

GETTING MORE OUT OF THE ELIMINATOR See Page 263

# Practical and Amateur Wireless

3<sup>d</sup>  
EVERY  
WEDNESDAY

Edited by F.J. CAMM

a GEORGE  
NEWNES  
Publication

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May 23rd, 1936.

AND PRACTICAL TELEVISION

The ELF and the INVINCIBLE

Final Adjustments!

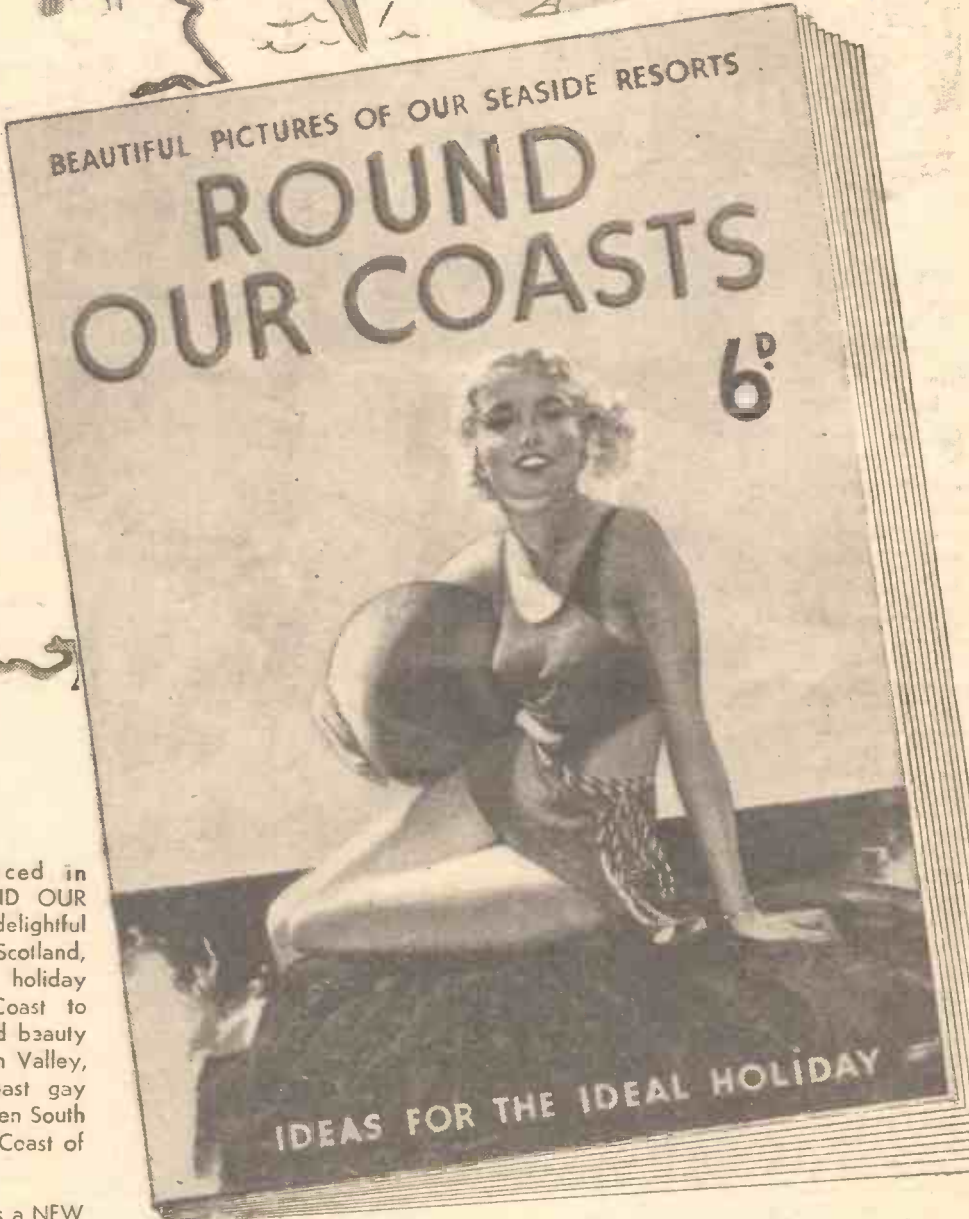
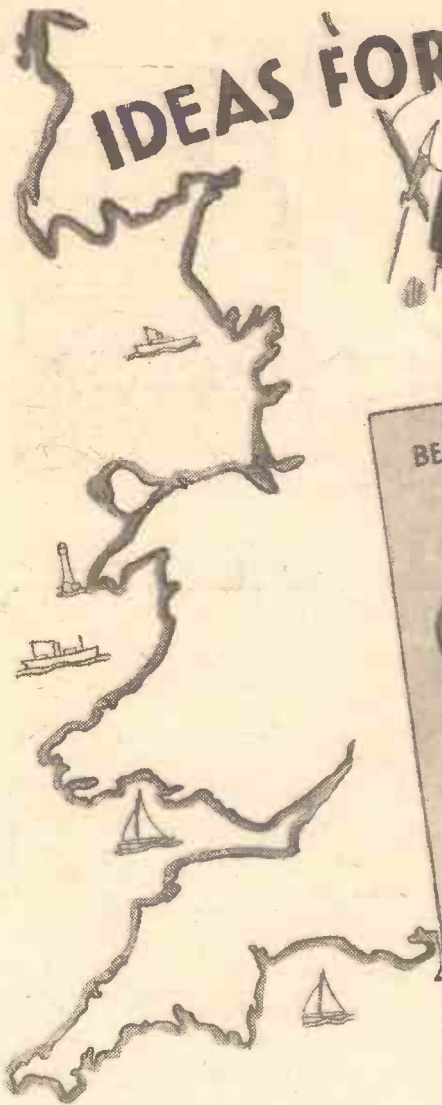


# THE ELIMINATOR

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# THE LEADING WIRELESS WEEKLY!

## Practical and Amateur Wireless

Edited by F. J. CANN

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

VOL. VIII. No. 192. May 23rd, 1933.

## ROUND *the* WORLD of WIRELESS

### Binding Cases and Indexes for Volume VII.

**B**INDING cases and indexes for Volume VII of "Practical and Amateur Wireless" are now available. The binding case, complete with title page and index, costs 3s. 6d., and the index alone 7d., by post from Geo. Newnes, Ltd., 8-11, Southampton Street, London, W.C.2.

### Television Hostess

**T**HE B.B.C. announce that Miss Cowell and Miss Bligh have been appointed as announcer-hostesses for television, and will be seen as well as heard in the forthcoming television programmes. Readers will remember that the B.B.C. have been to considerable trouble to find hostesses who will have a suitable appearance in view of the fact that in the television transmissions the announcer will be visible to the listener as well as audible, and a completely new field is to be covered by combining the function of announcer and hostess to introduce the artists to the television screen.

### Proposed New Studios in Holland

**T**WO of the leading Dutch broadcasting organisations will shortly erect more modern and commodious studios at Hilversum. We may therefore expect improved programmes in future from the A.V.R.O. (Algemeene Vereeniging Radio Omroep) and from the K.R.O. (Katholieke Radio Omroep). It is the latter Society which organises the radio entertainments broadcast every Sunday on short waves.

### One Way of Celebrating Victory

**T**HE *Radio Rurale*, an Italian committee entrusted with the popularisation of broadcasting in country districts, has been advised by the *Banca d'Italia* that in order to commemorate the Italian victories in Ethiopia, a gift of one hundred wireless receivers will be made, to be distributed as the *Radio Rurale* deems fit.

### Radio and French Composers

**T**HE Paris Press reports that French composers have intimated that the broadcasting of works specially written for the microphone is insufficiently remunerative to encourage further contributions. In future, studios will be compelled to seek new musical com-

positions elsewhere, unless the broadcasting authorities can see their way to increase their royalties.

### A Dearth of Comics

**A**PPARENTLY new radio comedians are as difficult to discover in the United States as they are in the British Isles, for, following a five weeks' search for new talent, in the course of which fifty-five candidates offered over forty alleged humorous acts, the WOR, Newark (N.Y.), studio stated that they failed to find one artist worthy of facing the microphone.

### New Stations for Bulgaria

**A**LTHOUGH, at present, the Bulgarian capital only possesses a small transmitter (Radio Rodno), it is expected that

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the 100-kilowatt station which is being built at Vakarel, some twenty-six miles from Sofia, will be ready by the end of the year. In the meantime, however, tests are to be carried out shortly by a 2-kilowatt transmitter at Stara Zagora on 214 m. (1,402 kc/s). Another relay will be opened later at Varna, on the Black Sea.

### Listen to Africa

**O**N Empire Day, May 24th, in co-operation with the African Broadcasting Company, the B.B.C. will relay, via Cape Town, broadcasts from six different points in the Union. They will include transmissions from the historic castle at Cape Town, the Bluff at Durban, the Union Buildings (Pretoria), a Johannesburg gold

mine, a visit to Grahamstown, and the old Government House (Raadsaal) at Bloemfontein.

### How the Germans Punish Interference

**A** WOMAN at Saalfeld who, with a view to annoying her neighbours, switched on an electrical vibrator in the course of the main evening broadcasts, was recently sentenced to a heavy fine, and both her wireless set and the offending vibrator were confiscated by the authorities.

### Another U.S.A. Giant

**W**JZ, Boundbrook (N.J.), one of the N.B.C. "key" stations, is seeking authority to increase its power to 500 kilowatts. If the permission is obtained from the Federal Communications Commission, the new station will be ready by next November.

### Automatic Radio Lighthouse

**O**N the Peshtigo reef in Green Bay, Lake Michigan, the U.S.A. Department of Commerce has installed a fully-equipped lighthouse complete with a powerful light, an electrically-operated bell, and a compressed-air fog signal, all of which are automatically controlled by radio apparatus from the mainland.

### Greece Makes Another Attempt

**T**HE Hellenic Government is offering a broadcasting concession for a period of twenty-five years to any approved concern able to organise an adequate programme of radio entertainments for the country, its income to be derived from the sale of listening licences. The scheme calls for three transmitters to be erected at Athens (100 kilowatts), Salonica (10 kW), and a smaller station on the island of Corfu.

### A Message Goes Round and Round

**A**LTHOUGH the U.S.A. Legation at Addis Ababa was only roughly distant from the British Legation by five miles, when the former recently sent an appeal to their English colleagues for assistance it had to be transmitted by radio to an American warship, thence to Washington, whence it was telephoned to London, re-forwarded to Aden, and finally wirelessed to the British Legation radio station on the outskirts of the Ethiopian capital. The distance actually covered was more than ten thousand miles!

# THE PICK of the PROGRAMMES

## "Musical Mixture"

JOAN and Evelyn Ashley will broadcast again on May 30th from the Western Regional in a programme entitled "Musical Mixture." Other artists taking part will be Alfred Salter (baritone) and Fred Winslow's Serenaders. Fred Winslow has personally constructed all the instruments of the mandolin and guitar family used by his musicians.

## MAKE THESE DATES WITH YOUR RADIO

### Empire Day Broadcast

IN co-operation with the African Broadcasting Company, the B.B.C. will broadcast on Empire Day (May 24th) a special programme which will come to this

### "RADIO'S GIRL 'DATAS'"



Eileen Leftwich, 22-year-old coilwinder in Ekco Service Department, has wound half-a-million coils; she has memorised all the different types ever used by Ekco, and has earned the title of "Radio's Girl 'Datas'."

### "On First Acquaintance"

THE sixth programme in the series entitled "On First Acquaintance," in which artists make their debut before the microphone, will take place at Plymouth on May 26th, when items will be given by artists living in or around Plymouth.

### Recital by Frank Titterton

THE well-known Birmingham tenor, Frank Titterton, will give a recital of eleven songs in the Midland Regional programme on May 24th.

### Town and Country

TOWN and Country will be represented in a programme by the B.B.C. Welsh Orchestra conducted by Idris Lewis and supported by Clifford Deri (baritone) on May 27th. The programme will include Ketelbey's "Cockney Suite"; the suite "Hyde Park," by Jalowitz; the suite, "From the Countryside," by Eric Coates, and Montague Phillips' suite, "The World in the Open Air."

### Orchestral Concert

LESLIE HEWARD will conduct the B.B.C. Midland Orchestra on May 26th in a programme which is to consist mostly of music for the dance, including Cowen's "Four English Dances in the Olden Style." Three waltzes by Coleridge Taylor, and the ballet music to "Rosamunde," by Schubert.

country by the beam telephone service of the G.P.O. from Capetown. The programme as planned at present will consist of six short actuality broadcasts from six different points of the Union. The places chosen to represent the historic traditions and present-day activities of the Dominion are as follows: the old Castle at Capetown, from which Capetown was defended against the natives in the early days; the Bluff at Durban, which overlooks the city; the Union Buildings at Pretoria; a gold mine in the neighbourhood of Johannesburg; an historic site in Grahamstown; and the old Randsall (Government House) of the original Free State, at Bloemfontein.

### Railway Centenary

MAY 26th marks the centenary of the opening of the Whitby-Pickering Railway, and on the preceding night, May 25th, in the Northern Regional programme, R. Underwood, son of one of the founders of the railway, will broadcast a talk about it and its history. The railway was at one time unique in that trains were drawn up steep parts of the railroad by means of pulleys.

### "The Ball Turns Once"

JACK LOUDAN'S play, "The Ball Turns Once," is to be broadcast from Northern Ireland on May 23rd. Originally a three-act play, it deals with twenty-four hours in the life of a typical lower middle-class

Belfast home—hence the name "The Ball Turns Once." The family has been plunged into chaos by a piece of scandal. The play was first produced at the Grand Opera House, Belfast, in 1924 by the Ulster Literary Theatre, and subsequently at the Abbey Theatre, Dublin, and at the Lenox Hall Theatre, New York. It earned the commendation of that distinguished Ulster dramatist St. John Ervine, and the radio adaptation promises to vie with the stage productions in artistic merit.

### A Boxer at the Microphone

LIONEL SECCOMBE, the well-known big fight commentator, will be the interviewer in the next of the Club-room Conversations series, to be given in the Midland Regional programme on May 27th. His subject will be Larry Gains, of Leicester, ex-Heavyweight Champion of the British Empire. Larry Gains was beaten twice by Ben Ford, but he regained much of his old form in his fight against Maurice Strickland, the New Zealand champion, which he won on points on April 28th.

### "Cardiff Castle"

"CARDIFF CASTLE," a dramatic programme devised by A. C. F. Beales and produced by T. Rowland Hughes will be broadcast on May 27th in the Western programme. Various episodes in the early history of this famous castle will be presented in dramatic form. Among them will be the kidnapping by night of the Norman Lord of Cardiff in 1158; the visit of King Charles the First to raise help in 1645; and the famous martyrdom of two Popish priests in 1679.

### "For Western Gardeners"

THE second talk in the series, "For Western Gardeners," will be given on May 28th. This series is designed to cover the interests of gardeners of all types, from the allotment-holder to the exhibitor.

## SOLVE THIS!

### Problem No. 192.

Walters had a three-valve battery-operated receiver using a variable-mu. S.G. valve, a triode detector and a pentode output valve. The variable-mu. properties of the S.G. valve were not made use of, however, and zero bias was being applied to this valve. He decided to fit a grid-bias potentiometer volume control, using a component having a value of 50,000 ohms with a .1 mfd. bypass condenser joined between the earth end of the grid coil and earth terminal in the usual manner. He was surprised to find that sensitivity dropped after this modification had been made. He tested the bypass condenser and checked the wiring and found both to be in order. 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. 192 in the left-hand corner and must be posted to reach this office not later than the first post Monday, May 25th, 1936.

### Solution to Problem No. 191.

A 120-watt lamp would have to be used to pass  $\frac{1}{2}$  amp., and one unit would last 8 $\frac{1}{2}$  hours. The cost per week would therefore be 1s. 6d.

The following three readers successfully solved Problem No. 190, and books are accordingly being forwarded to them: R. F. Hill, Holt Hatch, Alton, Hants.; D. F. Eadie, 15, The Loaning, Whitecraigs, Renfrewshire; J. F. Shore, 131, Churchbury Rd., Eltham, S.E.9.



# Getting More Out of the Eliminator

There are Various Schemes which May be Adopted for Obtaining a Better Performance from an Old Battery Eliminator and Some Hints are Here Given. By W. J. DELANEY

ALTHOUGH it is not wise to endeavour to use old-type apparatus, there are many listeners who, for reasons of economy, are forced to employ such accessories, and there are cases where it is found impossible to lay out sufficient money to replace some part of the wireless equipment which has really passed beyond its field of usefulness. A particular case is the H.T. battery eliminator. It is apparent from the various queries that are received from time to time that many listeners are still using old-fashioned mains units of this type which originally gave very good service, but which are now difficult to make use of with a new receiver. The set with which the eliminator was originally employed has, perhaps, been rebuilt, or even scrapped, and the new outfit does not lend itself readily to the H.T. supplies which are provided on the mains unit. It is, of course, not worth while modifying the modern receiver in order to make use of the old eliminator, but it is certainly possible in the majority of cases to make certain additions or alterations which will enable the eliminator to give some further period of service, probably with every satisfaction.

## Two Important Factors

The H.T. battery delivers a certain voltage at a given maximum current, and the battery eliminator is similarly designed, except that the two factors are interdependent. Therefore, it is very important that the total current of the eliminator be ascertained and every endeavour made to keep within this figure when a new receiver is to be used with it.

Fortunately, it is not impossible to use a receiver having a larger drain, and it is possible on an A.C. unit to make up the additional load by means of an H.T. battery used separately. With a D.C. eliminator there will only be the problem of replacing the resistance which acts as the main limiting factor in reducing the mains voltage to that required by battery valves (R, Fig. 5), and the question of current will then have to be considered from the point of view of the carrying capacity of the resistance in question. This is a simple matter, as the wattage rating is ascertained by squaring the current passing through the resistance

$\frac{20}{1,000}$  amps, and  $\frac{20}{1,000}$  times  $\frac{20}{1,000}$  is  $\frac{4}{10,000}$  and if the dropping resistance is 5,000 ohms, this must be multiplied by the former fraction, and this gives us  $\frac{4 \times 5,000}{10,000}$  or 2 watts.

Alternatively, the voltage drop through the resistance may be calculated by multiplying the current by the resistance and dividing by 1,000 and then multiplying the resultant figure by the current over 1,000. Thus in the above example we would have  $\frac{20 \times 5,000}{1,000}$  or 100 volts, and then  $\frac{100 \times 20}{1,000}$  which also gives us 2 watts as the answer.

## For A.C.

On an A.C. eliminator, however, no modification to the internal resistance should be made, and, therefore, the additional load must be arranged for in other ways. The simplest is to connect an extra H.T. battery, and whether this is done for

(Continued overleaf)

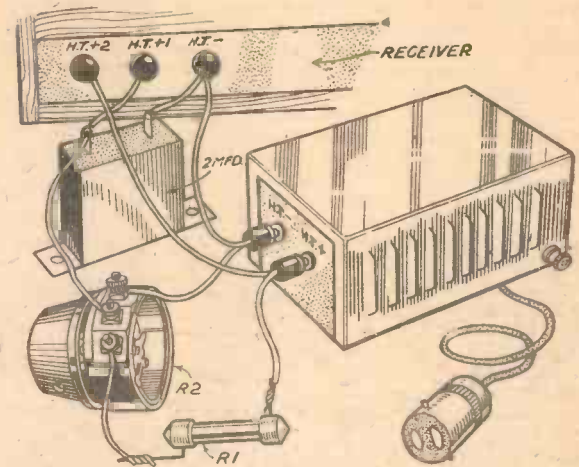


Fig. 1.—A separate variable voltage tapping may be obtained as shown in this illustration.

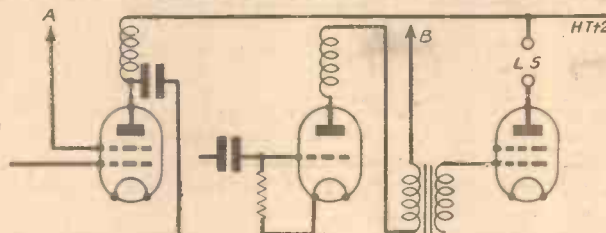


Fig. 2.—The usual separate voltage supplies in a standard 3-valve circuit.

and multiplying this by the value of the resistance. In other words, add up the current of all the valves, and add to this any additional current which may be passed through a potentiometer device connected between H.T. + and H.T. -, and multiply it by itself. For instance, suppose that the total current was 20 mA.  $20 \text{ mA} =$

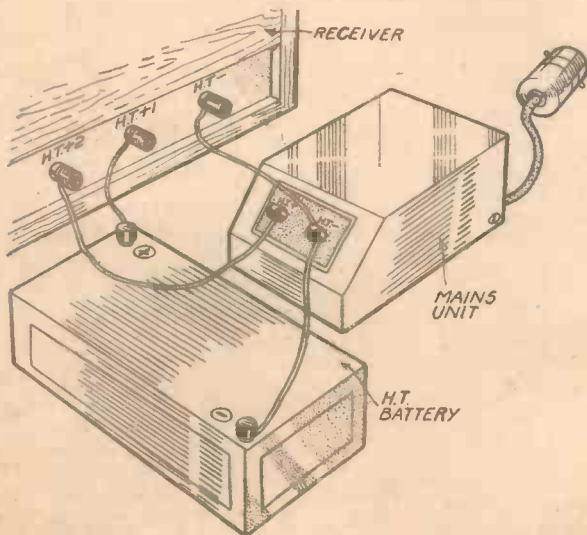


Fig. 3.—A separate supply for a low voltage tapping may be obtained as shown here.

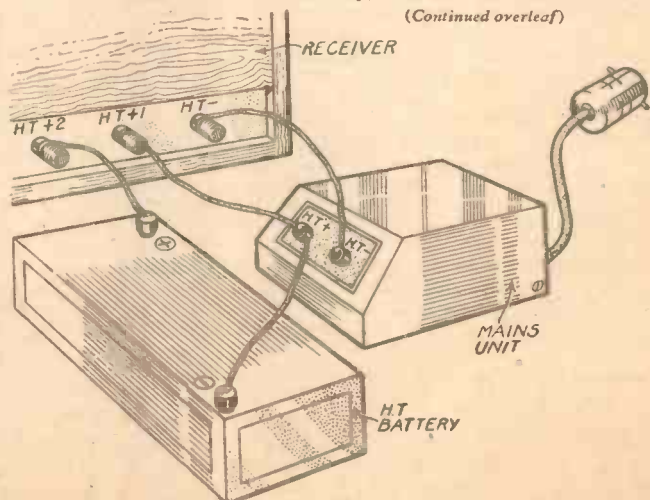


Fig. 4.—An additional voltage supply may be used in this manner as a temporary expedient.



(Continued from previous page)

the output valve or one of the earlier valves depends upon the circuit and the eliminator. If, for instance, the total load of the new set only exceeds the eliminator output by 5 or 6 mA, then the extra battery could be used for the detector stage. In general, however, it would hardly be worth while using a separate battery in such a case, but where the total load worked out at an excess of 10 mA or more then the extra battery could be employed in parallel with the eliminator (Fig. 6). That is, with the H.T. negative socket of the battery joined to the H.T. negative terminal on the receiver, and the H.T. positive joined to the H.T. positive terminal on the receiver. The battery will,

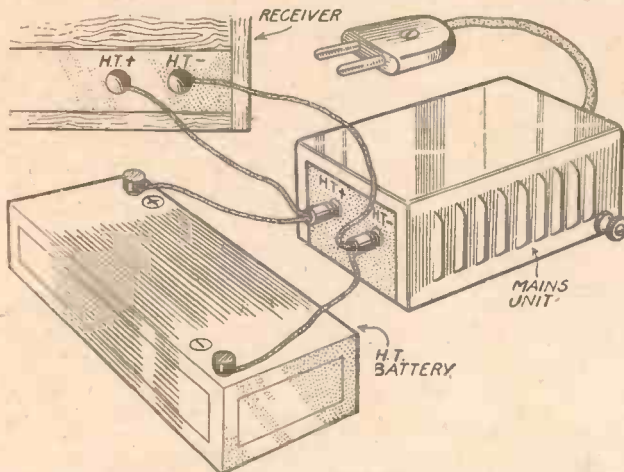


Fig. 6.—Although not a very efficient arrangement, additional current may be obtained by connecting an H.T. battery in parallel with the mains unit.

of course, have to be replaced, but it will no doubt enable a combination to be employed until the listener is able to purchase a larger eliminator.

An extra battery may also be used in conjunction with a D.C. eliminator to increase the voltage output. For instance,

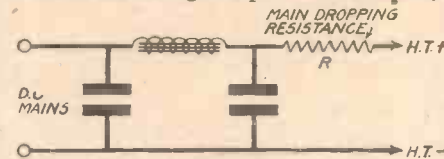


Fig. 5.—In a D.C. mains unit the voltage output may be modified by changing the value of the resistance in the H.T.+ lead.

if the output from the D.C. eliminator is 120 volts, and an additional 30 volts are felt desirable without any alteration to the eliminator, a battery rated at 30 volts may be joined in series with the H.T. positive lead from the eliminator (Fig. 4).

**Separate Voltage Tappings**

It may be found, however, that the total current output of the eliminator is in order, but that the tappings provided are unsuitable. Or, alternatively, the unit may be of the pattern having only a single tapping and the new receiver may neces-

sitate two or more tappings. In some cases these additional points could be provided for in the receiver itself by using decoupling resistances in the H.T. leads to the valves, and thus a single H.T. positive lead could be employed. In a receiver employing a screen-grid valve, however, a separate voltage for the screening grid is often desirable, whilst a separate voltage for the detector anode is also a valuable feature. In addition to enabling stability to be obtained these separate supplies also enable the sensitivity of the receiver to be controlled, and in the case of the detector stage it is often found that the H.T. voltage is very critical indeed.

Some eliminators are provided with a socket or tapping marked S.G., or 60 to 80 volts. If no variable resistance or potentiometer is included in the eliminator, and this tapping is fixed, the voltage supplied may or may not suit the receiver with which it is used, and, therefore, an external variable tapping should be made by connecting a fixed resistance and potentiometer across the H.T.+ and H.T.—sockets (Fig. 1). In such a case the S.G. tapping may then be used for the detector stage. By using, say, a 40,000-ohm fixed resistance and a 50,000-ohm potentiometer, and also connecting a fixed condenser (say 2 mfd.) between the arm of the potentiometer and earth as shown in Fig. 1, the extra drain on the eliminator will be limited to only 1 mA or so and a fairly wide variation will be provided. It may be found on trying out this idea that the variable tapping is of more use when used for the detector valve, and the original S.G. tapping may serve for the S.G. valve. The same idea is applicable, of course, to either A.C. or D.C. units, and may also be included where the unit is of the type which has only one or more fixed tapping points.

**France's Colonial Network**

IT is at Noyant-sur-Allier, in the neighbourhood of Moulins, in the centre of France, that the P.T.T. will erect five high-power short-wave stations to assure a service to its Colonies overseas. The transmitters will be equipped with directional aerials permitting five simultaneous broadcasts to be carried out to different quarters of the globe.

**World's Smallest Mobile Transmitter**

WHAT must be the smallest mobile station in operation is the one used by one of the N.B.C. commentators in New York for picking up outside broadcasts. Working on a wavelength of 1.1 m., the transmitter is built in the crown of the announcer's hat, the power plant to actuate it consisting of batteries carried in a cartridge belt under his coat. The transmitter uses three "acorn" valves, and radiation is made through a small hollow aluminium rod aerial some six inches high projecting from the headgear. One of the smallest microphones in existence is connected by a short length of cable, thus permitting the operator to mingle inconspicuously in the crowd, and hand the microphone to any person he wishes to interview. The broadcasts are picked up by a mobile radio car nearby and then passed over the ether to WEAF, New York, the "key" transmitter for rebroadcast over the N.B.C. network.

**New Paris Interval Signal**

ALL broadcasts emanating from P.T.T. (Paris) are now regularly preceded by a fanfare of trumpets, and 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 donné Paris.*

**ITEMS OF INTEREST**

**Broadcasts from R.M.S. Queen Mary**

SO great has interest been aroused internationally in the maiden trip of the new Cunard-White Star liner that, although originally the B.B.C. contemplated making only eight broadcasts during the trip, it is now anticipated that over fifty transmis-

sions will be carried out. In addition to running commentaries and descriptions of life aboard, from May 28th short messages will be relayed from the *Queen Mary* for inclusion in the second news bulletin. On his arrival at New York on June 1st, Sir Edgar Britten will broadcast the story of the liner's first trip. Many of the transmissions are being taken by European countries and also by the U.S.A. stations for re-broadcast over their networks.



An A.C. Superc-Hel. is the designation given to this Corsor receiver in the first Radio Book published in the Sudan. The caption reads:—"This 535 A.C. Super.—Here is a receiver which has been designed to guide a large number of programmes with quality of the highest order, rather than all the stations on the ether differently."



# Where Capacity Counts

The Capacity of Wanted and Unwanted Condensers Plays Such An Important Part in Radio that this Brief but Simple Review will Serve as a Useful Reminder to Readers

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

**I**N many cases capacity is not only beneficial, but essential to the correct functioning of circuits, but in others it is a disadvantage, and every step must be taken to avoid unwanted condenser effects or, at any rate, to reduce them to the minimum.

In addition to properly made and proportioned condensers deliberately introduced into a circuit, there will be many "accidental" or incidental condensers consisting of wiring, coils, parts of other components, the chassis and so forth for the metal portions or "plates," and the normal insulating materials in the set, or even air, as the dielectric.

## An Energy Content

When a voltage is applied between the plates of a condenser there is a sudden rush or current into it, resulting in the dielectric being brought to a condition of electrical stress. The current cannot pass through the condenser because the plates are separated by insulating material, but the energy of the current flowing into it is "stored" in the form of the state of stress mentioned. The first point to note is that when the voltage is first applied it is comparatively easy for the current to flow into the condenser, but as the condenser soon becomes more and more completely charged the charging current becomes less until it ceases. An increase in voltage will, however, result in more current flowing in and a larger charge being built up.

If the charging voltage is removed suddenly energy will remain stored in the condenser, but can be withdrawn by providing a suitable conducting circuit.

If, instead of applying a direct current supply to a condenser a source of A.C. is used, the charging voltage will grow and die away, and then reverse, grow, and die away, and the charging current will follow the same cycle from the point of view of magnitude and direction. The effect upon the circuit, therefore, is exactly as if it was completely conducting, which accounts for the rather loose but nevertheless generally accepted phrase—a condenser will not allow a direct current but will allow an alternating current to pass.

## Opposition

It has already been explained that the charging current falls off as the condenser becomes charged, and in scientific language this is expressed by saying that the current is proportional to the rate at which the voltage is changing. A moment's thought will show that, in the case of an alternating voltage, the rate of change is greatest at the beginning and end of each half-cycle, and is zero at the instant when the voltage reaches its maximum and commences to decrease. This explains the fact that the current flowing into a condenser is an alternating one which follows a cycle leading the voltage cycle by one quarter of a period.

Lastly, it must be remembered that although the existence of a condenser in series with an A.C. supply does not prevent

the flow of current, it does offer some opposition—generally known as "reactance" which is measured in ohms, in the same way as the resistance of a wire. This reactance depends upon two quantities—one, the condenser size or capacity, expressed in microfarads, where the larger the capacity the less becomes the reactance and, two, the frequency of the A.C. voltage applied, the reactance being greater at low frequencies than at high frequencies.

## Developing a Voltage

The first example of the advantageous use of capacity is, of course, the familiar process of tuning. It must be understood

the condenser being adjusted to give a combined impedance as close to the theoretical infinite value as possible at the frequency of the station it is desired to receive. Resistance and other losses make infinite impedance impossible of achievement, but values of several hundred thousand ohms are obtainable with good components. As signals of many different frequencies exist in the aerial circuit, the voltage drop corresponding to each depends upon the signal strength and the impedance at each particular frequency, and as the impedance of the circuit is adjusted to be a maximum at the frequency of the wanted station, the voltage developed across the tuned circuit will also be a maximum for the wanted station.

## Filters

The next way in which capacity can serve a useful purpose is to provide a path for alternating currents while preventing the flow of direct currents. The technical name for such an arrangement is a "filter." Filters are of many types, but can be divided roughly into those where it is the alternating current which is required and the direct current which it is desired to eliminate, and those in which the direct current is wanted and it is necessary to filter out the alternating current component. A good example of the first type is the coupling condenser between the anode circuit of one valve and the grid circuit of another. The anode current of the first valve is, of course, a direct current with a superimposed alternating current modulation—either high frequency, in the case of an H.F. amplifier, or low frequency in the case of a detector or audio-frequency valve. It is desired to transfer the A.C. impulses from the anode circuit of the first valve to the grid circuit of the next, but it is essential that the D.C. high tension voltage at the anode shall be isolated from the following grid circuit. This is done by inserting a condenser of suitable capacity in the lead joining the anode circuit to the following grid circuit.

The simplest example of the reverse process is the smoothing circuit used in a mains H.T. unit, shown simply in Fig. 1. The output of the rectifier unit is a direct current with a fairly heavy A.C. ripple. The smoothing choke offers a high impedance to the A.C. component but only a small resistance to the D.C., whereas the condensers provide an easy path for the ripple, but will not pass the direct current. Another way of looking at such a smoothing circuit is to consider the choke and condenser as a potentiometer so far as the A.C. component is concerned, the total ripple voltage being developed across the two in series. Owing to the much higher impedance of the choke as compared with the reactive impedance of the condenser, the A.C. voltage drop across the choke is much greater than across the condenser, so that the ripple voltage across A-B (that is, across the H.T. output terminals) is very small.

Not only can a condenser be employed for  
(Continued on page 275)

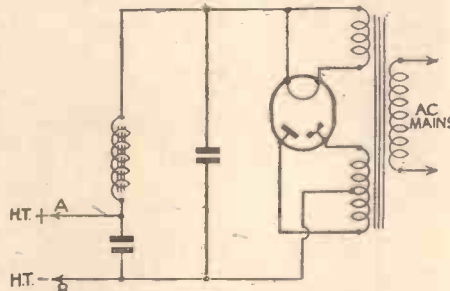


Fig. 1.—The smoothing choke and condenser may be regarded as an A.C. potentiometer in this filter circuit.

that a coil offers opposition to alternating current, but the phase relationship of the current through its "impedance" is one quarter of a period behind the voltage, and thus exactly opposite in phase to that through a condenser. Moreover, the impedance of a coil, also measured in ohms, depends upon the inductance of the coil (a function of its dimensions) and the frequency, being higher at high frequencies. Taking any given coil, therefore, it is

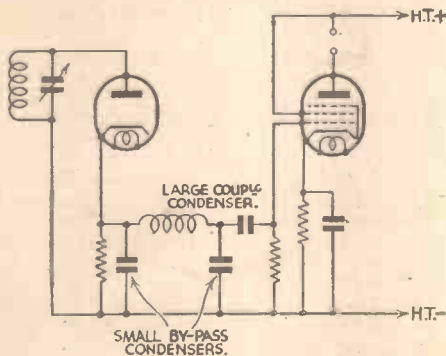


Fig. 2.—A diode detector circuit with an H.F. filter between the detector and the following valve.

possible to find one particular value of capacity which, if placed in parallel with the coil, will make a combination offering (theoretically) infinite impedance at one particular frequency. A tuning system consists of a coil of fixed inductance and a variable condenser in parallel, the con-



# Practical Television

May 23rd, 1936. Vol.3 No. 3.

## A B.B.C. Television Film

It is learned that the B.B.C. are preparing a film of their own which will deal with the development of high-definition television. Scenes showing stages in the reconstruction of the Alexandra Palace, together with items of historical interest, have been included and the "celluloid document" will, it is expected, not only be televised, but be shown in cinemas all over the country. This will do much towards stimulating the initial interest in television, and the work has been in the capable hands of Major L. G. Barbrook, who has been appointed to the B.B.C. television staff as film assistant. His appointment, together with six others, was announced a few days ago, but so far an air of mystery still shrouds the women announcers and hostess. Their names have not been made public, and yet it is stated that they will be heard on both the National and Regional transmitters prior to taking up their work of being both seen and heard.

## The First Indian Plan

It is learned from quite an authoritative source that the Nizam of Hyderabad is making plans to initiate a television service which at first will cover the area encompassed by his capital city. Although appreciating that television development as represented by high-definition services is in an early stage, he believes that considerable and valuable experience will be gained by work in a country like India. After the first tests of rather a local character, the scheme, if successful, will be extended to cover the whole state as part of the rural broadcasting campaign which is now going ahead rapidly in that country.

## The Eiffel Tower

Although reports have been rather divergent as to the success of the 180-line television service which was inaugurated on an experimental basis in Paris, every effort is being made to improve matters. Originally, the ultra-short-wave radio transmitter located at the Eiffel Tower was rated with a power of 1 kilowatt, and the signal range, in consequence, was fairly small. A new 10-kilowatt transmitter has now been built, however, and the trial working has given every satisfaction.

## Voltage Magnification

These multipliers will in time replace the ordinary thermionic valves in a very large degree, for the magnification of voltage and/or current which will be achieved by one multiplier tube will be equivalent to several valves and their associated inter-stage amplifying equipment. Looked at in a broad sense it is possible to segregate multipliers into two types which can be regarded as successive and reciprocal. An outstanding example of the latter is the multiplier tubes of Farnsworth. In this case two cathodes at opposite ends of a glass tube have an alternating potential difference established between them with a central annular anode, which causes the electrons to reciprocate (hence the classification) between the cathode surfaces. Since

these metal surfaces are purposely made secondary emissive, any electrons introduced into the device oscillate to and fro between the surfaces, and the velocities of these free electrons are high enough to ensure releasing secondaries from the surfaces owing to the impacts. At a certain frequency the current collected by the annular anode reaches a maximum, thus furnishing a high degree of amplification. The device is proving extraordinarily efficient and its industrial applications are only a matter of the time necessary to produce these multipliers in commercial form.

## An American Visit

Some time ago we drew attention in these columns to the visit of Major Bell to America in order to study on behalf of the Cinematograph Exhibitors' Association the advances which have been made in talking

definition programme service on the ultra-short waves.

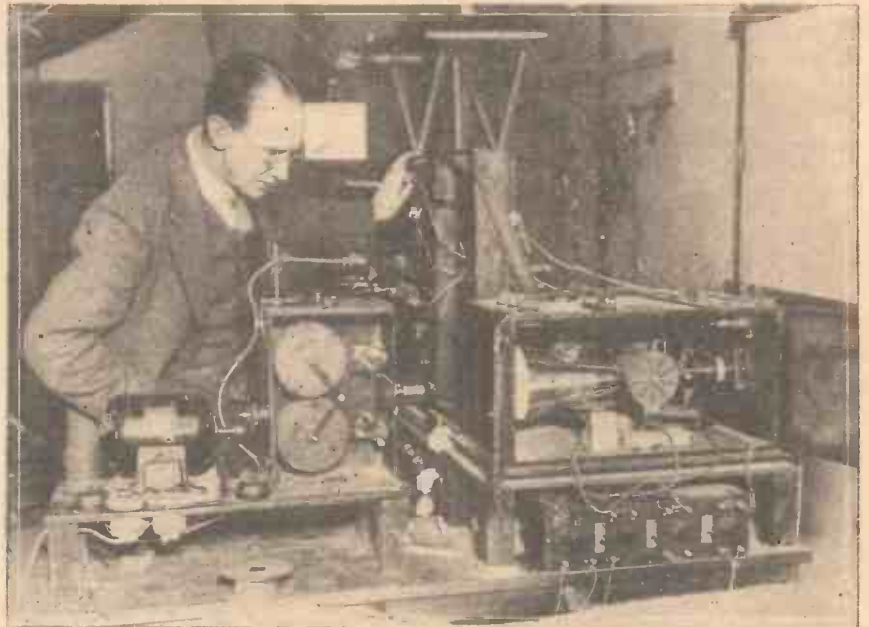
## Television Posts

It is stated that the successful applicants for the vacant posts on the B.B.C. television staff have now been chosen, but until an official date can be given for the inauguration of the service the names will not be announced. Although originally one lady announcer and a hostess were to be chosen, it is learned that three have been picked. Both a blonde and a brunette will feature on the screen of the television receiver, while the name of Cecil Lewis is mentioned quite freely in connection with the post of television producer. In the meantime a nucleus for a television orchestra is being recruited so that when the final installation of scanners, amplifiers, radio transmitters, feeders, and aerials is complete the staff will be in readiness to give attention to the programme side which, after all, will make or mar the service as far as public judgment is concerned.

## Video Frequencies

The dovetailing of any new art into everyday life always brings in its train new words and expressions which ultimately

## SLUTHING THUNDERSTORMS BY RADIO



At the radio research department at Slough, thunderstorms are traced by means of a sensitive radio direction finder which picks up the disturbances, projects them on to a cathode ray oscillograph, causing a series of sparks. These are filmed, and together with a similar record made at exactly the same time at Leuchars, Scotland, is projected on to a huge map of the world, thus indicating the position of the thunderstorm.

picture technique, and also to investigate the position in regard to television. Major Bell has now returned to England, and as far as television is concerned he states that we are more advanced in this country than they are in America. It appears that there is not a very marked public interest in television on the other side of the Atlantic, and no doubt this is wrapped up in the difficulties associated with the provision of a national service owing to the enormous areas which have to be covered, and the signal screening brought about by the tall metal buildings abounding in the large cities. All development is in the hands of private enterprise, and as far as New York is concerned very exhaustive tests are being carried out by the R.C.A. in an effort to solve the problems connected with the high-

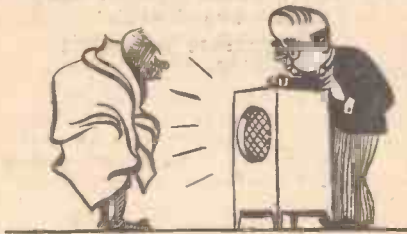
become quite commonplace. This was noticed very particularly with radio, and now television is proving no exception to the rule. Perhaps one of the most interesting is the use of the word video. We have become accustomed to high frequencies and low frequencies, but even here there is no rigid line of demarcation, but merely an inferred comparison according to which particular action of radio is under discussion. With television, however, it was thought advisable to have some other form of differentiation. For example, we are quite familiar with the use of the expressions low-frequency and high-frequency synchronising signals, but they bear no relation to the ultra-high frequencies involved in the television signal itself, where band widths of two million cycles are dealt with.



# On Your Wavelength

## Announcers

WHY is so much made of an announcer's job? You would think from the reverence in which they are held by most people that they were possessed of heaven-sent gifts instead of being people of just ordinary intelligence who are trained to read in an artificial voice notes which are prepared and written for them by somebody else. They have no thinking to do, and I must presume from this that they are singularly unintelligent people, since all intelligent people like to give their brain a little bit of work to do. The stereotyped monotony of their announcements bores me. Whatever item they are announcing gets the same treatment; they lack warmth of utterance. I am not in the least bit interested in who is announcing a particular item, since I know that they are merely reading something which could be equally well announced by Blattnerphoné. Why not sack all the announcers and have one of the crooning, golden-voiced, soft-moustached, limpid-lipped, callow youths recording everything which needs to be "announced." Better still, why not employ some out-of-work actor? The latter will have been trained from the point of view of elocution, and his declamations and voice inflection would be adjusted to the particular item he was



Radio will cause some surprises in India.

announcing. There is always such an air of nasty preparedness about announced items. The sinking of an ocean liner would be described in the same monotone as an announcement about fat stock prices, whilst a romantic item, such as the sudden engagement of Bessie Nitwit, the film actress, to Lord Dunfumcum, which really calls for a throb in the voice, is announced in a cold-blooded way. Now when it comes to the lady television announcers, I am all for careful selection of face. I don't

## By Jhermion

like ugly actresses, for when I pay for a seat in a theatre I expect to be entertained and to gaze upon something pretty. An ugly face has no right on the stage, for, like all things ugly, it is best kept in the background and not paraded in public. I shall look into announcements with greater zest than I listen in. I hope that they pick two pretty blondes with voices which resound like tinkling silver bells. I don't care much what sort of brains they have, because the B.B.C. is unlikely to discover many females possessed of that rare commodity. Save me from the adipose and throaty soprano; save me from the woman who has influence. Let us hope that the women will be chosen irrespective of whether they are English, Irish, or Scottish. By the way, what is the relative distribution of these in the B.B.C.? It would be interesting to know!

## Eye Strain

PROPOS my recent note on this subject, Mr. William Oakley, of Sutton Scarsdale, Chesterfield, writes:—

"I read with interest your remarks on eye strain and short-wave work. I am troubled in exactly the same way; in fact, it is the reason why I don't do a lot more short-wave work. My explanation (in my case, anyhow) is that I am one of those 'tense' people who do exacting things keyed up. I find sometimes, after trimming a set, that I feel completely exhausted, and often friends can do certain work for hours without fatigue and yet I am completely worn out in a very short time, and my eyes go misty. I had a nervous breakdown some years ago, and I put it all down to that.

"I can also bear out the motorcyclist and goggles effect. I never wore goggles unless compelled to, on account of not being able to hear so well; in fact, the engine sounded completely different with goggles on. Trusting these remarks may be helpful."

Another reader, Mr. H. Young, of London, W.11, writes in a somewhat similar strain (no pun intended):—

"I have read your notes on eye strain when searching for weak or distant stations, and I quite agree with you. I have noticed that after a good short-wave search for weak ones or distant ones, the eyes feel quite sore; something akin to the feeling produced by riding a motor-cycle without goggles over the eyes, which is more noticeable riding at night, when one cannot see properly if goggles are worn. You see, I happen to be also a motor-cyclist, and if one wears heavy and close-fitting goggles the hearing certainly is impaired, as you remark. A light celluloid mask obviates this. I have wondered if earphones produce a similar effect on the eyes."

## Dickens Again

I AM sorry to have to revert again to this topic, for I thought I had disposed of it. It is usually my practice to publish the opinions and letters of those who oppose me. As one or two readers have challenged me to produce any letters in support of my views on Dickens, may I quote just one of them, received from Mr. C. Hadfield Galloway, of Prince Arthur Road, London, N.W.3: "Just a line to congratulate you on the firm attitude you have adopted *re* Dickens. Far too much fuss is made of the gentleman who wrote quite amusing



My complete nightingale broadcaster.

stuff but certainly no masterpiece. It is refreshing to find a journalist who has the courage to write what he thinks. There is far too much spoon-feeding of the public by the writers of to-day, and as you say, things and people of no real importance get all the praise, much of which is more like mass hysteria than healthy admiration. If a great man like Lister were alive to-day and was going to appear in public at the same time as some crooner, I do not think there would be much doubt as to who would receive



most notice from the Press and the public. Keep up the good work, Thermion. Write what you think. It does the public good to have its pet theories exploded. More power to your pen." It hurts me to have to publish a letter in support of my views, and I merely do it under duress. Mind you, I was careful to say that Dickens was not the only one. There was the scoundrel Scott, the writer of doggerel verse, Burr-----rrrrrrrr-----uns (don't forget the rerutilated r, or you will offend all our Scottish readers), and the writer of schoolboy trash—Stevenson. I haven't heard from readers regarding those yet.

### Broadcasting in India

SEE that broadcasting in India is to have a fresh lease of life, according to a report by Mr. H. L. Kirke, head of the B.B.C. re-



Radio has not affected their country accent.

searr-----rrch department. He was loaned to the government of India to study brr-----rrrrroadcasting prrrrrproblems. His chief recommendations are: Eight new medium-wave transmitting stations, each catering in language and programmes for the province in which it is located (a programme in Choctaw must be interesting; do they rerutilate their r's?), one central station for the English-speaking population, using anything from 150 to 500 kilowatts, and a short-wave experimental station at Delhi. If the 500-watt scheme comes off, India will have a more powerful transmitter than any in Europe except Moscow. A truant thought assails me. Will they still be able to perform the Indian rope trick when they hear a crooner, or will the ropes just collapse? How is it that the medical profession have not been able to find a cure for the peculiar throat disease known as crooning?

### The Nightingale

THE B.B.C. is having its annual difficulty in getting a suitable nightingale to interrupt the dance music. Why all this bother about nightingales? The song of the thrush and hedge sparrow is just as fascinating, although they do not chirp at night. The nightingale disease has



## Notes from the Nest Bench

### Screened Leads

IN last week's notes it was mentioned that if the anode and grid leads of the H.F. and I.F. valves are long it is advisable to screen them in order to prevent instability.

Screening the leads has one disadvantage, however; it produces a stray capacity between the lead and earth as the screening cover has to be joined to earth if it is to be effective. The screening cover acts as one plate of a condenser, and the lead itself as the other plate, with the insulation round the lead acting as the dielectric of the condenser. If the lead being screened is very long, this stray capacity can be sufficiently high to render accurate trimming impossible. This is especially the case in superhets having a long screened I.F. valve cap lead. If the I.F. transformers normally tune to the required intermediate frequency with the trimmers near their minimum setting, the additional capacity across the primary winding caused by the screening of the cap lead can be sufficiently high to prevent matching of the primary and secondary tuned circuits of the transformer. The remedy for this is to use a cover having a greater diameter so as to reduce the stray capacity to a low value.

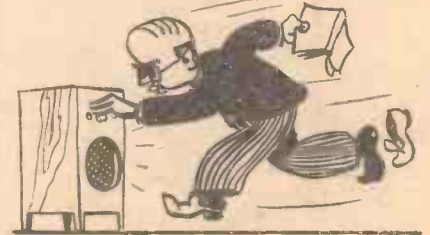
### Extension Speakers

DURING the week-end I was asked to examine a friend's receiver which had been gradually losing its sensitivity. I applied the usual voltage and current tests, and contrary to my expectations I found them to be normal, indicating that the valves and batteries were in order. The grid circuit components also seemed to be in order so I suspected the speaker, which was an old cone model plugged into a socket board attached to the wall, the sockets being connected to the speaker terminals of the set by means of long flex leads. Another speaker happened to be available so I joined this direct to the receiver L.S. terminals, and signal strength increased threefold. At first, I thought that my friend's speaker was at fault, but when this was joined direct to the set instead of to the wall socket satisfactory reception was again obtained. The loss of volume was eventually traced to a leakage across the two flex leads connecting the set to the wall sockets, and when these leads were replaced signal strength reached normal level.

### H.F. Valve Replacements

IT is not commonly realised that battery type H.F. pentodes do not all require the same anode and screen voltages, and are not, therefore, interchangeable in all cases. Some of the latest 7-pin type pentodes take 120 volts on the anode and screen, whereas others should not have a screen voltage in excess of 75 volts. The latter type would be damaged if a voltage of 120 were applied to the screen, and, therefore, great care should be taken when replacing a valve of this type. If a meter is not available to measure the voltage being applied to the screen it is advisable to use exactly the same type of valve as was originally fitted.

been going on for years, and I fail to see why this bird should be elevated to this importance over all other birds. What's wrong with broadcasting the cock crowing, an ass braying, or a crooner snoring. I am sure they must all snore. However, to help the B.B.C. choose this silly bird, which is such a late riser and late retiroer that it has to sing at night, I am marketing my latest invention, the complete nightingale broadcaster's tree trunk. It is made in four sizes—the first is the smallest model for engineers, and all their apparatus and amplifiers; size No. 2 is slightly larger, but has to accommodate all the journalists and reporters from the daily papers so that they can tell their readers how the nightingale was broadcast and/or why the B.B.C. failed to broadcast the nightingale. The third size is even larger, and is especially designed for announcers, containing all that man



A dash to switch off those bells.

can desire for his comfort. Size No. 4 is the de luxe model, and this is only supplied to crooners and band leaders. I have arranged the sizes in inverse ratio to the importance of the people for whom they are intended.

### I Play Shove-ha'penny

LAST Sunday I went into a small country pub and played shove-ha'penny with the yokels who all spoke in their broad country accent. Each told me that he didn't know what he would do without the radio and that he spends much of his time listening. It seems queer to me, after all the uplift on pronunciation from the B.B.C., that they have not lost their dialect. I suppose when their children grow up they will speak the parent tongue.

### Those Bells

DON'T like intervals on the radio, and the B.B.C. has started a bad habit in those chiming bells. They always remind me of church, funerals, and similar lugubrious ceremonies. They seem to chime on indefinitely. Are the programmes being timed short to avoid the fading out which the papers made so much fuss about a little time ago? I have placed ringing bells a good second in my list of radio hates, at the top of which list are the names of all crooners.



A PAGE OF PRACTICAL HINTS

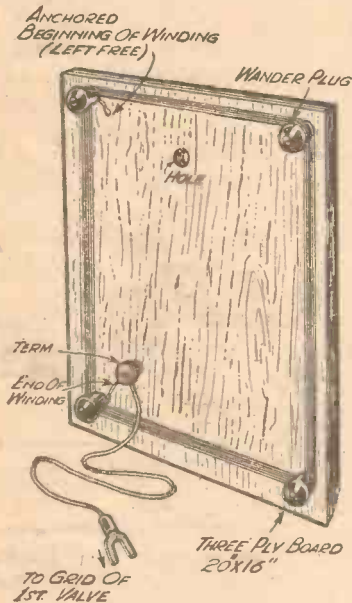
**SUBMIT YOUR IDEA**

**READERS WRINKLES**

**THE HALF-GUINEA PAGE**

**A Simple Frame Aerial**

To enable me to use a simple detector, 2 L.F. set in any room as a portable set, I made the simple frame aerial shown

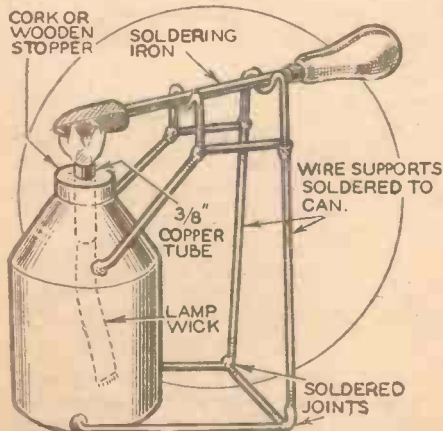


An easily-made frame aerial.

in the accompanying sketch. It is connected to the grid of the first valve direct, and to vary the amount of "capacity" to earth, and thereby control selectivity, I placed the aerial either on the floor or on a chair.—R. J. RUDD (Harrow).

**A Soldering-iron Stand**

WHERE electricity or gas is not available, this soldering stand and heater will be found very useful. Obtain a leak-proof tin and on it solder wire



A useful soldering-iron stand and heating lamp.

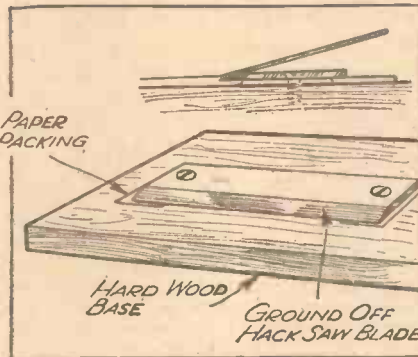
**THAT DODGE OF YOURS!**

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.

supports bent to the shape indicated. A piece of 3/16 in. copper tubing is pushed through a hole in a cork or stopper, the tube projecting about 2 in. into the tin. Push through enough wick nearly to reach the bottom of the tin, and about half fill it with methylated spirit.—W. SMITH (Hackney).

**Splitting Sheet Mica**

WHEN making fixed condensers it is often desirable to split up the mica sheet, as purchased, into much thinner sheets. By using the thinner sheets, not only is the capacity of the condenser increased, or, inversely, a fewer number of



An efficient method of splitting sheet mica.

sheets required, but the complete condenser is, of course, much cheaper. Mica is easily split with a knife, but a much better way

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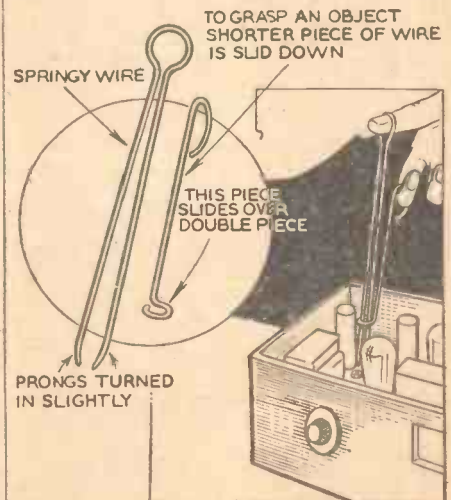
of doing this is shown in the accompanying sketch. The blade is a piece of hack-saw blade ground off on one side to a knife edge, and drilled through, after softening the ends of the blade, so that it can be screwed to a piece of hard flat wood. The blade is packed up from the wood with pieces of paper, the thickness of which decides the thickness of the split mica sheet. As a guide, the thickness of an inside page of PRACTICAL AND AMATEUR WIRELESS is about .003 in. The corner of a piece of thick mica is pressed against the edge of the blade, and pushed through, by pressing the fingers on top, the lower piece emerging the correct thickness from the underside of the knife.—A. H. COPLEY (Manchester).

**Earthing to a Water Tap**

THE following dodge may be of use to readers who have to make an earth connection to a water tap. After turning off the water, unscrew the top part of the tap, and then from a piece of thin sheet brass, cut out a washer to fit over the thread of the tap. In filing the washer to shape leave a tag on the side to which the earth wire can be soldered. Rescrew the top part of the tap tightly.—P. SCHOFIELD (Glasgow).

**Handy Tongs**

A PAIR of tongs, like those shown in the accompanying sketch, will be found very useful for recovering small objects, such as nuts, etc., from cramped places in a wireless receiver. The tongs are made with two pieces of springy wire, shaped as shown. To pick up an object, slide the shorter wire



Details of useful tongs for recovering small objects from awkward corners in a wireless set.

down on the tongs; the ends then come together gripping the object. The tongs are easily operated with one hand.—H. SMITHERS (Willesden).



# The "Invincible" S.W. Three

Some Further Notes on Our New Short-wave Receiver, with Some Helpful Suggestions Concerning Times of Transmission and Programmes Which May Be Heard.

LAST week we gave practically all the essential details for building and using this new three-valve receiver, and no difficulty should have been encountered by anyone. As, however, there is always the possibility that some faulty or defective component may be obtained, or that some other hitch may occur, we will anticipate some of the likely points and deal with them in order, and this information will, no doubt, also prove of advantage in obtaining a high standard of performance from the receiver even if everything goes correctly at first. One of the most important details of the setting-up of the receiver is the adjustment of H.T. and G.B. voltages, although it is quite conceivable that when the respective plugs are inserted at almost any position some signal will be obtained. Remember, firstly, that the grid-bias voltages will govern not only the life of the H.T. battery, but also the life of the valves. Each valve is designed to operate at a certain maximum current, and if this is exceeded the life of the valve is shortened.

A low grid-bias voltage will result in increased anode current, and, therefore, the maker's data sheets should be carefully adhered to, and if any doubt exists the highest possible grid-bias voltage should be applied consistent with good quality. Obviously, if too much bias is employed signals will become distorted and reduced in volume.

### H.T. Voltage

The voltage applied at H.T.1 is very critical, and it will well repay the builder of the receiver to experiment with various values, although it is not merely a question of plugging the H.T. plug into various parts of the battery and just listening to the difference which that makes. At each new adjustment of H.T. the three main controls should be adjusted. That is, the aerial series condenser should be tried at various settings, and the tuning and reaction condenser

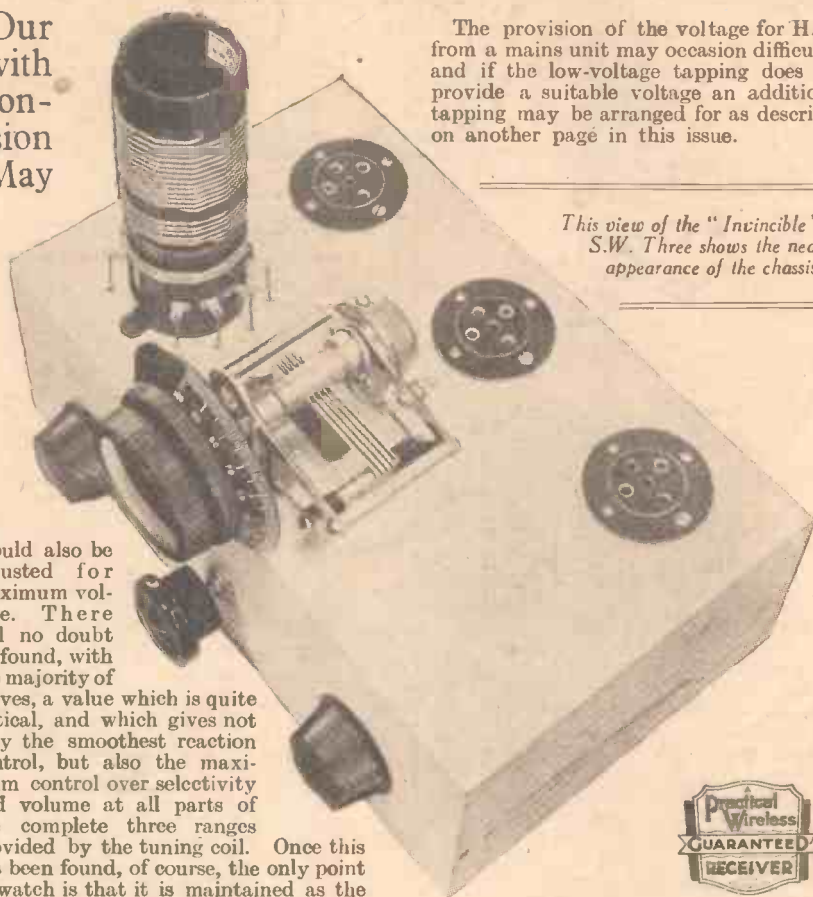
should also be adjusted for maximum volume. There will no doubt be found, with the majority of valves, a value which is quite critical, and which gives not only the smoothest reaction control, but also the maximum control over selectivity and volume at all parts of the complete three ranges provided by the tuning coil. Once this has been found, of course, the only point to watch is that it is maintained as the battery becomes discharged. Thus, from time to time the plug should be inserted into a higher tapping, until the battery becomes too low to be of practical use.

### Using An Eliminator

Many constructors may wish to use the set with a battery eliminator, and in most cases it will be found that this is quite satisfactory except for the difficulties of hum. The unit must be well smoothed if this trouble is to be overcome, and thus only a really well-designed unit should be used with a short-wave set. If any trouble is experienced from hum, additional smoothing will have to be employed.

The provision of the voltage for H.T.1 from a mains unit may occasion difficulty, and if the low-voltage tapping does not provide a suitable voltage an additional tapping may be arranged for as described on another page in this issue.

This view of the "Invincible" S.W. Three shows the neat appearance of the chassis.



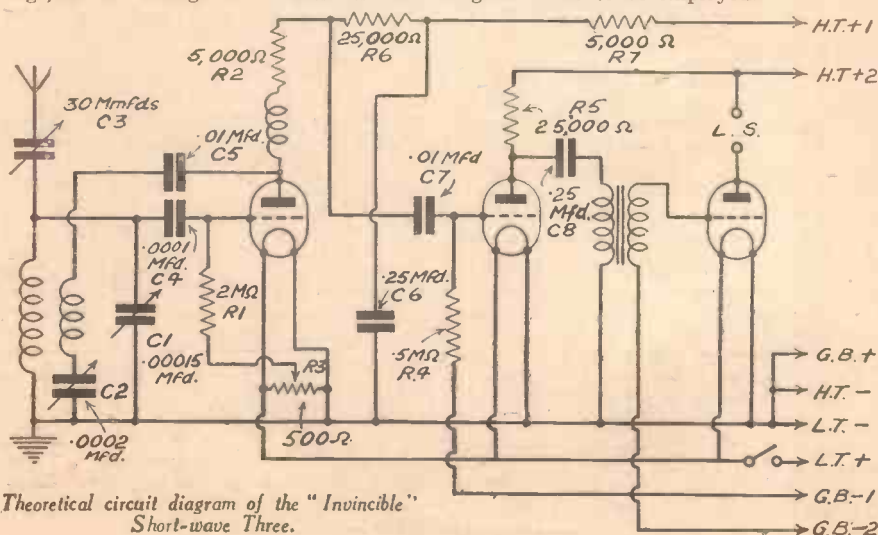
### Aerials

The ordinary horizontal broadcast aerial may be found in many cases to provide adequate results on the short waves, but the possibility of an improved performance by the aid of a special short-wave aerial should not be overlooked. In the average home this receiver will be built for use by the experimenter, whilst the normal broadcast receiver will remain for the use of the remainder of the household, and thus a separate aerial will be desirable so that the short-waves may be explored without interfering with the enjoyment of the rest of the family.

As has already been pointed out in these pages, the dipole aerial is most efficient at a particular wavelength and thus, if on experimenting it is found that one particular station provides the most consistent entertainment, it may be thought worth while to erect this type of aerial tuned to the frequency of that station. The aerial is then erected so that each half is equal to one quarter of the wavelength of the station. Alternatively, such an aerial may be erected with its frequency or resonant point in the centre of the short-wave band. An inverted "V," a doublet, or any other special type of aerial may be used if preferred, and the various notes on these aerials which have already been given will prove of value in making a selection.

### When To Listen

Disappointment will result if an attempt is made to tune in American signals on the 50-metre band during daylight. It is essential to remember that the range of



Theoretical circuit diagram of the "Invincible" Short-wave Three.



signals is governed on the short waves by the atmospheric conditions, and there is a slight difference between the conditions obtaining in summer and winter.



be carried out, when interesting discoveries may be made. The following guide will, no doubt, prove of value to the beginner in short-wave

ter. During the summer months the effective range of signals on the 19/20-metre waveband, for instance, will be approximately from 800 to 4,000 miles during daylight, whilst during darkness these signals will circle the entire world and thus signals may be heard from practically any country. The same applies to the higher wavelengths up to 50 metres or so during darkness, although at times it may be found that the higher range just mentioned will only be heard over about 300 or 400 miles. In daylight these distances are considerably reduced, and therefore it is worth while, at first, making a point to listen only on particular bands at certain hours. When more experience has been obtained in the operation of the short-wave receiver, explorations on other bands may

The "Invincible" S.W. Three seen from the front.

listening, although, as just mentioned, it need not be rigidly adhered to.

Listening Time	Waveband
Night	30 and above
Evening	25 to 30 metres
Afternoon	17 to 25 metres
Mid-day	12 to 19 metres

Finally, remember that although the receiver may function quite well with a poor or indifferent earth connection, a really good earth will not only give a greater range, but will also result in a reduction in many extraneous or background noises. A good buried earth of the copper mat type is preferable, but any metallic body buried in moist earth, preferably 2ft. or 3ft. down, will serve. Failing this, a well-made connection to a main water pipe should be employed, and this should be periodically inspected to make certain that no corrosion has taken place.

If this is your first short-wave receiver and you are in any doubt regarding the types of station to which to listen, the Short-wave Log which is given below, and which appears each week, will give you some clear indications as to current transmissions and also will assist in some cases in identifying the stations. Addresses are given from time to time to which reports of reception should be sent in order to receive a verification card, and a collection of these forms a valuable indication of the activities of the short-wave listener.

COMPONENT LIST FOR "INVINCIBLE" S.W. THREE

One 3-range coil No. S.W. 66 ..	Bulgin	One L.F. transformer, type Niclet 34-1 ..	Varley
One .00015 mfd. condenser with S.M. drive, No. 1049 (C1) ..	J.B.	One multiple switch ..	B.T.S.
One 30 m.mfd. condenser, No. 2141 (C3) ..	J.B.	Two socket strips, A.E. and L.S. ..	Clix
One .0002 mfd. reaction condenser, No. 2095 (C2) ..	J.B.	One component bracket ..	Peto-Scott
Six fixed resistances: 2 meg (R1), 1/2 meg. (R4), two 25,000 ohms (R5, R6), two 5,000 ohms (R2, R7) ..	Erie	Three valve-holders, 4-pin type ..	Clix
Five fixed condensers: two .25 mfd. (C6, C8), two .01 mfd. (C5, C7), .0001 mfd. (C4) ..	T.C.C.	Six plugs: H.T.2, H.T.1, H.T., G.B.+ , G.B.-1, G.B.-2 ..	Belling-Lee
One H.F. choke, type H.F.3 ..	Wearite	Two spades: L.T.-, L.T.+ ..	Belling-Lee
One filament potentiometer, 500 ohms, R3 ..	B.T.S.	Three valves: 210HL; 210Det, 215P ..	Cossor
		One metallised chassis, 10in. by 6in. by 3 1/2in. ..	Peto-Scott
		One 120-volt H.T. battery ..	Drydex
		One 9-volt G.B. battery ..	Drydex
		One 2-volt accumulator ..	Exide
		One speaker, type Junior ..	W.B.
		One pair headphones ..	Ericsson

Leaves from a Short-wave Log

New South Americans

FROM South America, Central America and the West Indies we are daily receiving a larger number of broadcasts and several new calls have been recently logged. In addition, it is necessary to note certain alterations in wavelengths. You may add to your list the following three stations which are operating in Ecuador; namely, HC2CW, Guayaquil, on 35.59 metres (8,430 kc/s) with the call: *Ondas del Pacifico* and daily transmissions from B.S.T. 02.00-05.00; HC2ET, in the same city on 65.22 metres (4,600 kc/s) working on Sundays and Thursdays between B.S.T. 03.15-05.15 and for which reports of reception should be sent to *El Telegrafo, Casilla 249, Guayaquil*. "El Telegrafo," as you may gather from the name, is a daily newspaper published at Quito, and in that capital it has also opened a short-wave broadcasting station of which the channel is 44.5 metres (6,740 kc/s). It offers a radio programme and weekly news bulletin every

Sunday between B.S.T. 00.15-02.15. From Colombia comes the news that HJ4ABD, Medellin, now a 1-kilowatt, is a daily fixture on 52.15 metres (5,752 kc/s), from B.S.T. 16.20-18.00 and returns to the ether for a much longer programme at B.S.T. 23.30. As a rule it does not close down before 05.00, giving in addition to its call in Spanish and English, the slogan: *La Voz de Aburra*. From Cuba I am advised that CO9JQ, Camaguey, on 34.62 metres (8,665 kc/s), for the summer months has added a further broadcast to its daily schedule. Over and above the usual transmission given between B.S.T. 02.00-03.00 the studio now offers a radio entertainment at B.S.T. 23.30 lasting until well after midnight. This consists mainly of whatever is being given by the mother station, the medium-waver CMJA. As an interval signal the blowing of a bugle is occasionally heard but identification is facilitated by the fact that the announcer frequently gives out the call slowly and clearly in the English language. The address is P.O. Box, 64, Camaguey, Cuba. Another station in that island, CO9WR, situated at Sancti Spiritus has jumped from 25.40 metres (11,811 kc/s) to 47.69 metres (6,290 kc/s). The summer programme is fixed as follows: B.S.T. 22.00-24.00 and from 03.00-05.00 daily. On most nights it depends for the greater portion of its broad-

casts on a relay of the local medium-wave station CMHB. Reports should be sent to Senior V. E. Weiss, Radio-Commercial, Box 85, Sancti Spiritus, Santa Clara, Cuba.

The Argentine

Whilst in that section of the waveband I must refer to LRX, Buenos Aires, on 31.32 m. (9,580 kc/s), which on three separate occasions was picked up whilst testing with relays of programmes from LRI, *Radio el Mundo*, the 50-kilowatt medium-wave station in that city. Up to the present the lower channel (19.62 m.) has been more frequently used for the purpose. Should you desire a verification, send reports of reception to Estacion LRI, Calle Maipu, 555, Buenos Aires, Argentine Republic.

Two Far-Eastern stations for which a search may now be made, as they are reported by French "fans" as having resumed tests, are HS8PJ, Bangkok (Siam), on 27.32 m. (10,980 kc/s), which is on the air between B.S.T. 14.00-16.00, and F31CD, Saigon (French Indo-China), which has reappeared on 31.51 m. (9,520 kc/s). Formerly working regularly on 49.05 m. (6,116 kc/s), it suspended its broadcasts a few years ago, but in view of the regular transmissions now carried out by the Dutch Java stations the authorities have been induced to put it back on the ether.

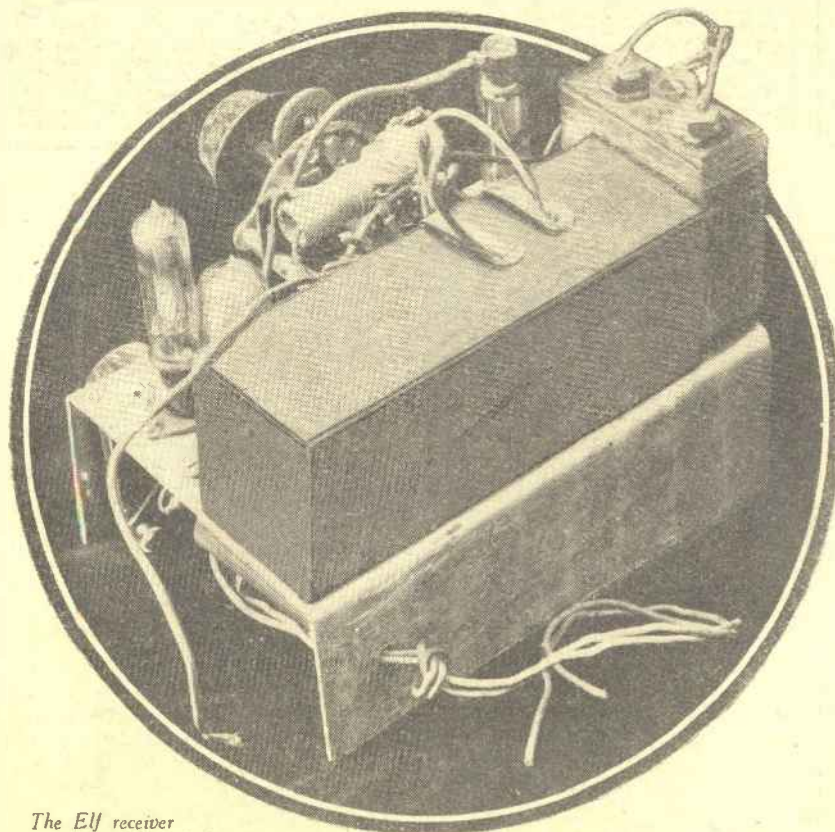


THE version of the Elf Portable which was fully described last week, was designed for headphone reception only. In such a form it will have a very wide appeal, not only because of its small dimensions, but owing to the fact that the received music is not broadcast and may be heard only by the user of the portable. There are, however, occasions when it will be desirable for others to hear the programme, and I have therefore designed this receiver in two separate forms, the second of which is the subject of this article. As may be seen from the illustration on this page, a loud-speaker is now included inside the cabinet in place of the headphone compartment, and although this has resulted in a slight increase in the size of the cabinet it is still smaller than any complete portable which has yet been put before the constructor public. The total height of the cabinet is now 11½ in., whilst the remaining dimensions remain the same as for the original model. The same chassis and batteries are employed, and the circuit remains unchanged, so that all the main constructional details which were given last week still hold good.

**The Cabinet**

The cabinet may be obtained ready drilled from Messrs. Peto-Scott, but if for any reason the constructor desires to employ some particular cabinet of his own design or to suit some individual requirement, the original panel-drilling dimensions, given last week, will be found useful for drilling the control panel or cabinet front. The loud-speaker is the W.B. Midget, and in order to facilitate connection and possible circuit checking, long flexible leads should be attached to the speaker chassis and connected to the receiver before it is placed in the cabinet.

The speaker should be screwed to the loose baffle



The Elf receiver complete with batteries.

**MORE ABOUT**

**F. J. Camm's "Elf"**

In This Article an Alternative Cabinet is Described that the Receiver may be Used

which is found in the lower compartment of the cabinet, and it will be found preferable to select screws which project one-eighth of an inch through the front of the baffle so that this in turn may be held against the front of the cabinet. With reference to the receiver chassis, it will probably have been noticed that there are two types given in the list of components. Messrs. Peto-Scott can supply the chassis in metal drilled ready for the attachment of the valveholders and other sundries, or, if preferred, you can obtain a complete chassis, with the valveholders eyeletted to the chassis, and with a metal clip fitted into position to hold the grid-bias battery in place. The cost of this chassis represents a slight saving in cost and will, of course, facilitate the constructional work.

**The G.B. Battery**

A point of doubt may arise in connection with the grid-bias battery. The particular model which is specified is not marked in the usual manner, but instead has one socket marked —, and the remaining figures (i.e., 1.5 3, 4.5) are actually positive voltages. Therefore, the G.B. + plug should be inserted into the 3-volt socket, and the G.B.— plug should be inserted into the — socket.

In the theoretical diagram two H.T. positive connections are indicated, and are marked 1 and 2. In the blueprint it will be found that these two points are connected together so that a single H.T. positive lead from the H.T. battery may be employed. If, however, at any future date it is desired to use a larger battery (with which, of course, better volume will obviously



The Elf in the new cabinet

LIST OF		
	s.	d.
Special Tuning Coil Assembly	8	6...
Two .0005 mfd. condensers (Compax)	5	0...
One .0003 mfd. differential condenser	3	0...
Three Tubular fixed condensers, two .1 mfd., one .0001 mfd.	3	0...
Three fixed 1 watt resistances, one 1 meg., one 15,000 ohms, one 5,000 ohms	3	0...
One L.F. transformer, type L.F. 33	4	0...
Three midget type valveholders, one 5-pin, two 4-pin.	1	10...

B.T.S.  
Polar  
Polar  
T.M.C.  
Dubilier  
Bulgin  
Clix



# "Portable Three

ed, in Which a Loudspeaker is Mounted so Under Different Conditions

be obtained) a separate tapping may be employed for the detector stage so as to provide a more reliable control over this stage. In such a case the 15,000-ohm resistance should be disconnected from the terminal on V<sub>3</sub> and a flexible lead attached so that it may be inserted into the H.T. battery.

## Aerial and Earth

Two short flexible leads are at present marked on the blueprint for Aerial and Earth, and the former is joined to the coil unit, whilst the latter is anchored to the metal chassis. When using the receiver it is obvious that some further length of lead must also be employed for both of these connections, and therefore the constructor may fit two sockets to the chassis, or a terminal strip. Alternatively, for the aerial a long flexible lead may be soldered to the red lead on the coil unit, and this may then be wound round a flat strip of cardboard and kept inside the cabinet when the receiver is not in use. When required, the aerial should be thrown out, either over a tree branch, or along the top of a fence. Alternatively, it may even be laid along the ground. The earth lead should simply be pressed into the ground, or, if the set is employed when in a car it may be attached to the chassis of the car by means

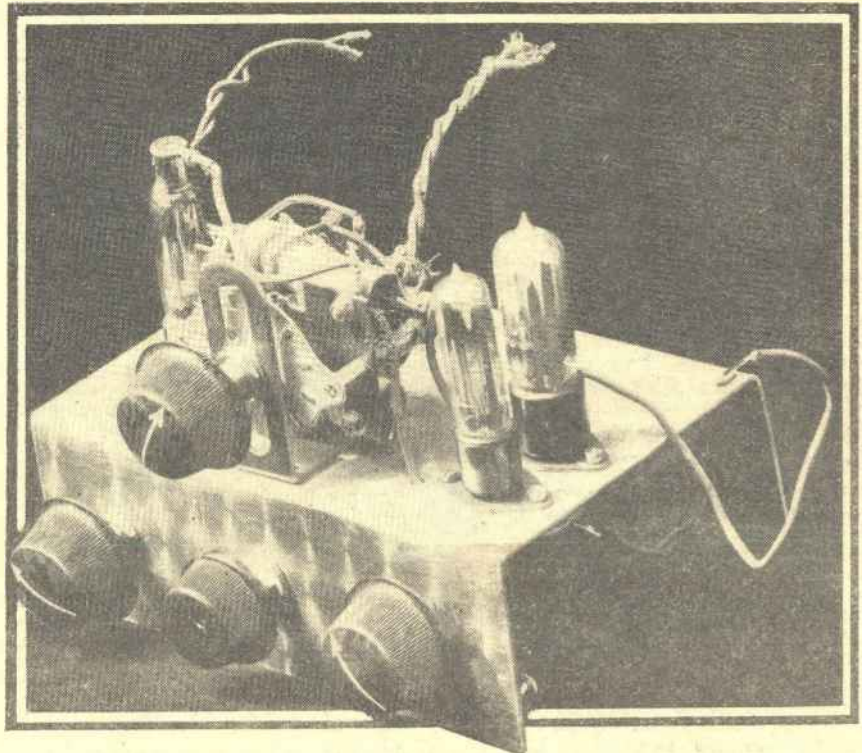
et with loud-speaker.

of the most conveniently situated nut or bolt.

If the aerial is very short it may be found desirable to cut out the aerial coil and to attach the aerial (either direct or through a small fixed condenser) direct to the grid coil in the first stage. In that case, the aerial lead will be joined to the white lead on the coil unit. The selectivity, when this connection is employed, will obviously not be so high as when the aerial coupling coil is used, but this will be counterbalanced by the fact that a short aerial is in use.

## Avoiding Damage

The leads from the output valve, which are marked



This illustration shows the Elf Portable chassis without the batteries.

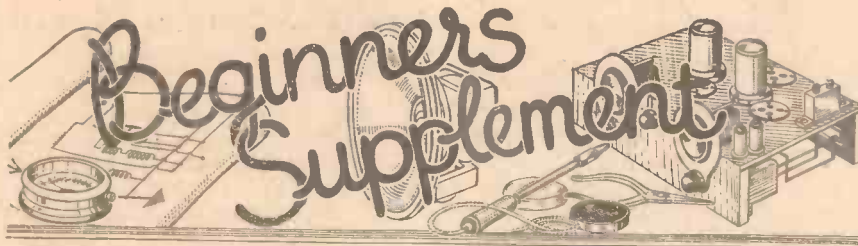
“To L.S.” on the blueprint, are quite free, and there is a risk, when the receiver is being used under some conditions, of the lead being broken away from the terminals on the valve-holder. To avoid this, a knot should be tied in the leads before they are passed through the hole in the chassis, and as a further precaution a short length of insulated sleeving should be placed over the leads and held in position by means of another knot. This will prevent the edge of the hole in the metal chassis from chafing through the rubber covering of the leads and so causing a short-circuit. If the constructor can obtain a grummet, this may be let into a suitable size of hole instead, but the knot at the rear should still be employed to prevent accidental dragging away of the leads.

It may be as well to mention before completing this article that the leads to the batteries are shown attached direct to these components in the illustration on this page, although in the complete receiver they are attached to contact pieces. However, this point should be clear when the components are obtained, and therefore no difficulty should be experienced. Remember, however, that our Queries Service is always open for the solution of any problems which may arise.

## COMPONENTS.

	£	s.	d.	
Two plugs, G.B. + and G.B.—			3...	Belling Lee
One component mounting bracket			4...	Peto-Scott
One special Chassis	5	6...		Peto-Scott
Three valves, one XSG, one XL and one XY	2	1 6...		Hivac
One 60-volt battery, type X418		6 6...		Drydex
One 4½-volt battery, type X89		1 0...		Drydex
One 2-volt accumulator, type M.7		7 0...		B.T.S.
One Midget Loud-speaker	17	6...		W/B.
Wire, nuts, bolts, etc.		1 6...		Peto-Scott
One special carrying case		15 0...		Peto-Scott
Chassis with v.holders eyeletted in position, G.B. battery clip, etc.	7	0...		Peto-Scott





## L.F. AND SMOOTHING CHOKES

An Explanation of the Function of Iron-cored Chokes, with Details of Their Behaviour in Different Circuits. By FRANK PRESTON

**A**LTHOUGH iron-cored chokes are very widely used, their function is often misunderstood by the constructor. Reduced to the simplest possible terms, the principle of a low-frequency or smoothing choke is that it offers a comparatively low resistance to direct current and a high resistance to alternating current. A choke consists merely of a large number of turns of copper wire wound on an iron core, and the inductance (which will be explained later) is dependent upon the number of turns of wire, the area of cross-section of the iron core, the weight of the iron, and the magnetic properties of the particular kind of iron or iron-alloy used. For most practical purposes, however, it is sufficient to consider only the number of turns and the cross-sectional area of the core, assuming that standard Stalloy core stampings are used.

### Resistance—A.C. and D.C.

If we consider the average type of 30-henry choke we find that its resistance to direct current (H.T. current, etc.) is about 500 ohms, whilst its resistance to alternating current varies between rather more than 500 ohms for very low frequencies, up to very nearly 100,000 ohms at 500 cycles, or almost 1,000,000 ohms at 5,000 cycles (per second). From this it might be appreciated that the resistance to alternating currents—which is a practical expression of inductance—is proportional to the frequency. Thus, any particular choke offers ten times as much resistance to alternating currents of 50 cycles per second than it does to frequencies of 25 cycles per second. In fact, it is because of this that it is generally necessary to employ a larger choke for smoothing purposes in a mains set fed from 25-cycle A.C. mains than when 50-cycle mains are used. It should be mentioned in passing that fluctuating D.C. can be considered as being the same as A.C. as far as a choke is concerned.

### A "Buffer"

For the benefit of those who have no idea of the actual behaviour of a choke it should be explained that it behaves in the manner just described due to the effect on the ferrous core of the current passing through the winding. As the current starts to pass, the core becomes more magnetic, thus "absorbing" the power equivalent of the current; as the current intensity falls off, the magnetic "field" round the core is re-transformed and appears as current passing through the windings in the opposite direction. From this it may be seen that the choke as a whole acts very much like a spring or "buffer." It might be compared with the spring-loaded buffers on railway trucks which "give" every time another truck is

shunted against the end of the train. The result is that the whole string of trucks moves comparatively smoothly. In just the same manner the fluctuating current—or power impulses—applied to one end of the choke are smoothed out, so that there is a smooth flow of current from the other end of the choke.

### L.F. Coupling Chokes

The above explanation chiefly concerns the so-called smoothing choke used in the H.T. supply system of a mains receiver, but chokes are also used for coupling purposes. One example of this use was given last week, when it was explained that a choke can be used in the anode circuit of the output valve to feed the speaker; a similar system of coupling can be used between one valve and another. In such cases as these, the choke

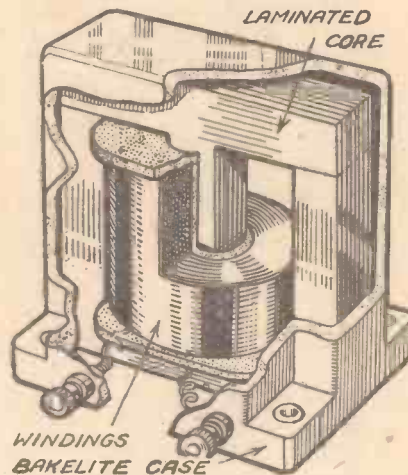


Fig. 1 (left).—Showing the construction of an ordinary L.F. choke. Fig. 2 (right).—The alloy core of a constant-inductance choke showing air gap.

carries the steady direct current to the anode of the valve without offering very much resistance, but the audio-frequency or sound-frequency currents are prevented from passing through the windings due to the fact that the "back voltage" produced when the magnetic field is transformed into current is practically as great as the voltage in the other direction which is tending to drive current through the windings. This is why the resistance or impedance to alternating currents becomes so great.

It is generally found that the impedance of the component connected in the anode circuit of a valve operating at low frequency should be twice the impedance of the valve. Thus, if the valve has an impedance of 15,000 ohms, the choke should offer an impedance of 30,000 ohms; such a choke would require to have an

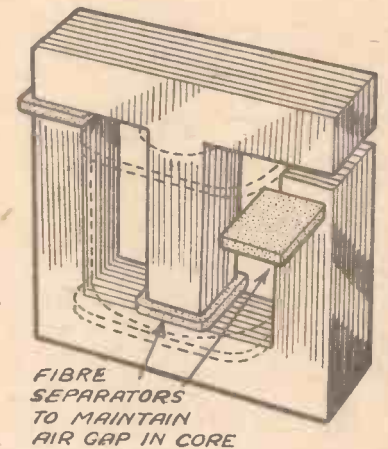
inductance of nearly 100 henries if the impedance were to be sufficiently high at 50 cycles.

### Effect of Direct Current

The inductance of the ordinary type of iron-cored choke varies according to the direct current passing through the windings, quite apart from the frequency of the alternating current. As an example, it can be mentioned that one well-known choke of good make has an inductance of 40 henries when not carrying any D.C., or of only 30 henries when the D.C. amounts to 100 mA. Another high-inductance choke (intended for choke-capacity coupling after a power-grid detector) has an inductance of 300 henries at no D.C., and of 200 henries at 8 mA. Both of these chokes are particularly good ones, but many cheaper types may have an inductance value of less than half their "no-D.C." value when the direct current is no more than 5 mA. The reason for the reduction as the direct current is increased is that the core becomes more strongly magnetised, so that less of the available magnetism, as it were, is left to produce the effects which have been described.

### Constant-inductance Chokes

It is possible to make chokes—and there are several on the market—which have an almost uniform inductance value regardless of the steady D.C. passing through them; these are known as constant-inductance chokes, for obvious



reasons. The difference in construction is that instead of the core being "closed," as shown in Fig. 1, an air gap is left between the ends of the two sets of stampings, as in Fig. 2. Even with chokes of this kind the steady D.C. must not exceed a certain value, or else the core becomes "saturated," with the result that the normal function is not fulfilled. By saturation, in connection with iron-cored chokes, is meant that the core is as magnetic as it can be made and, therefore, there is no "reserve magnetism" which can be used to provide the necessary "buffer." For this reason it is usual to give the maximum current which a choke is intended to carry besides giving a figure relating to its inductance. It is sometimes thought that the maximum-current figure applies to the windings, but this is rarely

(Continued on facing page)



**BEGINNER'S SUPPLEMENT**  
(Continued from facing page)

the case, because even the finest wire which is generally used (44-gauge) will carry a current of 80 m/A without fusing, and this is considerably greater than the highest rating of most small chokes.

**FROM OUTPUT STAGE TO SPEAKER**  
(Continued from May 16th issue)

It was shown in Fig. 4 last week (where choke-output connections were given for valves in push-pull) that the speaker may be joined to the two ends of the choke or to appropriate tapings. With regard to the tapings, the ratio obtained is equivalent to the ratio of the number of turns between the two tapings to the total number of turns on the choke. For example, a step-down ratio of 2:1 would be obtained by placing the two tapings equidistant between the centre tapping (H.T.+) and the two ends (anodes). In the circuit given, coupling condensers are not shown between the choke and the speaker, and these are not essential due to the fact that both speaker terminals are at the same potential in respect of H.T.+ . When the speaker is to be used away from the receiver, however, it is better to include a condenser in each lead, this having a capacity of about 1 mfd.

**Condenser Capacity**

Actually the condensers, or the single one used with a single output valve, may have a value between, approximately, .5 and 4 mfd., but in practice 1 mfd. is nearly always satisfactory. It is worth bearing in mind, however, that the tone of reproduction can often be varied within reasonable limits by variation of the condenser value—the lower the capacity the less the response to the lower frequencies.

The circuits given are for battery-operated sets, but they can be used when mains operation is adopted, although it is then often found beneficial to modify slightly the choke-capacity arrangement, by joining the lower terminal of the speaker direct to the cathode of the valve instead of to earth, or, in the case of a directly-heated output valve, to the centre-tapping of the filament winding on the mains transformer. When this is not done there may be a certain amount of loss across the bias resistance which would be in series between the speaker and the valve cathode. In the case of the directly-heated valve there would also be the transformer winding between the speaker and the cathode, and this might produce various undesirable effects.

**WHERE CAPACITY COUNTS**

(Continued from page 265)

separating A.C. from D.C., but alternating currents of two different frequencies may be separated. A familiar example is the high-frequency filter used to avoid H.F. reaching the grid of a low-frequency valve, and thus overloading it, or giving rise to instability. Fig. 2 shows part of the circuit of a diode detector, in which a high-frequency choke and bypass condensers are employed in the lead to the L.F. valve grid. It is important to note, in this case, that the capacity of the bypass condenser must be small or its reactance at the higher audio-frequencies may be small enough to bypass some of the treble notes, thus spoiling the quality of reproduction. Even among the so-called low frequencies, condensers may be employed as filter or selective circuits, as, for example, where a condenser (usually in series with a variable resistance) is connected in parallel with a speaker to reduce the higher frequencies or treble notes by bypassing them instead of allowing them to pass through the voice-coil of the speaker.

**Unwanted Effects**

The most familiar "nuisance" examples are where incidental capacity provides a path for alternating currents (usually high-frequency signals) and thus permits them to go where they are not wanted. The classic case is, of course, the capacity existing between the electrodes of a radio valve, and particularly the older types. At one time high-frequency amplification was almost impossible because the H.F. signals in the anode circuit of the amplifying valve, returned to the grid circuit via inter-electrode capacity, were re-amplified and, the process being cumulative, instability of the circuit resulted. In modern screen-grid and screened pentode valves this trouble is reduced to an almost negligible amount for ordinary wavelengths, but for short and ultra-short-wave working special care must be taken in selecting valves of very low inter-electrode capacity, and special types of valve for this purpose are now being made.

**Signal Leakage**

Then serious losses of R.F. signal can occur by the by-passing effects of incidental capacities. For example, the turns of a high-frequency choke have capacity between each other—self-capacity it is termed, so that, although the choke is intended to offer a high impedance to H.F. signals, part of the signal energy escapes via this self-capacity instead of being diverted to the desired path. When selecting H.F. chokes, therefore, a type should be chosen which is designed to have low self-capacity.

Similarly, signal strength may be lost due to aerials or aerial leads running close to earthy objects.

In addition to causing signal leakage, capacity may result in the introduction of interference. It is clear that if signals can leak away through a condenser or through parts of the circuit which act like condensers, unwanted signals can just as easily enter by the same path. For this reason, H.F. components are placed in screening boxes and H.F. wiring well spaced from other circuits. Here again, long grid leads are a fruitful source of trouble, as they may pick up unwanted signals from other parts of the circuit. But care must be exercised in using screening, since the screen itself acts as one plate of a condenser with the wire or component as the other, so that, although an earthed screen may prevent the entrance of unwanted signals, it may prove an easy leakage path.

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**INVINCIBLE S.W.3**

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By JACE

### A Spot of Bother at Brixton

OF all the entertaining personalities made famous by broadcasting there are few more widely known than Clapham and Dwyer, whose cheerful inanities are often the eagerly awaited high-spots in the Variety programme, or perhaps one should say "High-Spots of Bother." Recently these amusing people performed a little ceremony in Brixton Road, where they opened a new Radio House—an event which caused a good deal of merriment. Radio House is a store of the newest kind, devoted entirely to the needs of the listening public—a permanent Radio Exhibition where the very latest developments in wireless receiving sets and equipment may be examined, and where the expert advice of experienced radio engineers may be obtained.

### New Factory for Whiteley Electrical

WE understand that The Whiteley Electrical Radio Co., Ltd., manufacturers of "W.B." speakers, have purchased the Rivoli Ballroom, Church Lane, Mansfield, for conversion into a new and much enlarged "W.B." factory. Work is already in full swing in preparing the building for occupation, and Mr. A. H. Whiteley hopes that it will be ready to commence production in about six weeks' time. When it is in production the factory will afford employment for between 200 and 300 more workers.

It is interesting to recall that the business originated in a small wooden building in Nottingham Road. Progress necessitated many extensions, and eventually led to the removal of the business to the present works—Portland Mills—which have now themselves been outgrown.

### Experimental Radio Station G5CV

ON the morning of June 19th, when a total eclipse of the sun will be visible in Siberia and Japan, and a partial eclipse will be visible in England, special radio transmissions will be broadcast from Station G5CV, London, W.4. The wavelength (crystal controlled) will be 42.43 metres (7,170 kc/s) and the power will be 150 watts. The transmissions, consisting of a 1,000 cycle tuning note interrupted at frequent intervals for station identification purposes (i.e., call sign, power, frequency, etc., in telephony), will commence at 4.15 a.m. and continue until 5.15 a.m. B.S.T.

Reports upon the reception of these signals, with especial reference to any unusual variations in signal strength, will be welcomed, and all these will be acknowledged with the station's QSL card. It is particularly desired to receive reports from the Eastern Hemisphere. Reports, if they are to be of any value, must state accurately the times when any unusual variations are noticed. They should be addressed to: Mr. Douglas Walters, Station G5CV, c/o The Radio Society of Great Britain, 53, Victoria Street, London, S.W.

It is expected that at some time the transmissions will exhibit night-time characteristics, due to the moon obscuring the sun's disc and therefore restricting ultra-violet radiation and its consequent effect upon the height of the Ionosphere.

### Derby Day, May 27th

THE Outside Broadcast Director and his advisers have visited Epsom Downs, and are shortly to decide on any new angle which will add to the local colour of the Derby broadcast. In past years, various schemes have been tried. In the very early days there was the famous occasion when Nelson Keys and a party visited Tattenham Corner on the wettest Derby Day ever. It rained so hard that even the microphone could not be taken outside. Under these conditions, it was intended "Bunch" should be extremely funny. He was—but not down the microphone. The general



The well-known radio comedians, Clapham and Dwyer, performing the opening ceremony of a large Radio Stores in Brixton.

procedure for broadcasting the Derby is to have two commentators on the top of the Grand Stand, one to describe the appearance of the ground and the parade of the horses, and the other the actual race. This year it may be possible to have microphones among the crowds, but the difficulties are obvious, as the holiday atmosphere of Epsom does not always lend itself to the broadcasting medium.

### British Music

BRITISH music will be well to the fore during the latter part of the present month. On May 23rd two concerts of contemporary English composers will be broadcast—one conducted by Joseph Lewis (National), the other by Aylmer Buesst (Regional). The latter programme will include a first performance of a "Symphonic Fantasia," by J. Russell Williams,

and W. H. Reed's Symphony for Strings, conducted by the composer. On May 27th the B.B.C. Choral Society will take part in Vaughan-Williams's "Sea Symphony," under Dr. Boult (National), and another programme of British music will be broadcast on May 29th (National), also under the direction of Dr. Boult. The programme will include works by W. G. Whittaker, Granville Bantock, Owen Mase ("Lights out" for Orchestra and Chorus—first performance), and John Greenwood.

### Springtime Revue

THE Variety Director has been able to arrange for two special revues to take place in May and June. It had been hoped to get Mr. Douglas Byng to take a very active part in the production and compilation of these revues. Unfortunately, he cannot manage the month of May, but possibly he may be in the June edition. The cast of the May Revue, to be broadcast on May 27th in the National programme, is a strong one, headed by Hermione Baddeley and Jean Sablon, the French broadcasting star who has already made a name for himself in this country. The supporting cast is also strong in radio talent. Edward Cooper, with his inimitable songs at the piano, is having special material written for him. Richard Ainley (son of Henry Ainley) will appear in a light musical production for the first time in his theatrical career. Up to the present moment he has been known in London as a Shakespearean actor. At a private party he was persuaded to sing. Fortunately, a member of the B.B.C. Variety Department was there, and Richard Ainley is to make his broadcasting début as a "jeune premier" in a singing rôle. The rest of the cast includes Adèle Dixon, who scored a great success in "Lots of Love"; Doris Hare, the inimitable mimic and revue artist, who would be heard much more often on the radio if she were not always engaged in West End

productions, and Ernest Sefton, who has delighted many variety audiences. The famous Radio Three will introduce and close the Revue. "This Month of May" will be produced by Archie Campbell, and a further interesting point is that possibly the new conductor, Charles Shadwell, will arrive at Broadcasting House in time to take charge of the music in the revue as his first musical appearance.

### "Accent on Sweet"

BY way of contrast, the accent will be on sweet in the seventh of the "Swing Low, Sweet Music" concerts which is to be broadcast by the Northern Revue Orchestra on June 5th. The soloist will be a Merseyside soprano who goes by the name of "Denise." The programme has been arranged by David Porter and Thomas Matthews.



# REVIEWS OF LATEST RECEIVERS

TESTS OF STANDARD RECEIVERS

ON OUR  
AERIAL

## G.E.C. "Fidelity" All-Wave Receiver

An Interesting Eight-Valve Superhet, Designed for the Short and Broadcast Wavelengths

THERE are a number of features which mark this new G.E.C. receiver as something out of the ordinary in circuit design, and the high standard of performance which it gives may be traced to the ingenious circuit which has been incorporated. There are actually seven valves employed in the circuit, with the addition of a valve rectifier, and we will examine the circuit stage by stage instead of enumerating the valves one by one. Firstly, the aerial is connected to a tuned circuit (with or without the inclusion of a wave-trap) which is included in the grid circuit of an H.F. pentode. This is transformer coupled to a triode-hexode, which provides for the necessary change in frequency, the two former circuits tuning to the signal frequency. The oscillator circuit, as well as the two former circuits, are of the multi-unit type, operated by means of the wave-change switch to function on separate wavebands, covering, with the ganged tuning condenser in use, bands of 16 to 36, 36 to 98, 200 to 550, and from 1,000 to 2,000 metres. The coils are totally screened, and to obtain maximum efficiency they are arranged in various ways. Thus, on one waveband we find that a separate coupling coil is used, for instance, in the aerial circuits, whilst on another waveband an auto-transformer scheme is employed. This shows that great attention has been paid to the performance of the receiver on each waveband, and it is not simply a circuit wired with all-wave coils to operate on the short waves as well as on the broadcast bands.

### Two I.F. Stages

After the frequency changer we find two H.F. pentodes acting as intermediate-

frequency transformers, and thus, in addition to the previously-mentioned tuned circuits there are six further selectivity devices, bringing the total number of tuned circuits up to nine. A high degree of selectivity may naturally be expected. The output from the second I.F. stage is fed to a double-diode-triode, which performs the function of second detector, A.V.C., and first L.F. stage. The signal from this valve is fed via a push-pull transformer, which is coupled by the parallel-fed scheme to two pentodes in push-pull, and a special tone-control device is included in the output circuit in order to assist in removing the accentuated top-note response of the pentodes when desired. Finally, the valve rectifier operates on the full-wave system, and, in addition to a smoothing choke, the loud-speaker field is included for smoothing purposes. The two anodes of the output valve are connected to the speaker transformer, and provision for a speaker extension is made by including two sockets on the secondary side of the speaker transformer. To enable this to be silenced when using the extension, a switch is included in the speech-coil circuit, and an 8-ohm resistance forms part of the speech coil circuit.

### The Controls

As will be seen in the illustration, there are five panel controls, one of which performs the dual function of on-off switch and sensitivity control. This is the left-hand knob. Next to it is the volume control, which limits the signal voltage applied to the grid of the triode section of the D.D.T. valve, and which therefore operates on both radio and gramophone. Next is the main tuning control, and this is of the two-position type. In the normal (in) position the condenser is driven through a reduction gear (15 to 1) which is sufficient for normal broadcast use, but which is not quite fine enough for the short waves. When, however, the knob is pulled out, a very low ratio (75 to 1) is brought into action and the control may then be used for short-wave tuning. In addition, the control knob is on the large side (actually, 2½ in. in diameter), and thus greatly facilitates tuning. Next is the ganged wave-change switch, and, finally, the tone control. As has been previously mentioned, this consists of a resistance and capacity network across the two output anodes.

### Test Results

The receiver was tested under normal daylight conditions in a badly screened building with an indoor aerial. Under these conditions, the sensitivity revealed was of a very high order. On the broadcast medium-wave band practically all of the worth-while European stations were received at high quality, and on the long waves ample material was available from which entertainment could be obtained. The only stations which were not of entertainment value were those which were marred by the usual heterodyne whistle, and, of course, there is no receiver which can take advantage of these stations unless a special whistle filter is employed, when, of course, musical quality suffers. On the short waves both bands provided many good signals, and the A.V.C. action was found to be of great value.

The tone control gave a very wide control over the reproduction, and the fact that pentodes are employed in the output stage gave brilliancy to the reproduction under normal conditions. Hum was negligible, and the makers have made provision at the rear of the receiver for the connection of various forms of aerial so that maximum performance may be obtained on any desired band. For use with an external speaker, special sockets are provided, together with a silencing key.

## SPECIFICATION

Receiver: Fidelity All-wave Receiver for A.C. Mains.

Circuit: Seven-valve superhet with two I.F. stages; push-pull output stage; A.V.C. and full-wave rectifier. A signal frequency H.F. amplifier is employed and tone control is fitted to the output stage.

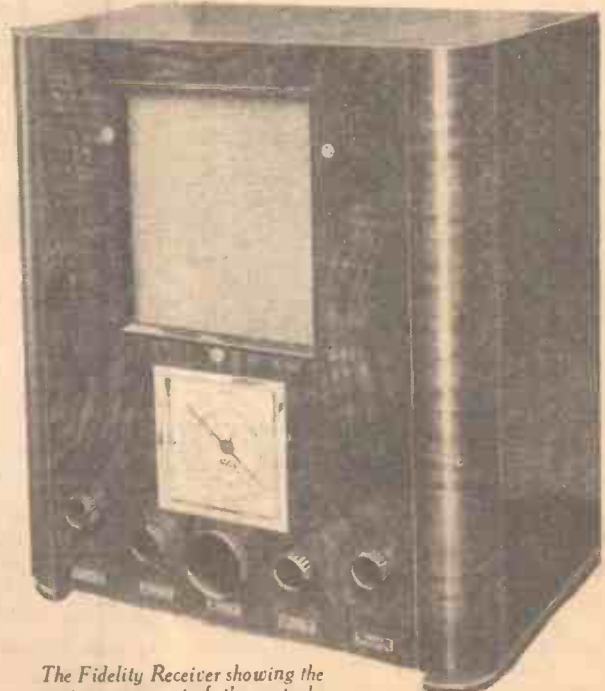
Valve Combination: H.F. Tetrode as signal-frequency amplifier; Triode-hexode frequency changer; H.F. pentodes in the two I.F. stages; Double-diode-triode, and two pentodes in the push-pull stage. Full-wave valve rectifier.

Controls: Five in number, combined on/off and sensitivity control; volume control; wave-change switch; tone control; and main tuning control. The latter has two positions providing different reduction gears to the tuning condenser.

Remarks: Provision is made for an extension speaker, and also for the use of various types of aerial, including the type employing a twin feeder. A circular tuning dial is employed calibrated in wavelengths on each range, and a separate pointer is included with indications showing the setting of the wave-change switch.

Price: Twenty-five guineas.

Makers: The General Electric Co., Ltd., Kingsway, London, W.C.2.



The Fidelity Receiver showing the neat arrangement of the controls.



# 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).

## Transmissions from the "Queen Mary"

SIR,—With reference to your statement made in a recent issue of PRACTICAL AND AMATEUR WIRELESS, concerning the registration letters and various wavebands on which the liner *Queen Mary* will transmit, I have already received transmissions from the *Queen Mary*. The broadcast took place on a recent Sunday evening between 17.30 G.M.T. and 20.00 G.M.T., and consisted of tests of the liner's wireless. The station testing was the London Radio terminal station GBT. Various tests were carried out, such as frequency tests, speaker tests, QRI tests, QRK tests, and many others. The most interesting test was when GBT station called New York and asked them to test the GBT, but the *Queen Mary's* operators objected because they said they were not used yet to long-distance calls. The GBT station came over fine, and GBT was particularly good, but faded considerably at intervals. As my set and coil is home-made, I cannot find out the wavelength on which I received this broadcast. I should be greatly pleased if you could give me details of the wavelength, etc., and should like to know if any other short-wave enthusiasts received this broadcast.—L. GIST (Cloveley).

[As the "Queen Mary" has been allotted about eight different wavebands, we are unable to inform you on which band you received the above-mentioned transmission. The wavelength is usually given during tests.—ED.]

## Back Numbers Wanted

SIR,—I should be glad if any reader could loan or sell me a copy of PRACTICAL AND AMATEUR WIRELESS, No. 626, dated June 9th, 1934. I will pay all expenses.—A. HOBBS (21, Bridge Road, Alum Rock, Birmingham).

## Service Men!

SIR,—I have been following with interest the various letters published in your paper dealing with the subject of incompetence of service men employed by some radio dealers. I hold this position in quite a large radio store, and in the course of my travels I assure you that I find far too many cases of damage to sets due to ignorance. The usual remark of the customer is to the effect that: "I had so-and-so to see my set, but since they put in that new transformer the set has not worked half so well, and they charged me 12s. 6d." Upon investigation I find that the transformer used was most unsuitable for the job, and that there must have been about 900 per cent. profit on that particular component. This is hardly playing the game, especially when the victim happens to be a poor person who perhaps has to go without necessities to pay the 12s. 6d. I submit that all radio dealers employing service men should first of all make sure that they are eligible for the post. The following two experiences of mine illustrate how easy it would be to "sting" a section of the public.

The other week I discovered a gentleman attempting to work a well-worn two-valve battery receiver, using quite a good outdoor

aerial. His earth, however, consisted of about four feet of copper wire, connected to the end of a meat skewer. This was hanging in a milk bottle full of water, and, Hey presto! one earth complete. He was quite proud of this device, and it was some time before I could gently persuade him that it was useless. In another case I was installing a portable radio and was just about to demonstrate when the lady owner got on a chair, and, with some difficulty, opened the window to its limit, explaining at the same time that she hoped the window was large enough to allow the sound to reach the portable. It is obvious that such people as these have to rely entirely upon their radio dealers, and if the dealer happens to be without a conscience, well, I leave the rest to your imagination.

Finally, may I thank you for the many excellent articles published from time to time in your paper. A great many of these such as "Beginner's Supplement," etc., I have filed, and they help me immensely. I am sure many readers would welcome more space devoted to S.W. work.—RON B. COOMBER (Kent).

## An Efficient Adapter

SIR,—Please allow me to thank you for many interesting articles in your paper. I made a short-wave adapter from hints given a few months ago, and since then I have received many hundreds of amateur and commercial stations. The adapter plugs in to my broadcast set—Det., R.C. and trans. I have heard about eighty American amateurs in all, mostly on 'phones, and over 100 G stations on the speaker. A few weeks ago the 20 and 40-metre bands became dead for about a week, but they are now normal again, a curious feature being that G 40-metre stations can be heard up to midnight and later.

Here is a list of a few of the best stations heard. Perhaps this will interest other readers:

VK2ME, W2XAF, CT1P, EAQ, PHI, WKC, W8XK, CT1AA, ROME 2RO, MOSCOW. 20 metres, W6BGH, W6MXW, W6ITH, VK2BW, W2BSD, W3EOZ, W2HFS, W3MD, MU8AB, SU, LY1AG, VE2BG, VE3EO, VE1DR, CO6OM, CO7CX, CO2HY, CO2KY, T2MG, SU8NA, VP9R, HI5X, EA5BC, EA5BE, VE3JV, WIHAV, W8CPC.—P. EVANS Hockley (Birmingham).

## An Amplifier for the Deaf!

SIR,—I read with considerable interest the letter by "Social Exile," and your reply, on page 678, of February 8th issue, but as I have been out of the country since then, I have not seen subsequent issues of your paper, I don't know whether you have published a "deaf aid" outfit scheme.

Personally, I think a simple battery set, to enable a deaf person to listen to con-

versation in a room, by the aid of headphones, would be a great boon, and I should like to make up such a set, and feel sure many others would also like to do so.

I understand it is possible to adapt a wireless receiving set for this purpose, but I think most people would prefer a small set made up for amplifying from a microphone to headphones, without having a lot of useless components in the set, which I am told is the case when a wireless receiving set is connected to an amplifier.—E. A. CLIFT (Guildford).

## Our Simple Short-waver

SIR,—I have just completed your "Simplest Short-waver," which I am using as an adapter in conjunction with an S.G.-det.-pen. battery-operated broadcast receiver. This is my first experience on the short waves, and I think your splendid set is very easy to handle. I have received over thirty stations on the 40-metre band in a few evenings, including W8XK and W1XAL. Reception was on the loud-speaker. I have been taking your paper for the last twelve months, and I must congratulate you on designing such a range of splendid sets, many of which I have made up and sold.—DAVID ROBINSON (Derry).

## A Log of Amateur Transmissions

SIR,—I enclose a log of some amateur stations received here, and hope that it may be of some interest to other readers.

All were heard on the loud-speaker: ZE1JR, HP1A, SU1RK, HI5X, HI7G, K4SA, VO1L, VP6YB, VP9R, VE1CR, VE2HK, VE2EE, VE2CA, VE2GA, VE3JV, CO2SV, CO2HY, CO2WZ, CO6OM, etc., and also all W. districts, except six and seven.

Regarding W2BSD, I also receive log sheets from this station, which I fill in and return monthly.

Its normal times of operation are given as from 14.00 to 22.00 G.M.T., but it has been heard here, working well outside of these hours. My receiver is a det.S.G.4.—D. BAKER (Pitsea, Essex).

CUT THIS OUT EACH WEEK.

## Do you know

—THAT the screening of the grid-lead to a pick-up will sometimes give greater instability.

—THAT when a tone-compensator is employed for record reproduction, greater care is necessary to avoid cabinet resonance or boom.

—THAT induction to an earth lead can cause serious hum difficulties.

—THAT when hum is experienced in a receiver operated from batteries, the aerial, earth and loud-speaker leads should be moved, as the induction of hum from mains leads in the wall is probably responsible.

—THAT variable-selectivity I.F. transformers are provided with movable primary and secondary windings.

—THAT it is possible to use old I.F. transformers in a form of variable-selectivity circuit by connecting variable resistances across the windings.

—THAT when a grid battery is used for H.F. biasing, it should be placed as close to the H.F. stage as possible, preferably on the chassis.

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

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

## THE WIRELESS ENCYCLOPEDIA

By F. J. CAMM  
(Editor of "Practical and Amateur Wireless")

4th Edition 5/- net  
Wireless Construction. Terms and Definitions explained and illustrated in concise, clear language.

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# IMPRESSIONS ON THE WAX

By  
T. Onearm

## Operatic Records

Of special interest in the "His Master's Voice" record supplement for this month are the recordings by Kirsten Flagstad and Margherita Perras, two famous artists who are making their appearance in Covent Garden Opera this season.

Flagstad, incidentally, contributes the record of the month—"Ho-Yo-To-Ho" (Brunnhilde's Battle Cry, Act II, "Die Walküre"), also "Allerseelen" (All Souls Day), Op. 10, No. 8, Strauss, on *H.M.V. DA 1460*. The other recording by this artist is "Isolde's Liebestod" (Isolda's Love-Death), Act III, "Tristan and Isolde," Wagner, Parts 1 and 2, on *H.M.V. DB 2746*.

Margherita Perras has recorded two well-known excerpts from "Il Seraglio"—Mozart—"Ach, ich liebe" and "Marten aller Arten," on *H.M.V. DB 4439*.

Another recording which should appeal, especially to opera enthusiasts, is the prelude to "Die Meistersinger," surely the most popular of the Wagner operas. It is played by the London Philharmonic Orchestra, conducted by Georg Szell, on *H.M.V. C 2809*.

## "Gloomy Sunday"

THE publicity given of late to "Gloomy Sunday" is one good reason why the public will want to hear it. *H.M.V.* have recorded two versions: one by Paul Robeson (singing "Honey" on the reverse side)—*H.M.V. B 8423*, and the other by Alfredo and his Orchestra, who also contribute a spirited melody, "Gipsy Idyll," on the reverse side. "Gloomy Sunday" had the glory of being banned by the B.B.C.; but eventually the ban was removed. Now you may hear it in its original setting on *H.M.V. B 8424*.

## Stage and Film Success

JOAN CROSS has recorded a number from the well-known musical comedy "Rose Marie." It is the "Indian Love Call," a song which has been sung many times, but of which one never tires. She couples this tune with another film hit, "Say You Will Not Forget" (from the film of that name).

## From the Films

THE Paramount Theatre Orchestra, recording for the first time, contribute a fascinating selection from "Follow the Fleet," on *H.M.V. BD 346*. Reginald Foort accompanies the orchestra on the Paramount organ.

A piano medley of the music written by Irving Berlin for "Follow the Fleet" is cleverly played by Vivian Ellis on *H.M.V. BD 340*.

William Walker, who wrote the music for "Spread it Broad," gives the authentic version of the fascinating piano medley from that show on *H.M.V. BD 342*.

Helen Morgan, actual star in the new version of the film "The Show Boat," sings two numbers from the film: "Bill" and "Can't Help Lovin' dat Man," on *H.M.V. BD 343*.

## Dancing Time

RAY NOBLE and his Band has recorded two numbers from "Follow the Fleet"—"Let's Face the Music and Dance" and "Let Yourself Go," on *H.M.V. BD 5047*.

This band has also recorded "We Saw the Sea," the reverse side of which being devoted to yet another "Follow the Fleet" number, "I'm Putting all my Eggs in one Basket," played by Guy Lombardo and his Royal Canadian Orchestra, on *H.M.V. BD 5048*.

The Ballyhooligans, those versatile fellows recruited from the leading dance bands in London, contribute two records—"I'm Nuts about Screw Music" and "I Got Rhythm," on *H.M.V. BD 5056*, and "Goodbye Medley" and "Oriental Medley," on *H.M.V. BD 5049*.

## Columbia

THE xylophone, like the flute, is rarely recorded, so particular interest attaches to a Columbia recording of Harry Robbins, the acknowledged wizard of the xylophone, playing a "Dancing Dolls" medley on *Columbia FB 1355*, incorporating such standard favourites as "Doll Dance" and "Wedding of the Painted Doll."

## The Song of the Moment

ONE of the titles that Turner Layton sings in the new issue of Columbia records is "Alone," the hit song of the moment. This is coupled with "Heart of Gold" on *Columbia FB 1365*. This artist has also made three other records this month—"Riding the Range in the Sky" and "Alone at a Table for Two" on *Columbia FB 1369*; "I feel like a Feather in the Breeze" and "When my Mammy Smiles," on *Columbia FB 1370*, and "West Wind" bracketed with "The Star and the Rose," on *Columbia FB 1371*.

## Variety

WITH four records in the now universally popular 1s. 6d. Columbia "variety" series one could reproduce quite a good variety programme. You can kick off with Howard Jacobs playing two saxophone solos, "Ah! Sweet Mystery of Life" and "Canzonetta" on *Columbia FB1344* (Jacobs is now director of Australian dance music). This can be followed with Clapham and Dwyer in an extremely humorous "Spot of Income Tax Bother" on *Columbia FB1346*, after which Quentin Maclean will play you "Liebestraum" and Schubert's "Serenade" on the Trocadero Cinema Organ—*Columbia FB1345*. Lastly, Geraldo's Gaucho Tango Orchestra has recorded an extremely fine medley of old favourites on *Columbia FB1343*.

## LATHE-WORK FOR AMATEURS

by F. J. CAMM

1/- or 1/2 by post from

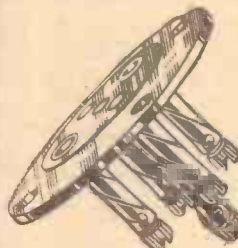
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to readers who have Gift Tokens  
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All you have to do to claim your Camera is:—

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(2) Fill up the form and give the number of your postal order, value 2s. 10d. Cross your P.O. and make it payable to George Newnes, Ltd. (also write your name on the back).

(3) Write your name and full address (in block letters) on the label below and place in an envelope together with the other form and your postal order, and send to PRACTICAL WIRELESS (Camera Offer), 8-11, Southampton Street, Strand, London, W.C.2.

Your Camera will then be despatched to you and should be in your possession in about 14 days after sending your postal order. Keep your postal order counterfoil until you receive your Camera.

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### REPLIES IN BRIEF

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

**R. H. (Swansea).** With your receiver an S.W. converter would be the most useful piece of apparatus, as this would enable all the valves in your set to be used and would convert the apparatus into a superhet. With an adapter you could only use the detector and L.F. stages of the set. However, before making a definite recommendation you should communicate with the makers of the receiver in order to obtain their confirmation that the receiver is suitable for use with a converter, as there may be some whistle-interference eliminating device or other aerial filter which will prevent satisfactory operation of a converter.

**G. W. G. (Birmingham).** The rectifier could be employed in the manner you indicate and no additional resistance would be required. The main point is, however, that adequate insulation be provided as the batteries will, in effect, be in contact with the mains leads.

**G. J. (Old Colwyn).** In view of your difficulties, and also in view of the hum, we suggest that you communicate with the makers of the receiver as it would appear quite definite that there is some fault.

**A. F. (Farnley).** The point raised by you has already been dealt with in our pages, and we have pointed out on more than one occasion that the layout of the terminals is unimportant. So long as the connections are made to the references indicated everything will be in order. We have also mentioned the arcing when the screwdriver touches the screening can. We refer you to the various articles in this receiver and to the wrinkle on page 154 of our issue dated April 25th.

**L. S. (Leicester).** Messrs. Heayberd can supply the transformer you require, and if you supply them with full details of your requirements they will give you a quotation.

**J. R. (Tresco).** The parts may be obtained from Messrs. Peto-Scott for £5 10s. This is Kit A.

**W. S. (Accrington).** The AR.4100 is a general purpose triode, with an impedance of 17,000 ohms and an amplification factor of 33. The P414 does not appear in our records. We cannot recommend a blueprint without type numbers of the coils you have, as a number of different coils are obtainable from the firm in question.

**H. H. (Old Trafford).** If you can let us have type numbers of the coils we may be able to recommend a blueprint.

**E. F. (Edgeley).** It would be advisable to communicate with the makers of your receiver in order to ascertain whether or not it is suitable for use with a converter. If so, we recommend PW.48A.

**R. T. (Llandoverly).** We cannot supply a diagram, and we have no blueprint of a set of the type described. We have given details from time to time of "automatic receivers," but cannot supply data for an individual set to suit your particular needs.

**B. R. (Rhuddlan).** Any aerial may be used, but a vertical wire may be found most useful. Alternatively, obtain one of the all-wave aerials now on the market. See the recent article on the subject of aerials.

**W. O'C. (Cork).** Our short-wave converter, blueprint P.W. 48A, will be quite suitable for your requirements.

**R. B. L. (Notts).** We have not described a receiver using the coils in question. Any standard short-wave set could be modified to use these coils, and the Prefect S.W. Three may be regarded as a good standard circuit of the type indicated.

**M. G. (Dublin).** The receiver in question was described in a contemporary and we have no details of it.

**A. S. D. (Harrogate).** Any model may be employed, according to the price you can afford. For the Elf Portable the smallest model should be used.

**A. W. (Stourport).** A screened anode connector may be found desirable, or, alternatively, one of the special screening caps such as are found on commercial receivers.

**J. B. W. (Eastbourne).** The particular valve referred to is no longer on the market, but probably a standard S.G. valve may work. The circuit was not designed by us and we cannot assist you in the matter. Write to the journal which sponsored the circuit.

**K. J. S. B. (Sherborne).** We do not think the idea will function satisfactorily. It will probably be more satisfactory to use the converter in the form of an adaptor, plugged into the detector stage of your receiver.

**A. G. H. (Fulham).** The box should be quite satisfactory, and we refer you to the oscillator described in our issue dated February 29th last, and the operating instructions in the issue following that date. Binders, as well as indexes, are available for PRACTICAL AND AMATEUR WIRELESS. The index costs 7d. each, and the binding case and index cost 3s. 6d. post free.

**E. T. (Portishead).** We have no circuit suitable for your use. To obtain satisfactory results you will have to employ at least one tuned H.F. stage, and preferably a superhet with A.V.C.

**D. M. H. (Edinburgh).** The baseboard in question was described in PRACTICAL WIRELESS dated December 24th, 1932.

**H. T. (Bury St. Edmunds).** We have no designs suitable, but Messrs. Burne Jones have designed a special Yacht radio set which should meet your requirements.

**C. D. (Coleford Bath).** A standard L.F. amplifier may be added, and to obtain maximum gain a high ratio step-up transformer should be employed, with a pentode in the output stage.

**P. O. (Conway).** The condensers are designed so that the rating is correct irrespective of the earthing of the case. In practically every case, however, the metal screening box or case is intended as the earth connection and forms one side of the condenser. Aluminium is preferable, and it should be borne in mind that tinfoil is actually iron—a material which should not be employed for H.F. screening. Copper may, however, be used instead of aluminium.

## 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.

**WALTHAMSTOW AND DISTRICT RADIO SOCIETY**  
 THE above society was inaugurated on May 4th, twenty-two members being present. We have three club rooms, i.e., general club room, reading room, and a test room, fitted with work bench, and shortly to be equipped with all the instruments required for general radio work.

All radio amateurs living in and around Walthamstow will be given a hearty welcome at the club headquarters if they care to come along. The address is 16, Station Road, Walthamstow, E.17. The club is open every evening at 8 p.m., except Thursdays and Sundays. Morse classes, and general instruction classes in transmitter and receiver design, are held. Our general meeting is the first Monday in each month.—W. T. Cooper (2AYB), Secretary and Treasurer, 2, Station Road, Walthamstow.

### THE RADIO PHYSICAL AND TELEVISION SOCIETY

AN event which has been eagerly awaited by members of this society took place on Sunday, May 10th, at Wimbledon Common. It was the first 5-metre field day of the season organised by the society and was attended by some thirty of our members. In addition to these it was gratifying to find several readers of PRACTICAL AND AMATEUR WIRELESS who had brought their receivers out in response to our invitation.

Mr. E. G. Nurse was operator of the transmitting station under the call G5NR, and the object of the field day was to investigate the radiation of various antennas with particular reference to their directional properties. A new antenna, designed by Reinarz, was tried for the first time. Briefly it consisted of two hoops of copper tube cut to a special length with a break in the continuity of the hoops.

During the afternoon mobile station G5CV was heard, who reported that he had lost himself on Wimbledon Common, and he made contact with G5NR. Besides G5CV's car transmitter, an ingenious member carried his miniature receiver on a cycle, and was thus able to follow the mobile transmitter for a time, besides hearing the fixed station. He reported very good reception, not being troubled in the least by receiver instability, although the path was a rough flint track.

The receiver used by the majority of members was that briefly described in the last report, namely, a self-quenching one-valver, and reception of the mobile and the fixed transmitters was in most cases particularly reliable. We would welcome reports on our transmissions from any reader who may have heard them.

Activities of this society will be considerable and extensive during the summer months, and will include several field days, one of these being probably worked on 50 cms., whilst several visits will be paid to various radio concerns. Readers of this paper are cordially welcomed to our meetings every Friday at 8 p.m., our headquarters being at 72a, North End Road, West Kensington. Full details of the Society, including our scheme for members abroad, will be sent on request to the Hon. Sec., Mr. M. E. Arnold, 12, Nassau Road, Barnes, S.W.13.

## CATALOGUES RECEIVED

### PREMIER RADIO COMPONENTS

A VERY comprehensive range of radio components and accessories is given in the latest list issued by The Premier Supply Stores. In the first part of the list, which runs to forty-four pages, a large variety of condensers of all types; short-wave coils, formers, and aerial equipment; loud-speakers; transformers and chokes; and microphones and amplifiers. In this section full particulars of the Premier "High Fidelity" P.A. Amplifier Outfit are given. Two models of this amplifier are available having undistorted outputs of 10 or 20 watts respectively. This efficient unit completely eliminates the necessity for providing field excitation, and is strongly recommended for use with all types of public-address equipment.

In the section devoted to cabinets, several well-finished models are given for table and console receivers, and also for radiograms, at very competitive prices. Other items listed include eliminator kits; accumulator charger kits; gramophone motors; metres; and kits of parts for making three-valve receivers, and a short-wave superhet converter.



# Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

## The B.T.S. Anti-Noise Aerial

WE gave advance details last week of the newly-introduced equipment supplied by the British Television Supplies Company, and, as promised, we now give technical details of the actual assembly. The aerial transformer is housed in an aluminium can which is specially treated to avoid oxidation and consequent deterioration of the metal itself. We had rather expected to find on examination that the aerial transformer might be one of those boxes of mystery which are now and again offered to the public, and which in actual fact comprise just a fixed condenser or resistance or something equally simple, but on taking the B.T.S. Anti-Noise Aerial transformer to pieces, we found that it comprised three wave-wound midget coils on an ebonite former surrounded by four fixed coupling condensers, the whole assembly being a very neat and workmanlike job.

The transmission line or down lead which emerges from the bottom of the aerial transformer is in practice connected at its bottom end to the set transformer, this being a bakelite moulding with a switch mounted on the face of it and containing the necessary wave-wound midget coils which are also wound on ebonite.

The other side of the set transformer is connected by means of very short leads to your receiver, and it is a very important point to bear in mind that these leads from the set transformer to your receiver must be very short indeed if you are to obtain the full benefit from the Anti-Noise Aerial, as obviously these leads, being ordinary flex leads, are capable of picking up the interference in the same way as the ordinary aerial would, and the manufacturers advise that these leads should not exceed 7in.; they provide for this by equipping the transformer box with two leads so that this is fixed to the receiver as close as possible to the aerial and earth terminals.

On actual test, using the ordinary three-valve battery set designed for all-wave reception, and also an A.C.4 designed for broadcast only, we found that the B.T.S. aerial succeeded to a remarkable degree in eliminating man-made static which can be so exasperating, and, what is equally important, reception conditions with both sets were very definitely improved. It is therefore apparent that as a result of the elimination of static and minimisation of the usual interference experienced, one is able to receive stations that normally would be difficult to listen to owing to the superimposed noises.

## Vocalian Swing Records

MANY gramophone enthusiasts prefer the hot type of record for dancing and also for testing purposes. To meet the increased demand the makers of Vocalian records are now introducing a series of discs known as Vocalian Swing Records. These are of the 10in. type selling at 2s. 6d. each, and releases will be made from a leading American list. The makers are Crystalate Gramophone Record Manufacturing Co.

## New Ferranti Lines

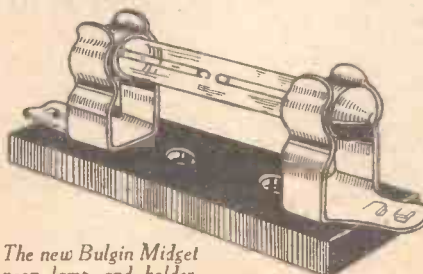
SOME interesting new Ferranti meter accessories are now announced. A multi-range volt box fitted with a rotary switch giving choice of ranges of 5, 10, 20, 50, 100, 250 and 500 volts, and with a resistance of 1,000 ohms per volt, costs £3, and is suitable for use with type 27P portable pattern milliammeter which has a full-scale deflection of 1 mA. It may also be used with the meters types 27 or 27F. For D.C. use, there is a universal shunt box, having a rotary selector switch providing five ranges of milliamps up to 1,000. Extra ranges up to 25 amps. may be obtained at 5s. per range, and the shunt box alone costs £2. If more than five ranges are required (up to the maximum of nine) the prices are modified slightly.

An A.C. multiplier is also now available for ranges of 10, 50, and 200 mA, and for 1 and 5 amps., the cost being £6 10s. This multiplier is suitable for use with the 301 type instruments.

## Bulgin Midget Neon Lamp

A NEW Midget neon has been introduced by Messrs. Bulgin, and will be found invaluable for test purposes. It should be included in the kit of every Service Engineer, and the keen experimenter will find numerous uses for this unique device. As may be seen from the illustration below, this lamp fits into the standard single-pole 1 1/4in. type cartridge fuseholder (type F.17), which costs 6d., or if desired it may be mounted direct on a panel by the aid of a pair of fuseclips which cost only 1 1/2d. per pair. The lamp will be found to be of considerable advantage in many ways, but should always be employed with a series resistance of approximately one megohm. In view of the very small current which will flow under normal circumstances this resistance may be of the half-watt type, and will cost only 6d. The ionisation voltage is of the order of 180, and the lamp may be used for indicating purposes in certain A.V.C. circuits, to effect quiet A.V.C., and for the generation of oscillation for modulating wave-meters.

Since the lamp will light at an extremely small current (and through the high resistance) it may be incorporated in various equipments to indicate leakage current. As is usual with all neon devices, when used with a D.C. supply only one electrode will glow, whilst when used with an alternating supply (A.C.) both electrodes will glow, thus providing a still further use for the device in identifying the source of a supply. The retail price has been fixed at 3s. 6d., and the list number is N.L.1.



The new Bulgin Midget neon lamp and holder.

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A BIG OPPORTUNITY for the serious worker in Recording. A pedestal Unit with an 18" turntable on gear-box with bell-cut gears, constant speed stabiliser, also a tubular iron pedestal 30" high. Fitted with free tone-arm and shaft for outside drive. Weight over 1 cwt. New condition. Bargain 67/6, as illustrated.



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Any make of speaker supplied.

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# Practical and Amateur Wireless BLUEPRINT SERVICE

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

	Date of Issue.	No of Blueprint
All-Wave Unipen (pentode) ..	—	PW31A
<b>Two-valve : Blueprints, 1s. each.</b>		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
<b>Three-valve : Blueprints, 1s. each.</b>		
Selectone Battery Three (D, 2 LF (trans.)) ..	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.)) ..	2.12.33	PW34A
Leader Three (SG, D, Pow.) ..	—	PW35
Summit Three (HF Pen, D, Pen)	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen)	22.0.34	PW39
Hall-Mark Three (SG, D, Pow.) ..	—	PW41
Hall-Mark Cadet (D, LF, Pen (R.C.)) ..	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three)	13.4.35	PW49
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)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	7.12.35	PW64

**Four-valve : Blueprints, 1s. each.**  
Fury Four (2 SG, D, Pen)  
Beta Universal Four (SG, D, LF, Cl. B)  
Nucleon Class B Four (SG, D (SG), LF, Cl. B)  
Fury Four Super (SG, SG, D, Pen)  
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)  
F. J. Camm's Superformer (SG, SG, D, Pen.)

**Mains Operated.**

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A.C.-D.C. Two (SG, Power)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.)	—	PW19
<b>Three-valve : Blueprints, 1s. each.</b>		
Double-Diode-Triode Three (HF Pen, D.D.T., Pen)	10.6.33	PW23
D.C. Acc (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW20
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
"Allwave" 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
<b>Four-valve : Blueprints, 1s. each.</b>		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47

**SUPERHETS**  
Battery Sets : Blueprints, 1s. each.  
£5 Superhet (Three valve) ..  
F. J. Camm's 2-valve Superhet (two-valve) ..  
F. J. Camm's £4 Superhet ..  
**Mains Sets : Blueprints, 1s. each.**  
A.C. £5 Superhet (three valve) ..  
D.C. £5 Superhet (three valve) ..  
Universal £5 Superhet (three valve) ..  
F. J. Camm's A.C. £4 Superhet 4 ..  
F. J. Camm's Universal £4 Superhet 4 ..

**SHORT-WAVE SETS.**  
**Two-valve : Blueprints, 1s. each.**  
Midget Short-Wave Two (D, Pen)  
**Three-valve : Blueprints, 1s. each.**  
Experimenter's Short-wave Three (SG, D, Power) ..  
The Prefect 3 (D, 2 LF, RC and Trans.) ..

**PORTABLES.**  
Three-valve : Blueprints, 1s. each.  
F. J. Camm's ELF Three-valve Portable. 16.5.36 PW05  
**Four-valve : Blueprints, 1s. each.**  
Featherweight Portable Four (SG, D., LF., Cl. B) .. — PW12

**MISCELLANEOUS.**  
S. W. Converter-Adapter (1 valve) 23.2.35 PW48A

**AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.**  
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Four-station Crystal Set .. — AW427  
1934 Crystal Set .. — AW444  
150-mile Crystal Set .. — AW450

**STRAIGHT SETS. Battery Operated.**  
**One-valve : Blueprints, 1s. each.**  
B.B.C. Special One-valver .. — AW387  
Twenty-station Loud-speaker One-valver (Class B) .. — AW449

**Two-valve : Blueprints, 1s. each.**  
Melody Ranger Two (D, Trans.) .. — AW388  
Full-volume Two (SG, Det., Pen) .. — AW392  
Iron-core Two (D, Trans.) .. — AW395  
Iron-core Two (D, Q.P.P.) .. 12.8.33 AW396  
B.B.C. National Two with Lucerne Coil (D, Trans.) .. — AW377A  
Big-power Melody Two with Lucerne Coil (SG, Trans) .. — AW338A  
Lucerne Minor (D, Pen) .. — AW426

**Three-valve : Blueprints, 1s. each.**  
Class-B Three (D, Trans, Class B) 22.4.33 AW386  
New Britain's Favourite Three (D, Trans, Class B) .. 15.7.33 AW394  
Home-Built Coil Three (SG, D, Trans) .. — AW404  
Fan and Family Three (D, Trans, Class B) .. 25.11.33 AW410  
£5 5s. S.G.3 (SG, D, Trans) .. 2.12.33 AW412  
1934 Ether Searcher : Baseboard Model (SG, D, Pen) .. 20.1.34 AW417  
1934 Ether Searcher : Chassis Model (SG, D, Pen) .. — AW419  
Lucerne Ranger (SG, D, Trans) .. — AW422  
Cosor Melody Maker with Lucerne Coils .. — AW423

P.W.H. Mascot with Lucerne Coils (D, RC, Trans) .. — AW337A  
Mullard Master Three with Lucerne Coils .. — AW424  
£5 5s. Three : De Luxe Version (SG, D, Trans) .. 19.5.34 AW435  
Lucerne Straight Three (D, RC, Trans) .. — AW437  
All Britain Three (HF Pen, D, Pen) .. — AW448  
"Wireless League" Three (HF Pen, D, Pen) .. 3.11.34 AW451  
Transportable Three (SG, D, Pen) .. — WM271  
£3 6s. Radiogram (D, RC, Trans) .. — WM318  
Simple tone Three (SG, D, Pen) .. June '33 WM327  
Economy-pentode Three (SG, D, Pen) .. Oct. '33 WM337  
"W.M." 1934 Standard Three (SG, D, Pen) .. — WM351  
£3 3s. Three (SG, D, Trans) .. Mar. '34 WM354  
Iron-core Band-pass Three (SG, D, QP21) .. June '34 WM362  
1935 £6 6s. Battery Three (SG, D, Pen) .. — WM371  
Graduating to a Low-frequency Stage (D, 2LF) .. — WM378  
P.T.P. Three (Pen, D, Pen) .. June '35 WM389  
Certainty Three (SG, D, Pen) .. Sept. '35 WM393  
Miniature Three (SG, D, Trans) .. Oct. '35 WM396  
All-wave Winning Three (SG, D, Pen) .. Dec. '35 WM400

**Four-valve : Blueprints, 1s. 6d. each.**  
65/- Four (SG, D, RC, Trans) .. — AW370  
"A.W." Ideal Four (2SG, D, Pen) 16.9.33 AW402  
2 H.F. Four (2SG, D, Pen) .. — AW421  
Crusaders' A.V.C. 4 (2HF, D, QP21) .. 18.8.34 AW445  
(Pentode and Class-B Outputs for above blueprints 6d. each) .. 25.8.34 AW445A  
Self-contained Four (SG, D, LF, Class B) .. Aug. '33 WM331  
Lucerne Straight Four (SG, D, LF, Trans) .. — WM350  
£5 5s. Battery Four (HF, D, 2LF) .. Feb. '35 WM381  
The H.K. Four .. Mar. '35 WM384

**Five-valve : Blueprints, 1s. 6d. each.**  
Super-quality Five (2HF, D, RC, Trans) .. May '33 WM320  
New Class-B Five (2SG, D, LF, Class B) .. Nov. '33 WM340  
Class-B Quadradyno (2SG, D, LF, Class B) .. Dec. '33 WM344  
1935 Super Five (Battery Superhet) .. — WM379

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

**Mains Operated.**  
**Two-valve : Blueprints, 1s. each.**  
Consoelectric Two (D, Pen) A.C. 23.9.33 AW403  
Economy A.C. Two (D, Trans) A.C. — WM290  
Unicorn A.C./D.C. Two (D, Pen) Sept. '35 WM394

**Three-valve : Blueprints, 1s. each.**  
Home-lover's New All-electric Three (SG, D, Trans) A.C. — AW333  
S.G. Three (SG, D, Pen) A.C. — AW390  
A.C. Triodyne (SG, D, Pen) A.C. 19.8.33 AW399  
A.C. Pentaquester (HF, Pen, D, Pen) A.C. 23.6.34 AW439  
Mantovani A.C. Three (HF, Pen, D, Pen) A.C. — WM374  
£15 15s. 1936 A.C. Radiogram (HF, D, Pen) .. Jan. 36 WM401  
**Four-valve : Blueprints, 1s. 6d. each.**  
All Metal Four (2 SG, D, Pen) .. July '33 WM329  
Harris Jubilee Radiogram .. May '35 WM386

**SUPERHETS.**  
**Battery Sets : Blueprints, 1s. 6d. each.**  
Modern Super Senior .. — WM375  
Varsity Four .. Oct. '35 WM396  
**Mains Sets : Blueprints, 1s. 6d. each.**  
1934 A.C. Century Super A.C. .. 10.3.34 AW425  
Heptode Super Three A.C. .. May '34 WM359  
"W.M." Radiogram Super A.C. .. — WM366  
1935 A.C. Stenode .. Apl. '35 WM385

**PORTABLES.**  
**Four-valve : Blueprints, 1s. 6d. each.**  
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Holiday Portable (SG, D, LF, Class B) .. 1.7.33 AW393  
Family Portable (HF, D, RC, Trans) .. 22.9.34 AW447  
Two H.F. Portable (2 SG, D, QP21) .. June '34 WM363  
Tyers Portable (SG, D, 2 Trans) .. Aug. '34 WM367

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**One-valve : Blueprints, 1s. each.**  
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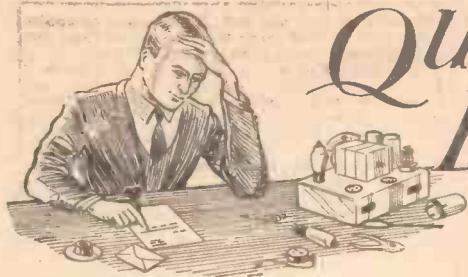
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Listener's 5-watt A.C. Amplifier (1/6) .. Sept. '35 WM392  
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De-Luxe Concert A.C. Electrogram .. Mar. '36 WM403  
New style Short-wave Adapter (1s.) .. June '35 WM388  
Trickle Charger (6d.) .. Jan. 5, '35 AW462  
Short-wave Adapter .. Dec. 1, '34 AW456  
Superhet-Converter .. Dec. 1, '34 AW457





# QUERIES and ENQUIRIES

## Erratic Tuning

"I have built the Superhet 4 but cannot tune in the stations at the correct point. Sometimes the setting is right by the dial, but although I do not alter anything I find another night that it shifts up the scale. I have sent the I.F.'s for test and the makers report is O.K. Can you suggest any possible cause of this fault, or is it usual with a superhet?"—B. R. A. (Basingstoke).

THE fault is certainly not usual, but we have had a number of complaints of the same trouble which have all been traced to the same cause. This is due to the fact that the grub screw which locks the tuning dial to the tuning condenser is not tightened sufficiently when the set is installed and consequently the dial turns without the condenser spindle. It grips at odd points and thus you find that when turned to a certain position it slips for a short space and then picks up again. The remedy is to make certain that the locking screw is tightened sufficiently, and if you care to go to the trouble a flat face may be filed on the spindle before placing the dial in position, to ensure that the screw cannot slip.

## Parallel-fed Transformer

"I enclose a sketch of my set which uses a 5 to 1 L.F. transformer. I should like to use this so as to get a parallel-fed scheme with a step-up of 7 to 1. Could you give me the connections to do this, please?"—P. S. W. (Teddington).

YOU could not obtain 7 to 1 from this particular transformer, but by adopting a certain method of connection you could obtain an additional 1 to 1, bringing the transformer ratio to 6 to 1. As, however, the primary of the transformer will be removed from the anode circuit and a resistance will have to take its place, there may even be a loss in volume when the new scheme is adopted. You appreciate, of course, that the amplification of the valve is governed by the resistance load in the anode circuit, and this should be high to maintain maximum amplification. As the resistance is increased, however, the H.T. applied to the valve will be decreased due to the voltage drop through the resistance. Thus, if you have not ample H.T. available you may find that such a low valve resistance is required to operate the valve satisfactorily that the total gain of the stage is no greater than at present. You may, however, obtain better quality,

due to the effect of the coupling condenser and the transformer primary forming a resonant circuit.

## Twenty-station L.S. Set

"I am interested in the twenty-station loud-speaker one-valver in October 27th, 1934, issue. Could you say whether the set will work a moving-coil P.M. speaker, and has it a good volume. Also, how many stations will it get?"—P. B. (Ossett).

THE volume from this receiver is sufficient to operate a moving-coil speaker of the type mentioned quite satisfactorily, although naturally the volume will depend upon the station being received. During tests with the original model twenty

### RULES

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

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

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

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

stations were received in London at good volume, hence the name of the receiver. We cannot give any guarantee, however, that twenty or more stations will be heard in any particular locality in view of the differences in local conditions, but you may certainly rely upon the receiver to give really good results considering that only one valve is employed.

## Reaction Control

"I have a straight three set, det., L.F., and power. Since I have obtained new components for it it has developed a serious fault. On the long waves the strength is adequate, but as soon as I switch over to the medium-waves I have to decrease reaction almost to zero. There is also a high-pitched whistle on the medium waves and I cannot get the station loud enough. Could you suggest a cure?"—E. D. S. (Mansfield).

THE trouble may, in this case, be due to the coils. The usual type of dual-range coil has a common reaction winding, and this is generally designed to provide

equal effects on both wave-bands when used with a certain value reaction condenser. If the coil on your set is too close to the M.W. coil, or too large for this wave-band, and the reaction condenser is also on the large side, then uncontrollable reaction could take place. Reduce the H.T. applied to the detector valve, and also try a smaller reaction condenser. We would not recommend an adjustment of the reaction winding until it is found that no other cure can be found, but if the coil should prove faulty it may be advisable to have it tested by the manufacturers.

## Modifying an Old Set

"I have picked up an old straight three-valve set which I intend to keep for tinkering about. I wonder if I could substitute an S.G. valve for one of the others in the set. If so, would you tell me just what extra components I should require and how to connect them up?" W. T. (Porth).

FIRSTLY, to what do you refer as a "straight three"? This may be any type of receiver, but as you wish to substitute an S.G. valve we imagine you refer to a circuit of the detector and two L.F. type. In this case, an S.G. valve could be used in place of the existing detector, and the only modification would be to remove the lead or leads at present joined to the anode terminal on the detector valve-holder and to fit a flexible lead to those wires. This lead should then be joined to the cap on top of the S.G. valve. A flexible lead fitted with a wander plug should then be joined to the original anode terminal on the valve-holder, and this should be plugged into the H.T. battery at some value between 60 and 70 volts, the best value being found on test. This is the simplest modification, but there are other ways of using an S.G. valve in the detector stage, and these have been given from time to time in our pages.

## The Monitor, First Stage

"I am building the Monitor, first stage, and would like, as I have on hand a .0005 mfd. air-spaced tuning condenser, to substitute this for the Compax specified. Will this be satisfactory? Further, could I use the Colvern T.D. coil in place of the B.T.S., as I have one by me?"—L. H. P. (Wareham).

IT would certainly be possible to use the two components mentioned, but, of course, you would not be building the Monitor. Your Colvern coil has probably been dismantled from an old receiver, and there is always the possibility when using old components in this manner that some defect exists, and as we have before pointed out, you will be transferring any difficulties which previously existed to the new receiver. Therefore, if you do employ the components mentioned in the Monitor you must do so at your own risk, and we cannot guarantee the results unless you use the specified new parts.

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

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