

**NEW SEASON'S RECEIVERS**—See Page 289

# Practical and Amateur Wireless

3<sup>d</sup>  
EVERY  
WEDNESDAY

Edited by F.J. CAMM

A GEORGE  
NEWNES  
Publication

Vol. 8. No. 193.  
May 30th, 1936.

AND PRACTICAL TELEVISION

# INTERFERENCE

and its  
Suppression



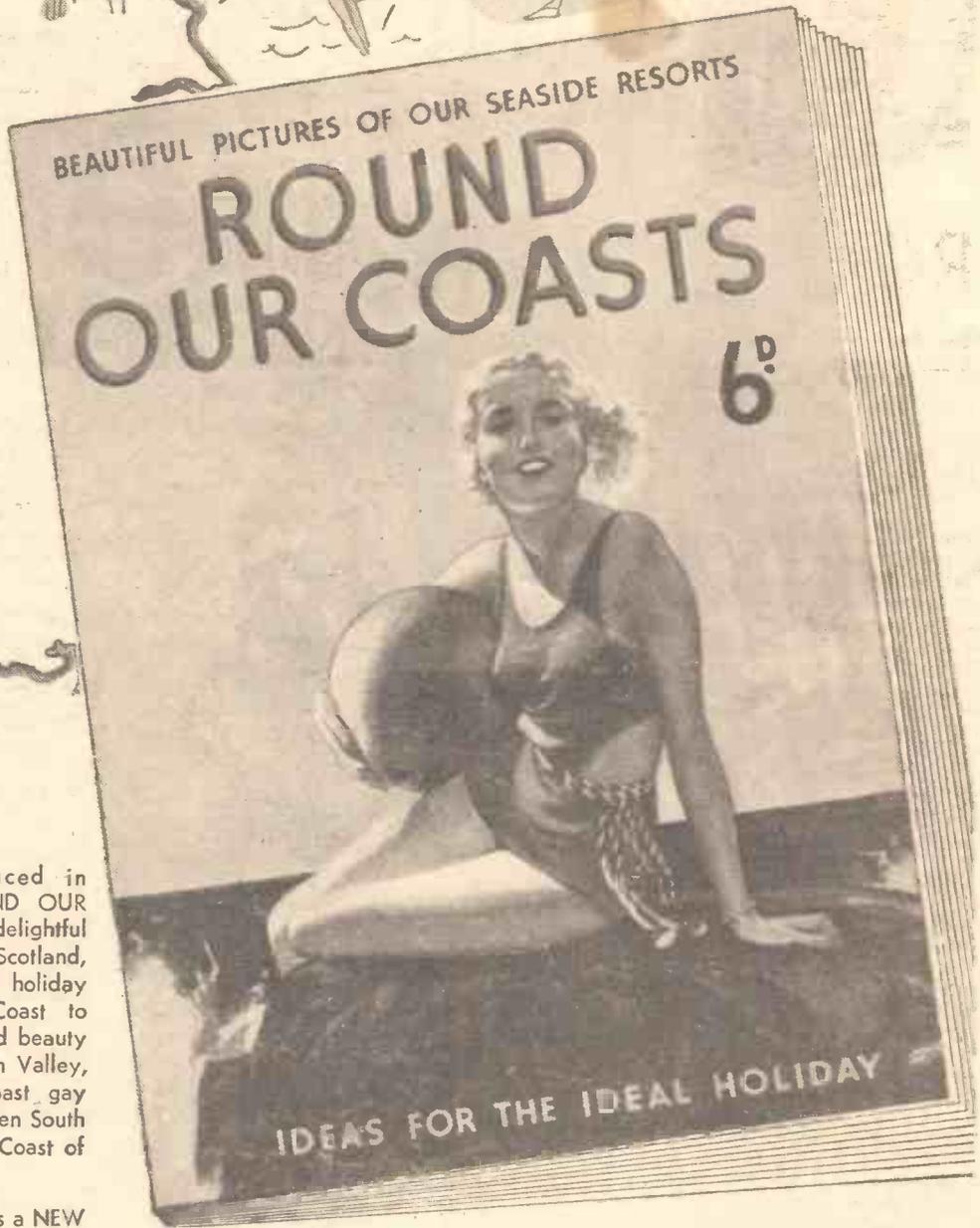
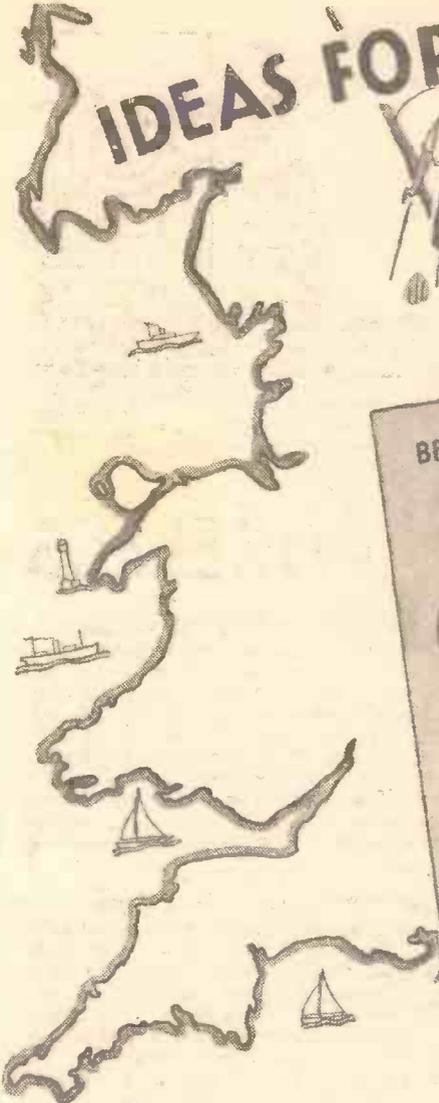
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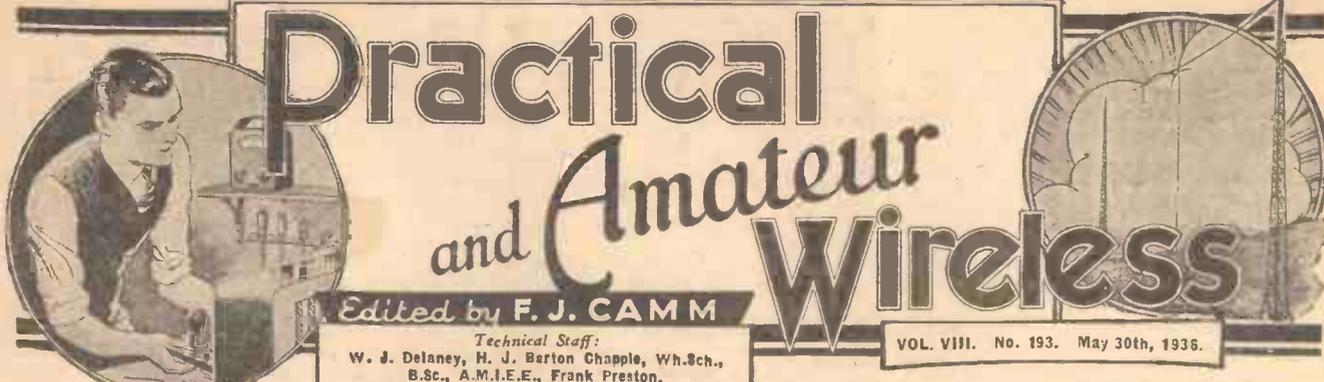


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## CRYSTAL RECTIFICATION—See page 299



# 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. 193. May 30th, 1936.

ROUND *the* WORLD of WIRELESS**The New Paris Interval Signal**

ALL broadcasts are now regularly preceded by a fanfare of trumpets when emanating from the P.T.T. Paris (*Ecole Supérieure*) studios; intervals are marked by the chiming of small bells giving the first bars of an old and popular French melody: *Si le Roi m'avait donne Paris*.

**First All-Indian Broadcast**

RUNNING commentaries on the ceremonies connected with the installation of the new Viceroy of India at New Delhi were broadcast through the various stations of the Indian State Broadcasting network, and also relayed by land-line and beam transmitter to other parts of the British Empire. The broadcast was also taken by the short-wave stations VUB, Bombay, and VUC, Calcutta.

**Interference**

COMPLAINTS are being received by the French Ministry of Posts in regard to the marring of the *Poste Parisien* (Paris) broadcasts by Bordeaux-Sud-Ouest working on 309.9 m., inasmuch as on most evenings this private station has been found straying from its allotted channel.

**Telephony Service with the Channel Isles**

THE telephone service between England and the Channel Islands hitherto carried on by means of one cable and one wireless link is to be extended shortly by the addition of radio stations at Jersey, Guernsey and Chaldon (Dorsetshire). In this manner three separate and distinct circuits will be brought into operation. Telephony transmissions are made on wavelengths of the order of four and five metres with a power of roughly 100 watts.

**Results of a Strike**

IN consequence of the steps taken by a large number of listeners to organise a general strike of licence holders as a protest against the delay in bringing the new high-power transmitter into operation, the French authorities have decided to carry out tests daily with the 120 kW. Marseilles-Reactor station between midday and 14.00 and from 20.30 onwards.

**Propaganda by Popularity**

IN view of the fact that most European stations are now closed down by midnight, the late concerts broadcast by the

Stuttgart (Muehlacker) and Frankfurt-am-Main stations every weekday are tending to make them the most popular of the continental studios. For the benefit of foreign listeners all announcements are made in several languages.

**Broadcast of the Olympic Games**

DURING the period August 1st-16th the B.B.C. will broadcast running commentaries on the finals of all events in which British teams are competing. A short eye-witness account will also be transmitted every evening. Listeners, through the German medium short-wave

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stations, at intervals will hear the peal of the famous Olympic bell weighing nearly fourteen tons, which has been installed in the 250ft. tower of the Berlin stadium.

**A Verboten Wavelength**

IT is reported that three men and two women residing in a suburb of Bremen (Germany) were recently convicted of listening to a Moscow broadcast, and were sentenced to prison for periods varying from one to two years.

**Still Forging Ahead**

DURING the month of April the Post Office issued 474,539 listening licences, thus bringing up the total for the United Kingdom to 7,643,643, or an increase of 588,042 over the last twelve months. The war against radio pirates is being steadily waged, and the authorities carried out 320 successful prosecutions in April alone.

**India's Broadcasting Developments**

IN view of the interest taken by all classes of the community in the radio programmes, the authorities are considering a considerable extension of the network. It is suggested that some nine or ten more stations will be necessary if an adequate service is to be supplied, and also that a super-power station should be installed on some suitable site in central India to permit the broadcasts to be heard throughout the country.

**Wired Wireless for the Czechs**

AS listeners in mountainous districts of Czecho-Slovakia experience considerable difficulty in receiving broadcasts from Prague, Brno and other stations free from interference, it is proposed to introduce a radio diffusion service for telephone subscribers as successfully established in Switzerland. To add variety to the programmes a wireless listening post is being erected at Drahelcice near Podebrady (Prague) to permit the relay and rebroadcast of overseas transmissions.

**Where Mere Man Takes a Back Seat**

WOMEN, at most of the Polish stations, are replacing men not only as announcers but also as station directors and heads of departments. In several instances they hold responsible positions on the engineering and other technical staffs.

**Getting Rid of Junk**

IN order to benefit the radio trade in Austria manufacturers are destroying all out-of-date wireless receivers taken in part exchange against new models. A start was recently made at Vienna when over one thousand obsolete receivers were crushed in a hydraulic press in order that the usable components should not be again placed on the market.

**The Cuckoo Station**

RADIO Ljubljana on 569 m. (527 kc/s) is a studio which frequently puzzles listeners who are not "in the know," as occasionally when tuning in that wavelength an English transmission is picked up. The explanation lies in the fact that every Friday the station broadcasts a special concert for British listeners between B.S.T. 22.30-23.00. Ljubljana may always be identified by its characteristic cuckoo signal.

# THE PICK of the PROGRAMMES

## An "All-Star" Party

A STAR Party in which film fans will be introduced to film stars will be broadcast, from the Western Regional, on June 6th, when the stars will be introduced by June Bussell as Ned Sparks. She is a clever impersonator, and will introduce a number of film stars at a party.

## "Down River" Series

IT is a compliment to Midland Talks department that a series designed for the region has been taken in the National

MAKE THESE DATES  
WITH YOUR RADIO

## Variety from Peterborough

THE Empire Theatre, Peterborough, has provided a number of broadcasts for the Midland programme, and has been described in the "Variety of Theatres" series. For the bill on May 29th the attraction is the "Summer Smiles" Concert Party, presented by Daniel Mayer.

## CONES FOR QUALITY SPEAKERS



Fixing the special metal centre on the cones for "His Master's Voice" high fidelity loud-speakers.

programme. This is entitled "Down River," and in it Geoffrey Bounphrey will describe a canoe journey from Newport, on the upper reaches of the Severn, to Gloucester; then by devious ways to the Thames at Lechlade, and so on to his home at Mapledurham, Oxfordshire. Mr. Bounphrey made his name as a broadcaster with his "Roman Roads" series; and then went to the Midlands and wakened up some of the local authorities with his series on town and country planning. This broadcast will be given on May 29th.

## "Mr. Mike Presents . . ."

THIS is the second of a series of topical revues which Martyn C. Webster will present on June 2nd, and for which a number of Midland sketch-writers and composers supply the material. The star artist for this revue will be Marjorie Wynn. There is to be a strong cast of performers, including the Four Rhythm Boys from Derby. Reginald Burston will conduct the B.B.C. Midland Revue Chorus and the Revue Orchestra.

## "Musician at the Gramophone"

ON June 5th the speaker in this series is to be Dr. Thomas Armstrong, Organist of Christ Church, Oxford. He last broadcast in the "Midland Organs and Organists" series. Later on the same day Leslie Heward will conduct the B.B.C. Midland Orchestra in Schumann's second symphony.

## The Colwyn Follies

WITH the summer come broadcasts from the coast towns of North Wales; concert parties are now getting into full swing, and on June 4th, a variety programme by the Colwyn Follies, presented by Ernest Binns, from the Pier Pavilion, Colwyn Bay, will be broadcast. The cast will include Hal Julian, comedian; Frances Davis, soubrette and dancer; Frank Rydon light comedian; Mildred Hammond, comedy soprano; Leo H. Hunt, baritone; the Raymond Sisters, speciality dancers; Len Clifford, pianist and entertainer, who hails from Wales, and Louis Holt, comedian.

## Music from the Operas

ON May 31st a programme of selections from the operas will be sung and played by the male voices of the B.B.C. Scottish Singers, with Neil Forsyth (baritone) and the B.B.C. Scottish Orchestra, led by J. Moulard Begbie, and conducted by Kemlo Stephen. The excerpts will include the Huntsmen's Chorus from "Der Freischütz," March of the Priests and Air "Oh Isis and Osiris" from "The Magic Flute," Chorus and "Toreador's Song" from "Carmen," "Serenade" from "The Jewels of the Madonna," and the Soldiers' Chorus from "Faust."

## Concert from Bridlington

HERMAN DAREWSKI and his Band will broadcast a concert of light music from the Royal Hall, Bridlington, on May 31st.

## Play by Coventry Repertory Company

ON May 31st Pinero's one-act play "Playgoers" will be presented by the Coventry Repertory Company under the direction of A. Gardner Davies, and produced in the studio by Howard Rose. The company, which has given nearly 3,000 performances in the theatre, has broadcast a number of plays in the Midland programme including, notably, "Sweet Lavender" and "Candida." Most of the members of the company are under thirty. The situation developed by Pinero in "Playgoers" is an attempt by a newly-married couple to please their domestic staff by giving them free tickets for the theatre.

## Symphony Concerts

TWO symphony concerts of more than ordinary interest will be broadcast this week. On May 30th Sir Hamilton Harty will conduct a Sibelius programme (Regional), consisting of "Karolia," "The Mermaids" and Symphony No. 5 in E flat. On Whit-Sunday evening, May 31st, there will be a symphony concert in the Regional programme, when Dr. Boult will conduct the Cesar Franck Symphony and two settings, one ancient and one modern, of the "Veni Creator Spiritus"—the first for unaccompanied chorus by Palestrina, the second for chorus and orchestra by Alexander Mackenzie. These will be sung by the B.B.C. Chorus (Section A).

## Popular Outside Broadcasts

THE North's "Summer O.B. Scheme"—which provides a regular service of concert party and light orchestral broadcasts from Northern seaside resorts and inland spas—opens on June 3rd, with a broadcast from the South Pier, Blackpool, by the Arcadian Follies, featuring Harry Korris. Previous to the broadcast, two veterans of the profession, Edwin Adeler and Sidney Frere, will broadcast some "Concert party Reminiscences," while Frank A. Terry, of "Pleasure of Parade," will introduce a modern note into the conversation. "Pleasure of Parade" will be broadcast from the Floral Pavilion, New Brighton, on June 6th.

# SOLVE THIS!

## PROBLEM No. 193.

Brandon's three-valve mains receiver, using an A.C./Pen in the output stage, suddenly stopped functioning. He checked the anode current consumption of each valve in turn and found that no current was being taken by the output valve, although a meter connected from the anode of this valve to H.T.—indicated that maximum anode voltage was being applied. He therefore suspected the valve, but when this was tested it was found to be in perfect order, and further tests indicated that the heater voltage was normal. What was the trouble? 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 St., Strand, London, W.C.2. Envelopes must be marked Problem No. 193 in the left-hand corner and must be posted to reach this office not later than the first post Tuesday, June 2nd, 1936.

## Solution to Problem No. 192.

The low sensitivity was due to a defect in the potentiometer. The moving arm could not quite reach zero setting, and therefore a small bias voltage was being applied to the valve even when the control was set at maximum.

The following three readers successfully solved Problem No. 191, and books are accordingly being forwarded to them: H. Pursey, 2, Radnor Rd., Harrow, Middx.; W. E. Watkins, Temple Laugherne Villas, Lower Broadheath, nr. Worcester; E. W. Gasby, 6, Beulah St., Hyde Park, Leeds, 6.

# Modern Methods of Manual Volume Control

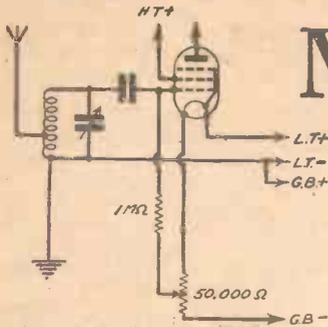


Fig. 1.—Skeleton circuit of variable-mu control of a screened pentode in a battery set.

IN the more complex present-day receivers the volume control usually fulfils several functions at the same time, and the correct use of such controls not only determines the loudness of the programmes according to individual tastes or requirements, but may also make all the difference between good and bad reproduction.

Two points in this connection should be noted. In the first place, no form of volume control as normally fitted to a complete receiver acts directly upon the apparatus

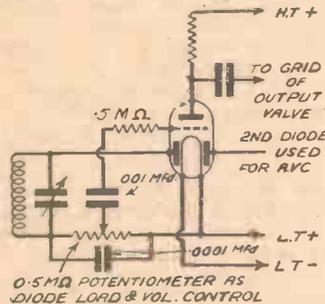


Fig. 3.—Diode load used as volume control in a duo-diode-triode arrangement.

which produces the sound, i.e., the loud-speaker, although controls of this kind are available for independent speakers such as those connected to an extension circuit, or to a relay system. Secondly, since most modern volume controls are applied to one or another of the circuits of the valves in the receiver, they can often be used to adjust the working conditions of the valve with which they are associated, and thus ensure the best possible reproduction.

Since the output of a receiver, and hence the volume of sound, is governed by the amount of amplification in each stage and also by the input into each stage, it is clear that there are, roughly speaking, two forms of control available, namely, sensitivity controls and input controls.

## “Early” Control

The first point at which control can be applied is, of course, at the aerial because, for a given sensitivity of the receiver and for a given depth of modulation, the volume depends upon the carrier voltage in the aerial system. The two available methods are to connect a variable resistance in parallel with the aerial coil (or a potentiometer between aerial and earth with the slider connected to the high potential end of the coil) and to use a differential condenser as a “capacity potentiometer” connected in a similar way.

Using a variable series condenser or variable inductive coupling between aerial circuit and tuner are quite sound as selectivity controls and they do, to a certain degree, affect volume; but they are adjustments which should be made once and for all when the set is installed, and are there-

## A Brief Review of Some of the Most Suitable Methods of Controlling the Volume of Sound Emanating from the Loud-speaker

By H. J. BARTON CHAPPLE,  
B.Sc., A.M.I.E.E.

fore not really suitable as main volume controls. These schemes are liable to affect the tuning of the set, but they may be used in simple straight sets where a high degree of selectivity is not desired, and are therefore very convenient for local station quality sets. They are, however, quite unsuitable for sensitive superhets employing A.V.C., as a reduction in the aerial input would be immediately compensated for by the A.V.C. circuit.

## Bias Adjustment

The advent of the variable-mu valve has, however, made aerial input volume control unnecessary in the majority of cases, since by means of this type of valve the set is made amenable to sensitivity control in

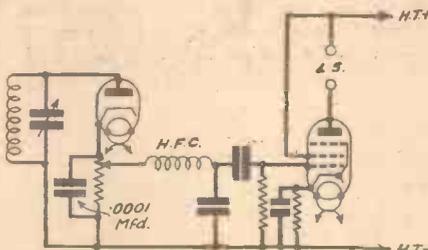


Fig. 4.—Diode load used as volume control with a pentode output valve.

the high-frequency and intermediate-frequency stages. Readers will remember that a variable-mu valve is a screen grid or screened pentode valve (or even a frequency changer) in which the mutual conductance, that is the sensitivity of the valve, is varied by adjusting the grid bias. With small values of negative bias the valve is in its most sensitive condition and will give maximum stage gain, while by increasing

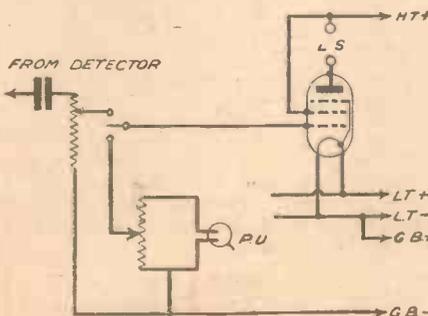


Fig. 6.—Method of radiogram switching where separate volume controls are used.

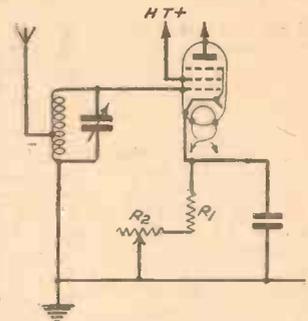


Fig. 2.—Variable-mu control of a screened pentode in a mains set. R1 gives a minimum fixed bias, and R2 the variable controlling bias.

the negative bias the degree of amplification is correspondingly reduced. Not only does this permit the overall gain in the H.F. stages to be controlled, and hence the volume, but at low sensitivity the risk of distortion through overloading in the early stages is avoided. Typical circuits for variable-mu control are given in Figs. 1 and 2, Fig. 1 being for a battery valve, and Fig. 2 for a mains valve where the biasing voltage is obtained by utilising the voltage drop in a resistance in the cathode lead. The principle of the variable-mu valve is, of course, made use of in many modern sets for automatic volume control, or A.V.C. as it is termed.

## Detector Control

Manual volume control by means of variable-mu valves is the ideal for straight sets employing one or more H.F. stages, and may often be the sole volume control, provided the receiver is not used also for gramophone reproduction, in which case a low-frequency control must also be fitted, as explained later. But before doing so reference must be made to volume control as applied to the detector stage. It is not usual to attempt any form of input control at the detector, except in so far as the aerial or variable-mu control varies the detector input. But there is one useful control which can be associated with the detector valve if of the leaky grid type, namely reaction.

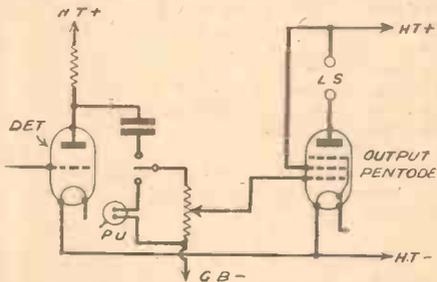


Fig. 5.—L.F. control applied to the grid of a high sensitivity output pentode, and switched for radio or gramophone.

It has been amply proved that excellent three-valve sets can be built without any reaction, relying upon variable-mu control with, perhaps, an L.F. control ganged with it, but the addition of reaction may be considered worth while, since it does provide that extra selectivity required when listening to foreign stations. Reaction is also essential in a short-wave straight set or in a straight all-waver, although in the latter case it may be considered good practice to confine its use to the short-wave range. For ordinary medium and long-wave straight sets, however, the reaction control should be supplemented by one or another of the other types of control described in

(Continued overleaf)

(Continued from previous page)

this article, and the reaction should be used mainly as a selectivity control, and always adjusted to the minimum value which gives the desired result. Selectivity beyond that absolutely necessary to separate the wanted programme from those on nearby channels means unnecessary cutting of the upper frequencies and unnatural reproduction.

### With Diode Valves

The diode detector, almost universally used in superhets and to an increasing degree in straight receivers, is not amenable to any form of volume control, and all other forms of control to be described operate on the low-frequency section of the receiver. Dealing with the most common case, namely, a diode followed by a low-frequency amplifier, which may be either a separate L.F. valve or the output valve itself, or the triode portion of a duo-diode-triode valve, the first convenient spot is at the grid of the L.F. valve. Here, the usual method is to use as the diode load the full resistance of a potentiometer, the input to the L.F. grid being taken from the slider, as illustrated in Figs. 3 and 4, which shows the arrangement for a duo-diode-triode, and for a diode followed by an output pentode.

These arrangements have the advantage that they are operative on either radio or gramophone, and in one form or another

are employed as the manual volume control for most superhets employing A.V.C. A variant, for use in straight sets following a leaky-grid detector, is shown in Fig. 5, and may conveniently be ganged with the variable- $\mu$  sensitivity control if desired. In this case, the volume control is not the detector load, but is placed across the available input to the L.F. valve, a suitable proportion being tapped off at the slider. The diagram shows the correct switching for a radiogram combination. In this connection, however, many gramophone pick-ups have a separate volume control embodied in the tone arm, and in this case the switching should be as indicated in Fig. 6.

### Combinations

Finally, it is often desired to have an independent volume control on extension speakers. Undoubtedly the best means of achieving this is to introduce a variable series resistance in the speech-coil circuit of the moving-coil speaker, that is, in the secondary circuit of the output transformer. Quite a small value of resistance is required—usually of the order of 50 ohms. The only disadvantage of this system is that on low volume the bass notes will be cut in greater proportion than the treble, but this must be considered the price which must be paid for convenience of controlling the volume of an extension speaker without going into the room where the set is installed. Many modern moving-coil speakers

are fitted with a pair of terminals which are normally strapped together, but which can be separated for the introduction of such a volume control.

Having reviewed the various forms of volume control at present in use, it will be useful to set down appropriate combinations for use with different forms of sets. This can to a great extent be left to the judgment of the builder, but the following are the most usual arrangements: For a straight three, a variable- $\mu$  control and L.F. input control, ganged if desired, so that the same knob is used for both gramophone and radio. For a superhet employing A.V.C., a single low-frequency control operating as the diode load, and switched to permit the diode load to be used as the volume control for gramophone. As an alternative, and depending upon the circuit arrangements a low-frequency control as above, for radio only, and independent volume control for the pick-up. This is sometimes necessary because the value of total potentiometer resistance required for the diode load is not the correct one for the particular pick-up employed. For a straight set not fitted with gramo-terminals, a variable- $\mu$  control plus reaction (for long-distance work only), while for a local station quality set, aerial-input control, in conjunction with a fairly high fixed bias setting for the variable- $\mu$  valve, plus a low-frequency volume control, either operating on the diode load or the grid circuit of the output valve.

## RANDOM JOTTINGS

### Ex-King of Siam at "His Master's Voice" Factories

DURING an informal visit to the "His Master's Voice" factories at Hayes, Middlesex, recently, the ex-King of Siam, Prince Prajadhipok of Sukhodhaya, witnessed the pressing of records to be despatched to Africa, India, and other countries. The ex-King, who was accompanied by his equerry, Major Svasti, was received by Mr. Alfred Clark, chairman of "His Master's Voice."

Having listened to a programme of music from America, received on an "H.M.V." new all-wave Autoradiogram, the ex-King placed an order for one. He asked Mr. Clark to have it sent to his home, remarking that he wanted to hear the Metropolitan Opera, and the big symphony orchestras broadcasting from America. In the research department of the "H.M.V." factories, where he saw experimental work in connection with television, the royal visitor moved a switch which set in operation scientific apparatus. He was keenly interested in all he saw.

Prince Prajadhipok is a keen radio enthusiast, and his residence at Virginia Water is fully equipped in this direction. He is the possessor of thirteen instruments, including an "H.M.V." Model 800 Autoradiogram. The thirteenth—the 485—will be used exclusively for the reception of American stations. Before leaving Hayes, the ex-King expressed the desire to witness the recording of a "big symphony orchestra" at "H.M.V." studios at Abbey Road, London.

### "The Little Man"

ON May 31st, a radio version of Galsworthy's brilliant one-act play, "The Little Man," will be broadcast in the

Northern Ireland programme. Many listeners will remember the stage play, the scene of which is laid at the railway stations of two little Austrian villages and in the train which connects them. This setting has made stage presentation rather difficult, and the whole play is admirably suited to radio adaptation. The story is that of a little man, of indefinite nationality, who unconsciously becomes a hero by rescuing a

baby. The story of his plight and the reactions of the other passengers, English, American and Dutch, to an uncomfortable situation are told with a wealth of humour and irony. Edward Wilkinson has adapted the play and will produce it.

### Television Appointment

DALLAS BOWER, the new B.B.C. Television Producer, is well acquainted with both film and radio production. He worked with Elisabeth Bergner and Paul Czinner as Assistant Producer of "Escape Me Never," and also directed the film version of L. du Garde Peach's famous radio play, "The Path of Glory."



The ex-King of Siam, Prince Prajadhipok of Sukhodhaya, intrigued by one of the automatic coil-winding machines at "His Master's Voice" factories at Hayes, Middlesex. The machine in the picture carries out ten operations at once and some of the smaller coils contain as much as three miles of wire finer than a hair.

# New Season's Receivers

A Brief Review of Some of the New Commercial Models which have been, or are being, Released for the Coming Season

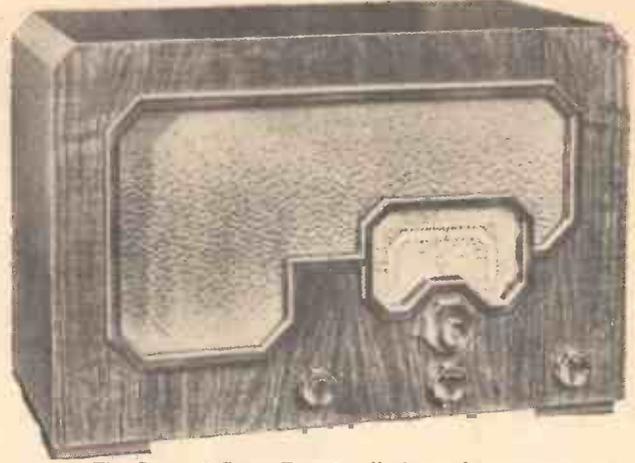
SOME interesting new receivers are announced by the various well-known manufacturers, and a selection of these is shown on these pages. Probably the most interesting from the point of view of the general design is the H.M.V. Model 425, of which we show both an outside and an inside view. It will be seen that this receiver employs the new H.M.V. metallic grille behind the speaker opening, and that an additional support has been given to the large loud-speaker which is employed. This method of mounting removes a great deal of vibration, which in some receivers spoils reproduction, and at the same time enables the speaker to function more efficiently as there is no risk of distortion of the diaphragm which might arise where only the periphery of the speaker is employed for mounting. The new rectangular easily-read tuning scale is employed, and this is of the type which operates with a large ring or spot of light which travels across the dial as the receiver is tuned. The outer line is for medium waves, and the inner line for long waves, and the main station names are clearly marked above each line, whilst the wavelengths are marked below the lines. Perhaps there could be more of these markings, as the only calibrations on the medium-wave band are 200, 300, 350, 400, 500, and 550 metres, but the dividing lines between these points, together with the various station names should enable anyone to locate a desired station. The receiver is a five-valve (plus rectifier) superhet with A.V.C., and in accordance with the majority of present-day receivers sockets are provided for the addition of an extra loud-speaker which should be of the low impedance type. The rated output is 2 watts and the mains consumption is 60 watts.

The price of this model is 11 gns.

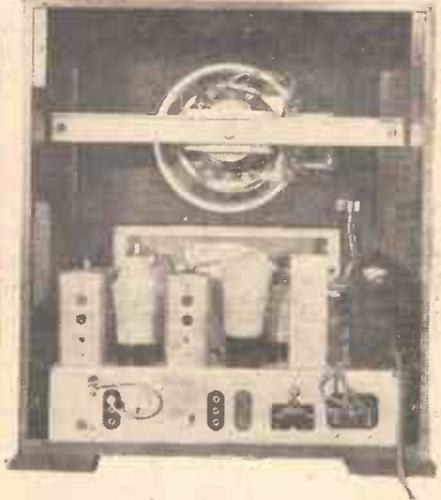
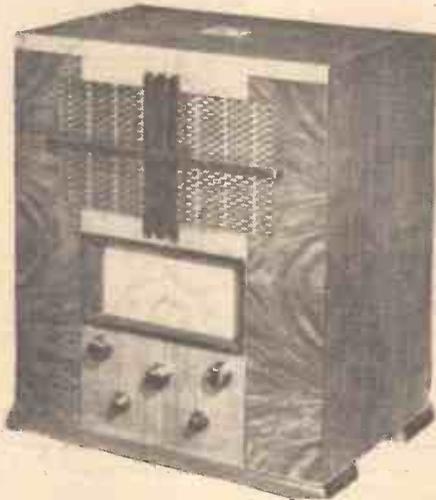
## Cossor Super-Ferrodyne

The receiver shown at the top of the page is the new Cossor "Super-Ferrodyne" Model 378, which is also an A.C. mains model, with three valves—all pentodes. In this model a very high degree of selectivity has been obtained without adopting the superhet principle by utilising

stage gain. An 8in. energised loud-speaker is employed, whilst plugs and sockets are also provided for the use of a gramophone pick-up and extension speaker. Volume control in this model is carried out by



The Cossor "Super-Ferrodyne" three-valve receiver.



These two illustrations show the front and rear views of the H.M.V. Model 425 receiver, and reveal the method of ensuring a firm mounting for the loud-speaker.

super-selective iron-cored coils, and the high-efficiency H.F. pentodes which are employed in the H.F. and detector stages give good

utilising a variable-mu H.F. stage, and there are only three controls, one of which combines the function of on/off switch and wave-change control.

This receiver costs 8 guineas.

## Burgoyne "Hollywood" Receiver

In the bottom left-hand corner of the page is the new Burgoyne "Hollywood" model, which again is an A.C. mains receiver utilising a non-superhet three-valve circuit. Iron-cored coils are also employed in this model to retain a high degree of selectivity, and the coils are Litz wound. To assist in preserving the selectivity on long waves this particular receiver is fitted with a Droitwich wave-trap. A variable-mu H.F. pentode is employed in the first stage, and the detector is operated on the power-grid method, with a resistance-capacity coupling to the output pentode. A coloured tuning scale is fitted, and this is calibrated in both metres and station names. There are only three controls, and a combined reaction and H.F. volume control is fitted so that reaction is only applied when the H.F. amplifier is working at maximum efficiency, and thereby the complications of a separate control are eliminated. The loud-speaker is of the energised type, and this model costs 8½ guineas.

(Continued overleaf)



The Burgoyne "Hollywood" three-valve receiver, which employs a "straight" circuit arrangement.



The new McMichael "Inexpensive Luxury" superhet, showing the novel tuning scale.

## NEW SEASON'S RECEIVERS

(Continued from previous page)

## McMichael "Inexpensive Luxury" Superhet

An unusual shape of tuning scale identifies the new McMichael superhet which has been called by the makers the "Inexpensive



A luxury automatic all-wave superhet radiogram, H.M.V. Model 485.

sive Luxury" model. This is priced at £11 7s. 6d., but is a four-valve superhet utilising seven stages, with band-pass tuning. The tuning dial includes twin illuminated scales, has separate duo-pointers, and shows station names and wavelengths individually and simultaneously, the smaller wavelength scale being inset in the bottom of the station scale.

The receiver is fitted with four controls, providing tone control, tuning, volume control and wave-changing, whilst a further valuable feature in this particular receiver is the inclusion of a mains static suppression device. The usual pick-up and extension speaker sockets are provided, together with a silencing key for the self-contained energised speaker.

## H.M.V. Auto-radiogram de Luxe

In the more expensive class is the H.M.V. automatic radiogram shown on this page, and which includes every refinement for the wireless fan and the keen musical student. This also is a superhet, but is designed for all-wave tuning, and the well-known H.M.V. chassis Model 480 forms the basis of this receiver, with which is incorporated the automatic record-changing device and wide frequency range pick-up. The tuning control is of the full-vision aeroplane type and the wavebands covered are 750-2,200 metres, 185-560 metres, 46-140 metres and 16.7-51 metres. Each waveband is identified by a letter, and the control is similarly identified to



Two portables—the Vidor and the Burndept, in which the reproduction may be heard just as clearly when the cabinet is closed.

assist in ready selection of the desired band. Two tone controls are fitted, giving complete control over the treble and the bass frequencies, and thus it is possible to obtain any desired range of tone. The special metal grille is also employed in this model, and additional loud-speakers may be plugged in at the rear. A special three-position switch enables either the internal speaker to be used alone, the additional speakers to be used alone, or all speakers to be employed together. The price of this model is 36 guineas.

## Vidor and Burndept Portables

The remaining receivers on this page are portables which are practically identical in appearance and in which provision has been made for the reproduction to be heard no matter whether the cabinet is open or closed. A full report of both of these receivers will be found in our issue dated May 2nd last, and the price of these is £5 18s. 6d.



## ITEMS OF INTEREST

## Mr. Reginald King

THE appointment of Mr. Reginald King, whose name so often appears in the B.B.C. light music programmes, as Professor of Composition of Light Music at the Royal Academy of Music, is a compliment not only to Mr. King, but also to light music itself. It has always been the policy of the B.B.C. to encourage the best light music, but it has long been felt that much remains to be done both as regards improving the standard of light music performances and encouraging composers to learn to write good music of this class with a special view to broadcasting. Mr. King's appointment is a step in the right direction.

## Listen to Radio Marconi

THE new 50-kilowatt transmitter at Bologna (Italy) has now taken over the channel previously used by Trieste, namely 245.5 m. (1,222 kc/s), the latter station sharing with Turin (1) the wavelength 263.2 m. (1,140 kc/s). This explains the volume at which you now hear broadcasts on the old Trieste condenser band.

## Another Belgian Radio Station

IT is reported that a privately-owned broadcasting transmitter, Radio-Vlaanderen, has started daily transmissions at

Ghent; the wavelength is 202 m. (1,485 kc/s), the call and announcements being given out in the Flemish language.

## Radio and the Solar Eclipse

A TOTAL eclipse of the sun to be observed in certain parts of Europe is due to take place on June 19th. Scientific missions are being sent to the U.S.S.R., as the most favourable site for observations, from many quarters of the globe to study the solar effect on wireless transmissions. Similar observations were made on a previous occasion in 1932.

## The French Press Protests

OF all European announcers it is said that the Frenchman is the one who to the greatest degree distorts the pronunciation of foreign names. If you listen to some of the news bulletins you will hear references to *Mistaire Bol-de-Veen* (Baldwin), *Idden* (Eden), *Lowie Georges* and *Tchamberlan*, which in most instances are unrecognisable by the English hearer.

## Newmills Burgh Band

THE Newmills Burgh Band, conducted by George Hawkins, and Ian MacLean (entertainer) will give an early evening performance, in the Scottish programme,

on May 30th. The Newmills Burgh Band was formed about a hundred years ago and is entirely supported by public subscription. All its members are employed in the lace and Madras trade.

## Military Band from Leamington

THE visiting band at the Pump Room Gardens, Leamington Spa, on the Saturday of Whit-week end, is that of the Third (the King's Own) Hussars. Bandmaster Lawes will be in charge, and the programme to be broadcast from the Midland Regional on May 30th will include a selection from "Lilac Time" and Reminiscences of Tosti. At the Battle of Dettingen the Regiment distinguished itself and captured a pair of silver drums. For this exploit it still enjoys the privilege of having one kettle-drummer and horse in excess of establishment.

## "America's Choice"

BRENT WOOD, whose "Keep in Time" gramophone recitals are so popular a feature of the Northern programme, will present on June 4th a programme of records by the dance bands, crooners, and vocal items adjudged to be most popular in the American Press ballot for 1935. "America's Choice" includes Lombardo's, the Casa Loma, Ray Noble's and Wayne King's dance bands. Connie Boswell, Kate Smith, and Bing Crosby (crooners); and the Mills Brothers and the Boswell Sisters (vocal teams).

# On Your Wavelength

## An Unusual Experience

ONE of my readers, J. W., of Bangor, in the course of an interesting letter relates details of an unusual experience which befell him the other evening. He switched off his short-wave set at about 11.45 p.m., after touring about. On taking off the headphones he heard a continuous high-pitched note similar to that produced when you advance the reaction condenser too far. He searched round to locate the source, but failed. The noise was not faint, but quite loud. As the set was switched off, he with some justification concluded that the noise must have been in his ears. Upon retiring, the whistling still persisted, so he got up again and had a further hunt around the wireless set. He even disconnected the battery, but still the noise went on. His thoughts by that time were introspective, and turned to blood pressure and other maladies. At about 12.10 a.m. his fears were calmed by his electric light becoming very brilliant,



Jailed for listening to Moscow.

followed by a blue flash, a plop, darkness and silence. He asks me whether I have ever heard of a like occurrence, and I can assure him that it is by no means uncommon for even a 40-watt, 230-volt lamp, operated from 50-cycle mains, to oscillate audibly and violently.

## In Gaol for Listening

I READ that five Germans have been sentenced to imprisonment, one for two years, for listening to Moscow programmes. The offence was described as "preparing for High Treason." There are many of us who object to propaganda programmes broadcast in English from foreign stations, but, thank goodness, in England we are still free to listen if we wish. Those who feel that

## By Jhermion

England is a harsh place to live in might well ponder over this incident. It is always difficult for an Englishman to get the Continental outlook, and perhaps it is wrong of us to sit in judgment upon them, since we can only judge international conditions from what we are permitted to know of them.

## Afraid of Thunder and Lightning

I MET an old friend in the train the other evening who was full of praise for his latest super-super-hyper-radio. When we arrived home at our suburb there was a terrific storm raging, with thunder and lightning, and as he lives but a few yards from the station, I accepted his hospitality and invitation to see the new wonder receiver. Imagine his plight when he found that his wife, on hearing the thunder, and being afraid of lightning striking the set, had switched off, disconnected the aerial and earth, and *dropped the set into a bath of water*. I left hurriedly, preferring the existing storm without to the impending storm within.

## Cycle Radio

WHENEVER I make a date with my radio set I like to preface the event with half an hour's stroll, so that I can accustom my mind to the pending half an hour or so of sitting still. On one of these peregrinations I was surprised to be overtaken by a cyclist wearing headphones. The set was in a midget case strapped to the crossbar. I mused that one of the great charms of cycling is its silence. Apparently this cyclist preferred music and entertainment; or perhaps he was experimenting. I wonder if the act of listening whilst riding prevented him from hearing the otherwise audible warning of approach of vehicles astern? Anyway, I thought it was very enterprising of him, and if this paragraph should catch his eye I hope he will drop me a note. I can imagine that such a set would relieve the tedium of a long journey if compulsorily undertaken.

## Swing Music

I AM puzzled by this new term "swing music." I took the trouble to consult a lexicon, and found that the word "swing" means, among other things, "to cause to wave or vibrate as a body suspended in the air; to move to and fro; to be hanged; oscillation; influence of a body put in motion; unrestrained liberty." If swing music is the sort I think it is, the definition I favour is "to be hanged." All of which caused me to think of monkeys swinging to and fro with unrestrained liberty from the bough of a tree. I suppose this is the connection between jazz and the jungle, although I had thought previously that the connection was with the natives, and not with the denizens of the forest. I was not in the least surprised to find that it had a connection with oscillation—at least, that was my reaction to it. No pun intended.

## More Controversy

HEREWITH a letter from M. M.—  
M. of London:

"Tell those readers who would praise Dickens to try to translate him into some other language; then, being forced to scrutinise the text, they will soon find out how full of ambiguity and incorrectness is the original. And then let them consider the general 'tripy-ness' of the fellow's writings, the slime of his sentimentality and the pallidness of his characters! Peace be on his bones, but I do not doubt he would have been a crooner had he lived to-day. Perhaps he has reincarnated as one?"

"I write the above lines as a good hater of Dickens (the writer—the man doesn't interest me), and in thanks to you for attacking this idol of the unthinking. Good for you,



A bath for the set.

Sir, carry on with the work of destruction.

"P.S. Chuck that bowler—it's 'orrid!'"

I am sorry this reader does not like my bowler hat, but he must really blame the artist. I don't really look so bad as that!

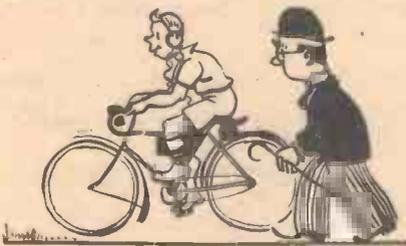
### Smarting Eyes

M. J. of West Hampstead adds to my correspondence on this subject as follows:—

"In the current issue of 'P.W.' you mention that your eyes smart when listening-in to faint transmissions and then, referring to motor-cyclists' hearing being affected when wearing goggles, you ask for word from readers on this point.

"I therefore, in response to your request, write to say that although I have not experienced any affection of the eyes when listening-in, I certainly did find that I was not able to hear so well when I wore goggles when motor-cycling, and for that reason always avoided them when possible. It seems to be quite a well-accepted fact, but whether the reaction is physical or psychological I am quite in ignorance.

"Whilst actually writing you I



Cycle Radio.

might touch upon the abusive letters that you receive, and to which you refer in your paragraph headed, 'Bats in My Belfry.' I may say that I cannot think why you attach so much importance to them that you devote nearly two columns to the subject. If I were a journalist I should meet, and deal with, *considered* criticism, but treat with contempt abuse from those who screamed for my blood merely because my opinion differed from theirs.

"I wonder if it has ever struck you that many who metaphorically jump on you because you happen to assail some pet subject of theirs in one instance would probably chortle with joy and scream, 'He's a Jolly Good Fellow,' when you advanced some point of view that coincided with theirs on some other occasion.

"For instance, I disagree with you, wholeheartedly, on the question of Dickens, whose books have always given me much enjoyment, and which



## Notes from the Nest Bench

### A.C./D.C. Valves

IN A.C./D.C. (universal) receivers the valve heaters are wired in series in order to keep the wattage consumption as low as possible, and for the same reason the heaters have a high resistance as compared with those of A.C. valves. If valves taking the normal 1 amp. consumed by A.C. valves were used in universal receivers the wattage consumption would be 250 watts, excluding the H.T. consumption; this is, of course, approximately fifteen times the heater consumption of the average four-valve A.C. set. By designing valves to work satisfactorily with a low heater current, the running cost of universal receivers has been reduced to very nearly as low a level as that of A.C. receivers having the same number of valves.

### Replacements

UNFORTUNATELY, however, these valves have not yet been standardised to the same extent as their A.C. counterparts; their heater current requirements vary between .1 and .3 amp. Great care must therefore be taken when replacing A.C./D.C. valves, the characteristic to particularly note being the rated current consumption. If a .3 amp. valve were replaced by a .1 amp. type, the latter would burn out very quickly.

### A.C. Valves

IN order to obtain best results from A.C. valves it is necessary to supply the correct voltage—usually 4 volts—to the heaters. When a home-constructed receiver is first switched on it is therefore advisable to measure the heater voltage by means of a reliable A.C. voltmeter, as it is often found that the heater voltage supplied by the L.T. winding of the mains transformer is not sufficiently accurate. This inaccuracy may be due to excessive or insufficient load (too many or too few valves in use), or to bad design.

### Regulating Heater Voltage

SLIGHT inaccuracies can generally be corrected by altering the tapping on the primary of the transformer. For example, if the heater voltage is slightly low and the primary plug is in the 250-volt socket, the 240 socket could be used to increase the heater voltage. This procedure must only be adopted when the current consumption of the valves does not exceed the rated current output of the transformer, however. If, on the other hand, the heater voltage is high it may be reduced by using a higher socket on the primary winding, e.g., the 250 socket instead of the 240. This method of varying the heater voltage affects the H.T. voltage as well, but the variation of the latter is seldom sufficient to affect reception. In cases where it is desired to avoid reducing the H.T. voltage, excessive heater voltage can be reduced by connecting a resistance across the heater circuit; an old A.C. valve, with heater circuit intact, is useful for this purpose.

I should like to read again and again—were not life so short!! But I am with you every time, and murmur, 'Up, Thermion,' when you attack crooners, who are a perpetual pain in the neck, and acute nausea, to me.

"So here's wishing you all the best, and hoping that you will continue to express what you think without let or hindrance as long as you bear in mind that many of your readers do not see eye to eye with you every time, and possibly sometimes with very good reasons."

### A Letter from Iraq

I HAVE received the following letter from E. A. D., of Iraq. Perhaps my readers would like to consider it and let me have their opinion:

"Some time ago I remember reading in your article in PRACTICAL AND AMATEUR WIRELESS that the ideal radio installation will consist of a unit hidden away under the stairs with merely a dial similar to a telephone dial in each room and, of course, a loud-speaker also.

"I think (in fact I am pretty sure) that I have found a method whereby a unit could be attached to any set (with at least 1 H.F. stage) without



Swing music and monkeys.

any alteration whatsoever, no removal of knobs, in fact, merely inserting the unit in the aerial and earth leads. From the unit would run four leads (including L.-S. leads) to each of a number of operating dials for each room. The cost for production would be about £4 or £5 for the unit and about 15s. or £1 extra for each extension (this is a very liberal estimate).

"Of course, the number of stations obtainable would be limited, but twelve would be easily obtainable, possibly twenty-four, which should be ample. The unit could be incorporated in a set very much cheaper.

"By substituting a filter which would by-pass a band of frequencies in the R.F. stage of the unit, in place of a tuned circuit, I reduce the number of variably-tuned circuits to one, the oscillator circuit. Thus, by using pre-set condensers brought in circuit by a rotary-magnetic switch, I can remotely tune mv receiver."

A PAGE OF PRACTICAL HINTS

SUBMIT  
YOUR  
IDEA

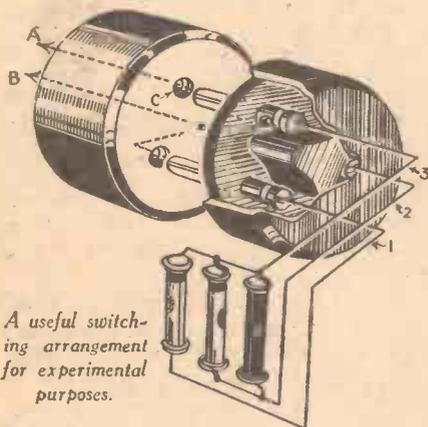
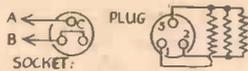
READERS  
WRINKLES

THE  
HALF-  
GUINEA  
PAGE

A Novel Switching Arrangement

**I**N experimental work it is frequently necessary to switch in and out of circuit one, two, or three resistances, inductances, or condensers connected in parallel. Such a problem often arises when testing or experimenting with resistance networks, filters, tone correction, and similar circuits. The problem also occurs with the switching of two or three loud-speakers, the speech coils of which are fed from a common supply. It is by no means easy to design a switching system which is simple, easily wired, and at the same time ensures perfect contact in each position.

The diagram shows a particularly neat and effective method of achieving the desired result by utilising a single plug and socket. This is of the 3-pin pattern with the pins all the same size and arranged 120° apart. The plug can thus register with the socket in three different positions. The three resistances, inductances, or condensers, as the case may be, are connected as shown to the plug, two of the terminals of the socket being bridged. It is obvious that when the



A useful switching arrangement for experimental purposes.

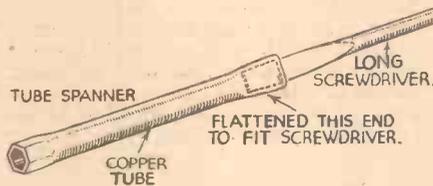
plug is inserted so that pin 3 registers with the socket outlet C, all three resistances are connected in parallel in the circuit A, B. When pin 2 registers with C, one resistance is cut out, and other two remaining in parallel. When pin 1 registers with C, only one resistance remains in circuit. It will thus be seen that three alternative connections are provided, the changes being made readily, with the certainty of positive contact in each case. The change-over is facilitated if a suitable mark is placed on the socket adjacent to C, the plug being marked 1, 2, 3 to identify the pins. The arrangement obviously has many applications, always bearing in mind that when all three resistances, etc., are in circuit, the direction of the current flow is reversed as compared with the two alternative positions of the plug.—C. MUSTILL (Leeds).

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 Set of Tube Spanners

**F**OR refractory nuts difficult of access, the following dodge will be found useful. Obtain several lengths of copper

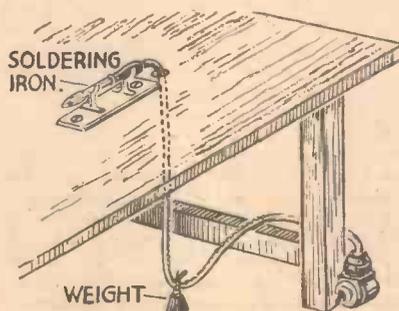


A method of making tube spanners.

tube, approx. 3in. long, the internal diameter of the tube being the size of the nut. If a nut is placed within the end of the tube, and the same lightly hammered, an efficient tube spanner results. A complete set for all B.A. sizes can be made in this way. If the other end of each piece of tube is flattened to fit the blade of a long screwdriver, one has a set of tube spanners with a universal handle, which are easily carried. The application of a little soap to the inside of the spanner end will retain the nut while it is being removed.—L. J. FRY (Devonport).

A Soldering Hint

**H**ERE is a dodge which will be found very useful to constructors who use electric soldering and who find that the flex hampers their movements. By drilling a hole in the bench, passing the flex through it, and attaching a small weight, as shown in the accompanying sketch, the flex is



A handy soldering dodge.

pulled down each time the iron is replaced on its stand.—K. TROUT (Birmingham).

Lighting a Radiogram Turntable

**A** TURNTABLE lamp is a refinement that is often omitted from a radiogram, but the provision of one will often obviate damage to records and pick-up due to inability to see exactly where to place the needle. The lamp described below can be made in a very short time and at negligible cost. The materials required are: an empty bakelite shaving-stick holder, a flash-lamp holder of the baseboard mounting type, a small piece of springy brass, such as is found on flash-lamp batteries, and a few 6 B.A. screws. The four holes shown should first be drilled in the base of the shaving-stick case, two of them on centres to suit the flash-lamp holder. The strip of brass is mounted under the centre screw head with a spring washer and a nut, and the remaining hole takes a screw the head of which forms a contact for the switch arm. A soldering tag should be slipped under this screw to take a connection, and a piece is



A neat lighting fitting for a radiogram turntable.

then filed out of the base so as to form a stop for the switch arm in the on and off position. A corresponding piece should also be filed in the top half of the shaving-stick holder. It may be found necessary to mount the flash-lamp holder on a small block of wood to raise it above the edge of the turntable, but in any case a few washers or nuts should be placed beneath it to clear the switch.

The window is best cut out by drilling a 1/8 in. hole in each corner, and then sawing between the holes with a hacksaw blade, trimming it up with a file afterwards if needed. Make sure, however, to place the opening on the opposite side to the switch arm. A small piece of clear celluloid behind the opening and some tinfoil to act as a reflector can be secured with a touch of adhesive. If the screws are sufficiently long to project beneath the motor board, the connections could be made to them, and no wires need show on the top.—D. BESSANT (Mitcham).

# Summer-time Experiments

There is No Need to Give Up Wireless Experimenting During the Summer Months, and Some Suggestions for Various Lines of Experiment are Here Given By W. J. DELANEY

**T**HE rise in temperature, and the longer hours of daylight result in many amateurs and experimenters giving up wireless as a hobby during the summer, and thoughts turn to outdoor hobbies. There is, however, no reason why this should be so, and there are particular lines of experiment which are only available during this time of the year, and the keen wireless amateur is interested not only in hearing programmes from afar but also in perfecting his apparatus. By carrying out systematic tests and trials it is possible also to gain a further and more intimate acquaintance with radio, and therefore it will well repay the time which is devoted to a study of the various sections of radio—both from the transmitting and receiving end.

Dealing first with the equipment as such, we must consider the problem which arises when the receiver has to be taken into the open. In the normal way the broadcast receiver will be housed in a cabinet either of the console type or in what was at one time known as the American type of cabinet. The batteries in such a case will be in a separate container. Many amateurs now possess two separate receivers—one for use indoors and one for carrying out. The latter may be a portable or a transportable, the difference merely relating to the weight.

## Portable Apparatus

If the receiver is light enough to be carried on a walk, then it is known as a portable, whilst if it is only in a convenient form which enables it to be lifted from the house to a car, and then from a car to a picnic spot, or carried from one room to another (generally with a struggle), then it is a transportable. But where the only apparatus in use follows the orthodox form, then it may quite easily provide for a line of experiment with a view to re-designing it so that it can take on a portable or transportable aspect. It is not suggested that the receiver should be rebuilt or the lay-out modified, as such a step might easily result in a loss of efficiency. If, however, the receiver is of an old pattern where all components are mounted on the top of a flat baseboard, it should seriously be considered whether or not it is worth while rebuilding it in the now familiar chassis form so that the overall size may be reduced. This comes about owing to the fact that the components are mounted both above and below the chassis and the length is thus considerably reduced.

To make the receiver portable, then, the only consideration will be the carrying case and the method of storing the batteries. If the receiver is only required for use in the garden, or on a picnic where a car is available for transport, the simplest way out is to arrange the receiver in one case, and the batteries in another; there is thus ample scope for experiment in the design of the containers, in the method of arranging for quick battery connection and release, aerial and earth facilities, and



Here you see an amateur carrying out open-air experiments on the summit of a mountain in the Isle of Man. A kite aerial is being employed.

convenience of rearranging the apparatus for use in the home.

## Aerials and Earths

You can also interest yourself in experiment whilst in the open air by trying out new aerial and earth arrangements. One important direction concerning the aerial experiments might take the form of arranging an inconspicuous aerial. Too many aerials to-day are slipshod arrangements which in addition to inefficiency also deserve condemnation on the ground of ugliness. Do not spoil the appearance of a neat garden by an ugly pole and a sagging wire running from one side of the garden to another with a length of odd rope to hold it to a chimney stack. Try and rearrange all this and, if possible, hide the aerial wire. The old Beverage antennæ will give you something to work on—tack the wire along the top edge of a wooden fence, for instance.

In the matter of the earth, you can try different situations in the garden, and if you wish to spend a great deal of time on this important item, make up various chemical earths, and test out their efficiency not only on radio signals but also on any flowers which grow above the buried chemical.

## Short Waves

A rough and ready portable set may be built up for use out in the garden or during an outing for short-wave reception. If you belong to a radio club, there will be ample scope for outdoor experiments of this nature, although in such a case one of your members will no doubt be carrying out transmitting tests upon which you can work. However, at all times of the day there are wide fields to explore in the matter of short-wave reception on all wavelengths, and with a portable you can travel about and notice the various effects of screening, fading, etc.

Do not let these experiments be aimless. Carefully note the changes which take place from time to time, and also the particular local conditions at the time. You will then

be able to compare notes on another day, and observe whether the changes are due to the time of day, the surroundings, or other factors. Such information may easily prove of great value, not only to you but to the radio industry in general.

## Atmospherics

Finally, it must be remembered that the warmer weather always brings increased interference from atmospherics. The tendency to thunder and lightning often renders it impossible to carry out long-distance tests, and therefore there is ample field for experiment in the cutting down of this interference. So far, nobody has discovered a means of eliminating interference from this source entirely. The crackles and bangs may be reduced in strength, but where only a morse signal is desired this is not too difficult. To preserve the quality of music and at the same time avoid the background is a different matter. Tuned acceptor circuits, or wave-traps, may be tried, but it will probably be found that on most occasions the atmospherics are of no particular frequency, but are audible over a very wide band. Special resistance shunts across the aerial-earth circuit have been tried and have proved fairly effective in some circuits, but here is a very good method of using the wireless receiver to advantage during the summer months, for it will be found that there are no such difficulties available for experiment during the remaining part of the year.

Again, do not make haphazard tests and scrap them if they prove unsuitable. Make a careful note of the arrangement tried, the effect which it has, the time of the day, and the degree of interference. Then, as each successive experiment is made you can compare your written notes and these will prove more reliable than memory, and when something really tangible is discovered you will be able to put it in writing for submission to the proper quarter—either the Patent Office or a commercial firm who is interested in it.



Miss Jasmine Bligh and Miss Elizabeth Cowell, the two recently appointed announcer-hostesses for the forthcoming television programmes. These two young ladies are still in their early twenties, and they have a wonderful future before them.

A STAGE farther has now been reached in the preparation for the television transmissions under the high-definition systems. This is the appointment of two of the new announcers of the fair sex. We met these charming personalities

the other day and learnt some of the more intimate details of their forthcoming career in which, of course, they may really be regarded as pioneers. So far, there have been attempts at introducing lady announcers into the ordinary broadcast programmes, and on odd occasions a lady has been seen on the old thirty-line television screen in the rôle of an announcer—or should it be announceress? But now that television is to be on a much greater scale than hitherto, and details will be much clearer to the receiver of the programmes, some real attempt is being made by the B.B.C. to bring the programmes and their presentation up to a standard which will be justified by the high-definition systems. Accordingly, it has been decided by Mr. Gerald Cock that there will be a greater appeal if announcements are made by someone who has, in addition to a marked personality, good looks and charm. Who could fill such a rôle but a member of the fair sex? We reproduce on this page portraits of the two ladies who were eventually selected to fill this rôle, and who are the final selection from no fewer than 1,122 applicants for the post.

During an interview with Mr. Cock and these two new members of the television staff the other day, I was told that great things will be expected when the transmissions commence. Firstly, Miss Bligh, who, by the way, is only twenty-two years of age, has had three years' stage and film experience, and, therefore, will fully grasp the possibilities of the television camera,

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## THE TELEVISION ANNOUNCER-HOSTESSES

and will undoubtedly make her announcements in the most suitable manner.

I asked her if she was at all apprehensive of the task, bearing in mind the fact that all announcements will have to be memorised, as it would be quite out of place to see an announcer reading from a book or paper. She said that she was looking forward with great pleasure to the job and had no qualms whatever. "You see," she said, "having had considerable experience in front of the talkie cameras I do not think there will be so very much difference when I come to announce the television programmes." I questioned her regarding the make-up which will have to be employed, but apparently this is not going to be nearly so difficult as for film work. At the moment, no experiments have been undertaken concerning the exact colouring which will have to be adopted, but Mr. Cock has selected these two ladies with an eye to their complexion and skin texture, and he stated that in all probability blue lip-stick will have to be employed, with a yellow powder or cream for the skin, although as progress is made in the development of the television art it may be found possible to reduce the amount of colouring, or to use some more natural arrangement.

Miss Cowell, who is appointed with Miss

Bligh, has also spent many hours in front of the camera, although in her case she has had no professional stage or film experience. She told me that her work as a mannequin has brought her into touch with the art of presenting the most favourable aspect

to the camera lens, and no doubt we shall see the advantage of this experience when first she appears on the television screen. Both of these ladies have travelled extensively, in spite of their youthfulness, and they both speak French fluently. Miss Cowell has the advantage of a good knowledge of German in addition.

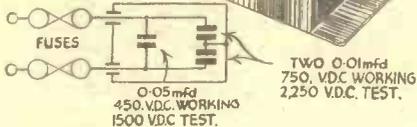
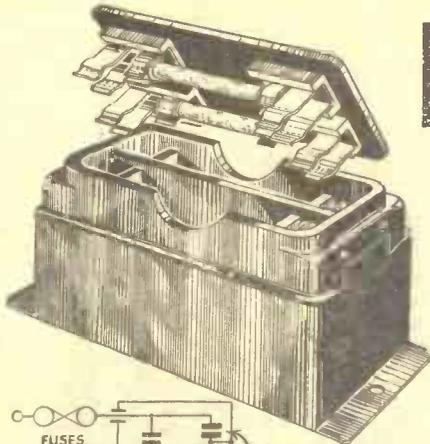
## A Male Announcer

I asked Mr. Cock whether he intends to employ a male announcer as well, and he thinks that such an addition will be almost certain, although some difficulty may be experienced in the selection of a suitable person. He does not want a "gigolo" type, neither does he require a "he-man," and I sympathise with him in his task of selecting a man who can wear clothes of all kinds correctly, has a marked personality, charm of manner, good looks, and sufficient technical knowledge to fulfil the post of announcer-in-chief. The ladies are combining with their function of announcer the duties of hostess, and will make their television appearances at the Alexandra Palace alternately. Whilst one is announcing, the other will be acting as hostess, the latter greeting the artists, and helping them to become acclimatised to the unusual atmosphere of the television studios.

To gain experience in front of the microphone these two ladies are to be given opportunities of announcing from now onwards in the lighter sound-broadcast programmes, such as variety, dance items, etc.

# INTERFERENCE

Some Brief Details of the Various Forms of Electrical Interference  
Commercial Interference

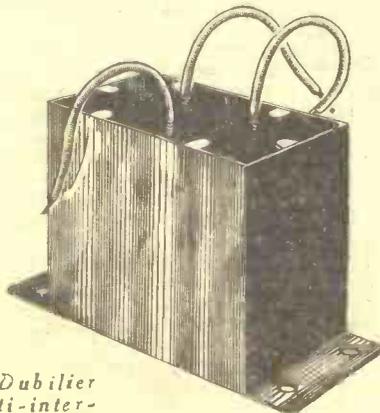


The Belling-Lee type 1171 interference suppressor and circuit.

It would still appear that interference is the greatest trouble with which listeners have to contend, and there are so many different sources of interference, and means by which it is introduced into the broadcast receiver, that in many cases the listener is completely at a loss as to the best method to adopt in order to prevent the trouble from marring his programmes, or even from preventing him from listening at all during certain periods. The commonest sources of interference are electric signs of the flashing type, electric motors of all kinds, ordinary motor cars, refrigerators, etc. Included under electric motors, of course, are a hundred-and-one pieces of apparatus of ordinary domestic use in which the motor is included, such as vacuum cleaners, coffee grinders, fans, hair-dryers, and so on. From all of these items the interference can be introduced into the receiver by conduction through the electric supply mains or by radiation from the apparatus. In the latter case, of course, it may be fed to the receiver through the aerial or earth leads, or even picked up by the inter-circuit wiring or some inductive component.

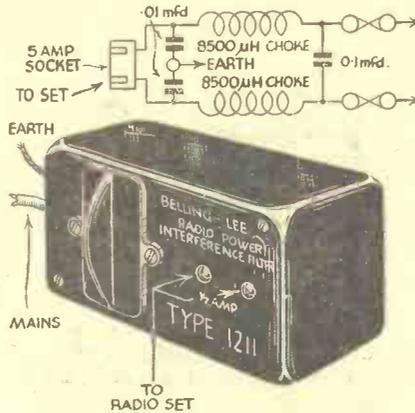
## Battery or Mains Receivers

In the case of a receiver operated from ordinary batteries, there is no possibility of the interference arriving via the mains, and thus any interference will come from

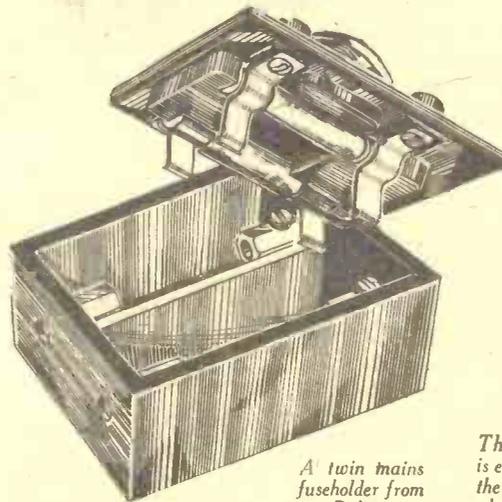


A Dubilier anti-interference unit which is obtainable in different types.

the aerial or earth leads or from induction between supply wires inside the walls of the house. If the interfering apparatus is very close, there may even be direct pick-up by the circuit wiring. The users of the apparatus should take the necessary steps to avoid interference, and there are several schemes for preventing motors and similar electrical equipment from radiating inter-



This device is employed on the input circuit to a radio receiver, and is a Belling-Lee product.



A twin mains fuseholder from Bulgin.

ference. When an electrical circuit is broken or interrupted a small spark will be seen, and if some inductive load is included in the circuit there will be a considerable radiation of energy when the spark occurs. A non-inductive shunt across the contacts which are broken will prevent (in most cases completely) the formation of a spark and thus the radiation of the interference, and the shunt may take the form of a specially-wound coil or a simple condenser. In an electric motor, for instance, the brushes will make and break at the commutator, and if an electric motor is inspected whilst it is working the sparks will be seen at the junction of brushes and commutator. Thus, in view of the above

remarks, a condenser may be joined across these two points to prevent the interference, but it is found that better elimination is obtained when a condenser is joined to each brush and the junction of the two condensers is joined to earth or to the casing of the motor.

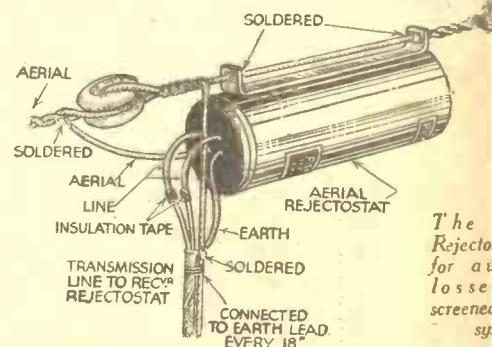
Whilst ordinary condensers may be employed, it is necessary to guard against an overload of the condenser, and where the mains voltages are connected to the motor, good insulation is required to avoid the risk of anyone receiving a serious shock on touching the condenser.

## Commercial Units

A number of firms make up a unit consisting of the two necessary condensers inside a case, with a terminal for connection to earth, and amongst these firms may be mentioned Messrs. T.C.C., Belling-Lee, Bulgin, Dubilier, etc. Some examples are seen on this page. Where it is not possible to obtain access to the actual motor (such as in a modern domestic vacuum cleaner) the interference-removing device may be included in the mains lead to the apparatus, and in such a case a smaller component would be employed, such as the Belling-Lee



This is a K.B. amplifier, which is employed in conjunction with the Rejectostat aerial for the supply of "community" receivers.



The Rejectostat for a screened system

# SUPPRESSION

ference, and Comprehensive Data Concerning a Number of Interference-eliminating Devices

flex lead suppressor, or the T.M.C. device shown in the next column.

In some cases it may even be found that the inclusion of this type of suppressor in the mains lead to a mains receiver will remove the interference, without connecting it to the interfering apparatus, and thus, where more than one piece of apparatus gives rise to the interference a single suppressing device may be used continuously.

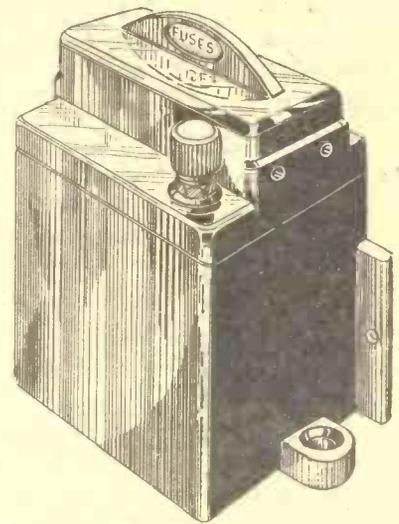
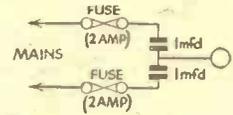
## Tracing the Source of Interference

Obviously from what has already been said, the first step when interference is experienced is to locate the source of such trouble, and the simple precaution of removing aerial and earth leads will show whether or not it is coming from that direction or from the mains supply leads. If the trouble is only slightly reduced in intensity when aerial and earth are removed it will indicate in most cases that it is being induced, and a removal of the receiver to another part of the room should result in a further modification of the interference. In such a case it will be necessary totally to screen the receiver in order to prevent pick-up by the wiring.

If, however, no alteration in intensity

results when aerial and earth be removed it may be taken that the source of the interference is the mains supply leads and the remedies already mentioned, or to be mentioned later, should be adopted.

If the interference comes from some outside source, where it is not possible to fit the interference eliminating apparatus, or where no control over the apparatus may be obtained by the listener, some form of anti-interference aerial system must be employed, and the Goltone Statoformer

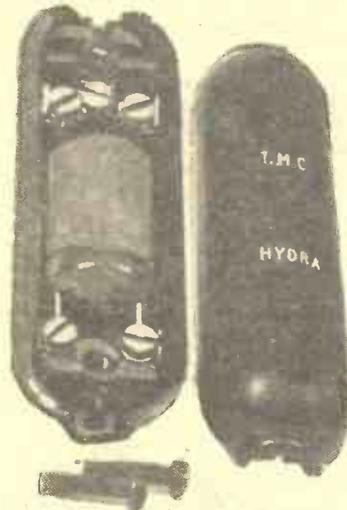


A simple but efficient suppressor made by T.C.C.

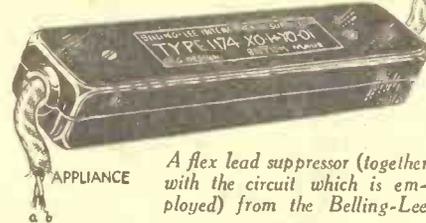
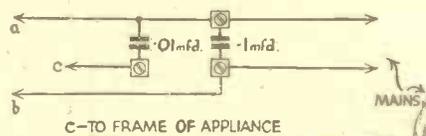
## Community Aerials

A further advantage which is obtained when this type of screened aerial and matching transformer is employed is that more than one receiver may be fed from the single aerial and thus this arrangement lends itself particularly well to flats and similar buildings where a number of residents may require broadcast reception facilities, and difficulties experienced in erecting a suitable aerial free from interference. The Kolster Brandes system, for instance, has been developed particularly in this direction, and on this page we show an illustration of one of the special amplifiers which are employed in connection with this Community Radio system. It is possible under this system to feed from one to one thousand receivers from a single aerial which may be erected at any distance from the receivers so that full advantage may be taken of an interference-free locality.

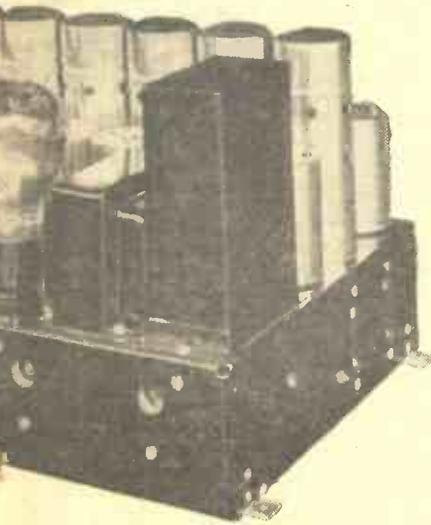
There are, of course, other sources of interference which can arise in the home or in connection with the apparatus which is used for the reception of the radio signals, and these will be dealt with next week, together with other interference-eliminating devices.



This is a flex lead suppressor made by T.M.C.



A flex lead suppressor (together with the circuit which is employed) from the Belling-Lee range.



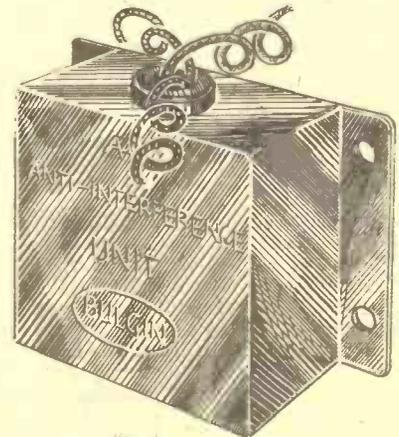
TRANSMISSION LINE FROM AERIAL REJECTOSTAT CONNECTS ACROSS A & B. EARTH VIA SHIELDING TO C



aerial rejectostat used for shielding in a community aerial system.

This is the remaining part of the Rejectostat equipment, and is used to feed the receiver.

aerial or the Kolster-Brandes Rejectostat aerial should be employed. In these forms of aerial a special screened lead-in wire is employed, and it is intended that the aerial proper—that is, the horizontal portion—should be erected where possible clear of the area of interference. Then, to make up for the long lead from the aerial to the receiver, a special impedance-matching transformer is connected between the aerial and the lead-in wire, whilst a similar transformer is, then joined between the receiver and the other end of the lead-in wire. Without such transformers, the loss due to the long lead and to the capacity existing between the lead and the outside metallic (earthed) casing would be so great that only the nearest and most powerful stations would be heard.



A combined condenser anti-interference unit from the Bulgin range.



## TUNING THE OSCILLATOR OF THE SUPERHET

An Explanation of the Methods of Ensuring Correct Tracking of the Oscillator and Signal-frequency Tuning Circuits

THE principle of the superheterodyne circuit is by now fairly well known, for it has been explained in these pages on a number of occasions. There is, however, one point in connection with the tuning circuits which is by no means well understood; this concerns the tuning of the oscillator. The same fundamental arrangement holds good whether the first valve is of the pentagrid or triode-pentode type, or a separate oscillator valve is employed—the latter is, of course, obsolescent to-day except in short-wave receivers. Those who have studied the circuit diagram of, say, the "£4 Superhet," will have noticed that in addition to the normal section of the gang-tuning condenser there is also a fixed condenser in series with the long-wave section of the grid winding, as well as a pre-set condenser in parallel with the long-wave winding.

### Two Systems Compared

If this tuning circuit is compared with that used in the popular "£5 Superhet" a difference will at once be apparent because in this case there is just a pre-set condenser in addition to the gang-condenser section, this being in series with the long-wave winding. Both tuning circuits are designed to fulfil the same purpose, but that first mentioned applies when using the newer intermediate frequency of 465 kc/s, whereas the other is for 110 kc/s. The two relevant circuits are shown in Figs. 1 and 2 for ease of comparison, the values of the components in question being indicated.

It will be remembered that ganged tuning condensers are used in both instances, and it is really because of this that the apparently complicated tuning system is necessary. If separate condensers were used for the aerial and oscillator circuits the so-called tracking and padding condensers would not be required.

### Frequency Ratio

As most readers will be aware, the oscillator must always tune to a frequency differing from that to which the input circuits are tuned by a definite and fixed amount—in the cases quoted, by 465 and 110 kc/s. At first glance this might not appear to introduce any difficulty, but on reflection it can be seen that the capacity increase in the case of the two circuits varies appreciably. Thus, if it is assumed that the receiver tunes from 200 to 600 metres (which corresponds to a frequency range of 1,500 kc/s and 500 kc/s) it will be seen that the ratio of maximum to minimum frequency of the input circuits is 3 to 1. But the oscillator circuit must tune from 1,965 kc/s to 965 kc/s to permit of the required frequency difference, it being remembered that it is found better to tune the oscillator to a higher frequency

than that of the aerial or input circuit. The ratio of minimum to maximum frequency here can therefore be seen to be only slightly more than 2 to 1. This means that the rate of change of frequency is quite different. Even when using 110 or 150 kc/s for the I.F. there is still a difference in ratio, although it is not as great.

From this it may be understood that the capacity of the oscillator section of the gang condenser must be less than that of the section or sections used to tune the input circuits. In addition, the plates of

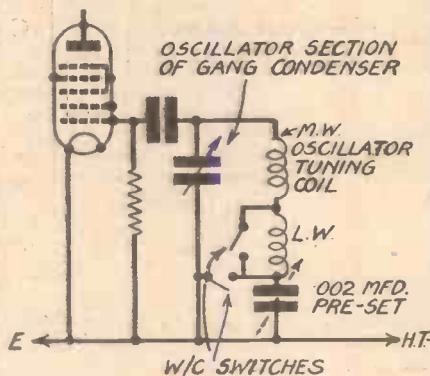


Fig. 1—The simple oscillator tuning circuit of the "£5 Superhet." The intermediate frequency is 110 kc/s.

the condenser must be of different shape so that the change of capacity—and thus of frequency—takes place at a different rate. When using a comparatively low intermediate frequency it is possible to ensure correct tracking on the medium waves simply by having a condenser with plates of the correct shape, this varying according to the particular frequency adopted. On long waves, however, the matter is somewhat different, because the rate of change is different again. As an example, we may consider the ratio of frequencies which have to be covered when tuning between 1,000 and 2,000 metres (300 and 150 kc/s). The ratio for the aerial input circuit is 2 to 1, but for the oscillator it is 450 to 300, assuming this time an I.F. of 150 kc/s, which is only 1.5 to 1. When the I.F. is 465 kc/s, the range of the oscillator-tuning circuit is only 915 to 765, or about 1 to 1.2.

### Long-wave Padding

This is where the special condenser for long-wave padding comes in. In the circuit shown in Fig. 1 this condenser is simply in series with the long-wave winding, and is short-circuited when tuning on medium waves. The condenser is virtually in series with the tuning condenser on long waves, and has the effect

of reducing the effective tuning capacity, the reduction being of greater extent when the capacity of the tuning condenser is increased. The natural consequence is that the range of frequencies covered is curtailed, this being the effect desired. When the set is first constructed and the condenser trimmers have been set so that the oscillator section of the gang condenser gives proper tuning, the pre-set condenser must be adjusted with the wave-change switch in the long-wave position. Once the setting of this has been so adjusted that maximum signal strength is obtained on long waves it need not be altered again and the receiver will tune accurately over both wavelength ranges. Very careful and accurate adjustment of the pre-set condenser is essential, and the setting should be checked on a few long-wave transmissions.

### 465 kc/s I.F.

As suggested above, a more complex system must be adopted when using an intermediate frequency, such as 465 kc/s, which is high in relation to the frequencies of the signals to be received. The range of frequencies covered by the oscillator circuit is still smaller, and for this reason the series condenser is reduced in value; in the case of the "£4 Superhet" the series condenser is fixed and has a capacity of only .0004 mfd. In order to obtain accurate tracking, however, a .0001-mfd. pre-set condenser is wired in parallel with the long-wave section of the oscillator coil, and this must be adjusted in the same way as the condenser shown in Fig. 1.

Even this arrangement is applicable only to certain coils, and in many instances it becomes necessary to use still more padding and tracking condensers in order to maintain accurate tuning over both wavelength ranges. Again, if a different type of superhet-tuning condenser is employed, modifications must be made to the tracking system. Thus, in some instances, a small fixed condenser is connected permanently in series with the variable condenser, whilst in others this condenser is short-circuited on medium waves. For these reasons it is imperative that the coils and condenser be chosen to suit each other, whilst the tracking system advised by the makers of the coils must also be adopted, because there can be no one standard arrangement.

The above explanation will probably help to remove any misunderstanding which readers may have had on seeing different and apparently misleading oscillator-tuning arrangements in the pamphlets of different component or receiver manufacturers.

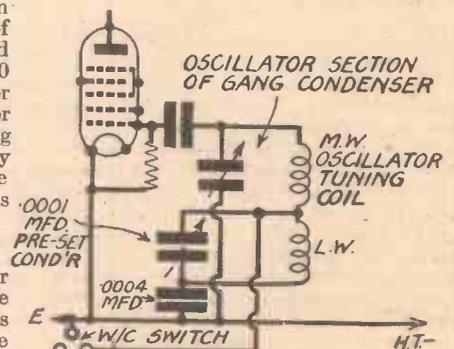


Fig. 2.—The oscillator tuning circuit of the "£4 Superhet," which has an intermediate frequency of 465 kc/s.

# Crystal Rectification

The Peculiar Characteristics of Receiving Crystals are Dealt With in this Article - - - By G. V. COLLE

AT the present time there appears to be a growing interest amongst amateurs in this country in the action of crystals. It is also becoming a recognised fact that a crystal set makes an excellent "stand-by" in the event of a breakdown in the multi-valve receiver. The opening-up of radio stations in India, and the growing prosperity of the mine workers in South Africa, at least, are creating a tremendous revival in crystal reception, so that altogether there appears to be reasonable justification for reconsidering the subject.

We are not concerned here with the relative merits of crystal circuits, but rather with the construction of the crystals themselves and their rectifying properties.

Owing to the high lead content, oxidation or tarnishing of the surface crystal facets takes place fairly quickly, when exposed to the atmosphere. Hence, in order to maintain the sensitivity without constant chipping of the surface, the crystal should be made substantially air-tight by enclosing it in a glass tube. Experience has proved that the most suitable metal "catswhiskers" for exploring the crystal surfaces are copper, brass and silver. The contact pressure must be light, so that the catswhisker must be well spiraled, and of small gauge, say 28 or 30 S.W.G.

A harder and perhaps more stable type of crystal is Zincite, which is a copper-zinc alloy containing up to 33 per cent. zinc and producing an aggregation of

to cover only their construction, application and function, we must content ourselves with a list of well-tried arrangements:—

- Copper Pyrites and Zincite.
- Zincite and Bornite—sometimes used with a polarising battery and potentiometer.
- Zincite and Tellurium.
- Carborundum and flat steel strip with battery and potentiometer.
- Iron Pyrites and gold point catswhisker.
- Molybdenite and flat silver strip.
- Hertzite and catswhisker of copper, brass or silver.

The mounting of crystals has, in the past, created no little difficulty inasmuch as stability in operation necessitated firm electrical and mechanical contact with the metal container. Whereas clamping screws tend to work loose or crush the crystal, molten solder on the other hand, would often spoil the sensitivity before it "set." Crystals having a Galena base could never be mounted in solder, as the lead in Galena would melt before the solder, thereby disintegrating the crystal.

Tinfoil packings in a split cup with an overhanging lip have been used successfully, but generally speaking, Wood's Metal, a metal with an extremely low melting point, is used nowadays practically to the exclusion of all other methods. (Wood's Metal consists of 2 parts lead, 1 part tin, 4 parts Bismuth, and 1 part cadmium.)

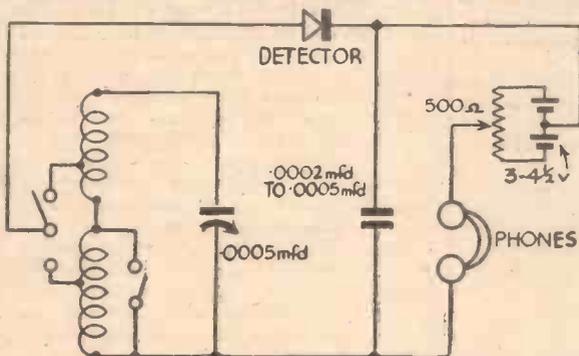


Fig. 1.—Method of applying a potential to a detector to increase its sensitivity. The potentiometer and associated battery can be alternatively arranged after the 'phones on the earthed side of the latter, and to avoid the constant discharge of the biasing battery a switch may be included.

Such conclusions as we can draw from a study of their behaviour will enable us later to decide the best means of application, and hence the most efficient operating conditions.

## Crystals Available

Although there are but few firms manufacturing crystal sets, yet a study of current trade lists brings to light a most imposing array of crystals, which are usually given fancy names, generally ending with "ite."

These "ites" in either crude or refined form, are to be found in the following list of minerals and mineral ores:—

- |                         |              |
|-------------------------|--------------|
| Bornite                 | Hessite      |
| Carborundum             | Haematite    |
| Cassiterite (tin stone) | Hertzite     |
| Chalcopyrite            | Iron Pyrites |
| Copper Pyrites          | Malachite    |
| Galena                  | Molybdenite  |
| Ghane                   | Silicon      |
| Graphite                | Tellurium    |

### Zincite

Probably the most popular crystal in the above list is Galena, owing to the fact that it lends itself to re-crystallisation in more sensitive form. Galena is a lead sulphide in an impure state and contains iron, copper, zinc lime carbonates, zinc sulphides and gangue (silica, etc.). It is used commercially by brassfounders as a flux in making 50-50 lead-copper alloys. The crude ore contains about 86.6 per cent. of lead, and varying amounts of silver in addition to the above elements. Its rectification properties to radio signals are very moderate, but in a refined state by re-smelting it becomes Hertzite, which, as supplied by Russells, reaches a very high degree of sensitivity.

dendritic, i.e., fir-tree like, crystallites. In alloys containing up to 45 per cent. zinc, crystallites so formed are surrounded by a mass of fine CuZn<sub>2</sub> crystals.

## Crystal Combinations

In a list given below it will be noted that Zincite is used in conjunction with a dissimilar crystal rather than a metallic contact.

It would be easy to discourse at length on the relative merits of various crystal combinations, but as this article is intended

## Action of Crystals

The behaviour of receiving crystals in actual operation is perhaps the most interesting part to study. It has been held by some authorities that the action of crystals has not been strictly defined, or, in other words, a lack of unanimity in technical circles has cast doubt on any one theory.

It is claimed, on the one hand, that a thermo-action occurs between the crystal elements (which can comprise two crystals or one crystal and a metallic contact),

(Continued overleaf)

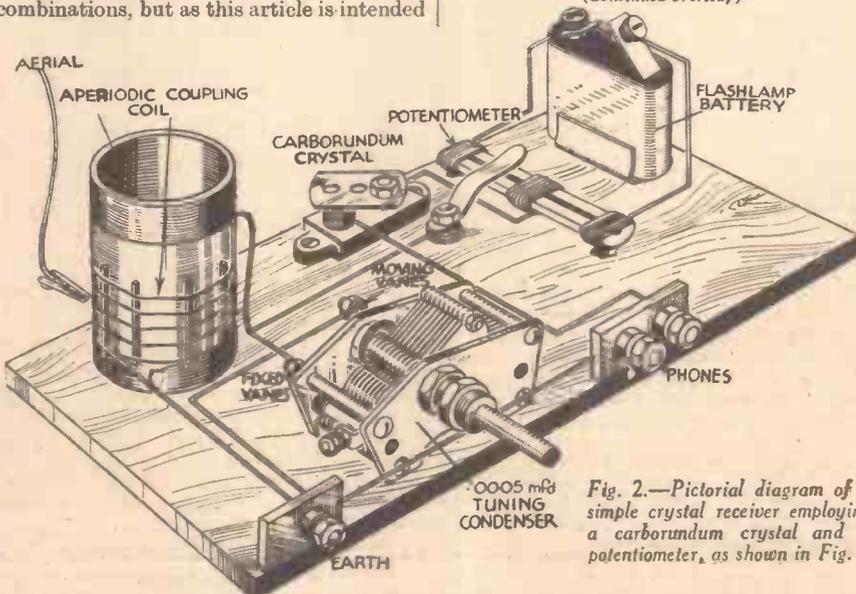


Fig. 2.—Pictorial diagram of a simple crystal receiver employing a carborundum crystal and a potentiometer, as shown in Fig. 1.

(Continued from previous page)

while in the second case the effect is stated to be purely electrical.

Whatever may be the theoretical explanation, the results are beyond dispute, namely, crystals have the property of converting radio-frequency oscillations into a uni-directional current. The latter term means that crystal rectification permits a relatively large current to flow in one direction, and a very small current, or none at all, in the opposite direction.

Another way of stating the effect is that the radio-frequency oscillations developed across the tuning coil and picked up by the aerial, produce substantially equal and opposite variations of potential across the crystal detector during each half-cycle, although the current only flows through on either the positive or negative half-cycles.

The current may actually be measured on a micro-ammeter (say 0-150 micro-amperes) connected in series with, or in place of, the phones.

By rotating the tuning condenser, and plotting its dial readings against the rise and fall of the micro-ammeter needle (with the set tuned close to, dead-on and slightly off-tune to, say, the local station) it is possible to judge by the ensuing graph the selectivity of the receiver.

### Damping Effects

With a simple tuning system where no provision has been made for the crystal damping, it is surprising how the response curve will vary on the one station when various adjustments are made to the crystal detector. A light contact on a Galena crystal will "sharpen up" the tuning whereas if the pressure is increased even for the same degree of sensitivity the curve will broaden out.

Heavy crystal damping will often produce these undesirable tuning effects, and additionally will adversely affect the rectified signal efficiency by decreasing the working H.F. resistance of the tuning coil. By tapping the crystal connection down the coil, or by using a small tightly-coupled crystal winding, the signal input to the crystal is reduced, but owing to better coil operating conditions it will be found that the net result is a gain in signal input and increased selectivity.

### Polarising Voltage

Certain crystals, such as Carborundum, require a polarising voltage for their best operating conditions. Such rectifiers are usually insensitive in their natural state, although possessing far greater stability than the more popular types. The application of a weak current at about .25 volt increases the intensity of the incoming transmission, particularly when very closely regulated by means of a potentiometer, as in Fig. 1.

When the local battery current passes in the direction of negligible resistance, it adds to the pulsations of rectified current from the received transmission, thereby providing a greater total current through the headphones and actuating the diaphragms to produce louder sounds.

An examination of Fig. 1 will show that two 1½-volt cells are joined in series across the potentiometer, but a tapping is taken from between the cells, which is equivalent to shunting the crystal detector across part of the total resistance of the potentiometer-battery circuit. Should no adjustment of the potentiometer slider produce a louder signal, then reversal of the crystal connections will be desirable, as the polarity may not be correct.

Increasing the voltage across the crystal,

and noting the rectified total signal current on a micro-ammeter, will show that the current does not increase in direct proportion to the voltage increase, as in Ohm's Law. In actual fact, the conductivity of a polarised crystal does not behave in a manner similar to an ordinary conductor.

### Potentiometer Control

Careful rotation of the potentiometer knob shows that the current rises slowly until a critical point is reached, after which it increases rapidly with increase of voltage. The effective crystal resistance decreases in a non-proportional manner with increase of voltage, while the loudest response corresponds to the critical point. Hence polarised crystals are usually found to possess steep curves, the best operating point being at the critical bend in the characteristic.

In the same connection, it is claimed that the duty of the potentiometer is to heat up the junction of the crystal couple to the point where the latter suddenly becomes unidirectionally conductive. With highly sensitive crystals the writer has found that after using one sensitive spot or area of crystal on a really powerful transmission (of about 120 micro-amperes) over a period of a few days, it has eventually become insensitive, despite being enclosed, and free from atmospheric disintegration.

There are two possible conclusions, namely:

(a) that constant use of a small crystal surface area has caused mechanical surface damage, or (b) sufficient heat due to a thermo-action has been created to fuse or oxidise the crystal surface. Judging from these facts, there appears to be greater justification for the thermo-action theory than for the electrical one.

## TELEVISION NOTES

### Sheffield Wants to be Heard

Sheffield, England's cutlery city, is determined to be in the forefront of progress as far as television is concerned. A television address was given there a few days ago by an expert on the subject, and the attendance broke all records. This has now been followed up by a council resolution that the B.B.C. be asked for some assurance that the claims of Sheffield will be considered when the Corporation's plans for a national system of television are prepared. The city has a peculiar geographical position owing to effects of five hills, but it is felt that any limitation in range from an ultra-short-wave radio transmitter could be met by building low-powered relay stations on each hill. The television signals could be fed to these relay points by directional microwaves or use made of the co-axial cable. In any case, a densely-populated centre of this nature is justified in giving due prominence to its claims. It is also curious that Mr. D. Birkenshaw, who has been appointed as engineer in charge of the television station at Alexandra Park is a Sheffield man.

### A Demonstration Aftermath

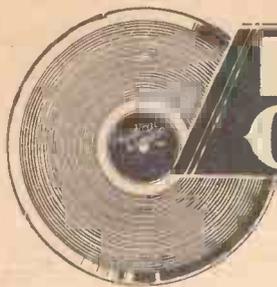
In November of last year a very ambitious and successful demonstration of high-definition television on the 240-line standard was staged at the Press Club in Fleet

Street. Both films and real artists were televised from the Crystal Palace Studios, and shown on two cathode-ray tube receiving sets before the assembled audience at the club's headquarters. Outstanding in his performance as a comedian was Leonard Henry, and as Gerald Cock, the B.B.C. television director, was a guest of the Press Club on that occasion it is reasonable to assume that he was duly impressed, for it has just been announced that Leonard Henry has been signed up to undertake a series of broadcasts as soon as the Alexandra Palace service starts. Since he relies so much on facial expression during the course of his turn, this should lend itself admirably to the needs of television.

### Why "Time Bases"?

With television preparing to take its place as something more than a scientific novelty, it is natural that the terms and expressions used to describe the equipment and the processes should come under a careful scrutiny. Unfortunately, the whole nomenclature would appear to be growing in a slipshod manner with little attempt at co-ordination between those responsible for coining the names given to the various parts. A number of cases could be cited, but as an example the expression "time base" will be taken. This is meant to describe an

extremely important piece of auxiliary equipment essential to the correct functioning of cathode-ray tubes. Either by electromagnetic or electrostatic methods the spot of light made visible on the fluorescent screen, by the impinging of the narrow pencil of electrons on the screen powder, has to be made to trace a definite geometrical path in a series of sequential or interlaced lines, so that by modulating the beam a picture is built up rapidly as light and shade variations. The agency for effecting the required spot movement is the electrical equipment incorporated in the time base. The term "time-base" may have been satisfactory when cathode-ray tubes were used for the graphical representation of electrical phenomena, when the familiar X and Y co-ordinates were in effect traced as a result of timed pulses fed to the tube. With television, however, we are not concerned with quantitative records so dear to the heart of engineers and mathematicians, but with recognisable pictures of scenes or persons. Both the low-frequency and high-frequency time-base circuits generate saw-tooth voltage or current pulses which are fed to the tube, and to ensure perfect synchronisation their pulsing action is governed by the shaped synchronising pulses generated at the transmitting end, and injected into the picture-signal modulation of the radiated ultra-short carrier-wave. The component parts of each circuit are so connected that the apparatus functions as a current or voltage generator of a saw-tooth waveform, so why not call them current or voltage generators, as the case may be, and so give a better idea of their true function, a fact which is by no means made clear by referring to them as "time bases"?



# IMPRESSIONS ON THE WAX

By  
T. Onearm

sung by the Columbia Light Opera Company.

## "Bunk House Dances"

IN their series of Columbia records the Rocky Mountaineers, have, up to now, taken the floor. Now the instrumental section of this Canadian outfit—the Bunk House Boys—have made a record themselves. They play "Bunk House Dances" in the traditional "hill-billy" style, with the rest of the Rocky Mountaineers joining in at intervals. The number of the record is *Columbia FB 1356*.

It is said that the B.B.C. banned the first edition of "I'm Nuts on Screw Music," afterwards withdrawing the ban on the revised version. It is interesting, therefore, to find this title played by Henry Hall and the B.B.C. Dance Orchestra on *Columbia FB 1372*. It is hoped that it is the approved version!

## Dancing Time

COLUMBIA have spared no efforts in adequately presenting "Follow the Sun" in song and dance versions by their various artists—available in the 1s. 6d. series. Hildegard sings "But Where Are You," coupled with "Life Begins When You're in Love," on *Columbia FB 1354*; Henry Hall and the B.B.C. Dance Orchestra provide "I'm Putting all My Eggs in One Basket," and "We Saw the Sea," on *Columbia FB 1364*, while from Carroll Gibbons and the Savoy Hotel Orpheans we have "Let's Face the Music" and "But Where Are You," on *Columbia FB 1363*.

## Decca Records

FRANZ VOLKER, the Viennese tenor, makes his first appearance on Decca records this month, singing four songs from the films. They are "Say That You Will Not Forget" and "Venetian Serenade," on *Decca F 5930*, and "Fair or Dark, I Love Them All," coupled with "Give Me Your Heart To-night," on *Decca F 5931*.

## Handel's Berenice Overture

AN extremely fine record by the Decca Company this month is Sir Henry J. Wood and the Queen's Hall Orchestra playing "The Berenice Overture" on *Decca K 819*.

This is the first recorded performance of Handel's Berenice Overture. Oddly enough, the Overture complete is not very well known nowadays (it was written nearly two hundred years ago), but the second section of the Overture, which begins at the opening of the second side, is a tune that rivals Handel's "Largo." This part of the Overture was played at the broadcast memorial service to King George the Fifth.

## Albert Sandler's Latest

RECORDS by the above popular artist are now available, for the first time, at 1s. 6d. In his latest recording—*Columbia FB 1366*—he has chosen the much-publicised Continental song "Gloomy Sunday"—the Hungarian suicide song which is reputed to have driven many people to take their own lives. On the reverse side, "Vienna, City of my Dreams" is played by Albert Sandler and his Orchestra.

## A Light Orchestra

ANDRE CHARLOT'S new revue, "The Town Talks," now running at the Vaudeville Theatre, is considered one of the most tuneful shows in town. A selection of the tunes from this show, including "You Have that Extra Something" and "The Trees in Bloomsbury Square," are played by the actual theatre orchestra on *Columbia DB 1641*, with the Vaudeville conductor and Donald Stuart singing the vocals.

## "Follow the Sun"

THE sensational rumba band in the Cuban scene from the above Cochran show have made their first record, which appears in this month's list. Ciro Rimac's Rumbaland Muchachos—as they are called—have chosen for their titles "La Rumba, el Viandero," picturing an excited vendor of eatables in a Cuban street, and "La Conga, mi Rosa," in which the jaw-bone of an ass is actually used. All the members of the band are natives of Cuba, and the authentic instruments, rhythms, and effects are used.

## Variety Records

THOSE topical humorists Clapham and Dwyer are right on the mark with their skit "It Isn't Cricket," on *Columbia FB 1361*, as the cricket season has just commenced. The wireless favourites are in their funniest vein here. The Columbia 1s. 6d. Variety series this month also includes Sidney Torch on the organ playing "Hot Dog" and "Dance of the Blue Marionettes"—*Columbia FB 1359*; Debroy Somers' Band (with Raymond Newell) in a "Cavalcade of Martial Songs" on *Columbia FB 1362*, and Carroll Gibbons and J. W. Green on two pianos playing "Terence's Farewell to Kathleen" and "Kerry Dance," on *Columbia FB 1360*.

## Gilbert and Sullivan

THE Columbia Company have produced this month four of the famous Gilbert and Sullivan operas, each of which is recorded on six 10-inch records obtainable in a free portfolio with a booklet of words. The operas are: "The Mikado"—*Columbia DB 321-6*, "The Gondoliers"—*Columbia DB 386-91*, "Yeomen of the Guard"—*Columbia DB 434-39*, and "Iolanthe"—*Columbia DB 550-5*. They also include in this series "Merrie England," by Sir Edward German—*Columbia DB 478-83*. All the records in this series of operas are

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by F. J. CAMM

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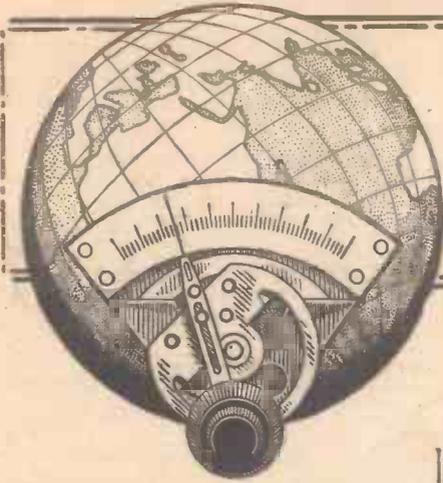
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# SHORT WAVE SECTION

## UNIT CONSTRUCTION FOR THE EXPERIMENTER

How the Beginner Can Make a Start on Short-wave Work in the Most Economical Way. By A. W. MANN

WHILST experimental work has a definite appeal to the short-wave enthusiast, many are apt to regard it as an expensive pastime.

This, however, is not the case if the beginner will start at the bottom, spend wisely, and save wherever it is possible to do so. A little common-sense discussion will, it is hoped, remove remaining doubts. Complicated circuits must be ruled out, owing to lack of experience and expense, so we must confine ourselves to experimenting with simple circuits.

We will assume that your present receiver, and incidentally the first one you have ever constructed, is a simple one-valver. Having constructed your own tuning coils, H.F. choke, and carried out a few experiments as outlined in previous articles, in order to obtain the maximum of sensitivity, volume, and selectivity, further improvement is impossible due to circuit limitations.

Something more ambitious is desired. A two-valver will provide world-wide reception on headphones, whilst another additional stage of L.F. amplification will enable you to obtain loud-speaker reception of the various high-power transmissions.

### A Three-valve Experimental Receiver

The three-valve combination, *i.e.*, detector and two low-frequency combination, appears to be an attractive proposition. It is probable that a number of discarded broadcast receiver components, such as valve holders, fixed condensers, and maybe an L.F. output choke, are on hand. Providing they are electrically and mechanically sound, there is no reason why they should not be used. You may not have sufficient components on hand to build a complete receiver, but in any case it is possible to obtain L.F. transformers, for instance, of sound design at bargain prices.

Having decided to construct a three-valve experimental receiver, the first snag arises. The one-valve set must be dismantled in order to incorporate its component parts in the new receiver. Under the circumstances, short-wave listening cannot be carried on until the new set is completed, and the task of hotting up the detector stage must be carried out afresh, when possibly a number of L.F. amplifier troubles may crop up, which, however, can soon be remedied.

Carefully study the theoretical diagram shown in the accompanying illustration. At A is shown a one-valve short-wave adapter of the plug-in type. At B is shown a two-valve transformer-coupled low-frequency amplifier with L.F. choke output and decoupling.

A well-designed and carefully-built low-

frequency amplifier is a very useful piece of laboratory apparatus, and the one illustrated has been modified to suit the individual requirements of potential experimenters and beginners of limited means. Note the valve-holder, to the terminals of which the plate and filament connections are taken.

Reverting to the adapter circuit it will be seen that the filament and plate leads are connected, *via* a three-way flexible lead, to a standard adapter plug. The general idea will be obvious. The two-stage L.F. amplifier is built on a suitable chassis and housed in a cabinet, and thus becomes a separate piece of apparatus. If desired, the all-in principle of construction, including batteries, may be adopted at a later date, with the four-socket valve-holder mounted on the end of the cabinet.

### Unit Construction

Thus the experimenter has two alternatives; for example, detector stages may

under way, he can still carry on his short-wave listening.

The complete amplifier can be laid aside when not required, and thus the experimenter can build up suitable chassis for two stage units, as for example tuned H.F. and detector, untuned H.F. and detector, also various types of regenerative detectors, such as the Hartley, and couple them to the L.F. amplifier for test purposes in a few seconds. A series of tests can also be made, meanwhile retaining the original single-valve adapter unit and amplifier unit respectively as permanent receiving apparatus for listening to schedule and comparative tests.

The foregoing is suggested as an idea worthy of consideration by prospective experimenters, whose equipment and funds for the purpose of experiment are definitely limited. It has much to recommend; it in fact, several well-known and experienced old hands have arranged their equipment on similar lines.

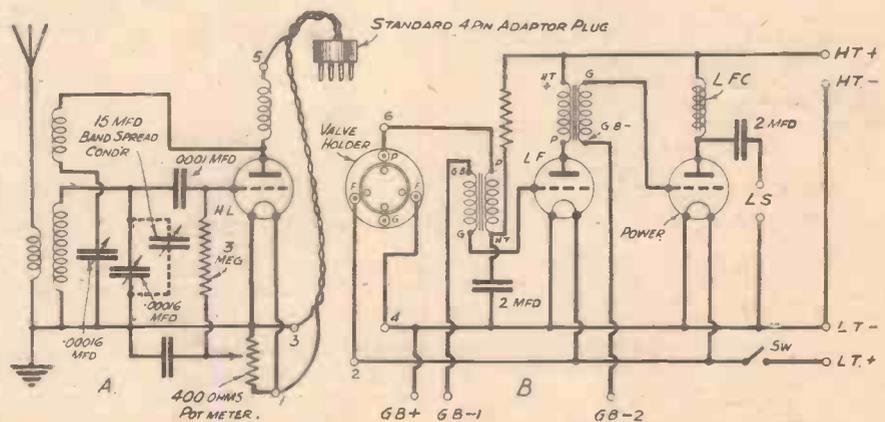


Diagram showing the unit arrangement of a detector stage and amplifier.

be built in adapter form if desired, or as complete one-valve receivers. Experiments with a view to obtaining maximum all-round efficiency may be undertaken and completed, retaining the one-valve receiver form. In order to convert the one-valver for use as an adapter, all that is necessary is to bridge the phone output terminals or sockets, and couple the appropriate leads of the multi-cord to the plate, *i.e.*, H.T.+ and filament terminals respectively. The four-pin plug is inserted into the four socket valve-holder, and thus we have, in effect, a complete three-valve receiver in unit form.

To the potential experimenter who has already constructed an efficient one-valve receiver, and does not wish to dismantle it in order to build a three-valver, the idea will appeal, because whilst the amplifier is

### D.X. Work

At some future date when experience has been gained, it may be desirable to build a chassis type 0-v-2 receiver, completely shielded in a metal case and fitted with band-spread tuning for D.X. work. The circuit illustrated will be found to be satisfactory for the purpose. If desirable either L.F. transformer may be replaced by an R.C.C. unit, with a consequent reduction in noise level.

In order to combine the adapter and amplifier circuits as shown, ignore the flex lead connections and plug, and continue the wiring right through from 1 to 2, 3 to 4, and 5 to 6 respectively, as shown above.

In conclusion, the possibilities of using the amplifier in conjunction with a 5 and 10-metre ultra-short-wave receiver built on the adapter principle should not be overlooked.

# 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.

**BIDEFORD AND DISTRICT SHORT-WAVE SOCIETY**  
 THIS Society is continuing its meetings fortnightly on Mondays at the British Legion Headquarters, Bideford, throughout the summer, and a Field Day is planned shortly. Talks by various members have been given during the last three months on such subjects as S.-W. Receivers, Components, DX Reception, Meters, and S.W. Propagation. Two Morse classes are held at each meeting, one for beginners, and another for more advanced operators intending to qualify for an Amateur Transmitting Licence. Three call-signs are held amongst the Society's own members, and there is much interest in this side of its activities. Applications for membership, whether beginners or otherwise, should be addressed to the Secretary, 5, Furzebeam Terrace, East-the-Water, Bideford, Devon.

## NORTH WALES RADIO AND TELEVISION SOCIETY

THE above Society has now been formed and meetings will be held (with the kind co-operation of the Technical Institute) at the Technical Institute, Wrexham. We have an enthusiastic backing of about two dozen members, and we intend holding a Public Meeting at the Technical Institute shortly with the idea of increasing our membership around Wrexham. Further particulars can be obtained from E. Beuden, 4, Kilt Bungalows, Hope, Wrexham.

# CATALOGUES RECEIVED

**BROCHURE OF NEW "H.M.V." RECEIVER**  
 FULL particulars of a new "H.M.V." Receiver (Model 425) are given in an attractive brochure which has just been issued. The brochure, which is in the form of a folder, is a full-size replica of the "H.M.V." 425. The front is a reproduction, in natural colours, of the front of the receiver, the general impression being made more realistic by the ingeniously reproduced discs of light, which simplify tuning.

The back of the brochure shows the rear of the receiver with back removed. Here, again, the reproduction shows clearly the chassis of the instrument, and every visible component, from the loud-speaker to the smallest screw, is reproduced in the actual colours. Another realistic touch is the "O.K." test label, which also bears the caption: "New 1 425 5-valve A.C. Superhet. 11 guineas."

## LEARNING THE MORSE CODE.

A HANDY booklet entitled "Marlborough's How to Learn the Morse Alphabet in Half an Hour" describes a novel method for quickly memorising the Morse alphabet. The method is to substitute for the familiar dots and dashes "a series of significant words which not only commence with the several letters of the alphabet but, at the same time, indicate by their sound the corresponding characters in the Morse system." For example,

- A. Against : -
- B. Barbarian : . . .
- C. Continental : - . . .

and so on.

The price of the booklet is 3d., or 4d. by post, from E. Marlborough and Co., Ltd., 51-53, Old Bailey, London, E.C.4.

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This is an extreme instance of the common phenomenon known as "aural tolerance." You are not proof against it. Nobody is. You may even now be satisfied with radio reproduction far inferior to that which your set could give with a W.B. 1936 Stentorian, simply because your ear has become accustomed to the present imperfections.

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If you cannot honestly answer "yes" go straight to your radio dealer and ask to hear a W.B. 1936 Stentorian loudspeaker. Afterwards, in the intervals between listening to the vivid presentation of broadcast items which it brings you, you can reflect on "aural tolerance," and the pleasure of which it has cheated you for so long.



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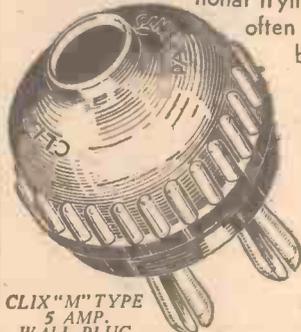
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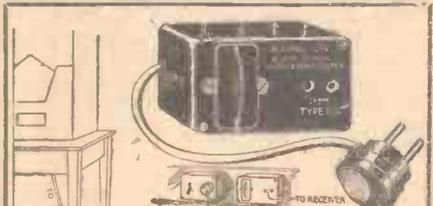
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# LETTERS FROM READERS

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



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

## Loaned Back Numbers

SIR,—I take this opportunity of expressing my appreciation of your valued and most instructive journal, PRACTICAL AND AMATEUR WIRELESS, of which I have been a reader since No. 1. I value the help and hints I have received from it, not to mention the pleasure in reading of others' experiences and problems. While thus expressing my appreciation, I'm afraid I must state that I have had a similar treatment as your correspondent, Mr. S. M. Moseley, of Manchester. My total is eleven copies, including two 6d. magazines and fourteen prints. My sentiments are as Mr. Moseley's and, of course, I have the addresses of the gentlemen concerned, but if they cannot write in the first instance, they are not likely to at all.—GEORGE E. BEARD (Burgess Hill).

[We much regret this unfair treatment of an obliging reader by some readers of the paper, and, owing to this unsatisfactory state of affairs, no more requests for back numbers will be published. Will other readers please note.—Ed.]

## The "Eliminator 4"

SIR,—I notice that "The Experimenters" have recently given some simple quality circuits. Now, I have a 3-valve circuit, H.F. Det. super-power, and it is four years old. It is selective enough on medium waves, but terrible on the long waves. In spite of this, however, the quality is still better than any set in the district, due, in my belief, to the use of a super-power output valve, and I argue that you cannot get quality with a pentode. Now what is really wanted is a design for a quality set, using 2 super-power valves in push-pull for the output. Forget about batteries for once, and cater for the man who dislikes all-mains sets, yet uses a good eliminator. There must be thousands of eliminators in use, yet I can't remember PRACTICAL AND AMATEUR WIRELESS ever catering especially for them. So why not a 4-valve circuit, each valve decoupled, 2 super-power in push-pull output, also radio-gram switching, as the quality set user would surely use a pick-up. Super-powers for quality is my belief.—A. TREVETT (Banbury).

## S.W. Reception in Scotland

SIR,—I have just read in the May 9th issue the letter from Geo. Proctor (Dunfermline) re 10 m. reception. He states that the New Jersey Police transmitter on 9 m. rivals the usual American broadcast stations. If he receives this station at such good strength, then surely he should know that the call sign is "W2XEM" and not W2XEN, from whom I have a verification, in which they state that I am the first to report from this country.—DONALD ROCK (Old Hill, Staffs.).

## A Short-wave Log from Oxford

SIR,—Not having seen a short-wave log from this district before, I am enclosing my log of stations received during the last month.

Commercial.—PHI, EAQ, 2RO, DJA, DJN, W2XAF, RNE, GSE, GBC.

40-metre phones.—PAOPK (Holland),

G6YU, G2WD, G6MM, G6TD, G5GL, G5ZJ, G5CU, G2QH, G5PS, G2MS, G5PU, G6AG, G5GC, G2MF, G5ML, G5OC, G6OK, G5II, G6LK, G6NF, G5JW, G5AJ, G5ZJ, G2OO, G500, G2NV, G6AH, G6UX, G2AW, G2DK, G5TP, G5XT, G2IL, G2NQ, G2AJ, G5JO, G6PY, G5KJ.

As you will notice, I have received GBC (Rugby) which was calling the steamship *Queen Mary*, whose call sign is GBTT.—E. I. HOBBS (Oxford).

## Experimenters, Please Note

SIR,—I would be very grateful if you could put me in touch with any of your readers who, like myself, are interested in obtaining better quality and greater volume from wireless receivers and amplifiers of the battery-operated type, and who could help me solve some of the problems which are now puzzling me. I am a war-disabled soldier (38 years old), and use wireless as my greatest hobby, as I cannot now take part in outdoor sports. By that I do not mean I am unable to get around and visit people.

If there is a radio club in my district, I would like to become a member.—C. PALLANZA, (55, Oseney Crescent, Kentish Town, N.W.5).

## Experimental Station G5CV

SIR,—With reference to transmissions from G5CV on June 19th, details of which were published in the last week's issue, the frequency of these transmissions should read 7070, and not 7170 as was inadvertently included in the schedule.—M. MUSKETT (Bedford Park).

CUT THIS OUT EACH WEEK.

## Do you know

—THAT the value of a resistance element changes with modifications in temperature.

—THAT the above is the main reason for taking great care in the wattage rating of a resistance when making up a circuit.

—THAT the inductance value of a coil or choke may be modified by the presence of a screening can, and therefore such cans should not be removed from screened components.

—THAT for the above reason it is necessary to exercise care when fitting a screen to a component which has not been designed with a screen.

—THAT the insulation of a control spindle will not necessarily reduce or remove hand-capacity effects.

—THAT when screening the back of a panel it is not essential to use a solid metal screen—ordinary perforated metal or netting being just as efficient for this purpose.

—THAT when making your own chemical earth some care is necessary to guard against corrosion of the earth wire due to the chemical action.

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.

## 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.

R. C. (Belfast). You will have to remove some turns from the aerial coil, or alternatively, fit a series aerial condenser so that the frequency range of the aerial coil is reduced. By using a variable condenser in this position a suitable setting may be obtained to give you the desired waverange.

M. A. M. (Aldershot). The Wearite Unigen coil could be used in a circuit of the type referred to and this particular coil was used in the Centaur Three published in the December 7th, 1935 issue.

W. A. H. (Blackpool). We have not published a mains version of the receiver in question.

G. R. (Belfast). We cannot give you instructions for fitting the coils to the Lissen receiver and do not advise this modification.

N. W. (Nanwich). We regret that we can see no reason for the performance, but we are not familiar with the circuit of the Lissen receiver and we therefore suggest that you write for a copy of this and then communicate with the makers of your battery who may be able to solve the problem regarding the switch difficulty.

K. N. E. (Walworth). The receiver should function quite satisfactorily from an eliminator and no difficulty would be encountered in making any necessary modification to the H.T. supplies for the purpose.

T. H. (South Shields). We are interested in your report of reception. We suggest you obtain one of the Bulgin four-range coils, or an Eddystone or Bulgin all-wave coil unit.

C. W. (Rochester). We do not approve of the arrangement suggested. It would no doubt be preferable to erect a separate aerial for the S.W. set and quite a modest arrangement may be found perfectly satisfactory and better than the divided aerial which you suggest.

K. W. E. (Erdington). You will probably find that the trouble is L.F. instability, and that it may be remedied by reversing the connections to the L.F. transformer secondary.

A. D. C. (Portsmouth). Your 5 to 1 transformer may be used quite satisfactorily in the receiver in question, and no alterations of any kind will be required.

J. W. G. (Aylesbury). An adaptor is the most suitable piece of apparatus for your particular requirements and the unit which was illustrated is quite suitable.

F. C. (Manchester). The trouble is obviously due to the coil and you have probably confused the connections in making the repair.

D. W. (Hexham). We regret that we have no blueprint in which the coil referred to by you has been employed.

J. S. A. (Sandwich). No details can be released until transmissions commence and some practical working details obtained. In any case, it is going to be a problem to obtain a picture of the size referred to by you from a battery-operated receiver. Do you realise the cost of a cathode-ray tube of the dimensions given, and the voltages which would be required to operate it?

J. O. H. (Birmingham). One of the Eddystone special band-spread condensers could be used by you, and the two condensers referred to may be used for tuning and reaction.

W. S. (Leeds, 6). The valve is the special Hivac combined Driver and Class B valve. Any type of good standard broadcast H.F. choke may be employed, but we do not think that very satisfactory results would be obtained on the short waves.

J. B. W. (Eastbourne). The valve in question was the original forerunner of the S.G. valve and is not now obtainable in its early form. No definite cure can be stated until the cause of hum is known, as it may be due to interaction, poor smoothing, a faulty component, etc.

L. C. (Withernsea). The hum cannot be removed entirely, and you must expect to hear it faintly when using headphones.

W. E. H. (Nilfiri Hills). The most suitable apparatus would be a signal generator, L.F. oscillator and output wattmeter, together with an A.C.-D.C. all-purpose meter. If you can manage it, it would be preferable to build the entire apparatus which formed the basis of the series of articles "Servicing Sets for Profit."

T. F. C. (Bideford). Both converter and set should be earthed. When both are battery-operated, the earth connection for the receiver is made through the L.T. negative feed. Where one is mains operated a separate lead will have to be made unless the H.T. negative feeds are commoned.

J. B. (Greenwich). We cannot give components or values, and the only information available is that in the article in question.

M. K. (Glasgow). There is no fault, and the effect is quite normal and is often adopted when long-distance reception is not required, or when it is desired to test the H.F. stage.

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# Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

## B.T.S. Microphone

An interesting new microphone has been produced by the B.T.S. and possesses certain new features which are protected by patents. The unit is exceptionally neat, and in the illustration below it is shown attached to a small square of plywood to show the ingenious mounting method which may be adopted. It is, of course, quite possible to arrange for the microphone to be mounted in some other way, but the three simple wood screws, driven through the three rubber arms provides not only a simple arrangement for anyone to carry out, but also provides a very efficient vibration-free scheme which can cause no troubles of any sort. A hole is, of course, cut in the wood to permit the diaphragm to be influenced by the sound waves.

The overall diameter of the central part of this instrument is 2½ in., and the spun aluminium conical diaphragm is of this size. A perforated metal cover fits tightly over the front of the diaphragm and two precautions are here seen to avoid difficulties from rust which often arises due to the condensation of the speaker's breath on the cold metal under certain conditions. Firstly, the perforated cover is blue enamelled on both sides, and a thin disc of oiled silk is placed over the flange of the mounting before the protecting cover is forced home. This does not prevent the microphone from functioning, and we made a sensitivity test of the instrument both with and without the silk and could detect no audible difference on speech or music.

The carbon granules are contained in a substantial carrier (seen in the centre of the unit in the illustration), and to avoid difficulties due to temperature changes, condensation, etc., the back of the container is sealed by a lock-nut and washer of bakelite and then doped with a colloidal preparation. Contact to this part of the unit is obtained by drilling the rear section and plugging a wander plug into this. The remaining contact is soldered to the frame and the microphone is supplied with substantial leads fitted.

Sensitivity is of a high order and background noises were at a minimum. The model used by us had been dismantled for examination, and some of the granules were naturally lost in the process. Even so, the unit was very efficient and was not found to be critical regarding the position of the announcer when using it for speech. As was usual with this type of instrument, however, blasting was noticeable if one spoke directly into the diaphragm, and thus a position slightly at the side is desirable and by adopting a quiet conversational tone about 3 in. from the unit very clear speech was obtained on a two-valve battery amplifier. The price of the microphone is 9s. and 6d. for the rubber mount.

## Belling Lee Plug

In a new wander plug produced by Messrs. Belling & Lee, moulded bakelite is employed in place of the usual casein for the head. The top and centre of the metal plug is hexagonal, enabling good firm contact to be obtained, and the usual side entry is provided for connection

purposes. It will be available shortly in all the usual colours and lettering at 2d., and will supersede the old type of plug.

## New Ealex S.W. Converter

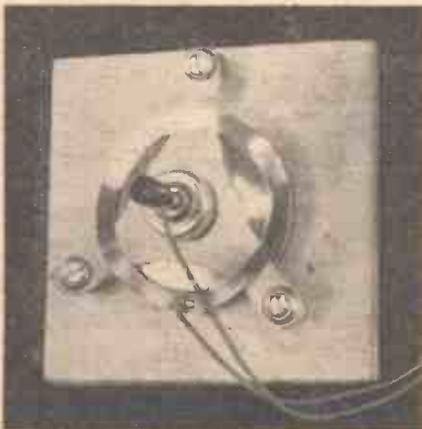
MESSRS. J. J. Eastick & Sons announce a new pattern S.W. converter, designed for A.C. mains operation and fitted with a triode-hexode frequency changer. The tuning coil is of the plug-in dual-range type covering from 13.4 to 30 metres and from 29 to 55 metres by means of a switch. It is intended to produce a further coil which will enable other ranges to be obtained. The wave-change switch is of the combined type designed to change over not only the wave-band utilised on the tuning coil but also the aerial connection so that the converter may be put out of action when desired without the removal of any leads. The tuning scale is calibrated in both metres and megacycles. The price is £4 14s. 6d., and it is proposed to introduce an A.C./D.C. model at a later date.

## An Interference Analyser

THE service engineer who is looking for an instrument which may be carried about and which will demonstrate the cure of interference to the satisfaction of a customer should obtain particulars of the Rothermel-Sprague interference analyser. This handy little outfit enables you to locate the exact circuit in which interference originates, decide exactly what condensers and chokes are needed to eliminate it, and demonstrates to the customer that the trouble can definitely be cured. It is simple to use and eliminates all guesswork. The apparatus is sold complete with four filter condensers and one special filter choke, and costs £4 10s.

## New Hivac Power Output Triode

A NEW A.C. directly-heated power output valve is announced by the High Vacuum Valve Co., Ltd., and is designated the P.X.41. This is of the 4 volt 1 amp. heater type, designed for a maximum anode voltage of 250, the amplification factor being 5 and the impedance only 830 ohms. Fully loaded, the undistorted A.C. output is 2.5 watts, the optimum load is 3,500 ohms, and the price is 13/6.



The new B.T.S. Microphone, mounted on a plywood square.

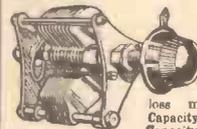
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Summit Three (HF Pen, D, Pen) ..	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen) ..	22.9.34	PW39
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Genot Midget (D, 2 LF (trans.)) ..	June '35	PM2
Cameo Midget Three (D, 2 LF (trans.)) ..	8.6.35	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) ..	8.2.39	PW61
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Fury Four Super (SG, SG, D, Pen) ..	—	PW34C
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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
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A.C. Fury Four Super (SG, SG, D, Pen) ..	—	PW34D
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D.C. £5 Superhet (three valve) ..	1.12.34	PW42
Universal £5 Superhet (three valve) ..	—	PW44
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### MISCELLANEOUS.

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Fan and Family Three (D, Trans, Class B) ..	25.11.33	AW410
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1934 Ether Searcher : Chassis Model (SG, D, Pen) ..	—	AW419
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Lucerne Straight Three (D, RC, Trans) ..	—	AW437
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"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
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1935 £6 6s. Battery Three (SG, D, Pen) ..	—	WM371
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Minute Three (SG, D, Trans) ..	Oct. '35	WM396
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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
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1935 Super Five (Battery Superhet) ..	—	WM370

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 unaccepted) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

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

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Harris Jubilee Radiogram ..	May '35	WM388

### SUPERHETS.

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Heptode Super Three A.C. ..	May '34	WM359
"W.M." Radiogram Super A.C. ..	—	WM366
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Holiday Portable (SG, D, LF, Class B) ..	1.7.33	AW393
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Two H.F. Portable (2 SG, D, QP21) ..	June '34	WM363
Tyers Portable (SG, D, 2 Trans) ..	Aug. '34	WM367

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S.W. One-valve for America ..	—	AW429
Roma Short-waver ..	—	AW452

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Home-made Coil Two (D, Pen) ..	—	AW440

<b>Three-valve : Blueprints, 1s. each.</b>		
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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

<b>Four-valve : Blueprints, 1s. 6d. each.</b>		
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Empire Short-waver (SG, D, RC, Trans) ..	—	WM312
Standard Four-valve Short-waver ..	Mar. '35	WM383
Superhet : Blueprint, 1s. 6d. ..	—	—
Simplified Short-wave Super ..	Nov. '35	WM397

### Mains Operated.

<b>Two-valve : Blueprints, 1s. each.</b>		
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
<b>Three-valve : Blueprint, 1s.</b>		
Emigrator (SG, D, Pen) A.C. ..	—	WM352
<b>Four-valve : Blueprint, 1s. 6d.</b>		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	Aug. '35	WM391

### MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6 (1/6)) ..	June '35	WM387
Listener's 5-watt A.C. Amplifier (1/6) ..	Sept. '35	WM392
Radio Unit (2v.) for WM392 (1a.) ..	Nov. '35	WM398
Harris Electrogram (battery amplifier) ..	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram ..	Mar. '36	WM403
New style Short-wave Adapter (1s.) ..	July '35	WM383
Trickle Charger (6d.) ..	Jan. 5, '35	AW462
Short-wave Adapter ..	Dec. 1, '34	AW456
Superhet Converter ..	Dec. 1, '34	AW457



# QUERIES and ENQUIRIES

## Car Radio

"I was very interested to find your article on 'Wireless Awheel' in a recent issue. Many people have asked me for details of a suitable receiver, and in view of the expense of car radios I suggest that many small car owners would welcome a circuit suitable for a 6-volt car battery."  
—J. W. O. (Norbury).

THERE are, of course, many different schemes for employing a standard receiver as a car radio. An ordinary battery receiver may be fitted somewhere in the car, with ordinary batteries concealed for the operation of the set. Better results are, however, obtained with a receiver employing the higher-efficiency mains valves in all stages, and this naturally leads to an increase in expense for the initial components. In addition to this, however, the necessary high voltage has to be obtained for the H.T. and the only practicable method of obtaining this is by means of a converter operated from the car battery.

### 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. Rownes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

This is an expensive item, and thus it is extremely difficult to cut costs in a good car radio. Added to this, a powerful or sensitive circuit must be used, and a superhet is obviously most practicable, and to compensate for the fading which is likely to be encountered when passing between high buildings or under railway bridges, etc., some reliable form of A.V.C. must be fitted.

## A Faulty Switch

"Can you please explain why it is that for no apparent reason the station I have tuned into fades right out and cannot be heard at all? On turning the wave-change switch the station returns at full volume. I get best results on the long-wave stations, when the switch is turned to 'pick-up.' I cannot find any loose wires, but I do not think it is due to this because stations fade so slowly. The set is S.G., D., and pentode output, all mains."—A. J. (Kenton).

THE first part of your query would tend to suggest a faulty valve or defective grid circuit, but the second remark regarding best results being received on long waves when the switch is turned to 'pick-up' rather points to the fact that the wave-change switch is defective. The action of the switch is primarily to short-circuit part of the tuning coil winding for medium-

wave reception, and then to change over the grid connections for pick-up work. On long waves all of the tuning coil should be in circuit and generally no tuning should be employed when turned to 'pick-up.' Therefore, it would appear that your switch is not carrying out its function and we advise you to examine it carefully. It would be possible for the indicator pointer to have become moved so that a false indication of the setting were obtained, but we think you will find that the contacts are not functioning, and thus the grid circuit becomes choked due to the bad contact.

## Economiser Circuit

"I have a four-valve receiver which I operate from a mains unit. Now I wish to use it as a portable, but as the total H.T. consumption is high I wish to fit an 'economiser' unit. You give the circuit for a device of this kind in the issue dated September 21st, 1935, but there is one resistance in the circuit for which no value is given as you say it varies for different valves. Could you give me the value of this resistance for a Hivac Z.220 output valve, please?"—I. M. (Widnes).

THE value of the resistance must be chosen according to the impedance of the valve which is employed in the output stage. For low-impedance triodes having an impedance between 1,500 ohms and 3,000 ohms the value of the resistance should be 20,000 ohms. For triodes having an impedance between 3,000 ohms and 5,000 ohms the resistance required is 60,000 ohms. For pentodes the values of the resistance may be 100,000 or 150,000 ohms, according to the type of pentode, and in your particular case the lower value will be found most suitable.

## Local Station Interference

"I have a four-valve set, but cannot use this to the best advantage for the following reason: The local station can be heard over nearly thirty degrees of the dial, but when I transfer the aerial tapping to another terminal on the coil the local only covers one degree, but I cannot get any other stations. What is the best method of converting the set so that I can restrict the local to two or three degrees at the least expense?"—G. F. E. (Barnet).

YOU do not give any details of your circuit, and, therefore, it is difficult to say whether or not it is of a suitable type for modification. It is obviously impossible with an ordinary receiver to obtain both sensitivity and selectivity without some sacrifice of one or the other, and selectivity is only obtained at the expense of sensitivity. If yours is a simple tuner it would appear that an aperiodic aerial coil is fitted, and that with this in circuit the selectivity is good but sensitivity is bad. The transfer of the aerial tapping apparently cuts out this coil and thus gives improved sensitivity but reduces the selectivity. If you do not want to convert the receiver into a more efficient arrangement, the only way out is to fit an ordinary wave-trap in the aerial lead. A standard iron-core broadcast coil may be used for this purpose, with a .0005 mfd. tuning condenser in parallel.

## Superhet Whistles

"I recently constructed your 1935 Superhet. As regards quality and power there is nothing to grumble at, but on the long waves there is a series of whistles through which you can hear the station, but which you cannot tune in without interference. I have followed your instructions as regards trimming and have used all specified parts. Perhaps you would be good enough to suggest a remedy."—C. J. B. (Guernsey).

THE presence of whistles on the long-wave band is generally traced to interference caused by medium-wave stations. In most cases it is only necessary slightly to readjust the setting of the oscillator section so as to shift the whistle to a point on the dial where no station is received, and on most commercial superhets a trimmer is fitted to a convenient point on the chassis to enable this to be done. Any form of filter is undesirable as it will cut top notes. The greatest improvement will, however, be obtained if the input circuit is converted to a band-pass arrangement, as described in our issue dated May 2nd, and the limiting provided by the two tuned circuits will remove practically all of the whistles, those which do remain being carefully shifted by adjusting the oscillator as above mentioned so that they occur at points on the dial where no station is received.

## Oscillator Tuning

"I understand that the first detector and oscillator of a superhet may be tuned with an orthodox twin-gang condenser having equal sections in conjunction with a pair of ordinary tuning coils, provided that padding condensers are used in the oscillator circuit. I intend using a standard twin-gang condenser and matched coils, and would like to know the value of the padding condensers needed to give correct tracking for 110 kc/s intermediate frequency for medium and long waves."—L. J. E. (S.E.14).

THE frequency separation mentioned by you is 110 kc/s, which means that the oscillator section must be tuned 110 kc/s; above or below the received stations frequency. In practice it is found desirable to employ a frequency which is higher than the received signal, which means that the wavelength is lower. Thus, if receiving the London National on 261.1 metres (1,149 kc/s) the oscillator would have to be tuned to 1,149 plus 110, or 1,259 kc/s. This corresponds to a wavelength of approximately 238 metres. From this it is obvious that the oscillator section will have to be adjusted to a lower value even at its minimum setting, when the tuning condenser is at minimum and has no effect. Obviously, therefore, the inductance of the oscillator coil must be lower to start with, and the values now standardised are 157 micro-henries for ordinary coils and 126.9 micro-henries for the oscillator. It is necessary, therefore, to use correctly-designed tuners and oscillator coils, although a standard-shaped oscillator condenser need not be employed.

### FREE ADVICE BUREAU

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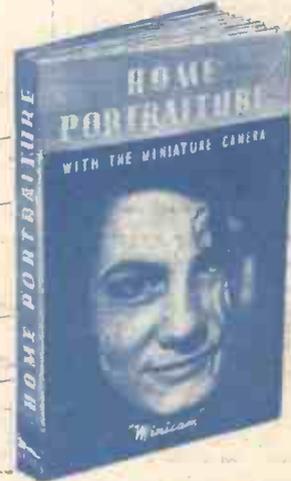
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