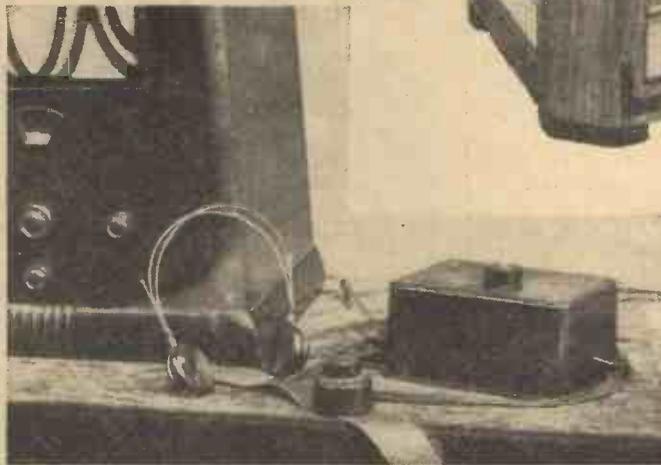
ALTHOUGH valves will form a large proportion of the exhibits on this stand, the new receivers will prob-



For P.A. work this Prism Loud Speaker gives surprising results.



A quality radiogram with many novel features. This is a Prism product with a special speaker.



For the deaf or hard of hearing this Multitone device enables the programmes to be heard without inconveniencing others.

NEW LONDON ELECTRON WORKS, LTD., East Ham, London, E.6. Stand No. 22.

AMONG the many novel radio accessories to be seen here the new Screened Superial and the all-wave aerial will be the main features. In addition the Globe aerial will also be prominently displayed, together with various types of aerial wire.



A cabinet with distinctive lines used for one of the new Mullard all-wave receivers.

ably prove just as attractive to visitors to the show. The novel cabinet designs which have been introduced, coupled with the new control features such as the "Uni-knob," will attract many, and as usual the giant models of various items will initiate the newcomer into the mysteries of many of the usual radio accessories.

MULTITONE ELECTRIC CO., LTD., 95-98, White Lion Street, Islington. Stand No. 86.

THE main feature on this stand will be the Adaphone device, designed to enable a deaf person to join the rest of the family circle in hearing the broadcast programme from the standard broadcast receiver. The listener cannot be jarred or startled by a sudden loud access of sound, whether caused by someone else turning up the volume control or by a loud burst of music, owing to a special method of automatic volume check included in the device. A manifold system of insulation also avoids the danger of shock either on a battery or a mains set.

GEORGE NEWNES, LTD., 8/11, Southampton Street, Strand, London, W.C.2. Stand No. 10, Ground Floor.

MESSEURS. GEORGE NEWNES, Ltd., probably publish more technical wireless handbooks, blueprints, and wireless and television periodicals than any other publisher. On this stand, therefore, you are bound to find a book or a periodical which appeals to you.

PRACTICAL AND AMATEUR WIRELESS, *Practical Mechanics*, *Practical Motorist*, and *The Cyclist* are but a few of the leading journals on show here. A full range of blueprints of wireless receivers ranging from crystal sets to multi-valve superhets will be on sale, as well as a full range of technical books, including "The Wireless Constructor's Encyclopaedia," "Everyman's Wireless Book," "Television and Short-Wave Handbook," "The Practical Motorist's Encyclopaedia," "The Home Mechanic's Encyclopaedia," "Ralph Stranzer's Wireless Library." You will also be able to inspect Mr. Camm's series of receivers and the receivers described in PRACTICAL AND AMATEUR WIRELESS during the past year. Mr. F. J. Camm and the technical staff will be available to answer readers' queries free of charge. Call and see us.

PARTRIDGE WILSON & CO., Davenset Works, Evington Valley Road, Leicester. Stand No. 107.
MANY of the well-known Davenset Battery Chargers will be seen here, together with some special models designed for the charging of H.T. accumulators. In addition a full range of battery charging accessories,



Two of the T.C.C. electrolytic condensers.

such as cell-testing voltmeters, non-corrosive battery clips, hydrometers, etc., will also be shown.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2. Stand No. 43.

MANY novel features are to be seen on this year's Philips receivers, and the single-knob control which enables tuning, volume, tone, selectivity and so on to be carried out by means of a single control, together with the adjustable tuning scale will prove of the greatest interest. The scale may be raised or lowered to provide the most easily-read position, yet the pointer, as well as the visual tuning indicator and the wave-range switch indicator work perfectly in all positions.

PLESSEY COMPANY, LTD., Vicarage Lane, Ilford, Essex. Stand No. 27.

THE exhibits on this stand will consist of components, chassis, etc., made up especially for set manufacturers, and will furnish an interesting illustration of the methods involved in modern set construction.

PRACTICAL & AMATEUR WIRELESS

See George Newnes, Ltd., p. 632

PRIMOGRAPHIC, LTD., 40-44, Chipstone Street, W.C. Stand 223.

FRIMUS MFG. CO., LTD., Primus House, Willow Street, E.C.2. Stand 1A.

PRISM MFG. CO., LTD., California Works, Brighton Road, Belmont, Surrey. Stand No. 80.

HIGH-quality reproduction has been achieved in the Prism radiogram by the use of an ingenious type of built-up loudspeaker and the cabinet is open on all sides. In addition to this speciality, some interesting public-address equipment will also be exhibited.

PYE RADIO LTD., Africa House, Kingsway, London, W.C.2. Stand No. 48.

FIFTEEN new receivers will be on view on this stand, and the models will cover practically all requirements. An interesting feature of the new receivers is that many parts which are incorporated are immediately detachable and interchangeable. Two models are being kept secret and will not be despatched from the

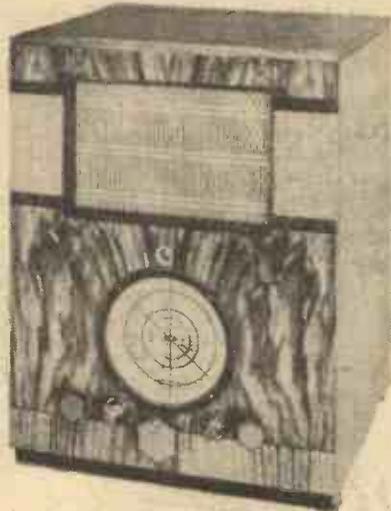


The new season's Ultra models have many new features. Above is the Model 48, in a novel cabinet design.

Cambridge works of the company until the morning of the exhibition, when they will be flown to London by autogyro. All-wave tuning is an important feature of the new sets, the short waveband being covered in two separate stages.

RADIO GRAMOPHONE DEVELOPMENT CO., LTD., 18-20, Frederick Street, Birmingham. Stand No. 56.

FOUR 6-valve receivers, an 8-valve and a 12-valve radiogram will be the main items on this stand. All these models are of the "all-wave" type, with four separate wavebands. The larger models incorporate such details as "mystic ray" tuning, 5-point high and low-note balance control, automatic record changing,



A quality receiver in a table console cabinet. One of the 1937 R.G.D. models.



Shaftesbury Microphones' latest model—The Bio-Tran.

etc. In addition, the largest model incorporates a new feature known as a contrast control valve which gives the correct relationship between the loud and quiet passages in reproduction.

RADIOMETERS, LTD., Dunbar Works, Dunbar Street, West Norwood, S.E.27. Stand No. 203.

AMONG the various measuring instruments to be seen on this stand is the resistance and capacity measuring bridge, the valve analyser, an A.C. voltmeter, an adaptor for the all-wave tester, and a universal meter for measuring D.C., volts, current, and ohms.

RADIO RESISTOR CO., LTD., 1, Golden Square, W.1. Stand No. 16.

RESISTORS of all types will be shown on this stand, and these are available in every conceivable ohmic value from 1 to 40 megohms in 1, 2, and 3-watt



Ultra's latest model, 99.

ratings at 1s. per watt. In addition, grid leaks in various values with wire ends, insulated resistors of the miniature type in $\frac{1}{4}$ - and $\frac{1}{2}$ -watt ratings, kits of resistors, wire-wound resistance and volume controls will be featured. In addition, suppressors for use with car radio apparatus will also be seen.

RADIO SOCIETY OF GT. BRITAIN, 53, Victoria Street, S.W.1. Stand 174.

RAWPLUG CO., LTD., Rawplug House, Cromwell Road, S.W.7. Stand No. 79.

THE main items on this stand will be Rawplugs, plastic wood, and the special heat-proof adhesive Durofix. The latter is of great value to the home constructor for the repair and manufacture of loud-speaker cones, etc. Plastic wood also is of value for the repair of cabinets and similar processes.

REPRODUCERS & AMPLIFIERS, LTD., Frederick Street, Wolverhampton. Stand No. 92.

THIS display will consist of high-grade energised and P.M. types of loudspeaker. Special models, not offered for sale direct to the public, will be available for inspection by designers and constructional engineers. Other apparatus to be seen will consist of P.A. sound-projection equipment featuring exponential horns and a new P.A. unit with a 10in. chassis.

RIST'S WIRES & CABLES, LTD., Waveney Works, Lowestoft. Stand No. 208.

THE display here will consist of various types of wire from lead-in cable to headphone leads. The range includes special aerial wires, loudspeaker cords, multiway cables, slip-back connecting wire, and screened tubing.



Tannoy, the sound people, make a speciality of P.A. equipment. One is seen above.





"PRACTICAL & AMATEUR WIRELESS" GUIDE to the SHOW



ROTHERMEL, R. A., LTD.,
Rothermel House, Canter-
bury Road, N.W.6. Stand
No. 89.

THE "Radio-heart" will be the most interesting feature on the Rothermel stand, and this consists of a complete chassis covering four wavebands (from 10.5 to 2,400 metres), complete with tuning condenser, coils, etc., and only needs the necessary valves to be plugged into the holders mounted on it in order to convert it into a complete "receiver." The unit is complete with dial. In addition to this there will be the usual range of piezo-electric components, such as pick-ups, tweeters, and microphones.

SELECTA GRAMOPHONES LTD., 81, Southwark Street, S.E.1. Stand T11.

SELF-CHANGING GRAMOPHONES, LTD., 11, Berkeley Square, W.1. Stand No. 59.

THE main feature of the apparatus shown on this stand will be the special self-changing record mechanism. The special cabinet designed by Robert Duteyens, shown on another page in this issue, will be a prominent feature, and the portable automatic radiogram will also attract attention. Finally, there will be a special remote control system which allows for the operation of the automatic gramophone from a number of different points in a house, with extension speakers for the purpose.

SHAFTESBURY MICROPHONES, LTD., 24, Aldersgate Street, London, E.C.1. Stand No. 99.

THE Bio-Tran microphone, the Junior Microphone, and special power amplifiers will be shown here, together with a complete range of box and exponential horn type speakers capable of handling up to 20 watts.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4. Stand No. 60.

THIS exhibit will comprise a comprehensive range of Full O'Power batteries, amongst which will be found a type suitable for practically every receiver on the market. In addition, a range of small batteries suitable for torches and lamps will be featured.



Two new Varley Coil Units and a new I.F. Transformer.

STRATTON & CO., LTD., Eddystone Works, Bromsgrove Street, Birmingham, 5. Stand No. 23.

ALL of the apparatus shown on this stand will be designed for short-wave work, and will include a new 8-valve battery superhet, built for tropical use and fitted with all up-to-date refinements, such as A.V.C. and push-pull output stage. Some new short-wave coils of the interchangeable type will also be seen in company with many existing popular short-wave items.

TANNOY PRODUCTS, Canterbury Grove, West Norwood, S.E.27. Stand No. 45.

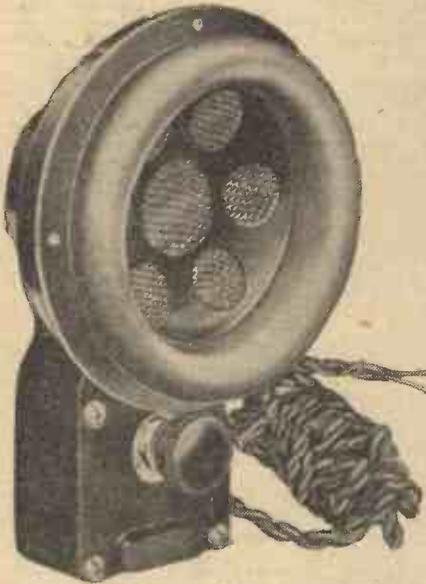
ALL of the apparatus on view here has been designed for public-address work, and includes amplifiers, speakers, and microphones. Every branch of the subject is covered by these items, and the makers have a wide experience in the subject.

TELEGRAPH CONDENSER CO., LTD., Wales Farm Road, North Acton, W.3. Stand No. 68.

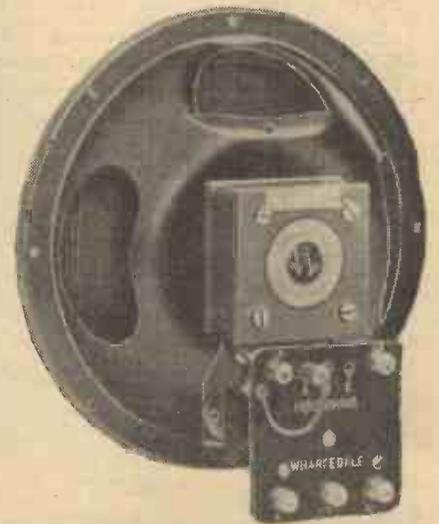
THE T.C.C. exhibits will consist of all types of mica and paper fixed condensers, including non-inductive paper tubulars, and special components for car

radio work. In addition, dry and wet electrolytics will be seen and a special feature will be the surge proof voltage regulating wet electrolytics designed for use in A.C./D.C. receivers. All types of moulded condensers and transmitting and high-voltage condensers will also be seen.

For the Best Books,
Blueprints, Periodicals,
and Reader Service,
visit our Stand, No. 10,
Ground Floor!



Above is seen one of the new Vidor receivers, and on the right and left are two Wharfedale components, the left-hand model being a small loudspeaker designed to be held in the hand.



SOUND SALES, LTD., Marlborough Road, Upper Holloway, N.19. Stand No. 76.

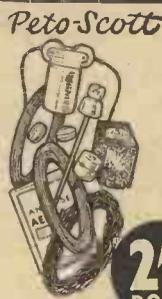
INCLUDED in this exhibit will be amplifiers, speakers, chargers, microphones, and a complete Quality Radiogram. This particular model will be fitted with a gramophone record-changer and a 4-12 watt quality amplifier, feeding a super auditorium speaker.



1937 STENTORIAN

NOW—
A NEW AND HIGHER STANDARD OF REPRODUCTION

PETO-SCOTT FOR EVERYTHING THAT YOU SEE AT OLYMPIA



Peto-Scott NOISE-SUPPRESSING ALL-WAVE AERIAL

- Eliminates Man-Made Static.
- Increases Signal Strength on all bands.
- Improves Selectivity.
- Waterproof and Weatherproof.

Obtain the utmost entertainment from your radio set by using this Peto-Scott Aerial Outfit, the first really economical solution for overcoming the noise of man-made static.

AERIAL OUTFIT COMPRISES
Duplex enamelled stranded aeriols, 4 insulators, 50 feet waterproof "lead-in" wire, Aerial and Set Transformers, all assembled and ready with detailed instructions and drawing illustrating the method of erection.

2/6 DOWN

ASSEMBLED and READY FOR ERECTION and 7 monthly Cash or C.O.D. Carriage payments of 2/6. Paid. 17/6.



Peto-Scott 1937 ALL-WAVE S.G.3 KIT

World-wide programmes on all wave-lengths, 16-2,100 metres. Every constructor should build his own all-wave set and enjoy the thrill of All-Wave listening that will bring programmes from all over the World.

Peto-Scott offer you a Kit which is, in the words of a famous designer, "An amazingly efficient yet simple to build Kit set."

7/6 DOWN

and 11 monthly payments of 7/-

- NO COIL CHANGING.
- LOW LOSS ROTARY SWITCH.
- PRESSED STEEL DRILLED CHASSIS.
- S.G. DETECTOR and PENTODE CIRCUIT.
- FULL INSTRUCTIONS AND DIAGRAMS.

Kit "A" Cash or C.O.D. Carriage Paid £3:17:6

Complete Kit of components, less valves and cabinet.

Kit "B" As for Kit "A" but with 3 recommended Hivac valves. Cash or C.O.D. Carriage Paid. £5:0:3 or 9/- deposit and 11 monthly payments of 9/3.

CONNECT THIS Peto-Scott SHORTWAVE AC/DC PRESELECTOR TO YOUR EXISTING SET



and tune into America and the whole World on Short Waves. Only a few simple connections necessary and NO ALTERATIONS to your receiver. Incorporates special coil unit covering 13 to 74 metres and is equipped with an arrangement whereby just a turn of the switch by-passes the pre-selector so that your set is then available for reception on normal broadcast wave-lengths. Suitable for all receivers, A.C., D.C. or battery, providing mains supply is available.

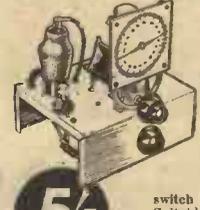
9/6 DOWN

Absolutely Ready for Use.
Dual Ratio Flow-Motion Dial (6-1, 100-1)
Wavelength-Calibrated Scale.
B.V.A. Valves.

COMPLETE with valves and cabinet illustrated

and 11 monthly payments of 9/-. Cash or C.O.D. Carriage Paid. £4:17:6

B.T.S. SUPERHET SHORT WAVE CONVERTER KIT



13-71 Metres on Your Present Set

- No Coil Changing.
- Ready drilled and Enamelled Steel Chassis.
- Simple to Build.

This amazingly sensitive Superhet Converter Kit set ON EASY TERMS. Build it in an evening and connect it to your existing set. Equipped with self-contained dual range coil and rotary switch (13-29 and 30-71 metres). Suitable for any Battery receiver.

COMPLETE KIT comprising all necessary parts with full instructions and diagrams, less valves. Cash, C.O.D. Carriage Paid. £1:17:6

2 B.V.A. Valves 18/6 extra

5/- DOWN

and 9 monthly payments of 4/-. Fully described in No. 2 B.T.S. SHORT WAVE CONSTRUCTOR. Post Free 41d.

EST. 1919

IMMEDIATE DELIVERY of all latest Speakers, Eliminators, Kits, Pick-ups, Testing Meters. Receivers for CASH, C.O.D. or Easyway. Quotations of anything Radio on Request. PILOT AUTHOR KITS are guaranteed to specification, build one and be satisfied.

The following comprises just a small selection of 1937 productions that we can supply for CASH, C.O.D. or EASYWAY. Many more available. SEND FOR QUOTATION.

NEW SPEAKERS

BLUE SPOT SENIOR SPEAKER, complete with multi-ratio transformer which provides 16 matchings, and 4 low impedance tapplings for Extension Speaker matching. £19/9/6. Cash or C.O.D. Carriage Paid. £19/9/6. Balance in 10 monthly payments of 3/-.

Send 2/6 only

ROLA F514 P.M.T. SPEAKER, supplied with universal tapped transformer suitable for all outputs. £13/6/6. Cash or C.O.D. Carriage Paid. £13/6/6. Balance in 10 monthly payments of 2/6.

Send 2/6 only

BENJAMIN "DUODE 33" SPEAKER. Double voice coil construction and provided with Hum Neutralising Coil and tapped transformer. £25/5/0. Cash or C.O.D. Carriage Paid. £25/5/0. Balance in 11 monthly payments of 3/9.

Send 9/- only

CELESTION JUNIOR 8 SPEAKER. Permanent Magnet speaker with matching transformer suitable for all outputs. £11/5/0. Cash or C.O.D. Carriage Paid. £11/5/0. Balance in 9 monthly payments of 4/-.

Send 2/6 only

NEW PICK-UPS

COSMOCHORD MODEL 10. Pick-up head only fitted with clip for fixing to existing gramophone arm. With silk covered connecting leads. £10/-. Cash or C.O.D. Carriage Paid. 10/-.

Send 2/6 only

CELESTION P.2 PICK-UP. Florentine bronze finish. Complete with volume control. £13/9/0. Cash or C.O.D. Carriage Paid. £13/9/0. Balance in 10 monthly payments of 3/-.

Send 2/6 only

ROTHERMEL 88 PICK-UP. Piezo-electric pick-up and arm, with head-rest. £2/2/0. Cash or C.O.D. Carriage Paid. £2/2/0. Balance in 11 monthly payments of 4/-.

Send 2/6 only

B.T.H. NEEDLE ARMATURE PICK-UP and TONE-ARM. With pick-up rest, flexible level and volume control. Cash or C.O.D. Carriage Paid. £2/0/0. Balance in 10 monthly payments of 4/3.

Send 2/6 only

NEW GRAMO-MOTORS

COLLARO AC37 ELECTRIC INDUCTION MOTOR. A.C. mains 100/130 or 200/250 volts, 50-60 cycles. 12in. turntable and fully automatic stop. £11/4/0. Cash or C.O.D. Carriage Paid. £11/4/0. Balance in 9 monthly payments of 4/-.

Send 2/6 only

COLLARO DOUBLE SPRING MOTOR, with 12in. turntable and all accessories. Will play 2 full 12in. records at one winding. £16/0/0. Cash or C.O.D. Carriage Paid. £16/0/0. Balance in 10 monthly payments of 2/6.

Send 2/6 only

GARRARD 202A ELECTRIC INDUCTION MOTOR. A.C. mains 100/250 volts, 25/60 cycles. 12in. turntable mounted on motor plate with automatic start and stop. £2/10/0. Cash or C.O.D. Carriage Paid. £2/10/0. Balance in 10 monthly payments of 5/-.

Send 5/- only

NEW RADIOGRAM UNITS

COLLARO AC37 RADIOGRAM UNITS. Mounted on 8in. by 7 1/2in. units plate with 12in. turntable, automatic start and stop, pick-up and volume control. A.C. mains 100/130 or 200/250 volts, 50-60 cycles. £3/0/0. Cash or C.O.D. Carriage Paid. £3/0/0. Balance in 11 monthly payments of 5/6.

Send 5/- only

GARRARD RADIOGRAM UNIT with A.O.G. Electric Induction Motor. Complete with pick-up, 12in. turntable and plate. Type B. A.C. mains 100/250 volts, 60/60 cycles. £3/2/6. Cash or C.O.D. Carriage Paid. £3/2/6. Balance in 11 monthly payments of 5/9.

Send 5/- only

NEW ELIMINATORS

PETO-SCOTT M.A. 10 30 ELIMINATOR WITH TRIGGLE CHARGER. A.C. mains 200/250 volts, 50/100 cycles. Westinghouse metal rectifier. 4 H.T. tapplings. Output 20 mA at 130 volts. £2/19/6. Cash or C.O.D. Carriage Paid. £2/19/6. Balance in 11 monthly payments of 5/6.

Send 5/- only

PETO-SCOTT A.G.2 ELIMINATOR. A.C. mains 200/250 volts, 50/100 cycles. Incorporates Westinghouse rectifier. 3 tapplings. Output 25 mA at 150 volts. £2/9/6. Cash or C.O.D. Carriage Paid. £2/9/6. Balance in 10 monthly payments of 5/-.

Send 5/- only

REGENTONE W.F.F. ELIMINATOR with output A.C. mains. 7 voltage tapplings. Output 120/150 volts at 12 mA. £2/10/0. Cash or C.O.D. Carriage Paid. £2/10/0. Balance in 10 monthly payments of 5/-.

Send 5/- only

NEW TESTING METERS

PIFCO ROTAMETER. 9 ranges, 100 tests. Mains or battery receivers. £15/9/6. Cash or C.O.D. Carriage Paid. £15/9/6. Balance in 10 monthly payments of 3/-.

Send 2/6 only

AVOMINOR D.C. MAINS AND BATTERY TEST METER. 10 ranges. Supplied in velvet lined case with leads, clips and prods. £2/0/0. Cash or C.O.D. Carriage Paid. £2/0/0. Balance in 10 monthly payments of 4/3.

Send 2/6 only

AVOMINOR Universal A.C./D.C. Test Meter. 22 ranges. Moving Coil. 3" full scale deflection. £5/0/0. Cash or C.O.D. Carriage Paid. £5/0/0. Balance in 11 monthly payments of 8/3.

Send 9/- only

DESCRIPTIVE LEAFLET OF ANY OF ABOVE ON REQUEST.

PILOT AUTHOR KITS

Any item supplied separately. Orders over 10/- sent C.O.D.—carriage and post free.

BANDSPREAD S.W.3 KIT "A" CASH OR C.O.D. £3:5:0

CARRIAGE PAID £3:5:0 or 12 monthly payments of 6/-

Author's Kit of first specified parts, less valves, speaker, headphones, and cabinet.

With 3 specified valves. Cash or C.O.D. Carriage Paid, £4/17/0 or 12 monthly payments of 8/9.

3 specified valves	£ s. d.
W.B. Speaker, Type 37M	1 12 0
Pr. Ericsson headphones	17 6
Peto-Scott Bandspread 3 cabinet	15 0
	19 6

GLADIATOR THREE KIT "A" CASH OR C.O.D. £4:19:6

CARRIAGE PAID £4:19:6 or 12 monthly payments of 9/-

Author's Kit of first specified parts, less valves, speaker and cabinet.

With 3 specified valves. Cash or C.O.D. Carriage Paid, £6/12/6 or 12 monthly payments of 12/-.

Peto-Scott Gladiator Cabinet	£ s. d.
W.B. speaker, Type 37J	19 6
3 specified Valves	1 12 6
	£1 13 0

SIGNET TWO KIT "A" CASH OR C.O.D. £2:4:6

CARRIAGE PAID £2:4:6 or 5/- down and 11 monthly payments of 4/-

Author's Kit of first specified parts, less valves, cabinet and speaker.

With specified valves. Cash or C.O.D. Carriage Paid, £2/17/9 or 12 monthly payments of 3/3.

3 specified Valves	£ s. d.
Epoch speaker, Type S.D.	13 3
Peto-Scott Signet Cabinet	1 12 6
	19 6

W.B. STENTORIAN

YOURS FOR **2/6 DOWN**

IMMEDIATE DELIVERY

W.B. 1937 STENTORIAN JUNIOR (Type 37J)

Specified for the Bandspread S.W.3. Incorporates the new exclusive Stentorian features and makes an unmistakable improvement in volume and realism of reproduction. Perfectly matches any receiver as principal or extra speaker.

CASH OR C.O.D. CARRIAGE PAID £1 12 6 or 2/6 down and 11 monthly payments of 3/-.

W.B. 1937 STENTORIAN BABY (Type 37B)

Highly efficient Baby Speaker with an adaptation of the famous "Microdode" matching device. Suitable for any receiver.

CASH OR C.O.D. CARRIAGE PAID £1 3 6 or 2/6 down and 10 monthly payments of 2/6.

The undermentioned W.B. speakers, chassis and cabinet models are also available on attractive Easy Payment Terms. Cabinet models can be fitted with the new "W.B." "Long Arm" Remote Control Device at a slight increase in deposits and monthly payments.

W.B. SENIOR (Type 37S) SPEAKER	£2 2 0
In cabinet with volume control	£3 3 0
W.B. JUNIOR in cabinet with volume control	£2 9 6
W.B. BABY in cabinet	£1 9 6

POST THIS COUPON NOW

FOR THIS CONSTRUCTORS' BOOKLET—FREE

PETO-SCOTT CO. LTD., 77, CITY ROAD, LONDON, E.C.1

WEST-END: 62, HIGH HOLBORN, LONDON, W.C.1

Please send booklet describing

- S.W. PRESELECTOR
- ALL WAVE S.G.3 KIT
- BROADCAST S.G.3 KIT
- S.W. ADAPTOR KIT
- TELEVISION ADAPTOR KIT
- H.T. BATTERIES
- ELIMINATORS
- ANTI-NOISE AERIAL
- SPEAKERS
- GRAMADAPTOR KIT

NAME.....

ADDRESS.....

R. W. 18

To maintain Good Reception

The D.C. AVOMINOR

A compact moving-coil combination meter—13 ranges of readings in milliamps, volts and ohms. It tests circuits, valves, components, batteries, power units, etc. Provides a degree of accuracy unapproached by any other instrument at anywhere near its price. In case, with leads, interchangeable testing prods and crocodile clips, and complete instruction book.

Price 40/-

Deferred Terms if desired

The UNIVERSAL AVOMINOR

A smaller brother of the Universal Avometer. It gives 22 different ranges of readings (A.C. and D.C.). Has 3in. scale. Total resistance 200,000 ohms. Complete with instruction book, leads, and interchangeable testing prods and crocodile clips.

Price £5

Leather Case, 10s.

Deferred Terms if desired

The AVODAPTER

Every valve test can be made externally on the bench. No grovelling about inside the set or having to sever connections. Tests are made with ease and under actual working conditions. Instantly adaptable for 4-pin, 5-pin, or 7-pin valves.

Price 25/-

The AvoCOUPLER

Renders the AvoDapter instantly suitable for 9-pin valves. Complete with instructions.

Price 12/6

"RADIO SERVICING SIMPLIFIED" with Supplement

This invaluable book explains every phase of fault-tracing and testing in non-technical language. Multitudinous tests are so set forth as to be a matter of straightforward procedure. The comprehensive information and numerous diagrams enable everyone to test sets and apparatus with ease and success.

Price 2/6 Post Free 2/9



Is the performance of your set as efficient as it should be? Nine times out of ten the reception you should get is lost because of small defects. If they are traced, remedied, you can put new life into the performance of that set of yours.

With 'Avo' Testing Instruments you can trace faults speedily and accurately. It is, of course, essential that highly accurate instruments are used. 'Avo' Instruments, famous for precision, are designed to meet the needs of every radio enthusiast as well as of service men. See 'Avo' Testing Apparatus at Radiolympia.

RADIOLYMPIA Stand 31

AVO-OSCILLATOR

A compact Oscillator of extreme usefulness for service work. Provides a steady local signal, modulated or non-modulated at will, the fundamental frequency of which can be varied over the long, medium and intermediate wave-bands. Harmonics extend the range down to the short waves. Small size (6ins. x 4ins. x 3ins.) enables the instrument to be easily carried. Complete with shielded lead, valve and H.T. and L.T. batteries.

Price £5 10s.

Deferred Terms if desired

'AVO' TESTING ACCESSORIES

Accurate and simple testing is greatly assisted by the boxed kit of 'Avo' Testing Accessories. They do away with nondescript lengths of wire. You can test more quickly without making dangerous mistakes. For use with any testing meter.

Price 2/6

'AVO' TESTING INSTRUMENTS

WORLD FAMOUS FOR ACCURACY

If you do not visit Radiolympia, write for illustrated lists of 'Avo' Instruments.
THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
Winder House, Douglas Street, London, S.W.1. Phone: VICTORIA 3404-7.

THE 362 RADIO VALVE CO., LTD., Stoneham Road, Upper Clapton, E.5. Stand No. 207.

THOMPSON, DIAMOND & BUTCHER, 34, Farringdon Road, E.C.1. Stand No. T4.

TUCKER EYELET CO., LTD., Cuckoo Road, Birmingham, 7. Stand No. 105.

THIS exhibit will consist of a range of eyelets, solder tags, battery connections, and sockets, and a range of other small metal presswares for use in receiver construction. These components are, of course, only employed in commercially-built receivers.

ULTRA ELECTRIC LTD., Western Avenue, Acton, W.3. Stand No. 52.

THE new Ultra receivers will show many new novelties, the most prominent of which is the new tuning scale on Models 96 and 99. A novel type of cabinet is also employed for Model 48, and the large airplane type dials fitted to the remaining receivers will prove of great interest. All-waves will also be a feature of some of the new Ultra models.

UNION RADIO CO., LTD., U. R. Works, Aurelia Road, Croydon. Stand No. 20.

VARLEY, LTD., Cambridge Place, Burrage Road, S.E.18. Stand No. 77.

SOME new components for the home-constructor will be seen on Stand No. 77, and many existing lines will also be seen. Among the new lines are ganged coil units for superhet. and straight receivers and a New I.F. transformer. Amongst the remaining lines are chokes, transformers, power resistors and the popular thermal delay switch.

VIDOR, LTD., West Street, Erith, Kent. Stand No. 61.

AMONGST the various complete receivers to be seen on this stand will be the miniature portable which has already been reviewed by us. A short-wave converter, and a superhet. radiogram represent the other extremes, and the new open tuning dial which is fitted to these receivers will represent the modern trend of tuning indicators.

WATERHOUSE, LTD., F., Stanley Works, Edward Street, Dudley Hill, Bradford. Stand No. 201.



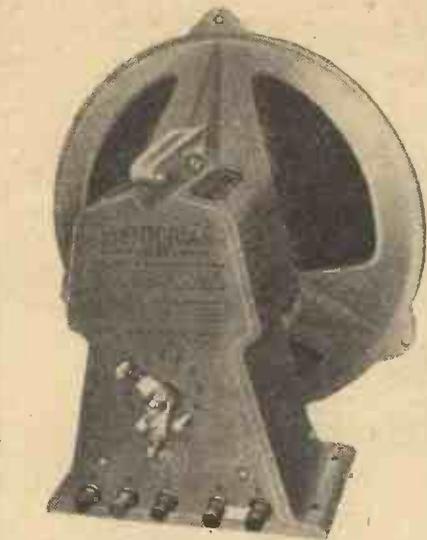
The Weston Oscillator, one of the many measuring devices produced by the Weston Electrical Instrument Company.

WEBBER & CO., LTD., J. M., Weblite House, 39, Gt. Eastern Street, E.C.2. Stand No. T13.

THIS exhibit will be of a wholesale nature and will embrace the various manufacturer's receivers which Messrs. Webber are handling this season.

WESTINGHOUSE BRAKE & SIGNAL CO., LTD., 82, York Road, King's Cross, N.1. Stand No. 36.

A RANGE of metal rectifiers, from the simple H.F. type to the large charger type, will be seen here,



This year's Stentorian has a number of improvements, and the model shown above is the Junior which may also be obtained in a cabinet version.

latest product, the Voluphone, will present an entirely new aspect in reception conditions. This is a "hand loud-speaker" designed for the partially deaf listener. It is complete with a volume control and may also be used by the ordinary listener who wishes to avoid disturbing other people when listening to a particular item. Extension speakers, and a moving-coil microphone will complete the range of exhibits.

WHITELEY ELECTRICAL RADIO CO., LTD., Victoria Street, Mansfield, Notts. Stand No. 66.

THE range of Stentorian speakers will again be the feature on this stand, and this year's models present several interesting improvements. The latest model will prove popular on account of the present trend in miniature receivers, and the larger Senior models will also attract those to whom high-quality reproduction is of the greatest importance. There is a Stentorian for practically every type of receiver, and the prices cover every class of listener. The extension models incorporate a volume control so that the output may be regulated without the necessity for continual journeys to and from the actual receiver, and a new distant control, "Long Arm," is also to be prominently featured.

WINGROVE & ROGERS, LTD., Arundel Chambers, 188-189, Strand, W.C.2. Stand No. 95.

THE displays on these stands will embrace many of the popular Polar components such as variable condensers, slow-motion drives, etc., as well as the N.S.F. volume controls, resistors, and tubular condensers. The new condensers include the Bar Type

two and three-gang units in which rigidity of construction has been featured, and which may be obtained either with bakelite or ceramic insulation. One or two new models have been introduced to replace certain models which were seen at the last exhibition.



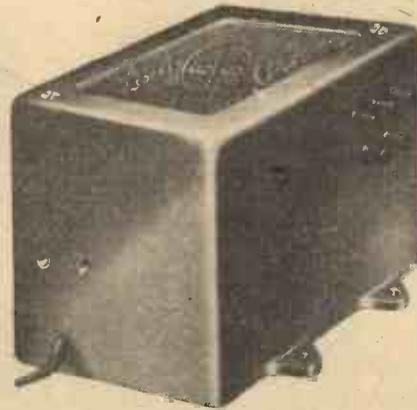
For Television apparatus this Westinghouse rectifier will find many uses. It is rated to give an output of 650 volts.

and amongst the new types the "H" and "J" models, designed for use in modern television apparatus, will be most prominent. These are the high-voltage low-current types suitable for time-base units and other cathode-ray tube circuits. Charging sets suitable for commercial use will also be seen.

WOODWORK, DAVIES D. M., Trading Estate, Slough, Bucks. Stand No. 17. See also D. M. Davies Woodwork.



An Output Meter which is another Weston product.



The "Long Arm" is a remote-control device produced by W/B, and gives full control over the receiver at a distant listening point.

WESTON ELECTRICAL INSTRUMENT CO., LTD., Kingston By-pass, Surbiton, Surrey. Stand No. 215.

A COMPREHENSIVE range of measuring instruments, including output meters, will be shown on this stand, and some new items will include the Selective Analyzer, which is a complete testing equipment. Other models are the Super Oscillator, the Volt-Ohmmeter, and the Valve Voltmeter.

WHARFEDALE WIRELESS WORKS, 62, Leeds Road Bradford. Stand No. 204.

THE complete range of Wharfedale speakers will form the exhibit on Stand No. 204, and the

WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17. Stand No. 97.

THE well-known Wearite components will be shown together with some new lines and the welcome announcement of a reduction in price in certain existing models. Coils, condensers, switches, volume controls, mains transformers, chokes and many other items of great value to the home constructor will be seen, together with the range of test equipment which will appeal to the service engineer and the advanced experimenter.

HEAR THE DIFFERENCE A
1937 STENTORIAN
 WILL MAKE TO YOUR SET



The SIGNET Two

WE have received so many inquiries for an efficient, yet simple, two-valve receiver recently that it was decided to produce a design that could easily be built by the veriest novice. A chassis was chosen in preference to a flat base-board, as the finished receiver is neater and can be housed in a very small cabinet.

Circuit Details

The circuit is the well-tried detector-L.F. arrangement, a triode valve being used in the detector stage and an economy pentode in the output stage. A triode could be substituted for the pentode, but this would result in loss of volume and, therefore, the specified valve should be adhered to. The coil is an efficient dual-range type, wave-changing being effected by means of an external three-point switch. It is of the transformer type so that a high degree of selectivity can be obtained if the reaction condenser is judiciously operated. This coil works best with an outside aerial of approximately 40ft. If a longer aerial is used it will be advisable to connect a fixed condenser of approximately .0002mfd. between the aerial lead and the aerial socket of the set.

L.F. Coupler

Reaction is provided by means of a differential reaction condenser, thereby ensuring an effective path to earth for the H.F. component at the anode of the detector valve. A special L.F. coupling unit is used

A Simple Two-Valver for the Beginner

between the detector and output valves. This incorporates a resistance and a condenser as well as a transformer. Parallel-feed coupling is therefore provided with resultant good bass response. When a straight transformer coupler is used direct current passes through the primary winding of the transformer and bass response is consequently adversely affected. The transformer section of the coupling unit has a step-up ratio of 3-1, and, therefore, an adequate input for the pentode valve is assured.

Range

This simple little set can be relied upon to pick up medium-wave stations at a distance of approximately 100 miles when a reasonably efficient aerial is employed, and reception of Droitwich on the long wave-band may be obtained in most parts of the country. This does not mean that foreign



A Simple Detector-L.F. Receiver which Offers the Utmost Simplicity of Construction and Operation, and is Ideal for the Beginner

in the meantime, the following abridged details will enable the constructor to commence the work of building the set.

Building the Receiver

It will be noted that the receiver is ideal for the constructor who is attacking his first piece of constructional apparatus, and the layout has been arranged so that no possible difficulty can arise. The wiring diagram shows how the very few wires are placed in position, and provided that all connections are firmly made (either by making a neat loop for inclusion beneath the terminal head, or by soldering to connecting lugs) the receiver may be relied upon to offer many months of efficient service without risk of breakdown. When wiring the receiver cross out each wire on the wiring diagram as its counterpart is placed in the receiver, and thereby avoid the risk of omitting one wire and dispose of all doubt as to whether any mistakes have been made.

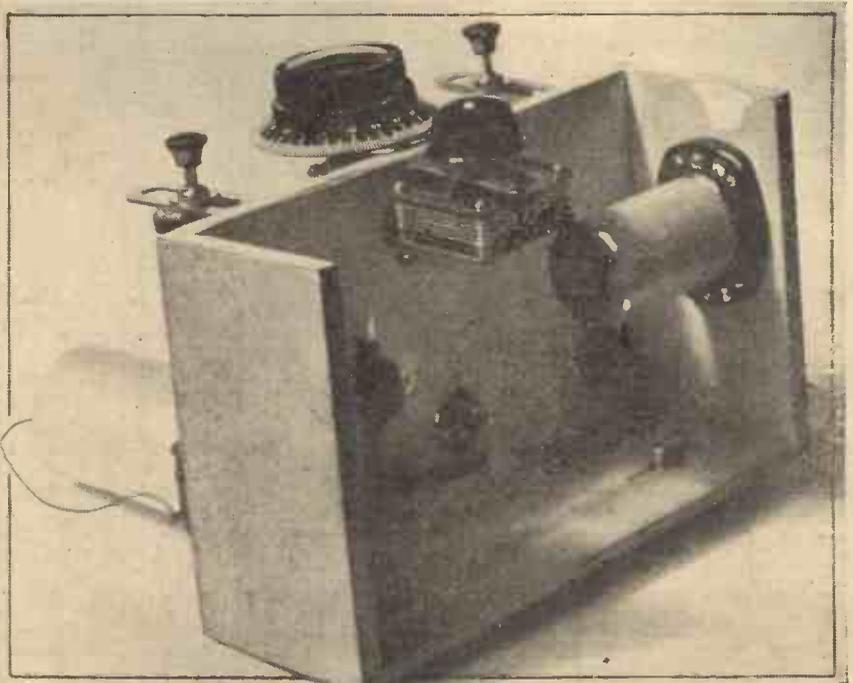
The illustrations may be used as a guide in wiring, and every component required is clearly set out in the list of components on page 641. Do not be tempted to use a substitute if you cannot at-once obtain the parts named. Not only will the layout

station reception is impossible; with an efficient aerial several Continental stations

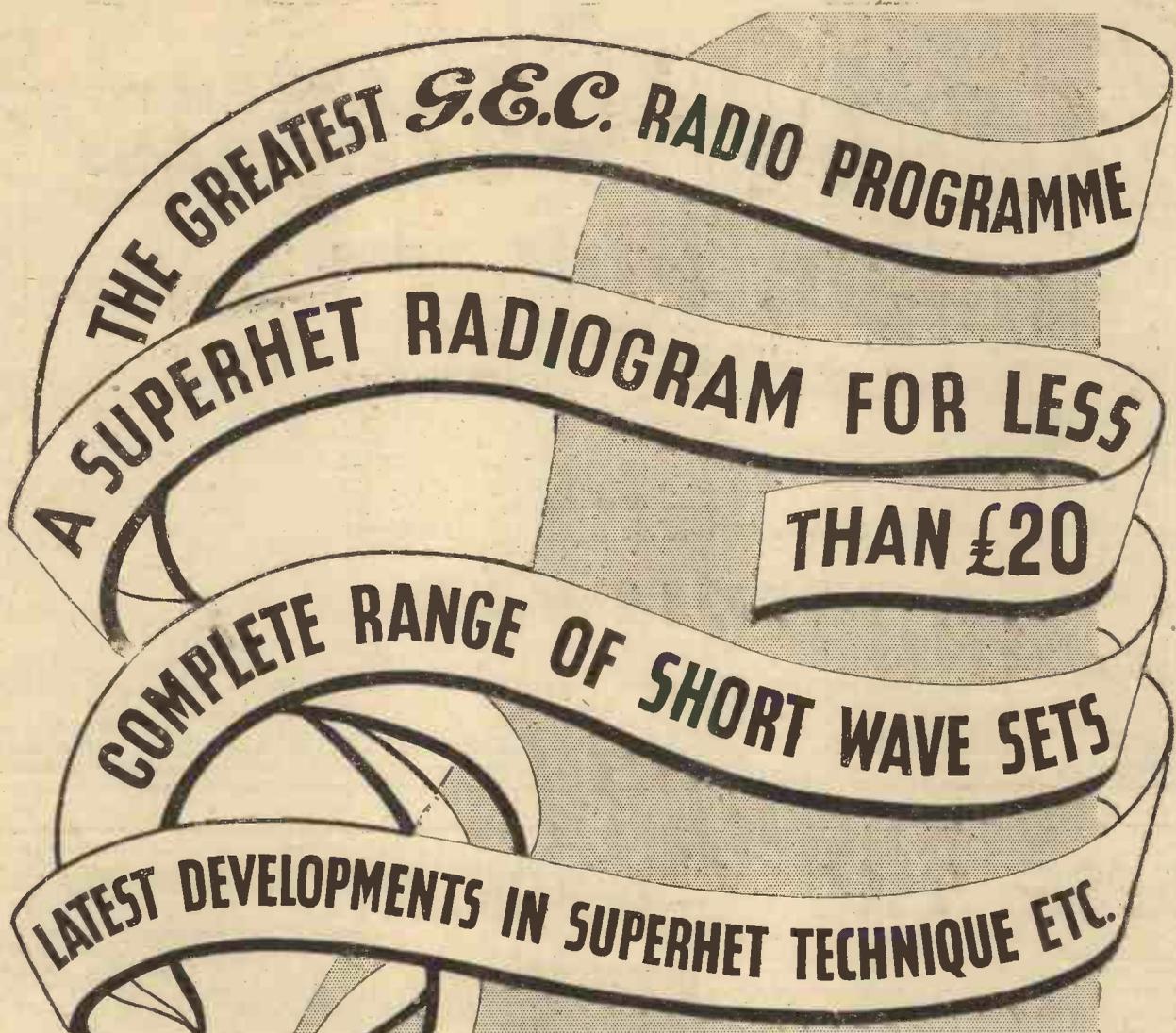
Full Constructional Details will be Given Next Week

will be picked up after dark. Full constructional details will be given next week;

(Continued on page 641)



A view of the underside of the Signet ready for wiring



THE GREATEST G.E.C. RADIO PROGRAMME
A SUPERHET RADIOGRAM FOR LESS
THAN £20
COMPLETE RANGE OF SHORT WAVE SETS
LATEST DEVELOPMENTS IN SUPERHET TECHNIQUE ETC.



*Visit the G.E.C.
at Radiolympia
— positively a
great show!*

2 new MAZDA BATTERY PENTODES

V.P. 210

A variable-mu screened H.F. Pentode for use in battery receivers.

The valve is specially constructed for use under conditions where freedom from microphonic noise is required.

The anode-grid capacity is only 0.004 mmfd.

RATING

Filament Volts - - - 2.0	Filament Current - - 0.1
Max. Anode Volts - 150	Max. Screen Volts - 150
Mutual Conductance - 1.4*	
*at $E_a 120v$, $E_s 60v$, $E_g 0$	

The bulb is metallised and fitted with a 7-pin standard base.

PEN. 231

A high slope output pentode for use in battery receivers with a self-biased circuit

RATING

Filament Volts - - - 2.0	Filament Current - - 0.3
Max. Anode Volts - 150	Max. Screen Volts - 150
Mutual Conductance - 5.3*	
*at $E_a 100$, $E_s 100$, $E_g 0$.	

TYPICAL OPERATING CONDITIONS

Anode Volts - - - - 120	Screen Volts - - - - 120
Grid Bias - - - - - 2.5	Anode Current - - - - 5.0
Optimum Load - - - 19,000	

The valve is fitted with a standard 5-pin base.

EDISWAN



Full details of these valves and others in the MAZDA range can be obtained on application to the Technical Service Dept.

Mazda Radio Valves are manufactured in Great Britain for The British Thomson-Houston Co. Ltd., London and Rugby, and distributed by

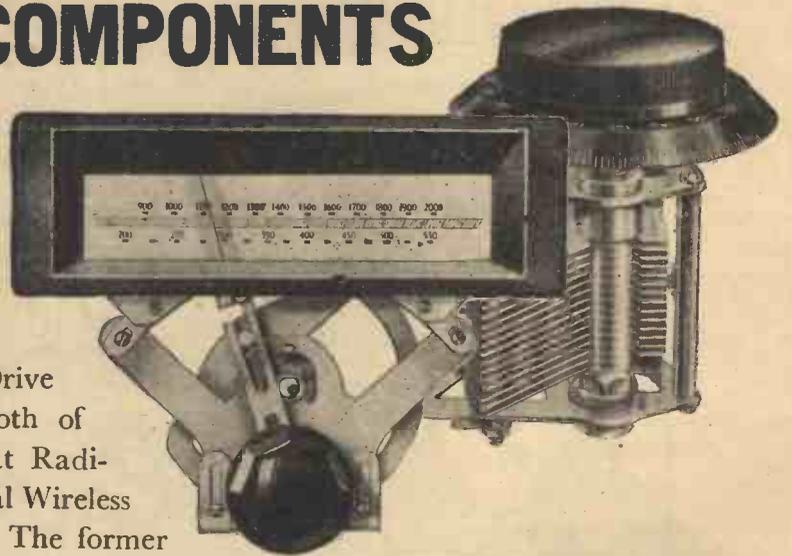
THE EDISON SWAN ELECTRIC CO. LTD., 155 CHARING CROSS ROAD, LONDON, W.C.2 R.M.292



THESE TWO COMPONENTS

Horizontal Drive Type SL 9. Black or Brown Bakelite Escutcheon with Air Dielectric Trimmer, Cat. No. 2135. Price 6/6.

Slow Motion Popular Log ratio 35-1. Cat. No. 1046. Price 7/6.

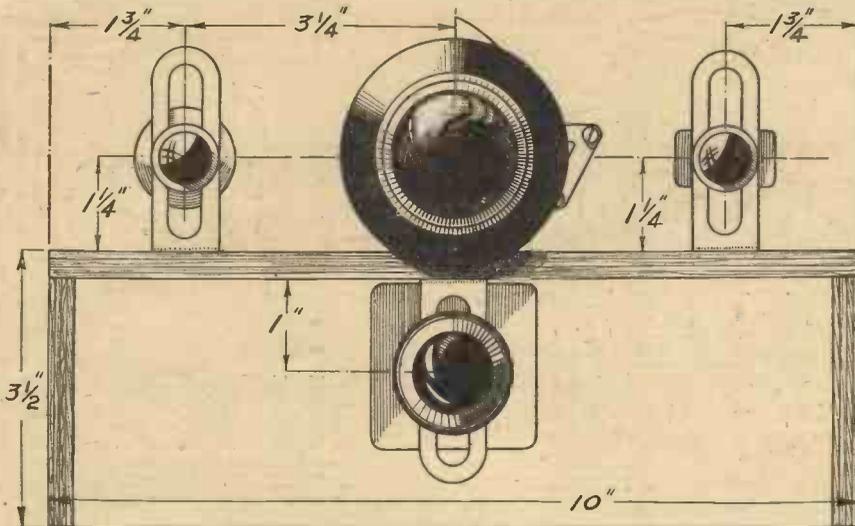


These two components, the Horizontal Drive and the Slow Motion Popular Log, both of which are on show on the J.B. Stand at Radiolympia, have been chosen by the Practical Wireless Technicians for their two latest circuits. The former is specified for the "Gladiator Three," and the latter is included in the specification of the "Signet Two."

A full selection of our condensers and dials is on view on Stand 81 at Radiolympia. You can examine the mechanism and make your choice.

RADIOLYMPIA
STAND
No. 81





Panel layout diagram.

(Continued from page 638)

probably have to be modified to accommodate the alternative part, but the performance may be impaired due to differences in characteristics.

The Chassis

If desired, a chassis may be obtained already drilled from Messrs. Peto-Scott, from whom also a complete kit of parts for

LIST OF COMPONENTS

- One coil (C20) (Bulgin).
- One .0005 mfd. condenser (1,046) (C1) (J.B.).
- One .00025 mfd. reaction condenser (1,081) (C2) (J.B.).
- One L.F. coupler (Transfeeda) (Benjamin).
- One resistance: 1 meg., R1 (Brie).
- One .0001 mfd. condenser (665) (C3) (Dubilier).
- One switch (S36) (Bulgin).
- One switch (S22) (Bulgin).
- Two terminal strips, A.E. and L.S. (B. Lee).
- Two valveholders (one 4-pin, one 5-pin) (Clix).
- Two valves: D210, Y220 (Hivac).
- Five plugs: H.T.—, H.T.1, H.T.2, G.B.—, G.B.— (Belling-Lee).
- Two spades: L.T.—, L.T.+ (B. Lee).
- Four component brackets (P. Scott).
- Metaplex chassis, 10" by 6" by 3" (P. Scott).
- One 100 m.a. microfuse and holder (Microfuse).
- One speaker, Type SD (Epoch).

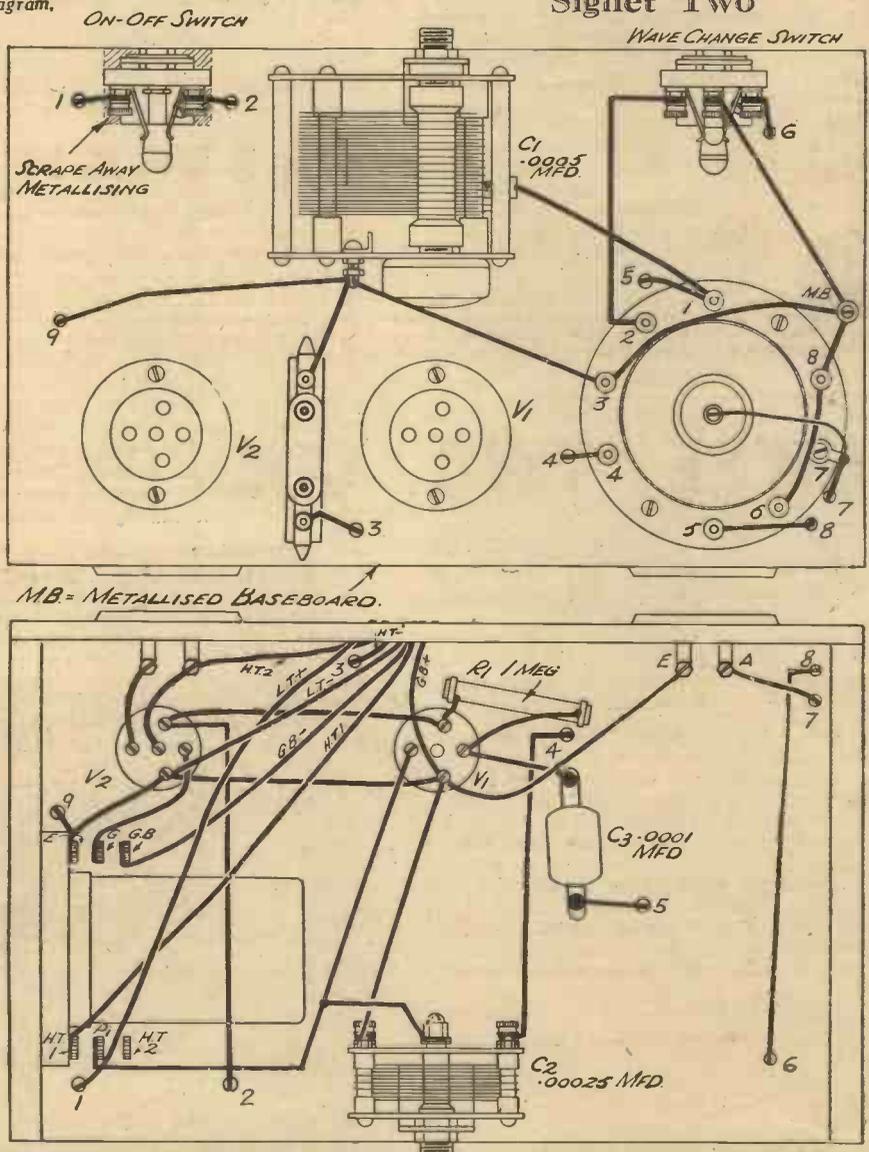
this receiver may be obtained. If such a chassis is obtained the actual constructional work may be carried out with the aid of only a screwdriver and a pair of pliers. If a complete chassis is obtained holes will have to be drilled in order to accommodate the valveholders, the terminal socket strips and for the various connecting wires to pass through. There are nine of these, and a gimlet may be used for the purpose. Alternatively, a hole $\frac{1}{16}$ in. in diameter may be drilled, but for the valveholders a hole $\frac{1}{16}$ in. in diameter must be drilled, and as a precautionary measure the metallised surface round the hole should be scraped away by means of a penknife in order to avoid risk of short-circuits when the valveholders are screwed into position. For the socket strips you can drill either a separate $\frac{1}{16}$ in. hole for each projecting socket, or may cut a slot into which both sockets on each strip will pass. This is done by drilling two $\frac{1}{16}$ in.

holes separated by a space of lin. and sawing away the intervening wood.

Before mounting the components one important factor must be stressed. The on-off switch is included in the L.T. positive lead and, consequently it must be insulated from the metallised chassis which is connected to the L.T. negative lead. The metal-mounting bracket, which is employed is screwed to the chassis, and the plunger of the switch is in direct contact with the mounting bracket. Therefore, before screwing the bracket into position the metallised surface must be scraped away for a sufficiently large area to ensure that the foot of the bracket will be effectively insulated. Again, a penknife will enable this operation to be carried out quickly and efficiently.

Next week we will give further details concerning the construction, together with operating details.

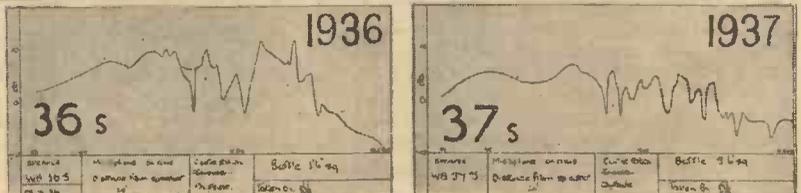
Wiring Diagram of the Signet Two



MB = METALLISED BASEBOARD.

WB

YOUR SET MAY NOW BE JUST THIS MUCH BETTER!



A Pre-Show View and Review

By W. J. DELANEY.

Receivers and their Cabinets

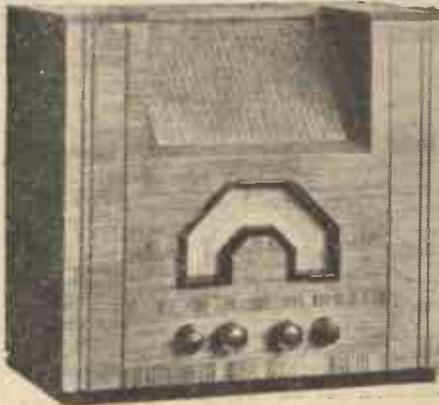
An Interesting Review of the Development of the Modern Wireless Receiver, with Special Reference to Some of the New Models Which will be Seen at This Year's Radiolympia

Other Interesting Cabinet Illustrations will be Found in Our Complete Show Report, pages 623 to 637.

IN the early days of radio the apparatus used for the reception of the various amateur and commercial transmissions was of a really crude nature. Mounted upon a flat baseboard (in many cases the domestic breadboard or pastry-board) and adorned with a weird collection of home-made components, it reposed either in the son's den, or was treasured by father, and was not to be touched by

and, in view of the general bulk, the privileged position near the window was forsaken, and the equipment was provided with a separate table in a corner out of the way. We may trace the progress of the apparatus from this stage to the present day in many steps, from the large cabinet enclosing both speaker and receiver, with separate batteries placed upon the floor or in a nearby cupboard, to the floor model, or large type cabinet which now seems to be the recognised home for the radio receiver. But those early cabinets were reminiscent of the Victorian piano, with their fret-worked fronts backed with gaudy pieces of silk. Do you remember the loud-speaker openings of those early days? Such motifs as rising suns, trees in the desert, bird and cloud effects, and even children hand-in-hand were carefully cut out, and, whilst perhaps appealing to some tastes, they did very little to improve the poor reproduction of the loud-speaker, due to the rattle set up by the split layers of fretwood, and flap of silk against wood.

loud-speaker opening, and the thin three-ply structure which resonated at every note. In their place we find solidly-built cabinets, lined with non-resonant material, or otherwise divided up to avoid resonances;



The loud-speaker opening on this Aerodyne receiver is neat, and gives the cabinet a distinctly effective appearance.

anyone. When the broadcast programmes started, commercial components became steadily available, and the receiver began to take on a new appearance. An endeavour was made to enclose the "works" and protect them from damage and dust. To enable advantage to be taken of the programmes which were from time to time available, the receiver had to be installed in the living-room, and it generally took a place of honour in front of a window so that a short aerial and earth lead could be utilised. The loud-speaker was improvised, and stood on the receiver or the table, or, in some cases, was hung upon the wall.

Separate Speakers

As improvements were made the receiver became totally enclosed in a cabinet, generally home-made from any odd plywood, and the general appearance was not unlike a miniature coffin, the front arrayed with controls of all shapes and sizes.

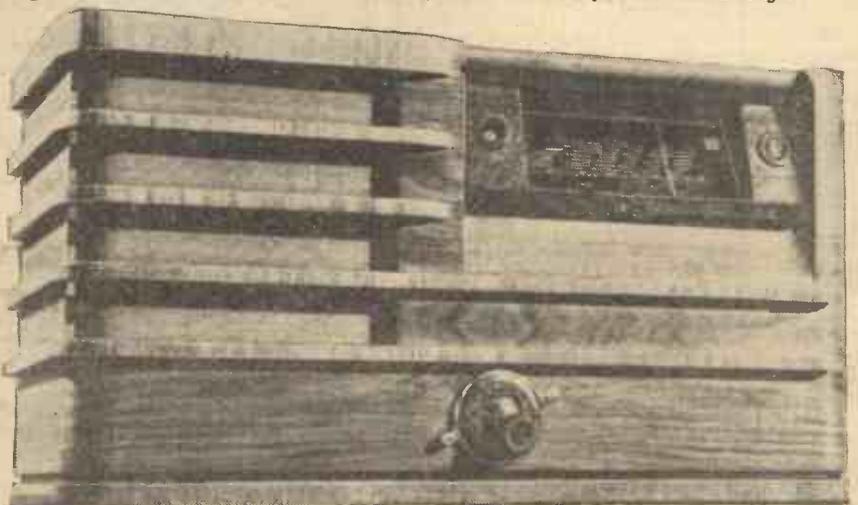
The development of the cone-type loud-speaker led to the construction of cabinets to accommodate this type of speaker, and this took up its position near the receiver,

To-day's Furniture

But to-day all this has changed. The radio outfit is now rightly regarded as a musical instrument, and takes its place in the home as an article of furniture in addition to this. A walk round the stands at this year's great exhibition will show that the craftsman, the scientist, as well as the radio-technician, has been called in to design the cabinet. Gone is the fretted



In this receiver the loud-speaker opening has again been diverted from the vertical, but is curved, and strikes a new note in design.

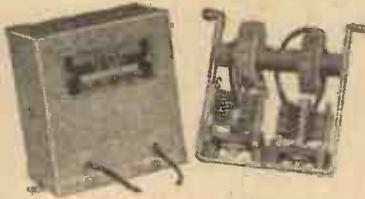


This is a Mullard receiver, in which the cabinet design follows the very modern trend of severe and straight lines.

IT PAYS TO USE EDDYSTONE

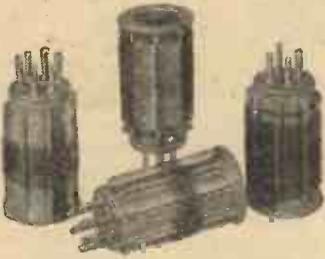
VISIT STAND 23

Get your copy of the
1937 EDDYSTONE
SHORT WAVE MANUAL



AIR TUNED I.F. TRANSFORMERS
Compact unit with high efficiency air trimmer and genuine litz wound coils. Total tuning coverage 400 to 500 Kc/s. Gives high stage gain with approximately 9 Kc/s. band-width. No. 1,014. 450 kc/s. Price 13/6.

ULTRA SHORT-WAVE H.F. CHOKES.
These chokes are single layer space wound on DL-9 formers, and have an exceedingly low self-capacity. 2½-10 metres. No. 1011. D.C. Resistance 1.3 ohms. Price 1/3. No. 1021. D.C. Resistance 0.4 ohms. Price 1/3.



INTERCHANGEABLE COILS
New low loss formers of DL-9 high-frequency insulation. Rigidly made and each coil matched. First class results assured. 4-pin coils have two windings. 6-pin three windings. No. 959 6-pin Set of 4 12-170 metres Price 16/- No. 932 4-pin Price 14/-

MIDGET INSULATOR
Made from Frequentite for high frequency work, with N.P. metal parts. 1in. overall height. No. 1019. Price 4½d. each.

UNIVERSAL S.W. VALVEHOLDER
A low loss holder for above or below baseboard use. The valve enters the contacts from either side. There is no measurable increase of self-capacity to that already in the valve base. DL9. H.F. dielectric, one-piece noiseless contacts. No. 1015. 4-pin, 1/3. No. 1016. 5-pin, 1/5. No. 1024. 7-pin, 1/8.



IMPROVED MICRODENSER
No. 900.
For ultra H.F. and general S.W. use CALIT insulation, low series resistance, noiseless movement, extended 1in. spindle for ganging. 20 m.mfd., 3/9; 40 m.mfd., 4/3; 100 m.mfd., 5/-.



BANDSPREAD TUNING OUTFIT.
Devised to simplify station selection.

The Tank condenser unit has a capacity range of 10 x 14 mmfd. Achieved by a patented step by step device. Complete with scale and knob.
Tank Unit:
Cat. No. 1042. Price 6/-

In parallel with the Tank capacity is the slow motion Bandsread Trimmer condenser, with capacity slightly greater than each step by step of the Tank condenser.
Trimmer Unit:
Complete with dial. Cat. No. 1043. Price 6/6.

EDDYSTONE

SHORT WAVE COMPONENTS

STRATTON & CO., LTD. Bromsgrove St., Birmingham. LONDON Service Depot: Webb's Radio Stores, 14, Soho Street, Oxford Street, W.

TUNGSRAM VALVES EXCLUSIVELY SPECIFIED

Listed below are the only valves specified for the new "Bandsread S.W. Three" details of which are given in this issue. All are 2 volt battery valves. All are Tungoram!

- H.P.211 H.F. PENTODE . . . 4 PIN . . . 11/-
- H.P.210 H.F. PENTODE . . . 4 PIN . . . 11/-
- P.P.222 OUTPUT PENTODE . 5 PIN . . . 10/-

TUNGSRAM

MANUFACTURED IN
TOTTENHAM · LONDON

Barium VALVES

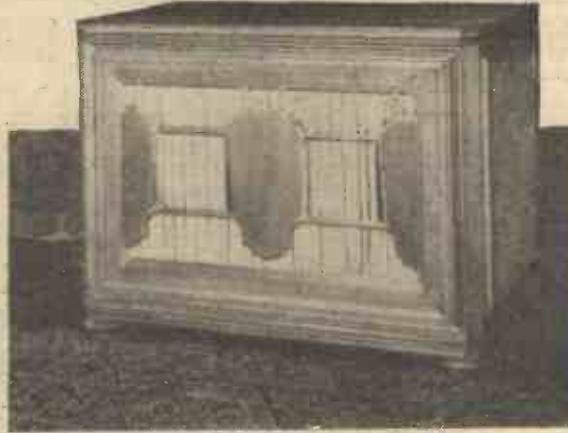
THE TUNGSRAM ELECTRIC LAMP WORKS (GREAT BRITAIN) LTD., 72, OXFORD ST., LONDON, W.1. PHONE: MUSEUM 5053.

RECEIVERS AND THEIR CABINETS

(Continued from page 642)

special loud-speaker mountings to produce every note in the musical scale with equal fidelity; special materials covering a clean-cut opening for the speaker, and, in many cases, a complete absence of knobs, switches, and other projections.

Look at the H.M.V. receivers, in which a complete departure has been made from all standard practices. The loud-speaker opening is not even flat, but is neatly curved to enable the speaker to be mounted at an angle and direct the sound waves in a more useful manner, and to provide at the same time "something different." Special metallic gauze covers the openings, and in one case three separate speakers face in different directions, and thus cover every part of the room with their radiations.



This massive cabinet was designed for the Self-Changing Gramophone Company by Robert Lutyens, F.I.A.A.

Utility Apparatus

Many radiograms are used as a convenient place for the placing of a bowl of flowers or a small electric standard-lamp. Consequently, when it is desired to reproduce gramophone records, these articles must be removed to open the lid. Again, H.M.V. have come to the assistance of everyone by designing a cabinet on the lines of an ordinary writing bureau, and the top does not have to be lifted, the sloping front lowering to reveal the controls, turntable, etc.

In two or three cases we find that well-known personages have been called in to assist in the design of

a cabinet which may be itself regarded as a work of art. In the Self-Changing Gramophone Company's console model the well-known architect, Robert Lutyens, F.I.A.A., was responsible for the cabinet design, and this particular model is illustrated on this page.

Moulded Cabinets

But cabinet-work has taken on a different atmosphere in the Ekco models, where bakelite has been employed, and this is moulded by a special high-pressure process. Again, special experts have been called in to assist in obtaining cabinets which may be placed alongside modern furniture, and one of this year's special Ekco models has been designed by Serge Chermayeff, and is an artistic production in black, with ivory control knobs.

Television Receivers

But the forthcoming production of receivers for the reception of the television programmes necessitates the inclusion either of the screen of the cathode-ray tube on the front of the cabinet, or, as in the case of the H.M.V. receivers, of a mirror inside the lid, which has to be raised at an angle of 45 degrees in order to reflect the top of the cathode-ray tube which is placed in a vertical position. These particular models, together with some other interesting examples of the modern wireless receiver, are illustrated in our Complete Guide to the Show, which is given on other pages in this issue, and the home-constructor is catered for by several firms who now specialise in the production of cabinets which may take their place with the modern home furnishings, and no longer give to the radio receiver the appearance of a scientific piece of apparatus which was in the past regarded as "something uncanny."

HIVAC

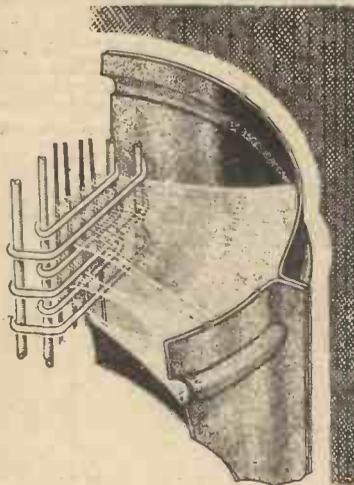
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AN EXPERIMENTER'S TEST BENCH
(Continued from page 604)

provided with six terminals—for aerial and earth, loudspeaker and low-tension leads, and with Clix sockets for the grid-bias and high-tension connections. The jacks are arranged between the terminals and sockets, those for current readings being above the centre line, and those for voltages being below, as indicated. This ebonite strip can be attached to the back of the bench, and should preferably be covered in at the back so that stray wires cannot fall on the terminals and connections and so cause short-circuits.

Another refinement consists of a .0003-mfd. bakelite-dielectric condenser, mounted between the aerial and earth terminals, and connected in series with the aerial lead-in; this can be used for varying the degree of selectivity when the set under test is not provided with a series-aerial condenser. If a D.C. mains unit is employed for H.T. supply, another refinement might consist of a 1-mfd. fixed condenser wired between the earth terminal on the panel and the earth lead.

An Output Filter

The idea of using the loudspeaker terminals on the panel is that a standard loudspeaker, placed in what has been found to be the best position in the room, can be permanently connected to them. The speaker should preferably be fitted with a tapped matching transformer, but an alternative is to mount a choke-capacity output filter on the panel, connected as shown in Fig. 3. It will be seen that the two ends of a tapped output transformer are connected to the two speaker terminals on the panel, the speaker itself being connected to any one of the other terminals by means of a flexible lead with spade terminal, and also to one terminal of a 4-mfd. condenser, the other terminal of which is joined to the earth terminal on the panel.

Reverting to the meter and its plug, it is best to connect a .1-mfd. non-inductive condenser in parallel with the meter to act as a by-pass when current readings are being taken. If this were not done instability might be introduced due to the comparatively high resistance of the meter. The meter can then be mounted on a suitable bracket above the test panel or arranged to hang from a hook on the wall. In any case it will be found convenient to arrange yet another open-circuit jack on the panel, and to attach a couple of leads with test prods to this. Then any measurements which have to be taken inside the set, or when testing components, can be taken simply by inserting the meter plug into the "spare" jack and using the test prods in the normal manner.

Modifications

The general arrangement which has been described can be modified in various ways to suit individual requirements, and it would be a perfectly simple matter to include additional jacks for extra H.T. and G.B. leads. Those who have an output meter of some kind could also arrange to plug this into a jack connected to the loudspeaker terminals. In the case of mains operation some of the leads might carry A.C., in which case it must be remembered that an A.C./D.C. meter would be necessary in order to take all measurements. Generally speaking, however, the system is more suitable for battery-set users, and unless the reader has a fair knowledge of electricity he is not advised to attempt to modify it for use with mains sets.

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briefly, in restricted space



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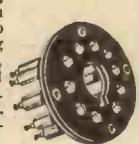
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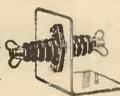
"Q" TYPE TERMINAL. Rotating and removable head in all-metal black, red or brown: 4 B.A. stem and collar. No lettering. Ea. 2d.

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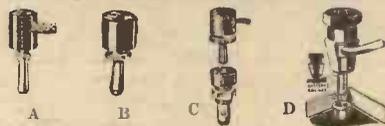


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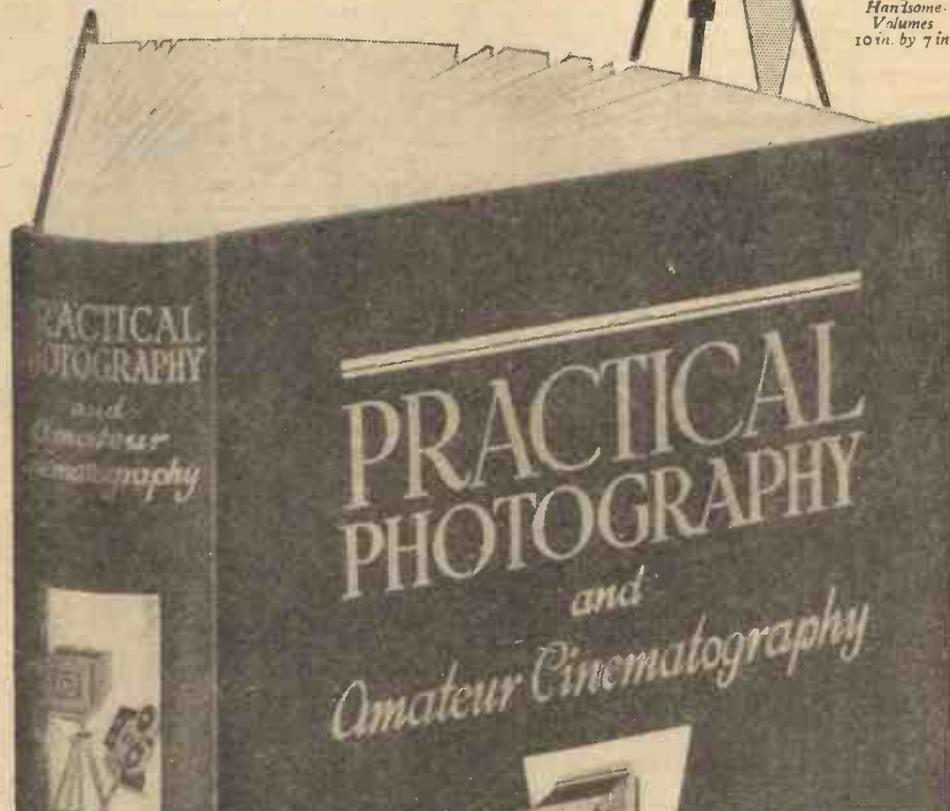
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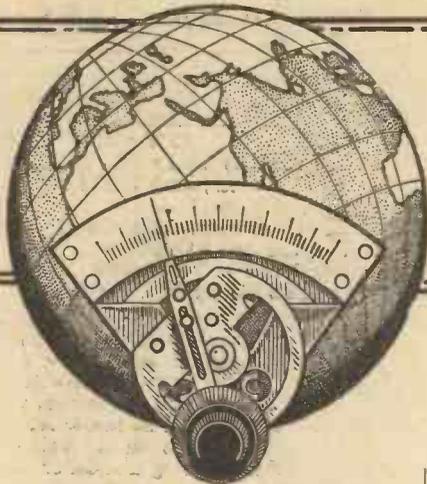
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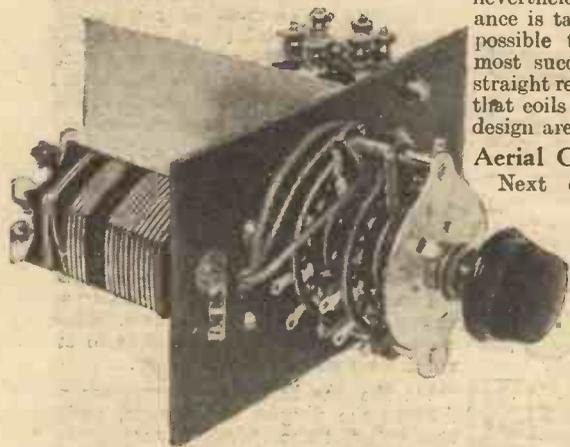
SHORT WAVE SECTION

Further Notes for S.-W. Experimenters

Among the Subjects Discussed in This Article are Aerial Coupling, Aerial and Earth Systems, and Tuning Units By A. W. MANN

FOR short-wave reception simple apparatus is very popular, and, if intelligently operated, will provide world-wide reception under average receiving conditions.

Choice of receiving apparatus is largely governed by individual requirements and circumstances, both of which are apt to present the set designer with some difficult problems to solve, in order that all tastes may be catered for in a satisfactory manner.



A B.T.S. 3-range dual S.W. coil unit fitted with rotary switching device.

For example, one enthusiast favours a straight two or three-valver, and judging by the colossal logs compiled by many who use this type of receiving apparatus, there is no doubt that very satisfactory results are obtained.

On the other hand, some enthusiasts favour the superhet, owing to its superior selectivity, and others, whilst in agreement in matters of selectivity, consider supers to be noisy, everything else unselective, and await the ideal receiver with super selectivity, and a one-valve noise level.

The Straight Two and Three-valver

The straight two and three-valve type of receivers are comparatively unselective, but in the light of personal experience, not as unselective as many would have us believe. When a receiver of this type is so unselective that reception on all bands is devoid of any pleasure at all, it is clear that the circuit fundamentally is not at fault, but that the constructor is largely responsible.

For example, short-wave coils as we know them to-day all look very much alike; nevertheless, they are not when performance is taken into account, and if it were possible to take a census amongst the most successful DX enthusiasts who use straight receivers, I think it would be found that coils of high class make and first rate design are used by the majority.

Aerial Couplings

Next comes the question of aerial couplings, which may be aperiodic or capacitative. Fortunately, the present day constructor cannot go far wrong when the former method is used, due to the fact that the coupling between the windings is fixed.

Thus it will be appreciated that when aperiodic coupling is used, first class coils are most desirable, otherwise, once absorption and associated troubles are experienced a remedy under the existing circumstances may be hard to find.

Another point sometimes overlooked, especially by those who wind their own coils, is that the distance between the grid and aperiodic windings, also the number and spacing of the turns of the latter, have a great bearing on the selectivity.

As we have only one tuned circuit, it is necessary to strike a compromise. Imagine that the aperiodic winding is movable, in fact a separate coil unit as in the old days.

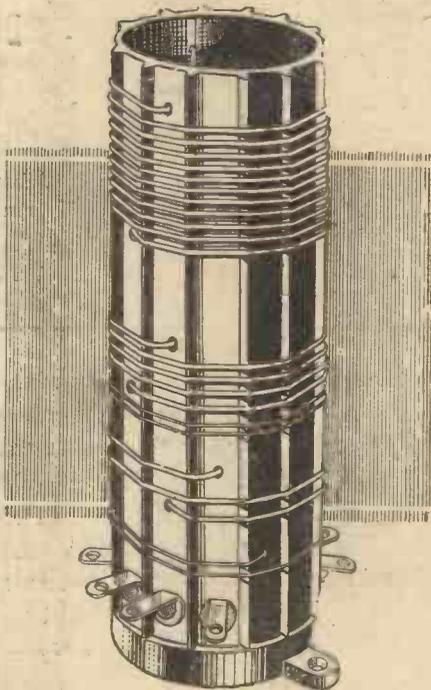
First couple the aperiodic and grid coils as close together as possible; volume will

be satisfactory, but selectivity poor, whilst instability may be expected.

In order to improve selectivity, it is necessary to slacken the coupling between aperiodic and grid coils, and strike a happy medium which will assure average selectivity and volume with stability. It will be appreciated, therefore, that when home-constructed coils are contemplated, it is advisable to work from published data.

Aerial series-capacity coupling is very much in favour nowadays, especially with beginners. The latter, however, sometimes strike trouble when first putting this method in use.

They find that by screwing the '0001 (Continued overleaf)



A three-range air-spaced short-wave coil by Belgin.

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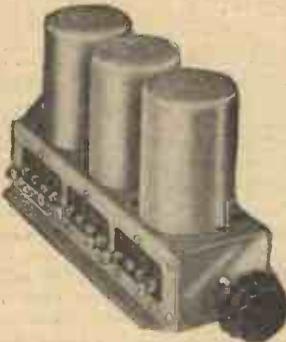
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BP 114 Straight model having one H.F. Valve. 13/6.

As in previous years the Varley company have produced another interesting range of efficient components for the home constructor.

Old friends, such as the Permeability tuner, are on show and in addition the three new components shown here. All three have caused a considerable stir in the radio industry and they are assured, by their low price and efficient action, of a record sale to the home constructor.

Come and see them on Stand 77.

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SHORT-WAVE SECTION

(Continued from previous page)

mfd. pre-set condenser right down, maximum volume is obtained. Selectivity, however, will be poor, and it is undoubtedly true to state that instability, threshold howl, and body capacity effects in modern straight circuits as used by beginners, are, in the majority of instances, directly due to tight aerial coupling.

A little time spent in trying various settings of the pre-set condenser until a position is found which enables optimum volume and selectivity on all ranges to be obtained, is well worth while.

Here again well designed coils will prove to justify their cost, because a setting will be found which will provide the desired results no matter which coil is in use, and the pre-set condenser can be firmly locked in position. This is a most desirable feature when direct tuning dial calibration is contemplated.

Aerial and Earth Systems

Apart from the above considerations there is another, which has a bearing on the selectivity problem, i.e., the aerial and earthing systems. How many use long aerials and poor earths? Even a single wire aerial designed on scientific principles will provide better results than a haphazard erection.

In many instances anything given the name of an earthing device is considered suitable for short-wave requirements. Copper-plated metal tubes, for example, whilst satisfactory for broadcast purposes, are in some instances unsatisfactory for short-wave use. Examination of such devices after a few months use, shows that the copper covering no longer exists. A tube of solid copper, a length of solid copper rod, or a copper earthing mat are the most satisfactory. On the other hand, it is sometimes found that a battery-operated short-wave receiver, functions satisfactorily without an earth.

Interest and attention is now being paid to experimental all-wave receivers. Experimenters have their own ideas as to what constitutes an all-wave receiver.

On the one hand is the amateur who favours the plug-in coil system, and on the other those who favour specially designed tuning units. When the plug-in coil method is used, selectivity on the broadcast bands is relatively poor.

The reason for this state of affairs is due to the unsuitable ratio of inductance and capacity. The standard tuning capacity for broadcast reception and around which medium and long-wave tuners are designed, is .0005 mfd., and the most suitable value of tuning capacity for short-wave use, is either .0001 mfd. or .00016 mfd., according to the make of coils used. Thus, in order to cover broadcast wavelengths, a coil for use with such low capacity tuning condensers contains a greater number of turns than when the higher capacity is used.

As a result, we have a high inductance and low capacity ratio which, due to broad tuning, provides very poor selectivity. All-wave tuning on the above lines cannot be otherwise than a compromise.

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PRACTICAL AND AMATEUR WIRELESS,
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THEY'RE ON STAND 77

WITH the continual increase in the number of South American and other distant stations reported in various quarters, one is apt to lose sight of the great development taking place in the European short-wave network, which includes many powerful transmitters giving broadcasts easily received by the owners of the more modest one and two-valve sets. As a rule, the tyro who takes up short-wave listening, in his anxiety to log distant transmissions is liable to miss much of interest nearer home, and it would be wise, if disappointment with the new receiver is to be avoided, to try at the outset for some of the short-wave broadcasts regularly put out by the Continental stations. Without turning to Colombia, Venezuela, Canada, Cuba, Costa Rica, it is possible in this manner to compile a very respectable log in the course of a few hours on most evenings, as identification by means of the musical interval signals, and the oft-repeated calls in various languages, has been made much less difficult than it was a year or so ago.

Germany's Extra Stations

During the period of the Olympic Games the ether was full of broadcasts carried out by Berlin, and no doubt some of the extra stations brought into action for the purpose of transmitting commentaries and reports of results to foreign countries interested in the competitions may be used again in the near future. Here are three powerful transmitters which were on the air in addition to the regular numerous DJ, Zeesen stations: DZC, 29.16 m. (10,290 kc/s); DZB, 29.87 m. (10,042 kc/s); and DZA, 31.01 m. (9,675 kc/s), all situated at Zeesen, and as a rule solely employed in commercial telephony or relays of programmes for re-broadcast abroad.

And Now Sweden

The Stockholm short-wave station to which I referred recently in these notes now appears to have adopted a regular schedule; it is on the air daily on 25.63 m. (11,705 kc/s) from roughly B.S.T. 17.00-23.00 with a relay of the Stockholm-Motala programme. On Wednesdays a special transmission is made for Swedish listeners in North and South America from B.S.T. 23.00 until midnight. On some nights from the closing-down time the station reverts to its amateur status, and, under call-sign SM5SX, works on 14,341.2 kc/s—namely, in the 21-metre band. The Swedes as a nation are good linguists; from the Stockholm short-wave transmitter you will hear announcements in Swedish, German, English, Spanish, French, Italian, and Russian.

Oslo Follows Suit

Oslo will be shortly testing the new 25 kW. Jeløy short-wave station on 31.48 m. (9,530 kc/s) with special programmes for listeners outside Europe. Identification will be facilitated by the fact that the announcer will give call and details of programmes in both Norwegian and English. To finance these extra transmissions, which are to consist of half-hour broadcasts from B.S.T. 00.00-03.00 daily, sponsored programmes will be given advertising Norwegian goods suited to the export trade. Care must therefore be taken not to take the Norwegian transmissions for some emanating from the United States.

Leaves from a Short-wave Log

A New Portuguese Channel

Lisbon, with the call *Emisora Nacional*, has been heard trying out gramophone records and speech on a condenser reading immediately below that of 12RO Rome; although I have not yet secured confirmation I take it that the broadcast is on 25.36 m. (11,830 kc/s), a channel used last year by CTIAA, Lisbon, and later abandoned for its present frequency.

Extended Russian Broadcasts

Again Moscow transmitters have altered their timing of English programmes; we now find RW96 on 19.76 m. (15,180 kc/s) with a Sunday transmission at B.S.T. 16.00 and another one at 19.30. RNE, on 24.99 m. (12,005 kc/s), takes the air on Sundays at B.S.T. 16.00, every week-day at midnight (S.B. on 31.51 m.—9,520 kc/s), and on Wednesdays give a special talk at midday.

The Lesser Reported Jugoslavian

Belgrade (II), on 49.18 m. (6,100 kc/s), 250 watts, gives out broadcasts which are now clearly heard in most parts of Great Britain. This station works from B.S.T. 17.30-22.30, and occasionally again after 23.00 for an hour or so. The woman announcer repeats the call at every possible opportunity in French, Italian, German, Magyar, Greek, Albanian, and Serbian.

Dutch Programmes for America

PCJ, Eindhoven (Holland), on 31.28 m. (9,590 kc/s), may be heard every Monday between B.S.T. 01.00-02.00 and every Thursday from B.S.T. 01.00-04.00 with a very good wireless entertainment mainly destined to the United States. Mr. Startz, the announcer, leaves you in no doubt regarding the origin of the programme, as he repeats his Dutch announcements in English, German, French, and Spanish.

More Transmissions from Schenectady

W2XAF, on 19.56 m. (15,330 kc/s), has extended its broadcasts by nearly two hours daily; the station now gives a continuous transmission from B.S.T. 16.00-21.45, whilst W2XAD, on 31.48 m. (9,530 kc/s) continues to transmit from B.S.T. 22.00-06.00.

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THIS valuable book tells you all about the many highly-paid positions available to trained radio men. It tells you how YOU can qualify for better pay and a secure position, or become your own master.

There is a constant demand for trained men; we can give YOU the training which leads to success.

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"I have obtained fresh employment at a much higher salary through giving particulars of your Course which I am taking."

"He engaged me at a big increase in salary. I couldn't have got this situation without your help."

"I have much pleasure in announcing an increase in salary and promotion."

"I could not have obtained this job without your Course."

"I was engaged on the spot as Engineer-in-Charge of their Service Department."

"My engagement was due entirely to the technical knowledge I gained from your training."

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PR71

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).

S.W. Reception in Aberdeen

SIR,—Perhaps some readers would be interested in the following list of recently verified reception as I have not seen a published S.W. log from this district.

Empire broadcast to Africa, 49 metres; time, 8.0 p.m. B.S.T. Saturday, August 1st, 1936. Radio Coloniale, F.Y.A.; time, 8.0 p.m. Sunday, August 2nd, 1936: DJE, DHB, DHB, Germany calling China; time, 11.50 a.m. Calls in English every minute until 11.59 a.m.

The set used was a B.T.S. International S.W. receiver. Aerial 25ft. with 25ft. lead in. With headphones reception was very clear.—E. LEASK (Aberdeen).

S.W. Superhet

SIR,—I should like to add my appeal to those you have already received for a short-wave superhet. I suggest a battery-operated four-valve set using plug-in coils, preferably of the six-pin type.

In such a set I should like to see sensitivity given the first consideration. As some

people are interested in C.W. reception the inclusion of a beat oscillator should be optional. I am at present using a det-2LF set, and should like something more selective.—E. Cox (Bishopstoke, Hants.).

Automatic Tuning

SIR,—I have seen on some commercial receivers a device by which the set automatically pulls itself into tune, when the hand is removed from the tuning knob, provided that the tuning is approximately correct. Please could you explain the working of the above device, or inform me where I could obtain details?—R. A. H. KENT (Northallerton, Yorks).

[An article dealing with this subject appeared in PRACTICAL AND AMATEUR WIRELESS dated November 9th, 1935.—ED.]

A Good S.W. Log

SIR,—I enclose my log, which may interest other S.W. listeners.

Broadcasting stations: GSC, DJA, 2RO, RW59, VP3MR, GBTT, HBP, HBL, EAQ, HVJ, WIXK, W2XAD, W3XAL, JVH, JVM, OXY, CKAA, VK2ME, TFJ, PHI, W2XE, OLR, W8XK, TPAC, GBZW, and R. Belgrade.

Two a.m. phone: SM5SX, G6LB, WIMX, W1VJ, SU1SG, F8NG, W2SA, W2MJ, W2EO, W2BT, W1BIC, W2EIO, SU1CH, VE2PJ, OM2MJ, W8CMA, W8DW, W1AXA, W3EAL, W1SLO, W3GPP, W2FS, W1CH, W3EAO, W5XG, W3CP, ON4PA, PY2BA, G5ML, G6LL, G2FC, G2FJ, SUIED, and SU1KG.

Eight a.m. phone: PAOPMR, ON4SS, and PAOSV.

My receiver is a home-made 0-v-1 with a 70ft. aerial of a single strand.—E. WILKINSON (Alford, Lincs).

Public Schools Expedition to Finland

SIR,—My brother, J. R. S. G. T., is in charge of W/T morse, on 20, 40, and 80 metres with the Public Schoolboys' Exploration Society's expedition in Lapland, and should be "on the air" till about September 14th, working from 11 to 11.30 p.m. (B.S.T.).

British and other transmitters are invited to try and make contact with them. They are, I believe, about 500 miles away from rail and road, in the extreme north of Finland.—CHRISTOPHER TAYLOR (Derby).

[Further particulars of this expedition were given in our issue of August 22nd, p. 573.—ED.]

Light Entertainment from Weston-super-Mare

"THE Show of Shows," presented by Geoffrey Hope and Vivian Palmer and produced by Vivian Palmer, will be heard in a broadcast from the Knightstone Pavilion, Weston-super-Mare, on September 4th. This is the second opportunity which Western listeners have had this season of hearing "The Show of Shows" from the Knightstone Pavilion, the previous broadcast being given on July 10th.

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, George Newnes, 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.



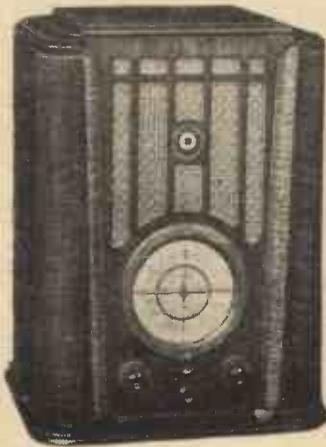
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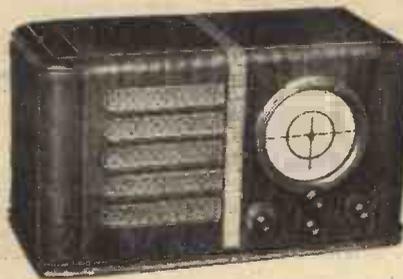


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PRACTICAL TELEVISION

(Continued from page 614)

Lewis's Concert Hall, where a chamber large enough to accommodate two people together with the associated lighting and scanning equipment was erected for the purpose. Details of the method used are being kept a close secret at the moment, but according to one newspaper report arrangements are being made to install apparatus in France for use in conjunction with a broadcasting station.

Spain Rejects

In Spain recently an effort was made by two engineers to secure the required authority for setting up a television station. This was, however, refused by the Ministry of Communications, since any form of radio transmission is an exclusive service of the State. It devolves upon the radio administration for providing any service of television, and this can only be undertaken on some competitive basis. No doubt this is meant to infer that a committee of investigation would have to be set up on lines similar to that of this country before any final concession was awarded. Bearing in mind the turmoil which at present exists in that country, there seems little likelihood of Spain undertaking any work of this nature for some time to come.

The U.S.A.

Some of the evidence placed before the United States Federal Communications Commission has been dealt with in these notes, and it is now interesting to refer to that detailed by Mr. Jolliffe on behalf of the R.C.A. Quite rightly, he pointed out that no system of television could properly justify itself until it had undergone the most stringent field tests prior to commercialisation. After trying out a number of methods, concentration was now being made on the iconoscope, the present standards of test transmission being one of 343 lines with 60 frames per second interlaced to give thirty complete pictures per second. Carrier frequencies of 49.75 megacycles were employed for the vision signals, and fifty-two megacycles for sound during the course of the New York tests, but it was felt that this did not in any way represent the final ones which would be acceptable to a critical public requiring perfect home television entertainment. Good television could be embodied in a band width of six megacycles (three megacycles maximum modulation frequency), and any effort to work below this figure would only reduce picture quality to an unacceptable standard. Figures were also furnished for the optimum viewing distance from the picture screen, this being given as approximately four times the screen height. Screen brilliance and colour must also have a direct bearing on this quantity, however, and further tests will have to be undertaken in conjunction with line definition and the picture repetition frequency.

Other important questions dealt with by Mr. Jolliffe concerned the relation between service range and interference range. It was conceivable that the latter may be anything from five to ten times the former. To secure an adequate ether allocation for frequency channels the possibility of wholly or partially suppressing one side-band was considered, but many more tests will have to be undertaken before any kind of decision can be arrived at on this question. Experiments conducted in the U.S.A. confirm those carried out by the Baird Company in this country; namely, that for satisfactory picture reception a signal strength of one millivolt was sufficient. Below this figure results could still be satisfactory provided the

receiver or the aerial was remote from any possible form of interference, factors which could very readily be settled on site without much difficulty. Another factor to come under discussion concerned the distribution of programmes. It was pointed out that as far as America was concerned no network of cables capable of handling the video frequencies of television signals was available, although installations of a co-axial cable had already begun. On the other hand, the direct relaying of programmes by means of directional microwave links was feasible and further work on both these methods would have to be undertaken. A careful watch was being kept on the work being carried out in the principal European countries, it being stressed that carrier frequencies between forty and fifty megacycles were being centred on by those authorities concerned with the provision of any form of ultra-

short-wave, high-definition television service, whether for experimental work or commercial exploitation.

FROM THE PUMP ROOM, LLANDRINDOD WELLS

WELSH listeners will hear a new combination of broadcasters for the first time on August 31st. Violet McDermott and her Orchestra will give a Recital from the Park Pump Room, Llandrindod Wells. Walter Glynne (tenor) will be the solo artist. The leader of the Orchestra is Anna Janssen, who, as her name suggests, is of Norwegian descent. The second violin is Peter Rosetti, daughter of Julian Rosetti, the Polish pianist. The cellist, Paula Wilcock, has broadcast from the North Regional on several occasions and was until recently a member of the Scottish Symphony Orchestra.

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QUERIES and ENQUIRIES

Second Channel Interference

"I have repeatedly come across the expression 'second channel interference' when dealing with superhets, and would like to know just what it means. Also I am considering taking up radio engineering as a career, and would like to know the best way to go about it."—G. S. M. (Rochdale).

SECOND channel interference is the name applied to the whistles which are experienced in a superhet receiver and which are due to the generation of a beat note between the station to which the receiver is tuned and other powerful stations which have a wavelength of such a value that harmonics fall upon the desired station. That is to say, when receiving a station at 400 metres, a powerful nearby station radiating on 200 metres would set up a second channel whistle, as the first harmonic of 200 metres is 400 metres and this coincides with the station being received. The only satisfactory way to avoid this trouble is to fit selective circuits before the frequency-changing stage, and whilst a simple band-pass aerial tuner in the grid circuit of the frequency-changer will do much to avoid the trouble, when situated very close to powerful transmitters, the only effective remedy is to use a signal H.F. stage with sharply tuned circuits. One of the well-known training colleges can provide you with details of a course suitable for your requirements.

L.F. Couplings

"I use transformer coupling between the detector and L.F. valve, and also between the L.F. and output valve. I want to know if it would be all right if they were parallel-fed as shown in the Beginners' Supplement in your August 8th issue, as they are cheap transformers. Also, would it be permissible to use zinc sheet instead of aluminium on the baseboard?"—R. C. (Belfast).

IT would certainly prove better to use the parallel-fed method of coupling with cheap transformers, but, generally speaking, when using two similar couplings in successive stages, it is worth while mixing the couplings. That is, use straight transformer coupling in one stage and parallel-fed in the other. The order to be adopted will depend upon the H.T. available, and to enable the detector to receive sufficient H.T. for smooth reaction control and give good rectification the transformer could be included as the first coupling. The L.F. valve must then be of the type which will operate with a low anode current, or the voltage drop through the anode resistance

will prevent the valve from handling a very large signal. You should therefore experiment in your particular case and find which combination provides the maximum performance. Zinc sheet or any other metal, provided it is non-ferrous, may be used for screening the H.F. circuits, and, as pointed out last week, the metallised chassis used by us are sprayed with zinc.

Winding Broadcast Coils

"I wish to wind a small coil to cover the medium waveband tuned by a .0005 mfd. condenser, with a reaction winding, to use in a straight three designed solely for quality reception of the local programmes. What

RULES

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.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

number of turns should I require on a former 1in. in diameter for tuning and for reaction? Also, what number of turns in each case on a former of 1½in. diameter? I make these small diameter dimensions because I wish to make the set as compact as possible."—H. R. (Shipley).

AS you only wish to cover the medium waveband for the reception of the locals, your coil should include the North National and North Regional, and therefore must tune from 261.1 to 449.1 metres. Allowing a small margin at either end, the coil may be wound to cover from 200 to 500, in which case an inductance of approximately 175 microhenries would be required. This could be obtained on a 1in. former by winding on approximately 90 turns of 34 gauge enamelled wire. On the 1½in. diameter former you would need only approximately 80 turns. For reaction purposes 35 turns of the same wire should be wound in the same direction and separated about ¼in. from the "earthed" end of the former winding.

Faulty H.F. Chokes

"In most wireless receivers I notice that

an H.F. choke is put in the plate circuit of the detector valve, and this I am told is to prevent the H.F. currents from getting into the L.F. side to prevent distortion. I have a receiver that was faulty—a terrible noise being emitted with the signals. I put this right by shorting the H.F. choke, and the set is now O.K. Also, in another receiver the H.F. choke was taken out, replaced by a resistance of 20,000 ohms and I had no more trouble. Probably you could explain this, seeing that they both now function better without the choke."—H. M. (Cawthorne).

THE trouble may be put down to one of two things. Either the H.F. chokes were inefficient due to insufficient turns, or they were so placed in the receivers that interaction took place between them and some other component—probably the tuning coils. This latter effect would be exactly the same as the normal reaction effect, and thus the receiver would be in a state of oscillation all the time, producing distorted signals. If the choke had insufficient inductance, it would fail to act in the correct manner, and could just as well be omitted. By purchasing a good make of component this factor may be taken care of, and if the choke is of the screened type, the casing should be earthed in order to provide the necessary screening effect. Alternatively, the choke may be wound astatically to restrict the field and avoid interaction with other components.

Grid Insulation

"I have built a mains R.C.C. amplifier, but experience severe distortion. I have made various tests with such meters as I have in my possession, and the only defect I can locate is that the anode currents of the L.F. valves are higher than they should be by the valve data. I have checked the grid bias circuits (these are automatic) and they appear in order. Is it possible to give me any assistance to locate the trouble from these details? The distortion is apparent throughout the entire musical scale and especially on speech, unless the volume is reduced to a very low level."—G. I. L. (Cardiff).

THE fact that the anode current is high would indicate either that the H.T. applied is greater than you think, or that the G.B. is lower than it should be. As the latter point has been checked and found in order, and we presume that the H.T. is more or less correctly arranged, the only cause of the trouble must be that in some way the G.B. voltage is reduced or negatived. This can be caused by a leaky coupling condenser, and as the amplifier is a mains model you may have used coupling condensers which are not designed for the high voltage working, and as a result a positive potential is being applied direct to the grid. This will result in distortion, and, in addition, the increased anode current may be resulting in an overload of some other component which has been selected from your original calculations.

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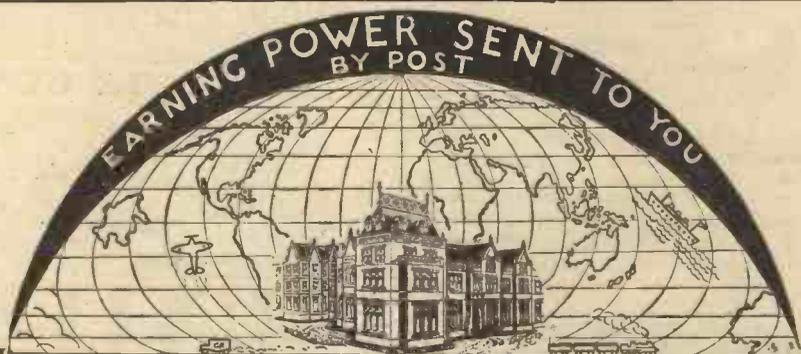
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Cameo Midget Three (D, 2 LF (trans.))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (R.C.))	31.8.35	PW55
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Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
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A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
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	PW50
"All Wave" A.C. Three (D, 2LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56
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Home-lover's New All-electric Three (SG, D, Trans) A.C.		AW383
S.G. Three (SG, D, Pen) A.C.		AW390
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
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said the Duke,
 "Onderstand, lad, I mean no rebuke;

Thy Fluxite work's neat,
 But gun's at thy feet,
 And that's not accordin' to 't' book."



See that FLUXITE is always by you—in the house—garage—workshop—wherever speedy soldering is needed. Used for 30 years in government works and by leading engineers and manufacturers. Of Ironmongers—in tins, 4d., 8d., 1/4 and 2/8. Ask to see the FLUXITE SMALL-SPACE SOLDERING SET—compact but substantial—complete with full instructions, 7/6. Write for Free Book on the art of "soft" soldering and ask for Leaflet on CASE-HARDENING STEEL and TEMPERING TOOLS with FLUXITE.

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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.

A. V. B. (S.E.19). We have no details of the coil, and connections are not standardised. We cannot assist you in this case.

R. R. (Enfield). Take a course at one of the technical training colleges, such as the Northern Polytechnic. They will coach you for the appropriate examination.

W. B. (Hexham). We do not publish any book on the subject.

A. L. (High Wycombe). We have not published any circuit or blueprint for a receiver of the type mentioned.

J. A. (Hebden Bridge). In view of the different characteristics of the valves we do not recommend a re-fitting with modern valves in this particular set.

F. E. B. (Pontyfeifion). The Perfect S.W. Three is the best we can recommend in your particular case.

H. W. M. (Wood Green). See the various reports in this issue in the Guide to the Show section. There are several makers of the type of apparatus mentioned.

W. G. (Wigan). We could not recommend a receiver to go with your condenser. Perhaps one of the sets described in this issue will prove of interest to you.

F. O. (Farnworth). The blue glow generally indicates that the valve is being over-run, either due to excessive H.T. or lack of G.B. It would appear from your other remarks that the circuit is wrongly wired or is otherwise faulty.

N. A. W. (Redland). We have not described the method of fitting A.V.C. to the set in question.

F. H. (Kenton). We have no service data of the apparatus in question and cannot suggest the reason for the wire. Can you not communicate with the firm from whom you obtained this device?

P. H. (Llandudno). We have no blueprint of a receiver for the parts named by you. The Hall-Mark Four is the nearest, but the output is Class A push-pull, not Class B or Q.P.P.

J. M. (Glasgow). A blueprint is available, but the issue in which the set was described is now out of print.

A. S. V. (Stoke Poges). We have not designed a set of the type mentioned within recent times.

J. J. (Manwood). We have not yet examined the apparatus referred to, but we have given one or two readers' wrinkles in which a similar device was employed. We shall go into the matter in a future issue.

B. T. (Bolton). The code has been fully described in a past issue and in our Short Wave Handbook. It will no doubt be referred to again in a subsequent article in our S.W. section. The choice of a meter must be left to you as we are unable to make definite recommendations and comparisons between various makes.

G. E. T. (Hull). We have no blueprint of a portable of the type referred to.

D. E. H. (Smethwick). The aerial must be short and efficient and probably the damping of your present system prevents the receiver from oscillating.

W. C. (Hull). The receiver should be constructed exactly as described and the rectifying valve should be included.

A. E. S. (Barking). It should be quite possible to make the substitution, but without a circuit diagram we cannot say what alteration (if any) must be made to the wiring.

W. F. (Leicester). No doubt we shall deal with the point as raised by you, under the B.L.D.L.C. section in a future issue.

J. S. B. B. (No address). The apparatus may be obtained from Electradix Radios, whose advertisement appears in this issue.

BOOK RECEIVED

B.T.S. S.-W. Constructors' Manual

NUMBER two of this interesting journal for short-wave enthusiasts has just been published by the British Television Supplies, Ltd., Faraday House, 8-10, Charing Cross Road, London, W.C.2, at threepence. It is a magazine specially produced for short-wave enthusiasts, and contains many interesting articles, including constructional details of the World-Wide Two (an all-wave S.G.3), How to Cut Out Noise, Tuning for Shorts, Do's and Don'ts, Using Your Present Set for Short-Wave Reception, Building Your Own Short-Wave Converter, The B.T.S. 5-valve Short-Wave Superhet, and an article by the Editor of PRACTICAL AND AMATEUR WIRELESS entitled "The Truth About Television." A useful List of Short-Wave Stations is also included. An interesting little journal which every short-wave constructor will want.

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Include Tapped Mains Transformer and Westinghouse Rectifier.
8 volts at .5 amp. 14/6
8 volts at 1 amp. 17/6
15 volts at 1 amp. 19/-
15+15 volts at 1 amp. 37/6
15+15+15 volts at 1 amp. 50/-
8v. at 2 amps. 29/6

Premier Mains Transformers
Screened Primary. Wire-end Type.
250+250 or 300+300 v. 60 ma. 4v. 1-2a., 4v. 2-3a., 4v. 3-4a., all C.T.
H.T. 8 & 9, 4v. 1a., 4v. 4a., all C.T.
H.T. 10, 4v. 1a., 4v. 4a., all C.T.
8/6 EACH
350+350 v. 120 m.a. 4v. 1-2a., 4v. 2-3a., 4v. 3-4a., all C.T. **10/6**
500+500 v. 150 m.a., 4v. 2-3a., 4v. 2-3a., 4v. 2-3a., 4v. 3-4a., all C.T. **19/6**

Terminal Types, as illustrated, 1/6 extra.
100 watt auto transformers; 100-110 v. to 200-240v. 10/- terminal type.
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H.T.10, 9/6 extra.

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0-1 ma. 100 ohms resistance. Diameter 2 1/2 in., 18/6.
Larger model, diameter 3 1/2 in., 22/6.
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40 ma. 30 HY 4/-
60 ma. 40 HY 5/6
150 ma. 40 HY 10/6
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120 volts 20 milliamps. 20/-
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Diagrams supplied.

SPECIAL OFFER
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13-26, 22-47, 41-94, 76-170 metres,
1/9 EACH.
Four- or six-pin fitting. On highest grade plastic material.

Formers only, 1/- each.
Special Set of Three 4-pin Coils, 15-150 metres, 4/-.
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From 12-2,000 metres in 4 wavebands without coil changing. Tuned S.G., Detector and Pentode. Complete with 2-volt valves and moving-coil L.S. Diagram supplied. Nothing else to buy **60/-**

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Complete set of parts for this splendid receiver, includes Valves and Speaker. Battery Kit .. 50/-
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1 watt any value .. 6d. 8 watts any value .. 1/6
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Premier "Loud Tone" .. 2/6

SHORT-WAVE HF CHOKES
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Collaro Gramo unit, consisting of A.C. motor 100-250 v. high quality pick-up and volume control, 45/-; Motor only, 39/-; Universal Model, 100-250 v. A.C./D.C., with high quality pick-up and volume control, 67/6; Universal Motor only, 49/6; Edison Bell double spring motors, including turntable and all fittings, 15/-; Cosmocond Gramo unit, comprising A.C. motor, pick-up and volume control (list 55/-), 35/9.

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With Valves.
Also supplied as Kits.
20 watt .. 18/8/0
10 watt .. 15/5/0
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3 watt A.C. .. 12/0/0
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.5 mf. .. 1/6
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Weko 1 mf. 450v. working, 1/-; 2mf., 1/9; 4mf., 3/-; 2mf. 700v. working, 2/-; 4mf., 3/6; 1mf. 1650v. working, 3/6; 2mf., 5/6.

Electrolytics T.C.C.:
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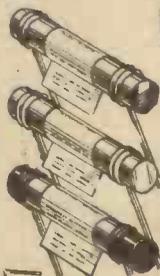
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