SECOND BIG SHOW NUMBER : STAND-TO-STAND REPORT

Practical and Amateur Wireless

3D. EVERY WEDNESDAY

Edited by F. J. CAMM

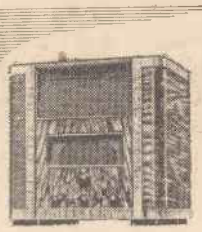
AND PRACTICAL TELEVISION

a GEORGE NEWNES Publication

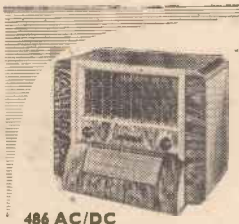
Vol. 8. No. 207. September 5th, 1936.

491 AC
All-Wave Superhet 13½ Gns.

481 AC
All-Wave Superhet. 5 wave bands 18½ Gns.



482 AC
All-Wave Superhet. New type Fluid Light. 16 Gns.



486 AC/DC
Universal All-Wave Superhet 13½ Gns.

149
All-Wave Battery Receiver 9½ Gns. (Including Batteries)

An *Instantaneous Success*

The new All-Wave models emphasise "His Master's Voice" leadership in the science of sound reproduction. Many of the instruments have a short wave range of 7-140 metres and a Vernier scale. Two-speed tuning knobs are standard on All-Wave models. When choosing or recommending a new receiver or radiogram, remember that "H.M.V." costs no more than ordinary All-Wave Radio.

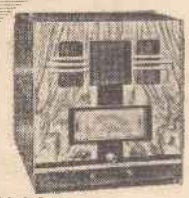
THE COMPLETE NEW RANGE OF

"HIS MASTER'S VOICE"

(Including All-Wave)

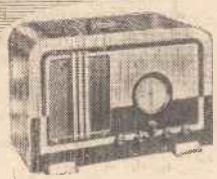
RADIO

445 AC
Station Selector Ray Superhet 13 Gns.



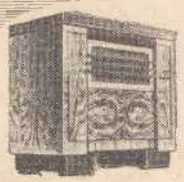
381 AC
Superhet with Spot Light Tuning 12½ Gns.

159
Battery Receiver 8 Gns. (Including Batteries)



480 AC
All-Wave Superhet. 4 wave bands. 17½ Gns.

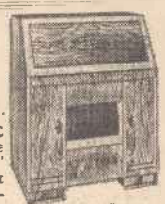
425 AC
Superhet with A.V.C. 11 Gns.



545 AC
Station Selector Ray Superhet Radiogram 22 Gns.

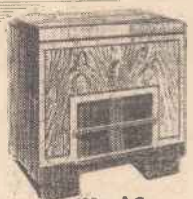
No. 9.
Filing Cabinet. Holds 400 Records (10" or 12") 6 Gns.

801 AC
All-Wave High Fidelity "Concert" Autoradiogram. 10 valves, 5 wave Bands. 8-record Changer. New type Fluid Light. Clock. 3 Speakers, Record Cupboards and 5 Albums 80 Gns.

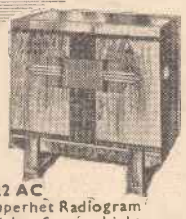


581 AC
All-Wave "Bureau" Superhet Auto-radiogram. 5 wave Bands. 8-record Changer. Record Cupboards. 6 Albums. 48 Gns.

488 AC
All-Wave Superhet Radiogram. 5 wave Bands 28 Gns.



485a AC
All-Wave Superhet Autoradiogram. 5 wave Bands. 8-record changer. 36 Gns.



622 AC
Superhet Radiogram with Spot Light Tuning 22 Gns.

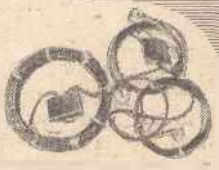
183
Wide Angle sound Distribution Speaker
£5 . 17 . 6

172
All Purpose Moving Coil Speaker
3 Gns.

800
All-Wave High Fidelity Autoradiogram. 15 valves. 5 wave Bands. 4 Range Selectivity device. 8-record Changer. Fluid Light. 2 Speakers. Clock. 110 Gns.

11
Pick-up and volume control with screened leads 32/6

All-Wave Anti-static aerial 37/6



"HIS MASTER'S VOICE"
98-108, CLERKENWELL ROAD, LONDON, E.C.1.

A TELEVISION SOUND SET—See page 683

Practical and Amateur Wireless

Second Souvenir Number

Edited by F. J. CAMM

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

VOL. VIII. No. 207. September 5th, 1936.

ROUND *the* WORLD *of* WIRELESS

A New High-Power Broadcaster

A NEW high-power broadcaster of 100 kW carrier power and advanced design is to be installed near Prague. This new station will provide an alternative programme service to the 120 kW station at Liblice which (supplied in 1929) is now being modernised.

The transmitter, now being manufactured in the works of Standard Telephones and Cables, Ltd., will use the modern system to be supplied to the Continent by that company.

Listening-in Abroad

IT is stated that the number of registered listeners in France has very nearly reached the three million mark. The figure at the end of June being 2,950,996, as compared with 2,929,910 at the end of May.

On July 1st the number of German listeners showed a decrease of 1.16 per cent. compared with June 1st, the total number being 7,430,319, or 86,921 less than a month previously.

New Sound-film Process

IT is reported from America that a new process of "talkie" recording has been developed by R.C.A.-Photophone Corporation which will result in greatly increased quality of reproduction.

The new process is based, like others, on the modulation of a ray of light, but instead of using visible light, a narrow spectrum of ultra-violet rays are used. It is stated that sharper images can be recorded, and this permits the recording of higher frequencies with improved quality.

"Seeing" Your Voice

DR. H. HALL, of Cruft Laboratory, Harvard University, has invented a high-speed sound analyser which makes a photographic record on paper of the intensity and frequency of the different components present in a sound. A person can actually see a word that he has just spoken, and see the high- and low-frequency parts of the sound as he has pronounced it. The device will show the pictures of the different accents used by persons in different parts of the world.

Wonder Chair for the Deaf

AN armchair in which the deaf, by simply leaning back, can hear—without disclosing their deafness—has been invented by Mr. J. Polakoff, head of Multitone Electric Co., Ltd., deaf-aid specialists, of 17, New Cavendish Street, London, W.1.

To all outward appearances the chair is just an ordinary armchair, designed in the Queen Anne style, but a deaf person, by sitting down quite naturally and leaning back, can hear general conversation with perfect distinction or, if preferred, can listen in to radio programmes.

Technical principles used in the making of the chair are embodied in the light portable instruments for the deaf, also designed by Mr. J. Poliakoff.

Wireless in East Africa

EXPERTS of the Air Ministry and the Marconi Company have been visiting Mombasa recently, discussing with officials the site for a powerful wireless station. The wireless station will have directional and position-finding apparatus working on medium- and short-wavelengths.

The Veri Service

OWING to the fact that many transmitters do not reply to the details of reception which are forwarded to them (in spite of the enclosure of Reply Coupons), we regret that we must withdraw the Verification Service inaugurated by the B.L.D.L.C.

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THE PICK of the PROGRAMMES

Variety from the Bristol Radio Exhibition

A VARIETY programme will be broadcast from Bristol's Radio Exhibition at the Coliseum on September 11th.

MAKE THESE DATES WITH YOUR RADIO

example of fairy fantasy in music—and John Crook's selection, "Peter Pan."

NEW H.M.V. RESEARCH LABORATORIES

The Research Laboratories of the "His Master's Voice" factories at Hayes, Middlesex, where experiments in the development of Television have been proceeding for the past six years.

"Variety in Miniature"

ARCHIE CAMPBELL, the London producer of "Camp Fire on the Karroo" fame, has changed places for three months with Martyn C. Webster, the Midland Variety producer. Archie Campbell will begin his Midland spell by compering a programme entitled "Variety in Miniature," to be broadcast on September 4th. Most of the artists have broadcast often before; these include Jack Hill, the Birmingham pianist and composer; Dorothy Summers, comedienne; Warwick Vaughan, impersonator; and Schofield Earl, piano accordionist. With Warwick Vaughan is a lady impersonator who is new to radio programmes; this is Helen Collier, who has acted in cabaret, been vocalist with a Birmingham Dance Band, and is a member of a newly formed concert party, "The Fantastics."

Revue from Blackpool

AN excerpt from Jack Taylor's revue, "King Fun," will be broadcast to Northern listeners from the Opera House, Blackpool, on September 12th. The cast includes George Formby, Frank Randall, and Randolph Sutton.

Light Music from Northern Ireland

FAIRY tales in the form of music is the theme of a programme of light music to be broadcast on September 12th by the B.B.C. Northern Ireland Orchestra, conducted by Philip Whiteway. The programme consists of Eric Coates' Fantasy, "Cinderella," Roger Quilter's Suite, "Where the Rainbow Ends"—a supreme example of fairy fantasy in music—and John Crook's selection, "Peter Pan."

Shrewsbury Carnival Concert

SHREWSBURY is organising a Carnival Week, including a boxing contest and a Flitch Trial, in aid of the Royal Salop Hospital. Part of the concert with which the Carnival Week opens will be broadcast on September 6th from the Midland Regional. The artists—all very well known as stage and radio performers—are Garda Hall (soprano), Webster Booth (tenor), The Alfredo Campoli Trio, and Ronald Gourley (pianist and entertainer).

Delayed Drop

LISTENERS will remember the original production of the play entitled "Delayed Drop," by Alan Byrne, and its revival is sure to be welcomed; those who did not hear it will have an opportunity of enjoying its exciting situations and swift action. The producer, S. A. Bulloch, will probably be using over a dozen gramophone effects records, each representing the sounds made by an aeroplane under different conditions. There are, for example, aeroplane engines being started up, aeroplane climbing, flying straight, diving, and even crashing. The action of the play is set in a Flying Club and in the air above it, and the plot deals with a somewhat gruesome revenge planned by a jealous aviator. The cast will include Matthew Thomson, A. S. G. Loxton, Fraser Mayne, Charles E. Owens, W. R. Gordon, and Elizabeth Gardner, and the play will be broadcast in the Northern Ireland programme on September 3rd.

The "White Coons" and the "Kentucky Minstrels"

ARRANGEMENTS are being made for these popular concert parties to appear monthly throughout the winter months. The "White Coons" will be heard at the beginning of next month, their first broadcast being on October 1st; and the "Kentucky Minstrels" will be heard at the end of the month, also starting in October. Harry Pepper is in charge of the preparation and production. Not content with this activity, he is also devising a variety programme to consist of acts seen when he and Davy Burnaby toured the seaside resorts. This should be an amusing broadcast to end the summer holiday period.

Brass Band Concert

THE September Contest at Belle Vue, Manchester—oldest and, after the Crystal Palace, most important fixture in the brass band calendar—takes place this year on September 7th. Twenty-two bands are to take part in it and, with an entry including such famous bands as Black Dyke Mills, Besses o' th' Barn, Brighouse, Wingates, and Nelson Old, competition is likely to be very keen. Arrangements have been made for the winning band to broadcast from one of the Northern studios on the following night, September 8th.

"All is Not Gold"

FRANK VOSPER'S one-act play, "All is Not Gold," will be produced by Cyril Wood on September 5th. Mr. Vosper, who needs no introduction to film or theatre goers, is a Devonian who speaks the authentic dialect and "All is Not Gold," which he has given a Devonshire setting, demands Devonshire dialect from two of the three characters in the play.

A Summer Revue

"WHITE NOTES," a Summer Revue presented by Simrose and Watney from the Cosy Nook Theatre, Newquay, will be broadcast on September 10th. The guest artist will be Renara.

SOLVE THIS!

PROBLEM No. 207.

Edwards substituted a pentode detector for his triode, using a 100,000 ohms anode resistance and a .01 mfd. coupling condenser. He applied 72 volts to the screen of the pentode detector as specified on the manufacturer's leaflet, but could not get satisfactory results. Why was this? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 207 in the bottom left-hand corner, and must be posted to reach this office not later than the first post Monday, September 7th, 1936.

Solution to Problem No. 206.

The resistance should have a value of 1,000 ohms and a wattage rating of 2.5 watts or more.

The following three readers successfully solved Problem No. 205, and books have accordingly been forwarded to them: J. Martin, 29, Hawker Avenue, Swan Lane, Bolton, Lancs; G. R. Tice, 85, Arden Street, Gillingham, Kent; K. E. Walters, 39, Durgan Avenue, Thorne, Nr. Doncaster, Yorks.

Outstanding Exhibits

Other Notable Exhibits are Illustrated on Pages 674 to 681

Television Exhibits will be Dealt With Separately

A Survey of the Exhibits which are Likely to Create Most Interest Amongst Home-constructors

IT is certain that many of those enthusiasts who visited last year's Radiolympia went away feeling rather disappointed. They felt that they had paid 1s. 6d. to see a repetition of the previous year's exhibits—1934 sets fitted into new cabinets, and old components enclosed in new cans: they left the exhibition of the opinion that the

The Weston Oscillator, a new measuring instrument by the Weston Electrical Company.

industry had reached a standstill. We who have watched the development of the broadcasting service since 1922 recall similar periods of stagnation, notably that preceding the advent of the all-mains set—and remember the following years of intensive development. The stagnant period of 1934-1935, culminating with the publication of the Television Committee's Report, will be no exception, and there is abundant evidence that this year's show is far more interesting than any since 1930. The fact that the television transmissions are being made on a very short wavelength has increased interest in reception on the short-wave bands, and manufacturers have therefore concentrated on all-wave models this year—practically every manufacturer is exhibiting these.

PRACTICAL AND AMATEUR WIRELESS is never behind the times, and visitors to our stand will be able to examine an efficient three-pentode all-waver, and a special three-valve receiver for short-wave reception only. A new two-valver for beginners is also on view, and our technical staff is in attendance to welcome readers. Bring your problems to Stand No. 10.

Testing Equipment

The exhibits of testing equipment will undoubtedly interest home-constructors. Several new instruments are available this season, and many of the old instruments have been improved. The Automatic Coil Winder Co., Ltd., have produced a new model Avometer—Model 7—which incorporates many unique features. It has forty-six ranges and embodies a protective cut-out device. This firm is also exhibiting a new capacity meter, and an improved model of their Avo-Oscillator.

The stand of Weston Electrical Instrument Co. is also worthy of a visit from the keen experimenter. Here is seen a new valve voltmeter, and many other useful test instruments, including the famous selective analyser. The valve voltmeter has infinite resistance in ohms per volt and is, therefore very useful for making measurements in the automatic volume control circuits of modern receivers. It is probable that the resistance and capacity bridge exhibited by Radiometers, Ltd., will also prove to be a popular exhibit. This is battery operated, and will measure capacities of 20 m.mfd. to 25 mfd., and resistances from 100 ohms to 2 megohms. Constructors requiring a portable valve and set tester should also visit the stand of Everett, Edgcumbe, Ltd. Their well-known Radiolab Set Analyser and Valve Tester is on view together with several new unit testers.

A popular Cossor receiver in the Super-Ferrodyne range.

Wright and Weaire, Ltd., are exhibiting several new test instruments.

Interference Suppressors

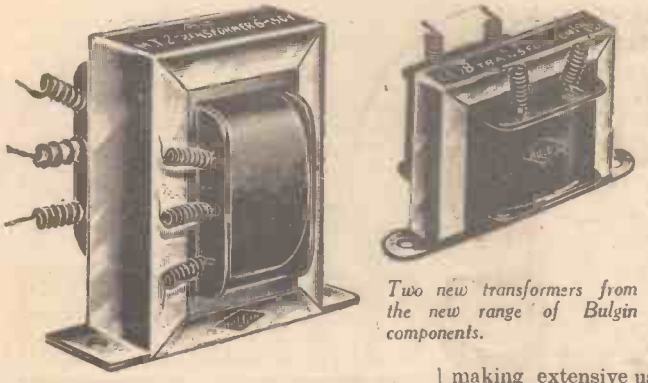
Belling and Lee, Ltd., have been specialising in noise suppression equipment for the past few years, and it is certain that their exhibit will create interest. Their new range includes a set lead suppressor for connection in the mains supply circuit near the receiver. Two models are available, covering a wavelength range of 10 metres to 2,000 metres. A new anti-interference aerial is also exhibited, which is claimed to cover the short-, medium-, and long-wave bands, with a very low efficiency loss.

Speakers

All the speaker manufacturers are exhibiting new models. The W.B. Stentorians, so well-known to readers of PRACTICAL AND AMATEUR WIRELESS, have been improved and are now fitted with a new type of cone which the makers claim provides a still better frequency response than has been available from previous models. The new Duode 33 is the centre of interest on the Benjamin Electric stand. This speaker has a double speech coil and has a remarkably good frequency response, extending over 10,000 cycles. The special

(*Continued overleaf*)

The new Avo Capacity Meter.



Two new transformers from the new range of Bulgin components.

tuned baffle speaker which is on view on the Prism Manufacturing Company stand is also worthy of note. The tuned baffle renders the sound waves from the speaker non-directional, and eliminates the usual focussing of the high notes; this results in a more natural reproduction than is obtainable from open speakers.

Components

Constructors will naturally be very interested in exhibits of the component manufacturers. The majority of component parts have been reduced in price this year, and several interesting new lines have been added. Varley, Ltd., are concentrating on inexpensive coil units for the home-constructor. These include two- and three-gang types for superhet and straight circuits. Bulgin, Ltd., have a very extensive range of components on view, and the prices in most cases are decidedly lower than last season. Of the Polar exhibits the new bar construction tuning condenser will probably arouse most interest. This method of construction provides a lower minimum capacity, thereby making the component very suitable for use in short-wave and all-wave receivers; it will be noted that this model is used in F. J. Camm's Gladiator All-wave Three. Another component which will probably prove of great interest to constructors is the "Radio Heart" exhibited by Rothermel, Ltd. This consists of all the necessary coils and tuning condensers for an all-wave receiver operating on the superhet principle.

Receivers

E. K. Cole, Ltd., and Philips Ltd., are making extensive use of the vibrator unit this year, the former incorporating it in their "No H.T. Battery" receiver, and the latter in their A.C./D.C. mains models. In the Ekco battery receiver the unit takes the place of the H.T. battery, and if reliability has been ensured it should prove a boon to the battery set user. An L.T. accumulator will be necessary to feed the vibrator, of course, but it is cheaper to charge an accumulator periodically than to purchase new H.T. batteries. Most of the Philips A.C. models are available at approximately £1 10s. extra with a vibrator incorporated so that the receiver can be supplied from D.C. mains. It is claimed that with this method of supply a better performance is obtainable than with A.C./D.C. valves in use. The Cossor range of receivers employ well-tried designs, and their latest models of the inexpensive all-wave type should prove very popular.

It is probable that experimenters and constructors will be more interested in the quality receiver exhibits than in the mass-produced inexpensive types. Haynes Radio, who are specialists in this branch, are exhibiting their new quality amplifiers and receivers. These employ the patented Duophase output circuit as in last year's models, but it is claimed that the quality of reproduction has been still further improved by the use of larger capacity bias condensers and oil-immersed grid condensers. The addition of the oil-immersed condensers is certainly an innovation.

A power amplifier from the Haynes quality range. This delivers an output of 14 watts.

THE MALLORY G.B. CELL

THE Mallory grid bias cell shown in the accompanying sketches, is a small acorn-shaped self-contained device, the case itself forming the negative electrode, and the disc is the positive. The no-current potential of the cell is 1.0 volt plus or minus 10 per cent. This potential is constant within wide limits of temperature, humidity, and superimposed alternating current. The cells are long-lived in storage and under various operating conditions they show no change in characteristics after three years of study.

Typical Uses for Grid Bias Cell

The principal use of this cell is to supply bias for valves used as the first L.F. stage in modern high-gain A.V.C. receivers. These valves usually have intrinsic disadvantages peculiar to extremely high mu triodes which make satisfactory current design either critical or expensive.

Fig. 1 represents a common circuit of the self-bias type in which the bias is obtained by a common cathode series resistor. One major difficulty of this circuit lies in the necessity of providing a large capacity by-pass C., usually a low voltage electrolytic. This condenser is necessary because of the fact that the cathode is above earth. This circuit is susceptible to the usual degenerative effects of self-biased audio circuits and overloads easily with consequent distortion.

Fig. 2 represents another bias circuit in common use. In this case the cathode is earthed. The bias return is usually brought to a point in the negative power supply return. Though somewhat more stable and less sensitive to the disadvantages of the system shown in Fig. 1, this circuit usually requires the filter R-C, involving a resistor and a condenser.

The circuit using the grid bias cell is shown in Fig. 3. This circuit furnishes a definite normal bias of 1.0 volt on the grid. This bias remains independent of valve characteristics, due to valve variations, and the variations encountered in one valve throughout its life. This circuit avoids degenerative effects and is not so greatly susceptible to overload distortions. The cell replaces the R-C filter of Fig. 2, as well as simplifying the negative power return circuit. It also replaces the cathode resistor R and cathode by-pass C of Fig. 1, with the cell and grid resistor of Fig. 3. This cell, which is priced at 1s. 0d., can be obtained from The Mervyn Sound and Vision Co., Ltd., and various methods of mounting it will occur to the user.

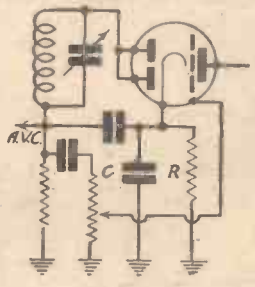


Fig. 1.

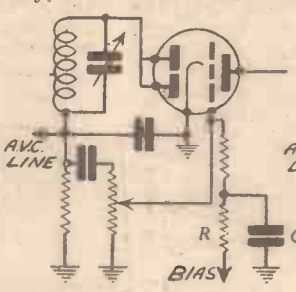


Fig. 2.

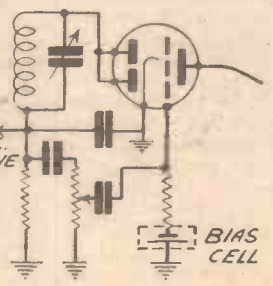


Fig. 3.

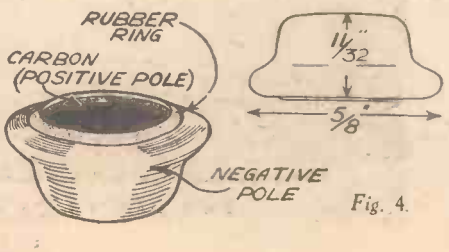


Fig. 4.

Details of the Mallory G.B. Cell, and theoretical diagram showing its application.

Interesting Details of Some of the Apparatus being Employed at Alexandra Palace

NOW that much of the mystery of television has been cleared away, and the various details of the transmitters have been made public, added interest is lent to the experimental transmissions now being carried out daily from the B.B.C. station at Alexandra Palace. The aerial array which is employed is very similar to that shown on pages 664 and 665, that on the former page being the Marconi-E.M.I. experimental aerial at Hayes. The diagrams on page 665 show that the aerials are vertically disposed and the connections to the centre from the special feeders are clearly shown. It will be noted that the vision aerials are arranged above the sound aerials, and the arrangement adopted should ensure good signal strength over a wide area, but the actual service area will not be known until the experiments have been carried out over some considerable period.

With regard to the equipment used inside the building, the diagram on page 665 shows how this is arranged in the case of the Marconi-E.M.I. equipment, and a very similar arrangement is adopted for the Baird equipment which is on another floor. Each separate part of the complete installation is arranged on a separate chassis, and the various sections are isolated into steel cabinets, with a most comprehensive system for ensuring reliability and freedom from breakdown.

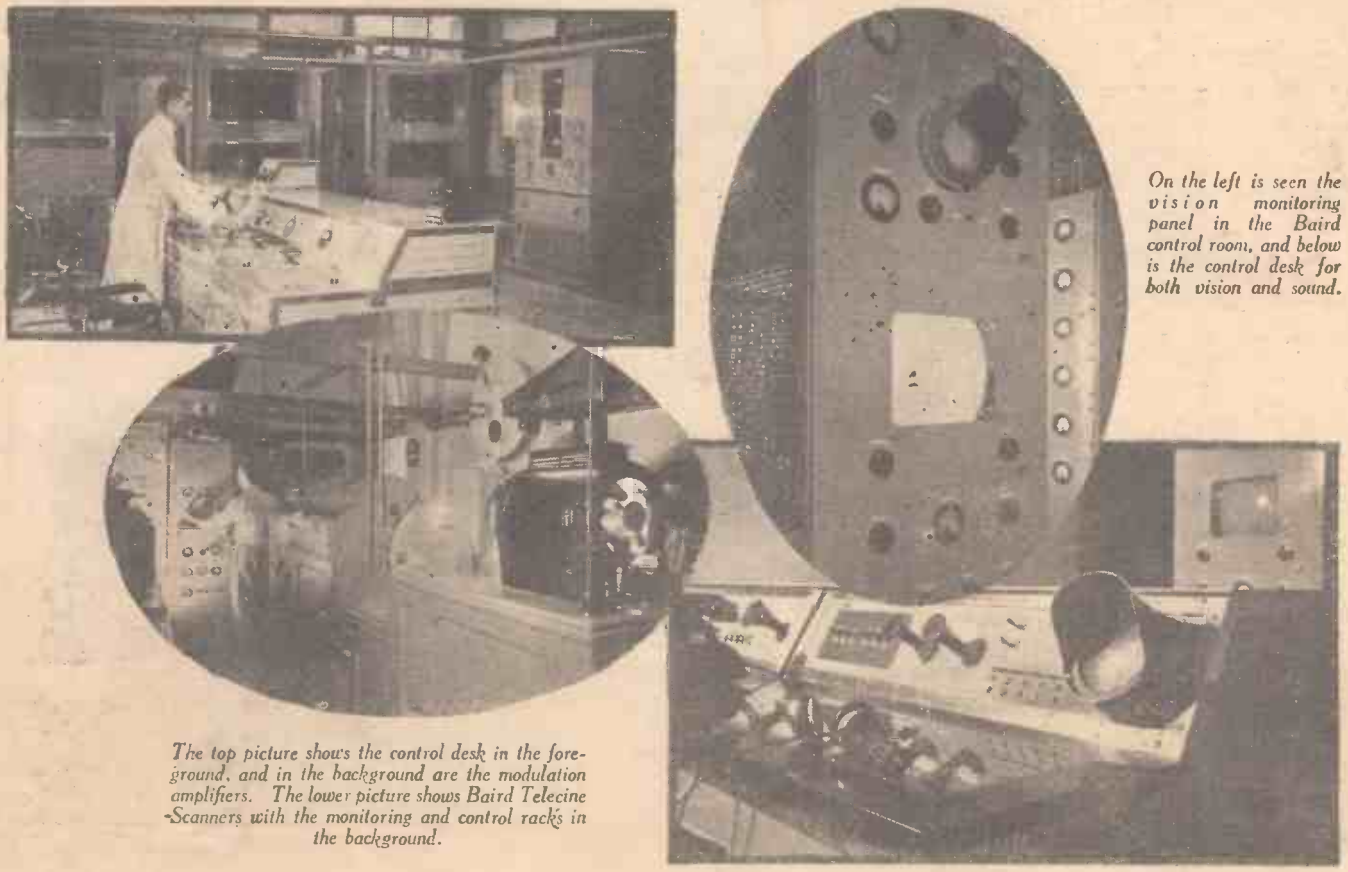
Replacements

In the case of the Baird equipment, for instance, certain of the motors are run in vacua, and to keep them cool (as they run at very high speeds) water circulation is employed round the bearings. The motor cannot be started until the vacuum is created, and this in turn cannot be created independent of the water supply. If any one fails, the supply is cut off and the motor stops. The larger valves used in this particular transmitter are of the demountable type, and should a filament fail, for instance, the valves may be taken to pieces, a new filament placed in position, the valve reassembled, and the vacuum again created. These valves are also water cooled. Engineers watch carefully a reproduction of the transmission which is being radiated by means of special viewing apparatus seen at the foot of this page, and are able instantly to rectify any fault which arises, in exactly the same manner as is done at the present B.B.C. stations with regard to sound transmissions.

In the Studios

In the actual studios various types of equipment are employed, and on the next page is a picture of a band being televised. In the case of the Baird equipment the artists are scanned in exactly the same manner as with the old 30-line transmitter, the original Baird principle still being employed, only in a modified form. There are 2 discs, one provided with 240 apertures arranged in four spiral traces arranged near to a second disc with a slit arranged in a spiral trace near the outer edge. This acts as a shutter, and the light from a powerful arc source passes through the slit and series of holes and is directed on to the artist. The scanning discs revolve at 6,000 revolutions per minute and photo-electric cells arranged in four units of five cells pick up the light variations from the artist, and they are then converted into electric oscillations as before.

(*Continued overleaf*)



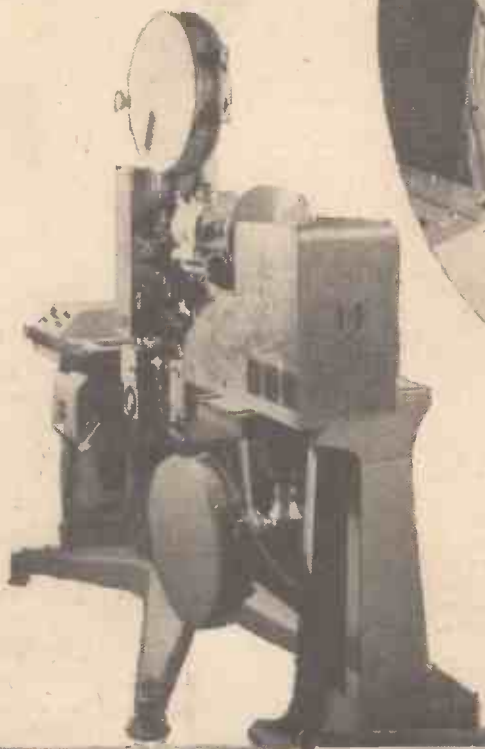
On the left is seen the vision monitoring panel in the Baird control room, and below is the control desk for both vision and sound.

The top picture shows the control desk in the foreground, and in the background are the modulation amplifiers. The lower picture shows Baird Telecine Scanners with the monitoring and control racks in the background.

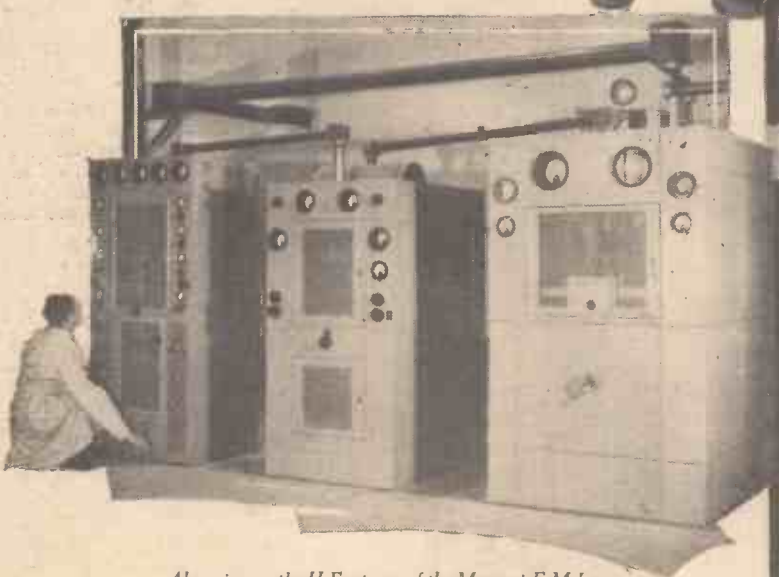
The Marconi-E.M.I. experimental mast at Hayes.

The Film Scanner

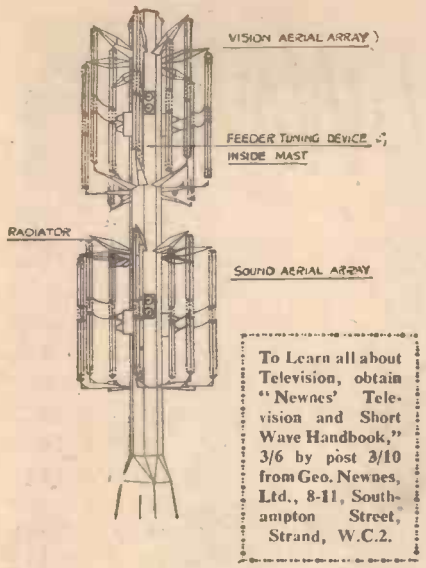
The film scanner used by Bairds is probably the most interesting equipment, as this enables the scene to be photographed with a more or less standard movie camera, providing the advantages of rapid change from long shot to close-up, and may be moved easily to follow an artist. In this equipment the film, which is of the substandard 17.5 mm., passes through the camera and then through a developing and fixing process and is rolled up wet. It then passes through a scanner similar to that just mentioned, after which the film is cleaned and re-used. The time taken from the moment the film is exposed in the camera to its actual transmission

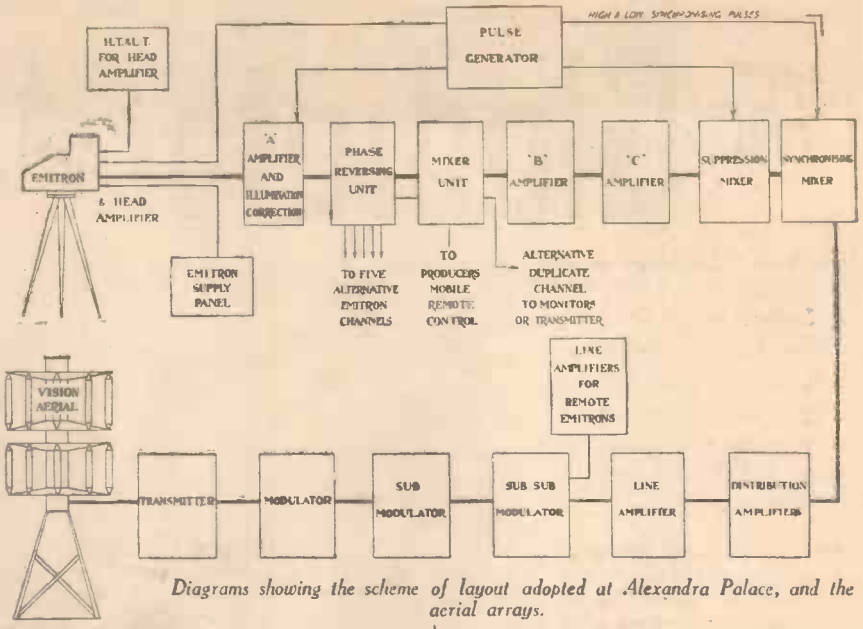


The Marconi-E.M.I. sound amplifiers are seen above, and on the left is the Emitron Instantaneous Television Camera.



Above is seen the H.F. stages of the Marconi-E.M.I. vision transmitter, and on the right is the Baird studio.





Diagrams showing the scheme of layout adopted at Alexandra Palace, and the aerial arrays.

is only thirty seconds, and in that time the film is developed, washed, and fixed. It will thus be seen that ordinary photographic processes have been considerably speeded up for television work.

There is also a standard cinema equipment to enable standard sound films to be transmitted, and further water cooling is adopted in this apparatus.

The Emitron Camera

AS distinct from the Baird intermediate film scanner, a unique device is employed in the Marconi-E.M.I. apparatus and this has been termed the Instantaneous Camera, to distinguish between the system employed in this and the Baird instrument. As the name implies, the scene is picked up by the "camera" and instantaneously broadcast or converted into electrical energy, without the intervention of the film. This is accomplished by means of a device which has for some time been referred to as the "electric eye" and it consists in effect of an electrical reproduction of the human eye; the best non-technical description of this is that it is a cathode-ray device in which a number of miniature photo-electric cells are arranged in such a manner that the image is directed on to them from the lens and each cell transmits its reflected light in much the same manner as the individual scanning holes in a scanning disc.

The new Cossor television receiver, and the method of dividing up the set into separate chassis.

The Gladiator ALL-WAVE 3

A Super-efficient Receiver Incorporating Some New Principles of Design, Giving a Remarkably High Degree of Selectivity and Sensitivity. Wave Ranges are from 18 to 55 Metres, 200 to 550—Metres, and 850 to 2,050 Metres. The Receiver is Extremely Simple to Build and Operate, and the Kit of Parts is Low in Cost. Its Construction is Here Futher Described

IT is not likely that constructors will have experienced any difficulty in wiring the Gladiator from the wiring diagram given in last week's issue. There are a few points which may not be quite clear to beginners, however, and, therefore, these will be dealt with before commencing the operating instructions.

The Wave-Change Switch

The multi-contact wave-change switch is used for switching from the medium and long-wave bands to the short-wave band, switching from medium to long waves being effected by means of the switch attached to the ganged coil unit. The multi-switch has been drawn separately so as to make the wiring quite clear. The lettered leads must, of course, be connected to the corresponding lettered leads on the underside of the chassis. The switch will be received completely assembled, the plates marked A and B being fastened to the central shaft, and no difficulty whatever should be experienced with the wiring if the separate switch diagram is carefully studied. Only three outside contact tags are shown on Plate A and four on Plate B. The actual switch specified has ten contact tags, however—five on each side, but only the ones shown on the diagram must be used. Four are unused on one side of Plate A, and three on the other side; three are unused on each side of Plate B. The leads to the switch contacts should be in the positions indicated on the wiring diagram, and the leads of Plate A must be kept clear of Plate B leads in order to avoid H.F. instability.

Coil Holders

The four-pin coil holder is the type normally used for four-pin valves. The makers have indicated the baseboard type in their illustration, but it was found that the sockets of this type are too short to protrude through the Metaplex chassis and, therefore, constructors are advised to use the exact type shown on the wiring diagram. The six-pin holder is of the baseboard type with the sockets reversed for sub-baseboard mounting. In order to ensure that the sockets protrude sufficiently to grip the coil pins securely, the three supporting pieces of the holder should be embedded in the under-surface of the wooden chassis. This can easily be done by drilling three shallow holes (about ⅛in. deep) for the supporting pieces to fit into.

Condenser Packing Piece

As mentioned in last week's article, a wooden packing piece must be placed under the gang condenser, otherwise the spindle of the latter will not be sufficiently high to fit into the bush of the horizontal drive. The height of this packing piece should be ⅜in., but we understand that it is being supplied with the Metaplex chassis, ready cut to the correct dimensions. The best method of securing the gang condenser to the packing piece is to remove one of the supporting legs of the condenser and screw it in a central position at the back of the packing piece. The hole in the supporting leg will then coincide with the central hole in the back supporting plate of the gang condenser, and a short screw may be used for securing the leg to the back plate. The front end of the condenser will be held rigidly by the supporting legs of the drive.

LIST OF COMPONENTS FOR THE GLADIATOR ALL-WAVE THREE

One 2-gang coil unit (BP50, BP51) (Varley).
Two short-wave coils (special) (B.T.S.).
One 2-gang condenser (C1, C2) (Polar).
One two bank multi-switch (B.T.S.).
One .00015 mfd. differential reaction condenser (C3) (Polar).
One horizontal drive with trimmer (SL9) (J.B.).
Three valve-holders (two 4-pin, one 5-pin), V3 (Clix).
Two coil holders (one 4-pin, one 6-pin) (B.T.S.).
Two extension rods (E.H.2) (Bulgin).
One volume control, 50,000 ohms, with 3-point switch (R7) (Erie).
Six fixed resistances: .5 meg. (R1), 1,000 (R2), 100,000 (R4), 100,000 (R5), 2 meg. (R3), 1 meg. (R6) (Dubilier).
Seven condensers: .1 mfd. (C6), .1 mfd. (C8), .01 mfd. (C5), .01 mfd. (C9), .0005 mfd. (C4), .0001 mfd. (C7), .003 mfd. (C10) (T.C.C.).
Five component brackets (P. Scott).
Two terminal strips: A.E. and L.S. (Clix).
One 100 m.a. fuse and holder (Microfuse).
Three valves: 210V.P.T., 210S.P.T., 220H.P.T. (Cossor).
One Metaplex chassis 10in. by 9in. by 3in. (P. Scott).
One speaker (37J) (W.B.).
One cabinet (P. Scott).
Seven plugs: H.T.1, H.T.2, H.T.3, H.T.—, G.B.+, G.B.—1, G.B.—2 (B. Lee).
Two spades: L.T.—, L.T.+. (B. Lee).

Volume Control Bracket

The spindle of the specified volume control is insulated from the centre tag, but to avoid the possibility of a short circuit occurring due to the use of a different type of control, it is suggested that the supporting bracket be insulated from the metallised surface of the chassis. This may be done by scraping the metallising off with a file or a penknife. It should also be noted that the switch attached to the control is actually of the four-contact type, but this is used as a three-point switch and, therefore, two of the tags must be soldered together, as shown on the wiring diagram.

M.B. Bolt

The point marked M.B. on the underside of the chassis is the nut attached to the bolt holding the ganged coil unit to the chassis. Connection to this bolt ensures good contact between the metallised surface of the chassis and the earth socket and L.T.— sockets of the valveholders. One further point is worth mentioning. The resistance R6 is not rigidly fixed by its own connecting wires, and therefore it will be advisable to secure it to the side runner by means of a small bracket or a piece of wire. The wire may be looped round the resistance and then screwed to the runner.

On Your Wavelength

By THERMION

Television is Here—or Is It?

NO doubt with the idea of providing an element of surprise the B.B.C. kept everyone in doubt as to whether television would be permitted at Olympia. The first intimation which I received was on Saturday, August 22nd, when I was invited at short notice to visit the Alexandra Palace, because I was told the engineers had just succeeded in completing their plans for a public demonstration at Radiolympia. If you have visited the exhibition you have been able to judge for yourselves whether the claims of the authorities are well founded.

After two years the service once started should technically be well-nigh perfect. In my submission it was not, but it has not far to go before it is comparable to the early telephony transmissions. I am disappointed, and I have done my best to encourage the development of television. My disappointment is that after two years of messing about (I have searched my vocabulary and cannot find any other term which expresses my thoughts on the matter so aptly), the service is still not on the air. I am not impatient.

The Television Committee told me two years ago that the moment was ripe for a public television service. Yet, on Monday August 24th (the day following the demonstration at the Alexandra Palace), I was again invited to go to Olympia to witness a special demonstration of television, and was also told to be there promptly. It was a private press view. As one of the few good points about me is that I am extremely punctual, I arrived two minutes before time. I arrived, but television did not, so I went to the bar. After waiting in the company of some hundred or so representatives of other papers for more than half-an-hour, I thought it was time to make inquiries, because journalists are busy people. We are the advocates appointed by our readers, and we are expected to be back at the office by our respective Editors with the news. Many of the pressmen were getting restless.

A Technical Hitch.

HOWEVER, I was advised that there had been a technical hitch. A technical hitch, mark you! After two years of experimental work! They took pity on us, however, by asking us to watch a stage rehearsal in the theatre where pretty girls seemed to be able to do just what they liked with pretty legs. A good show. At 6.35 p.m. a rumour went round that television was on, so we scurried off to the demonstration cubicle, and gathered from the sound issuing from the speakers that a film of the Spanish Civil War was being televised. The cubicles were, however, so packed that it was some minutes before I could manœuvre my head under the armpit of a taller acquaintance and orientate my left optic into such a position that I could see the reception. I can well believe that it was a film of the Spanish War. It was fairly good whilst it lasted, but after a little while further technical knots, bends, and hitches occurred. The Press Reps. were then getting really restless, and I was pushed, shoved, or urged, a rod, pole or perch away, whilst they unravelled the hitch. The sound and vision equipment alternated so that we had sound without vision, vision without sound, and at odd moments neither vision nor sound, except the disgruntled murmurs of hardened reporters. It was some time before sound and vision was synchronised. A close-up was definitely good, quite comparable with the results from a good home cine, but I was not expecting to see close-ups. Such are one of the easiest things to televise, and I saw good close-ups eighteen months ago, and was expecting progress. I was not privileged to see any outdoor or full-length scene except in the film reception. These were certainly good, but I doubt whether the public will be prepared to pay £70 or so to see it. After all, you can go to the pictures quite a lot for £70, whilst equally good results can be obtained from a home cine costing considerably less. Still, good television is here.

For talks, singing, interviews, and similar items, television does add considerably to the interest of reception. No doubt after the long and wearying delay, and partly due to the fact that I have witnessed so many demonstrations of television before, I failed to appraise the show at its full worth. I suppose we must be prepared for technical hitches in the early stages, if you can call them the early stages after two years. There really should be no cause for them. The companies concerned have taken their own time, and they need not have staged a demonstration until they were ready. Am I entitled to conclude that this was a rushed affair to attract visitors, and that they were not really ready?

In any case we ought to be proud of the fact that Britain is the first country to have a public television service, and that it has at last been proved that television is an actuality. May I hope that it will soon be available to a wider public. This can only

be brought about by a considerable reduction in the prices. A surprising thing is that few of the firms were willing to accept orders for televison receivers, and not all of them have fixed prices. Who, then, will look in when the public service does start? Unless the receivers are on the market, the programmes will go out to the angels only.

An Ode to a Valve

A. P. T., of Earl's Court, has sent me a cutting containing an Ode to a Valve. He says that he came across it and thought it would be of interest to readers of my sunshine corner! He tells me that he is an anti-crooner, and that I can feel perfectly safe should I be at Radiolympia on Thursday, August 27th, and happen to be recognised by him. Here is the ode:

VALVE-ITIS

When I was still of tender age
The diode tube was all the rage,
Then came the triode and high-mu,
The latest thing, I'm telling you.

Next came the tetrode with its screen,
And then the pentode hit the scene;
We thought they surely were the last,
But from then on things happened fast.

Duo-diode, Pentode-triode,
Pentagrid converter;
Duplex-diode, detector triode,
Pentagrid inverter;
New valves arrived by every train,
'Twas at this point I showed the strain.

Now I am old beyond my years,
I've got grey hair above my ears,
And to this world I tell my wrongs,
Why *do* valves have so many prongs?

(Editor's Note)—
The author of this bit of verse
Is in a padded cell.
The metal valves have made him worse,
He isn't doing well.

Notes from the Test Bench

H.F. Chokes

HIGH-FREQUENCY chokes were considered to be indispensable in a receiver three or four years ago, but many of the modern sets do not use a single choke of this type. In the H.F. stages the H.F. choke commonly used in the anode circuit of the S.G. or H.F. pentode valve can be omitted if an H.F. transformer is used. And even if an H.F. transformer is not used the choke is by no means essential; the anode of the H.F. valve can be connected direct to the grid end of the grid winding of the succeeding coil or to a tap on this winding, the earth end of the winding being then connected to H.T.+ with a condenser of the non-inductive type joined between this point and earth in order to by-pass the H.F. currents. If an efficient choke is used in the H.F. stage very satisfactory results can be obtained, but if the choke is of doubtful make it is much better to use one of the methods of connection outlined above.

Reaction Choke

IN medium and long-wave receivers the choke normally connected in the anode circuit of the detector valve can generally be omitted without seriously affecting the results. If reception on the short-wave bands is desired, however, some form of choke is essential. An inductive choke need not be used, and it is often found that a resistance of approximately 10,000 ohms is more effective than the normal type of wire-wound choke. If resistance-capacity coupling is used, this resistance may also be dispensed with, as in our latest short-wave receiver, the Bandspread Three. In this set the stopper resistance connected in the grid circuit of the output valve acts as an effective choke for H.F. currents.

Power or Pentode

IN battery-operated receivers the pentode valve is almost invariably used in the output stage nowadays. This is due to the fact that the pentode provides a decidedly higher degree of amplification than the triode type of valve. It also has the advantage of being suitable for use with resistance-capacity coupling between the detector and output stages. When a triode is used in a receiver of this type the output from the detector is too low.

Finale for Another Year

YOU will be reading these notes just a few days before the Exhibition closes. It has been one of the best Exhibitions of the series of Eleven—the same number as the Olympiad at Berlin this year. It is always an amusing period for me. A newspaper correspondent worked out that every visitor to the Show would have to spend £150 on wireless apparatus to attain the expected volume of orders. The poor mutt thought that the only orders placed at Radiolympia are placed by the public. The technical "experts" of the daily press wrote their usual screeds, and quite a number of them as usual displayed their lack of knowledge of the subject. It will be a year hence before I shall again visit Radiolympia. A lot can happen in a year. I may not, for example, for one reason or another, occupy this platform a year hence. To my many friends, however, who greeted me, may I express my thanks for their kindly thoughts?

Silly Symphonies in the Home

I DO not know whether we shall ever see Mickey Mouse as a part of a television programme, but I learn that, as the result of a contract just completed between Walt Disney-Mickey Mouse, Ltd., and "His Master's Voice," cinema-goers and gramophone enthusiasts throughout Great Britain are now enabled to enjoy, in the comfort of their own homes, records from the Mickey Mouse films and Silly Symphonies.

Negotiations between the Walt Disney Company and "His Master's Voice" have been proceeding for many months and now "H.M.V." have secured exclusive rights in this country of the Silly Symphonies, excerpts from which will be recorded on "H.M.V." records.

The new Mickey Mouse and Silly Symphony recordings will be taken from the actual films. Expensive apparatus has been installed at the "H.M.V." studios at Abbey Road, London, and recording experts are working at top pressure on the complicated process of transferring the music from the film to the records.

The first "H.M.V." recording of a Silly Symphony will be released in the near future. In anticipation of a boom, special copies of the Walt Disney films are now being rushed from Hollywood to England where, after careful scrutiny, they will be sent to the "H.M.V." studios. Let us hope that those who construct the television programmes will not overlook the claims of this notable screen character, who is the world's greatest, and certainly best-known, film star.

Now a new Stentorian and a new High Quality!

IN place of a detailed explanation of multitudinous small improvements which bring the 1937 Stentorian's new sensitivity and fidelity, the reproduction curves below (taken from the 1936 and 1937 Stentorian senior chassis) are published for your inspection.

Even if you have a 1936 Stentorian (by far the finest commercial speaker available till now), this new instrument, embodying a further year's discoveries, will improve your set by just the same margin as the curves show. If you are using any other, then the difference this new speaker brings will be a positive revelation to you.

In fairness to yourself, hear one!
Chassis from 23/6 upwards will be in your dealer's possession soon. He will tell you about convenient H.P. terms, on the large models too, if you are interested.

SEE THEM AT RADIOLYMPIA STAND 66

READ THIS MESSAGE FROM MR. F. J. CAMM :—

"Once again I can confirm the claims of your engineers to have enhanced even further the already enviable reputation which your speakers enjoy. The 1937 Stentorian, which I have submitted to a thorough test, represents a marked advance on your previous models. If anything, your claims are too modest, for my curves show a greater degree of frequency response at both ends of the register. Last year I asked, 'Can there be a better speaker?' Your 1937 Stentorian Speaker supplies the affirmative answer. All listeners, and particularly constructors, owe a debt of gratitude to the indefatigability of your research engineers."

F. J. Camm

Better volume on weak stations, new clear top notes free from shrillness full, colourful bass without "thump" and a surprisingly incisive realism are available to you—at moderate cost. For a reasonable deposit (from 7s. 6d. upwards) you may have from your radio an entertainment quality you have never attained before! Hear this new speaker, and know what 1937 reproduction can be!

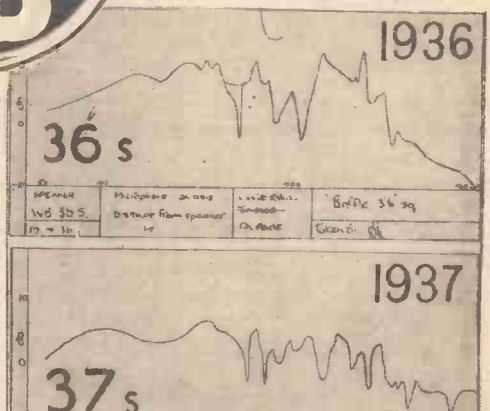
1937 STENTORIAN PRICES

CABINET MODELS

37 *SC (Senior)* ..	63/-
37 *JC (Junior)* ..	49/6
37 *CC (Cadet)* ..	39/6
37 *BC (Baby)* ..	29/6
Duplex	£6 6

CHASSIS MODELS

37 *S*	42/-
37 *J*	37/6
37 *B*	23/6
37 *M*	17/6
XM/W	70/-
Duplex	84/-

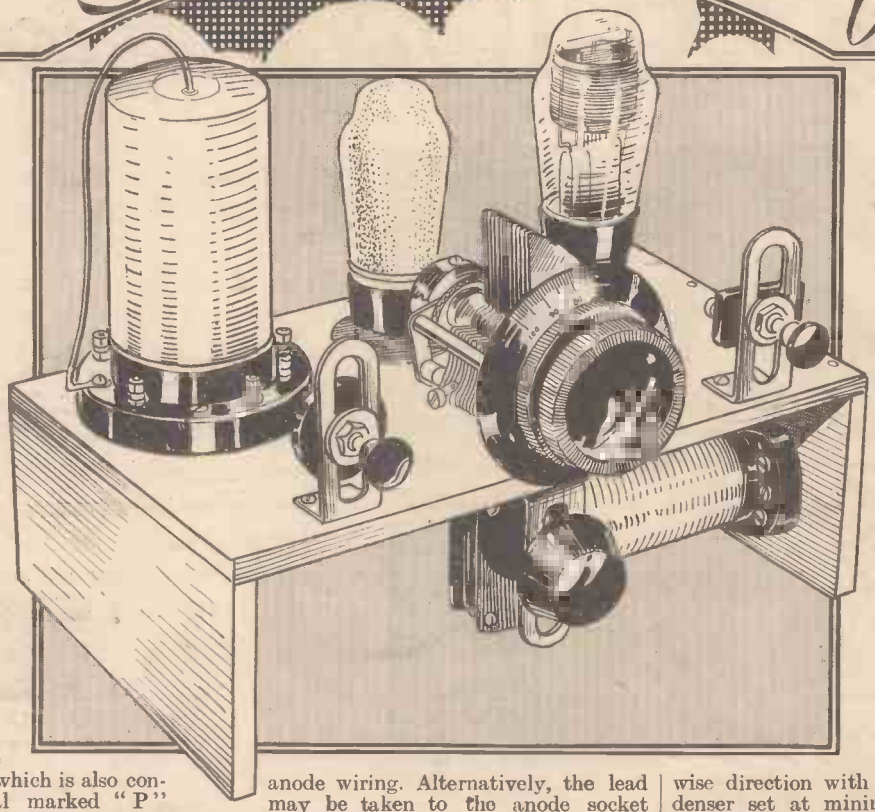


1937 STENTORIAN

PERMANENT MAGNET MOVING COIL SPEAKERS.

Whiteley Electrical Radio Co. Ltd., Mansfield, Notts.

The SIGNET Two

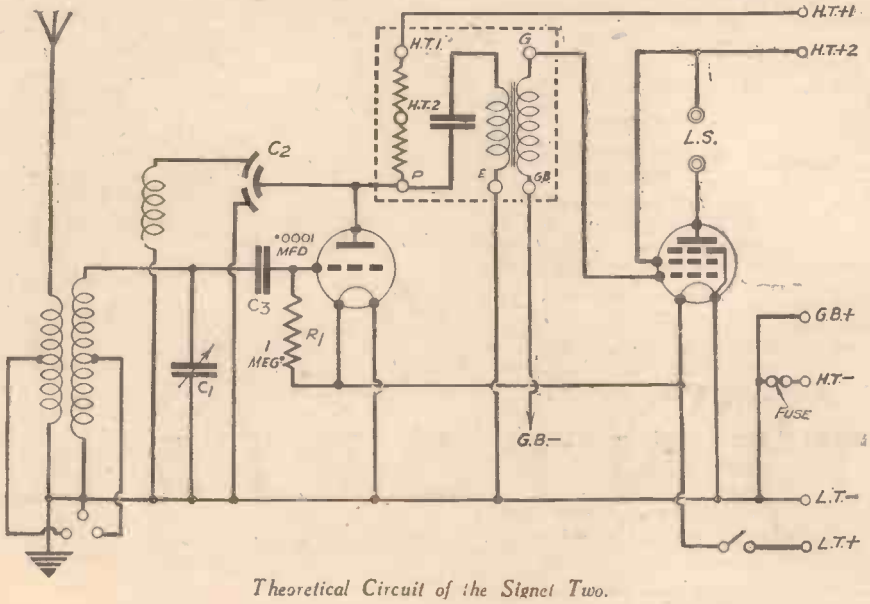


Completing this Simple Two-valve Receiver and How to get the Maximum Performance from it Under Normal Conditions

THE wiring of this receiver should not have been found difficult, and the details which were given last week should enable even the beginner to make quite a satisfactory job of construction. There is, perhaps, one point which might not be clear to those who are not used to following a Wiring Diagram, and this concerns the lead joined to the centre terminal of the reaction condenser mounted underneath the chassis. The lead from this is shown attached to the lead from the anode socket of the detector valve-holder, which is also connected to the terminal marked "P" on the Benjamin coupling unit. This lead is not necessarily soldered to that previously referred to, but if it is joined as shown in the Wiring Diagram soldering must be resorted to in order to ensure freedom from noises. If you hesitate about making a sound job of the soldering it may be avoided in this particular case by connecting the lead from the centre of the reaction condenser direct to terminal P on the coupling unit, and this is electrically the same thing as joining it to any part of the anode wiring. Alternatively, the lead may be taken to the anode socket of the detector valve-holder.

Operating Instructions

Connect the aerial and earth leads to the two sockets marked A and E, and plug the leads from the loud-speaker into the loud-speaker sockets. The two L.T. leads should be joined to the positive (+) and negative (—) terminals on a 2-volt accumulator, and the H.T.— lead should be inserted in the negative socket on a 120-volt H.T. battery. The lead marked G.B. + should be inserted into the positive socket of a 9-volt G.B. battery, and the lead marked G.B. — should be inserted into the 4.5-volt socket on this battery. Lead H.T.+ 2 should be inserted into the 120-volt socket on the H.T. battery and H.T.+ 1 should be plugged into the socket marked 99 volts, or somewhere near that value. Pull out both switches, and the receiver will then be in action on the medium waves, and before attempting to tune in a station rotate the reaction condenser in a clockwise direction with the main tuning condenser set at minimum (with the vanes "all out"). If the set goes into oscillation smoothly, as indicated by rushing sound in the speaker turning to a plop, turn the main tuning condenser with vanes all in, and again try the reaction condenser. The same thing should happen. Try this also on the long waves, that is, with the left-hand switch pushed in, and you should find that the reaction operates smoothly over the entire band. A modification of the voltage at H.T.+1 will vary the sensitivity and the smoothness of the reaction control, and a value should be used where a smooth build up is obtained on a station without a sudden plop, which indicates oscillation. If the H.T. voltage here is too low no reaction will be obtained. Stations are located by turning the main tuning condenser, and the strength is increased by the reaction condenser, but this should be used judiciously.



Theoretical Circuit of the Signet Two.

LIST OF COMPONENTS

One coil (C20) (Bulgin).
One .0005 mfd. condenser (1,046) (C1) (J.B.).
One .00025 mfd. reaction condenser (1,081) (C2) (J.B.).
One L.F. coupler (Transfeeda) (Benjamin).
One resistance: 1 meg., R1 (Erie).
One .0001 mfd. condenser (665) (C3) (Dubilier).
One switch (S36) (Bulgin).
One switch (S22) (Bulgin).
Two terminal strips, A.E. and L.S. (B. Lee).
Two valveholders (one 4-pin, one 5-pin) (Clix).
Two valves: D210, Y220 (Hivac).
Five plugs: H.T.—, H.T.1, H.T.2, G.B.+, G.B.—(Belling-Lee).
Two spades: L.T.—, L.T.+ (B. Lee).
Four component brackets (P. Scott).
Metaplex chassis, 10 by 6 by 3 (P. Scott).
One 100 m.a. microfuse and holder (Microfuse).
One speaker, Type SD (Epoch).

A PAGE OF PRACTICAL HINTS

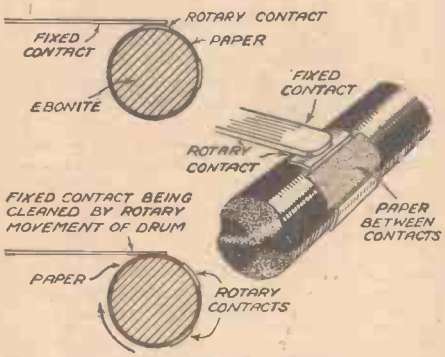
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Maintaining Good Contact Surface on Multipole Switches

REFERENCE to servicing manual suggests cleaning multipole switches by inserting paper between the contacts and segments upon the rotary drum. This is only a temporary measure, but I found that



A method of maintaining good contact surfaces on multipole switches.

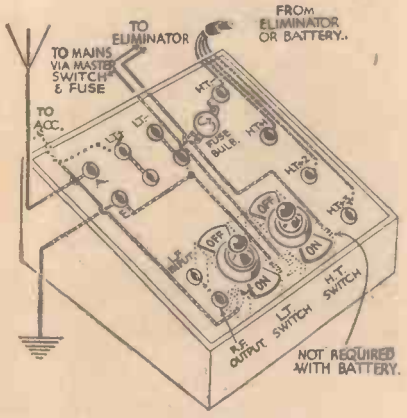
the following scheme kept the contacts perfectly clean for an unlimited period.

After thoroughly cleaning the segments the ebonite portions on the rotary drum were covered with rough adhesive paper so that at each movement of the rotor the contacts wiped themselves clean over the paper surface, thereby ensuring a perfectly clean surface and freedom from ebonite sulphur deposit, which was the root of the trouble.—J. H. MAKINSON (Liverpool).

A Switching Panel

WITH the aid of the switching panel shown in the accompanying sketch, it is possible to try out various combinations of R.F. units and L.F. amplifiers, the switches being common to both units in use. A fresh unit can be brought into circuit by just plugging in.

In addition, alterations can be carried out on one unit at one's leisure, if another is



A handy switching panel.

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.

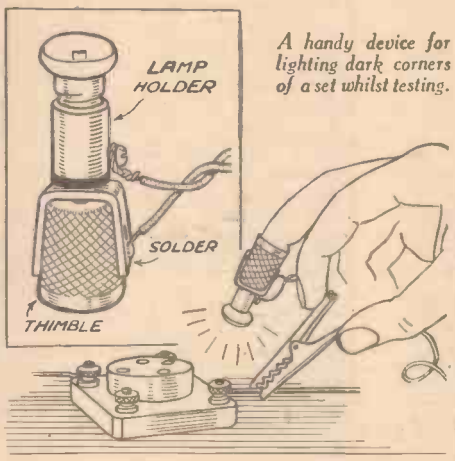
kept handy for broadcast programmes. The unit consists of a piece of ebonite 4in. by 4in. drilled for sockets and switches, as shown.

The panel is mounted in a suitable box, 2in. high at back, sloping to 1in. in front.

In addition to controlling the two separate units, a complete set can quickly and easily be connected.—F. MEITINER (Southampton).

A Handy Light for Dark Corners

THE accompanying illustrations show a device which I use for lighting up dark corners of sets when testing or adjusting. It consists of a bulb holder, a thimble, and a length of flex. The feet of the bulb-holder are bent to the shape of the thimble,



A handy device for lighting dark corners of a set whilst testing.

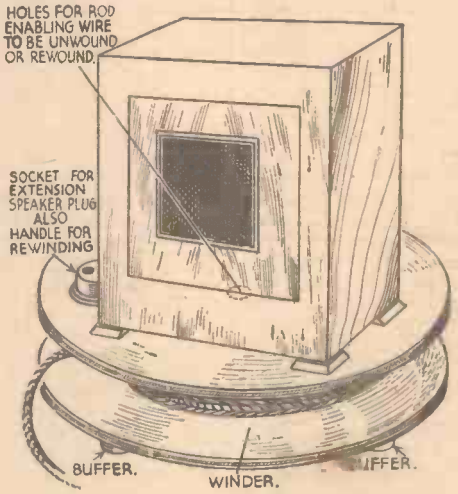
and then soldered together with one of the leads of the flex. The other lead is taken to the screw on the upper part of the holder.

A bulb is then placed in the holder and the flex taken to a battery which can conveniently be placed in a pocket. The thimble is then placed on any convenient finger, and wherever the hand goes to make any adjustment, the light goes as well.—RAYMOND DEANE (Harrow).

A Flex Winder for an Extension Speaker

I HAVE used the following device with great success this summer when taking the extension speaker outdoors.

The requirements are two discs of five-ply wood, 12in. diameter, one plug, two sockets, one former, 3in. diameter, and 4in.



When using an extension speaker outdoors, this flex winder will be found useful.

long, one rod, four rubber buffers, and a length of twin L.S. extension wire (36 yards in my case).

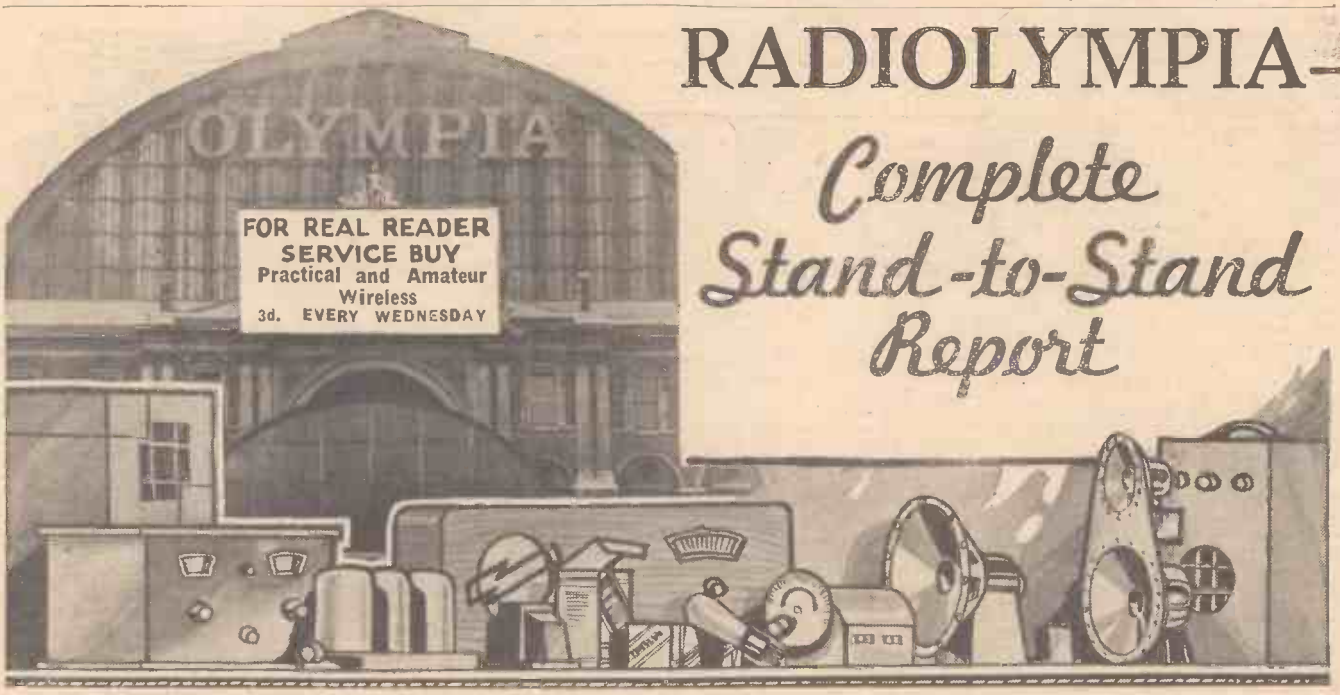
A hole is drilled in the centre of each disc of wood, an easy fit to the rod. One socket is fixed near the edge of the plywood, after holes have been drilled to take the L.S. wire. On the other disc the buffers are fitted. The discs are screwed to former, the socket and buffers being on outside. The whole is now ready for staining.

The next step is to connect one end of wire to the socket and wind the remainder on the completed "spool," the plug being fixed to the free end. The other socket is mounted in a convenient spot near the receiver, and connected to extension terminals on it.

The advantages of this winder are that the speaker may be placed in any position at any distance from the receiver, according to the length of wire. By placing the rod through the holes in centre, the winder revolves easily and the socket on it acts as a handle for rewinding, the whole becoming a pedestal for the speaker, if desired. Of course, this arrangement is not limited to outside use, as it can also be used for a temporary extension in the house where permanent wiring is not desired.—R. W. G. WHITLOCK (Blandford, Dorset).

RADIOLYMPIA—

Complete Stand-to-Stand Report



Items of Outstanding Interest on Each Stand

by THE TECHNICAL STAFF

STAND No. 1
BULGIN & CO. LTD., A. F., Abbey Road, Barking.

EVERY constructor will find this stand of the greatest interest, and in addition to the many popular components which have been familiar to amateurs for a long time, the many new items prove of equal attraction. The present television interest is clearly indicated by the many small accessories which are introduced, and judging by the inquiries and general remarks round this stand many constructors are getting ready to build their television apparatus, and this will incorporate many Bulgin accessories.

One of the Ferranti All-wave receivers to be seen on Stand No. 8.

STAND No. 1A
PRIMUS MANUFACTURING CO., 64/66, High Street, Battersea, S.W.1.

A COMPLETE range of "Autocel" dry batteries are exhibited on this stand, and these are designed for lighting and H.T. purposes. In addition there is a range of "Primus" Standard dry batteries including combined G.B. and H.T. units with "Fujo-volt," "Vap" and "Powerlite" units in 60, 100 and 120 volts. These batteries are made by exclusive processes giving remarkably long life and freedom from noise.

STAND No. 2
HARRIES THERMIONICS, LTD., Avenue Chambers, Vernon Place, Southampton Row, W.C.1.

IN addition to the valve which has been developed by Mr. J. O. Harries to deliver a maximum output, due to the critical spacing of the anode, a new All-Stage valve may be seen on this stage. This is a special valve designed so that it may be plugged into any stage in a receiver and greatly simplifies construction, as it is no longer necessary to select a special type for a special stage. Further details of this valve will be given at a later date.

STAND No. 3
DENT, R. H. (ARDENTE) LTD., 309, Oxford Street, W.1.

ALTHOUGH specialists in deaf-aid and similar appliances, Messrs. Dent now make a speciality of public-address apparatus, and an interesting display is to be seen on this stand. The various types of loud-speaker and microphone equipment, as well as the amplifiers, should be keenly examined.

STAND No. 4
FILM INDUSTRIES LTD., 60, Paddington Street, W.1.

SOME interesting public-address apparatus is also to be seen on this stand, and one of the most interesting is the small battery Class B amplifier, which is employed with a 40in. horn speaker. This is designed to give adequate volume for out-of-doors work.

STAND No. 6
DE LA RUE & CO., LTD., Thos., 90, Shernhall Street, E.17.

THE various mouldings shown on this stand give a fair indication of the scope of manufacturing processes involved in wireless set construction.

STAND No. 8
FERRANTI, LTD., Radio Works, Moston, Manchester.

EVERY keen amateur requires some kind of meter and the various types of instrument shown on this stand should attract considerable attention. The various movements employed are on view and a most impressive range of meters of all types will be seen.

STAND No. 9
AERIALITE, LTD., Junction Mills, Whittington Street, Ashton-u-Lyne.

THE "Trapeze" aerial forms an attractive identification sign for this stand and a very interesting range of aerial devices may be inspected. The introduction of short-wave receivers will result in an increased demand for the di-pole type of aerial, and the matched kit which will be seen on this stand should prove very interesting.

STAND No. 10
NEWNES, GEO., LTD., 8-11, Southampton Street, Strand, London, W.C.2.

A MOST comprehensive display of books and periodicals is made on this stand, and members of the technical staff are present to answer all queries. Receivers are on view and may be inspected, whilst a supply of blueprints of our various receivers are also available for inspection or purchase. The complete range of Wireless Publications is on sale, and many other valuable books dealing with allied subjects. We take this opportunity of thanking all those readers who called upon us during the first week of the Show and the various suggestions which were made concerning receivers and articles which are in demand are being tabulated and will be carefully filed for future reference.

STAND No. 13
HAYNES RADIO, Queensway, Enfield, Middlesex.

IN addition to the very high-quality radiograms and receivers shown on this stand, there are some interesting quality amplifiers which are suitable for use with any type of pick-up, microphone, or radio unit. In addition to these, there are some interesting time bases and other apparatus designed for use in a television receiver.

STAND No. 15
DIGGLE & CO., Jane Street, Rochdale.

SOME interesting charging equipment is to be seen on this stand, and although the majority of it is suitable only for the dealer or service man it will no doubt appeal to the keen amateur who is interested to know just how things are done.

STAND No. 16
RADIO RESISTOR CO., LTD., 1, Golden Square, Piccadilly, W.1.

NO receiver can be built without a supply of resistors and the vast range of these components to be seen on this stand shows that every requirement of the modern receiver may be met. In addition to the small components, there are larger ones suitable for power apparatus such as television equipment, etc., and the volume controls and car noise-suppressing devices will attract considerable attention.

A Special Haynes Radiogram costing £67 10s. 0d. You can see this model on Stand No. 13.

STAND No. 17
DAVIES WOODWORK, D. M., Trading Estate, Slough, Bucks.

STAND No. 18
CITY ACCUMULATOR CO., LTD., 18, Normans Buildings, Central Street, E.C.1.

ALTHOUGH the range of complete receivers forms an attractive exhibit on this stand, the all-wave units will no doubt interest the home-constructor to a greater extent. These are complete units forming the main portion of a superhet receiver and are complete with switches, etc. It is interesting to note that they include I.F. and local station filters so that they should form the nucleus of a really good superhet receiver of modern design.

STAND No. 20
UNION RADIO CO., LTD., U.R. Works, Aurelia Road, Croydon.

ALL-WAVE receivers are again the main feature on this stand, and they are obtainable for battery or mains operation. Two short-wave bands are covered, the lowest wavelength being 12.5 metres. A further interesting point with regard to the wave-range is that the top of the long-wave band ceases at 1,950 metres.

STAND No. 21
GRAMPIAN REPRODUCERS, LTD., Station Avenue, Kew Gardens, Surrey.

THE major portion of the exhibit consists of public address equipment, and in addition to the various loudspeakers and microphone, the amplifiers prove of greatest interest. High quality of reproduction is the keynote of the apparatus and the designs are full of interest.

STAND No. 22
NEW LONDON ELECTRON WORKS, LTD., East Ham, E.6.

THE present tendency to dispense with unsightly outdoor aerials will result in great interest being taken in this stand, where some novel types of outdoor aerial may be inspected. In particular the Globe aerial is claimed to provide wonderful results and is easy to fit. The all-wave aerial also attracted attention on account of the increased use of all-wave apparatus.

STAND No. 23
STRATTON & CO., LTD., Eddystone Works, Bromsgrove Street, Birmingham.

THE "home of the short-wave fan" might easily be the term given to the Stratton stand, for all types of short-wave apparatus may here be seen. Messrs. Stratton are specialists in this type of apparatus and the vast range of equipment will merit attention.

The New London Electron Works new All-wave aerial.

In addition the special sets made up for use in the tropics, in which every precaution has been taken to avoid breakdown due to the extremes of climatic conditions, proved of interest.

STAND No. 24
CELESTION, LTD., London Road, Kingston-on-Thames.

A COMPREHENSIVE range of loudspeakers may be seen on this stand, and the present tendencies in speaker design are plainly to be seen. The increased frequency range covered by modern speakers is determined by the novel features now employed in the mounting of the cone and the shape of the diaphragm, and speakers for all purposes may be selected from the Celestion range.

STAND No. 25
HEAYBERD, F. C., & CO., 10, Finsbury] Street, E.C.2.

ALL of the essentials for modern mains equipment may be inspected on Stand No. 25, and the name of Heayberd needs no introduction. From the smallest mains condenser to the largest types of mains transformer, practically every requirement may be met in this range. In addition to these items, however, Messrs. Heayberd are exhibiting this year a new P.A. amplifying equipment of the portable type.

STAND No. 26
HIGH VACUUM VALVE CO., LTD., 113, Farringdon Road, E.C.1.

VALVES for all purposes may be seen here, and the present all-wave interest will no doubt be reflected in the demand for the special short-wave types of valve made by Hivac. These are provided with steatite bases and present a new idea in valve construction. In addition, the special Harries output valve proved of great interest to the battery user who is out to obtain better quality and more volume.

STAND No. 27
PLESSEY CO., LTD., Vicarage Lane, Ilford, Essex.

THE Plessey Company manufacture complete chassis for use in commercial receivers and some interesting types of apparatus may be inspected on this stand.

STAND No. 28
HENLEY'S TELEGRAPH WORKS CO., LTD., W. T., Holborn Viaduct, E.C.1.

THE main attraction on this stand is the range of soldering irons, including the small electric iron for the type of work carried out by the home-constructor to the large commercial models used for soldering large expanses of metal. The improved pencil-point bit will be found of great value in soldering in awkward corners such as are now met with in modern sets in which wave-change switches and similar small items are tucked in rather out-of-the-way corners.

STAND No. 29
HACKER & SONS, H., Perfecta Works, Ray Lea Road, Maidenhead.

THE range of Dynatron receivers includes four new models this year, and there is a very interesting 16-valve all-wave radiogram which attracted the music lover. The Dynatron receivers have attractive easy-tune dials which greatly simplify station location.

STAND No. 30
AERONAUTICAL & GENERAL INSTRUMENTS, LTD., Purley Way, Croydon, Surrey.

STAND No. 31
AUTOMATIC COIL WINDER & ELECTRIC EQUIPMENT CO., LTD., Winder House, Douglas Street, S.W.

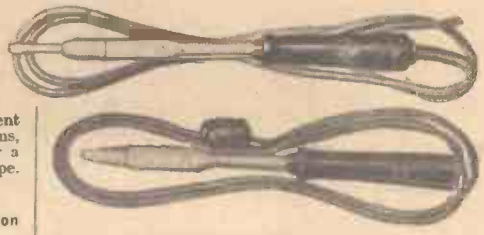
ALTHOUGH some elaborate coil-winding apparatus is to be seen on this stand, the many interesting measuring instruments form quite a substantial part of the exhibit. These include the now famous Avometer, together with the Avodapter which enables various working voltage and current tests to be made whilst a receiver is working. In addition there is the Avominor, a new 46-range Universal Avometer, an Avo-Oscillator and an improved signal generator.

STAND No. 32
CHLORIDE ELECTRICAL STORAGE CO., LTD., 417, Battersea Park Road, S.W.11.

ACCUMULATORS for all purposes may be seen here, together with some H.T. batteries and smaller batteries designed for use in torches and other small equipment. The complete range of L.T. accumulators covers practically all wireless requirements, and the novel indicator fitted to some models greatly prolongs the life of the cell as there is no risk of running it too low. The new H.T. units designed for use where no mains facilities are available, or where a perfectly smooth and unvarying H.T. supply must be obtained is also on show.

STAND NO. 33
BRITISH TUNGSRAM RADIO WORKS, LTD., West Road, Tottenham, N.17.

A FULL range of Tungsram valves is shown here, and in addition to the more or less standard types such as are familiar to the ordinary set builder, there are several high-power types designed for quality power amplifiers, public address equipment, etc. Valves for transmitting apparatus may also be seen.



Soldering simplification is assured if you use an electric iron of the type shown here. These are Henley products.

STAND No. 34
BEETHOVEN RADIO LTD., Chase Road, North Acton, N.W.10.

THE novel baby portable is an important item on this stand, and represents the latest in portable design. In addition to this receiver, however, there are some further portable models and an all-electric radiogram. A special large diameter aeroplane type dial is also a feature of some of the Beethoven sets.

STAND No. 35
INVICTA RADIO LTD., Parkhurst Road, N.7.

ALTHOUGH there are many novel points to be seen in the various receivers on this stand, the special Fisherman's receiver will no doubt create the greatest interest. This is a receiver built to fulfil a special need at sea, and in addition to the method of construction designed to prevent damage due to the action of sea air and spray (for which a special cabinet is employed), the circuit is designed to tune in a special waveband upon which shipping news and weather forecasts are given.

STAND No. 36
WESTINGHOUSE BRAKE AND SIGNAL CO., LTD., 82, York Road, King's Cross, N.1.

A COMPLETE range of metal rectifiers is shown here, ranging from the small H.F. type, or Westector as it is now known, to the large charging models. There are various models designed for use in mains receivers, and in addition some new high-voltage types which will prove of especial use in the construction of television apparatus.

STAND No. 37
GARRARD ENGINEERING AND MFG. CO., LTD., Newcastle Street, Swindon, Wilts.

VARIOUS gramophone motor units may be seen on Stand 37, and these range from a simple clockwork motor and turntable to an elaborate mains record-changer, playing automatically eight 10in. or 12in. records, with rejector switch. This unit is mounted complete on a base plate and may be inserted into a home-built radio receiver and cabinet to convert it into a complete auto-radiogram.

A neat Invicta Transportable shown on Stand No. 35.

Look for this novel tuning scale and the one-knob control on Stand No. 43.

STAND No. 39
DUBILIER CONDENSER CO. (1925), LTD., Ducon Works, Victoria Road, North Acton, W.3.

THE latest types of oil condenser are included on this stand and will interest those constructors who are preparing to build television equipment. Various other high-voltage types of condenser may be seen, in addition to the small wire-end tubulars and mica condensers and resistors which have already enjoyed a long run of popularity.

Simplicity of tuning is assured by this large McMichael clock dial.

STAND No. 40
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

ON this stand there is a display of Osram valves and public address and radio relay equipment. Probably the most interesting item on the stand in television equipment is the cathode-ray tube in view of the increased interest. Photo-cells and special valves are also exhibited.

STAND No. 41
BALCOMBE LTD., A. J., 52, Tabernacle Street, E.C.2.

THE all-wave feature is also prominent in the range of Alba receivers on this stand, and the lowest wavelength covered is 19.5 metres. Tuning simplification by means of the Searchlight device is also a feature which should be inspected.

STAND No. 42
EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, W.C.2.

IN addition to the complete range of Mazda valves shown on this stand, the B.T.H. pick-up takes a prominent position. There are several models of this, and the latest is the Minor, which is complete with volume control. Other items on this staud are the Ediswan batteries and Tungar charging apparatus, the latter covering the needs of the service station as well as the individual.

STAND No. 43
PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.

THIS year's Philips models incorporate many new features, and the working model showing how the new Mono-knob control functions is worth inspection. This control eliminates much unnecessary worry when tuning a receiver and enables volume, selectivity, tone and tuning to be accomplished with one single control. The wave-change and on-off switch is incorporated in a metal ring surrounding the control. The adjustable tuning scale is also interesting and the cabinet work and other features of these receivers will give to the stand an attractive air.

STAND No. 44
DECCA GRAMOPHONE CO., LTD., 1-3, Brixton Road, S.W.9.

A MAINS portable radiogram is a very interesting exhibit on this stand, and there are several other receivers which are well worth inspection. The simple three-valve battery receiver takes its place with the A.C. auto record changer, and the problems of tuning is attacked in these receivers by means of the Selectorlite dial.

STAND No. 45
TANNOY PRODUCTS, Canterbury Grove, W. Norwood, S.E.27.

THESE people have been termed "the Sound People" and their exhibit consequently consists of an effective display of public-address equipment of every possible type. The wide experience gained in this field has enabled them to develop some interesting equipment.

STAND No. 46.
GORST ELECTRICAL CO., LTD., Portadyne Works, Gorst Road, N.W.6.

THE short waves have also been included in the Portadyne receivers, and these consequently are also prominently featured this year in the "all-wave" class. The lowest range covered is 16 metres, although a separate waveband from 50 to 150 metres is also covered in one or two models.

STAND No. 47
McMICHAEL RADIO, LTD., 265, Strand, London, W.C.2.

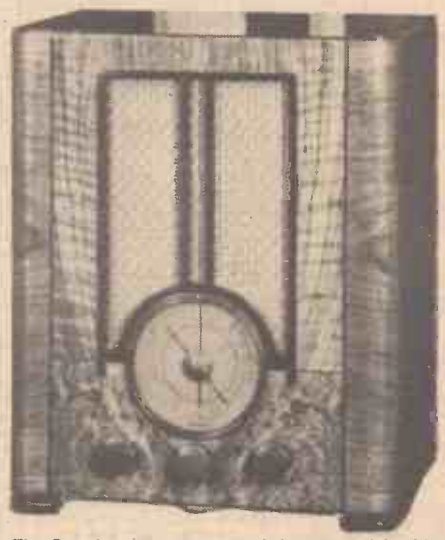
TUNING simplification is also an important feature of the new McMichael receivers, and probably the most interesting exhibit on this stand is the Model 366, in which a giant tuning dial has been fitted inside the lid of the console cabinet, and the point is operated from the normal controls.

STAND No. 48
PYE RADIO, LTD., Radio Works, Cambridge.

PYE receivers are already well known, and the latest developments are well worth inspection. The inexpensive battery receiver in which special tuning coils have been incorporated is claimed to provide remarkable results. The neon tuning device, in which the light travels along a perforated tube, is also an interesting development, whilst the all-wave dial divided into four segments marked in metres and degrees covered by two separate but coupled pointers will prove a useful aid in simplified tuning.

STAND No. 49
MARCONIPHONE CO., LTD., 210, Tottenham Court Road, W.1.

ALTHOUGH the many new and novel receivers shown on this stand have many points of interest, the new television receivers are undoubtedly the key note of the stand. The different models which are available, and the method incorporated for enabling the picture to be viewed in daylight are interesting and ingenious, and there are many other points of interest on this stand.



This Portadyne receiver is one of the range exhibited by Gorst Electrical.

STAND No. 50
BUSH RADIO, LTD., Woodger Road, Shepherd's Bush, W.12.

AGAIN on this stand the television receivers will prove the greatest attraction. These receivers also employ the "reflection" method of viewing the cathode-ray tube end, with its many advantages. All-waves again are featured in the Bush receivers, and four-waveband tuning indicators are again developed to simplify tuning.

Another of the Marconiphone Television receivers to be seen on Stand 49

STAND No. 51
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

IN addition to the claims of high fidelity, the G.E.C. receivers displayed on this stand also possess the all-wave feature. The two are combined in certain models, and these include an all-wave record-changing radiogram. Contrasting with this is a simple battery 3-valver employing a straight circuit as well as a 4-valve battery superhet. A bakelite cabinet is seen in the A.C. 37, which is fitted with a concert-pattern M.C. speaker. In addition to the receivers there is a range of loudspeakers and various radio components on this stand, including a gramophone pick-up and a microphone for home-recording.

One of the Bush All-wave receivers. Note the useful tuning indicator.

STAND No. 52
ULTRA ELECTRIC, LTD., Western Avenue, Acton, W.3.

ON this stand some of the new Ultra receivers will be found in which the short-wave bands have been included, and two separate S.W. ranges are thus added to the standard two broadcast bands, resulting in a four-ranger tuner. The lowest wavelength covered is 13 metres, and simplification of tuning is carried out in the Models 96 and 99 by the adoption of an external scale which enables the set to be tuned without lifting the lid.

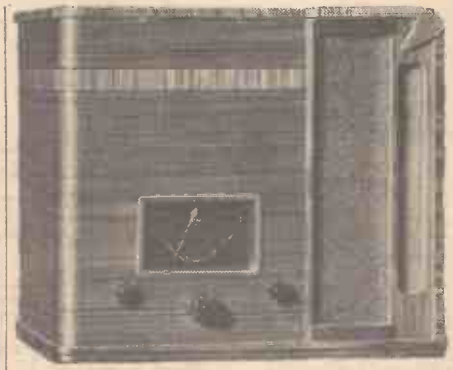
Cossor are showing this receiver amongst the many new models. The new Cossor Television set is seen on page 665.

STAND No. 53
COLE, E. K., LTD., Ekco Works, Southend-on-Sea.

MAIN interest will centre round the H.T. battery-less receivers in which a novel accessory is incorporated to deliver adequate high-tension from the L.T. supply. One of these is a seven-stage superhet with A.V.C. and costs 12 guineas. It may be obtained in a moulded cabinet designed by Serge Chermayeff, as illustrated in last week's issue. High-fidelity models are also to be seen, and some novel features are introduced to enable very high-quality reproduction to be obtained. Mystic eye tuning is another feature which should be examined, and is a further development of the simplified tuning accessories featured this year throughout the exhibition.

STAND No. 54
GRAMOPHONE CO., LTD., 98, Clerkenwell Road, E.C.1.

ON this stand also, the television receivers are undoubtedly the main attraction. The two models exhibited are both of interest, the smaller on account of the fact that no provision is made for tuning the sound receiver, except for a small trimmer. It is permanently tuned to the sound transmissions. The larger is a five waveband all-wave set enabling any programme to be picked up on the sound portion of the set. The receivers both employ the reflection method of viewing the cathode-ray tube screen, and no lens or other magnifying device is employed. In addition to these two receivers there may be seen an interesting range of table and console radios and radiograms, including an elaborate automatic radiogram.



An interesting departure from standard design is seen in this Ultra Model 48 receiver on view on Stand No. 52.

STAND No. 55
COSSOR, A. C., LTD., Cossor House, Highbury Grove, N.5.

IN addition to the several all-wave receivers shown on this stand, there is an interesting exhibition of cathode-ray tube apparatus. The receivers embody various circuits and are not all of the superhet type. A new Universal superhet is included. Amongst the remaining exhibits on this stand is a complete range of battery, mains and "universal" valves, from which practically every type of receiver may be equipped. The latest Television receiver is to be seen in both a complete and a chassis form, and the latter enables the various details of construction clearly to be seen.

STAND No. 56
RADIO GRAMOPHONE DEVELOPMENT CO., LTD., 18-20, Frederick Street, Birmingham.

THE latest developments in radio circuits which are included in the 12-valve radiogram on this stand incorporate such features as mystic-ray tuning and contrast control. The latter feature, sometimes referred to as automatic-volume expansion, provides a contrast between various degrees of volume which is not obtained with an ordinary circuit, and the receiver is the only one in the exhibition to embody this particular feature. The remaining R.G.D. receivers all represent very high-class apparatus.

This is the smaller of the H.M.V. complete Television receivers to be seen on stand No. 54.

STAND No. 57
KOLSTER-BRANDES, LTD., Cray Works, Sidcup, Kent.

A NUMBER of novel features are to be seen in the new K.B. receivers on this stand, not the least important of which is the new tuning circuits which have been developed with multi-strand windings. These receivers are known by the name of "Supermagnidyne" sets, and provide a high degree of sensitivity and selectivity. The cathode-ray visual-tuning indicator may be seen on some of the receivers, and the differential tone control is a further valuable feature fitted to some models. The Rejectorstat interference-free aerial equipment may also be inspected.

STAND No. 58
EVER READY CO. (G.B.), LTD., Hercules Place, Holloway, N.7.

ALTHOUGH complete receivers are to be seen on this stand, probably the complete range of batteries will prove of equal interest. These cover all types suitable for practically every receiver on the market, as well as for various types of pocket lamp, torches, etc. Table model superhets may be seen in the range of receivers, in addition to portables and transportables.

STAND NO. 59
SELF-CHANGING GRAMOPHONES, LTD., 11, Berkeley Square, W.1.

HIGHLY-EFFICIENT radiograms are exhibited on this stand, and amongst the most important items are the portable radiogram and the ingenious remote-control system. The latter enables an automatic radiogram to be controlled from any remote point and greatly simplifies the operation of this type of apparatus from different rooms as in the case of an ordinary radio receiver. The remarkably fine cabinet work is an important feature of this display.

STAND NO. 60
SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD., 39, Upper Thames Street, E.C.4.

THE Full O'Power batteries are featured here, and a type for every requirement may be found. They include pocket, torch and box batteries, as well as various standard H.T. and combined H.T. and G.B. batteries, and a range of glass cell type L.T. accumulators may also be seen.

STAND NO. 61
VIDOR, LTD., West Street, Erith, Kent.

THERE are eight receivers on this stand, four of which are new this season. Two are for battery use (one all-wave model) and two for mains. In addition to these receivers there are the special portable and the short-wave converter designed for use with any battery receiver employing H.F. amplification. This is a completely self-contained unit totally screened and may be left permanently connected to the radio receiver.

STAND NO. 62
MULLARD RADIO VALVE CO., LTD., Mullard House, Charing Cross Road, W.C.2.

THE high-light of the Mullard receivers to be seen on this stand is the single-knob control. This enables all of the ordinary receiver adjustments to be carried out without the usual hesitancy of knowing which knob to adjust next. The cabinet designs are also full of interest and many are out of the ordinary. The modern tendency of "straight line architecture" is vividly portrayed in some of these models. In addition to the receivers there is also a most comprehensive exhibit of valves for receiving and transmitting apparatus and some interesting cathode-ray apparatus.

STAND NO. 63
FERRANTI, LTD., Radio Works, Moston, Manchester.

MANY novel components for the home-constructor may be seen here, as well as some interesting power amplifiers. The components include L.F. and mains transformers, chokes, condensers, resistors, speaker chassis and other accessories, and some useful booklets may be obtained in connection with the various items.

A powerful speaker from the W/B range—see this on Stand No. 66.

STAND NO. 64
LISSEN, LTD., Worple Road, Isleworth, Middlesex.

SEVEN new season's models may be seen on this stand, including some all-wave models. The lowest wavelength covered is 13 metres. There is also a band-spread S.W. kit receiver for battery use, and a novel portable. Batteries and valves may also be seen on this stand.

STAND NO. 65
BURNDEPT, LTD., Light Gun Factory, Erith, Kent.

AMONG the new receivers to be seen on this stand the all-wave tuner is also featured, and the lowest wavelength is 13.5 metres. The receiver includes a 3-valve all-wave band pass, an A.C. superhet. employing a Westector, and a 3-valve battery suitcase portable. The twin-speaker receiver will certainly be a prominent model during the forthcoming season.

STAND NO. 66
WHITELEY ELECTRICAL RADIO CO., LTD., Victoria Street, Mansfield, Notts.

ALTHOUGH this stand consists mainly of a display of the famous Stentorian speakers in all types, a very attractive feature is the new "Long Arm" device which enables the receiver to be controlled from the distant listening point. All of the new models' speakers represent improvements on last

Some novel features are seen in this Lissen set.

year's models, and the new magnetic systems which are incorporated give much greater sensitivity. In addition to the chassis models, there are some interesting cabinet models, in which a volume control is included. The Microlode matching device is, of course, included in many of the models and enables the output valve to be matched with accuracy.

STAND No. 67
BRITISH BROADCASTING CORPN., Broadcasting House, W.1.

STAND No. 68
TELEGRAPH CONDENSER CO., LTD., Wales Farm Road, North Acton, W.3.

A FULL range of condensers of all types may be seen on Stand 68, and amongst these are many new high-voltage types suitable for television equipment. To cope with the surges often met with in A.C. equipment some special surge-proof electrolytics have been developed and will be seen for the first time. Special electrolytics suitable for A.C./D.C. (universal) receivers may also be seen.

STAND No. 69
BRITISH G.W.Z. BATTERY CO., LTD., Falmouth Road, Trading Estate, Slough.

THIS exhibit consists of a complete range of batteries in all voltages and types suitable for practically every model receiver.

STAND No. 70
COLLARO, LTD., Culmore Works, Culmore Road, Peckham, S.E.15.

IN addition to the many existing lines to be seen on this stand there is a new automatic record-changer designed in two models, one for A.C. operation and one for either A.C. or D.C. This plays mixed records in any order up to a total of eight, and a reject button is fitted. There are, of course, also the popular spring-operated motors as well as the A.C. induction models and universal mains units.

STAND No. 71
BRITANNIA BATTERIES, LTD., Union Street, Redditch, Worcs.

THE popular Pertrix batteries may be seen here, and there are models for all the existing commercial receivers, including portables. In addition to these batteries there are the smaller types designed for use in torches and cycle lamps, etc., as well as accumulators for L.T. supplies. A range of standard type (sal-ammoniac) batteries is also on view.

STAND No. 73
ISMAY DISTRIBUTORS, LTD., Sterling Works, Dagenham.

HALCYON receivers may be seen on this stand and are available in various models. The superhet. circuit is featured in practically all of them and the all-wave tuner is incorporated.

STAND No. 74
AERODYNE RADIO, LTD., Aerodyne Works, Tottenham, N.17.

THE remote control device which was shown at last year's Radiolympia is also to be seen again on this stand this year, and is fitted to the Model 47 radiogram. In addition to this model there are 11 others covering practically all types, and including two new receivers in which the "spear-o-lite" tuning device is featured.

STAND No. 75
BURGOYNE WIRELESS, LTD., Great West Road, Brentford, Middlesex.

IN the new all-wave receivers to be seen on this stand, the lowest wavelength covered is 19 metres. The superhet. circuit is employed in these receivers, but a "straight" three for battery use, with a vibrator operated from a 6-volt accumulator for the supply of H.T., is also to be seen.

STAND No. 76
SOUND SALES, LTD., Marlborough Road, Upper Holloway, N.

ON this stand may be seen amplifiers, microphones, loudspeakers, battery chargers and complete receiver chassis. A low-priced junior loudspeaker may also be seen, as well as a super auditorium model. The amplifiers are of the types designed for both public-address work as well as for normal domestic requirements.

STAND No. 77
VARLEY, LTD., Cambridge Place, Burrage Road, S.E.18.

AMONGST the new components to be seen on this stand is a new I.F. transformer with fixed coupling. This is designed for use at a frequency of 465 kc/s. In addition to this model there are a number of new coil units in straight and superhet. types with combined switches. The superhet. units are designed for both 110 and 465 kc/s, and the display also includes transformers (L.F. and mains), chokes, resistors, etc.

STAND No. 78
COSMOCORD, LTD., Cambridge Arterial Road, Enfield, Middx.

THE new playing desk is the most important item on this stand, and this includes an induction motor, anto stop, volume control, and the latest Cosmocord pick-up. A slightly larger model to include storage space for records is also to be seen. In addition there are three pick-ups, one fitted with built-in volume control and one of special high quality reproduction similar to that fitted in the above-mentioned playing desk. A small 5s. unit intended to clip on most tone-arms is also shown.

STAND No. 79
RAWLPLUG CO., LTD., Rawlplug House, Cromwell Road, S.W.7.

IN addition to the popular Rawlplug products such as Durofix and the various fittings, a new electric soldering-iron is also shown on this stand. Drills, mechanical hammers, screwdrivers, and other valuable accessories are also shown.

STAND No. 80
PRISM MFG. CO., California Works, Brighton Road, Belmont, Surrey.

THE novel reproducing boards incorporated in the Prism loudspeaker are the most important feature on this stand, although the elaborate cabinet work incorporated in model PR27 is also prominent. In addition to these items, however, there is a considerable amount of public-address equipment, including amplifiers, microphone, and loudspeaker.

STAND No. 81
JACKSON BROS., LTD., 72, St. Thomas Street, S.E.1.

ALTHOUGH there are no new components to be seen on this stand there is sufficient variety in the many items shown to interest every visitor to the show.

Two of the T.C.C. Electrolytics to be seen on Stand No. 68.

The components include ganged condenser units of all types, both for straight and for superhet receivers, and many short-wave accessories. The various types of tuning dial are also of great interest and represent the latest practice by the provision of full vision aeroplane dials.

STAND No. 82
LECTROLINX, LTD., 79a, Rochester Row, S.W.1.

THE constructor will also find this stand of great interest in view of the many useful accessories which are displayed. These include valveholders, plugs, sockets, and a new loudspeaker control panel with "plug-switch." For short-wave receivers the special leg-mounted valveholder will prove of great value.

STAND No. 86
MULTITONE ELECTRIC, LTD., 95, White Lion Street, N.1.

THE most important item on this stand is the new Adaphone device which enables a person to join the circle of listeners without interfering with others. Thus, in the case of a deaf person, the volume may be adjusted to provide a suitable output without overloading the speaker or producing too much volume for the remainder of the family. Alternatively, one may listen to a desired station without the remainder of the family hearing the programme. This device costs five guineas, and will no doubt prove a good attraction during the season.

The Prism De Luxe Radiogram.

STAND No. 87
GOODMANS (CLERKENWELL), LTD., Broad Yard Works, Turnmill Street, E.C.1.

AMONG the many loudspeakers to be seen on this stand, the new Junior and Senior auditorium models are no doubt of greatest interest. The 12in. model costs £7 13s. as a chassis, or may be obtained mounted on a 3ft. oak baffle for £10 10s. The Junior has a 10in. diaphragm, and is consequently slightly cheaper. The remaining models consist of domestic and public-address types.

STAND No. 88
KINGSWAY ELECTRICALS, LTD., 3-9, Dane Street, W.C.1.

ALTHOUGH the Simpson electric turntable forms the most important item on this stand, there are various other components and items which are made by this firm. The turntable is of the synchronous type and will greatly simplify the construction of a radiogram fed from a standard A.C. supply. Some special amplifiers for P.A. work are also on view.

A fuse plug connector manufactured by Belling and Lee.

STAND No. 89
ROTHERMEL, R. A., LTD., Rothermel House, Canterbury Road, N.W.6.

THE bulk of the exhibits on this stand are of the piezo-electric type, and include microphones, loudspeakers, and pick-ups. Various models are available in both ranges. A new high-note speaker unit is prominently featured. The "Radio Heart" is also an important feature on the stand, and consists of the main portion of a receiver, i.e., coils, condensers, etc. The Centralab volume controls are also exhibited on this stand.

STAND No. 91
BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, N.17.

THE popular Magnavox Duode speaker is the most important item on Stand 91, and is accompanied by the famous Sixty-Six and other well-known models in this range of speakers. Among the remaining exhibits on this stand are a whistle filter, a field-supply unit for energised speakers, and a range of transformers, valveholders and switches.

STAND No. 92
REPRODUCERS & AMPLIFIERS, LTD., Frederick Street, Wolverhampton.

ON this stand there are many different types of loudspeaker, including popular extension models. In addition, there are some smoothing chokes and transformers and other special apparatus made up for manufacturers' purposes. For car radio, some special speakers are to be seen.

STAND No. 93
BRITISH ROLA CO., LTD., 2, Minerva Road, Park Royal, N.W.10.

THE popular G.12 high-fidelity speaker is the most important item on this stand, and is accompanied by other types of speaker, both for general and extension purposes. In the latter class the Roma is the most important model and incorporates an 8in. diaphragm. This may be obtained either as a chassis model, or complete with cabinet.

STAND No. 94
EPOCH REPRODUCERS, LTD., Aldwych House, Aldwych, W.C.2.

THE range of speakers on this stand extend from the small unit designed primarily for use in portable receivers, to the large super-cinema models designed to handle 30 watts. This year's models are improvements on existing lines and the adoption of a new surround material ensures a much improved response. A range of public-address horns may also be seen, and some short-wave components designed especially for the serviceman are also displayed.

STANDS Nos. 95 and 96
WINGROVE & ROGERS, LTD., Arundel Chambers, 188, Strand, W.C.2.

THE many popular Polar home-constructors' accessories are here displayed and amongst them may be seen some interesting new lines. The Bar-type ganged condensers are included in the latter, and there are some interesting modifications designed for specific purposes. For short-wave work, for instance, these condensers may be obtained with ceramic insulation. The N.S.F. components, including tubular condensers, electrolytics, volume controls and resistors are shown on Stand No. 96 and include those items which have been popular in the past.

STAND No. 97
WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17.

COILS, switches, volume controls, mains transformers, chokes and sundry other odd items which are invaluable to the constructor may be seen on this stand, and the complete range of coils includes simple air-core types for the simple receiver or iron-core high-efficiency coils for modern superhets. There are also some I.F. transformers included in this interesting range of components.

STAND No. 98
BELLING & LEE, LTD., Cambridge Arterial Road, Enfield.

THE new Eliminoise aerial is the most prominent feature on this stand and is surrounded by many interesting noise-suppressing devices. These include simple condenser units for inclusion in the leads to different types of apparatus and also kits for use with cars to remove the interference from sparking plugs, etc. In addition, there is an interesting display of the well-known smaller components such as plugs, sockets, battery leads, terminal strips, and so on.

STAND No. 99
SHAFTESBURY MICROPHONES, LTD., 24, Aldersgate Street, E.C.1.

ALTHOUGH the majority of the apparatus on this stand is designed for public-address work, there are several items which will appeal to the home constructor. Amongst these is the Bio-tran microphone costing 55s., and the latest speaker at 3 guineas. The Velodyne microphone costs 9 guineas and represents the other end of the scale.

STAND No. 101
FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex.

A NEW accumulator recently added to the Fuller range may be seen on this stand in company with the many different types of cell manufactured by this firm. In addition to these batteries there will be a range of Sparta dry (H.T.) batteries in which types for all models of commercial receivers may be found.

STAND No. 105
TUCKER EYELET CO., LTD., Cuckoo Road, Birmingham 7.

AMONGST the products of this stand, mainly for the commercial set builder, the vast range of eyelets which are produced for the fitting of various components to metal chassis, etc., will prove an attractive exhibit for the listener who is interested in the manufacturing side of radio apparatus.

STAND No. 106
LINGUAPHONE, LTD., 24-27, High Holborn, W.C.1.

ALTHOUGH there are only four distinct models on this stand, they embrace many points of

The Major model seen in the Wayfarer range of Portables.

interest. The largest model is the Recordiogram, costing 50 guineas, and incorporates a 7-valve circuit with a push-pull output stage. The circuit is of the all-wave type and the lowest wavelength covered is 13 metres. In all these models provision is made so that a received programme may be recorded, or records made by the user with the aid of a simple microphone.

STAND No. 107
PARTRIDGE WILSON & CO., LTD., Evington Valley Road, Leicester.

THE major portion of this exhibit consists of charging apparatus and applied apparatus. The trade name Davenset is already well known in this connection, and some interesting types of apparatus and accessories may be seen on this stand.

This is the completion of the stands on the Ground Floor of the Grand Hall, but the exhibits are continued in the Gallery. The first stand number here is 201, and there are thus no stands bearing numbers between 108 and 200 (inclusive).

STAND No. 201
WATERHOUSE, FREDERICK, LTD., Stanley Works, Edward Street, Dudley Hill, Bradford.

ON this stand many radiogram, speaker and standard receiver cabinets may be seen, as well as a walnut record cabinet, and special types of cupboard cabinets, such as that designed to house the well known Milnes H.T. units.

STAND No. 202
CRYPTON EQUIPMENT, LTD., North Acton Road, Park Royal, N.W.10.

BATTERY-CHARGING plant also features prominently on this stand, and various types of constant-potential chargers, rectifier types and similar items may be seen.

STAND No. 203
RADIOMETERS, LTD., Dunbar Works, Dunbar Street, West Norwood, S.E.27.

FOR the service engineer, or the keen experimenter, this stand will prove very interesting. The range of testing instruments is very comprehensive and a new Universal All-Valve tester forms the most important of these. In addition is a new resistance and capacity measuring bridge and a multi-range D.C. meter. A valve Analyser enables full valve characteristics to be obtained whilst a valve is actually working in a receiver.

STAND No. 204
WHARFEDALE WIRELESS WORKS, 62, Leeds Road, Bradford.

THE new Voluphone is no doubt the most interesting item on this stand, although the complete range of speakers is a comprehensive one. As already mentioned, the Voluphone enables a deaf person to partake of the broadcast entertainment without the receiver having to be tuned up so loud that other members of the family circle are deafened. A small M.C. microphone and extension speakers may also be seen here.

STAND No. 205
MILNES RADIO, LTD., Church Street, Bingley, Yorks.

THE well-known H.T. unit may be seen here in an improved form, together with a new accumulator designed for recharging purposes. A special switch is

The Wharfedale Speaker to be seen on Stand No. 204.

also produced which enables the cells of the 6-volt accumulator to be connected in series or parallel, i.e., for use or for charging.

A Converter from the Farrex range. See this on Stand No. 218.

STAND No. 206
ALL POWER TRANSFORMERS, LTD., 8a, Gladstone Road, Wimbledon, S.W.19.

A COMPREHENSIVE range of transformers, chokes and similar apparatus may be seen here, and among them are special components designed for power amplifiers and for television and relay equipment work. The arrival of television will no doubt lend greater interest to the television apparatus which is prominently displayed.

STAND No. 207
382 RADIO VALVE CO., LTD., 324, Liverpool Road, Highbury, N.7.

IN addition to the many battery and mains type valves for broadcast receivers, some transmitting and special valves are also to be seen on this stand. Some high efficiency power output and pentode valves are featured, in addition to special rectifiers.

STAND No. 208
RIST'S WIRES & CABLES, LTD., Waveney Works, Lowestoft.

IN addition to the many odd lines of connecting wire, screened wire and loudspeaker and 'phone wires, there are also some complete aerials exhibited on this stand. These are made up in various lengths and are of various types ranging in price from 7d. to 2s. 5d.

STAND No. 209
BRITISH PIX CO., LTD., 11, Southwark Street, S.E.1.

THE popular Pix aerials, for indoor and outdoor use, together with the aerial accessories such as insulators, lead-in devices, etc., are prominently featured on this stand. In addition there may be seen the various Pix valves, special earth accessories and the Modula armchair volume control.

Massive plates are used in the Fuller cell shown here.

STAND No. 210
DAVIS & TIMMINS, LTD., Brook Road, Wood Green, N.22.

MANY small items may be seen on this stand, including terminals, plugs and similar items. Screws for all purposes may be seen, and this firm specialises in this type of work.

STAND No. 211
BRIDGER, R. O., & CO., LTD., 4, Shelford Place, Church Street, N.16.

THIS exhibit is more in the nature of a trade show, and consists of loudspeaker diaphragms of all types. It will no doubt interest the home-constructor to see the many different types and designs which may be employed in the modern loudspeaker.

STAND No. 212
LONDON ELECTRIC APPLIANCES, LTD., 62, Glengall Road, Old Kent Road, S.E.15.

THE novel Wayfarer portables are shown here and there are now four models, the Junior, Senior, Major and Grand. These all incorporate a 4-valve circuit and are fitted with the Hivac Midget valves. The Major and Grand are fitted with moving-coil loudspeakers, whilst the other two models have balanced armature speakers.

STAND No. 213
EVERETT, EDGCUMBE & CO., LTD., Colindale Works, N.W.9.

A COMPLETE range of test equipment, including the Radiolab instruments, may be seen here. The range now includes valve testers, an all-purpose tester, a signal generator and a complete set tester. Some new prices have been fixed and there are many new models, together with improvements on last season's instruments.

STAND No. 215
WESTON ELECTRICAL INSTRUMENT CO., LTD.

THIS display, also, consists of a range of measuring instruments. The most comprehensive is the Selective Analyser, which has voltage ranges up to 1,000 volts. There is also an oscillator, a valve voltmeter, output meters and a volt and resistance meter.

STAND No. 216
FERRANTI, LTD., Moston, Manchester.

SYNCHRONOUS electric clocks and other accessories manufactured by Messrs. Ferranti may be seen here, whilst the receivers, components and other

With this instrument you can make records from received programmes. It is a Linguaphone product.

items are divided between the three stands occupied by Messrs. Ferranti—namely, Nos. 8, 63 and 216.

STAND No. 217
HARMER & SIMMONS, LTD., Electra House, 223, Hoe Street, Walthamstow, E.17.

SPECIAL output rectifiers are seen here, in company with various special items manufactured for use with D.C. receivers and the Westinghouse rectifiers is incorporated. In addition there are some gas-filled valve rectifiers for use in charging plant and special models for transmitters and similar equipment.

STAND No. 218
FARREX RADIO, Rear of 543, Holloway Road, London N.19.

A RANGE of Farrex converters incorporating the latest improvements in S.W. design are shown on this stand. These are enclosed in metal containers and arrangements are made to prevent interaction between the receivers and converter, whilst a switch enables the latter to be left permanently connected.

STAND No. 224
ARMSTRONG MANUFACTURING CO., 100 King's Road, N.W.1.

SOME complete chassis are to be seen here ranging from a six-valve all-wave to a nine-valve all-wave with a 12 watt output stage. Two radio-gramophone chassis and a 10 watt push-pull amplifier are also on view.

The Constructor and the Show

From a Careful Survey of Radiolympia it is Evident that Manufacturers are Catering for the Constructor even better than before. The Large Number of New Components and Accessories is Full of Interest

EACH year Radiolympia provides a ready means for the constructor and experimenter to refresh his knowledge, and to add to that already gained. In fact, the Show forms part of the system of wireless education, the rest being supplied by PRACTICAL AND AMATEUR WIRELESS. This year is certainly no exception, for there is ample material at Olympia to thrill the new constructor and to make the "old hand" still more interested in his hobby.

In attempting to describe some of the more interesting items on view, one finds it extremely difficult, without filling far more space than the Editor could permit, adequately to describe the vast amount of material. It seems that the only method which can be followed is to deal with the exhibits in some kind of classified order and to hope that space restrictions will not make it necessary to omit any item which should by rights have been included.

Old Friends

As to components pure and simple, it is noteworthy that the manufacturers—such as Bulgin, Dubilier, Jackson Bros., T.C.C., Varley, Wearite, and Wingrove and Rogers (Polar)—who have served the constructor so well in the past, continue to study and cater for his needs. Among the hundreds of components of every kind on the Bulgin stand, the High-Tension Vibrator stands out as being an important contribution. This interesting unit enables an H.T. supply of 250 volts, 60 mA. to be obtained from a 6-volt accumulator. This is the kind of device the constructor has been wanting for years, and at the price of £1 it will be in strong demand. It is used in conjunction with a special transformer costing 10s. 6d. This new unit should solve the high-tension problem for many of those wanting mains-set performance from batteries, for the output is sufficient to operate mains valves, although in that case the L.T. consumption would be so great that it would be necessary to have convenient accumulator-charging facilities.

Condensers and Resistances

Another firm well known to constructors is Dubilier, and they have for the new season, in addition to the tremendous range of condensers which were available previously, a new model of the non-inductive type which has a higher safety factor and greater insulation resistance. They also have some new electrolytics and a new ½-watt metallised resistor selling for 6d.; this is ideal for battery-set use, as well as for incorporation in many positions in a mains set. Additionally, there are new wire-wound resistors rated at ½ and 1 watt and costing 9d. and 1s. respectively. T.C.C. also have some new condensers, one type being a tubular non-inductive model which is specially proofed against the effects of humidity; ideal for Empire use. Another interesting line is a range of moulded mica condensers obtainable with either terminal-tag or wire-end connectors.

Tuning Units

Varleys have some new complete tuning units suitable for use in both "straight" and superhet receivers. They are in two- and three-gang types, and all are fitted with three-position switches for wave-changing and on-off use. The superhet units are made in 110 kc/s and 465 kc/s types. Another new Varley component is a 465 kc/s litz-wound iron-cored I.F. transformer of the high-efficiency pattern. These are, of course, in addition to the wide variety of other components for which the name Varley has become famous.

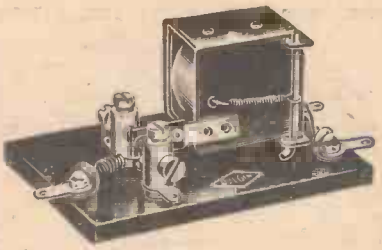
Jackson Bros. had such a complete range of variable condensers, drives and allied equipment that they found it unnecessary further to augment it, whilst Polar have new two- and three-gang "Bar"-type tuning condensers, these being made with bakelite or ceramic insulation, the latter costing slightly more and being especially useful when "low-loss" is the order of the day. In addition, Polar have some new brass-vane air-dielectric trimmers mounted on steatite bases, as well as "postage-stamp" mica-dielectric trimmers.

For economical operation of multi-valve sets—the Exide "Hycap" accumulator.

Wearite continue their range of coils, many of which ("Uni-gen" series) have been introduced since Radiolympia, 1935, along with a new iron-core coil at 7s. 6d. and a short-wave coil costing 2s. 6d. Additionally, they have a new series of smoothing chokes and mains transformers.

Speaker Specialities

Something new, and worthy of the manufacturers' name, is introduced by W. B. This takes the form of a special loud-speaker-fitting remote control known appropriately as the "Long Arm." It enables the set to be switched on and off from an extension speaker besides acting as a volume control. It can be obtained separately, at 15s. 6d., and can be used with existing speakers. A feature of some of the



The new Bulgin "H.T.-from-L.T." vibrator unit.

W. B. extension speakers is that, in addition to being suitable for use in the ordinary manner, they incorporate a special volume control and push-button switch for use in conjunction with the "Long Arm." The large 37-S W.B. speaker unit has a new exponentially-curved cone for "quality" reproduction, but all units have a new one-piece moulded cone which has definite advantages over previous types.

All-purpose Valve

When one turns to valves and associated equipment, one finds much of interest. Perhaps one of the most fascinating developments is the Harries "universal" valve. This is not universal in the ordinary sense, having an indirectly-heated cathode for 4-volt 1-amp. operation, but is designed so that it can be used for a multiplicity of purposes. There are five grids and the valve can be employed as an H.F. pentode, double-diode triode, heptode frequency-changer, or as a critically-distanced-anode output valve. The latter is the type of valve developed by Harries-Hivac which functions as a pentode, but without the disadvantages generally associated with this type of valve from the viewpoint of perfect reproduction.

It is interesting to see the "Acorn" type of valve available in this country—made by Osram and Mullard. As readers are probably aware, this is the smallest type of valve ever devised, and its special feature is almost negligible inter-electrode capacity, making it ideal for ultra-short-wave work. It is available in triode and pentode form, and the chief objection to it is the price—50s. for the triode and 60s. for the pentode. Both valves are indirectly heated and consume .2 amp. at 4 volts. Another new midget valve, which is additional to the well-known Hivac series, is one produced by Mullards for use in deaf aids; it is metal sheathed, in which respect it is similar to a new Hivac midget. Other Hivac Harries valves include a range for 13-volt heater working, and the AC/YY, two of which give an undistorted output of 12 watts when used in push-pull.

Cathode-ray Tuning

Also coming within the category of valves is the new Mullard visual-tuning unit which comprises a triode valve and a miniature cathode-ray tube in a single envelope. It is of the type used for visual tuning on many of the 1937 commercial receivers; its moderate price will make it popular with constructors.

Other new valves include a number of types specially designed for use in television receivers and amplifiers, and among these mention might be made of the Osram N 43, an output pentode. Cathode-ray tubes of various patterns are now available in Cossor, Osram, Mazda, and Mullard ranges.

One other comparatively small item which is of great interest to the battery-set user is a new type of large-capacity mass-plate accumulator suitable for outputs more in keeping with the requirements of multi-valve sets. These are being made by most of the accumulator manufacturers.

SHORT WAVE SECTION

A TELEVISION SOUND SET

Practical and Constructional Details of a Simple Receiver for the Sound Portion of the Television Transmissions from the Alexandra Palace

By W. J. DELANEY

NOW that the television transmissions are actually on the air, the keen experimenter wishes to hear just what is being done in this new section of broadcasting, and now is the time to step in and hear the early experiments in order to obtain the maximum entertainment from the television programmes when they become finally established. For the reception of the picture side of these transmissions A.C. mains supplies are essential in order to obtain the necessary 3,000 to 8,000 volts for the anode of the cathode-ray tube as well as the other high voltages for the lens electrodes, time bases, etc. That being the case, it is assumed that the experimenter will have such mains facilities available and consequently a mains sound receiver will be built. The listener who is unable to take advantage of mains supplies may, however, build a suitable battery receiver but will only be able to receive the sound portion of the television programmes, but the circuit to be described may be built up for battery use. It should be borne in mind, however, that when transmitting on the ultra-short wavelengths a much higher standard of musical quality is possible, and in order to obtain the maximum performance from this type of transmission high-quality amplifiers should be used. The restriction of H.T. supplies consequent upon the use of batteries prevents good R.C. amplifiers from being employed, and to obtain a really loud signal from the necessary low anode loads which have to be employed with low-impedance valves, several L.F. stages are required.

An Experimental Receiver

An experimental receiver was built up in order to pick up the earlier test transmissions and it was found that within the service area of the present transmitter, very good quality sound signals were obtained with a simple reacting detector stage. A superhet offers higher sensitivity, but was not found essential 5½ miles from Alexandra Palace, although no doubt such a circuit will be capable of being linked up with a superhet vision receiver. I think that a sound set of the type now to be described will prove best for the amateur as it enables the sound portion of the programme to be picked up and no adjustments have to be made to this portion of the receiver, thus leaving the experimenter to devote his whole time to the adjustment and improvement of the time bases and other equipment required for the picture portion of the apparatus.

The circuit used in the tests is shown in Fig. 1, from which it will be seen that the utmost simplicity has been adopted. The reacting detector is followed by three stages (R.C. coupled) with fairly low stage gain, but with ample H.T. to allow the valves to give a fair quality output. This type of circuit is exceedingly simple to build up, is not critical with regard to layout, and requires no skill in operation.

The Layout

The layout adopted is shown in Fig. 2, from which it will be noted that the detector stage is crowded to one corner of the chassis, and only one control is employed. My preference lies in the direction of avoiding any adjustment to the sound receiver, so that this may be placed out of the way in the final television equipment, and be operated by a simple on/off switch, ganged with the vision on/off switch. For this purpose the tuning condenser is mounted on a bracket back near the aerial-earth input socket, and a very small (home-made) vernier condenser is joined across the main condenser and brought out by means of an extension rod to the panel so that slight adjustments which may be rendered necessary by changes in the experimental vision equipment may be carried out. The reaction control is a pre-set, adjusted experi-

(Continued on page 685)

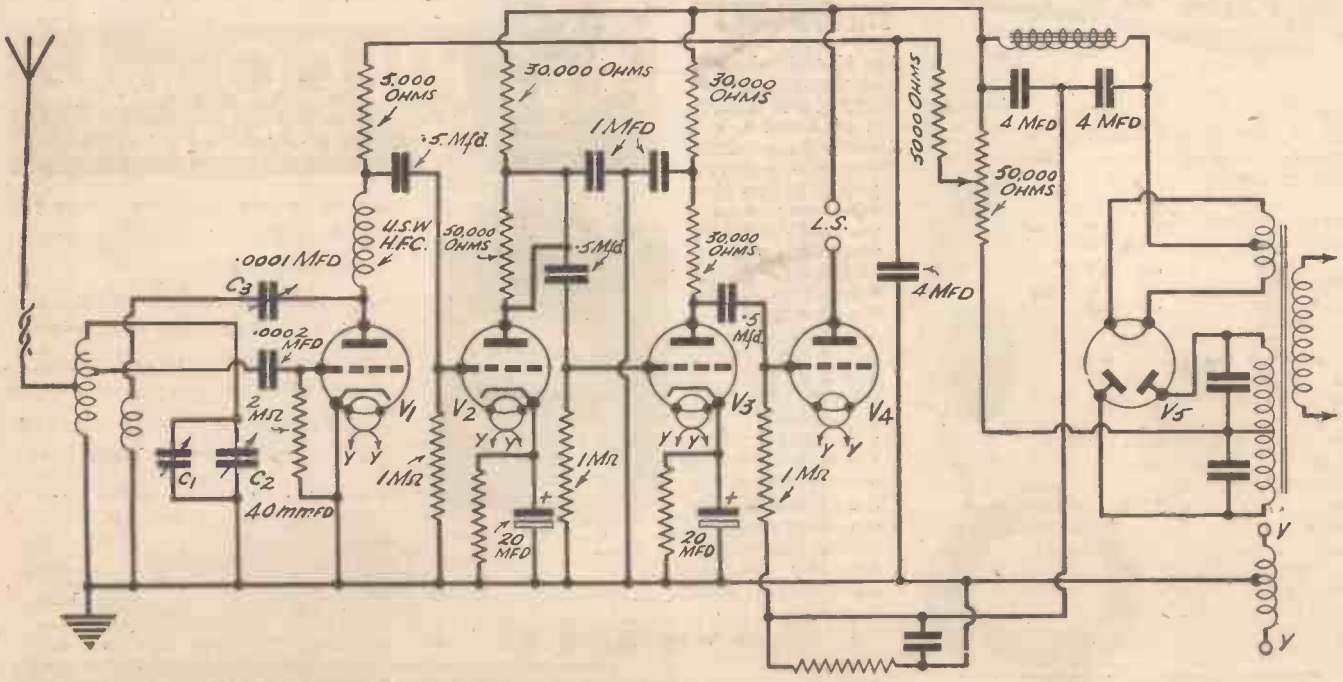


Fig. 1.—Theoretical circuit of the Sound receiver referred to above. The valves employed are as follows: V1—41 MH (Cossor), V2—AC/HL (Mazda), V3—AC/HL (Mazda), V4—PP3/250 (Mazda), V5—460 B.U. (Cossor)—Equivalents may, of course, be employed.

SHORT-WAVE SECTION

(*Continued from page* 683)

mentally for the necessary sharpness of tuning, and is not employed for signal build up in my locality. With a simple aerial input arrangement there was a faint but unmistakable background from the vision transmission, but a slight application of reaction coupled with a modification of the grid circuit effectively prevented this. If it is thought desirable, the constructor may bring out both reaction and main tuning controls to a panel, using standard extension handles for the purpose.

The tuning condenser used is an Eddystone Microdenser with a maximum capacity of 40 mmfds. and the tuning coil is mounted direct on the end of this. The coil in the grid circuit consists of three turns of 15 S.W.G. silver-plated copper wire wound to a diameter of 1in., and having an overall length of ¾in. The reaction coil is of similar wire with the same diameter, but only two turns are used and these are pulled out to provide a total length of nearly 1in. (The coils are actually dismantled from a B.T.S. Ultra-short wave unit.) The ends of the grid coil are soldered direct to the tuning condenser, and the reaction coil is soldered to one side of it and is approximately ½in. from the grid coil.

The L.F. Circuit

The lead to the aerial terminal is less than one inch in length, but is cut and twisted to provide a small capacity coupling to the aerial, as no condenser which I tried was found to provide quite the same effect. Furthermore, the lead is soldered to the exact centre of the grid coil, whilst the lead to the grid condenser is soldered about three-quarters of the way round the first turn. Again, this particular position was found as the result of experiment with clips and provided the necessary selectivity in my particular case. It may be found in other cases that the latter tapping is not essential. The grid leak and condenser are of standard values, but the anode resistance which follows the H.F. choke (B.T.S. Type UHF2) is very low in value, and is followed by a decoupling resistance joined to the arm of a potentiometer employed to find the best working value for the valve. The remainder of the L.F. circuit is quite standard, and each anode circuit is decoupled. For biasing purposes the standard cathode resistance and condenser circuit is adopted, and the latter components are of the electrolytic type mounted direct on the chassis.

Mains Supply

A Heayberd transformer delivering an H.T. output of 350 volts supplies the Cossor 442 BU rectifying valve, and the heaters are all fed from a common L.T. winding. An ordinary smoothing choke with standard 4 mfd. electrolytics provides ample smoothing, and no hum is audible on the speaker. As will be seen from the layout plan, the L.F. valves are equally spaced and the connection from anode of one to the grid of the next is accomplished by the actual coupling condenser. If the constructor feels that the expense is warranted oil or mica dielectric condensers could be used here. The resistances and grid leaks are joined direct from point to point by means of the wire ends, and a simple wooden chassis (metallised) with ebonite panel completes the receiver.

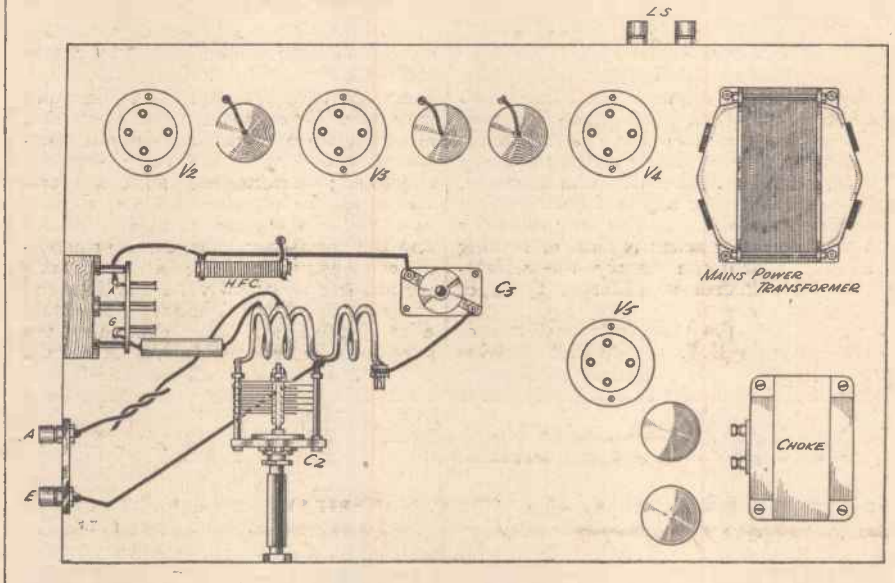


Fig. 2.—The layout employed in the sound receiver. Note that no screening has been found necessary in this simple arrangement.

The Aerial

It was found possible to hear the transmissions on a full vertical aerial of the "No-Mast" type, but subsequent tests showed that a special aerial was a decided advantage. Changes from this to various short wires and a dipole gave very little difference in volume or selectivity, but definitely gave marked differences in the ratio of signal strength to interference. With the ordinary type of vertical aerial, every car which passed along the road gave a loud sound in the receiver, building up as the car reached the house and dying away to inaudibility over a distance of about ten or twelve houses. A short dipole, without input matching devices, practically eliminated the trouble, although the cars may still be heard approximately one house on either side. No doubt tuned feeders or other input devices will enable this to be completely removed, whilst the position of the aerial will also be changed in due course. However, sufficient has been given to enable those experimenters who want to go ahead to build a similar type of receiver and hear the experimental transmissions.

LEAVES FROM A SHORT-WAVE LOG

A TRANSMISSION which comes through nightly at great strength is that put out by PRF5, Rio de Janeiro, on 31.58 m. (9,501 kc/s). PRF5 has a three-note gong as interval signal, and intersperses its talks with orchestral or "canned" music.

The call is given in English as a rule, towards the end of the programme, otherwise during the broadcast in Portuguese only (phon.: *Pay-air-effe-sinko*), *La Voz do Brasil*. Best time to tune in is towards B.S.T. 22.00-23.00. If you wish to secure a "veri" of your reception, address report to: 305, President Wilson Avenue, Rio de Janeiro (Brazil), and enclose an International Reply Coupon to defray cost of return postage.

In the early morning it is now an easy matter to log W9XF, Chicago, on 49.18 m. (6,100 kc/s), which on Mondays, Wednesdays, and Saturdays works from B.S.T. 05.00-06.00. If you hear this station closing down, do not switch off but remain tuned to the same channel, as within a few minutes you will pick up Belgrade giving out its early morning call prior to the first transmission.

New Cuban Call

A broadcast apparently emanating from Havana (Cuba), with the call CMC and COCQ, and with the sub-title *La Voz de la RCA Victor*, has been picked up on about 31.12 m. (9,640 kc/s); some weeks ago a new transmission from Cuba had been logged on 30.8 m. and this might well be the same station. Further particulars from any reader who has heard the broadcast would be welcomed.

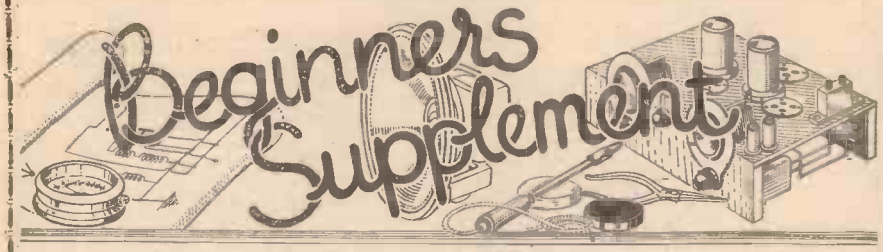
And From the Argentine

The two Buenos Aires short-wave stations which relay LR1, Radio el Mundo, have now adopted a fixed time schedule. LRU, on 19.62 m. (15,290 kc/s), works every day from B.S.T. 13.00-21.45, when its duties are taken over by LRX, which comes on the ether at B.S.T. 02.00 for one hour's broadcast. LRX, previously on 31.32 m., owing to interference, has adopted 31.06 m. (9,660 kc/s) as its permanent channel.

Two Newcomers

VJZ, Rabaul, New Guinea (Bismarck Archipelago), on 21.61 m. (13,880 kc/s) is a new station belonging to the Amalgamated Wireless (Australasia), Ltd., and has been recently converted to telephony. Tests in speech and music towards B.S.T. 10.00 were recently logged in the United States. Another newcomer, this time heard in Great Britain, is Santiago (Chile), CB960, a 100-watter on 31.25 m. (9,600 kc/s), which gives out the call: *Radio Praco*. Announcements are made in Spanish and English. The schedule is a daily one—namely, B.S.T. 01.00-06.00. Reports should be sent to Señor Henrique Humeres, Radiodifusora Pilot, Casilla 1342, Santiago (Chile).

Finally, a piece of information which may be of interest. Daily at B.S.T. 08.00, Radio Colonial, Pontoise (Paris), may be found on 24.49 m. with a special relay of the French news bulletin for rebroadcast by Radio Algiers between 08.00-09.00. The channel used is TYB, Paris T.S.F. (24.49 m., 12,250 kc/s), a 10-kilowatt commercial transmitter usually operating during the day in telegraphy and telephony with French Morocco.



THE EXPERIMENTER'S POWER SUPPLY

Details of an A.C. Operated High-tension Unit Suitable for Any Output Up to 250 volts at 60 milliamps. By FRANK PRESTON

IN an article published in last week's issue we described a suitable arrangement for an experimenter's test bench, the details applying particularly to battery operation. But there are now many readers who have A.C. mains available for the supply of the necessary H.T. and L.T. current. Consequently, it is much better and more economical to make use of this. The only difficulty which normally arises is that of making a unit which can supply the widely-varying demands of different types of receiver.

Probably the simplest method of arranging an H.T. supply unit suitable for practically any output is as shown in Fig. 1. It will be seen that a Westinghouse metal rectifier is used, this being connected on the voltage-doubler principle to a transformer having three output tappings. The latter provide A.C. voltages of 200, 175 and 110, with which the three available maximum outputs from the rectifier are approximately 250 volts, 60 mA; 200 volts, 60 mA, or 160 volts, 40 mA. One of these should be suitable for nearly any type of modern receiver, whether employing battery or mains valves.

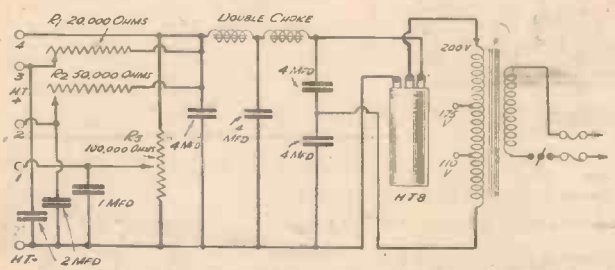


Fig. 1 (above).—Circuit of the H.T. unit described.

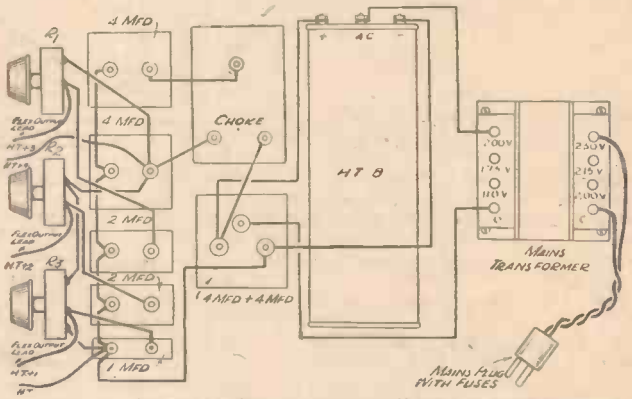


Fig. 2 (right).—Semi-pictorial wiring plan of the circuit in Fig. 1.

Voltage Tappings

In addition to these three maximum outputs—obtained from the tapping marked H.T.+4 in Fig. 1—alternative voltages and currents can be taken from the tappings marked H.T.+1, 2 and 3. Tapping number 1 is for screening-grid supply and is taken from a 100,000-ohm potentiometer connected in parallel with the maximum-positive and negative terminals. The other two tappings are from variable resistances which are capable of limiting the voltage from maximum down to 20 or 30 volts at, say, 2 mA. Thus it is possible to obtain almost any voltage and current that may be required by using one or other of the transformer-secondary tappings in conjunction with the variable resistances.

Practical Details

The remainder of the circuit is perfectly straightforward and calls for little comment, although it can be seen that a double smoothing choke is employed to ensure absolutely hum-free working. This is a Heayberd type 753, and the transformer may also be obtained from Heayberd, although there is not a standard component listed with the three tappings suggested; nevertheless, such a transformer can be supplied at a cost slightly in excess of a component tapped for 200 and 175 volts only. The several smoothing condensers should be of a type suitable for not less than 350 volts working, and some constructors might prefer to obtain a multi-condenser block combining the seven condensers required. As to the potentiometer and variable resistances, these should be good wire-wound components. A Q.M.B. switch is included in series with the transformer primary winding, whilst a mains plug of the type with self-contained 1-amp. fuses is advised. Suitable components are to be found in the Bulgin range, and are stocked by most good dealers.

It will generally be considered most satisfactory to mount all the components on a flat baseboard, and a suitable layout is given in Fig. 2, where the parts are shown in pictorial form, although they are not of any particular make. In any case, their exact choice is not important, provided that they are of sound construction and reputable manufacture. The various output connections are shown as flexible leads, since the experimenter will probably wish to connect them to a distribution board such as that described in the article dealing with the test bench. Although not shown in Fig. 2, it is a good plan to arrange a metal cover over the components as a protection against shocks, especially if the unit is to be kept on a shelf beneath the bench top, as is generally found most convenient. The cover can be made from perforated sheet iron or even perforated zinc, although the former is by far the better. An iron cover acts as a screen, and so prevents the possibility of mains hum due to unwanted couplings. It should be about 1in. away from the components and connected to the earth terminal of the receiver.

Voltage Measurements

The output leads can be attached to a distribution board similar to that described last week, and the various jacks can be fitted as before. There is, however, one point which must carefully be watched in this respect; that is that the voltmeter should be connected only when a receiver is wired to the H.T. unit, or when the meter is set to read a much higher voltage than that normally provided. The reason for this is that the voltage might well rise to 400 volts or so when there is no "load" on the supply. In any case, an accurate reading of the voltage applied to any particular terminal in the receiver can be obtained only when the normal current is being passed. As an example of what is meant it can be explained that if the variable resistance in series with tapping H.T.+3 were set to provide 80 volts at 5 mA a voltage of 130 or so would quite probably be obtained if the set were not connected to the supply.

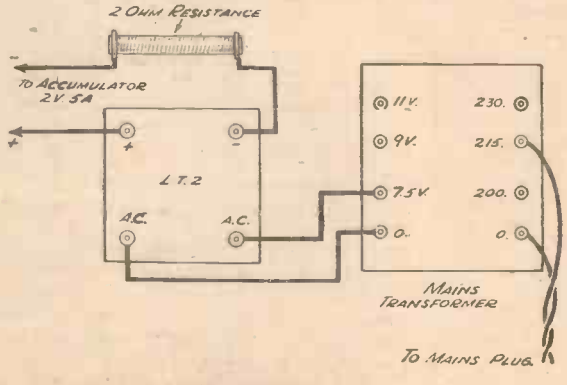


Fig. 3.—Semi-pictorial view of a simple .5-amp. A.C. trickle charger.

A Trickle Charger

The unit shown is, of course, for H.T. only, but it could easily be modified to supply 4 volts A.C. as well, either by having a mains transformer with an additional winding, or by connecting the primary winding of a 4-volt L.T. (A.C.) transformer in parallel with the primary of the existing transformer. That alteration would make the unit suitable for operating most types of A.C. receiver, but for

operating battery sets it would be better to employ the existing accumulator in conjunction with a trickle charger. The latter can easily be made (to give 2 volts, .5 amp.) by using a Westinghouse L.T.2 metal rectifier in conjunction with a Heayberd W.36 transformer and a 2-ohm fixed resistance made by winding approximately 1½yds. of Eureka resistance wire on a strip of fibre. The connections are shown in semi-pictorial form in Fig. 3. whilst Fig. 4 shows how a two-pole change-over switch can be used for controlling both the trickle charger and the H.T. unit. When the switch is turned to the "charge" position the accumulator is automatically disconnected from the set and joined to the charger, the H.T.

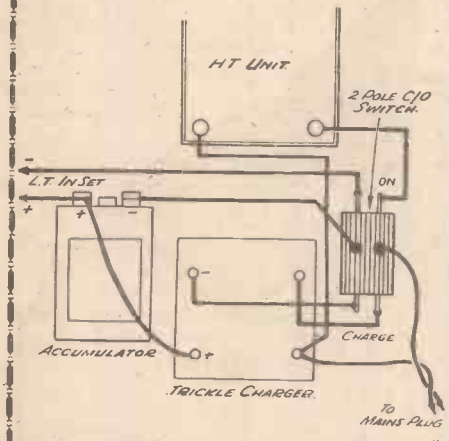


Fig. 4.—Wiring for switch to bring H.T. unit or trickle charger into action.

being switched off. When the switch is turned to the "on" position the charger is disconnected, the accumulator joined to the set and the H.T. switched on.

L.T. from the Mains

We frequently receive enquiries from readers who ask how to make a unit for supplying low-tension current direct from the mains. Whilst it would scarcely be true to say that this cannot be done, it is certainly not recommended; it is expensive and the user runs a continual risk of burning out the valve filaments. This is because the unit could only be designed to give a certain current output at a particular voltage. If the current actually taken were less than that for which the unit were designed the voltage would rise—and this would, naturally, be disastrous. In other words, if the filament of one valve did "go"—due to old age, perhaps—the others would be burned out because of the extra voltage applied to them.

By far the best method is to employ an accumulator, which automatically regulates the voltage and keeps it reasonably constant irrespective of the current load. In any case, the accumulator requires very little attention if a trickle charger is used. The charger described provides 2 volts at .5 amp. when the transformer connections indicated are used. Thus, if the set uses .5 amp. (an average figure for a three- or four-valve set), it is necessary only to turn the switch over to "charge" for a slightly greater length of time than that for which the set is used in order to keep the battery fully charged. If the receiver consumed 1 amp. the battery would require to be charged for double the time the set was in use; if it used .3 amp, charging should occupy about 3½ hours for every five hours' use of the set.

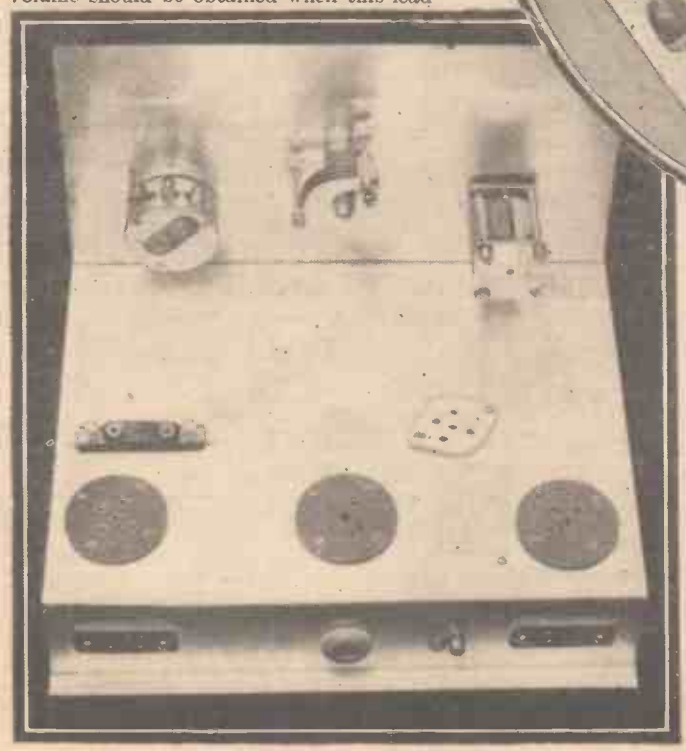
The BANDSPREAD Short-Wave Three

Adjusting and Operating Our Latest Short-wave Receiver

THE constructional details and wiring diagram of this receiver were given in last week's issue, and it is probable that hundreds of short-wave enthusiasts will have completed the constructional work by now. The wiring is so simple that no difficulty whatever should be experienced, but care should be taken to keep the under-chassis components clear of the metal surface. Resistances R1 and R3 have long connecting leads and therefore if there is a tendency for them to touch the metal chassis it will be advisable to place a piece of insulating material, such as empire cloth, underneath these components. Alternatively, their free ends may be secured to the nearest M.C. bolt by means of insulated wire. The only other point that needs mentioning is the volume control. The spindle of the specified control is insulated from the centre tag, and therefore it will not be necessary to use an insulating bush. If a non-specified control is used, however, it will be advisable to insulate the spindle from the metal panel.

Battery Leads

After the wiring has been carefully inspected, the battery leads may be joined up. H.T.3 should be plugged into the 120-volt socket of the H.T. battery, H.T.2 into a socket between 90 and 120 volts; greater volume should be obtained when this lead is plugged into the 120-volt socket, but the H.T. consumption will be greater than with the 90 socket in use. The voltage applicable to H.T.1 is governed by that applied to H.T.3. With 120 volts on the latter, H.T.1 should have approximately 36 volts, but the best socket can only be found by experiment. The H.T.— lead should, of course, be plugged into the — socket of the H.T. battery and the G.B.+ lead into the + socket of the G.B. battery, with the L.T. + and L.T.— leads connected to the + and — terminals of the accumulator respectively. G.B.2— lead must be plugged into the —9 socket of the G.B. battery, and G.B.—1 into the —4½ or —6 socket. As the H.T. battery is running down, it will be necessary gradually to lower the setting of G.B.—1, however. When the battery



On the left is the chassis, and on the right the coil and valves are in position.

LIST OF COMPONENTS FOR THE BANDSPREAD S.-W. THREE.

One short-wave coil, type B (Wearite).
One bandspread tuning outfit C2, C3 (Eddystone).
One 50,000 ohm potentiometer R6 (B.T.S.).
One air-dielectric pre-set condenser, Type SW.87 C1 (Bulgin).
Five fixed resistances (1 watt type) (Erie).
50,000—1 R1. (Erie).
100,000—2 R4, R5. (Erie).
1 megohm—2 R2, R3. (Erie).
Seven Fixed Condensers:
One .0001, Type 665 C8 (Dubilier).
One .001, Type 4501 C11 (Dubilier).
One .01, Type 4501 C9 (Dubilier).
Four .1, Type 4503 C5, C6, C7, C10 (Dubilier).
One 3-point on/off switch (B.T.S.).
Four chassis-type valve-holders, 3 four-pin, one 5-pin (Clix).
Two terminal Strips, aerial and earth and loud-speaker (Belling-Lee).
Seven wander plugs, H.T.—, H.T.1, H.T.2, H.T.3, G.B.+, G.B.1, G.B.2 (Belling-Lee).
Two spade connectors, L.T.— and L.T.+ (Belling-Lee).
One S.W. H.F. Choke, Type H.F. 3 (Bulgin).
One Type RC32 reaction condenser (B.T.S.).
One loud-speaker, Type 37M. (W.B.).
One pair headphones (Ericsson).
One Microfuse with Holder (100 m/A).
One Bandspread Three Cabinet (Peto-Scott)
One metal chassis 10in. by 7½in. by 2½in. (Peto-Scott).
Three valves, Types HP211, HP210 (4-pin), PP222 (5-pin) (Tungsram).

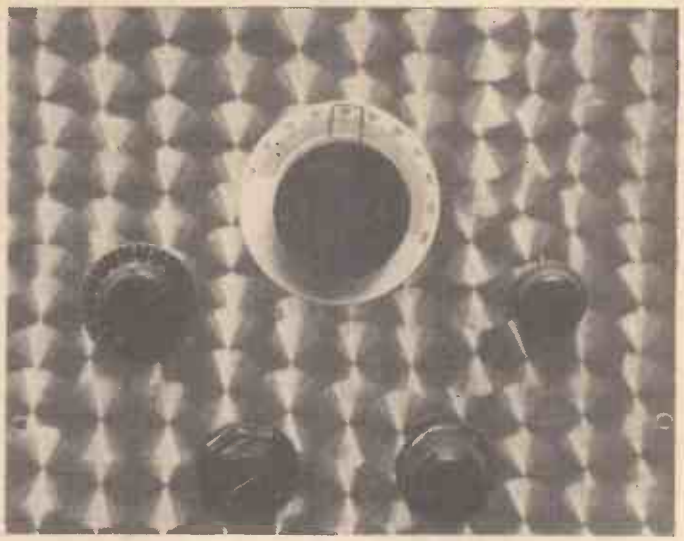
voltage has dropped to 80 volts, about —3 volts bias will be sufficient.

Aerial Series Condenser

When the battery leads have been correctly wired, the aerial-earth, and loud-speaker leads may be joined to their respective sockets and the set switched on by means of the three-point on-off switch. If a very long aerial is used the aerial series condenser C1 should be adjusted so that the moving vanes are nearly out of mesh. Reducing the setting of this condenser has the effect of reducing the effective length of the aerial. In most cases it will be found that best results will be obtained by keeping the volume control at maximum setting, but this control will often be found useful for improving the selectivity when interference is experienced from adjacent stations.

Tank Unit

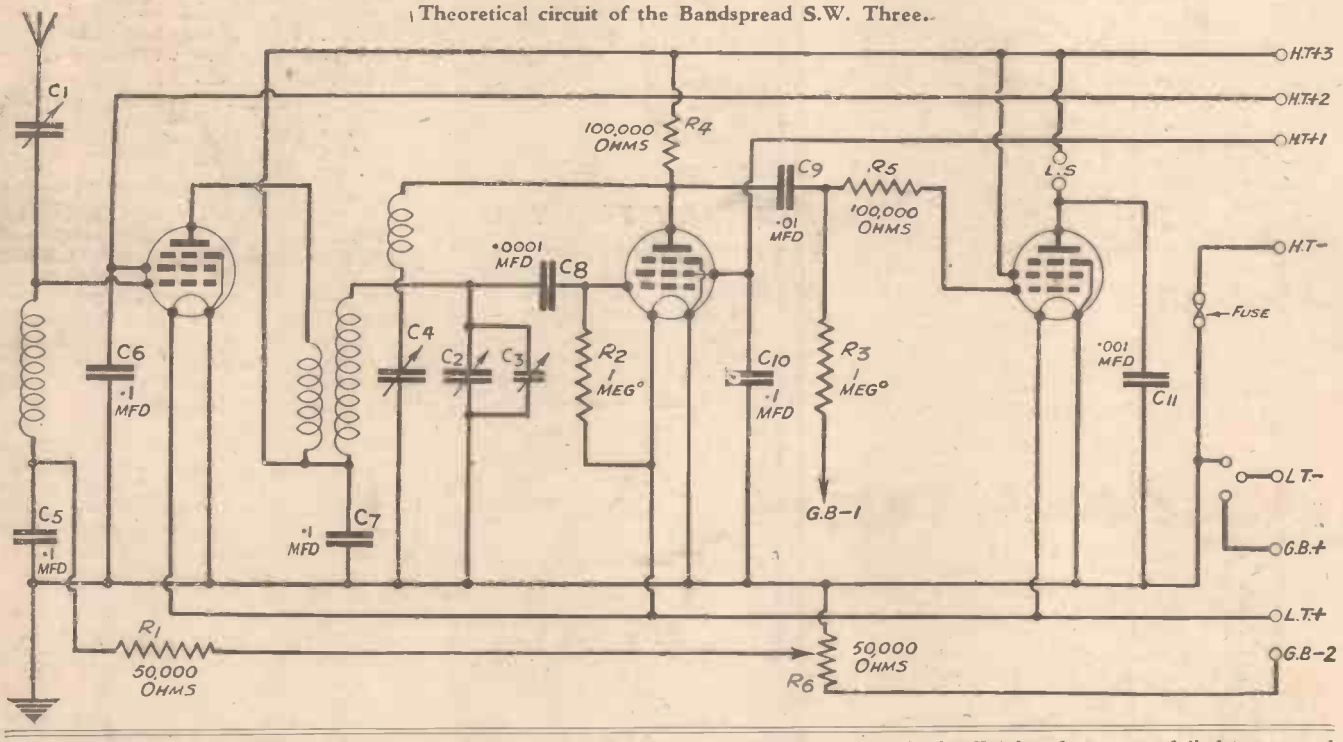
It is not likely that many constructors will have previously used the Eddystone tank unit, and therefore a few notes will be given concerning this. Condenser C3 is the tank, having a maximum capacity of 140 m.mfd., variable in ten steps by means of the control knob. Condenser C2 has a maximum capacity of approximately



The panel of the Bandspread S.W. Three.

20 m.mfd., and is connected in parallel with the tank C3, thereby enabling the operator to increase the effective capacity across the coil by this value. The specified coil has a wave-range of 24.6 to 51 metres when tuned by means of a .00016 mfd. condenser, and therefore when stations between 24.6 and approximately 27 metres are to be tuned in the tank condenser control should be set at the first stop. If, on the other hand, stations between 40 and approximately 43 metres are to be picked up, stop 5 should be used. The use of the tank unit in conjunction with a band-spread condenser having a remarkably smooth slow-motion drive greatly simplifies tuning—stations can be tuned in as easily as on the medium long-wave bands.

Theoretical circuit of the Bandspread S.W. Three.



B.L.D.L.C.—IMPORTANT NOTICE

IT is regretted that the scheme inaugurated by the B.L.D.L.C., under which readers could obtain through us verification cards from the various stations which they receive on all wavelengths, has had to be discontinued. Members will remember that a form had to be completed giving details of the programme received and this form was sent to us together with 4d. in stamps. We, in turn, despatched these to the various stations together with the necessary remittance for a reply, and the official verification cards, together with other interesting details of the stations and programmes, were then forwarded either direct to the reader or to us. Unfortunately, a large number of transmitters, both official and amateur, failed to respond to this arrangement, and although a remittance for reply was enclosed, no verification card was received, and no receipt or acknowledgment given.

Such a state of affairs causes annoyance to the amateur, and the only practical course is to discontinue this service. The remaining facilities of the Club will still be in force, however.

LETTERS FROM READERS

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

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

An Appreciation

SIR,—Although I have been a regular reader of your worthy magazine since the amalgamation last year, this is the first time I have expressed my appreciation. It really is a splendid threepennyworth.

I, too, would like to see more about the short and ultra-short wavelengths, and also television reception.—A. WALL (Hornchurch).

Reports and Postage and Q.S.L.'s

SIR,—I read with interest the letter from W. T. Cooper in the issue of August 22nd, and note that he finds it difficult to answer thirty-seven cards from Australia and New Zealand. W. T. C. does not state whether these cards included a reply coupon or not, but when a reply coupon is sent with a report from any part of the world it should be worth a Q.S.L. card.

Personally, I think that the trouble to write out the few words necessary on a Q.S.L. card and address an envelope (many foreign amateurs do not use envelopes, and therefore the extra they get on a reply coupon repays them for the card) should be looked upon as all part of the radio work which a transmitting amateur does. I am sure that W. T. C. and any other amateur can easily find time to reply to those S.W.L.'s who send return postage, and as for the price of the card and envelope, nobody can say they are very costly.

As for myself, I have never sent a report to a British amateur on 7 mcs., and I only possess three Q.S.L. cards from G stations, which I heard on 14 mcs. I have, however, sent about fifty reports since May of this year (all with reply coupons) and I am still waiting to hear from about twenty of them. I give here their calls, which may interest other amateurs: W3DMV, W1GPE, W2ZC, W4DAY, W2FOA, W1IFD, W1CHG, VO1I, VE1DC, VE1AW, SU1CH, OK2AK, OE6MP, SM5SI, EA7AI, CT1AY, CT1BG, LA2Y, and OZ5BK.

What I want to know is what happens to my reply coupons? If the station does not require reports, why do they not use the reply coupon and tell me so? I could then pass on the information to other S.W.L.'s. I would very much like to hear other readers' views on this subject.—N. OWEN (Kettering).

SIR,—With regard to the letters of Geo. Miller (West Ealing) and W. T. Cooper (Walthamstow) concerning "Reports and Postage."

It seems to me that many of the amateur stations that do not verify fail to do so because they do not wish for reports. This attitude, I think, is due in a large number of cases to the fact that reports sent them do not contain worth-while information. Stations must have definite particulars of Q.S.A., R., Q.S.B., etc. Some listeners who send good reports of this kind, in return get a "veri" even, very often, from stations which are "black-listed." The S.M.'s are too "local," and owing to this they receive more reports than is really necessary, and therefore a reply cannot be expected in every case. SU1CH is, no doubt, notorious. W stations have recently been reminding him, many times, to confirm his Q.S.O.'s with them. If he won't do this, what chance has a S.W.L. of obtaining a Q.S.L.? I am in a club whose membership is about 350, and we have yet to hear of someone possessing SU1CH's card, although good reports and coupons have been sent. So to Geo. M. I say, concentrate more afield on VK's, W7's, J's, or similar real DX, and he will then get a very much better return for his time and expenditure. On August 20th, 1936, 23.25 B.S.T., I heard SU1CH tell a certain G station he had been getting away hundreds of Q.S.L. cards. So live in hopes yet, G. M. There is one outstanding question I should like to ask, that concerns all S.W. listeners, like myself, who send out reports. Can anyone tell us what actually happens to the reply coupons when stations receive them but fail to reply. Surely they don't burn them! Wishing PRACTICAL AND AMATEUR WIRELESS great success.—W. E. G. BARTLETT (Weymouth).

H.M.V. All-wave Sets

SIR,—In several leading daily and weekly papers of this week it is stated that the H.M.V. sets tuning from 7 to 2,000 metres are the first British or American sets to cover such a low wave-range. May I point out that an American set was recently advertised as tuning 4½ to 2,000 metres.

I have not used or seen one of these sets but surely there must be a mistake in your statement.—R. L. DARTAN (Westcliff-on-Sea).

[*The H.M.V. Company claim that they are the first English or American company to manufacture a* range *of radios and radiograms tuning to such a low wavelength. It is quite true that certain American receivers are advertised which go down lower than the H.M.V. sets, but these are not members of a complete range, but individual models. The H.M.V. range comprises four radiograms and two table models which tune down to 7 metres.*—ED.]

A Log from County Armagh

SIR,—As I have not seen a log from this district published in your paper, I enclose mine, which I hope will be of interest. My set is an o-v-1 with inverted L type aerial, 60ft. long and 20ft. high. All reception is on phones. My log shows the following stations :—

Amateurs (20 m.): Sixty U.S.A., also VE3JV, VE3EO, YE3OX, VE1AW, VE1FE, VE1CR, VE1BR, VO1J, VO1I, TI3A, NY2AE, CO6OM, CO7CX, HI5X, VP6YB, HI7G, LU4DH, ON4OU, HB9A, I1TKM, I1KG, SM5SX, OK3VA, ON4VK, and PY2EJ.

On 40 metres: Ninety G stations and numerous European amateurs. On the broadcast bands I have logged over twenty stations, including VK2ME, VP3MR, and most of the Americans.

I should be pleased to get in touch with any short-wave listener who is interested in the 20-metre band and who is, preferably, about my own age—eighteen years.—WOLSEY GILPIN, Carne, Portadown, Co. Armagh, N. Ireland.

From a South African Reader

SIR,—Prior to the late Mr. Streeter's broadcast concerts, the only items we could listen to here were ships' morse and the "Slangkop" (snakeshead) ships' transmitter, which dealt with the traffic to ships at sea.

I use a "Blue Spot" R 69 speaker with a thick cardboard baffle 2ft. square, the boards being separated by rubbers at various points. This arrangement, which is supported on a cross-bracket in the corner of the room, just over half-way to the ceiling, and about 5ft. from the set, gives excellent results. Recently, however, there was distorted reception, and although this particular neighbourhood is noted for its bad receptive qualities, owing to the minerals in the near-by mountains, I felt that there were other causes. After satisfying myself that the valves and connections were all right, I took down the speaker, and found the trouble. Across the gap where the centring-pin is connected there was the fine textured web of a small spider, which was apparently acting as a short across the speaker magnet.

Here is an experiment which proved satisfactory. As previously mentioned, this particular part of the Peninsula is notorious for bad reception, so to try and improve matters on my Reinartz I wound some eighteen-gauge d.c.c. wire over the insulated lead-in, each turn occupying about ¼in. to 1in., and every 12in. I wound ten turns as close together as possible. At the end near the set I fixed a clip, which I connected to the aerial side of the fourth coil connection on the coil platform. Not only did I get much stronger signals—at least one-third stronger—but I was also able to cut out Capetown and receive Pretoria and Durban on the speaker, at entertainment value, and Johannesburg and Grahamstown on the 'phones without using a wave-trap. This arrangement may not be new, but I have never heard of it before.

S.-W. reception here is very erratic. Some nights it is difficult to read the powerful commercial morse stations, and on other nights Daventry will be good for about an hour on 19 m. only. Berlin and Paris are often strong, but no sign of Daventry on the 25/31 m. band. However, I anticipate better results in a few months.—T. TENNYSON (Kalk Bay, Cape, S. Africa).

CUT THIS OUT EACH WEEK

Do you know

—THAT interference may be reduced in short-wave receivers by using a tuned aerial system of special design.
—THAT a low-impedance speaker may be used for an extension speaker if a matching transformer is incorporated in the receiver.
—THAT L.F. transformer characteristics may be modified by connecting a resistance across the secondary winding.
—THAT vaseline spread round the connections to an accumulator will prevent corrosion by acid fumes.

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

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

RADIO CLUBS AND SOCIETIES

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

Bideford and District Short-wave Society

IN spite of summer counter-attractions, the fortnightly meetings of the Bideford and District Short-wave Society continue to be well attended. It had been intended to hold a Direction-Finding Field Day, with a portable transmitter located at a position to be found by the D.F. receivers, but some preliminary tests showed that for accurate bearings considerable care is necessary in the design and set-up of the receiving apparatus. As a result of these tests, a sound design has been evolved, and it is anticipated that when the Field Day is held, good results will be obtained.

The Morse Classes are being continued, and it is hoped that at least one member of the Club will shortly be granted a full transmitting licence. In this connection, the Society aims to possess eventually its own quarters and gear, but this depends to some extent on new membership, for which application is invited to the Hon. Secretary, Mr. E. K. Jensen, 5, Furzebeam Terrace, East-the-Water, Bideford.

Scottish Short-wave Radio and Television League

THIS Club holds its meetings weekly on Friday nights, 7.45 p.m., at Newspaper House, Hope Street, Glasgow. Lectures on Short-wave work, Television and kindred subjects will be given during the current session. A special feature will be a class for beginners, including morse. Mr. Baird, of television fame, is an honorary president. The subscription is 2s. 6d. per annum, payable in January. Intending members should communicate with the Secretary, Mr. James Neilson, 14, Bolivar Terrace, Glasgow, S.2.

BOOKS RECEIVED

Eddystone Short-Wave Manual

WE have just received a copy of No. 3 of this useful Manual, and can recommend it to all readers interested in short-wave work. Included in the Manual, which runs to 44 pages, are practical articles on the construction of a two-valve battery receiver, tuning from 15.5 to 52 metres; a four-valve battery model with bandspread tuning (15-100 metres); a five-valve superhet for A.C. mains (13.6 to 80 metres); a four-band transmitter for the amateur frequencies; and a battery operated five-valve superhet (13.6 to 87 metres). Notes on the construction and operation of a short-wave radio telephone, and a one-valve short-wave H.F. amplifier or S.W. converter, are also given in the Manual. There is also some useful information on short-wave aerials, soldering your set, and "wavelength or frequency?" Theoretical circuit diagrams, wiring diagrams, and list of component parts are given for all the sets described, and at the end of the Manual there are useful tables of the chief S.W. Broadcast Stations. This handy Manual, which is priced at one shilling, is published by Stratton and Co., Ltd., Eddystone Works, Bromsgrove St., Birmingham, 5.

REPLIES IN BRIEF

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

W. McC. (Carluke). We suggest that you insert a small advertisement in our pages. We are unable to publish your letter or to arrange for the exchange mentioned.

D. McK. (Alexandria). The condenser mentioned should certainly be non-inductive to avoid risks of instability. We do not advise you to attempt to convert an inductive paper condenser into a non-inductive one. Various makers adopt different methods of winding and connection to fulfil the requirements of a non-inductive condenser.

J. H. M. (Hirwaun). We have no blueprint which we could recommend in your particular case. We suggest you obtain the parts for one of our new sets described in this issue.

C. G. J. (Copnor). Whilst the circuit is theoretically correct, and the various voltages may be accurate, the instability may be caused by the layout. There may be some coupling between leads or between components which is causing the trouble, and your search should therefore be conducted from this point of view.

E. D. (Urmston). A modification of your aerial coupling, and perhaps also of your earth connection may cure the trouble.

C. M. (Whitchurch). The district may not be so good as your previous one, and inquiries amongst local residents or at a local dealer will enable you to ascertain the type of reception possible on your receiver. Alternatively, your new aerial may not be so efficient, and the earth connection may be poorer.

J. H. F. (Church, Nr. Acc.). Your wave-change switch must be faulty, and without a circuit diagram this is the only suggestion we can make.

J. F. (Hull). Full constructional details for winding a transformer cannot be given in the form of a reply, and we therefore refer you to the various articles on the subject which we have published.

H. H. W. (Llanelly). The component in question is not now manufactured, but you may be able to obtain it from Premier Supply Stores.

G. M. (Hendon). If the makers no longer supply the coil we regret that we cannot assist you, and suggest that you obtain a complete set of coils of another make.

R. W. (Totnes). Messrs. Peto-Scott can supply complete kits, and will quote you regarding the various sets described in our pages.

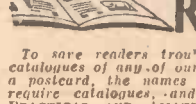
G. A. (West Croydon). How did you measure the voltages? If a low-resistance meter was employed the readings will not be correct, and this may account for the values given in your letter. A good high-resistance meter (1,000 ohms per volt) should be used.

F. B. H. (Andover). The set could be operated from the mains in so far as the high-tension is concerned, but a complete re-design would be required to fit all-mains valves, and in this case we do not recommend the procedure.

A. J. (N.W.2.). It is quite possible that the transformer primary is responsible, and this may be short-circuited. If no crackles are then heard you will know that the primary was the cause of the trouble, but if the noise persists you will have to look elsewhere for the cause. A faulty resistance or a badly-made connection can cause the trouble.

J. P. (Dewsbury). Is the trouble due to vibration from the choke or transformer? If the laminations are not tightly clamped they may be vibrating and transmitting the movement to other valves, thus giving rise to the trouble. If the hum is due to electrical sources better smoothing is indicated, and this may be accomplished by replacing the choke with one of higher inductance (but the same D.C. resistance) or by larger condensers. A broken-down condenser may give rise to hum.

CATALOGUES RECEIVED



To save readers trouble, we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogues," PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

CLIX COMPONENTS.

IN the latest illustrated folder issued by Lectro Linx, Ltd., particulars are given of the new Clix plugs and sockets for mains use. The pins in the Clix plug are of the helically-slotted type which allows of a positive fit in varying socket diameters. The wire strands are securely held. Popular lines are a 5-amp. fuse plug, fitted with two fuses of either 1 or 5 amp. ratings, and a 5-amp. 2-pin wall plug fitted with Clix patent self-centring pins. Other lines included in the folder are a two-piece plug adaptor, a loudspeaker "plug-switch," and various types of terminals and connectors. Copies of the folder can be obtained on application.

QUERIES and ENQUIRIES

A.C. Four-valve Push-pull Circuit

"Please could you supply me with a three or four valve circuit employing push-pull output and designed for A.C. mains. What would such a circuit cost?"—E. H. (Hackney).

OUR Hall Mark Four series consisted of an H.F. stage, Detector and push-pull output stage, and the receiver has been designed for battery use, and for A.C. or Universal mains working. The Universal model provides the maximum undistorted output, and blueprints for each of these are obtainable at 1s. each. Fuller details, including blueprint numbers, will be found in our Blueprint Service list included in each issue.

S.W. Coil Connections

"Is there any standard formation of the wiring of four-pin and six-pin coils in respect to the pins? I have two —— short-wave 4-pin coils with a range from 12 to 47 metres. I see that there is a —— coil made with a range from 9-14 metres and wonder if it will be in order to plug it into the coil holder without changing the wiring. Are the pins standard as in the case of valve pins?"—F. P. C. (Ainsdale).

ALL the better-known makes of short-wave coil are wired in the same manner, and therefore they may be interchanged. The connections for both the 4- and the 6-pin types were given in our issue dated May 9th last. In the case of the 4-pin coil, the pins are spaced as in a standard valve and the "grid" pin on the coil is joined to the grid end of the secondary winding, whilst the filament pin immediately on the right of it (looking at the coil from the base end) is joined to the earthed end of the secondary winding. The anode pin is joined to the aerial end of the primary winding (or the anode end of the winding if it is used for reaction purposes), and the remaining filament pin is connected to the end of this winding.

From Battery to Mains

"In your 'Fifty Tested Circuits' there is one (No. 48) for converting a battery receiver into an all-mains. I cannot understand the 4-volt A.C. portion, as the filaments of a battery valve only take 2 volts. Perhaps you would explain this. Should this method of supplying the L.T. be satisfactory, would it be in order to use a mains transformer using the L.T. tapping only? I have made up circuit No. 25 and am very pleased with the results."—F. W. (Feltham).

THE valves must, of course, be changed to the indirectly-heated type of A.C. valve when using the unit in question. A separate mains transformer may be employed for the L.T. supply, but battery-type valves cannot be fed with a raw A.C. supply, and it is exceedingly difficult to effect adequate smoothing to prevent hum, even when the A.C. supply is rectified. Replace your present valves by A.C. valves, and if your present mains unit delivers sufficient H.T., you need only obtain a mains transformer for the heater supply. Messrs. Heayberd can supply this.

Transformer for Television

"I am anxious to make up my television equipment and shall start by winding the mains transformers. Could you give me the necessary data to wind a substantial transformer for the vision superhet (8 valves) and the time-base? I wish to include all the supplies for these two on the one transformer. What size of stamping would be most suitable?"—G. B. (Harringay).

APART from the fact that it would be impossible to give you complete constructional details in the form of a reply, you do not give any details of the windings you require, nor of the type of time-base you intend to use. The insulation of the various windings must also be considered in conjunction with the type of apparatus you intend to use, particularly as to whether you intend to earth the anode or the cathode of the cathode-ray tube.

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 queriers.

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

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

Super-power Output Valve

"I am going to finish a public-address outfit which I started some time ago, but which I discontinued owing to the difficulty of finding a real power output valve. I want something in the neighbourhood of 15 watts undistorted output, but without exceptionally high H.T. Is there any valve now made which will answer my purpose?"—F. R. (Cambridge).

YOU do not give any details of the L.T. supplies which are available, and we therefore presume that you will arrange for this if a suitable valve can be found. In the class of valve you require there are three good examples which will operate with 500 volts H.T. These are the Marconi-Osram DA60, the Mullard DO60, and the Tungsram P.60/500. These valves have a 6-volt 4-amp. heater and an anode current load in the neighbourhood of 120 mA.

Visual Tuning Indicator

"I should like to fit to my receiver a visual indication of exact tuning. Can you suggest a suitable device which will not impose an additional load on the circuit and which will not interfere with the working of the set?"—E. T. F. (Leeds).

THE only visual tuning indicators at present on the market for the home-constructor are the Cossor, Western Electric, and the Philco. The latter is a complete device, whereas the former take the form of Neon indicators which have to be connected in circuit and mounted in a suitable position. In addition to these devices, however, there are numerous meters on the market which may be employed for the purpose, and Messrs. Bulgin in particular have a suitable meter which is designed especially as an indicator. No doubt the special cathode-ray devices to be seen at this year's Radiolympia will shortly be placed on the market as separate components for inclusion in any circuit employing a good measure of A.V.C.

Aerial Design

"I have just moved to a new house, and the garden is very much shorter than my previous one. I find that I cannot put up a really good aerial, partly on account of the short run and partly because of high trees surrounding the garden. What is another efficient arrangement which would enable me to obtain practically the same advantages and results as I had before with a 50-foot run elevated 35 feet and horizontal?"—W. I. P. (Birkenhead).

THERE is probably no arrangement which will prove exactly equal to your former scheme, but there are many alternatives which may prove better in some respects. For instance, a vertical aerial will prove non-directional, and in your particular case you may find that selectivity will be improved by adopting this type of aerial. There are many proprietary devices on the market, some of which are illustrated in last week's and in this week's issue, whilst your local radio dealer may be able to show you one or two types. A large capacity elevated as high as possible, and a substantial down-lead supported firmly, well clear of the walls and other earthed bodies, will be found extremely efficient.

The coupon on page 696 must be attached to every query.

Practical and Amateur Wireless

BLUEPRINT SERVICE

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 7½d., 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.

PRACTICAL WIRELESS

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.

	Date of Issue.	No. of Blueprint
All-Wave Unipen (pentode)		PW31A
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (trans.))	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Power) ..	—	PW35
Summit Three (H.F Pen, D, Pen)	8.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow.) ..	—	PW41
Hall-Mark Cadet (D, LF Pen (R.C.))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (trans.)) ..	*June* '35	PM2
Cameo Midget Three (D, 2 LF (trans.))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (R.C.))	31.8.35	PW55
The Monitor (HF Pen, D, Pen) ..	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P) ..	—	PW64
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen) ..	—	PW11
Beta Universal Four (SG, D, LF Cl. B)	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46

Mains Operated.

Two-valve : Blueprints, 1s. each.

A.C. Twin (D-(pen), Pen) ..	—	PW18
A.C.-D.C. Two (SG, Power) ..	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, D.D.T., Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen) ..	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen) ..	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF, Pen, D, Pen)	11.5.35	PW50
"All Wave" A.C. Three (D, 2LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (H.F. Pen, HF Pen, Westector, Pen)	31.8.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.

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

Mains Sets : Blueprints, 1s. each.

A.C. £5 Superhet (three-valve) ..	—	PW43
D.C. £5 Superhet (three-valve) ..	1.12.34	PW42
Universal £5 Superhet (three-valve)	—	PW44
F. J. Camm's A.C. £4 Supeghet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

SHORT-WAVE SETS.

Two-valve : Blueprints, 1s. each.

Midget Short-Wave Two (D Pen)	15.9.34	PW38A

Three-valve : Blueprints, 1s. each.

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

PORTABLES.

Three-valve : Blueprints, 1s. each.

F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) ..	16.5.36	PW65
Four-valve : Blueprints, 1s. each.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE

CRYSTAL SETS.

Blueprints, 6d. each.

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

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.

B.B.C. Special One-valver ..	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D. Trans) ..	—	AW388
Full-volume Two (S.G., Det., Pen)	—	AW392
B.B.C. National Two with Lucerne Coil (D. Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (S.G. Trans) ..	—	AW338A
Lucerne Minor (D. Pen)	—	AW426
A Modern Two-Valver	*July* '36	WM409
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5. 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans). ..	—	AW422
Cossor 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
£6 6s. Radiogram (D. RC, Trans)	—	WM318
Simple tube Three (SG, D, Pen) ..	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans) ..	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
P.T.P. Three (Pen, D, Pen) ..	*June* '35	WM389
Certainty Three (SG, D, Pen) ..	*Sept.* '35	WM393
Minitube 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
The Auto-Straight Four	*April* '36	WM404
The Request All-Waver	*June* '36	WM407
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	*May* '33	WM320
New Class-B Five (2SG, D, LF, Class B)	*Nov.* '33	WM340
Class-B Quadradyne (2SG, D, LF, Class B)	*Dec.* '33	WM344
1935 Super Five (Battery Superhet)	—	WM379

Mains Operated.

Two-valve : Blueprints, 1s. each.

Consoelectric Two (D. Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D.Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen) .	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383
S.G. Three (SG, D, Pen) A.C. ..	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW439
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen) ..	*July* '33	WM329
Harris Jubilee Radiogram ..	*May* '35	WM386

SUPERHETS.

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

Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C. ..	10.3.34	AW425
Heptode Super Three A.C. ..	*May* '34	WM350
"W.M." Radiogram Super A.C.. ..	—	WM366
1935 A.C. Stenode..	*Apl.* '35	WM385

PORTABLES.

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

Midget Class B Portable (SG, D, LF Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Two HF. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)..	*Aug.* '34	WM367

SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.

S.W. One-valve converter (Price 6d.)	—	AW320
S.W. One-valve for America ..	—	AW429
Roma Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen) ..	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver ..	*Jan.* 19, '35	AW463
The Carrier Short-waver	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (HF, Pen, D, RC, Trans) ..	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valve Short-waver	*Mar.* '35	WM338
Superhet. : Blueprint, 1s. 6d.		
Simplified Short-wave Super ..	*Nov.* '35	WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.

Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Shortwaver (D, Pen) A.C./D.C.	*Aug.* '34	WM368
"W.M." Long-wave Converter ..	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C. ..	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	*Aug.* '35	WM391

MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6)	*June* '35	WM387
Listener's 5-watt A.C. Amplifier (1/6)	*Sept.* '35	WM392
Radio Unit (2v.) for WM392 (1s.)	*Nov.* '35	WM398
Harris Electrogram (battery amplifier)	*Dec.* '35	WM399
De-Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New style Short-wave Adapter (1s.)	*June* '35	WM388
Trickle Charger (6d.)	*Jan.* 5, '35	AW462
Short-wave Adapter	*Dec.* 1, '34	AW456
Superhet Converter	*Dec.* 1, '34	AW457
B.L.D. L.C. Short-Wave Converter (1s.)	*May* '36	WM405
Wilson Tone Master (1s.)	*June* '36	WM406
The W.M. A.C. Short-Wave Converter (1s.)	*July* '36	WM403

Miscellaneous Advertisements

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

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, or Secondhand, etc.

SOUTHERN RADIO'S WIRELESS BARGAINS. ALL GOODS GUARANTEED AND SENT POST PAID.

SPEAKERS.—Celestion Soundex Permanent Magnet, 10/-; Telsen Permanent Magnet with ten-ratio transformer, 12/6; Blue Spot 99P.M. Extension Speaker, 20/-; 45P.M. Extension Speaker, 17/6; Telsen Loud Speaker Unit, 2/6; all new and boxed.

RECEIVERS.—G.E.C. A.C. D.C. Mains Three-valve sets. Complete with 3 Osram Valves, in exquisite Bakelite cabinet with Osram M.C. Speaker. Ready to plug in to any mains. Fully guaranteed. New, in sealed cartons, £3/5 (list £7/15).

G.E.C. Colpact 3-valve Battery Sets complete with 3 Osram valves, moving coil P.M. Speaker in attractive Bakelite cabinet, makers' 1936 series in original sealed carton, 50/- (List £5/10/0).

MULLARD M.B.3 three-valve battery sets. Complete with batteries, accumulator, M.C. Speaker. Three Mullard Pentode valves in beautiful walnut cabinet. Brand new, in sealed cartons, £4/10 (List £8/8).

TELSEN A.C. D.C. MULTIMETERS (latest 1936 type).—5-range for every conceivable test for radio and domestic electrical appliances, 8/6 each.

COILS.—TELSEN (1936). Iron-cored Coils, Type W349, midget size, 4/-; type W478 (twin), 9/- pair; type W477 (triple), 16/-; type W476 (triple superhet selector and oscillator), 16/- set. All Ganged Coils are Mounted on Base with switch. I.F. Transformer Coils W482, 5/-; Telsen Dual Range Coil with variable series condenser W76, 4/-; Varley Square Peak Coils BP5, 2/-.

ELIMINATORS.—Regentone (1936) Type. W5a with trickle charger, 37/6; Type WIa (less trickle charger), 32/6.

HOUSE TELEPHONES. A SPECIAL BARGAIN. BRAND NEW ONE-HAND TELEPHONES. Complete on stand, with or without Automatic Dials. Cost £4 each to manufacture, 10/- each.

MICROPHONES.—Ace (P.O.) Microphones, complete with transformer, perfect with any type of receiver, 4/6.

TRU-OHM RESISTANCES.—1 Watt. Wire ends colour coded and marked; 36 assorted capacities on card, 6/-.

AMERICAN VALVES.—A full range of valves for all American sets at 7/- each. Brand new, guaranteed.

SOUTHERN RADIO BRANCHES.—271/275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2. All mail orders to 323, Euston Rd., N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren Street Tube). 'Phone: Museum 6324.

ALL goods previously advertised are standard lines, still available. Post card for list free.

VAUXHALL UTILITIES, 163a, Strand, W.C.2. Over Denny's the Booksellers. Temple Bar 9338.

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, improved type, 120 watts output, at £2/10/0. Send for our comprehensive list of speakers, Resistances and other components.

WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

ALL lines advertised last week still available.

LOOK out for next week's advertisement. Special new season's lines.

RADIO CLEARANCE, 63, High Holborn, W.C.1. Hol. 4631.

WE BUY for cash, all types of Modern Second-hand Radio Sets, Accessories, etc. Unbeatable Part-exchange allowances for new goods. Bring, send or write.

UNIVERSITY RADIO LTD., 82, Hampstead Road, London, N.W.1. 'Phone: Museum 3810.

NEW RECEIVERS, COMPONENTS, AND ACCESSORIES

RADIO BARGAINS. Mains Receivers, Radiograms, from £4/10/-. All makes. Large stock components. Valve replacements, amazing prices. Goods guaranteed. Stamp for list.—**LITTLER,** 2, Barras Lane, **COVENTRY.**

3S. EACH any popular type of American valves. 90 days guarantee. Orders 10/- or over Carriage Paid. Entire Satisfaction or Money Refunded immediately. RADIOGRAPHIC LIMITED, 66, OSBORNE STREET, GLASGOW, C.1.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, or Secondhand, etc.

BIRMINGHAM RADIOMART G5NI.—Everything a constructor requires, lowest prices, no junk; catalogue, 1½d., shows thousands bargains; during summer few only shown below.
RADIOMART. Huge purchase Cossor 1936. Superferrodyne receivers half price, £2/19/6. Stamp for full list.
RADIOMART. Telsen screened dual range coils, 2/6. Pair, 4/6. Milliammeters, 25ma. upwards, 5/9. Super. 6/9.
RADIOMART. American mains transformers, 230 v. fully shrouded, 350/350. 6.3v. 5v, 6/11. Majestic 250/250. 2.5v, 5v, 4/11.
RADIOMART. Heavy duty mains transformer worth 35/-. 350/350. 150 ma.; 4v.2.5ACT., 4v6ACT., 12/6.
RADIOMART, 465 k/c., IF., transformers, 2/11. BTH. speaker transformers, 2/11. Telsen Ace, 1/11. RG4, Radiogrands, 2/9.
RADIOMART. Utility straight line wavelength dials, 3/11. Telsen H.F. chokes, 1/11.
RADIOMART. Utility 2-gang uniknob and dial, 3/11; 1,500-volt tubular condensers, 6d.; Helsby electrolytics, 8 mf. 500, 2/11; 4 x 4 mf., 1/11; 25 mf. 25 volt, 1/-; etc.
RADIOMART. Smoothing chokes, 20 hy. 120 m.a., 3/11; 100 m.a., 2/11; 40 m.a., 1/11.
RADIOMART. Pushback wire 6 yds. 6d.; heavy 9d.; 2 gross solder tags, 6d.; resin-cored solder, 9ft. 6d.
RADIOMART. Centralab pots, all sizes, 1/6; switched 2/-; tubular glass fuses, 2d.
RADIOMART. Lissen 3-gang superhet kit coils, two I.F.s, ganged condenser, ditto bandpass, ditto 2-gang all-wave, 10/- kit.
RADIOMART. Traders' monster bargain parcels, value £4/10/-, for 10/-; also 5/- parcels.
RADIOMART. Famous Continental A.C. valves, 4/6; American Duotron, etc., all types, 3/6; battery from 2/3.
RADIOMART. Utility 8/6, microdise dials, 3/11; Radiophone, 0.00016 short wave condensers, 3/6; series gap, twin, 3/9.
RADIOMART. Ceramic all brass microvariables, 15 mmfd., 1/4; 40 mmfd., 1/7; 100 mmfd., 1/10; short wave H.F.C., 9d.
RADIOMART. Order 5/- post free; get our bargain catalogues; General 1½d., Short wave 1½d.—44, Holloway Head, Birmingham. Tel: Mid. 3254.

GRAMOPHONE attachments for Radio, electric motors, 25s.; Pick-ups, 9s. 6d.; Portable Gramophones, 12s.; spring motors, 4s. 6d.; walnut pedestal Auexagram, £5; soundboxes, 1s. 6d.; tonearms, 2s. 6d.; horns, 2s. 6d.; cabinets, 4s.; 1,000 needles, 1s. 6d.; gears, springs, accessories cheapest. Trade discount. Thousands to clear. Liquidating stock bargains. Catalogue free.—Regentam, 120, Old Street, London, E.C.1.

NEW RECEIVERS, COMPONENTS, AND ACCESSORIES

HULBERT for Quality Surplus Speakers. All Music Lovers should write for List of amazing bargains. Prices from 8/6 brand new. Made by best known British maker.—Hulbert, 6, Conduit Street, W.1.

VALVES. By well-known manufacturer. Complete range of Battery, A.C. Mains, Rectifiers. Brand new stock with six months' guarantee. 2 volt Detector, 2/3, Power 2/9, Screen Grid, Pentode, H.F. Pentode, 5/-. The following American type valves, fully guaranteed, at 5/6 each: No. 80, 42, 43, 57, 58, 77, 78, 6C6, 6D6, 25Y5, 25Z5. Write for other prices to: Dulci Electrical Co., Ltd., 7, Lizard Street, London, E.C.1.

AMERICAN Transceivers, 1, 2, and 3 valve battery, £3, £5/2/6, £6/7/6. A.C. Mains. 4 valve, £9. Long range. Our guarantee—satisfaction or money refunded.—RADIOGRAPHIC LIMITED, 66, OSBORNE STREET, GLASGOW, C.1.

MISCELLANEOUS

MOVIES AT HOME.—How to make your own Cinema Projector. Particulars Free.—Moviescope, (L) Pear Tree Green, Doddinghurst, Essex.

SHORT WAVE on a crystal set. Full building instruction and crystal, 1/2 post paid.—Radiomail, Tanworth-in-Arden, Warwickshire.

WE WILL MAKE A GENEROUS ALLOWANCE on your old set or components in part exchange for any new receiver or Peto-Scott kit. Write for FREE EXPERT ADVICE before making your final choice. You are then assured of COMPLETE SATISFACTION. Prompt delivery of all the latest models. —R. Wigfield, Furlong Road, Goldthorpe, Yorks.

HEADPHONES. Brown, G.E.C., Ericsson, Telefunken, Sterling, etc. List free.
CRYSTAL SETS. Burne-Jones. Complete. Guaranteed, 5/6. Ditto, double circuit, 8/-. Large P.O. type, 10/-. Crystal detectors, complete parts, 1/-. Permanent detectors, 1/6.—Post Radio, 183, Caledonian Road, London, N.1.

FREE ADVICE BUREAU

COUPON

This coupon is available until September 12th, 1936, and must be attached to all letters containing queries.
PRACTICAL AND AMATEUR WIRELESS, 5/9/36.

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Practical and Amateur Wireless, September 12th, 1936.

BEST TELEVISION SECTION WITHIN

Practical and Amateur Wireless

AND PRACTICAL TELEVISION

3D. EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 8. No. 208. September 12th, 1936.

The First TELEVISION RECEIVERS Reviewed

The First Novel of the Wireless Industry . . . A Modern Romance on a Blueprint Background—

STRAIGHT BLACK LINES

By FRANK BOYCE

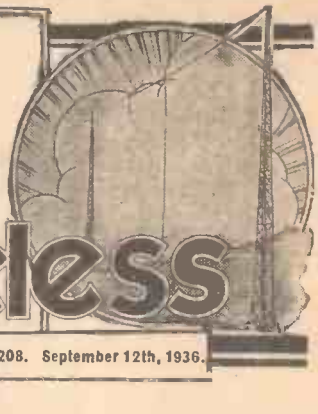
Borrow This Book from Your Library To-day—Newnes

MY OPINION OF THE SHOW—See page 699

Practical and Amateur Wireless

Edited by F. J. CAMM

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



VOL. VIII. No. 208. September 12th, 1936.

ROUND *the* WORLD *of* WIRELESS

Radio Sets in Australia

ACCORDING to a recent announcement by the Postmaster-General (Senator McLachlan), at the opening of the new national station, 2NR, at Lawrence, Nr. Grafton, N.S.W., there is now a wireless receiving set in every second home in Australia. At the end of June there were 825,000 listeners' licences in the Commonwealth, an increase of 100,000 in twelve months.

Russia Prepares for Television

IN addition to building a 10-kilowatt television transmitter for working on ultra-short waves from Moscow, one Russian factory is stated to have assembled 2,000 television receivers in anticipation of a regular television service next year.

Master Control Desk for U.S.A.

A RADIO engineering feat of considerable importance was carried out at the N.B.C. Chicago studios recently, when a new Master Control Desk and new studio control panels were installed and placed in operation without interrupting the broadcasting. The new Control Desk, which is over 15ft. long, and 6ft. high, contains 575 lights, 500 keys, is connected by more than 250,000 feet of wire with 650 relays in an adjacent room, and enables the supervising engineer in the main-control room to pre-set the network channels in such a manner that the announcer may cut his studio in or out of a circuit merely by pressing a button.

Radio Pioneers to be Honoured

A RECENT announcement from Paris states that the new P.M.G. is considering the issue of postage stamps bearing the heads of General Ferrie and Edward Branly, the French radio pioneers. These stamps will be an addition to the special series, already in circulation, bearing the heads of other famous Frenchmen.

Vidor Portable for Aeroplane Use

AT Stoke-on-Trent recently, British Empire Air Displays placed on permanent service in one of their machines, a standard Vidor portable receiver. The portable is placed on the seat by the side of the pilot, and provides entertainment for passengers and personnel. Its light weight first drew their attention to the portable, which receives British and German stations when required, even at 3,000ft. and over.

Cheese by Wireless

WE learn that a scientist, Dr. Korber, by name, of Vienna, Austria, has demonstrated that it is possible to produce cheese by means of wireless waves. There is no truth in the rumour, however, that the wireless apparatus used in the demonstration can be converted into a mouse-trap.

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Seeing Your Telephone Caller

A NEW type of telephone service, the first of its kind, recently opened between Berlin and Leipzig, permits the two persons to see each other during the telephone conversation. The distance covered is 105 miles.

Editorial and Advertisement Offices: "Practical and Amateur Wireless," George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

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

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

A Police Transmitter

FROM Caracas, Venezuela, comes the news that the government of the Federal District has appropriated a considerable sum of money for the purchase of a wireless broadcast transmitter to be used by the police at Caracas.

No Advertising

THE British Government has announced that direct advertising and sponsored programmes in wireless broadcasting and television will be forbidden for ten years to come.

A New Type of Speaker

THE Continental Motors Corporation of America announces a new permanent-magnet dynamic type of speaker known as the "Perm-O-Flux." Their statement reads that the usual sensitivity and tone quality is provided by the use of a new magnetic material developed in their laboratories.

"Talking Through Your Hat"

WE learn that a micro-wave transmitter has been built in a gentleman's top hat. This is not new, however, as we know a number of people who have succeeded in talking through their hats.

For the Wireless Beginner

IT is stated that Siemens and Halske, of Germany, are offering the wireless beginner a complete kit of wireless constructional parts from which he can gain actual experience by assembling and reassembling the parts into many interesting wireless instruments, such as a low-power transmitter, oscillators of various types, receivers, etc.

Listen to Australia

BECAUSE mention is so frequently made of the Sydney broadcasts through VK2ME, one is apt to forget that Melbourne programmes are also available to the short-wave listener. As a matter of fact, on weekdays, VK3LR, Lyndhurst (Victoria), on 31.32 m. (9,580 kc/s), is the only Australian short-waver offering a wireless entertainment, and if some care is taken it will be found a comparatively easy station to log at about B.S.T. 05.30-06.00 or 07.00 on Saturdays; other transmissions are made daily from Monday to Friday between 09.15-13.30. As an interval signal you will hear the call of the lyre bird, a record of which was made in a Victorian forest.

THE PICK of the PROGRAMMES

"In Town To-night"

LISTENERS to the National programme on October 10th will hear A. W. Hanson's popular "In Town To-night," with several new features. This winter, "In Town To-night" will absorb "Saturday Magazine," and the latter title will disappear.

Motor-boat Race Broadcast

AN interesting broadcast will be given from the Western Regional on September 12th, when Captain L. V. Head will give an eye-witness account of the International 100-mile race for the Motor-boat Championship, which takes place in Poole Harbour.

Gypsy Music

A WELL-KNOWN authority on the subject, P. Thurston Holland, will give an interesting talk on the origins and development of gypsy music, in the Regional programme on September 17th.

Works Band Concert

ON September 13th, from the Midland Regional, The Metropolitan Works Band, conducted by Harry Heyes, will give a popular programme which will include a Gilbert and Sullivan selection arranged by Wright.

Variety from Coventry

LISTENERS to the Midland Regional on September 15th will hear a programme of variety from the Coventry Hippodrome.

"Filmusic"

SOME of the best known tunes from films of the past seven years will be featured in the sixth and last in the series of gramophone recitals, to be broadcast from the Western Regional on September 14th.

Scottish Variety

A VARIETY programme will be broadcast by the Rothesay Entertainers on September 16th.

Sonata Recital

ON September 14th, Western Regional listeners will have an opportunity of hearing some interesting sonatas which are not often heard, including Respighi's Sonata in B minor for violin and pianoforte. The recital will be given by Eda Kersey (violin) and Winifred Davey (pianoforte).

Varied Fare for Midland Listeners

A PROGRAMME of light music, including selections from "The Little Dutch Girl" and "Mr. Barley's Abroad," will be given on September 17th by the B.B.C. Midland Orchestra, conducted by Reginald Burston. On the same day Gerald Newton will give an interesting talk on his holiday experiences in Lapland.

MAKE THESE DATES WITH YOUR RADIO

HEARING IS BELIEVING!

Leslie Holmes and Leslie Sarony would hardly believe that the natural tone of the Pye Olympia All-wave Model T.10 was produced mechanically.

For the afternoon concert on September 18th, Leslie Heward has chosen a Dvorak programme, to be given by the Midland Orchestra, and among the works performed will be the Husitska overture, the Symphony in G, and "The Noonday Witch." The same evening, Billy Merrin and his Commanders give a programme of dance music.

SOLVE THIS!

PROBLEM No. 208.

Jenkins wanted to convert his output stage for push-pull operation, but had no push-pull input transformers available. How could he have used an ordinary L.F. transformer in place of the push-pull type? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 208 in the bottom left-hand corner, and must be posted to reach this office not later than the first post Monday, September 14th, 1936.

Solution to Problem No. 207.

The voltage applied to the screening grid was too high; approximately 24 volts should be applied when the anode resistance is 100,000 ohms. The value given by the manufacturers was that applicable with 120 volts on the anode.

The following three readers successfully solved Problem No. 206, and books have accordingly been forwarded to them: E. Fisher, 33, Freeth Street, Oldbury, nr. Birmingham; P. Wooster, 11, Hillcrest Road, Purley, Surrey; E. H. Priestly, Holly Place, Accrington.

'Entertainment Parade"

A BRIGHT programme has been arranged for National listeners during October, when stars from the stage, screen, and concert platform will come to the studio for a new feature, "Entertainment Parade," to be broadcast on Mondays in alternate weeks, commencing on October 5th.

Eric Maschwitz and Bertram Henson will be responsible for the programme which will last for forty minutes.

The feature will be divided into three main sections dealing with the theatre, the screen, and the microphone; and news and personalities in all three forms in a novel way.

Concert from Torquay

THE Torquay Municipal Orchestra, conducted by Ernest W. Goss, will broadcast a popular concert from the Pavilion, Torquay, on September 15th. Morgan Davies (baritone) will be the artist on this occasion.

Gypsy Girls' Orchestra

AN interesting broadcast will be taken from Bristol's Annual Exhibition at the Drill Hall, Bristol, on September 15th, when Don Rico and his Gypsy Girls' Orchestra will play.

Seaside Concert Party

A VERY popular variety show now running at the Alexandra Gardens Theatre, Weymouth, is "The Show of Shows," produced by Vivian Palmer. A broadcast of this show will be given in the Western Regional programme on September 18th.

Variety from Plymouth

EXCERPTS from the variety programme at the Palace Theatre, Plymouth, will be broadcast on September 17th.

A Musical Mixture

LISTENERS to the Western Regional on September 17th, will hear the third of a series of programmes entitled "Musical Mixture." The artists taking part will be Alfred Salter (baritone), Kitty Adams (comedienne), Albert Gillett (syncopated pianist), and Fred Winslow's Serenaders.

String Orchestral Concert

ON September 15th the first of the new season's series of concerts by the Strings of the B.B.C. Welsh Orchestra, conducted by Idris Evans, will be broadcast from the Reardon Smith Lecture Theatre of the National Museum of Wales. Megan Foster (soprano) will be the vocalist, and the programme will include the "Pembroke Suite," an unpublished work by Oliver Edwards, which was included in the programme of one of the evening concerts of the National Eisteddfod of Wales.

My Opinion of the Show

BY F. J. CAMM

The Editor Criticises and Surveys the Eleventh Radio Exhibition and Makes Suggestions for the Twelfth.

AS a journalist I believe in attractive announcements, easily read by those who run and which tell their story by epigram, brief analogy, or appeal by humorous suggestion. I am convinced that tortuous drawings which are a cross between surrealism and a child's first effort with a crayon box are

A family conference. To buy or not to buy?

bad from a publicity point of view, tend to caricature that which should appeal to the serious side of us, to convey the impression that the sponsors of the announcement do not really believe in the announcement, to create a flippancy out of touch with the radio exhibition, and, in general, to create a spirit of "come to the fair where you will enjoy yourselves, but do not really believe all you see and hear." Everyone knows that circus posters do not always proclaim the truth, and I was disappointed to find that the Exhibition

Catalogues galore.

posters—those sponsored by the Association as well as those produced by individual firms—all bore a circus atmosphere. Grotesque lettering spread all over the place where it was most difficult to read, absurd figures of inhuman beings, silly statements, crude drawings, and a lack of the serious and dignified note were the order of the day. To me it seemed so much waste of space and time. My first impression of Radiolympia, therefore, was the dreadful array of these posters, which, after all, should convey the right atmosphere of an exhibition and put the visitor in the right mood. They were, I am sure I shall be permitted to say, somewhat cheap-jack in appeal, and really belonged to the man who had stood in this market-place for twenty years. This impression was confirmed by a visit to the Exhibitors' Club, where fantastic sketches decorated the walls of the offices of the various firms. A wireless exhibition is not a circus display, and I hope next year the appeal will be a dignified one, worthy of the dignified

One way of attracting visitors.

industry which the exhibition epitomises.

To the Radio Trade I would say: "I do not like your posters." The Exhibition itself disappointed me. It is true that in the opening days there was an air of desolation in spite of the fact that the attendance figures were up, no doubt caused by the fewer exhibitors and the correspondingly wider gangways. The latter was appreciated, for a tour of the exhibits became less of a jostling skirmish than it has been in previous years. If I gained the impression that the radio manufacturer has taken a leaf out of the book of the builder and the car manufacturer, I am entitled to it on the score that most of the cabinets were designed for feminine appeal, no doubt because it is now realised that John Citizen may decide to buy a set, but that it is Mrs. John Citizen who really does so. Sets will continue to be sold largely on æsthetic appeal, rather than on technical appeal. It must be remembered, however, that a wireless set, like a car or a house, or even a pretty girl, is a thing of beauty but by no means a joy for ever, necessarily. Most radio sets become a joy which lasts for not more than three years, and an ornate shell can become an exasperating thing if the works do not function so satisfactorily as one is led to suppose from the exterior. Still, on the whole the cabinet work was excellent. Design seems to have become rationalised. Speaker frets are more modern, and the finish and style have been chosen to tone with most styles of furnishing.

The system of relaying one programme through a speaker situated on each stand is, in my view, bad and may give the intending purchaser a false impression of the performance of the set. If the transmission happens to be bad the reception will be bad. I heard quite a number of visitors passing adverse comments on receivers I knew to be excellent, because they were judging them on the programme relayed from the studio at Olympia. This transmission left a lot to be desired. It was poor in quality.

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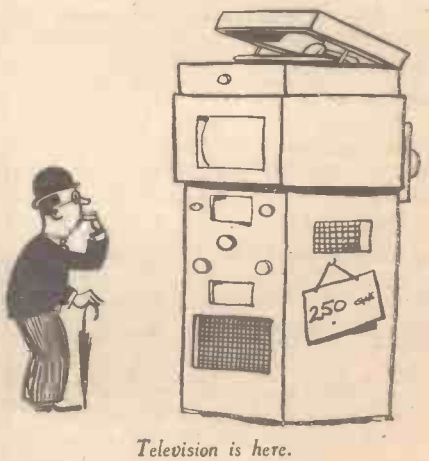
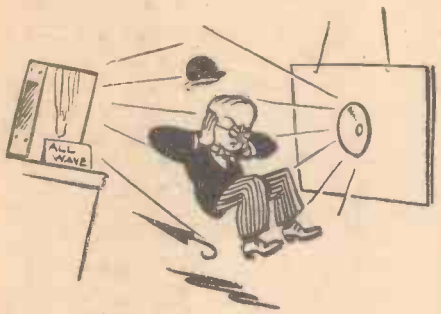


Television is here.

(*Continued from previous page*)

Manufacturers are entitled to expect something better next year. The transmission should be as nearly perfect as the engineers can make it.

It was a welcome thing to notice that nearly a dozen firms were preparing for the new industry by exhibiting television receivers. It was a mistake, however, to confine the demonstrations to the morning and afternoon, since most members of the public who have work to do cannot visit the Exhibition until the evening. I understand that the reason for this was that it might have destroyed the attendance at the Cabaret. Surely not! A quarter of an hour's demonstration could easily have been arranged in the evening, and it should also have been possible to have included a demonstration of television in the Cabaret programme



Caught.

itself. The trade missed a golden opportunity of getting the public interested in television. Perhaps the whole affair was so rushed that there was little time to do so. A little thought, however, would have resulted in the demonstrations having better effect. I understand that nearly 2,000 television receivers were ordered at the Show to be delivered before the transmissions commence. This indicates that the public is always prepared to take a risk on something new. In this case the risk is that the programmes may not start for some weeks. No official announcement regarding the commencement of the programmes has been made up to the time of going to press. It is time that the B.B.C. made up its mind when it is going to start. It has had two years to do so. We merely know that it has installed a staff at Alexandra Palace. Between now and the start of the programmes it should announce the times of its experimental transmissions to enable experimenters to adjust their equipment. Home constructors developed radio, and they will be expected to develop television. They are the ambassadors of the industry, and who in developing their own interests enthuse others.

As we said in a previous issue, this

"Do you think you could answer some of little Willie's questions?"

is going to be an All-wave year. One or two firms not interested in television provided on their receivers a means of tuning down to 7 metres so that their customers would be able to listen in to the television programmes even though they would not be able to look in. The public will clamour for ultra-short-wave receivers, and there would appear to be here a market for ultra-short-wave converters and adaptors to develop the television interest.

Tuning scales continue to attract the attention of inventors, apparently because it is realised that such afford an excellent selling point. There were no other novelties, which indicates that design has reached a state of stability, and hence of prosperity. The public is not too fond of buying expensive apparatus dated by a seasonal policy as with motor-cars. One or two car manufacturers have adopted a no-season policy, and instead of producing cars with new names produce them under a series number. Changes are only effected as and when they become necessary, and not merely for the sake of making a change. Such a policy might well pay a wireless manufacturer having foresight. The three-valve battery sets are in as great demand as ever, for nearly 50 per cent. of listeners reside in homes not possessing the advantages of electricity. It will still pay manufacturers to develop this market.

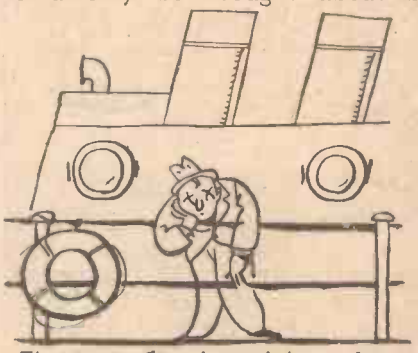
There was very little technical interest in the Show, and I feel that manufacturers do not lay sufficient stress on the technical merits of their receivers. It would pay handsomely

Half-way.

to have on their stands technical assistants who could explain in simple language the various advantages. As it is, the claims of rival manufacturers are cancelled out by their sameness. They all tell you that the set will receive every worth-while programme, that it only costs a penny a day, and so on. Most people nowadays can read a meter, and know that the average mains set consumes about 100 watts!

With the greater space now available owing to the shrinkage in the number of firms exhibiting, it would pay the authorities to provide seating accommodation for visitors on a greater scale. Tired people do not make responsive customers. It would be possible to arrange the theatre queues in a manner which occasioned less inconvenience to other visitors.

Prices apparently have reached an economical level, for there were no startling price reductions. It is my opinion that a modern wireless receiver sets a new example in values, for it would be impossible in any other industry to buy so much per unit of money spent. Any further reduction could only be brought about by



The strange effect of one of the stands on a visitor.

reducing the quality and efficiency of the product.

I learn that it is the attitude of the Radio industry to sell entertainment, not radio. My answer to this is that if you do not sell radio you cannot sell entertainment. Price has long ceased to have an appeal to buyers. The public is prepared to pay a bit more for a wireless set if it can be convinced that it is getting value for money. The public knows to-day that price cutting can only be effected by cutting the quality of the workmanship, and employing cheap circuits.

The constructor was very badly catered for at the Show, although it is pleasant to notice that some of the old-established component manufacturers are still with us and thriving. The interest of constructors is still there. They await television. It will be impossible for the set manufacturers to keep television out of the hands of constructors, much as they would like to do so.

The First Television Receivers Reviewed

Brief Technical Details of the First Receivers to be Produced for the Reception of the B.B.C. Television Transmissions from the Alexandra Palace

THE first receivers to be produced for the reception of the high-definition television transmissions were seen by the public for the first time at Olympia. There were, in all, ten different makes of television receiver, although some manufacturers have produced more than one receiver. The tendency as at present revealed appears to be to produce two receivers, one of which will give the television and sound signal only, whilst the other provides also the facilities for tuning the normal broadcast sound programmes. To this latter feature some manufacturers have also added the gramophone-reproducing apparatus, thus

This illustration shows the internal arrangement of the Model T.5 Baird Televisor. The large tube which is employed may clearly be seen.

providing an efficient radiogram with the addition of the television equipment.

The makers names are Bush Radio (Baird equipment), Cossor, Ferranti, General Electric Company, Halcyon, H.M.V., Marconiphone, Philips, and Pye. All of these receivers employ the cathode-ray tube apparatus for the reproduction of the picture, but in addition to these there is the Ekco-Scophony apparatus which relies upon a mechanical method of reproducing the picture. No details of this apparatus or the receiver are available, however, and therefore the following review is confined entirely to the first nine firms mentioned above.

Bush Radio

There are three receivers in the Bush range, models T.5, T.6 and T.7. The first mentioned is seen, in a family setting, on our cover this week, and Type T.6 is similar except that internally the apparatus is modified to enable the broadcast programmes on the medium and long waves to be received. This means, of course, that the control layout is modified slightly. Model T.7 is similar, but incorporates an automatic radiogram with Collaro automatic-record changer.

In each of these the picture is viewed in a mirror situated in the lid of the apparatus, and the approximate size of the picture is 12in. by 9in. in the T.5 and T.7. and 10in. by 7½in. in the T.6. In Model T.5 there is a total of twenty valves with a mains consumption of 240 watts. T.6 employs fourteen valves, and T.7 twenty-five valves, in each case the rectifiers and the valves in the sound equipment being included. The circuit employed in the two sections of the equipment is of the superhet type with separate intermediate frequencies, and a common beat oscillator for the various I.F.'s. The band-width in the vision part of the apparatus is over two megacycles, and the tuning control affects both sound and vision, thus enabling the correct picture balance to be obtained merely by tuning to the best volume and quality. Electro-magnetic control is employed at the cathode-ray tube for both scanning and focusing, and the vision, sound and time

(*Continued overleaf*)

The Emitron Camera, or Electric Eye, in action at Alexandra Palace. The aerials may be seen in the background.

(*Continued from previous page*)

bases are each built upon a separate chassis. The controls are as follows:

(1) Tuning.
(2) Focus.
(3) Contrast.

One of the Cossor receivers, and in the lower illustration the arrangement of the tube and chassis may be seen.

(4) Brightness.
(5) Sound volume.
(6) Vision control (adjusting the overall gain of the vision set).

In Model T.6 the vision receiver is a superhet with a band-width of three megacycles, and the sound set is a straight circuit. The power consumption of this set is 160 watts. At the time of going to press the prices of these receivers have not been fixed.

Cossor

In the Cossor range there are two receivers, models 137T and 237T, both of which enable the normal medium and long-wave broadcasts to be received. Model 237T in addition incorporates an automatic record-changer. The picture in these models is reproduced on a 13½in. diameter cathode-ray tube, the raster being adjusted to approximately 10in. by 7½in., and as will be seen from the illustration of this receiver the end of the tube is viewed direct. A simple switch is provided to change over from the Baird to the Marconi-E.M.I. system, and in addition to this control there is an oscillator trimmer for tuning in simultaneously the vision and sound transmissions, a contrast control, a sound volume control, and a six-point switch providing the following settings: off, gramophone, long wave, medium wave, ultra-short-wave sound, and television (with sound). The main tuning control and tuning scale is immediately above these controls. The equipment is built up on three separate chassis—a vision unit, the radio receiver, and a power unit supplying power for these two units. No prices have yet been fixed and no further details of these receivers are available.

Ferranti

There are also two receivers in the Ferranti range, one being designed for use at a distance of about 10 miles and the other for distances up to about 30 miles. Neither of these models will pick up the normal medium or long-wave transmissions, but the design of the sound section has been so arranged as to take full advantage of the higher fidelity of the U.S.W. transmissions. A cathode-ray tube is also used in these receivers, a 10in. diameter tube being provided and the approximate picture size being 9ins. by 7ins., with a colour image described by the makers as "electric light white." A switch is also fitted to these receivers to permit of an instantaneous change from Baird to Marconi-E.M.I. system. When the vision equipment is switched on, the picture comes automatically into frame, but brightness and contrast controls are provided to enable the picture to be adjusted to the required balance. A single tuning control is fitted to control both sound and vision, but it is possible to receive either sound or vision separately. There are 22 valves in all, with a total mains loading between 300 and 350 watts. The smaller model is of the direct-vision type and is illustrated on this page, the price being 85 guineas. The larger model is built with a mirror in the lid and gives a reflected view of the picture, and this model costs 100 guineas. No other technical details are available as yet.

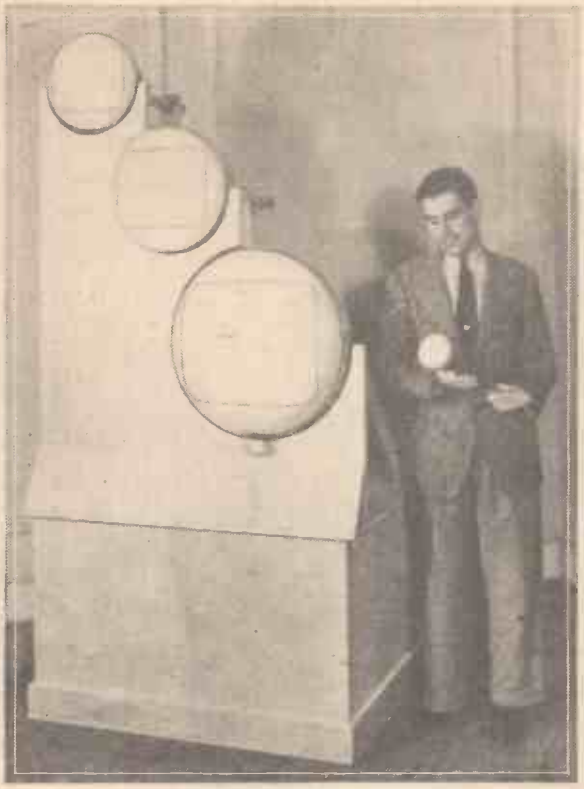
This is the smaller Ferranti Model, with a directly-viewed screen.

General Electric Company

Two cathode-ray receivers are introduced by the G.E.C., each employing a 12in. cathode-ray tube providing a picture size, or raster, approximately 9ins. by 7ins. Again a switch is fitted to make the change

from one system of transmission to the other, together with a brilliancy control for the picture. The cheaper model provides only the television (sound and vision) transmissions, whilst the other model incorporates also an all-wave broadcast chassis. Tuning for both vision and sound is carried out by a single control, the correct adjustment of sound volume giving the correct picture definition.

The small model employs twenty-three valves in a superhet circuit, and the larger model has an exactly similar television equipment plus an 8-valve broadcast chassis. No further technical details are available, but prices have been fixed at 95 guineas and 120 guineas.



On this stand may be seen some of the Baird Cathovisor tubes, including the largest model yet designed, measuring 22ins. in diameter.

Halcyon

Halcyon Radio have produced only one receiver so far, and this employs a 5-valve superhet for vision reception with a separate mains supply and one vision gain control in addition to the tuning control. The sound receiver employs a straight circuit of special design in which a triode-hexode valve is employed as combined detector and H.F. amplifier giving excellent results on the 7-metre band. This also has two controls, one for tuning and one for volume. The time base incorporates a gas discharge tube, and line and picture controls of novel design are mounted on the front of the cabinet. These operate in both directions, and when turned anti-clockwise they operate the equipment on the Baird system and when turned clockwise they operate on the Marconi-E.M.I. system. The mains unit incorporates both Westinghouse metal and valve rectification. A 10in. tube is fitted and the approximate raster size is 8ins. by 6ins. There is no provision in this model for the reception of the normal broadcasts, but a combined all-wave broadcast model is being designed. The price of the present model is 90 guineas.

H.M.V.

Two models are found in the H.M.V. range, each employing a 12in. tube with the reflected method of viewing the picture. The smaller model, No. 901 (price 95 guineas), is designed only for the television wavelengths, but the larger model, No. 900 (price 120 guineas), incorporates a five-band sound chassis providing the normal broadcast programmes as well as the most interesting of the short-wave signals. No details of the equipment are available at the time of going to press.

Marconiphone

A similar scheme is incorporated in the Marconiphone receivers, a low-priced model (Model 702, at 95 gns.) providing only the television programmes on vision and sound, and a higher priced model, No. 701, at 125 gns., incorporating also an all-wave broadcast receiver. The small model has a mains loading of 230 watts and the other model 260 watts, each receiver providing an undistorted sound output of 3 watts. Each receiver incorporates a 9in. cathode ray tube, the image being viewed through a mirror. In the case of the small model the picture size appears approximately 9½in. by 8in., but in the larger model a lens is interposed in order to give a larger effective image. The vision equipment in both receivers consists of a 6-valve straight circuit and a special equipment is fitted for the picture apparatus. The tuning is fixed, and the following controls are fitted:—

Line hold control,
Frame hold control,
Sensitivity control,
Contrast control,
Brilliancy control,

and a selector switch to change from one system of transmission to the other. With these receivers the makers supply a special dipole aerial ready cut to length and with all fitments to enable it to be erected in a few minutes.

Philips

Only one receiver is yet released by Philips and this incorporates an all-wave sound section. The picture is viewed direct on the end of a 12in. cathode-ray tube, and this is protected, when the receiver is not in use, by a sliding panel. The picture automatically appears in frame, and there are only two picture controls, one for brilliancy and one for changing from one system to the other. Hard valves are used in the time base, and all the remaining adjustments are carried out by pre-sets when the apparatus is first installed. The sound receiver is independent and incorporates an 8-valve superhet circuit feeding a 10-in. loudspeaker to provide the best quality from the high-fidelity transmissions on the ultra-short wavelengths. No technical details of the apparatus are yet released, but a novelty in the design lies in the use of a special chromium-plated stand, which enables a smaller cabinet to be used and yet to bring the picture just above eye-level. This avoids a heavy appearance in the cabinet design. No price has been fixed at the time of going to press.

Pye

Messrs. Pye have also produced two models, one for television sound and vision only, and the other incorporating an all-wave radiogram. The vision equipment is identical in both sets, and a 10in.

(Continued overleaf)

On the left is the G.E.C. All-Wave Model in which the panel covering the screen has been removed to show the constructional features.
On the right is H.M.V. Model 901 which receives television sound and vision only.

(Continued from previous page)

by 8in. raster is obtained. A band-width of 2.5 megacycles is obtained in the vision receiver and the cathode-ray tube is viewed direct. The sound sections have been developed to take full advantage of the high-fidelity transmissions, and a Duode speaker is fitted to a straight 4-valve circuit. No prices or other details are as yet released.

transmissions which will be inaugurated after Radiolympia has closed down. When the date has been finally settled and details of the programme times are known, the various prices will be fixed, and more complete details will be published. In addition, of course, new receivers will be introduced by other manufacturers, and the design of the circuits will no doubt be decided upon with the use of

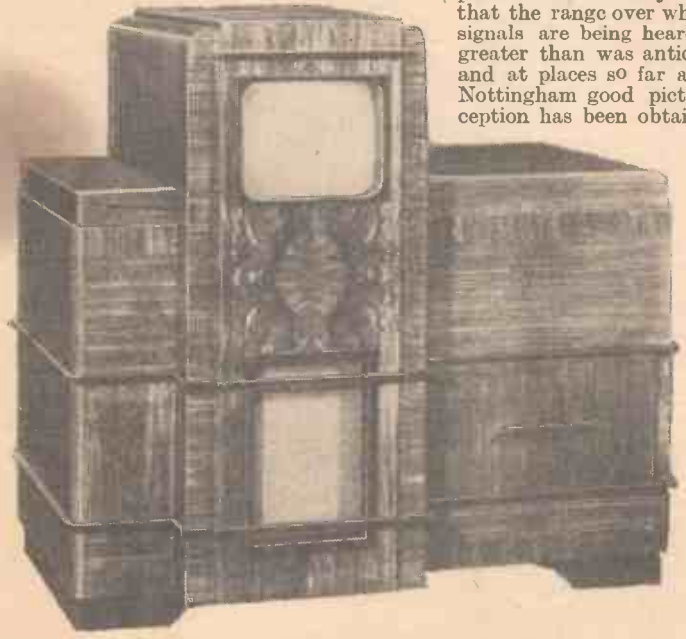
The film projector used in the B.B.C. Film Projection Room for film viewing.

The Philips receiver is fitted to a neat chromium stand to increase the height of the viewing screen.

We have witnessed special demonstrations of various receivers mentioned in the above range, and have been very favourably impressed by the high quality of the pictures and the remarkably steady manner in which the picture keeps in frame the whole time. Those who have had experience of the older system of television, in which the picture was continually running away and had to be brought back to synchronism

Latest Details

The latest information shows that in the majority of cases the manufacturers are awaiting news concerning the permanent data gained during the present temporary transmissions to Radiolympia. Already reports are coming in from different parts of the country showing that the range over which the signals are being heard is far greater than was anticipated, and at places so far away as Nottingham good picture reception has been obtained.



The large Pye Model seen here incorporates an auto-radiogram. Direct vision is employed.

Marconiphone Model 701 has a reflector to enable the vertical cathode-ray tube to be viewed.

will be particularly interested in this aspect of the new system, and it is now definitely possible to sit through the entire transmission without the necessity of making adjustments for synchronism.

On Your Wavelength

By THERMION

Some After-thoughts

BY the time you read this Olympia will belong to the limbo of the past. Although I found it a disappointing Show by comparison with previous Shows it had its moments. I was interested, for example, to read in one of the leading Evening newspapers an article by a leading RADIO EXPERT who told me all about *high-frequency television.* Although I searched the Show in vain I could find no details of this new system. I showed the cutting to the various firms who are marketing television receivers, and asked them ingenuously whether if they had no high-frequency television to-day, thank you very much, they could show me some low-frequency television.

I am sure that the radio man who wrote these notes is also a reader of PRACTICAL AND AMATEUR WIRELESS, so I do hope he will drop me a line and enlighten me. It is most unfair for him to keep these secrets up his sleeve. One or two of the assistants evinced a distinct desire to lead me gently away by the hand. Of course, I duly visited the bar where it was only necessary for me to extend my right hand when some kind friend, pitying my poverty, would fill it with a glass of the needful. On other occasions there were those who knew me not, and an extension of the right hand, gentlemen, produced not a sausage.

There was the usual gang who assailed the assistants on our stand with the remark "You're Thermion." No one, I am glad to say, pierced the veil of my identity. There were no secreted gangsters and others who belong to the crooning class to cause hurt to my person. This is surprising, bearing in mind how accurately the artist has in these pages portrayed the unmistakable aquiline and truly Grecian lines of my beatific countenance, both in profile and full face. Remember, also, that the nature of my crimes in these columns is beginning to tell upon me, and I daily grow a more furtive look. Perhaps I shall be unfrocked next year.

Radiolympia Cabaret

I VISITED the Cabaret complete with full staff of secretariat—those delightful and charming damosels who tap these notes, answer my letters, interpret my weird calligraphy, and generally make sense out of my utterances. They took extreme care of me, and possibly the fact that I visited the Show with a female bodyguard threw the sleuths off the scent. A most delightful evening, I assure you — with the exception of the Cabaret, which was rather poor stuff in places. If I may say so it lacked what I might term the radio influence. Henry Hall would have bucked things up tremendously, and so would all of the other radio artists who have appeared there previously. I think that an indicator announcing the numbers of the items would have saved a good deal of programme searching, particularly as some of the artists were unknown, though good. Still, the girls enjoyed it immensely, they tell me.

The visitors this year did not seem interested in radio, but were merely filling in the time until the Cabaret opened. Home constructors were there in full force. As there is only one journal to which they migrate once entering the portals of Olympia, you can imagine that the assistants were kept extremely busy. I am not permitted to give the name of that one paper. Most of the readers have an affection for it, so much so, that one or two of them found it impossible to leave the stand without taking a souvenir of their visit. If the gentleman from Dundee, who took away with him (I am sure in a moment of mental aberration) a copy of the "Wireless Constructors' Encyclopedia" will get into touch with me, I shall be glad to exchange a souvenir of his which I collected from him in the form of a nice pair of fur-lined gloves.

Interest in Short Waves

AN amazing thing was the interest evinced in short-wave construction, and I am sure that this season will see a short-wave or an all-wave set in every home.

It was quite a surprise to see nine or so firms exhibiting television receivers. I understand on good authority that one or two of them were full of emptiness. By the way, can't manufacturers show anything else but a picture of Mickey Mouse in photographs of television receivers? Rumour has it that the television programmes will start in the last week of October, but I accept this statement with the greatest of reserve. The public has had a foretaste of television at Olympia, and no doubt the trade is basing its production figures on the orders and interest evinced. I cannot see that the trade would be able to deliver receivers by October 23rd. Also, there are bound to be more technical hitches. We had them at the Show—a mouse on the wire causing a short-circuit, and an "attempt" at sabotage by short-circuiting a plug point with a piece of silver paper. Still, we can expect television any time after the next two, three, or four years. Constructors will get it first. It was a mistake to confine the demonstration of television to the morning and afternoon, since most members of the public are unable to visit the Show until the evening, but, of course, it would never have done to have staged a demonstration of television in the evening! It would have interfered with the attendance at the Cabaret!

Another Exhibition has come and gone. The next will be with us all too soon. Lots can happen between now and then. We shall all be a year older and possibly wiser by that time. It is certain, however, that the first really practical high-definition television receiver for home constructors

will be described in this journal. Look out for it !

Speaker Frets

DID you notice the tendency on commercial receivers towards a more modern note in speaker opening ? Previously these were as antediluvian as the fretted front pianos ; a more rigid geometrical and modern note is struck, and one or two makers have omitted the fret altogether, merely backing the opening with fabric. Cabinet design showed, perhaps, the greatest advance. You can now purchase a radiogram, complete with cocktail bar, at a price within the means of all. Manufacturers must have been specially catering for my delicate taste in wine.

Portables

PORTABLE sets were not so much in evidence—I am referring to the type complete with frame aerial. I suppose that most people nowadays prefer to use an indoor aerial, and take advantage of the greater sensitivity of such a system. Outdoor aerials are vanishing. I still think that there should be a portable set with frame aerial incorporated, in every home, since your licence enables you to use it without further payment. Such a set is most useful if you or a member of your family happens to be ill in bed. It can be moved from room to room without the inconvenience of having to rig up an aerial and earth. Speaker points in every room is, of course, the best solution, operating from a central set, and I am glad to note that speaker manufacturers are now producing excellent extension speakers with independent switching, and integral volume and tone controls.

Our Birthday Number

OUR issue dated September 19th marks the commencement of Volume 9. The following issue will be our special Birthday Number with its special features to which so many readers annually look forward. There are few wireless journals left, and thus verily those that are last shall be first ! PRACTICAL AND AMATEUR WIRELESS was the last in the field. It has become, in the course of its 208 issues, the leading journal with the largest nett sales. That is an achievement of which we are justly proud. Our position is strong. Let us hope that you and I will still be reading it when Volume 90 commences.

Radio for Lonely Welsh Island

I UNDERSTAND that Mr. J. Owen, of West End Radio, Pwllheli, the local Pye Service agent, is supplying a Pye T.60 battery-operated receiver for installation in a school on Bardsea Island, which lies off the Welsh coast. The total population of the island is thirty, and the number of scholars attending the school about eight. An extension speaker will be run from this set to the chapel. Considerable difficulties are encountered with regard to installation, as it necessitates Mr. Owen making a hazardous journey across the Bardsea Sound in a small motor boat. Weather conditions frequently enforce the occupants or any visitors to the island remaining there for several days until the weather improves. Incidentally, battery replacements are brought by the Trinity boat which makes monthly calls at the lighthouse.

Tuning Range

FOR short waves, a coil having a grid winding of four turns on a 1½ in. former will tune to a wavelength of approximately 13 metres—the actual wavelength being decided by the closeness of the turns and the stray capacity across the coil. If a .00005 mfd. tuning condenser were used with this coil the wavelength range would be approximately 13 to 19 metres, but if a .00015 mfd. condenser were used the range would be increased to approximately 25 metres. It is pointed out that the minimum capacity of the tuning condenser is also important, as this constitutes a stray capacity. It is therefore very desirable to use a condenser having as low a minimum capacity as possible.

Changing Output Valve

WHEN replacing the output valve in a mains receiver, great care must be taken to choose a valve having approximately the same H.T. and L.T. current consumption as the original valve. It must also be a valve requiring the same value of biasing resistance as the original. If the H.T. current consumption of the new valve is greater than that of the old valve, it is possible to damage the smoothing choke or the speaker transformer winding. On the other hand, if the current taken by the new valve is lower than that taken by the old one, excessive voltage may be applied to valve anodes owing to the lower voltage drop across the smoothing choke or speaker winding.

The value of the bias resistance is, of course, very important, as it governs the bias voltage applied to the valve grid. For example, the bias resistance required by the high amplification type of pentode is approximately 150 ohms, whereas the ordinary power type requires about 350 ohms. In commercial receivers there is also a possibility that the condenser connected across the bias resistance would need replacing. The condenser required for the high amplification pentode would need a working voltage rating of only 10 volts, whereas that used with the power pentode would have to have a rated working voltage of 15 volts or higher.

It is also pointed out that the high amplification valve is primarily intended for use after a resistance-capacity coupler.

Sir Thomas Beecham's Television Receiver

I HEAR that Sir Thomas Beecham was filmed by the British Movietone News at Radiolympia when he placed an order for the hundredth H.M.V. 120-guinea television receiver. A film record of this event is to be included in a special item of the British Movietone News, which deals with the E.M.I. system of television transmissions at Alexandra Palace.

Chief Engineer on Television

SAID Sir N. Ashbridge in a recent talk : " It may be some years before the same can be said of television. When the Alexandra Palace Station is in full working order, we hope that most people living within a distance of about twenty-five miles in any direction will be within reach. There may be others living further away who will also be fortunate, but there will certainly be a few within this limit, whose local conditions will handicap them in getting satisfactory reception. Our next steps must be guided by our experience of Alexandra Palace in the coming months.

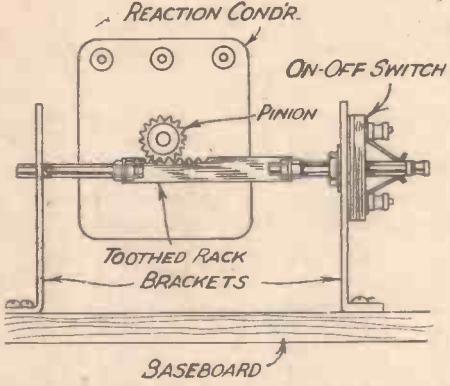
" Parliament has decided that television shall be developed by the B.B.C., with the advice of a committee under the chairmanship of Lord Selsdon. We at the B.B.C. are going to do everything in our power to ensure that television broadcasting in this country shall be second to none. We believe that all those who see at Olympia what has already been done, will feel enthusiastic about the future. If I have seemed rather cautious in what I have said, it is because I am most anxious not to raise any false hopes. As I see it, this is an adventure upon which the B.B.C. and the public are entering together, and for this reason we should be frank. Television progress is no further advanced anywhere in the world than it is in this country."

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA — READERS WRINKLES — THE HALF-GUINEA PAGE

Dial-light Economy

WHEN the local station is being received there is usually no necessity to keep the dial light going, as this only results in a serious wastage of current.

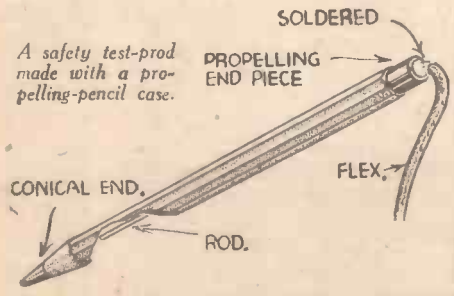


A simple method of cutting out a dial light when receiving local stations.

The scheme shown in the sketch does away with the dial light when the local station is being received, and reaction condenser is set at zero. When the reaction condenser is turned to increase sensitivity and receive distant stations, this automatically switches on the dial light. The diagram is self-explanatory. The toothed wheel, etc., was obtained from a boy's constructional set.—WM. NIMMONS (Belfast).

Safety Test-prods

I USED two sixpenny long propelling pencils to make a pair of very useful "safety" test-prods, and as will be noticed on referring to the illustration a length of



A safety test-prod made with a propelling-pencil case.

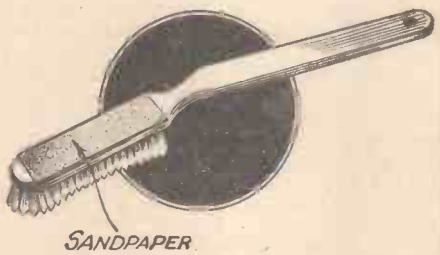
flex for each rod is soldered to the propelling end after having removed the rubber holder and pocket clip. The main feature of this idea is not only neatness and insulation afforded by this type of pencil, but that the conical end does not contact with the thin pin rod running down the centre of the shaft, and in order to use the prods, the usual procedure of propelling must be effected until the thin rod protrudes thus acting as the contact point, or making the cone act as the contact point, and the circuit to the flex completed. It will be seen that each prod acts as a switch in itself, and the tester and associated meters are thus safeguarded.—W. R. HOBBS (Ilford).

THAT DODGE OF YOURS!

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

A Handy Cleaning Tool

CLEANLINESS is one of the first considerations in obtaining consistent, efficient and noise-free reception. There are several methods of keeping the inside of a wireless set free from dust and dirt, but there are one or two places in a modern set where an occasional scour is necessary to remove corrosion or otherwise to ensure perfect contact. The tool illustrated here was made up by myself as an accessory to the

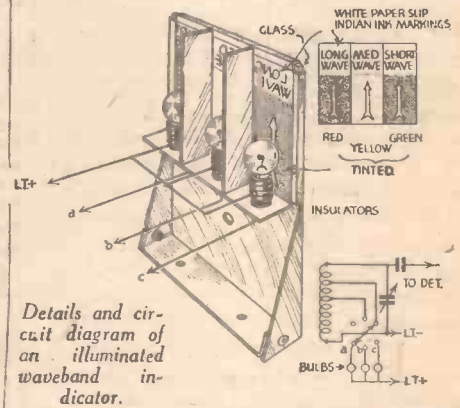


A simple and effective aid to good reception.

remainder of my receiving equipment, and as will be seen it consists simply of a good stiff tooth brush, to the back of which is glued a narrow strip of fine sandpaper. This may be used to rub over various metal parts, and the brush portion is then used to brush away the dust and metal powder which may result. It should not be necessary to add that the sandpaper must be of a very fine grade and must be used judiciously.—R. I. WHITE (Kintbury, Nr. Newbury).

A Waveband Indicator

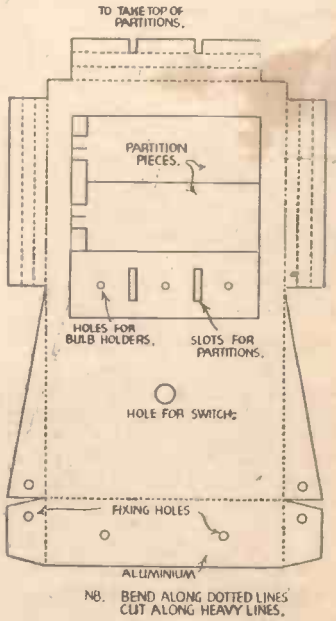
HAVING built an all-wave receiver I had difficulty in knowing which waveband was switched on, as I had failed to obtain a suitably marked dial showing long, medium, and short-wave bands. I therefore constructed this simple automatic illuminated dial from an aluminium screen and fuse bulb-holders. Coloured Cellophane was used in place of tinting, and I find that even when only required for



Details and circuit diagram of an illuminated waveband indicator.

a short-wave receiver with three-band switching the idea is very useful.

Details of construction are clearly shown in the accompanying sketches.—J. MCLELLAND (Liverpool).



How the aluminium sheet is marked out for forming the framework for a waveband indicator.

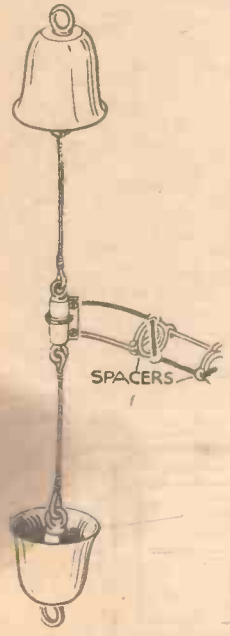
New Season's Experiments

The Experimenter should Now be Getting Ready for the Important Changes which will be Made During the coming Season, and the Hints Given here will Give some Indication of the Schemes to be Adopted.

By W. J. DELANEY

ALTHOUGH the keen experimenter spends his spare time during the entire year in an endeavour to improve reception and to modify his equipment there is obviously much less inclination for such work when the fine summer weather and long days are with us. Thus, the arrival of the autumn days generally means a return to more intense experiment and more hours are spent with the receiving equipment. Aimless experiment is out of the question where the really keen experimenter is concerned, but it is often found that it is not easy to decide upon any definite line or scheme which will afford the necessary interest and which will at the same time show its results in an improved performance so far as the permanent receiving equipment is concerned.

This season there is an entirely new field opened to the listener, and this is, of course, brought about by the introduction of the television transmissions. All-wave receivers have increased in popularity during the past year, but as will be seen from a study of the report of the receivers of this type at this year's Radiolympia the lowest wavelength covered, with one exception, is about 10 metres. The general range is actually in the neighbourhood of 13 or 15 metres, but in the H.M.V. all-wave receivers the range has been extended to embrace the sound signals from the Alexandra Palace.



This diagram shows how a neat and efficient dipole aerial may be erected. Various types of insulator may be used at the end of the half-wavelength aerial, and the feeder leads may be kept parallel up to certain distances, instead of being crossed over at intervals.

Short-wave Aerials

It will be assumed that the real experimenter has already installed a short-wave aerial in addition to the normal broadcast aerial, but when endeavouring to push a standard all-wave set down to the 7-metre wave-band, especially if it is intended to pick up the picture transmissions, it will be found that a considerable improvement will be required. The majority of the all-wave sets already referred to will give quite good results on the standard type of aerial, but the erection of one of the "All-wave" aerials will greatly improve the performance of the short-wave section. Even so, this is not sufficient for the lowest of wavelengths, and therefore, one important line of experiment will be to find the best ultra-short-wave aerial. Various details have been given in these pages from time to time, but there has, in the past, been little actual material upon which one could experiment. The present B.B.C. transmissions will, however, provide a really good signal for test purposes and therefore a good aerial should be the aim of the amateur who intends eventually to install a television receiver.

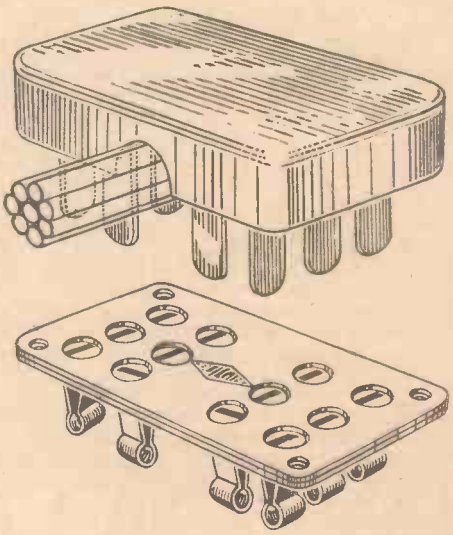
Dipoles are essential, not only for maximum signal strength, but also for the maximum signal-to-noise ratio. It is, however, useless to erect a dipole if the feeder (or lead-in) upsets the balance of the aerial system. Theoretically the dipole aerial should be one half the desired wavelength from the free end to the aerial end of the tuning coil, and this obviously would mean that the aerial would have to be inside the house, mounted immediately above the receiver. Whilst this might be efficient, changes in the positions of furniture in the room, or even the movement of a person across the room might upset the balance and destroy the advantages which are available. If the aerial is erected outside, the feeder should be of the balanced type consisting of two wires held an equal distance apart throughout their length, and screened if necessary. Special supports for the aerial may be obtained from such firms as Bulgin, B.T.S., or Eddystone (Stratton), whilst the necessary spacers for the feeder may be obtained from the same firms. An alternative for the feeder consists of standard lead-covered bell wire, but such a feeder should not exceed a few feet in length, and an earth connection to the lead covering should be taken at every foot.

Rack Construction

Standard 7/22 aerial wire may be used for the dipole aerial, but lengths of copper tubing will prove more efficient, or even heavy gauge copper rod. Another important field for experiment is in the actual method of building the receiving equipment. A television receiver, for instance, requires several separate units such as the time bases, the receiver proper, the separate mains units, and the sound section. A modern mains set also consists essentially of two parts—the receiver and the mains section. The recently-published illustrations of the equipment at Alexandra Palace will show that the entire apparatus is divided up into sections arranged in metal racks, and this is an ideal scheme even for a simple broadcast set as it not only localises sections to simplify fault-finding, but it saves space to a certain extent and permits of a simple modification at some future date.

The difficulty in the past has been to make the connection between one section and another, but the recent introduction of multi-point plugs and sockets such as the Bulgin, together with multi-way cables, will enable this system of construction to become more general. A framework of wood or metal should first be made, and cross supports fixed at the desired points to support the individual chassis. These may be of wood or metal, the latter being preferable especially if very high voltages are to be employed. Upon the chassis vertical screens may be erected to separate various portions, such as the I.F. stages in a superhet, and the various voltage supply points should be brought out to the same relative position in each chassis. The leads may then be taken from one chassis to another by means of the multi-way cable and plug, and it is only the work of an instant to pull out the plug and remove a section for inspection or alteration.

The reduction of capacity losses in a picture receiver will provide some interesting experiments in the arrangement of the various stages, and a scheme which was adopted in a well-known German experimental vision receiver consisted in arranging each stage in a separate section with the valves reversed alternately. This enables the lead from the anode cap to be joined to the following grid, through the screen and via the necessary condenser, with a lead less than half an inch in length.



This is the new Multi-connector in the Bulgin range.

Quality Components

On the low-frequency side, including the loudspeaker, there will also be ample scope for the modification of existing parts to enable the improved reproduction which is possible on the ultra-short wavelengths to be obtained. The addition of a tweeter, or another speaker for high-notes, will give most remarkable results from the sound transmission from Alexandra Palace, and an improvement in the L.F. couplings, either by the use of different transformers or values of resistors and condensers will provide not only an added interest to the hobby, but will no doubt result in a greatly improved performance.

Making 465 Kc/s I.F. Transformers

By FRANK PRESTON

Winding Data is Given, along with Particulars for Making Different Types of Variable-selectivity Transformer.

AN article printed in these pages some time ago, dealing with the construction of 110- and 150-kc/s intermediate-frequency transformers, evoked a good deal of interest, and many readers have written to ask for further corresponding data for the more modern 465 kc/s units. Actually, it is possible to adopt the same general form of construction as that previously described, simply by modifying the numbers of turns, but there are better arrangements. Fig. 1 shows the constructional details previously described, and is reproduced from the earlier article. It will be seen that the primary and secondary coils are wound on ribbed ebonite formers, and these are tightly fitted on to a length of wooden dowel rod arranged inside a screening box. A transformer to tune to 465 kc/s—which approximates to an equivalent wavelength of 650 metres—can be made by using 120 turns of 36-gauge d.c.c. or enamelled wire for primary and for secondary. This is the total number of turns on each former, although they are split up into sections to minimise self-capacity.

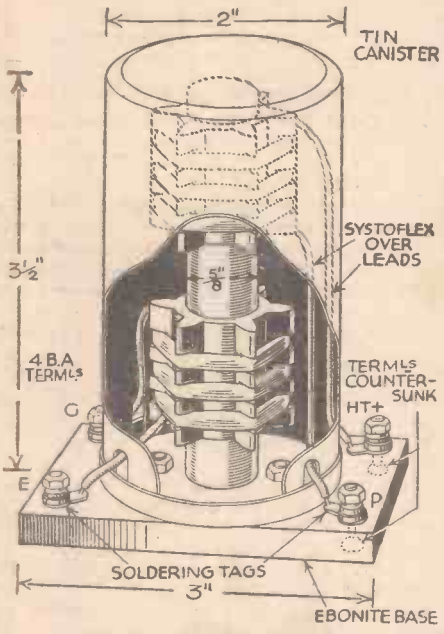


Fig. 1.—This shows a simple form of construction for I.F. transformers. The screening can may be a thin tinplate canister, or a screen from an old component.

Connections

The transformer can be used as shown in the circuit in Fig. 2 by connecting a .0003-mfd. pre-set condenser across each winding for trimming purposes. Incidentally, it is better to employ one of the new types of trimmer on steatite or similar bases, such as are made by Polar, Bulgin, and others. These condensers, besides being somewhat more efficient than older types, have a lower minimum capacity and are considerably more compact.

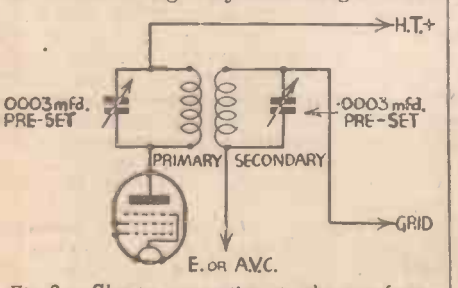
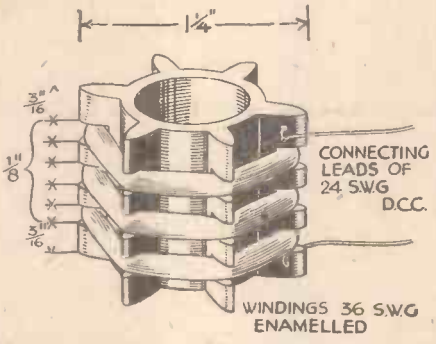


Fig. 2.—Showing connections to the transforme detailed in Fig. 1.

By following the form of construction shown in Fig. 1 it is easily possible to alter the coupling between primary and secondary and thus to vary the band-width covered; in other words, to obtain variable selectivity, which is a valuable asset in many modern superhets. The only objection is that the selectivity cannot be varied by means of an external control, and is therefore only pre-set, being adjustable only after removing the screening can and probing inside the set.



"Top-capacity" Variable Selectivity

There are, however, various methods of providing an external adjustment, one of the simplest being by using a .0001-mfd. variable condenser to provide "top-capacity" band-pass coupling. It is wired between the high-potential ends of the windings, as shown in Fig. 3—between the anode terminal of the primary and the grid terminal of the secondary. When using this system the I.F. transformer should be mounted near to the panel control so that extremely short leads can be used between the condenser and the transformer. Still further to assist in eliminating unwanted "pick-up" and coupling, it is often an advantage to screen the leads. With the arrangement described, preliminary adjustment can be made by varying the distance between the two coils, the variable condenser being used only when the set is tuned to a signal. In general, it will be found that the coils must be well separated, for otherwise the coupling will be too great.

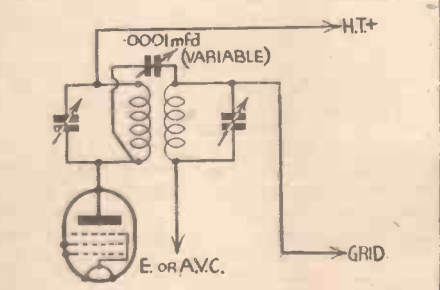


Fig. 3.—A simple method of obtaining variable selectivity is by using a transformer like that shown in Fig. 1, along with a .0001-mfd. variable condenser — which provides "top-capacity" coupling.

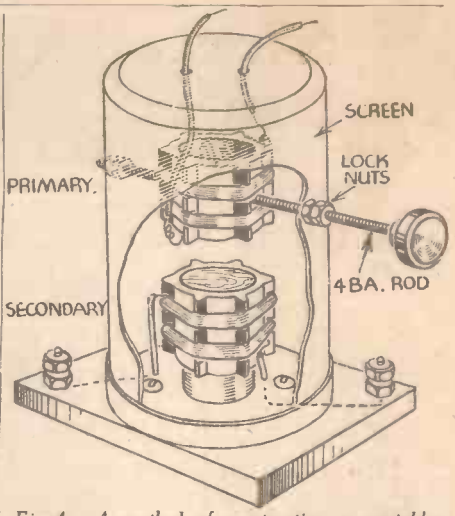


Fig. 4.—A method of constructing a variable-selectivity transformer where the secondary coil can be rotated to vary the coupling between primary and secondary.

Moving Coil

Another arrangement is to mount the two coils so that one of them can be rotated—in rather the same manner as one of the windings of the once-popular variometer could be moved. The idea is shown in Fig. 4, where it will be seen that the secondary winding is mounted on a length of screwed brass rod passing through the screening can. Nuts and lock-nuts are placed on the rod at the two points where it emerges from the screen, to prevent lateral movement, and these can be tightened so that there is sufficient stiffness to rotation to prevent the coil turning on its own. An ordinary knob is fixed to the end of the rod,

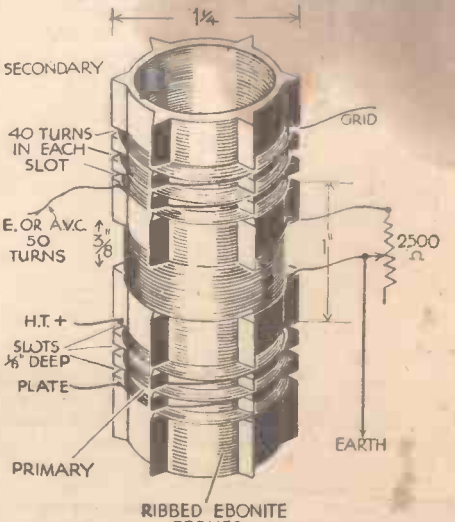


Fig. 5.—Another excellent variable-selectivity I.F. transformer. Primary and secondary windings each consist of 120 turns in all.

and this provides the operation. It should be noticed that the flexible leads from the moving coil are brought out through the top of the screen (which can be made from a thin tinplate canister or obtained from an old component), whilst those from the fixed coil are brought out at the base. In doing this it will be found convenient to mount one of the pre-set trimming condensers on top of the case or, better still, inside it and beneath a hole giving access to the adjusting screw.

Those with mechanical inclinations will appreciate that this simple form of construction is far from ideal, and will prefer to fit brass bushes in the screen to take the spindle. Another point worthy of mention is that a pair of transformers can easily be ganged by fitting a metal sleeve between the spindles of two transformers placed in a line.

Adjustable Coupling

There is another form of variable coupling available to the constructor, and one which offers many advantages, chief of which is that it does not depend for its successful operation on any mechanical devices. The system referred to consists of placing a third coil (which is not connected to any part of the circuit) between the primary and secondary windings. The form of construction referred to is illustrated in Fig. 5, and it can be seen that primary and secondary windings of 120 turns each are wound in three sections on a 1¼in. (overall) diameter-ribbed ebonite former. Each winding is divided into three sections ¼in. apart, and there is a space of 1in. between primary and secondary. In this space are wound fifty turns of 36-gauge enamelled wire, the ends of the winding being connected to two terminals of a variable resistance having a value of about 2,500 ohms—the exact resistance is not very critical.

When the resistance is set to its maximum value the coil provides a fair degree of coupling between primary and secondary, but when it is moved to zero the coupling is appreciably reduced. Thus, the degree of selectivity is increased, as is required when listening to distant stations or when interference is experienced. This electrical system of selectivity control has been found very satisfactory, although it is worth while to experiment with different sizes of coupling winding.

It will be understood, of course, that with any of the forms of I.F. transformer described it is necessary to include the .0003-mfd. pre-set condensers in parallel with the two windings for trimming purposes. These can be adjusted by trial when the transformers are put into use. It might be thought that the capacity suggested is rather high, but it is preferable to have a fair range of adjustment, especially when using home-made coils which cannot be calibrated as are factory-produced coils.

MY IDEAL RECEIVER

By H. J. Barton Chapple, B.Sc.

A Short Dissertation on the Requirements of an Ideal Radio Receiver

AS I always believe in designing and building a set for a definite performance, I shall make sure that it is capable of receiving all the principal B.B.C. stations — the long-wave and London Nationals, and London, Midland and one or two other Regionals, together with a selection of the best Continental stations. These are all I need, and I know from experience that a number like this can be received very well in my district. The design will be such that quality on the two local stations will be the best possible, and on the very distant ones very much above the average. The selectivity, general circuit arrangements and, above all, the loud-speaker will be chosen with just that end in view.

There will be provision for reproducing gramophone records, and for connecting up a microphone circuit, and the low-frequency section will also be available for use in connection with separate short-wave and ultra-short-wave units. I believe that medium- and long-wave development has now reached a stage when very little in the form of radical improvements is likely to arrive for some time, but there is still tremendous scope for experiment and development in short- and particularly ultra-short-wave working.

Things Avoided

I shall not design it to fit into some particular size or shape of cabinet to match the general decorative scheme of the lounge. It will be a really workmanlike job accommodated on a nest of racks in my own room, and programmes will be relayed to various parts of the house through the medium of a network of extension circuits. The equipment will not be crowded on to one chassis but will comprise a number of separate units—the main long- and medium-wave radio-frequency unit, complete down to the first low-frequency stage. Then will follow the main low-frequency amplifier with its own power pack, capable of giving a maximum output of about 10 watts—two 400-volt super power triodes in push-pull should suffice here. Room will be left on the rack for a couple of experimental units—short-wave or U.S.W., or even a standard-wave superhet and, of course, there will be a separate energising unit for the loud-speaker installed in my own room.

Gramophone input will normally be obtained from an electric turntable and pick-up already permanently installed in place close to the position for the proposed receiver racks. Possibly I shall add another turntable and a fade-over control. One turntable will be fitted with automatic record changing so that a complete programme can be given to any part of the house, and controlled either from my room or from the remote control system which I intend to install.

Tuning

Obviously I am not going to build a diminutive speaker into my ideal set. In the principal rooms there will be a separate speaker—the best from the quality point of view which is obtainable, and mounted so as to effect the best possible compromise between the rather unsightly baffle which is the most efficient, and the artistic cabinet which looks best. There will be no compromise about my own speaker, while in the less important rooms possibly smaller speakers will be installed, but they will be really good ones.

As I am prejudiced against the modern forms of tuning dials graduated in degrees or metres or having a large number of stations marked, I shall employ a scale on which I can indicate the exact tuning points of just those stations I know my set will receive, and no more. Also, because I know that for 99 per cent. of the family's listening time either the National or Regional local programmes will be required, there will be pre-set tuning arrangements for these two stations, controllable from the lounge by push buttons.

Remote Control

This brings into prominence the question of remote control. I have not worked out the details of the system, but I know that for anything really complicated in the way of changing over from one programme to another, the switching will have to be done in my own room. But it must be possible to switch the set on or off, to change over from the National to the Regional or *vice versa*, and from radio to gramophone from the lounge at least, so that either of the two stations or the records which happen to be loaded on the auto-changer can be heard at will. It should also be possible to switch on and off any of the extension speakers from the room in which they are installed, and there must be a master time-switch to switch off the whole installation at midnight to avoid waste if the last listener falls asleep without switching off. Although seeming to be extremely complicated, as a matter of fact it is not really difficult as a technical problem, and I have already gone quite a good way towards designing the system.

The chief question is to eliminate all unnecessary wires, and to simplify the switching mechanism so that the systems shall be "family-proof." For the moment it looks as though the choice will be between a multiple cable in conjunction with a specially designed multi-contact single-knob switch, and a single circuit with an impulser of the type used in automatic telephones.

There are many other things which I am not going to do in connection with the design and building of my ideal set. One is that no attempt will be made to substitute the "next best" thing for any item in the equipment. If calculation shows that a resistance of 35,000 ohms is required in a certain spot, this value will be incorporated, not 30,000 or 40,000 just because I happen to have a resistor of that value on hand. And speaking of resistances, I am going to calculate the watts dissipation of every resistor under working conditions, and see that the resistors used are rated for that dissipation at least. I know that in practice commercial resistors will carry an overload but I do not like the idea of excessive heating in any apparatus, and particularly in domestic equipment.

Absolute reliability must be a feature of my ideal set because I want it for listening to and not for taking to pieces every few weeks to repair something which has broken down.

CHECKING RECEIVER PERFORMANCE

Accurate Trimming: Making a Modulated Oscillator: Comparing Receiver Outputs.

IT might be thought that it would be a perfectly easy matter to decide how good or how bad a receiver is simply by connecting it to aerial and earth and listening to it. This would be a sufficiently good method of testing when only rough comparisons are to be drawn, but it is useless as a means of checking the results of experiments. The alteration might be so small that it is not audible in average conditions, in which case the time spent in experimenting would probably be wasted.

It is not suggested that the constructor and experimenter should provide himself with expensive calibrated valve voltmeters, cathode-ray oscillographs and the like, but he should have a small amount of simple apparatus, most of which can be made at home quite cheaply.

Obtaining a "Test" Signal

One of the first requirements is a device for generating a steady signal; this is because the signals sent out by a broadcasting station—with the exception of the tuning note—are quite useless for fairly-accurate test purposes. As an example of what is meant it can be explained that if an attempt were made to measure the output of a receiver, no matter how good the measuring instrument happened to be, it would be impossible to gain even a rough idea when, say, a band was playing. The reason is that the intensity of sound at the transmitting station is constantly varying between extremely wide limits, and corresponding variations must occur in the sound reproduced by the speaker, or in the output from the last valve.

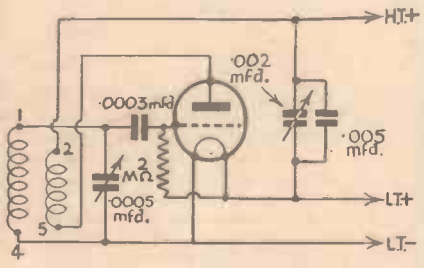


Fig. 1.—Circuit of a simple and effective local oscillator suitable for test purposes and for accurate trimming of a receiver.

A very simple and reliable miniature transmitter—for that is what an oscillator comprises—can be made by using a single valve in the circuit shown in Fig. 1, and using the connections indicated in the wiring plan in Fig. 2. It may be seen that a four-pin plug-in coil is used in a standard regenerative circuit with series reaction. The valve is an ordinary triode of the L or HL type, and is connected in the same way as a leaky-grid detector. Reaction coupling is practically "fixed," but slight variations can be made by means of the .002-mfd. pre-set condenser during use.

Using the Oscillator

In order to use the oscillator it is necessary only to plug in the valve and a standard four-pin coil (details for construction will be given later), and to connect a 2-volt accumulator and a 60-volt H.T. Incidentally, it is sometimes possible to use the same batteries as are used to feed the receiver, but the separate ones are to be preferred. After connecting it is necessary only to place the oscillator a few feet away from the aerial lead-in wire, and then to operate the oscillator tuning condenser until a high-pitched whistle is heard in the speaker. This is obtained only when the set and oscillator are tuned to the same frequency, and consequently the four-pin coil must be of such a size that it is appropriate to the wavelength to which the set is tuned.

When the oscillator and receiver have been adjusted in this manner, the effect of making the various alterations to the set can be noted by comparing the strengths of the note emitted by the speaker in various circumstances. In the same manner, experiments in selectivity can be carried out by noting the "spread" of the received note over the receiver tuning scale. Incidentally, this "spread" can be varied very consid-

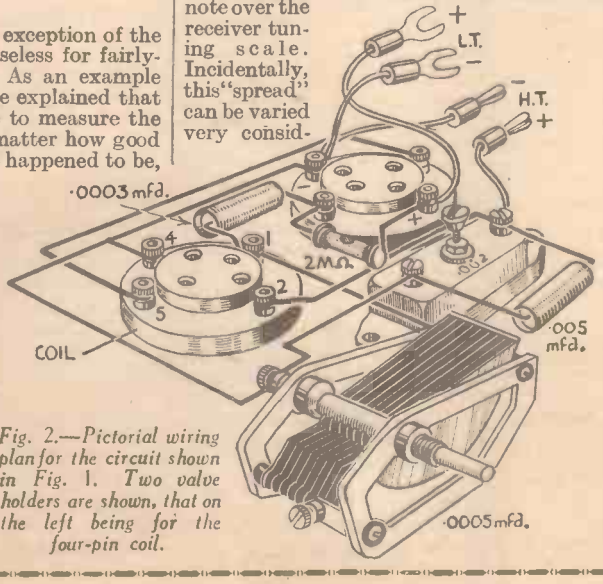


Fig. 2.—Pictorial wiring plan for the circuit shown in Fig. 1. Two valve holders are shown, that on the left being for the four-pin coil.

erably by altering the position of the oscillator in respect to the aerial lead-in, or of the set, so it must remain in the same relative position throughout the tests. It will generally be found best, however, to move the oscillator so far away that the whistle is very sharply tuned. When first using the oscillator, adjust the pre-set condenser until the note is perfectly clear.

Oscillator Coils

With regard to the coils, as mentioned above, it is possible to use standard ready-made components, but those who wish to make their own can use Eddystone four-pin formers, allowing approximately 75, 110 and 220 turns for the grid winding (between pins 1 and 4), and 40, 50 and 80 turns for reaction (between pins 2 and 5) for medium waves, 465 kc/s I.F., and long waves, respectively. The windings should be about ⅛in. apart and should consist of 30-gauge enamelled wire for the two smaller coils, and of 38-gauge enamelled for the largest. In each case the windings are arranged side by side, and both windings are wound in the same direction; details are given in Fig. 3. If it is wished to use the oscillator for short waves, suitable coils can be made, using approximately 9 and 6 turns for 30 metres; other ranges in proportion.

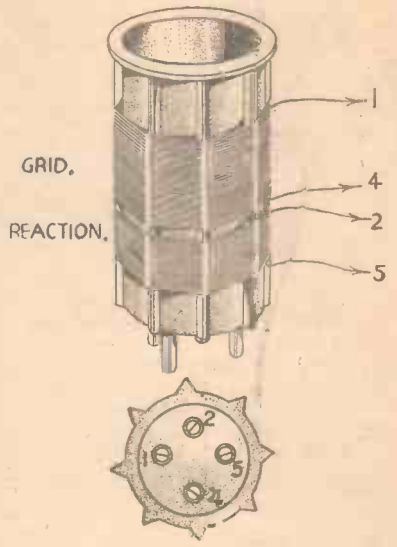


Fig. 3—Details of an easily-made type of four-pin coil. Winding data is given in the text.

Ganging I.F.'s

It will be appreciated that the oscillator can usefully be employed for ganging and trimming by adjusting the trimmers until the received whistle is at its loudest. In the case of a superhet the intermediate-frequency transformers can be adjusted in a similar manner, although some form of "artificial" coupling might be necessary due to the components being fully screened. One method is to wind a single turn of wire round the oscillator coil, and then to wind the other end of this wire round an unscreened lead to the primary winding of the first I.F. transformer. When this is done the oscillator must be placed near to the set so that the coupling lead is short. For 110 and 150

(Continued overleaf)

BEGINNER'S SUPPLEMENT

(Continued from previous page)

kc/s the long-wave coil should be used, whilst for 465 kc/s the middle coil will be suitable. In the case of the lowest frequency mentioned it will also be necessary to connect a .0005-mfd. fixed condenser in parallel with that used for tuning the oscillator in order to tune to the corresponding wavelength of about 2,700 metres.

Visual Output Checks

In many cases it is not sufficient to judge the output of the set by ear, especially when more than a few seconds must elapse between making the necessary adjustments. The reason is that it is impossible to "remember" sounds, and therefore even large variations are not easily recognised. A better method is to use some form of output meter, the simplest of which is an A.C. voltmeter, such as the Bulgin U.M.28, connected as shown in Fig. 4. The purpose of the 5,000-ohm potentiometer is to provide a reasonable load in the anode circuit of the output valve, and to vary the proportion of the output applied to the voltmeter so that a convenient portion of the scale can be used. It must be remembered that the meter does not read actual output volts, or output watts, but merely enables comparisons to be made. In practice the potentiometer should first be set so that it is short-circuited, the reading being zero. The potentiometer can then be adjusted until about a one-quarter-scale reading is obtained. After making a note of the exact reading the potentiometer should not be altered during the course of the experiments.

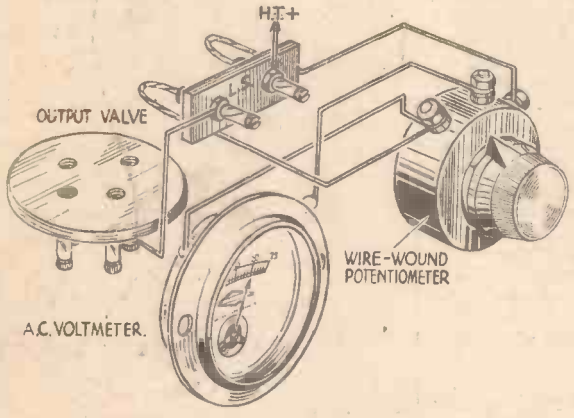
Any adjustments which result in an increased reading will be known to have resulted in a greater output being obtained and hence an increased efficiency, whilst the opposite is also true.

This system of measurement is not ideal because the optimum load of the output valve will probably not be provided unless especial care is taken in this direction. To a large extent this objection can be overcome by using a sensitive milliammeter (reading up to not more than 2 mA) in conjunction with a .005-mfd. condenser and variable resistance, as shown in Fig. 5. The resistance is first set to its maximum value, and then adjusted until a convenient reading is obtained on the meter scale. After that the procedure is the same as described above.

An Interesting Method

Another method, which has the advantages of being inexpensive and rather fascinating, is where a miniature neon lamp is used in place of the voltmeter shown in Fig. 4. In this case, increased output is indicated by increased brilliance of the neon, although most accurate results can be obtained by setting the potentiometer until the light is just extinguished. Any adjustment which causes it to glow again will be known to have resulted in greater output. After this adjustment has been made the light can be extinguished again and further adjustment tried. Incidentally, the small neon referred to is a new line introduced at Radiolympia by Bulgin. It is similar in size to a cartridge fuse and costs 3s. 6d.; it is used in a standard fuse holder.

Fig. 4.—A simple and accurate method of comparing outputs in various circumstances, by connecting an A.C. voltmeter and potentiometer in place of the loudspeaker.



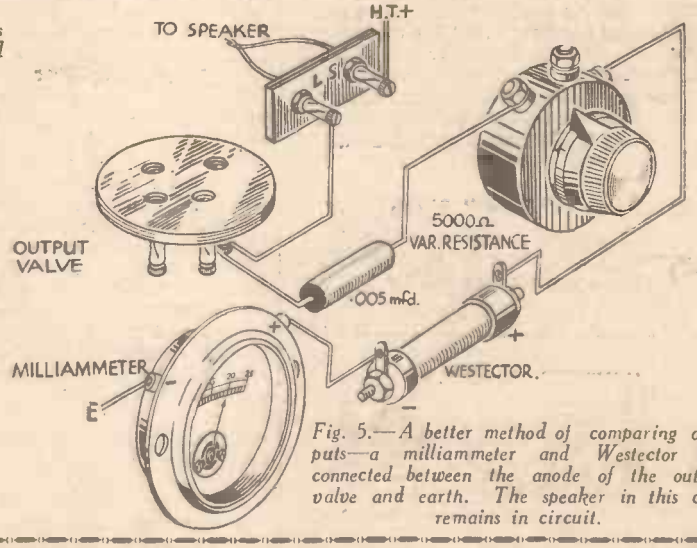


Fig. 5.—A better method of comparing outputs—a milliammeter and Westector are connected between the anode of the output valve and earth. The speaker in this case remains in circuit.

A Miniature Loudspeaker for the Nursery

AT the Leipzig Autumn Fair a Sonneberg toy factory is exhibiting a miniature loudspeaker, "Mi-La 4588," for children. This apparatus can be fitted to any make of wireless set, and is primarily intended to be a second loudspeaker for the nursery. Its dimensions are as follows: Height 6½in., width 4⅝in., depth 2⅝in. This small speaker produces a good room-volume, and the tuning dial can be illuminated by pressing the right-hand button; only a normal pocket lamp battery is needed. The broadcast can be switched on and off by a button on the left. The child is under the impression that it is manipulating a complete receiving set.

Judging Pianoforte Tests for Broadcasting

ACCORDING to a recent announcement, the panel of judges appointed to compare various makes of pianoforte under broadcasting conditions have just held their first meeting at Broadcasting House, under the chairmanship of Mr. E. Godfrey Brown, O.B.E. The judges include B.B.C. officials and outside experts, the latter being Sir Hamilton Harty, Mr. R. J. Forbes (principal of the Royal Manchester College of Music), Professor Victor Hely-Hutchinson (Professor of Music, Birmingham University), Mr. John St. Oswald Dykes (a well-known authority on the pianoforte), and Mr. Frank Merrick (pianist).

The panel decided that the tests should begin on September 14th. They will last for several days, and are to be held at Maida Vale. The pianists will be Ernest Lush, John Wills, and Leslie England. Mr. Lionel Shenstone has been appointed by the Pianoforte Manufacturers' Association as their official observer. Both the Pianoforte Manufacturers' Association and the Federation of British Industries were invited to appoint judges, but both declined to do so, as they did not wish to sit in judgment on their own, as opposed to foreign, products. Both British and foreign makes will be tested.

RANDOM JOTTINGS

New Series of Talks

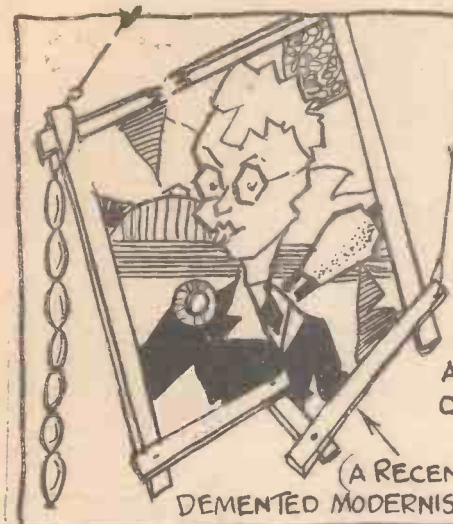
A SERIES of talks, which will be given from time to time and not necessarily at regular intervals during the autumn, has been given the generic title of "If." The talks will consist of suppositions about how the history of the world might have unfolded itself if different things had happened which, in point of fact, did not take place. The first talk, which was given by Igor Vinogradoff on August 9th, dealt with what might have happened "If Richard III had won the Battle of Bosworth." Subsequent talks in this series will include two which should prove of interest to all historically-minded listeners. One, on September 13th, will take the form of an inquiry by Maurice Healy into what might have been the result "If the French had landed in Ireland in 1796." Napoleon organised an invasion in that year which, fortunately, proved abortive, but since England's future at that time already seemed blacker than perhaps ever before, the success of the French expedition would certainly have given a fresh twist to the history of the world. On September 20th Helen Simpson, who is rapidly becoming as confirmed a favourite with listeners as she is already with the reading public, will talk on "If Napoleon II had been Madame Pirmon's son." This lady, whose name has vanished from the memory of everyone but the connoisseur of historical sidelights, was an early love of the great Napoleon's.

MYSTERY AT RADIOLYMPIA

ONE of the most mysterious—and intriguing — demonstrations at Radiolympia was shown on the Exide Battery stand (No. 32, Ground Floor). On a miniature stage, brilliantly lit, was a Drydex Battery and an Exide "Hycap" Cell, in full view of everyone. Slowly the Drydex Battery faded away and in its place appeared the Exide "Hycap" cell—then the battery gradually took form again and the "Hycap" cell vanished.

What was also amazing was that the writing on two showcards in the display completely changed its message.

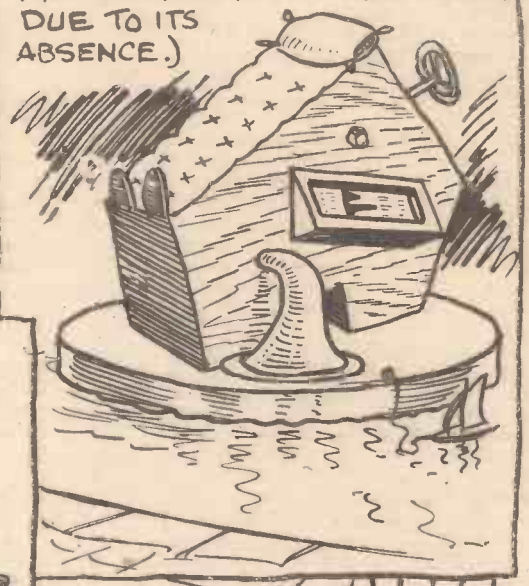
On inquiry as to the method of working the apparatus we were told it was a "particularly potent form of black magic"—certainly it is one of the most surprising exhibits ever seen at an exhibition, and the Exide stand was besieged by incredulous people trying to guess how it was done.

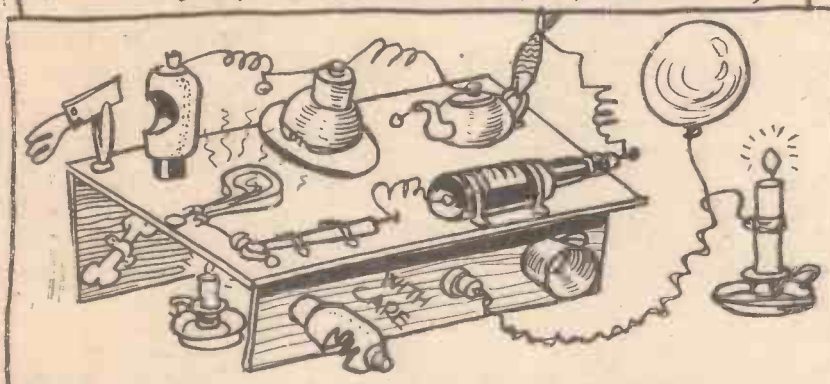


MASTER BATTISIN BELFRY—THE YOUTHFUL INVENTOR—WHO HAS FROM TIME TO TIME STAGGERED THE RADIO WORLD WITH HIS SENSATIONAL INVENTIONS, HAS NOW TURNED TO SURREALISM AS APPLIED TO WIRELESS. HERE ARE A FEW EXAMPLES OF HIS INGENUITY.

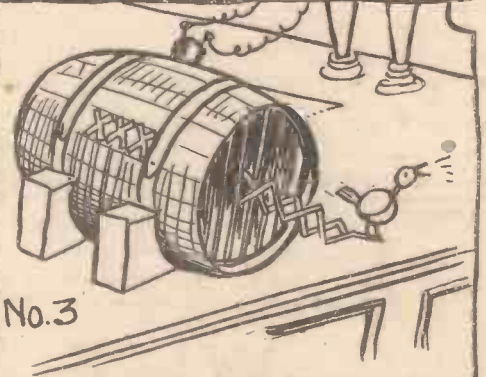
(A RECENT PORTRAIT BY THAT DEMENTED MODERNIST—IVAN AWFULEYE.)

NO. 1. A FLOATING RADIO CABINET WITH MUFFLED LOUDSPEAKER OUTPUT. IDEAL FOR BOTTLE PARTIES AND SEWING GUILDS. (NOTE THE INVISIBLE ELECTRIC FIRE WHICH IS NOT SHOWN MAINLY DUE TO ITS ABSENCE.)



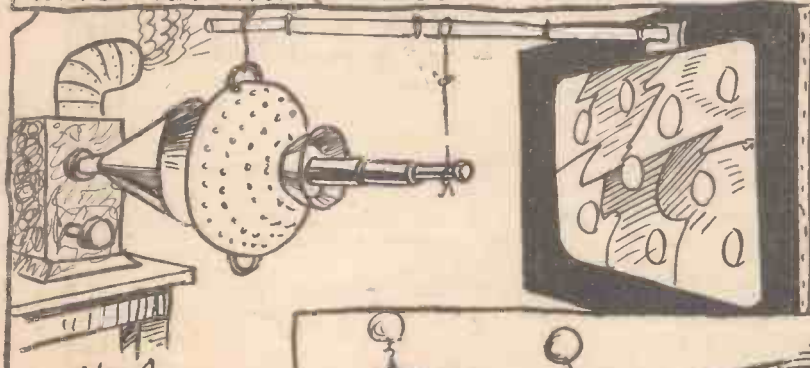


NO. 2. ANOTHER CHILD OF THE INVENTOR'S DREAMS — THE "SUPER-NEUROTIC NINE". THIS SENSATIONAL & EPOCH-MAKING RECEIVER IS QUITE INAUDIBLE UNDER THE MOST STRINGENT CONDITIONS & BECOMES EVEN MORE SILENT ON THE MINI-WAVES. A TECHNICAL FEATURE WORTHY OF NOTE IS THE HERRING-TUNED STAGE OF TEAPOT REACTION. (COVERED IN ALL COUNTRIES.)



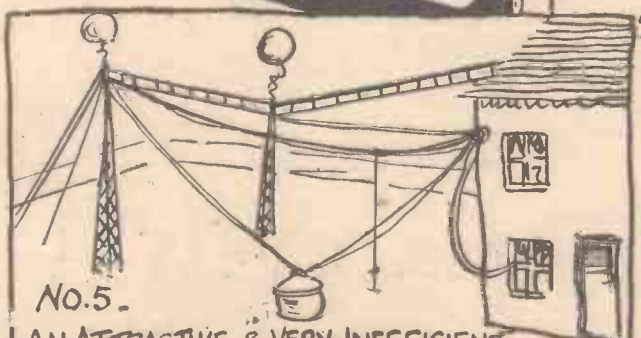
NO. 3

AN UNCONVENTIONAL EXTENSION SPEAKER SPECIALLY EVOLVED FOR USE IN DRINKING HOUSES DURING THE PERIOD WHEN AN EXTENSION OF LICENCE IS IN OPERATION.



NO. 4.

THE CULLENDER SYSTEM OF TELEVISION WHICH CREATES AN ATMOSPHERE OF INSOBRIETY IN THE HOME.



NO. 5.

AN ATTRACTIVE & VERY INEFFICIENT ANTI-STATIC AERIAL OF NORWEGIAN CHEWING-GUM.

WHEN ASKED THE REASON FOR NOT EXHIBITING AT "RADIOLYMPIA" MASTER BELFRY STATED THAT HE HOPED TO DICTATE HIS POLICY IN TOWN ANY OLD NIGHT.

(B.B.C.— BEWARE OF YOUR MIKE!)

ARTHUR ASHDOWN '36

Getting the Best From a Battery Radio-Gram

AFTER repeated experiments I have devised the arrangement, shown in the accompanying circuit diagram, which undoubtedly permits of the best possible results being obtained from a gramophone pick-up incorporated in a battery-operated radio receiver.

The innovation consists of the provision of *a separate first amplifier valve for the pick-up*, thus eliminating the usual switching arrangement in the grid circuit of the radio detector valve or pick-up plugging-in, with the inevitable capacity interference in the radio circuit of the receiver.

Moreover, this arrangement allows of matching a valve to the pick-up, instead of relying upon the radio detector valve to function in two capacities. A good detector valve may not function so well as a pick-up amplifier, whilst on the other hand a valve that is found to suit the pick-up may not give the desired results on radio. The present arrangement allows for the inclusion in the set of the correct valve for each circuit, a simple single-throw double-pole switch incorporated in the L.T. positive leads permitting of an automatic change-over from radio to gramophone, and *vice versa*, at the same time switching off the valve not required. This is much simpler, and a far more efficient arrangement of radio-gramo switching, leaving the radio circuit of the receiver absolutely independent of the gramo-amplifier circuit.

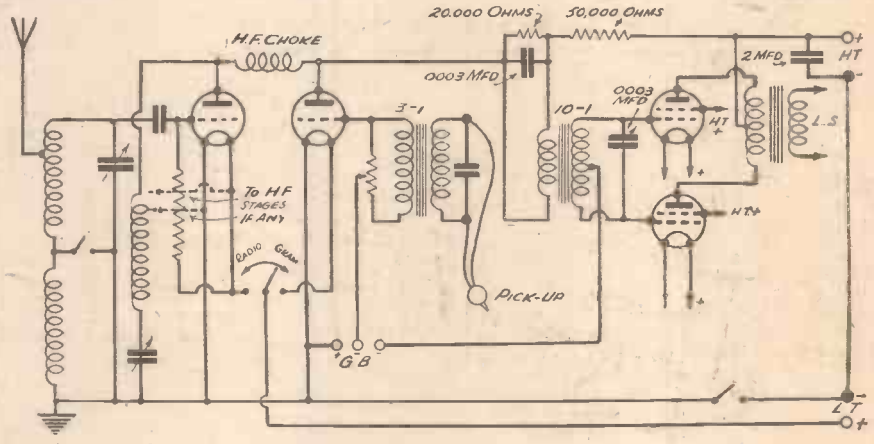
Q.P.P. Output Stage

Quiescent push-pull is preferred to Class B in the output stage, and provision is made for a very effective form of tone control which operates on both radio and gramophone reproduction. This consists of a .0003 variable condenser connected between the grids of the output pentodes (actually across the output winding of the 10-1 Q.P.P. transformer). Added "punch" and brilliance to gramo reproduction is obtained by the introduction of a 3-1 intervalve L.F. transformer between pick-up and its first amplifier valve, the potentiometer volume-control being connected across the output side of this transformer. Experiments with fixed condensers shunted across the primary of this transformer, the value depending upon the output characteristics of the pick-up, make for the suppression of needle-scratch and unwanted high frequencies in the pick-up.

Most radio home-constructors have a spare valve or two which may be utilised in making this conversion, and the addition of a special valve for the pick-up entails no extra filament consumption, since the change-over switch cuts out of circuit either the detector valve or the gramo-valve, whichever may not be required.

A "Three-Four" battery-operated radio-gramo receiver constructed on these lines, given a generous, steady supply of high-tension current (100-120 volts) incorporating a couple of good output pentodes and a suitably matched moving-coil loud-speaker, will give all the volume, clarity and quality that could be normally desired. A more ambitious pre-amplifier radio circuit will, of course, add range and selectivity to the set, but whatever arrangement may be incorporated on the radio side, the gramo section will remain entirely independent.

F. G. C.



The circuit referred to by our contributor.

Television at Sea

How Television Aids Navigation by Transmitting "Picture" Signals of Compass Bearings

By MORTON BARR

UP to the present, interest in television has been mainly centred around its entertainment value.

We are all waiting to know exactly when the new picture service is coming permanently into operation, and how much it will finally cost us to bring it into the home.

Meanwhile, whilst these questions still remain unanswered, the discovery of television is making itself felt in other directions than broadcasting. We have, for the first time in history, found out how to transmit instantaneously a picture of events occurring at a point beyond the normal range of vision, and it would be strange indeed if this new discovery did not find some useful applications outside the field of mere entertainment.

The whole subject is, of course, still in its infancy, but as a line of approach to some of the possible "outside" developments in television it will be helpful to see, in the first place, what has already happened in the case of wireless. What can be done with one can, or will be done—where it is advantageous—with the other.

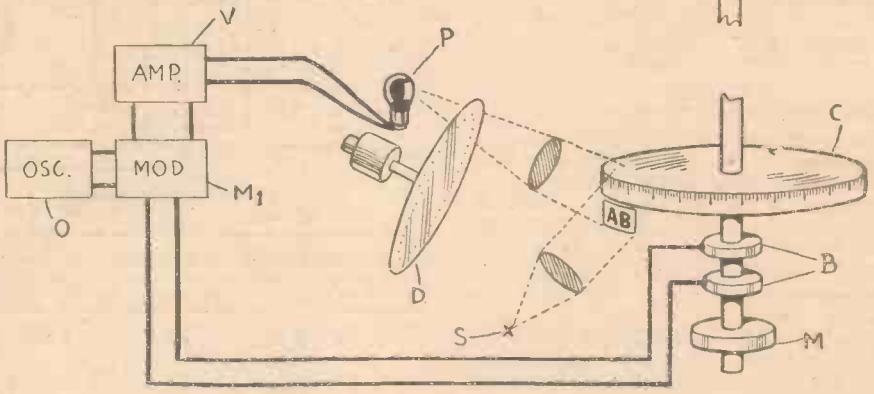
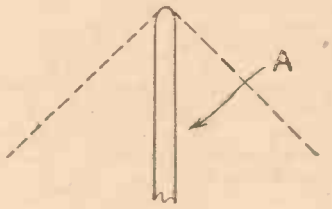


Fig 1.—Diagram of the apparatus used in a television "beacon" station.

Wireless first made its mark—long before the introduction of broadcasting—as a means of keeping in touch with those cut off from all ordinary means of communication, so that ships at sea and aeroplanes in flight for the first time lost their peculiar sense of isolation.

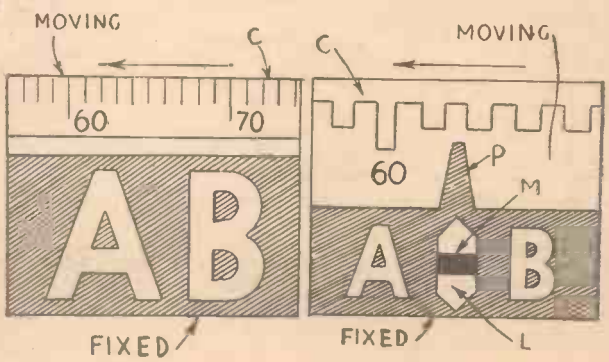
With the help of the radio direction-finder, a navigator can now come safely into port under conditions where all ordinary harbour lights and marks are completely blacked out. Similarly, a course can be "marked out" in the air by overlapping wireless beams, so that an aviator can fly blindly along a given route, knowing that he will be automatically warned of any deviation to port or starboard by the radio instruments on his dashboard. Finally, when he reaches his destination, short-wave radio beams help him to come safely to ground at the correct landing angle, even when fog completely blots out all sight of the aerodrome.



Aiding Navigation in Foggy Weather

Television is already following closely in the footsteps of directional wireless as a help to navigation in foggy weather. It has the definite advantage of giving a clear and unmistakable "picture" indication which can be seen at a glance, so that the navigator does not require either a knowledge of the morse code or an ear sufficiently sensitive to judge when the received signals are at maximum or minimum strength in the midst of a confusion of other noises.

For instance, in one well-known method of assisting mariners to find their location



Figs. 2 and 3. The beam pictures as seen by the navigator at sea, and which indicate his exact bearings.

during fog, a rotating beam of wireless is radiated from a beacon station near the coast, in much the same way as the ray of light from a lighthouse. In addition, a characteristic call signal—consisting of certain morse letters which identify the station—is broadcast or transmitted in all directions, together with the morse letter N at the precise moment when the beam is passing through the North point of the compass. The wireless beam makes one complete revolution every 30 or 60 seconds, or more, according to the particular transmitter concerned.

In order to find his bearings the navigator must first be able to recognise the morse call sign, so that he can identify the particular transmitting beacon on his map. He next listens for the morse letter N, which tells him that the beam is passing through true North on the compass, and immediately sets a stop-watch going. He then waits until the beam sweeps through his own position, where it produces a "maximum" signal in his receiver. At this moment he stops his watch.

The number of seconds between hearing the "North" signal and the time the beam reaches him then indicates his bearing relative to the land beacon. For instance, if the beam takes 60 seconds for a full revolution, and his stop-watch reads 30 seconds after hearing the "North" signal, he knows he must be lying due south of the transmitter. It will be seen that all this calls for a considerable amount of skill, as well as a competent knowledge of morse.

The Television "Beacon"

By contrast, it is possible to transmit comparatively simple television signals which show his bearings pictorially to a navigator, no matter where he is situated. The apparatus used at the beacon station is illustrated in simple form in Fig. 1.

The directive aerial A, which radiates a clear-cut beam of wireless energy, is constantly rotated at a uniform rate by a motor M. On the driving-shaft is a drum or disc C which is marked along its edges with a divided scale representing the points of the compass. At one particular point there is a card AB carrying the identification letters of the station. This card does not rotate with the drum and aerial, but remains fixed.

Light from a source S is focused upon the fixed card AB and upon the scale-markings of the disc C as the latter slowly swings past. The reflected light passes through the usual rotating scanning disc D, and is thrown on to a photo-electric cell P, so that a television picture of the fixed card AB and of the scale markings on the disc D is fed first to the amplifier V, then to a modulator M (which is supplied with a carrier wave from O), and finally back through brushes B to the aerial A, where it is radiated into space as part of the beam.

Simultaneously, a second aerial (not shown) radiates synchronising signals, not as a beam, but in all directions, so as to keep any television receiver within range in step with the scanning disc D.

All that the fog-bound mariner now requires to do is to watch his television screen. As the beam sweeps past him, he will see a picture similar to that shown in Fig. 2, consisting of the stationary identification letters AB and a slowly-moving image of the compass scale, which indicates his bearings relatively to the beacon station. Every suitably equipped ship within range

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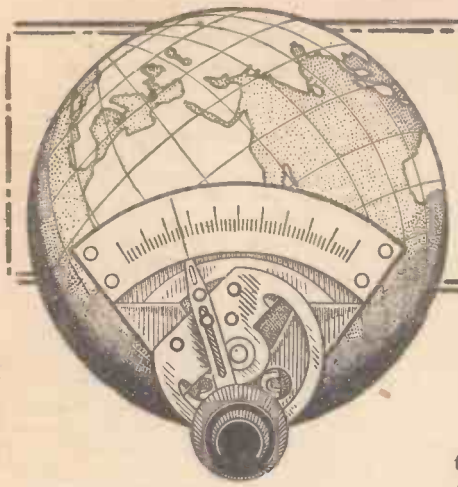

SHORT WAVE SECTION

MAINS U.S.W. SETS

Hints on Stabilising A.C. Supplies on the Ultra-short Waves

By G. V. COLLE

AN essential mechanical requirement on receivers arranged for ultra-short-wave reception is that all components shall be very rigidly mounted. This condition of construction is due to the very high frequencies involved, whereby small changes of capacity between adjacent components cause wide fluctuations in the tuning. It would be easy to quote innumerable instances as to how the effect in question can occur, but it must suffice to remind constructors that absolute mechanical rigidity is both necessary and desirable in all components, and the wiring between them.

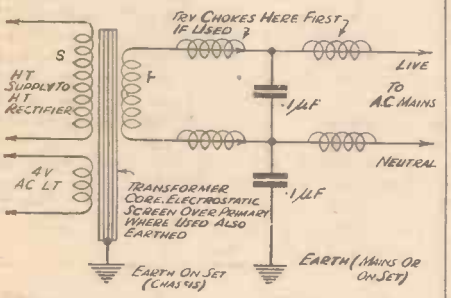

Fig. 1.—Methods of preventing A.C. mains modulation of carrier waves on ultra-short wavelengths. Note the polarity of mains connections. A three-pin plug will prevent errors of connections, and also provide the earth for the condenser.

Despite these precautions, it is surprising how on the more simple short-wave sets the *working* conditions, substantially under the control of the operator, can cause similar fluctuations.

Take, for instance, the popular detector, L.F. receiver combination. Unless the reaction winding is wound with fine instrument wire and has a low-capacity effect on the tuned winding to which it is coupled (usually achieved by bunching the reaction turns near the earthed end of the tuned coil), a variation of the wavelength to which the set is tuned is bound to occur when adjusting the reaction condenser.

A.C. Mains Working

Similarly, in order to avoid hand capacity effects, it is desirable to earth the frame and moving plates of the tuning condenser, employ a good earth connection of low D.C. resistance and, additionally, use an extension spindle for the former-mentioned component.

On the more ambitious set these precautions still hold good, although much depends on the actual circuit employed.

There is one aspect of this subject, however, which forms the main theme of this article and that concerns the use of A.C. supplies. Seasoned experimenters will recollect that it was not so long ago when the use of A.C. mains was not considered practicable for short-wave-set current supplies.

The chief difficulty apparently was that most short-wave transmissions were of low power and loudspeaker reception could not be achieved without an exceptionally high degree of amplification. The ultimate effect of receiving a transmission on or slightly above the prevailing static level plus the noises inherent to high amplification, produced a signal-to-noise ratio which gave no measure of entertainment. For the most part, therefore, reception was confined to 'phones. It is easy to conclude that such sets operated from the A.C. mains would be affected by the A.C. hum unless very efficient smoothing was provided. Even so, the low power of the transmissions at that time necessitated ample reaction, which was not very "smooth" with A.C. valves, and tended to reintroduce the A.C. hum and mains noises.

Present-day short-wave transmissions of course are on more generous outputs, a fact which considerably helps set designers.

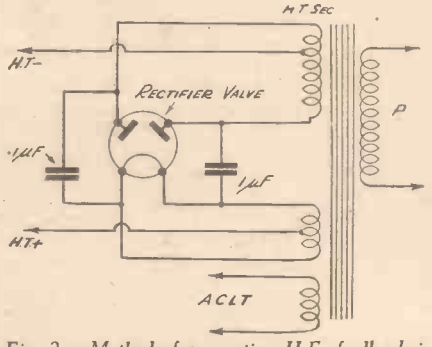

Fig. 2.—Method of preventing H.F. feedback in H.T. leads on ultra-short wavelengths. Condensers should be non-inductive, and of adequate test voltage.

Most receivers designed to include the short-wave bands operate on the superheterodyne principle, which possesses many points of advantage which more than outweigh any slight peculiarities common to this system of reception. So far the all-wave superhet covers wavebands commencing at about 13 metres and up to about 2,000 metres, invariably in four or five steps, with each waveband not always a continuation (or slight overlap) of the previous one.

The following notes deal only with the very lowest wave-range, as it will be found that reception for the most part will be good and consistent on wavelengths above, say, 50 metres. Below 50 metres the tendency is for the amplification of the signal-tuned circuits to fall progressively with wavelength, until at the lowest point of the dial the receiver sounds quite dead. Where there is a reserve of power it is of course utilised to restore the loss of sensitivity.

Apart from the tendency for ignition noises from passing cars to intrude on those programmes received, and the usual fading and distortion effects due to shifting of the Heaviside Layer, it is often possible to receive a station which is slightly modulated by the mains hum. At least, one is given that impression, although the writer has actually traced slight mechanical vibration of the A.C. transformer to the tuning condensers or canned coils, thus causing minute changes of capacity and inductance.

Separating the Power Units

The first point to be noted, therefore, is that A.C. power units should be separate from short-wave sets (or sections of sets), or otherwise mounted on resilient materials such as rubber, felt, etc. In those instances where a peculiarity of *circuit design* causes the signal to be modulated at the frequency of the mains (say 50 cycles) or twice the mains frequency (at the rectifier) it is possible to overcome the trouble by connecting condensers across the A.C. transformer primary, with or without associated chokes, as shown in Fig. 1.

Sometimes a full-wave rectifier valve itself will generate interferences, or alternatively create an H.F. feed-back in the H.T. leads which will lead to modulation hum. The usual remedy in this case is to place a .1 mfd. non-inductive condenser across each anode and one filament leg as close as possible to the rectifier valveholder, as shown in Fig. 2.

Television Transmissions

On wavelengths below 13 metres and principally in the region of 6 to 7 metres

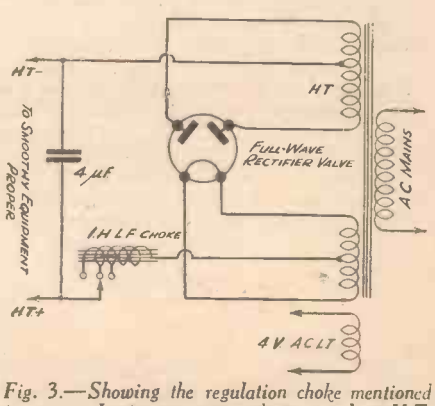

Fig. 3.—Showing the regulation choke mentioned in text. It improves smoothing, steadies H.T. voltage, and reduces surge strain on the valve.

SHORT-WAVE SECTION

(Continued from previous page)

(the band used for the B.B.C. television transmissions), fluctuations in the A.C. mains supply are most apparent.

In order to render high-definition television transmissions practicable the following features are essential: (a) direct optical radiations from the transmitting stations; that is, the carrier waves must not be received as ground or sky waves, (b) freedom from fading, which will be dependent on (a), and also on electrical and mechanical rigidity in the receiver design, (c) absence of interferences, such as electrical, and that due to adjacent channel stations, and (d) freedom from irregularities in the current supply.

The desirability (d) is the only one which concerns us here, and the problem is quite easy to solve if certain basic facts are borne in mind. First, the self-capacity of the valves in the signal-tuned circuits bears quite a large relationship to the total capacity across the coils at the radio frequency involved. Secondly, a change in the voltages applied to these valves will cause their internal capacities to vary. Thirdly, an irregular current supply will create artificial fading effects which cannot satisfactorily be dealt with even by an instantaneous A.V.C. action.

Stabilising the H.T. Supply

We can deduce from these requirements that not only must the H.T. supply be stabilised within close limits, but it must also be adequate as regards current output. The first necessity, therefore, is that the H.T. voltage should be freed from A.C. mains fluctuations. With regard to the current, it must be ample so that on sustained loud passages (corresponding, say, to heavy bass in the "sound" transmission and heavy shading on "vision"), the output valves do not rob the signal valves of their supply.

A special class of valve, called a barretter has been produced by valve manufacturers, for stabilising purposes in H.T. supplies. The method of wiring it, and the type of barretter to employ, depends on the type of rectifier adopted and the current to be regulated. Readers desirous of consistent reception at 6 to 7 metres should therefore communicate with their valve suppliers and request full details. An even better plan is to submit full details of the rectifier at present employed and ask for a suitable barretter to be recommended.

This device is additional to the existing rectifying system, and in its action can be compared to the difference existing between direct and indirectly-heated valves. When a very fine degree of H.T. control is required, such as on an ultra-short-wave heterodyne oscillator or wavemeter, two or more barretters can be employed on the one H.T. unit. An important point to note, however, is that the stabilisation of the H.T. supply becomes easier of solution when the A.C. transformer is built on generous lines. In other words, the transformer should possess good regulation, which implies that the windings should be of substantial gauge. Under these conditions the voltage output even without a barretter will remain sensibly constant at no load to maximum current loads. Of course, the reader should not infer from these remarks that a properly regulated transformer will replace the device in question, but only that a transformer with good regulation will materially assist in the attainment of both steady H.T. potential and current.

TELEVISION AT SEA

(Continued from page 717)

will pick up a corresponding picture of its own bearings, since the rotating beam carries on its back, so to speak, a visible record of each point of the compass through which it is moving.

The Picture Signal

Although the system provides a picture signal which can be easily understood by a navigator ignorant of the morse code, it is open to the objection that the scale markings are slightly "on the move" during the critical moment of observation. For this reason there may be some difficulty in taking an exact reading during the short period of time available.

In order to remove this uncertainty the procedure at the beacon station may be varied, by radiating the picture signals on a broadcast wave which travels outwards in all directions, instead of putting them on the back of the rotating beam. The latter is, instead, used to transmit a tone signal which has the effect of producing at the receiver a black "bar" or distinguishing mark under the exact scale-reading which represents the ship's bearing at any given time.

In this case, the pictures seen by the navigator would be as shown in Fig. 3, where C again represents the compass scale and AB the stationary identification letters of the beacon station. As before, the letters AB remain "still" on the received picture, together with a special pointer P and an aperture marked L, whilst the compass scale C continues slowly to move round. But at the precise moment when the rotating beam sweeps past his ship, a black bar M appears in the aperture L, and the navigator knows that the pointer P then marks his exact bearing.

Leaves from a Short-wave Log

A NEW Cuban has made its appearance, in this instance not at Havana, but at Matanzas. It is CO5RY, working on 48 m. (6,250 kc/s). Reports should be sent to Señor Bernabe R. de la Torre, Gral. Betancourt, 51, Matanzas, Cuba. Readers also report the reception of a Colombian station calling HJ4ABU, Pereira, on 48.82 m. (6,145 kc/s), but no further details have, so far, been secured.

Tracking the Offender

The station which has been interfering with Daventry GSC (31.32 m., 9,580 kc/s) is said to be HJ1ABG, Barranquilla (Colombia), which has been officially allotted 31.31 m. (9,583 kc/s) as a channel; it was formerly working on 49.65 m. (6,042 kc/s).

For the Early Birds

If you are up in the early morning hours it would be worth while to try for VPD, Suva (Fiji Islands), of which the power of the transmitter has been increased to 3 kilowatts. The station opens at B.S.T. 06.30 with a theme melody: *The Song of the Islands*, followed by the announcer's *Radio Suva calling*. Details of the wireless entertainments are always given in English, although the programme often includes native tribal chants accompanied by the beating of drums. It is a curious fact that, contrary to one's expectations Fijian music is in a major and not a minor key. Suva is approximately 11,100 miles distant from London, and the standard time is eleven hours in advance of the B.S.T. All programmes conclude with the playing of *God Save the King*.

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Electron All-wave Aerial

ANOTHER addition to the range of aerials designed so that maximum performance may be obtained with all-wave receivers is announced from the New London Electron Works. This kit includes the aerial wire and leading-in cable, with impedance matching transformer and three special insulators. The aerial cable is 60ft. in length and is divided into two portions, one of 43ft. and one of 17ft. These are joined together in one continuous length and the double twisted lead-in is already connected to the junction of the two lengths. This type of aerial enables the short-wave performance to reach practically as high a standard as when

The New London Electron Works new All-wave aerial.

a special short-wave aerial is employed, and at the same time gives the maximum performance on the broadcast band, whilst the twisted leading-in cable greatly reduces the interference which is often experienced on the short-waves by local electrical apparatus. The losses which are introduced by this type of lead are counterbalanced by the special matching transformer. The price of the kit, complete in a neat box, is 15s.

New G.E.C. Loudspeaker

THE range of loudspeakers marketed by the G.E.C. has recently been added to by the inclusion of a model designed primarily as an extension speaker for the current range of G.E.C. radio receivers and radio-gramophones. This model is of the permanent magnet type, employing a nickel-aluminium magnet of high permeability which gives a large flux density in the gap and consequently high sensitivity.

All current G.E.C. receivers have low-impedance extension speaker sockets, and the "Super" P.M. moving-coil loudspeaker is therefore designed so that a special transformer is dispensed with. It has an impedance of 2/4 ohms and a capacity of 3-4 watts.

The cabinet is of walnut with chromium relief, and its dimensions are: Height 12¾ins., width 13ins., depth 6½ins.

The price of the cabinet model is 52s. 6d. and the chassis only 29s. 6d.

New Ostar Ganz Pentode

A NEW pentode valve has been introduced in the Ostar Ganz range, and this news is accompanied by details of price reductions in all models of these high-voltage mains valves. The new valve is known as type M.43 and the heater may be used on all voltages between 100 and 250, the consumption being rated at 10 watts. H.T. for the anode is 250 volts max. and for the screen 200 volts, whilst the maximum grid-bias is 3.5 volts. The optimum load is 5,000 ohms, and the valve is fitted with the continental type of 7-pin base having side contacts, and during the coming season it will be possible to obtain all the Ostar Ganz valves with this type of base.

The new prices of these valves are as follows:—

	s.	d.
E.G.50 (half-wave rectifier)	9	6
E.G. 100 (half-wave rectifier)	12	9
A.520 (general purpose)	13	6
U.920 (output)	13	6
L.1525 (output)	13	9
D.130 (high-mu triode)	13	9
B.2 (double diode)	9	6
S.25 (screen-grid)	15	6
S.100 (screen-grid)	15	6
MS.18 (vari-mu S.G.)	15	6
MS.70 (vari-mu S.G.)	15	6
Pt.3 (multi-grid)	16	0
V.3 (vari-mu H.F. Pen.)	15	9
H.3 (H.F. Pen.)	15	9
M.43 (output pentode)	16	9
G.5 (pentagrid)	17	6
NG.50 (voltage doubler)	15	0
NG.100 (voltage doubler)	17	6
K.3560 (super power)	19	6
K.2050 (super power)	19	6

Clix L.S. Extension Panel

THE majority of listeners now employ an extension loudspeaker for use in another room in the house, and although this is generally connected permanently, there is no arrangement at the receiver end for connecting this and disconnecting the permanent speaker, or for otherwise making the necessary connections. If it is suddenly desired to bring into use the external speaker and to cut out the permanent speaker, the leads may be disconnected from the one model and the other leads connected, but such a procedure should only be undertaken when the set is switched off, and on no account should the anode circuit of a valve of the pentode type be broken whilst the H.T. and filament supplies are switched on. Even when a change-over switch is employed for the two speakers, the set should be switched off first to avoid open-circuiting the pentode, but the new Clix component illustrated on this page will avoid the difficulty in a simple manner. As will be seen, a small bakelite panel is provided with a socket and a slot, and a two-pin plug is provided with two different sizes of pins, the smaller being inserted into the socket and the thick pin in the slot. It will be found that the plug may then be twisted a short distance in either direction, and the pin makes contact in one position inside, with a brass contact piece seen in the left-hand illustration, and this enables the two speakers to be joined in parallel or the extension speaker only to be included in circuit, but at no point is the anode circuit broken. This is therefore both a useful device and a valuable safeguard, and it costs only 1s. The extension speaker leads are, of course, joined to the two-pin plug, whilst the internal speaker is connected permanently to the rear of the control panel.

A valuable safeguard. The Clix Extension L.S. Control Panel.

CATALOGUES RECEIVED

To save readers trouble, we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue," PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues No other correspondence whatsoever should be enclosed.

BULGIN RADIO PRODUCTS

THE latest Bulgin catalogue for the season 1936-1937 describes and illustrates an extensive range of radio and television components suitable for every need. The high quality of Bulgin components is well known and is due to the constant research work, modern methods of specialised production, and rigorous mechanical and electrical tests which all components undergo before leaving the works. Amongst the comprehensive ranges of goods shown in the catalogue are adaptors, aerial equipment (including the new Bulgin Doublet Aerial for short-waves), H.F. and L.F. chokes and coils. A new line of 3-range, self-contained, screened, superhet tuning coils is shown. These coils cover wave-bands of 18-55, 200-550, and 1,000-2,100 approx., and are suitable for converting two band sets, or for use in inexpensive all-wave sets. Various types of fixed and variable condensers; fuse holders and mains connectors; jacks and plugs; control knobs; measuring instruments; variable and fixed resistors, and signal and panel lights are also listed. A special section of the catalogue is devoted to couponents for ultra-short-wave and television work, and another section deals with mains switches. L.F. couplers, L.F. transformers, valve-holders, volume controls, and a range of kit sets are also included. At the end of the catalogue there are several pages of technical data and dimensioned drawings of various Bulgin components, which should prove very useful to constructors. This useful list, which should be in the hands of every constructor, is priced at threepence.

Another interesting Bulgin publication is the Radio Service Manual, published at one shilling. Comprising 64 pages, the manual contains 240 circuits and diagrams and is packed with useful information for the dealer, serviceman and experimenter. The explanatory text, in conjunction with the easily understood diagrams, covers the majority of points met with in practice. The novice, to whom this booklet will also appeal, will find much of interest in its pages.

K.B. RADIO

THE new season's list issued by Kolster-Brandes, Ltd., is in the form of an attractive folder, in which full particulars are given of this firm's latest receiver, including the "Supermagnidyne" all-wave mains-operated models. Other receivers in the range include a 3-valve battery receiver priced at 7½ guineas; a battery superhet with wave ranges of 200-570 and 900-2,000 metres, and priced at 10 guineas, and a universal mains transportable superhet with medium and long wave range, priced at 15 guineas. All these receivers can be obtained on hire-purchase terms, particulars of which are given in the folder. Particulars are also given of the K.B. Rejectostat System, an effective method of reducing interference.

DUBILIER CONDENSERS AND RESISTORS

DUBILIER condensers are known the world over for their robust construction and dependability, and the same may be said of their various forms of resistors and volume controls. Particulars of a wide range of these components are given in a well printed and illustrated booklet just issued by the Dubilier people. In this publication are included standard designs most used by home constructors and service engineers, and generally stocked by the trade. The range includes mica dielectric condensers; non-inductive paper dielectric condensers; wet and dry electrolytic condensers; metallised resistors and volume controls; and interference suppressor devices.

A larger catalogue, also issued by Dubilier Condenser Co., Ltd., is intended for the use of radio manufacturers, and contains comprehensive information of the latest developments in condensers and resistors, tabulated in handy reference form.

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).

COCQ, Havana

SIR,—In the Short-wave Log of August 8th, page 534, you invite information of COCQ, Havana, Cuba. I can definitely state that the W/L is either 30.73 m. or 30.74 m.

On Saturday, August 22nd, at 07.00, I was searching for HP5J, when I received this transmission. The name of the station was announced, but not the W/L. However, before the station finally closed down a powerful transmission started slightly above it. I was surprised when I heard a voice from the station say, "Hallo, ZMFR, this is VLZ, Sydney, calling you on 30.74 metres." Therefore, COCQ *must* be about 30.73 metres. I hope this information will be of use to you—A. P. L. CASLING (Hale, Cheshire).

Good Reception on 20 Metres

SIR,—As a regular reader of your fine paper, and a newcomer to the short-waves, I have read with interest the various logs submitted by your readers, especially those on 20 metres. Perhaps my experience on Sunday, August 23rd, will be of interest to other readers. Between 16.30 and 20.00 I received thirty-three American amateurs on 20 m. at strengths from R5 to R8, while special mention must be made of WIFL8, of Norwich, Connecticut; W1AXA, of Lynn, Massachusetts. W4CL, W1CMD, W2LCA, and W2MJ were all R9. During this time nothing was heard of the 19 m. Americans, despite their power, which is rather surprising to me. I have yet to log W3XAL on 16 m. In conclusion may I say I have heard six continents within twenty-four hours on two occasions within the last month. My set is a 5-valve battery superhet with "inverted L" aerial 96ft. long, but no earth, as I find that the first-floor water-pipe and gas-pipe earths give reduced signal strength.—D. LESLIE (Dundee).

Useful Short-wave Ideas

SIR,—Living in the Tropics, thousands of miles from home, we have two difficulties, amongst others, to overcome: (1) Very severe static and frequent lightning storms. (2) Amplification of very feeble signals from very distant transmitters. Pains have to be taken, therefore, to lose no signal strength in the aerial system, and also to provide a good earthing system and connections which eliminate risk of damage to the receiver from lightning storms.

The following system has been followed for several years, and has been tested out, with great satisfaction to myself and friends who possess s.w. receivers.

AERIAL.—Knock out all lightning arresters, lead-in tubes, knife switches, etc., and let the aerial be one continuous wire of insulated stranded copper.

EARTH.—Use a large sheet of copper, and on to the middle of this *weld* (or firmly solder if this cannot be done) a foot or so of really heavy gauge unstranded copper wire, and lead in this wire near to the receiver.

CONNECTIONS TO SET.—If the aerial lead-in can be connected to the receiver by a substantial crocodile clip, solder such a clip on to the end of the lead-in wire. Similarly, solder the end of the stout earth wire to a short length of stranded copper wire, at other end of stranded (flexible) wire solder a crocodile clip.

When actually receiving, aerial and earth crocodile clips are attached to the receiver terminals, and as soon as reception is finished, both clips are removed and clipped together, letting them hang against wall.—A. M. WALMSLEY (Kandy, Ceylon).

CUT THIS OUT EACH WEEK

Do you know

—THAT a sound and vision receiver for television reception may employ a ganged condenser to provide constant separation of both frequencies

—THAT the above scheme enables the correct tuning for vision to be accomplished simply by tuning for best quality and maximum volume on the speaker.

—THAT variations in volume may often be traced to the vibration of a flexible anode lead to the top cap of an H.F. valve.

—THAT when ordinary pocket-lamp bulbs are used for dial lights a switch should be included to break the circuit when a station has been located.

—THAT a valve has just been perfected which may be used in any stage of a modern receiver.

REPLIES IN BRIEF

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

E. O. M. G. (Redcar). The apparatus should work, but the efficiency will not be very high, and unless all component parts are chemically pure, various forms of interaction will be set up which will restrict the output.

G. A. (Clontarf). We cannot recommend any particular set to use the parts named by you. The coils cannot be identified, and we only recommend our receivers when built from the parts specified by us.

E. D. (Urmston). The trouble is undoubtedly due to your aerial coupling. A pre-set or variable condenser between the aerial and terminal B on your coil will overcome the difficulty.

A. E. C. (E.9). We do not think the arrangement would be commercially practicable. In any case, the addition of the trimmers enables optimum results to be obtained under any conditions.

A. W. (Huthwest). We cannot identify your set. It is, in any case, not one of our desigus, and therefore we cannot supply a blueprint.

W. B. (Chelsea). The lamp is certainly using current, and a cheaper method would be to use a step-down transformer. A specially-made component may be obtained for the purpose from Messrs. Heayberd.

A. E. S. (Wall Heath). We do not advise the method outlined. As the heater has a higher rating we also presume that the H.T. output is greater and therefore your remaining secondaries would not be correct. A separate transformer for the heater may be obtained from Messrs. Heayberd.

H. M. B. (East Barnet). The indication is either that the valve is defective, or that the H.T. supply is in need of replacement.

C. S. (Southwater). The tapping point is one-third of the number of turns from the "top" end of the coil. This applies to every size of coil.

E. D. (N.1). The arrangement is quite sound, and failure to work must be due to the layout or a defective component. As the set refuses to function properly now it has been returned to its original condition, it would indicate that you have damaged some part in the conversion.

C. W. (Wallasey). Class A is standard push-pull where the valves are biased to the centre of the curve. Class B is the method where the bias applied brings the working point to the bottom of the curve. The matter has been fully dealt with in our pages on more than one occasion.

N. McK. (Port Glasgow). It is not possible to make a direct change of coils. The circuit also will have to be modified and we cannot give instructions for doing this.

H. P. P. (Wembley). We cannot give you details from the brief information given in your letter.

J. H. (N. 1). There have been two or three different types of the tuner mentioned and we cannot supply instructions without knowing the exact type. Furthermore, we cannot give instructions for modifying our receivers.

H. G. (Goole). The licence is issued for genuine experimental work and research, not simply so that you may talk to a friend. You must therefore study the subject in order to acquaint yourself with all the necessary details before applying for a licence.

E. A. P. (Guildford). We have no designs of a receiver of the type you refer to.

W. S. (Fenstanton). The ratio is not criticial and any of the transformers you mention could be used. The firm referred to is no longer in existence and you cannot obtain a blueprint of the receiver.

J. W. (E.16). We have not used the coils in question.

S. J. P. (Enfield). The receiver would not be efficient on the very low wavelength mentioned and a set has to be specially designed to tune so low.

H. S. (Blaenavon). Our S.W. Converter-adapter (P.W. 48A) might prove suitable, but you should enquire of the makers of your set whether it is suitable for use with a S.W. converter.

J. B. (S.W.8). We have no details of the set and you should communicate with the makers, Messrs. Kolster Brandes. A blueprint of the Midget S.W. Two is still available. It is a battery-operated receiver, and the blueprint costs 1s.

"The Constructor and The Show"

IN an article under the above title, published in last week's issue, an illustration was given of a Bulgin electro-magnetic relay. This was incorrectly described as the new H.T.-from-L.T. vibrator unit. The latter novel component is built into a cylindrical case with a special five-pin base for fitting a holder similar in style to a valveholder.

QUERIES and ENQUIRIES

Bandspread Tuning

"I have read several times recently about bandspread tuning, but am not clear concerning the values of the two condensers which are used. Can you give me any details or data regarding the subject, as I have not seen this published in any issue of your paper, which I have taken for the past two years?"—L. A. (Dundee).

THERE is no exact value for either the tank or the bandspreading condenser. The idea is, of course, more or less a vernier tuner, but results are greatly improved and tuning simplified if the tank and the bandspread condenser bear a definite relation. For instance, in the two components sold for the purpose by Stratton and Co. (and used in our Bandspread S.W. Three), one condenser has a maximum capacity of 140 m.mfd., and the control spindle is provided with a plate having ten holes at equal distances. A ball stop registers in these holes and thus the total capacity is divided into ten equal sections of 14 m.mfd. The remaining condenser has a maximum value of 20 m.mfd., and thus each separate division on the first condenser may be spread over a further range and this is the most desirable arrangement. Of course, a slow-motion geared drive to the condenser still further simplifies tuning.

Superhet Receivers

"Recent advertisements in the daily press refer to various superhets as having so many valves, but then refer to a larger number of stages or tuned circuits. A reference to the valve types which are used shows that in most cases there is only one multiple valve (the frequency changer), and yet in most cases the number of tuned circuits far exceeds the valves, and I should like to know whether there is any catch in this statement."—V. R. E. (Knebworth).

GENERALLY, the term "tuned circuits" is applied to all those parts of the receiver where a coil is tuned by a variable or semi-variable condenser. Thus the intermediate-frequency transformers will be included and you will probably find that these account for the difference noted by you. For instance, the Bush D.C./A.C. superhet employs only three valves, yet it is described as being a "four-stage receiver with seven tuned circuits." The valves are a frequency-changer of the octode type (two stages), variable-mu pentode for the I.F. stage, which feeds a double Westector for 2nd detector and A.V.C. An output pentode completes the circuit. The seven tuned circuits are made up by a band-pass input filter (two stages), the oscillator tuning stage and four I.F. circuits.

Pick-up Wiring

"I have fitted a pick-up to my commercial A.C. receiver but have met with disappointment. There is hum when the pick-up is switched into circuit, and I am certain that the volume on wireless is not so good as before I fitted the switch. I followed instructions in your paper, disconnecting the lead to the grid terminal of the detector valve-holder and taking this to the centre of a Bulgin change-over switch. The pick-up and wire from grid-condenser were joined respectively to the two contacts on the switch. Is there any way of stabilising the results and getting the same wireless signals as heretofore?"—F. G. T. A. (Kensington).

THERE should be no trouble about getting good results, and no losses should occur on radio. You have probably mounted the switch on the panel or motor-board, and this has led to long leads which have caused both the hum and the signal loss. To overcome this the switch should be mounted on a standard component-mounting bracket as close to the valve-holder as possible, and the switch should be operated by means of an extension handle. For this purpose it is preferable to use one of the Bulgin side-action switches, such as the type S.92 or S.81.B. Losses on radio may be avoided by connecting an H.F. choke in the pick-up lead, with a by-pass condenser from the radio-side of the choke to earth. The value of the condenser must be chosen with care in order not to affect the quality of reproduction.

RULES

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

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

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

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

The Query Coupon **MUST** be enclosed.

Screened Leads

"What is the most satisfactory way of screening the leads to the anode of the S.G. valves? I have seen several schemes in commercial receivers, but cannot find any shop which sells the metal wire. You do not seem to recommend this type of lead in your constructional articles."—G. B. (Bournemouth).

IN a simple single-stage H.F. receiver it is usually only necessary to screen the actual lead to the valve. In a multi-stage receiver it may also be found essential to screen the entire top of the valve, including the anode terminal. For the former purpose screening sleeving may be obtained from any good radio dealer or direct from advertisers in this paper. The sleeving contains a length of systoflex through which the connecting wire is passed, and the outer metal covering is connected to earth by binding it with fine wire and soldering, taking care not to apply sufficient heat to melt the inner sleeving and thus produce a short-circuit. For the second type of screening you should obtain one of the special anode-cap connectors with screen manufactured by Messrs. Belling and Lee.

Choosing a Resistance

"I have a mains unit delivering a maximum output of 200 volts at 60 mA. The set I am going to use on this is a battery set, which wants 150 volts max., and the total current will only be 25 mA. What resistance must I use to avoid over-running the valves?"—A. R. W. (Leeds).

THERE are two ways of using the unit, and without a complete circuit diagram of both the receiver and the unit it is not possible to suggest the best way. For instance, a simple resistance may be joined in the H.T. positive lead, in which case the total current will flow through it, and then the various voltages for the receiver may be obtained by means of decoupling resistances in the usual way. Alternatively, a potentiometer may be joined across the output from the unit for the supply to the detector valve, so as to obtain a suitable H.T. voltage. However, the value of the resistance in the first case (the simplest way out of the difficulty) would be found by subtracting the required voltage from the total output, and dividing by the current. You must remember, however, that as the current is low, there will be a slight voltage rise, the amount of this depending upon the regulation of the mains unit. Taking it that about 60 volts have to be dropped at 25 mA the resistance required would be 2,400 ohms. The wattage rating of this would be 60 multiplied by .025 amps (or 25 mA), which gives you 1.5 watts.

Miscellaneous Advertisements

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

RECEIVERS, COMPONENTS AND ACCESSORIES

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RECEIVERS.—G.E.C. A.C. D.C. Mains Three-valve sets. Complete with 3 Osram Valves, in exquisite Bakelite cabinet with Osram M.C. Speaker. Ready to plug in to any mains. Fully guaranteed. New, in sealed cartons, £3/5 (list £7/15).

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MULLARD M.B.3 three-valve battery sets. Complete with batteries, accumulator, M.C. Speaker. Three Mullard Pentode valves in beautiful walnut cabinet. Brand new, in sealed cartons, £4/10 (List £8/8).

TELSEN A.C. D.C. MULTIMETERS (latest 1936 type).—5-range for every conceivable test for radio and domestic electrical appliances, 8/6 each.

COILS.—TELSEN (1936). Iron-cored Coils, Type W349, midget size, 4/-; type W478 (twin), 9/- pair; type W477 (triple), 16/-; type W476 (triple superhet selector and oscillator), 16/- set. All Ganged Coils are Mounted on Base with switch. I.F. Transformer Coils W482, 5/-; Telsen Dual Range Coil with variable series condenser W76, 4/-.

MICROPHONES.—Acc (P.O.) Microphones, complete with transformer, perfect with any type of receiver, 4/6.

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AMERICAN VALVES.—A full range of valves for all American sets at 7/- each. Brand new, guaranteed.

SOUTHERN RADIO BRANCHES.—271/275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2. All mail orders to 323, Euston Rd., N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren Street Tube). 'Phone: Museum 6324.

ALL goods previously advertised are standard lines, still available. Post card for list free. VAUXHALL UTILITIES, 163a, Strand, W.C.2. Over Denny's the Booksellers. Temple Bar 9338.

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, improved type, 120 watts output, at £2/10/0. Send for our comprehensive list of speakers, Resistances and other components. **WARD**, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

WE BUY for cash, all types of Modern Second-hand Radio Sets, Accessories, etc. Unbeatable Part-exchange allowances for new goods. Bring, send or write.

UNIVERSITY RADIO LTD., 82, Hampstead Road, London, N.W.1. 'Phone: Museum 3810.

GRAMOPHONE attachments for Radio, electric motors, 25s.; Pick-ups, 9s. 6d.; Portable Gramophones, 12s.; spring motors, 4s. 6d.; walnut pedestal Anexagram, £5; soundboxes, 1s. 6d.; tone-arms, 2s. 6d.; horns, 2s. 6d.; cabinets, 4s.; 1,000 needles, 1s. 6d.; gears, springs, accessories, cheapest. Trade discount. Thousands to clear. Liquidating stock bargains. Catalogue free.—Regentam, 120, Old Street, London, E.C.1.

LOUDSPEAKER REPAIRS

REPAIRS to Moving Coil Speakers, Cones and Coils fitted or rewound. Fields altered. Prices Quoted including Eliminators, Loud-speakers Repaired, 4/-. L.F. and Speech Transformers, 4/- post Free. Trade invited. Guaranteed. Satisfaction. Prompt Service. Estimates Free. L. S. Repair Service, 5, Balham Grove, London, S.W.12. Battersea 1321.

MISCELLANEOUS

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THE SEPTEMBER

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TUNING BY CATHODE RAY—See Page 7

Practical and Amateur Wireless

AND PRACTICAL TELEVISION

3d EVERY WEDNESDAY

Edited by F. J. CAMM

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Vol. 9. No. 209. September 19th, 1936.

More About the NEW Television Service

BIG BIRTHDAY NUMBER NEXT WEEK

Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. IX. No. 209. September 19th, 1936.

ROUND *the* WORLD *of* WIRELESS

Television in India

IT is reported that the Nizam of Hyderabad has ordered a demonstration of the development of television to be given during the coming Silver Jubilee celebration of his reign. He has also promised his full co-operation and provision of facilities for those who wish to use the occasion for the purpose of demonstrating the possibilities of television in the sphere of broadcasting.

New French High-powered Station

ACCORDING to M. Pellerc, the Director of French State Broadcasting, Grenoble is to be the venue of a super broadcasting station of high power. Engineers have already arrived at the proposed site of the new station in order to make a preliminary survey. Although it is not intended to make this station the most powerful in France, it is said that at least it will be comparable with the most powerful existing ones.

Television Station for the Vatican

IT is stated that the Pope intends to install a television station in the Vatican for experimental purposes, and that Senatore Marconi has been approached as to which system should be adopted. The present Vatican short-wave radio station and the ultra-short-wave station at the Pope's villa at Castel Gandolfo and in the Vatican were installed under the direction of Senatore Marconi.

Java's Short-wave Activity

WITH the exception of Japan, the Dutch island of Java records the greatest development in short-wave broadcasting in the Far East. Besides numerous low-powered private stations, there are three comparatively high-powered transmitters in operation at the island. These are—PMN (29.24 m.), PLP (27.27 m.), and YDB (67.11 m.).

Television on the Volga

A NOVEL method of utilising television to control the entry of ships into canals has been reported from Russia, where the canal between Moscow and Volga is under construction. The locks will be controlled from a central point, and the official on duty will be able to observe the entry of ships into the lock by looking at a television screen.

Radio Station for Air Base

THERE are indications that the site for the transatlantic air base will be located at Rynanna, on the Clare shore of the Shannon. A radio station, it is stated, is to be erected in the town of Ballygreen.

Progress in New Zealand

JUDGING by recent licence returns, New Zealand has made great strides in broadcasting. At the present time there are 185,008 listeners registered in the Dominion, representing 11.8 per 100 of the total population. This percentage is slightly higher than that for the Commonwealth of Australia. The increase in licences since the broadcasting system was taken over from private enterprise by the official New Zealand Broadcasting Board is 113,652.

World's Largest Radio Network

WHAT appears to be the largest radio network in the world is possessed by the National Broadcasting Company of America. With the recent addition of six transmitters the number of stations under its control is now 108, of which 97 transmitters are located in seventy-one cities scattered over the United States. For relays and broadcasts to overseas listeners the NBC uses 11 short-wave stations.

Telephone Dial Tuning

A NOVEL form of tuning known as the "teledial" is employed on the new Grunow receivers in America. The device consists of a notched wheel which is used as an escutcheon around the dial, and by placing a finger in the notch with the desired station marking, and revolving it once to a centre release, the station is accurately tuned. The dial can be pre-set to fifteen stations, and all others can be tuned-in in the usual manner.

Radio on French Trains

SEVERAL railway trains in France have recently been equipped for the reception of broadcasting. It is reported that in addition to the usual provision for reception in the ordinary passenger compartments, special coaches are to be attached to the trains for dancing purposes. These trains are intended for the use of organised parties of excursionists.

A Church as Aerial

OPERATORS in police wireless-equipped cars in Charleston (South Carolina, U.S.A.), have recently made a strange discovery. When operating in the ordinary way the receiving sets in the cars have a range of comparatively few miles, but when parked near St. Phillip's Protestant Episcopal Church, they pick up calls clearly from San Francisco on the extreme west. It is thought that the pillars of the church serve as huge aerials for the receivers.

India Becomes Radio-minded

IN India, excluding the states, there are at the present time 28,000 persons possessing receivers. This figure shows 50 per cent. annual increase over the past three years, and, as some new broadcasting stations are to be erected and everything is being done to popularise radio entertainment, it is expected that the increase will be further stimulated in the coming years.

THE PICK of the PROGRAMMES

Promenade Concerts

ON Thursday, September 17th, "A London Symphony," by Vaughan Williams, will be broadcast from the London Regional, and on the 18th Beethoven's "Eroica" will be given in the National programme. On Saturday, the 19th, Lisa Minghetti will be heard in the Max Bruch Violin Concerto, and the symphony will be Beethoven's No. 5 in C minor.

MAKE THESE DATES WITH YOUR RADIO

A GLIMPSE OF RADIOLYMPIA

A general view of the Radio Exhibition at Olympia, showing some of the stands in the Main Hall.

Song Recital

A PROGRAMME of popular songs will be given in the Scottish National programme, on September 19th, by Margaret MacCullum (soprano) and Alexander Sinclair (baritone). Among other songs Miss MacCullum will sing Eric Coates's "Bird Song at Eventide," Landon Ronald's "Down in the Forest," and Besley's "Someone." Included in Mr. Sinclair's repertoire will be Alan Murray's "She Shall have Music," and Beryl Gower's "The Old Blue Boar."

Orchestral Music

ON September 19th, in the National programme, Antoni Sala will be the soloist in a concert conducted by Leslie Heward, who will play the Haydn 'Cello Concerto. Mr. Heward will conduct the Concerto for small orchestra by Albert Roussel.

"The Red Sarafan"

RUSSIAN restaurant entertainment in all its glamour, artistry, and pathos will again charm listeners when "The Red Sarafan" is broadcast in the National programme on September 30th. Captain Victor Vivien, Marquis de Chateaubrun, will, together with the producer, Bill Hanson, stage this broadcast approximately monthly during the coming winter, and a new Russian Orchestra, directed by Serge Krish, of the famous Krish Septet, and new singers and artists, will grace the bill.

Leicester Imperial Band

SELECTIONS from "Show Boat" and "Frederica," by the Leicester Imperial Band, will be included in the Midland programme on September 24th. In interludes Abe Lewis, the Shrewsbury baritone, will sing four songs from "The Shropshire Lad" by the late A. E. Housman, set by Nicholls.

Carnival in the Midlands

A NUMBER of hospital carnivals will be visited by the B.B.C. mobile recording unit in order to build up a composite sound-picture. The result will be broadcast in the Midland programme on September 25th, and David Gretton, who is in charge of the outside broadcasts, is the producer. Three of the leading hospital carnivals to be drawn on are those at Shrewsbury and Long Eaton, which last a week, and the one-day carnival at Kidderminster.

Programme of Light Music

IN the Scottish National programme on September 18th, the popular Rutland Square and New Victoria Orchestra, directed by Norman Austin, will render some popular pieces of light music. The programme will begin with the Continental March "Queen of Hearts," by Haines, and this will be followed by Valse Intermezzo, "Petite Bijouterie," by Carl Bohm; Mosaique, "A Jewish New Year," arr. Farrar; Medley, "More Popular Hits," arr. Zalva; "Slavonic Dance No. 9, in A major," by Dvorák; "Hebrew Dances No. 1," arr. Phillips; and Selection, "Musical Comedy Memories," by Herman Finck.

Organ Recital from Bournemouth

PERCY WHITLOCK will broadcast a recital at the organ of the Pavilion, Bournemouth, on September 20th. This will be the ninth programme in the series "Some Organs of the West."

Military Band Concert

IN the Western Regional programme on September 23rd, the R. A. Lister Military Band, conducted by S. T. Webber, will give a concert, in which Kenneth Ellis (bass) will be the artist.

Royal Marines Band

THE popular Band of His Majesty's Royal Marines (Plymouth Division), conducted by Captain F. J. Ricketts, will broadcast from the Abbey Hall, Plymouth, on September 24th, when Dorothy Jennings (soprano) will be the vocalist.

Concert from the Western Studios

THE Wessex Quartet, directed by A. H. Morgan, will broadcast from the studios on September 25th, when Hooper Bussell (baritone) and Beryl Tichbon (pianoforte) will be the soloists.

"Western Cabaret"

A POPULAR item in the Western programme on September 26th will be the broadcast of the tenth "Western Cabaret," which will come from The Palm Court Hotel, Torquay.

An Amusing Programme

LISTENERS to the Scottish programmes may remember that when summer was "a-cumen in" two humorous gentlemen in Glasgow devised a programme entitled "Hints for the Holidays," which were better heard than followed. With the approach of the tincture of ammonia season their "Hints against the Winter," which will be broadcast on September 22nd, should provide as valuable information.

Vienna in Scotland

A PROGRAMME which will include Strauss's Overture to "Die Fledermaus" will be given by the Scottish Military Band, conducted by John McIvor, on September 23rd. This broadcast is from the Scottish Radio Exhibition of a Glasgow weekly newspaper in the St. Andrew's Hall, Glasgow.

SOLVE THIS!

PROBLEM No. 209.

Williamson substituted three 13-volt .3 amp. valves for the original three 20-volt .2 amp. type in his A.C./D.C. receiver, but results were not satisfactory, although the anode current taken by the new valves was equivalent to that consumed by the 20-volt type. Why was this, and what alterations were necessary? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 209 in the bottom left-hand corner, and must be posted to reach this office not later than the first post Monday, September 21st, 1936.

Solution to Problem No. 208.

G. and G.B. terminals of the L.F. transformer should be connected to the grid terminals of the push-pull valves. Two 250,000 ohms resistances should be obtained, one being connected to the G. terminal and the other to the G.B. terminal. The free ends of the two resistances should then be joined together and connected to G.B.— lead.

The following three readers successfully solved Problem No. 207, and books have accordingly been forwarded to them: L. R. Lacey, 357, Prescot Road, St. Helen's, Lancs; A. L. Parsons, 18, Milton Street, Hull; O. Greenfield, 30, The Maudlins, Tenby, Pembrokeshire.

All About the New Television Service

In Keeping Our Readers Abreast of All of the Latest Developments, We Here Describe Some of the Private Television Demonstrations Which We Have Recently Attended

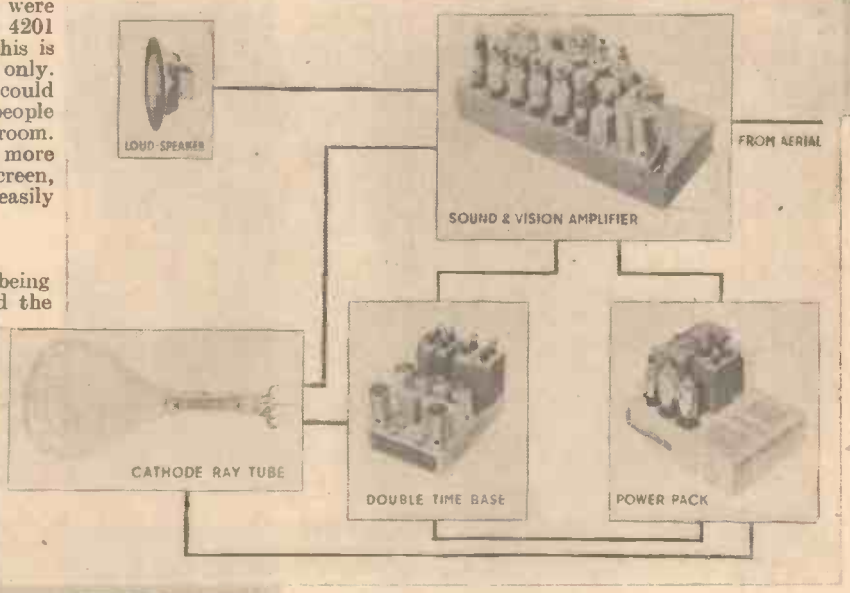
THE public demonstrations at Olympia, and many private demonstrations which we have witnessed during the past few weeks, can leave no doubt concerning the high state of perfection reached in television. At a demonstration organised by the makers of the Pye instruments, in a private house in Lowndes Place, we were able to see television in exactly the circumstances as those which apply in the average home. We were favourably impressed. The Model 4201 television receiver was in use, and this is made for television sound and vision only. The picture is 10in. by 8in., and could clearly be seen by about twenty people seated in a good-sized drawing-room. From the very back of the room, and more than 12ft. from the cathode-ray screen, both close-ups and long-shots could easily be seen.

The G.E.C. television receiver removed from its cabinet. The double time-base is in the foreground.

Direct Camera Transmission

The Marconi-E.M.I. system was being used by the B.B.C. at the time, and the definition obtained of the scene "viewed" whilst the "Emitron" camera was focused on the panorama around Alexandra Palace was extremely good. The picture was perfectly steady, so that cars running along the road at a good distance from the camera could be seen; even the spray thrown up from the wheels was visible.

Another view of the G. E. C. instrument, showing the simple connection to the cathode-ray tube by means of a 10-point protected socket.



On the left is shown a diagrammatic arrangement of the component assemblies of a G. E. C. television receiver.

We were afterwards shown the "televiews" of the film "Cover to Cover," the reproduction of which was equally good. When the television announcer introduced one of the hostesses the picture was not quite as clear, although still perfectly steady. The main trouble was that occasional shadows fell across the faces, but this could not be considered as very serious, because it did not spoil the entertainment value of the demonstration.

Sequence of Stages

Another demonstration which we visited was at the Wembley laboratories of the General Electric Co. Here the Chief Television Engineer briefly outlined some of the features of G.E.C. sets and also described many of the important experiments which the Company had carried out—in connection with both reception and transmission. By means of a chart he showed the sequence of stages used in G.E.C. combined sound-vision receivers. A single frequency-changer is used to receive both sound and vision

(Continued overleaf)

(Continued from previous page)

frequencies, after which the output is applied to two separate I.F. amplifiers; one of these deals with the sound signals and the other with vision. The output of the former is fed to a power amplifier and speaker, whilst that from the latter is passed on to the time-base circuits and the cathode-ray tube.

Lack of Interference

The standard of reception was again extremely good, and we took the opportunity of watching it at varying distances from a few feet to several yards. At all distances within the limits of the room (the library was used for the gathering) results were definitely pleasing. It was noticeable, both here and at the previous demonstration mentioned, that interference was almost entirely absent. This in spite of the fact that the dipole used by G.E.C. was within a very short distance of the extensive laboratories in which is installed all manner of electrical equipment at voltages up to several thousand. Very occasionally a faint line of spots would cross the screen, accompanied by a slight "ripple" from the speaker, but this was less troublesome than the interference often obtained when using a standard broadcast receiver.

The demonstration of reception just referred to was in connection with the B.B.C. transmissions from Alexandra Park, and the Marconi-E.M.I. system was again in use. A news-reel came over particularly well, whilst a new film starring Paul Robeson was received with excellent clarity. By comparison with the standard of pictures obtained when using a good home cine, this was particularly good; in fact, the entertainment value was far superior to that obtained from the best home cine we have ever witnessed.

No Adjustment Required

Five G.E.C. television receivers were working simultaneously, and from beginning to end it was quite unnecessary to make any adjustment whatever. All sets were switched on together from the mains, when first a spot was seen on the screen, after which the picture was gradually built up to the full size and brilliancy. This should be carefully noted by those who imagine that a certain degree of skill is required to operate the apparatus satisfactorily! The receivers are adjusted when first installed and nothing more need be done beyond switching on, controlling the volume of sound and regulating the brilliancy of the picture. Should any alteration ever be required, however—due to a change in wavelength or definition of the transmission, for example—it can be made easily and quickly by a control provided. Additionally, of course, there is a switch for changing over from the Baird to the Marconi-E.M.I. system.

How C.-R. Tubes are Made

After watching this very convincing show, we were conducted round some of the laboratories, where the process of making and testing cathode-ray tubes was seen. It was explained by the research chemists that the G.E.C. had carried out a considerable amount of work in connection with the production of fluorescent powders for coating the tubes, and we were shown several of these powders in normal daylight and when "illuminated" by near-ultra-violet light. The powders were all similar with regard to their principal content, but contained different "impurities," which control the colour of the picture. Incidentally, it is interesting to observe that the amount of "impurity" purposely introduced is approximately one-millionth of the whole!

Later we saw the blown-glass tubes being sprayed with the necessary adhesive—purified water glass—and then with the

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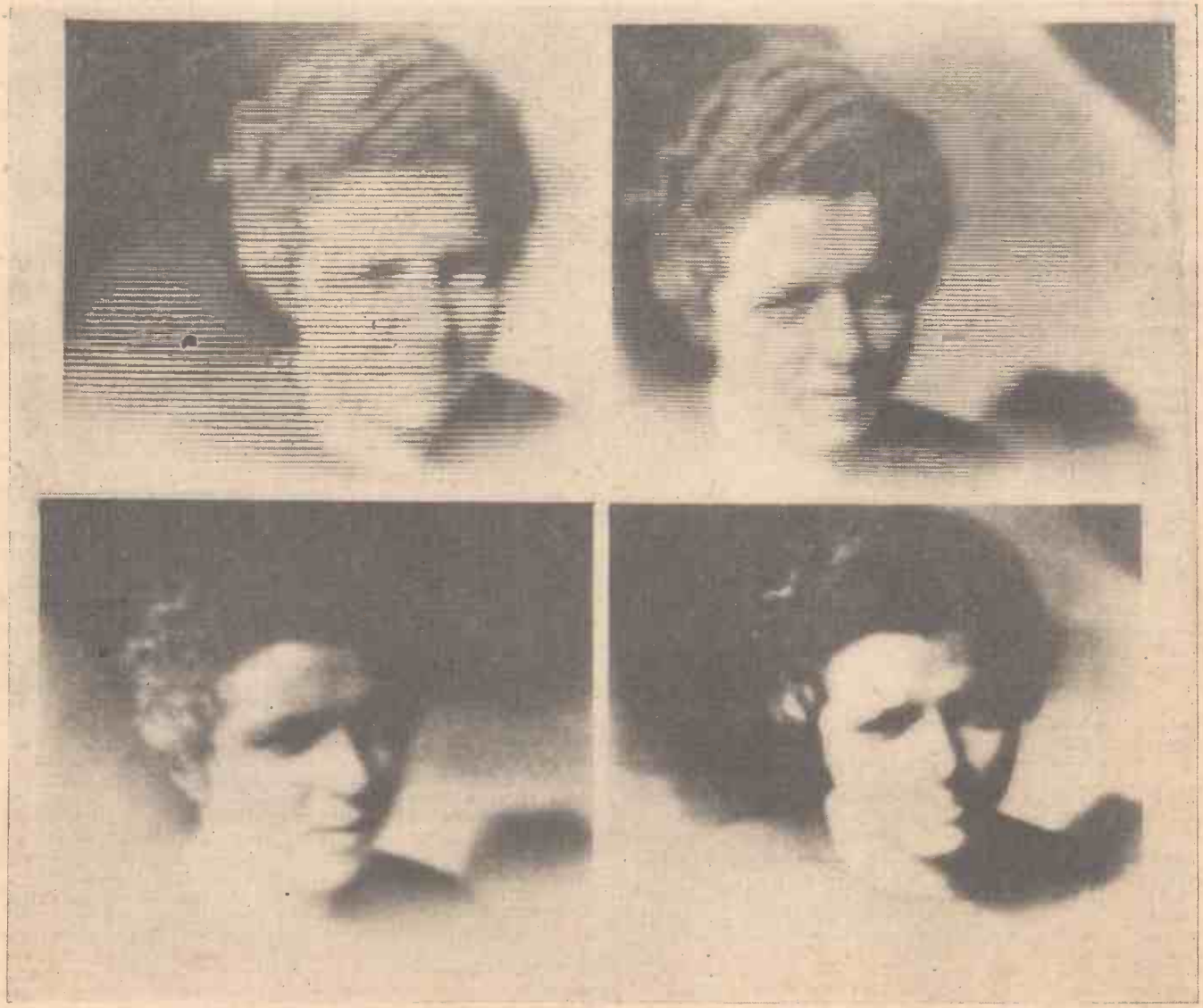


Photographs of the reproduction on the cathode-ray tube of a Philips receiver. In taking the photographs a two-second exposure was given, the subject remaining still for this period; this accounts for a certain "fuzziness" of the pictures. Top left is the reproduction of a 90-line transmission; top right, 120 lines; bottom left, 180 lines; bottom right, 405 lines interlaced.

(Continued from facing page)

powder. It has been found that this coating lasts for a few thousand hours; longer, in fact, than the cathode. Next we saw the electrode assemblies being made, on accurately constructed jigs, and assembled in readiness for evacuation of the tube.

Rigid Tests

In another department the tubes were being tested on special apparatus. The tests were very thorough, for each tube had to show a spot in the very centre, whilst a projected line had to pass through the centre and be transposed right across the screen. There were many other tests for accuracy, and whilst each one was made readings were taken of the applied voltages, currents passed and so forth, a chart being made for each tube.

Finally, we were shown over the transmitting apparatus, where a film transmitter was used. The transmitter itself operates on approximately 10 watts, and feeds into one of the many experimental dipole aerials situated on the roof of the building. Later reception of the private G.E.C. television transmission was demonstrated. This transmission was of the interlaced type, employing a definition of 240 lines. The results were, naturally, not quite as good as those obtained when receiving Alexandra Palace, but were sufficient to show the extremely good facilities enjoyed by the General Electric Company.

When regular television transmissions from Alexandra Palace start in October—as officially announced—we expect that a number of suitable receivers will have been installed in the homes of the public, and that nobody will have any cause to doubt the value of this new entertainment service. In the meantime, we are busily proceeding with experiments in our laboratories in order to find the most suitable type of television instrument for home construction. We shall continue to keep readers in touch with every development, and provide practical details concerning the results of our research.

A finishing operation in cathode-ray tube production at the G.E.C. research laboratories.

TELEVISION NOTES

Is Manchester Next?

IT has been stated officially that no decisions will be arrived at concerning the locations of high-definition television transmitting stations in the provinces until there have been tests of reasonable duration from the London station. In spite of this, however, it is a natural assumption to feel that the chosen towns will follow the run of the Post Office coaxial cable. London to Birmingham is the first stretch, but Major Tryon, the Postmaster-General, has now stated that the cable will be continued to Manchester. With the cable able to handle a minimum of two-hundred telephone conversations at once or a single television transmission for programme signal distribution the scheme is an admirable one and is sure to engage the earnest attention of the authorities once these matters are ready for discussion. A short time ago the city of Sheffield sought the assurance of the Television Committee that their claims for a station would receive consideration. A promise to this effect was made, and no doubt next year it will be possible to draw up a fairly comprehensive plan indicating how it is proposed to position the stations in order to provide television signals to between 60 and 70 per cent. of Britain's population. Naturally, the number of television stations will depend primarily on the technical success of the London station, coupled with the degree of public interest displayed in the programmes and the purchase of receivers. These facts were emphasised by Mr. Living, the B.B.C's Northern Regional director when he addressed a Press conference recently in Leeds. In the North it has been felt that their needs from the television point of view have been very sadly neglected, and their request for the 30-line television scanner which the B.B.C. ceased to use in September last was even refused. The low-definition equipment, it is now learned, is to be housed in the Science Museum, South Kensington, where it will ultimately stand side-by-side with Mr. Baird's original crude apparatus.

A Reasonable Suggestion

THE question of waveband allocation is still engaging the attention of the authorities in the United States, and in this connection it is interesting to study the remarks of the President of the Columbia Broadcasting System. He emphasised the necessity for taking a very long view of television development, especially in so far as frequency allocation was concerned. At the present time various opinions are being expressed regarding the degree of picture dissection which was certain to be acceptable to the looking-in public. Then came the question of the picture repetition frequency, which two factors together with the picture proportions settled the width of the frequency band necessary to radiate the picture without mutilation. While admitting that a standard of, say, 450-line definition seemed admirable at the present time, there was grave doubt as to whether this would always be the case. He recalled the fact that in the early days of aural radio's development, a ten-kilocycle separation between stations was judged to be good practice, but to-day we are bemoaning the shortsightedness of those early legislators, for with modern radio and higher standards of quality, this sideband limitation is handicapping everything. A lesson should therefore be taken to heart from this, and frequency bands allocated to television which, while appearing extravagant now, would provide for future progress in no uncertain manner. The responsibility of the Federal Communications Commission was a very important one, and the decisions reached would have very far-reaching effects in the future service of combined sight and sound signals.

In Holland

ALTHOUGH only a small country, it must be admitted that Holland does not lag behind in technical matters. The work of the Dutch people in the early days of broadcasting is still fresh in our minds, and by all accounts the same factors are likely to be apparent with television. The Philips Co. at Eindhoven are making good progress with their television experiments, and although originally working on the present German standard of 180-line definition, they have now abandoned that in favour of the present E.M.I. one of 405 lines coupled with interlaced scanning. The scanner they employ is the Iconoscope, and it is claimed that they have made these instruments with a very high degree of sensitivity, a necessary factor when outdoor scenes are to be televised, when the vagaries of the weather make the degree of available light such an uncertain quantity. The ultra-short-wave radio transmitter working on a wavelength of seven metres is still regarded as experimental, and the output power in the aerial is confined to half a kilowatt. It is claimed, however, that reception is very satisfactory, especially from the point of view of synchronising, a factor which is said to be linked up with very intensive research on the question of relaxation oscillators.

Using an Ultra-S.W. Converter

To Enable the Television Sound Transmissions to be Heard, a Short-wave Converter is the Simplest Scheme to Incorporate, and Some Important Details are Given in This Article. By W. J. DELANEY

REPORTS are already coming in from distances as far away as Manchester, showing that the television signals are being well received. When first introduced it was thought that the actual service range of the ultra-short-wave signals would be about 25 miles maximum, and no guarantee of greater distances can be given. But the reports which have so far been received reveal that quite good results may be heard up to 100 miles or more and thus many listeners will be anxious to try out their equipment in order to ascertain whether or not they are able to pick up the signals. Obviously it is not worth while building a powerful set just for the television transmissions under such circumstances, but some ready test should first be carried out in order to gain an accurate idea of the suitability of the district. Where the listener already has a good broadcast receiver in which one or more H.F. stages are employed a short-wave converter may be quickly made, and will be

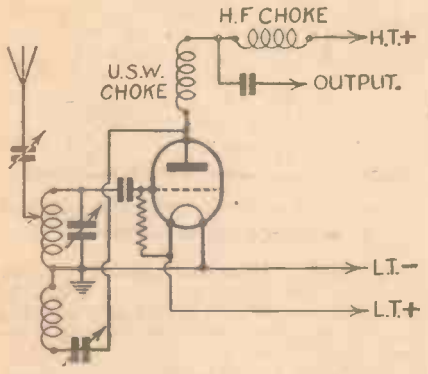


Fig. 1.—Theoretical circuit diagram of an ultra-short-wave converter.

quite inexpensive. It will convert the entire receiver into an ultra-short-wave superhet and will enable some interesting facts to be ascertained concerning signal strength.

Mains Equipment

As has already been pointed out, it is essential at the moment to have mains equipment for the reception of the picture transmission, but as such a large percentage of film broadcasts have been included in the experimental television transmissions, it is quite possible that many listeners will be quite content for some time to listen to the sound portion of these programmes only, and in that case a simple battery set may be used. The circuit of a suitable converter is shown in Fig. 1 for battery use, and the most important feature of this is that it may be built up, connected to the receiver and batteries and may then be switched in or out without any delay or disconnection of leads. For this purpose a double-pole change-over switch (Fig. 2.) is used and the aerial is connected permanently to the aerial terminal on the converter. Flexible leads are provided for the H.T. and L.T. supplies, and the output lead is joined to the aerial terminal on the broadcast receiver. It will be seen that the operation of the switch in one direction breaks the converter filament circuit and transfers the aerial to the broadcast receiver, whilst in the other direction the converter valve is switched on and the aerial is joined to the converter. Naturally, this arrangement necessitates another valve, and this should preferably be one of the special Graham Farish S.W. valves which has the grid connection brought out to the cap on top of the valve and is provided with a special low-loss base. The valve-holder also should be of the special ultra-short-wave low-loss type, and the coils should be selected from the Eddystone UL range. A 6-turn coil (type ULTO) should be used, with a 4-turn coil (type ULCA) for reaction.

Coupling

The aerial should be connected through a special air-dielectric pre-set (Eddystone type No. 978) to a tapping on the 6-turn coil, and the best position will have to be found by trial. The ultra-short-wave choke and the standard broadcast choke, together with the fixed condenser, may be chosen from any good range of components, but the tuning and reaction condensers should be of the type specially designed for the work. Suitable components may be found in the B.T.S., Bulgin and Eddystone range, and the maximum capacity of the tuning condenser should be .00005 and for the reaction condenser .0001 mfd. The wiring should be carried out with thick tinned copper wire and should be as short and as rigid as possible. Preferably, the converter should be enclosed in a large box lined with metal foil and earthed, and it may then be stood close up to the broadcast receiver without the risk of interaction. The broadcast receiver is, of course, tuned to a long wavelength (round about 1,500 metres) and tuning then carried out on the converter. It is necessary to make certain that the broadcast receiver is adjusted to a point where no signal is tuned otherwise this will be heard as a background to the short-wave signal.

For the Mains

The only change for mains working is in the arrangement of the wiring to the indirectly-heated valve, but in practice it will probably be found that hum difficulties, as well as the variation in voltage due to the imposition of the extra load upon the mains section, will introduce difficulties which will outweigh the advantages gained from the converter. It is therefore recommended that for the preliminary tests a battery converter as already described be used, and in the event of satisfactory signals being received, a complete mains receiver for television reception may be built.

Other Circuits

Some readers may have a preference for a super-regenerative circuit or a two-valve converter, and a similar scheme may be adopted in the preliminary stages in order to ascertain whether or not it is worth while going into the subject further, or to wait until transmissions are carried out from a station situated closer. The converter is the simplest apparatus, although in some cases it may be found that it is not productive of the best results. If, however, no worth-while signals can be heard on the converter it may be taken for granted that it is not worth while carrying on with the building of a sound or vision receiver under present conditions. It should not be forgotten, however, that the aerial is a most important part of the equipment, and just as much attention should be given to the design and erection of this as to the fitting of the converter, and the details given in last week's issue should be followed.

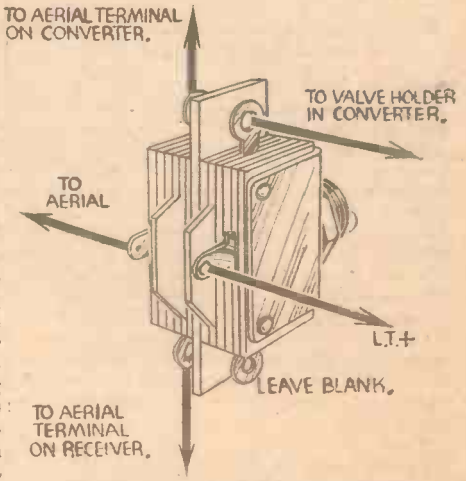


Fig. 2.—Diagram of switch connections.

"From the Esplanade"

A BROADCAST to be given on September 23rd by the Western Municipal Orchestra, conducted by H. C. Burgess, from the Rozel Bandstand, Weston-super-Mare, will be the fifth programme in the series entitled "From the Esplanade."

Ballet Music

FOR the programme of ballet music to be given on September 27th, by the B.B.C. Midland Orchestra, Leslie Heward, who will conduct, has chosen suites and other ballet music by Rubinstein, Debussy (The Children's Ballet), Gluck and Gounod.

PROGRAMME NOTES

Birmingham City Police Band

ON September 28th, this popular band, conducted by Richard Wassell, will give a programme which is to include a selection from the "Mikado," and the Overture to "Joan of Arc." Between the two groups of items by the band, Michael North is to sing at the piano.

Carl Rosa Opera Company

THE first act of "The Barber of Seville," given by the Carl Rosa Opera Company, will be broadcast from the Theatre Royal, Nottingham, on October 2nd. The principals are Kingsley Lark, Ivor John, Hubert Dunkerley, Norman Jones, Luella Paikin, and Winifred Ingham. Charles Webber is to conduct.

Visual Tuning by Cathode Ray

Variously Described as the "Electric Eye," "Mystic Eye," and "Electron Star," the Cathode-ray Tuning Indicator is One of the New-Season Novelties.

By FRANK PRESTON

SOME form of visual tuning—judging the exact tuning point of a station by sight—is very desirable in a receiver employing automatic volume control. This is because accurate tuning by ear is extremely difficult, but nevertheless important. As most readers are aware, A.V.C. produces an apparent flattening of tuning, since the receiver becomes more sensitive as it is tuned slightly away from a signal. And as sensitivity increases the signal remains at almost constant strength over a comparatively wide range of the tuning pointer. Because of the uniform strength it is an easy matter to obtain full volume whilst quality is poor—due to the fact that one of the side-bands of the transmission is being "cut." The effect is generally to make reproduction harsh, although this may not be noticed on certain forms of transmissions such as speech, where the frequency range required is small.

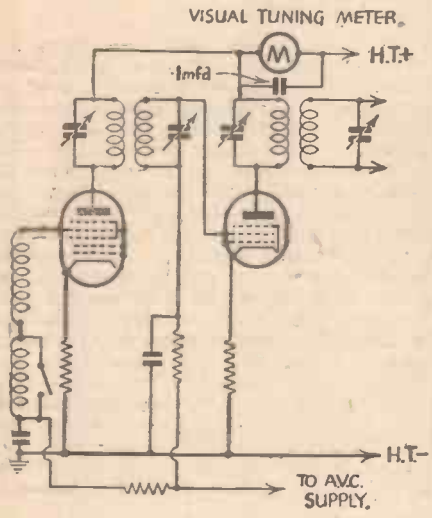


Fig. 1.—This skeleton circuit shows how a meter-type tuning indicator is connected.

Systems Available

Various systems of visual tuning have been devised; some of them depend upon the use of a meter, others employ a variable-width shadow, and others have a special neon tube the line of light from which varies in length according to the correct or incorrect setting of the tuning. All of these devices are perfectly satisfactory and have been adopted by different manufacturers according to their convenience in any particular design. A new visual-tuning device has recently been made available, however, and although not necessarily better than the others, it has the advantage of novelty, and is very fitting to this age of television. This is because it comprises a very small cathode-ray tube, the luminosity of which is governed by the tuning knob. Before describing it fully, it might be better briefly to review the other systems upon which visual-tuning indicators operate.

Tuning by Meter

The simplest of all consists of a meter (a milliammeter can be used, but there are special meters for the purpose) which is included in the high-tension lead to the valve or valves to which A.V.C. is applied. Fig. 1 shows how the meter is connected in a superhet circuit in which both the frequency changer and intermediate-frequency valves are controlled. When the receiver is tuned to a signal the A.V.C. voltage is increased due to the higher rectified voltage developed across the second detector. This voltage is used to bias the controlled valves, with the result that their anode current is reduced as the bias is increased; in other words, as a signal is tuned in. From this it will be obvious that the lowest reading of the meter used as tuning indicator is recorded when the receiver is tuned accurately to the incoming signal.

Neon-tube Indicator

The neon tuning indicator depends upon the same principle for its operation, and is connected as shown in Fig. 2. There is a cathode, an anode, and an auxiliary anode, the first and third of these being connected so that a glow can be seen in the neon tube when the set is switched on. There is a voltage drop across the resistance marked R2, connected in series with the H.T. supply to the controlled valves, and normally this voltage drop is comparatively high. It becomes lower as the current passing through it is reduced in accordance with the increased A.V.C. voltage. And as the voltage drop becomes smaller the positive potential applied to the anode through the resistance marked R3 becomes greater. This causes the length of the neon glow to be increased, so that accurate tuning is indicated when the length reaches a maximum on any particular transmission.

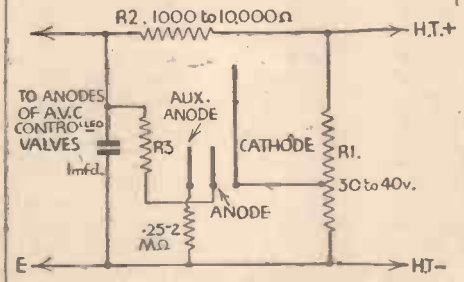


Fig. 2.—Connections for Cossor neon tuning indicator.

Direct Operation

Many of the shadow-tuning devices depend upon the same principle of operation due to the variable anode current applied to the controlled valves. It is thus interesting to note that the cathode-ray or electron-beam tuning indicator operates due to the direct change of rectified voltage appearing at the second detector (or detector in a "straight" set). This new indicator comprises a simple triode, used as a D.C. amplifier, and a miniature cathode-ray tube. The two are mounted in the same glass envelope, which is similar in size to a normal valve and fitted with a valve base. A skeleton circuit which shows the connections recommended by the makers of the Mullard TV4—it is made for 4-volt A.C. working only—is shown in Fig. 3.

It will be seen that the grid of the triode is connected to the rectifier portion of a double-diode detector through a decoupling network, and that the triode anode is internally joined to the ray-control electrode of the cathode-ray tube, the cathode being common to both triode and C.R. portion. As the rectified signal voltage increases due to the set being tuned to a signal, a greater negative voltage is applied to the grid of the triode portion. This voltage is amplified and applied to the ray-control electrode so that the intensity of the electron beam from the cathode to the target is increased. The target, incidentally is the phosphorescent end of the tube.

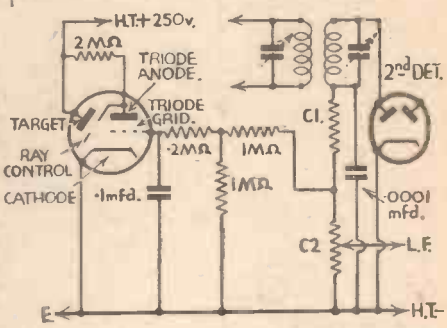


Fig. 3.—Connections for the Mullard TV4 cathode-ray tuning indicator.

A Luminous Cross

The construction of the indicator is such that under conditions of no signal a luminous cross is thrown on to the target or screen, the angle of the four arms of the cross being about 10 degrees. As the rectified voltage rises the arms of the cross widen until, at a grid voltage of 4, they reach 90 degrees, widening gradually as the

(Continued on page 16)

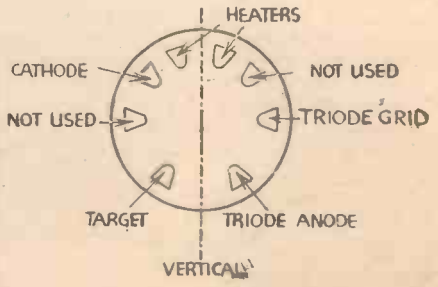
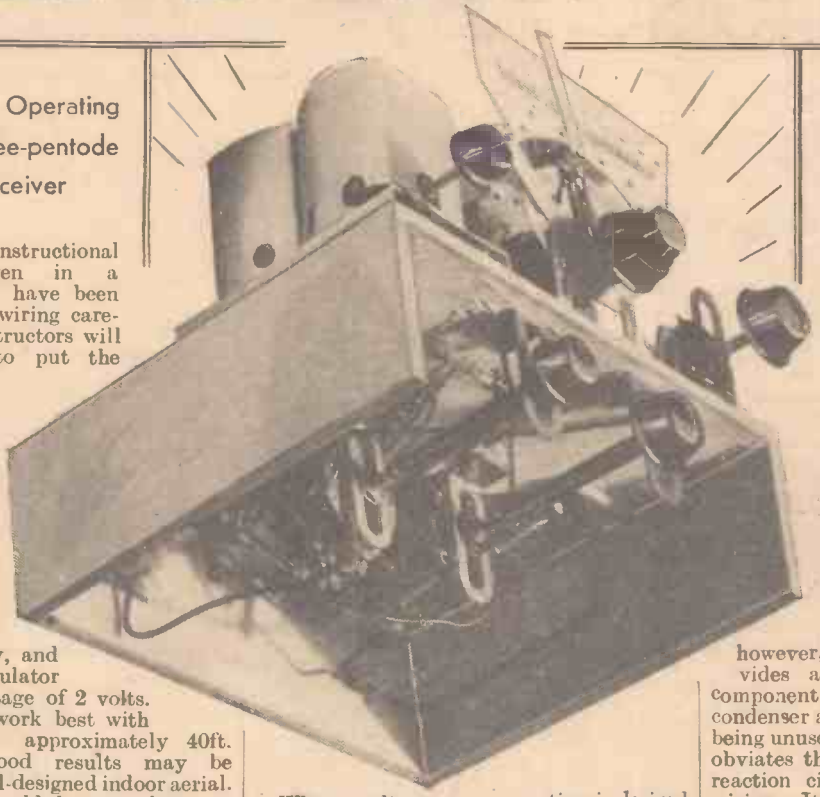


Fig. 4.—Connections to the side-contact base (underside of valve) of the TV4 cathode-ray tuning indicator.

The Gladiator ALL-WAVE 3

Adjusting and Operating This Efficient Three-pentode All-wave Receiver



When medium-wave reception is desired the multi-contact switch is set on its first stop, and the control knob of the medium-long-wave coils rotated in a clockwise direction. For long-wave reception the multi-contact switch is left on the same setting and the coil switch turned in an anti-clockwise direction. To obtain short-wave reception it is only necessary to rotate the multi-contact switch to the second stop.

AFTER the constructional details given in a recent issue have been followed and the wiring carefully checked, constructors will now be anxious to put the Gladiator through its paces. Before connecting up the various external leads, the H.T., L.T., and G.B. battery voltages should be checked and the aerial-earth system examined. The H.T. and G.B. batteries should be 120 and 9 volts respectively, and the L.T. accumulator should have a voltage of 2 volts. The receiver will work best with an outside aerial approximately 40ft. long, although good results may be expected from a well-designed indoor aerial. The earth lead should be as short as possible and should be securely fastened to the earth bolt. It is emphasised that the reception on the short-wave band is governed to a great extent by the efficiency of the aerial-earth system.

Battery Leads

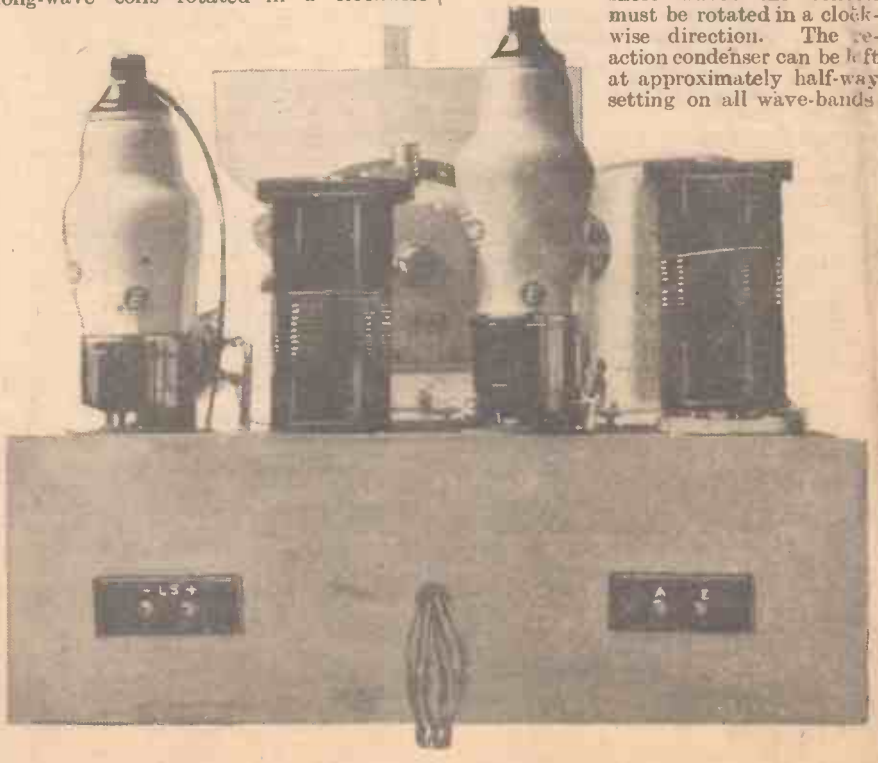
The H.T.3, H.T.2, and H.T.— leads should be plugged into the 120 volt, 60 volt, and — sockets of the H.T. battery respectively. The correct socket for H.T.2 is somewhat critical and will be governed by the actual voltage applied to H.T.3. In our experimental model best results were obtained when H.T.2 was plugged into the 24-volt socket, but the 36 socket should also be tried. The G.B.+, G.B.—1, and G.B.—2 leads must be inserted in the +, —4½ and —9 sockets of the G.B. battery and the L.T.+ and L.T.— leads connected to the + and — terminals of the accumulator.

Operation

An all-wave receiver is naturally slightly more complicated than the two wave-band type, but the Gladiator has been carefully designed with a view to keeping the operation as simple as possible. True, there are two wave-change switches, but although this means an additional control as compared with a broadcast-band set, the use of a medium-long-wave switch incorporated in the coil unit considerably simplifies the wiring. Our experience with complicated multi-contact switches in the past has governed our decision to use a separate switch for the short-wave band in this set.

Reaction Control

A study of the theoretical diagram will indicate that a unique reaction circuit is employed. When switched to medium or long waves the reaction condenser acts as an ordinary differential condenser, as the short-wave reaction winding offers no resistance to the high-frequency component on these wavelengths. When switched to the short-wave band, however, the 1,000 ohm resistance provides a barrier for the high-frequency component at the detector anode and the condenser acts as a straight type, one half being unused. This method of connection obviates the necessity for switching in the reaction circuit, thereby simplifying the wiring. It will be realised, of course, that the condenser will not operate in the same direction on both wavebands. When on short waves the control must be rotated in a clockwise direction. The reaction condenser can be left at approximately half-way setting on all wave-bands



Rear view of the Gladiator.

A PAGE OF PRACTICAL HINTS

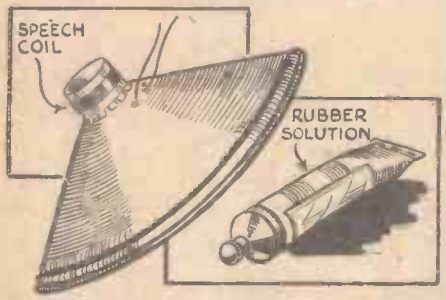
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Repairing a Speech Coil

NOTICING a slight "buzz" in my loudspeaker, I traced same to a faulty speech coil, which had become detached from its former owing to the fixative used by the manufacturers becoming perished. I carried out the repair with ordinary glue,



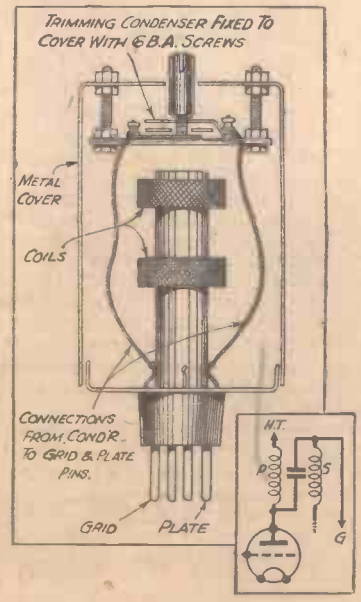
An efficient dodge for repairing a speech coil fixing.

but this flaked away in a very short space of time, and the speaker buzzed as much as ever before. Finally, I made the repair with rubber solution, and this has proved quite satisfactory. — M. G. ENGLAND (Ilford).

A Variable-selectivity Device

IT has been suggested in articles in PRACTICAL AND AMATEUR WIRELESS at various times that the selectivity of a superhet employing the old type I.F.T. could be modified by putting a condenser between the primary and secondary.

My set is the 1934 A.C. Century Super, and employs the 126-kilocycle I.F. transformer, and I have added these extra



Adding a small condenser between the primary and secondary of an I.F. transformer.

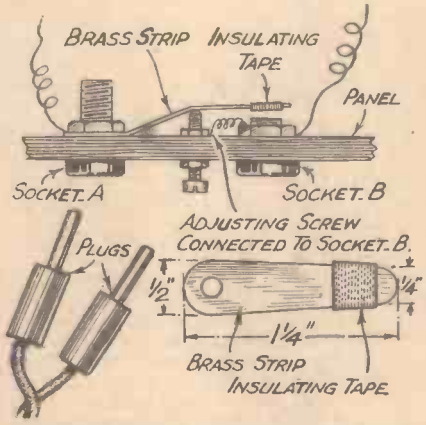
THAT DODGE OF YOURS!

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.

condensers and find them successful. I obtained some two-plate semi-variable condensers, as sold for external trimming, and fitted them inside the screening can, at the top. The sketch shows the method of fixing. The connections for the wires inside the can can be traced from the plate and grid pins at the bottom of the can.—A. E. WINDROW (Woodford Green).

An Easily-made Phone-jack

BEING in need of a phone-jack, I constructed one as shown in the accompanying diagram, which I think clearly explains the construction. The sockets may be of any suitable type, and one must be cut or filed short, so that the plug, when inserted, presses the brass shorting strip,

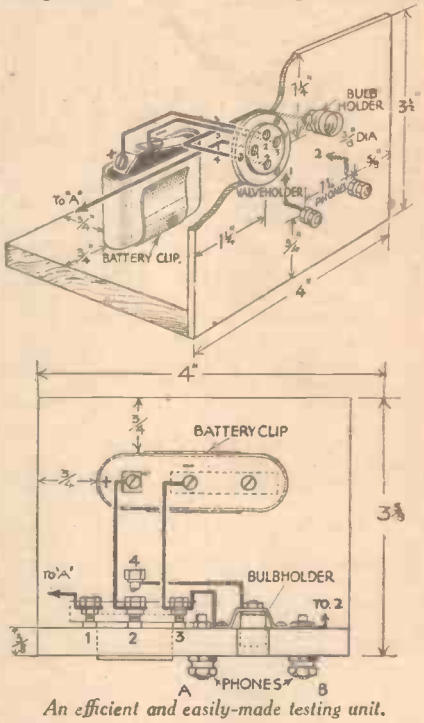


A handy phone-jack made from odds and ends.

which is insulated at the tip, thus breaking the circuit shorting the sockets. The adjusting screw and the short socket must, of course, be connected.—W. H. GEORGE (Haverfordwest).

A Simple Testing Unit

CONSTRUCTORS who have no meters to make tests with will find this simple tester very useful. The few components required are: one valve-holder, which may be either a baseboard or a chassis component; one flash-lamp bulb and



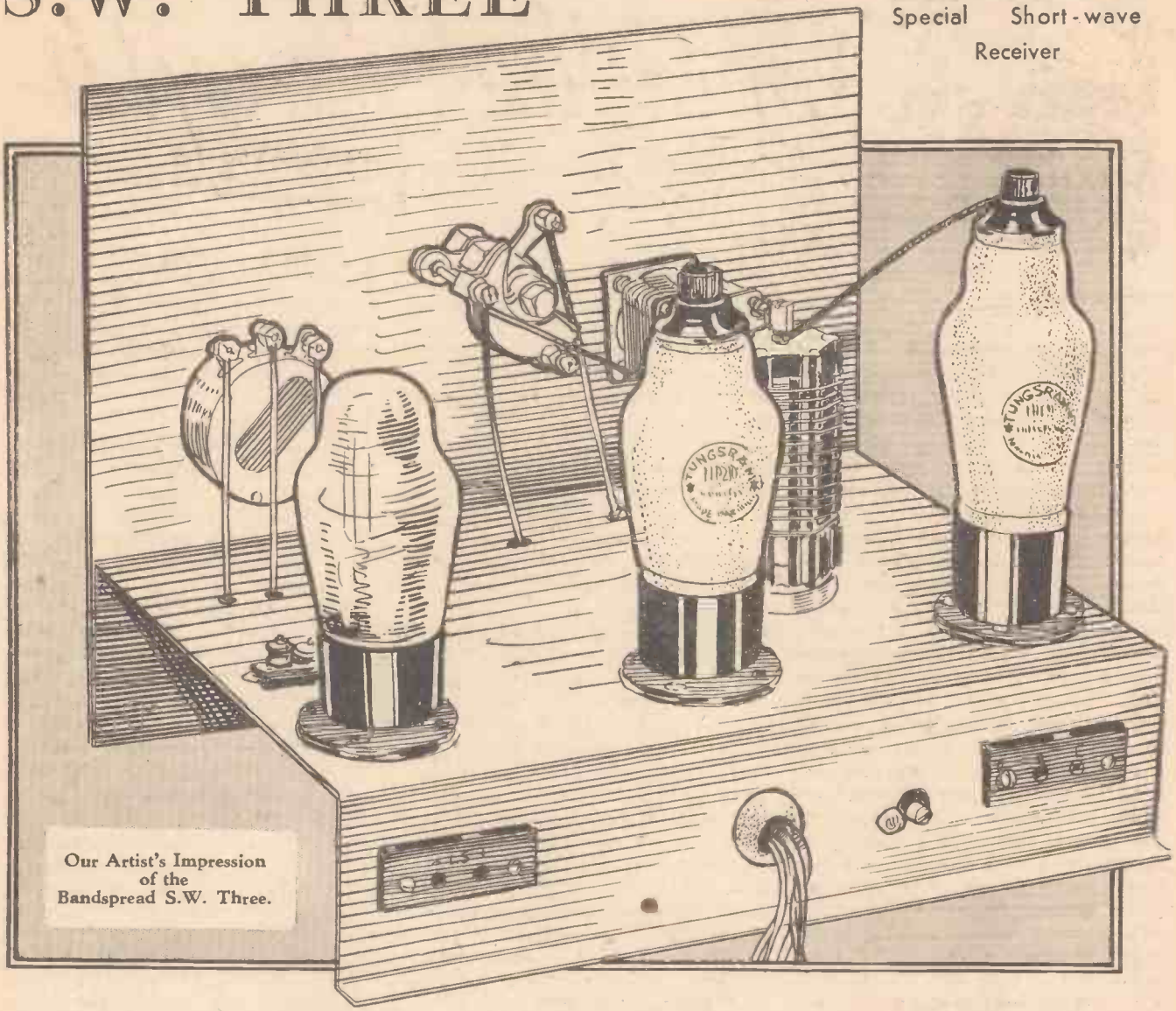
An efficient and easily-made testing unit.

holder; two terminals; and a 4½ v. pocket-lamp battery. These parts are mounted on a 4in. by 3in. baseboard and 4in. by 3½in. panel, as shown. A 1in. diameter hole is drilled for the valve-holder, and, if a baseboard component is used, the terminals will have to be reversed. The battery holder is made with a piece of tinplate, soldered at the joints, and screwed to the baseboard. The wiring is carried out as shown in the diagram.

To use the instrument, two prods, each with a wire and plug, are required. By plugging these into sockets 1 and 3, the headphones and battery are connected in series to test coils, H.F. chokes, etc. 2 and 4 may be used to test wiring continuity. Sockets 2 and 3 give 4½ v. D.C. across the prods, whilst by plugging in 2 and 4 and touching the prods together a bulb may be tested simply by inserting it in the holder. A small box may be made for the tester, if desired, and it will be found very handy for locating faults in simple sets.—DAVID ALLUM (Catford).

THE BANDSPREAD S.W. THREE

Some Further Notes on Obtaining the Maximum Performance from this Special Short-wave Receiver



Our Artist's Impression of the Bandspread S.W. Three.

AS was briefly explained previously, the tank condenser (the extreme left-hand control) is variable in steps of ten, and each step is spread out by a further capacity known as the bandspreader (the centre control). The correct procedure for station location is, therefore, to set the left-hand control on the first stop (which may not only be felt when turning the control, but which may be indicated by the specially calibrated dial) and then to turn the large tuning dial through its complete range. This control may be operated as in a normal standard broadcast receiver, and station location should be just as simple. In order to obtain the maximum performance from the receiver, however, it is necessary also to adjust the H.F. volume control potentiometer and also the reaction condenser. The correct procedure should therefore be as follows.

The Controls

Rotate all controls in a maximum direction anti-clockwise, leaving the pointer on the centre control at the zero mark on the tuning dial. Pull out the lower right-hand knob and the receiver should be in action, but no stations will be heard as the volume control is now at its minimum volume setting. Turn this slowly in a clockwise direction until a fairly prominent rushing noise becomes audible in the loudspeaker. It should only be necessary to advance this to its maximum position on the very weakest stations, but for the preliminary search a position about two-thirds of the way on will no doubt be found most satisfactory. The 40-metre waveband will probably prove the easiest upon which to commence searching, and, therefore, the left-hand control should be turned so that No. 5 is indicated on the dial, or, in other words, this condenser should be turned to its fifth stop.

Searching

Now hold the main tuning control with the right hand and the lower left-hand control with the left hand, and as the main condenser is turned slowly from minimum to maximum the left-hand control should be slowly turned to keep the receiver in a state just off the oscillation point. If turned too far the receiver will howl and only C.W. stations will be heard. This will be indicated by a loud chirp as a station is passed, and morse signals in a high-pitched singing note will be heard. As soon as a station is located, the reaction (left-hand control) should be slackened off, and the final adjustment carried out by means of the top right-hand control. In the event of the station being too weak, even when this latter control is at maximum, the reaction control should be used to augment the signal strength.

On Your Wavelength

By THERMION

Some Queries Answered

STANDING idly by and undetected on our stand at Olympia I enjoyed a refreshing half hour listening to readers' queries, comments, and criticisms. One reader tackled the Editor about chassis construction. He wanted to know when the Editor was going to drop his prejudice against the old flat baseboard. This reader was quite sure that there were thousands of constructors who would build sets if they were of the baseboard type. It soon became apparent that this reader had an old cabinet which was too shallow to admit the more modern chassis type of receiver. His reasons in favour of the baseboard were, therefore, not general but personal, and, if I may say so, therefore selfish. It is always my impression that when one reader speaks for thousands of other readers he is only speaking for himself. How does any reader know what thousands of other readers want? and how can this reader account for the fact that baseboard sets when they have been described in this journal have not, judging from the number of queries we receive on them, been made in very large quantities, whereas chassis sets are built in their thousands? The baseboard system is out of date. We must progress towards improved design. A baseboard set is quite satisfactory for some types of det. two L.F. receivers, but thoroughly unsatisfactory for most others. We do not want to go on building the same style of set. The chassis makes possible a cleaner looking job where all the odds and ends can be tucked away out of sight. I am open to be convinced on this matter, and if you feel strongly about it you will signify your opinions in the usual way. Meantime, I agreed with the Editor's judgment on this reader's query, that his job is to please the majority of readers, and whilst there had been no great demand for baseboard jobs it would be a waste of time, and space, to publish such designs. He is always willing to bow to general demands.

Enthusiasm

I WAS impressed by the enthusiasm of our readers. It must have been an eye-opener to component manufacturers to observe the steady flow of readers in search of a design or information. It may be true, although I doubt it, judging from circulation figures, that sets are not being built to the same extent as hitherto. Who is to blame? This journal has done its utmost to create interest. Can every member of the trade say the same? Can all of them be held blameless against the charge of slow delivery? Can most of them say that all of the components sold have been entirely satisfactory? I fear not. Take the case of a beginner who knows little of theory and nothing of construction, who builds his first receiver only to find that it will not work. He has no expensive instruments to test it. He takes it round to the local dealer who quite often knows less than he does. The dealer reports that it is wired up correctly, but "the circuit is no good." Such a reader, unless he has adopted the wise course of sending his receiver to us, if it is one of our designs, is lost to home construction for ever. When such receivers are brought to us, in 60 per cent. of cases the failure is due to a defective component, and in the remaining 40 per cent. to a mistake in the wiring. The case is not so serious with a skilled hand, for he can track the fault, trace the defective component, and obtain redress from the manufacturer without writing to us at all. Component manufacturers have the responsibility as much as the technical Press for giving satisfaction. I hope that this year things will be better. But for the PRACTICAL AND AMATEUR WIRELESS Free Advice Bureau and Free Service for sets built to our designs, home construction would have waned a long time ago.

Good Contact

STILL the Exhibition provides a valuable opportunity for contact between Editor, staff, and readers, and the success of this journal is largely due, as so many readers told us at the Show, to the fostering of a family spirit. They all like the personal touch, and the fact that the Editor himself is always accessible and available. Your Editor is probably the hardest worked journalist in Fleet Street. He does not take holidays, is in the office even on Bank Holidays, and contrives to turn out a great amount of additional work, including books and articles. He always seems fresh and alert, and has the peculiar faculty of being able to switch his mind from wireless to motor-cars, aeroplanes, and scientific matters. I mention this because so many readers wonder how it is that he can get through such an amazing amount of work. I thought I would give you this brief pen-picture of him as so many readers raised that point.

Over and Over Again

THE surprising thing is that so many readers continue to ask the same questions, although they have been answered dozens of times before in these pages. They could easily consult the half-yearly indexes and find the answers to most of their questions, thus solving their difficulties in a manner even more speedy than through our Free Advice Bureau. If you are a new reader, my advice is, have your copies bound. A binding case and index to each volume is available for a small sum. You should also obtain the volumes specially produced for your benefit, and which contain in easily consultable form every fact, figure, and

formula concerning wireless which you need to know. Those volumes are: "The Wireless Constructor's Encyclopædia," "Everyman's Wireless Book," "Television and Short-wave Handbook," "Home Mechanic Encyclopædia," and "Fifty Tested Wireless Circuits."

The First Television Programme

IT is announced, confirming the hint I gave last week, that the first television programme will be radiated towards the end of October. From then on the design of wireless receivers will gradually change. Already there is a demand for a receiver which will tune down to the television sound signals (a design for a three-valve ultra-short-wave receiver will be given next week), and by next August most manufacturers will be producing an all-wave receiver correctly so described. The modern all-wave receiver seldom goes down below 13 metres. These changes connote corresponding changes in the design of home-constructed receivers. Gradually our queries will change in nature. They will contain less about the medium and long-wave band style of set, and more concerning short and ultra-short-wave sets. The beginning of a new era is always the most interesting. When the programme starts this journal will be the first to publish a design of television receiver suitable for home construction. Shall we be permitted, I wonder, to *see* the King making his broadcast speech on Christmas Day? Such would give a terrific fillip to television.

Birthday!

ALTHOUGH last week's issue completed our eighth volume, owing to the vagaries of the calendar and the fact that there are 52 weeks, 13 lunar months, and 365¼ days to each year, and 366 this year, and also so that we can celebrate our birthday according to the calendar, next week's issue will constitute our special Birthday Number. The first issue of PRACTICAL WIRELESS first saw the light of day as far as the public is concerned on September 24th, 1932—four years ago. There were those who prophesied for us a short life and not even a gay one. Here we are, entering our ninth volume, still going strong, having outlived most of our older contemporaries. What will radio be like in another four years?

Television Interference

THE radiations from Alexandra Palace are giving rise to a severe form of interference which is causing local residents to wail, gnash their teeth, and make the queer gurgling noises which designate a listener with his back up. Letters to the Press and to the B.B.C. have acquainted them with the important fact that people are still listening on the medium- and long-wave bands. Engineers at the Alexandra Palace as well as Post Office engineers are naturally concerned about this. Truly the way of a pioneer is hard. There are snags to be overcome, and I have no doubt that our very efficient Post Office engineers, who have long experience in the tracking and cure of interference, will soon find a remedy for the new form of interference occasioned by the television signals.

Notes from the Test Bench

S.W. Coil Turns

A READER complained to us the other day that we did not publish sufficient details concerning the construction of short-wave coils. He went on to say that we had never mentioned how many turns should be used with various capacities of tuning condenser. The latter complaint indicated that he did not know the fundamental laws relating to capacity and inductance, of course. It is possible that many other readers are not quite clear on this point and therefore it is emphasised that the maximum capacity of the tuning condenser does not govern the number of turns required on the coil. The number of turns on the coil and the stray capacity across the tuned circuit govern the minimum wavelength to which the receiver can be tuned. The maximum wavelength, on the other hand, is governed by the capacity of the tuning condenser.

Transformer Design

The design of the transformer for an A.C./D.C. rectifying unit, using two H.T.11 rectifiers connected in bridge, is governed by the current consumption of the D.C. receiver, a secondary voltage of approximately 275 volts at 350 m.a. being necessary to provide a D.C. output of 250 volts at 250 m.a. It is advisable to connect a high-capacity condenser across the output terminals of the rectifying unit, a value of about 8 mfd. being generally sufficient. When the consumption of the D.C. set is very high, a converter should be used. Reliable machines of this type are rather expensive.

The Output Valve

It is commonly acknowledged that good quality of reproduction can be obtained when a triode is used in the output stage, and therefore in a mains receiver it is advisable to use a triode, or, preferably, two triodes in push-pull if very high quality is desired. The pentode has its uses, however, even in a mains receiver. It enables good high-note response to be obtained in ultra-selective receivers without the use of a tone control. When the H.F. or I.F. circuits of a receiver are very selective a loss of treble is inevitable. The pentode output valve, on the other hand, accentuates the high notes and, therefore, forms a good combination with high-selectivity H.F. circuits.

No Television for D.C. Users

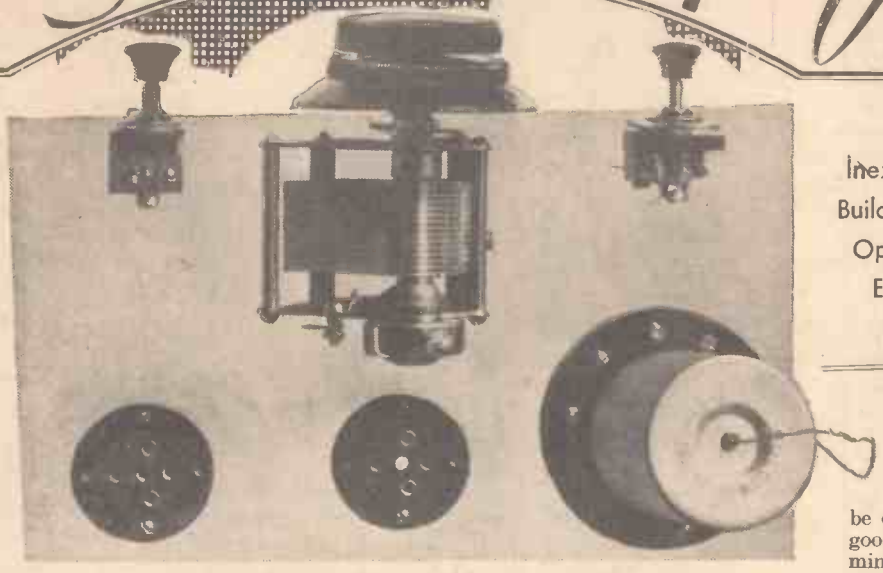
IT is obvious, bearing in mind the high voltages required, that television will not be available for battery users. It is obviously a mains job, and until someone designs a satisfactory means of stepping up D.C., those readers who operate from D.C. mains will have to do without television. I am aware that the ordinary type of rotary converter is satisfactory for ordinary wireless sets, and that you can build a universal set for the ordinary broadcast. Different problems arise in connection with television, where the imposition of varying electrical loads will cause distortion and flicker as well as reducing picture brilliancy. Demand, however, is always the mother of invention, and I have no doubt that public demand will create the device. Here is room for invention, and inventors. I have yet to be convinced that any mechanical system will satisfactorily receive high-definition television.

Another pretty problem for our television engineers concerns the design of suitable transformers. It is apparent that we shall not be able, as with broadcast receivers, to use one transformer, tapped off. We shall require at least three transformers for television sets. As far as I have been able to trace only one firm at the moment is marketing a television transformer for constructors. I have no doubt that there will be plenty available at the right time. Will all those readers who would be interested in building a television receiver drop me a postcard to that effect? I can say that the cost of building such a set is likely to be in the neighbourhood of £30 although many readers will possess in their junk boxes a number of parts which can be used, and which will bring down the price. Unfortunately, the high voltages employed would render most of the existing fixed condensers and resistances unsuitable.

The SIGNET Two

You Can Build This Simple Set in One Evening

Inexpensive to Build, Simple to Operate, and Economical to Run



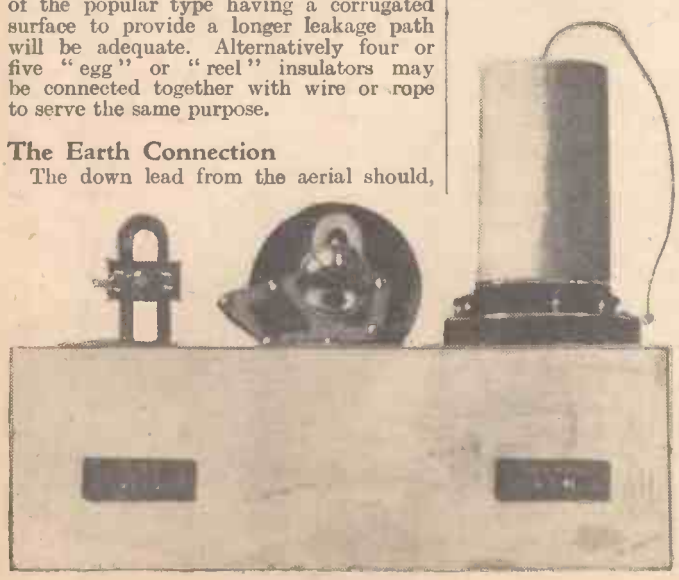
Plan of the chassis shewing the extremely simple layout.

MANY listeners are under the misapprehension that a two-valve receiver is incapable of providing sufficient entertainment to justify its existence as the home broadcast receiver. Obviously, with only a minimum of valves in use the actual signal strength must be at a minimum, but it is quite possible to obtain several alternative programmes with consistent volume and without any difficulty provided the receiver is used in the correct manner. One of the foremost requirements will, of course, be a good aerial and earth system. This does not necessarily mean that a thirty or forty foot mast must be erected in the garden with an aerial resembling that used at a transmitting station slung from the mast to the house. Insulation is of greater importance than height in many cases, and, therefore, no matter what type of support is arranged for the aerial (both at the end of the garden and at the house end) a chain of good insulators should be joined between the aerial wire and the supporting wire or rope. There are several types of insulator on the market, and two of the popular type having a corrugated surface to provide a longer leakage path will be adequate. Alternatively four or five "egg" or "reel" insulators may be connected together with wire or rope to serve the same purpose.

The Earth Connection

The down lead from the aerial should, if possible, be part of the actual aerial wire and should not be soldered or joined to it. This may be accomplished by threading the wire round one end of an insulator and binding it with fine wire to prevent it from slipping. Bring the wire in through the window by means of a good commercial lead-in tube unless you are certain that you can make a suitable substitute. To prevent the wire from swaying and causing fading effects it should be drawn tight to the leading-in tube.

A similar tube should be employed for the earth connection if this is taken out into the garden, but this should only be done if a length of about 10 feet maximum is to be used. If the distance to the ground is longer than this it may prove more efficient to use a connection to the nearest *main* water pipe—not a pipe which runs to a cistern at the top of the house. Use an insulated earth wire to avoid peculiarities due to coupling through walls, etc., and connect the outside earth wire to a substantial earth plate or a buried chemical earth such as the "Filt" or some similar device.



Rear view of the Signet.

Indoor Aerial

If you are situated in such a position that you cannot erect an outdoor aerial, make sure that the indoor arrangement has a high degree of efficiency, and do not rely upon a length of odd wire pushed down into the picture rail. Get a "Pix" or similar well-made indoor aerial arrangement which will be easier to erect and will be certain to give you good results with the minimum of trouble. Furthermore, it will be invisible when erected, and no nails or other fittings are needed.

The tuning will be found to be practically identical with the majority of ordinary aerial arrangements, and there should be no need for any modifications to the connections to the tuning coil. The separate primary winding provides just the right degree of coupling to compensate for aerial differences, but with a coil of this type the user is able to make modifications to provide different results. For instance, the aerial may be joined direct to the tuning condenser (terminal No. 1 on the coil), but this will provide poor selectivity, although volume will be greater. Alternatively, a fixed (or pre-set) condenser may be joined between the aerial and this terminal in order to give a different degree of strength and selectivity. Thus the receiver will form a very useful experimental equipment for the beginner as well as a standard home broadcast receiver.

LIST OF COMPONENTS

One coil (C20) (Bulgin).
One .0005 mfd. condenser (1,046) (J.B.).
One .00025 mfd. reaction condenser (1,081) (J.B.).
One L.F. coupler (Transfeeda) (Benjamin).
One resistance: 1 meg. (Erie).
One .0001 mfd. condenser (665) (Dubilier).
One switch (S36) (Bulgin).
One switch (S22) (Bulgin).
Two terminals strips, A.E. and L.S. (B. Lee).
Two valveholders (one 4-pin, one 5-pin) (Clix).
Two valves: D210, Y220 (Hivac).
Five plugs: H.T.—, H.T.1, H.T.2, G.B.+, G.B.—(Belling-Lee).
Two spades: L.T.+., L.T.— (B. Lee).
Four component brackets (P. Scott).
Metaplex chassis, 10in. by 6in. by 3in. (P. Scott).
One 100 mA microfuse and holder (Microfuse).
One speaker, Type SD (Epoch).

Radiolympia Reflections

We will award prizes to those readers who identify themselves in the sketches below. Readers must state the day and time at which they called at our stand.

SHORT WAVE SECTION

MINIMISING INTERFERENCE

How Interference is Picked Up ; Making a Doublet Aerial : A Screened Aerial-Matching Transformer.

By THE EXPERIMENTERS

DESPITE the great improvements which have been effected in short-wave working the interference problem is still one which calls for a good deal of attention. This is the case on short waves, in particular, because many forms of electrical disturbance which are quite inaudible on a broadcast set are "received" strongly with a short-waver. The reason for this is obvious, for it is simply that the electrical charges are roughly tuned to a

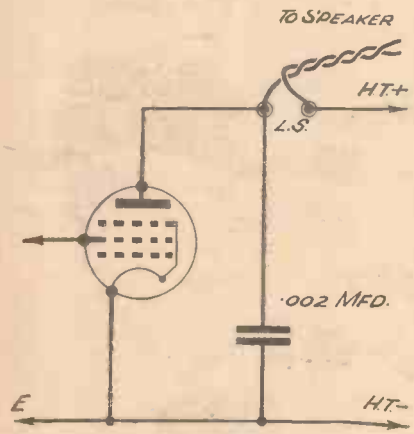


Fig. 1.—Interference pick-up by the speaker leads can be led away to earth by connecting a .002-mfd. condenser, as shown here.

frequency corresponding to a wavelength on the short-wave band.

A case in point is the crackling heard when a car passes fairly close to the aerial. In the case of the average broadcast set the radiation from the ignition equipment passes entirely unnoticed. But tune the receiver to 20 metres, for example, and the interference is easily picked up. When the receiver is tuned to a still lower wavelength the interference very often increases in intensity, so that on seven metres its field strength might be greater than that of the signal it is wished to receive. In every case, the most important factor is the ratio between signal strength and the strength of the oscillations comprising the interference. Thus, even in the face of powerful interference pick-up, good reception might be obtained from the local station—because signal strength is much greater than "interference strength," if such a term can be accepted.

Signal-interference Ratio

There are two important reasons for this, one of which is that a strong signal has the effect of "wiping out" weaker interference in just the same manner as a loud noise tends to "kill" one of lesser intensity. The other reason is that, when the signal is sufficiently powerful, the volume control can be turned down to such an extent that the receiver does not respond to any measurable extent to the interference.

In referring above to interference it has been assumed that this is of the type which is radiated; not transmitted along the mains leads into the power supply portion of the set. The latter form of interference must be treated differently, and methods of suppressing it have frequently been described in these pages. Radiated interference is picked up, as a rule, by the aerial-earth system, although long speaker leads, battery leads or unscreened connecting wires might occasionally act as "collectors."

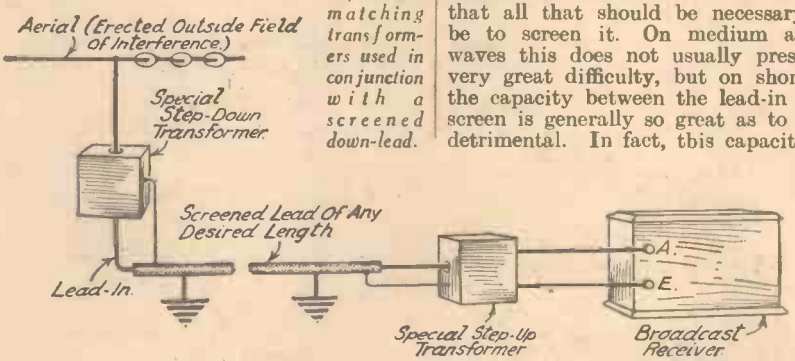


Fig. 2.—A system of impedance-matching transformers used in conjunction with a screened down-lead.

Lead-in "Pick-up"

If it is assumed that the receiver has been properly designed so that connecting leads are short, and if a by-pass condenser has been fitted (Fig. 1) to lead away to earth any interference picked up by the speaker leads, it will nearly always be found that by far the most prolific "collector" of interference is the aerial lead-in. It must not be overlooked, however, that a long earth lead—especially if it has a fair resistance and is insulated—might prove equally troublesome. This is a point which is often overlooked, but it is evident that an earth lead a few yards long can have a very high resistance to high frequencies (short wavelengths), and thus a strong "interference signal" migh be built up along it.

Screened Down-lead

Having seen that the lead-in is responsible for most of the interference pick-up—because it is nearest to the various sources of interference—it would appear that all that should be necessary would be to screen it. On medium and long waves this does not usually present any very great difficulty, but on short waves the capacity between the lead-in and the screen is generally so great as to be very detrimental. In fact, tbis capacity might be sufficiently high to allow the signals picked up by the aerial to leak away to earth.

Aerial-Matching Transformers

One method of overcoming this trouble is to use a pair of high-frequency trans-

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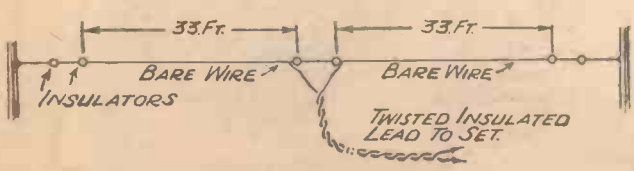


Fig. 3.—Showing the essentials of a doublet aerial. Dimensions are for 40-metre reception.

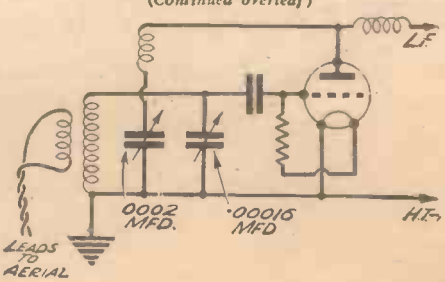


Fig. 4 (right).—Instead of using a special matching transformer the aerial leads can be joined to a separate winding in the first coil.

(*Continued from previous page*)

formers connected as shown in Fig. 2. These are of special design and are made by several manufacturers, whilst constructional details were given in the issue of PRACTICAL WIRELESS dated March 10th, 1934. The transformer connected between the aerial and the lead-in provides a step-down ratio, whilst that between the lead-in and the set steps up the signal voltages. Roughly, the consequence is that the low voltage (H.F.) passing down the screened lead-in has less tendency to leak away through the screen to earth. On reaching the second transformer the voltage is stepped up to its original figure before being applied to the set.

Special Aerial Systems

This arrangement has proved extremely successful, but improved systems have more recently been developed which are more satisfactory for short-wave work. In fact, the question of short-wave aerial design as a whole has been very thoroughly investigated during the past few years, and several novel systems have been developed. A good deal of rather advanced mathematics is involved in working out the ideal aerial system for no-loss, anti-interference reception, for which reason several manufacturers have now placed on the market complete aerial systems designed after considerable research in their laboratories. These special aerials are definitely worth while, although they are rather expensive, and prove that our old ideas of aerials were rather crude. The experimenter who is familiar with mathematics might work out his own design, but most readers have no great liking for calculations and prefer to experiment with more "rule-of-thumb" methods.

The Doublet Aerial

There is no reason why this should not be done satisfactorily once the main features are understood. It has been found that the best type of simple aerial for the amateur is that known as the doublet, and which is arranged as shown in Fig. 3. It will be seen that the aerial is a mixture of a T and an inverted L. There are actually two inverted-L aerials arranged end to end, the two lead-in wires being twisted together, and the most important point is that the length of the two horizontal portions be correctly chosen. Theoretically, this length should be different for every wavelength, but it is obvious that this could not be arranged except in the case of a transmitter. Each of the horizontal portions should be one-quarter wavelength long, or, in other words, their combined length should be one-half wavelength. As an example, if the aerial were to be designed for 20-metre use, each horizontal span should be 5 metres, or approximately 16½ft.; for 30 metres, each would be about 25ft. long, and so on.

It is worth noting, however, that a 40-metre doublet will also operate at almost maximum efficiency at 20 metres and 10 metres. But although an aerial of this type is most sensitive at half its resonant frequency, it can be used satisfactorily at other frequencies within a good range. Because of this, a doublet made for 40-metre working is satisfactory for all the most frequently used short wavelengths, which are the bands around 19, 20, 31 and 40 metres. The first and third wavelengths mentioned are those used by broadcasting stations, the second and fourth being those employed very largely by amateur transmitters.

Simple Matching

Even when using a doublet aerial it is sometimes preferable to insert some form of matching device, in the shape of an H.F. transformer, but this can be avoided simply by connecting the two lead-in wires to the ends of a separate aerial winding on the input coil, as shown in Fig. 4. It is, however, very well worth while to experiment with different numbers of turns for this winding, whilst it is a good plan for the experimenter to make a few alternative tappings, so that the best can be found for any particular wavelength. For most purposes it will be found that the most suitable number of turns on the aerial winding is about half that on the grid winding, but it is definitely worth while to experiment.

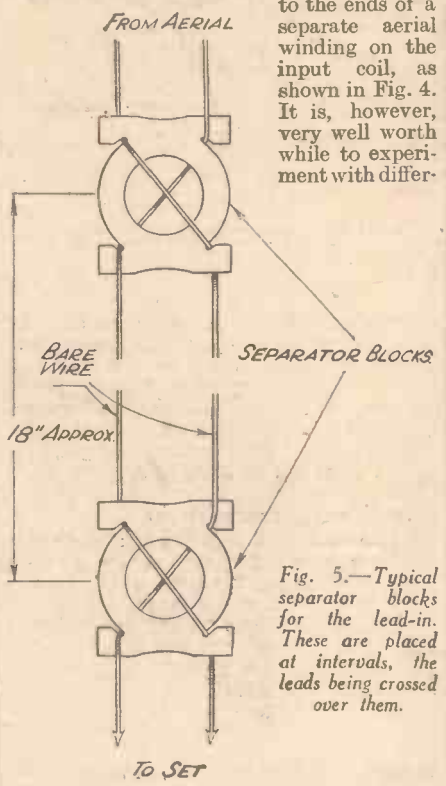


Fig. 5.—Typical separator blocks for the lead-in. These are placed at intervals, the leads being crossed over them.

Another point is that for theoretically-best results the lead-in should be of approximately the combined length of the two horizontal spans, but this must very largely be governed by circumstances.

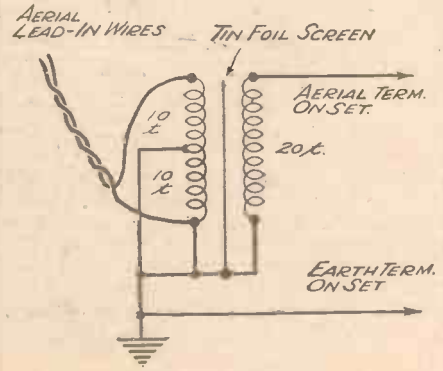


Fig. 6—This diagram shows how a simple, screened transformer can be fitted between the lead-in and the set to eliminate residual interference.

The Lead-in

As to the practical arrangement of the aerial, it should be pointed out that the twisted lead-in should consist of vulcanised-rubber wire which is not affected by the atmosphere, although another system which is just as good is to use bare wire supported by the special separating blocks which are now made by two or three firms. A pair of these is shown in Fig. 5, from which it may be seen that the wires are crossed at intervals and are insulated by the blocks. It is generally satisfactory to place the separators at about 18in. intervals in the run from the aerial to the leading-in point, from which the lead to the set can be of ordinary good-quality twisted flex.

Despite the fact that the top spans of the aerial are shown, and have been described as horizontal, it is not essential that excessive care should be taken in this respect, and it is often more convenient to allow the complete aerial to slope from the house to a convenient post or other fixing. It is better that the two spans should be in a straight line, but it has been found that efficiency is not seriously impaired by mounting them at right-angles; other angles are not recommended and are rarely as good.

Screened Transformer

When interference is in evidence, despite the use of a doublet, a simple shielded-primary transformer can be used as shown in Fig. 6. This can be made by winding 20 turns of 22-gauge d.c.c. wire on a 2in. diameter paxolin former, and taking a tapping at the exact centre. This winding should be covered, except for a gap of about ¼in., with tinfoil, after which the secondary—consisting of 20 turns of the same wire—can be wound over it. The tinfoil acts as an electrostatic screen, with the result that the coupling between the two windings is purely inductive. Notice that the screen, as well as the centre tap of the primary and one end of the secondary, is earthed.

VISUAL TUNING BY CATHODE RAY

(*Continued from page 7*)

grid voltage rises. From this it will be understood that accurate tuning is represented when the width of the arms of the luminous cross reaches a maximum. Values of all of the resistances are not given in Fig. 3, since those of C.1 and C.2 depend upon the detector valve chosen and the particular circuit. Normally, of course, C.2 is .5 megohm, since this is the potentiometer used for L.F. volume control; C.1 is chosen so that the arms of the luminous cross subtend 90 degrees when the receiver is tuned to a signal.

Anode and Target Voltage

It should be observed that the maximum anode and target voltage for the TV4 is 250, and in choosing the voltage-drop resistances to feed these electrodes it is necessary to know that the target current is .29 mA at zero grid volts, and .27 mA at minus 4 grid volts, whilst the triode anode current in these conditions is approximately 1.2 and .3 mA respectively.

Connections for the TV4, which has an eight-pin side-contact base, are shown in Fig. 4, whilst the correct angle of the base, when mounted vertically so that the end of the tube projects from the panel, is also indicated. If a different angle were employed the four arms would not appear to be equally illuminated.

Although the connections given show a simple double-diode detector valve, it should be mentioned that the same arrangement can be adopted when using a double-diode triode or double-diode pentode, the connections shown being represented in the simplest form for convenience. When using a "double-purpose" valve the potentiometer C.2 is connected directly to the cathode of the valve in the normal manner.

MODERN FEATURES EXPLAINED

A Brief Review of the Past Year's Progress, With Particular Reference to the Main Features of 1937 Receivers.

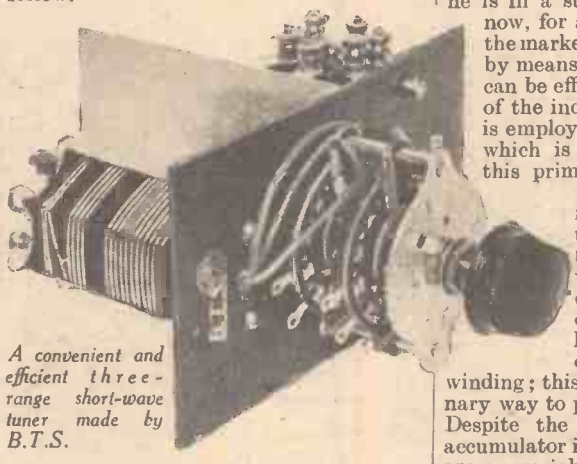
WE are starting a new radio year, and the time is appropriate to take stock of the position of receiver design to-day. Changes have been rapid and drastic in the past few years; can such things continue? Will the next five years produce a different technique in set design, or will our energies be directed more towards consolidating our present position and concentrating on detail improvements and refinements? Will television change our outlook?—no pun intended—or will it simply be a means of making radio reception more complete? Direct answers could not readily be given to these questions, but Radiolympia has afforded us a simple means of deciding on what the future may hold in store.

The constructor is apt to visit the Show only to see what the manufacturers who cater for his especial needs have to hold his interest, but he might well study the ready-made commercial sets as well. He would not dream of buying one, but there is a good deal to be learned by studying the new models and appraising their technical features. It is true that many of these were pioneered by the constructor and experimenter, but some of them have grown almost out of recognition in the vast and expensive laboratories which their makers must to-day maintain. Some of them may be useless to the constructor—he does not often want ultra-simplicity and foolproof working—but he can learn from the research of others.

All-Wave and A.C./D.C.

One of the most obvious changes concerns the rapid growth in numbers of the all-wave set; every maker now includes one or two models in his programme. This surely shows that the general listening public is now going to "trespass" on what has for long been the private preserves of the experimenter—short waves. And while the buyer of a commercial set marvels at world-wide short-wave reception, the amateur can sit back and chuckle, with the knowledge that he has had a good deal of the fun before the listening public has been able to join him. This is typical of the advantages which the constructor enjoys; he can always pioneer, and have his pick before the crowd arrives.

Another interesting fact is that almost every maker has discontinued the production of purely D.C. receivers. There are still plenty of sets suitable for operation from D.C. mains—more than ever before—but they are mainly designed for universal A.C./D.C. use. This type of instrument is generally rather more expensive than the A.C. set, but it does not lose its usefulness when the mains supply is changed. Several designs for universal receivers have been described in PRACTICAL AND AMATEUR WIRELESS during the past few years, and others will follow.



A convenient and efficient three-range short-wave tuner made by B.T.S.

Systems of Universal Operation

The most common method of providing for universal mains operation is by the use of valves with indirectly-heated cathodes requiring a voltage of about 13 to 40, the heaters being connected in series with each other and with a barretter. The latter is a form of self-regulating variable resistance which keeps the voltage supplied to the heaters constant regardless of differences in applied mains voltage. High tension is derived from the mains through a rectifier—valve or metal—and the usual choke-condenser smoothing system. The rectifier acts as such on A.C., converting the current to D.C., whilst when the receiver is operated from D.C., it merely serves as a small regulating resistance.

A different arrangement is adopted in certain receivers. These are designed primarily for A.C. operation, but can be converted to D.C. simply by fitting a vibratory transformer device which converts the current to alternating before applying it to the mains transformer. One important advantage of this system is that the receiver is not in direct contact with the mains regardless of the type of supply; in the normal type of universal receiver the set is always joined directly to the mains without the introduction of a transformer.

H.T. and L.T. from an Accumulator

An innovation in one make of 1937 "battery" receiver is a device for obtaining both high- and low-tension from an accumulator only. The constructor has used this system before, but he is in a still better position to do so now, for a device has been placed on the market, at a very reasonable figure, by means of which the transformation can be effected. The principle is that of the induction coil, for a transformer is employed in the primary circuit of which is a make-and-break. When this primary is connected to a D.C. supply (the accumulator) an intermittent current is passed through it due to the operation of the contact breaker or vibrator. The fluctuating current causes an alternating current of considerably higher voltage to be developed across the secondary winding; this can be smoothed in the ordinary way to provide high-tension current. Despite the fact that a 4- or 6-volt accumulator is required, running expenses are appreciably reduced, whilst a higher voltage and current can be obtained than those from any H.T. battery. Replacements are not required, and there is always a steady supply of current—provided that the accumulator is kept in a charged condition. The L.T. current is increased, of course, but charging is not an expensive matter, and in most

(*Continued overleaf*)

An ideal all-wave receiver for the constructor—the "Gladiator" described in recent issues of "Practical and Amateur Wireless."

BEGINNERS' SUPPLEMENT
(Continued from previous page)

districts the local charging station "collects and delivers."

Iron Core and Air Core

A few years ago there were heated debates concerning the merits and demerits of iron and air-core coils. Whatever points there were in favour of either type at that time, improvements have been so great on both sides that many set manufacturers now do not state whether their instruments employ air- or iron-core coils. The latter certainly score when compactness is an important requirement, and they are superior in the more expensive grades, but for medium-priced and cheap coils there is really very little to choose. It is more important to obtain a coil of reputable make than to insist upon either pattern.

New Varley tuning-coil assemblies and a 465 kc/s I.F. transformer.

When we come to consider the question of "How many valves?" we find two entirely opposing views. Many makers have increased the number at the same time as others have effected a reduction. If a comparatively expensive, long-range-with-quality receiver is under consideration, it is worth while to use five or more valves; on the other hand, popular demand proves that the constructor who has for long preferred the H.F.-Det.-Pen. type of circuit has not been unwise. There are still many sets of this type, and they are hard to beat, especially for the home constructor. But when something special is contemplated it is wise to use several valves working well within their capacity than fewer valves running "all-out." The constructor will favour multi-valve sets more than ever now that valve prices have been reduced—a reduction for which this journal has worked for at least three years.

A.V.C. and Noise Suppression

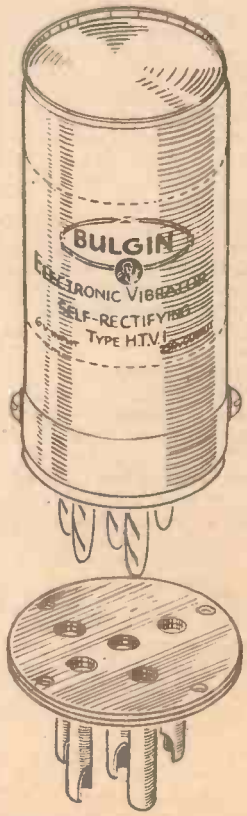
On the larger and more pretentious receivers automatic volume control in one of its many forms has become universal. One of the principal objections to its use—inter-station noise, due to the increased sensitivity when a signal is not tuned-in—has been overcome by the provision of a simple type of push-button noise suppressor. In principle, this does not differ from the local-distance switching systems which the constructor has known in the past, the only difference being in the actual method of operation. One very simple method is to include a fairly high resistance in series with the small fixed-bias resistance connected in the cathode circuit of the H.F. or frequency-changer valve. This is normally short-circuited, but the contact is broken by pushing in a spring-loaded knob. The knob is depressed until the tuning pointer has been set to the position of a station, and then allowed to return to its normal position. Another arrangement, which is also suitable in a battery receiver, is to arrange the push button so that when depressed a fixed resistance is connected in parallel with the aerial coil or with the secondary winding of the first I.F. transformer. Such arrangements as these will be more convenient to the constructor than they have been in the past, due to the fact that complete tuning units with calibrated condenser scales are available in greater numbers.

Visual Tuning

It has been said that a visual tuning indicator is essential in a receiver with A.V.C., because of the difficulty of judging accurate tuning by ear. Whether this is so or not, there are manufacturers who have previously used such an indicator and have now stopped. Perhaps reduction in costs has influenced this step, because visual tuning is definitely valuable. In this respect, particular attention is directed to the new cathode-ray device recently introduced. It is not more effective than a meter- or neon-type indicator, but it is perhaps more fascinating and more novel. The indicator consists of a miniature cathode-ray tube and a triode valve in the same envelope, the grid of the triode being joined to the A.V.C. line. Alteration in A.V.C. bias voltage results in a different width of fluorescence being shown on the screen or end of the cathode-ray tube. At the moment this new valve (it is not expensive) is available only for use in mains receivers, and full technical details are given in another article.

Variable Selectivity

Variable selectivity is another feature which has come to the fore since last year, and it is to be found on a number of sets—mainly superhets. The idea is that the coupling between the primary and secondary windings of the I.F. transformers can be varied at will by means of an external control. As a result of this the degree of selectivity is changed; in other words, the band-width covered by the receiver is altered. For local station quality reception the width may be 10 kc/s or more, whilst for distant stations, when interference is normally experienced and when quality reproduction is out of the question, tuning can be sharpened. By this means ordinary interference, as well as heterodyne whistles, can be considerably reduced in effect.



The Bulgin H.T. vibrator unit which has recently been introduced.

Concluding our survey, we might say that a receiver made to-day will not readily become out of date.

Leaves from a Short-wave Log

THE number of Spanish stations working on the amateur band, and on other high-frequency channels, is on the increase. In many instances it would appear that the Government and Revolutionary parties are using many amateur transmitting plants for the broadcast of war news bulletins as well as for intercommunication between districts as most of the telegraph and telephone lines have been severed. One of the newcomers heard on roughly 28.7 m. is EAJ43 of Santa Cruz, announcing itself as the Radio Club of Tenerife, although the call-sign does not tally with the one adopted by that club some time ago. With the information that it is working on 20 kW. (?) and transmitting simultaneously on 201 m., it is on the air nightly between B.S.T. 20.00-21.00. Another station logged is EHL, el Tablero, on 28.93 m. (10,370 kc/s), a five-kilowatter which, until trouble started in Spain, was used for telephony with shipping.

Another Colonial

Another colonial which has been recently logged is VE9DR, now CFCX, operating on 49.96 m.(6,005 kc/s) with a relay of the CFCF, Montreal, programme. The times are: Sundays, B.S.T. 15.00-17.15 and week-days from 23.00-06.00. It is a Canadian Radio Commission station with its studios located at the Mount Royal Hotel, Montreal.

Portugal's New Short-wave Transmitter

Pending the construction of a more powerful station forming part of the general scheme for the reorganisation of the Portuguese State broadcasting system, I learn that Lisbon will shortly open a 5-kilowatt transmitter working on a channel between 25 and 31 metres. It is to be used for the relay of the National station's programmes to the Portuguese colonies.

Those Mystifying Harmonics

Two signals which puzzled me greatly a few days ago were found on 25.31 m. (12,760 kc/s) and on 24.39 m. (12,300 kc/s), the first being identified as emanating from France and the second from some more distant spot. It was later possible to confirm the former as the 10th harmonic of Nice—Cannes—Juan-les-Pins (Radio Côte d'Azur), and from the call heard the latter proved to be the 2nd harmonic of COKG (formerly CO9GC), Santiago (Cuba), of which the fundamental wave is 48.78 m. (6,150 kc/s). The call, *Santiago de Cuba*, is put out every 15 minutes. Curiously enough on the lower frequency I could not even hear a whisper from the station.

Nairobi Reappears

A recent search on the 49-metre band resulted in the logging on two consecutive evenings of VQ7LO, Nairobi (Kenya Colony), on 49.31 m. (6,083 kc/s). The times of transmissions are: B.S.T. 17.30-20.30 (Monday to Friday). 17.00-21.00 (Saturday) and 17.00-21.00 (Sunday). Signals are usually well heard towards 19.00. All announcements are clearly given and identification can be confirmed by the fact that *God Save the King* is invariably played at the close of the broadcast. Reports should be sent to the East African Broadcasting Co., P.O. Box, 777, Nairobi (Kenya Colony).

Two Interesting Loggings

HI3C, La Romana, Dominican Republic, hitherto on 42.92 m. (6,900 kc/s), has moved to 49.14 m. (6,105 kc/s) immediately below HJ4ABP, Manizales (Colombia). It styles itself *La Voz de la Feria* in its daily broadcasts B.S.T. 18.30-20.00 and 23.00-01.00. Address: Radiodifusora HI3C, La Romana (Dominican Republic). In its vicinity, namely, 50.51 m.(5,940 kc/s), you should find a ½-kilowatter, TG2X, Guatemala City, *La Voz de la Policia Naçional* (The National Police Station), controlled by the Ministerio de Fomento and on the air between B.S.T. 03.00-05.00. Although an official station it closes down with a popular melody, *In a little Spanish town*. Just above on 50.76 m. (5,910 kc/s), HH2S, Port-au-Prince (Haiti), relaying the medium-waver HHV of that city can be heard between B.S.T. 02.00-04.00 with announcements in French, Spanish and English and a four-chimes interval signal. If you desire a "veri" write to La Société Haitienne de Radiodiffusion, Immeuble Magebgo, Boite Postale 103, Port-au-Prince, Republic of Haiti.

Hark Back to Europe

Two comparatively new short-wavers to which I now listen almost every day are the Sofia (Bulgaria) and Belgrade (Jugoslavia) transmitters, inasmuch as broadcasts from these cities on medium waves are almost impossible to get. LZA, Radio-Garata, Sofia, now a two-kilowatter on 20.04 m. (14,970 kc/s), comes in just above the Schenectady, Zeesen, and E. Pittsburgh transmissions, which are easy channels to find. Sofia is now on the air on week-days from B.S.T. 11.00-13.00 with additional broadcasts on Tuesday and Thursday from 19.00-21.00 and even sometimes later; on Sundays it is working from 06.30-14.00, and again from 16.00-22.30. I have heard both a man and woman announcer, although the latter appears to do most of the work.

Belgrade, on 49.18 m. (6,100 kc/s), provides a very powerful signal, and starts up at about B.S.T. 08.00 with an early news bulletin in the French language following at 08.45. The call is that of the medium-wave station, namely: *Ovde Radio Beograd* (phon.: *Bay-owe-grard*), but both calls and announcements are made in a number of European languages. As an interval signal it has adopted a short melody in chords played on a native string instrument. In view of our King's cruise in Jugoslavian waters the daily evening broadcast in French at B.S.T. 22.45 is particularly interesting, as full descriptions are given of the places visited by the Royal party. Belgrade has a woman announcer.

'Ware Harmonics

This particular portion of the band is rich in harmonics, and care must be taken, if French is heard, not to confuse the Belgrade broadcast with the 7th harmonic of Radio-Strasbourg heard on 49.89 m. (6,013 kc/s) or, when a foreign language is used, with the 7th of Poznan (Poland) on 49.37 m. (6,076 kc/s). On 49.8 m. (6,110 kc/s) it is also possible to get the 5th harmonic of Radio-Marconi (Bologna, Italy), and not far below on 47.86 m. (6,255 kc/s) the 9th harmonic of P.T.T. Paris. There is a further series of harmonics of French stations between 43.17 m. (6,950 kc/s), P.T.T. Paris (10th) and 47.02 m. (6,380 kc/s), Nice-Juan-les-Pins (5th), of which it would be useful to make a note. The 6th harmonic of Radio-Normandie (Fécamp) is on 44.916 m. (6,678 kc/s), and is so strong and clear that it might be taken for a direct broadcast on short waves. On 46.43 m. (6,462 kc/s) we also find the 6th of Bordeaux P.T.T. and on 47.1 m. (6,391 kc/s) the 7th of Radio-Toulouse. So beware of harmonics when endeavouring to log direct transmissions.

Venezuela is Again Logged

YV5RMO, Maracaibo, on 51.28 m. (5,850 kc/s), has adopted a new slogan and would appear to have changed hands. Instead of being told that the broadcast is an echo of the Caribbean (Ecos del Caribe) we are informed that it emanates from Zulia (Ecos del Zulia) the State of which Maracaibo is the capital. The power of the transmitter is 300 watts, and the signals are good from about midnight onwards.

Colombia Again

In the early morning (B.S.T. 03.00-05.00), on a slightly higher reading, chimes (C, G, C, E, G, E) were picked up; they emanated from HJ3ABF, Bogota (49.40 m., 6,073 kc/s), *La Voz de Colombia*. Here a man and woman announcer gave out the call alternately in Spanish and English. (Address: Box 317, Bogota, Republic of Colombia, South America.)

Mr. F. Wilson, of 41, Gordon Road, Enfield, Middlesex, finds the "Elf" useful aboard his yacht. He says it is a "charming" instrument!

OUR FREE CATALOGUE SERVICE

To save readers trouble, we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue," PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

POWER EQUIPMENT

THE latest list issued by Electro Dynamic Construction Co., Ltd., includes a range of their rotary converters for home radio, public address work, and car radio use. The 50-watt machine is increased in output to cover a much larger number of popular sets, and the filters have been re-designed to cover wavebands from 10 to 2,000 metres. This firm have recently taken over new and much larger premises, and their new address is St. Mary Cray, Kent.

COSSOR RECEIVERS

AN attractive booklet, printed in photogravure, gives particulars of the new season's range of Cossor receivers. Mostly superhets, they range from a de luxe all-wave radiogram (Model 837) at 22 guineas, to the ever-popular "Melody Maker" (battery model 370), priced at £5 19s. 6d. There are all-wave superhets embodying the latest refinements in radio practice, and various battery-operated receivers of the console type, in cabinets of various designs to suit all tastes. Also included in the list is a table radiogram (A.C. mains model 737) which is little larger than an average receiver. It incorporates a five-valve superhet circuit with full automatic volume control, tone coutrol, and a silent motor with automatic stop. The price is 15 guineas.

LISSEN LITERATURE

MESSRS. LISSEN now supply an interesting broadsheet showing all the main constructor components supplied by them, including the matched dipole aerial equipment, the Luxfilter, tuning coils, H.T. eliminator, M.-C. speaker, etc. There are many interesting items to be found in this list, the majority of which are already well known to constructors. In addition this list includes details of the range of dry batteries and accumulators, although a special leaflet is available dealing solely with this part of the Lissen supplies. Other useful leaflets describe the range of torches, all-wave radio receivers and other equipment.

BOOKS RECEIVED

THE CATHODE-RAY TUBE AT WORK, by John F. Ryder. 11s. post free, from Holiday and Hemmerdinger, Holmer Works, Dolefield, Bridge Street, Manchester, 3. Demy octavo, 333 pages.

THIS is an American volume dealing with the theory of the tube, sweep circuits, A.C. voltages on both sets of plates, commercial cathode-ray oscillographs, practical applications of the cathode-ray oscillographs, alignment of tuned circuits, the A.F. modulator, auto-radio-vibrator testing, transmitter adjustments, etc. etc. The volume is very complete, and well illustrated.

CATHODE-RAY OSCILLOGRAPHY, by J. T. MacGregor-Morris, M.I.E.E., and J. A. Henley, M.Sc. (Eng.). 21s. net. Published by Chapman and Hall, 249 pages, demy octavo.

THIS is the second volume in the monographs on electrical engineering, and covers electron theory, electron beam concentration and electron optics, cold cathode oscillograph, the hot cathode oscillograph, auxiliary apparatus, operation, performance, and limitation of cathode-ray tubes, time sweeping and time bases, applications, etc. etc. The volume is very authoritative and well planned.

RADIO INTERFERENCE AND ITS SUPPRESSION. 9s. 6d. net. Demy octavo, 130 pages. Published by Chapman and Hall, Ltd.

THIS volume explains how interference arises, and deals with mains supplies systems, analysis of interference, and methods of curing it, direct radiated interference, locating interference, curing at the source, design of suppressing equipment, short-wave working, measurement of electrical interference, and future possibility.

TELEVISION RECEPTION, by Manfred Von Ardenne, translated by O. S. Puckle, A.M.I.E.E. 10s. 6d. net. Chapman and Hall, Ltd., 121 pages, demy octavo.

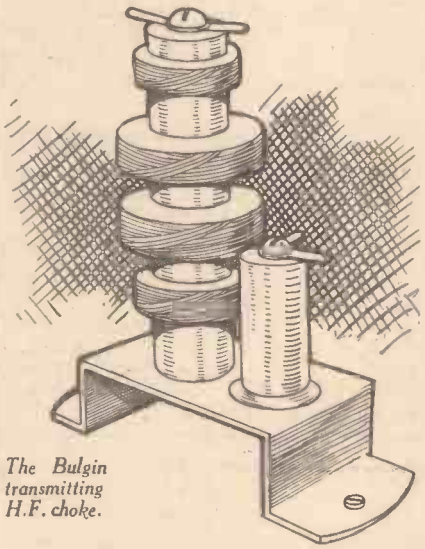
THIS book deals in detail with the principles of modern television, both from the transmitting and from the receiving angle. The latter forms the main portion of the material, and the various aspects of the cathode-ray tube and other equipment are fully dealt with. The book is translated from the German and thus much of the material has been treated from the angle of the German transmissions, but the translator has introduced here and there details applicable to the English equipment, and in the cathode-ray tube, for instance, he gives details and data of the Cossor tube in addition to the other details which are given. The book includes a theoretical circuit for a complete vision receiver, and the associated time bases and mains supplies, together with a sound-receiver, and a list of the components required for all these units is included. Photographic illustrations of the completed apparatus (of German construction) and also views of actual pictures on the screen of the cathode-ray tube, taken from the German transmissions, are included, and the book is invaluable to the amateur who wishes to enter the television field. Sufficient details are given to enable anyone to build the necessary equipment, and details of operation are included.

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Bulgin Transmitting Choke

ALTHOUGH designed primarily for transmitting circuits, the choke illustrated on this page may find application in certain types of television equipment. This is a special highly insulated choke, designed for working up to 10,000 volts about earth. The inductance is 4,000 microhenries, and the self-capacity only 1 $\mu\mu$F. In spite of the very high inductance the D.C. resistance has been kept down quite well and will be found to be only about 10 ohms.



The Bulgin transmitting H.F. choke.

The current-carrying capacity is given as .6 amps. A substantial metal bracket is provided for connecting purposes, and the connecting lugs are well insulated and so arranged that they will be clear of a metal base. The price is 6s. A second smaller model is also made, having an inductance rated at 1,000 μH and a self-capacity of .75 μF. The D.C. resistance of this model is 6 ohms, and the price 5s. 9d. It will carry up to 1 amp.

Goodmans' Junior Auditorium Speaker

THERE are many listeners who desire a good speaker but who obviously cannot supply one of the large auditorium types. In such a case a more or less standard speaker is employed. It is interesting to note, however, that Messrs. Goodmans Industries, Ltd., have produced two auditorium models this year, one fitted with a 12in. diaphragm and one with a 10in. diaphragm. The latter is illustrated on this page and is known as the Junior model. It has been designed to provide the highest degree of fidelity, and it will be noted from the illustration that special arrangements have been incorporated in order to improve the high-note response. The speaker is well made and will handle up to 6 watts peak. It may be used on small public-address equipments, and should be used preferably on a flat baffle not less than 3ft. square. A universal input transformer is fitted and the price is £3 10s., or £6 7s. with a 3ft. oak baffle. Where this large type of baffle cannot be conveniently accommodated a smaller one may be supplied, and the cost of the speaker and small baffle is £5 10s.

Full o' Power Batteries

MESSRS. SIEMENS now stock a complete range of H.T. batteries (with and without a combined grid-bias section) designed as replacements for all the standard portables, transportables, and kit sets. These include both Standard and "Cadet" batteries, and to assist the users of the type of receivers mentioned, a useful leaflet is issued showing all the makers, the various receivers which are made, and the appropriate batteries which may be used. In addition to these models, there are a few special replacement models designed for use in receivers which are of rather older design, and the list includes a number of standard batteries for wireless receivers and for torches, and electric lamps.

For use at home or in a public - address outfit this Goodmans' Junior Auditorium speaker will be found very efficient.

Epoch Super Dwarf

THIS neat little speaker is claimed to be the smallest permanent-magnet speaker yet made, and it is fitted with a special circular magnet of special alloy. The frame is made from pressed aluminium and a three-ratio input transformer is fitted to the casing. The overall diameter of the speaker is only 5in., and yet it will handle up to 2.5 watts without distress. On an input as low as $\frac{1}{4}$ watt it will give very good results, and when desired the makers can supply a neat cabinet for use with the speaker. It will be remembered that this speaker was specified for our Signet receiver described in previous issues. The price is one guinea, and the cabinet referred to, measuring 9$\frac{1}{2}$in. high by 5$\frac{1}{4}$in. deep and 10in. in length, costs 7s. 6d.

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.

Chu Nengi (Bangkok). The apparatus consisted of a photo-electric cell and was sold by Audiovisor, Ltd., of 28, Little Russell Street, London, W.C.1, and your letter has been forwarded to this firm.

W. A. (Sligo). H.T.1 and H.T.2 must not be joined together. The last paragraph on p. 151 explains this. When an S.G. valve is inserted the H.T. should be connected to H.T.1 and the screen current and voltage may then be read. A special neon may be obtained from Messrs. Bulgin, but the lamp referred to is a standard visual-tuning indicating lamp.

V. R. R. (Vallivedu). The parts may always be obtained direct from Messrs. Peto-Scott, but we cannot recommend alternatives.

J. B. (Salisbury). We cannot supply blueprints or wiring diagrams of commercial receivers and you should communicate direct with the G.E.C.

W. R. (Thorner). You should modify your aerial arrangements, preferably using a smaller aerial and paying more attention to the insulation.

F. G. T. (Abingdon). The arrangement is quite in order and to use a pentode in place of the power valve simply fit a five-pin valveholder in place of the holder for V.2 and connect the additional terminal to H.T.2. The remaining four pins are joined as in the present case. Any good modern valves may be employed.

C. H. (W.12). As you have no details of the circuit and the make is unknown you may be using it in the wrong manner, and it may not be suitable for use on high-voltage mains. The set may also be faulty as regards wiring. We have no simple two-valver of the type mentioned.

D. M. (Firdale Rd.). We cannot understand your remarks concerning the transformer. Can you explain more fully ?

Rev. H. R. (Newton Abbot). We have not designed a superhet of the type mentioned, and do not recommend the modification of the receiver referred to.

A. F. D. (Widnes). The rectifier should not be used in the manner outlined, but you may write to the makers if you have any suggestions for using it in any circuit other than the makers recommend. The resistances in question are for coupling and decoupling, R2 and R7 being the coupling or load resistances, and R3 and R6 being the decoupling resistances; C5 and C8 are the coupling condensers and C6 and C7 the decoupling condensers.

M. R. (Anfouchy). The device should not harm the receiver, but the consumption will not be lowered, as the resistance will still pass current. A volume control across the aerial circuit would be a better volume control.

D. E. W. (Ashton). There are several types of the tuner in question and we are therefore unable to recommend a circuit without knowing the type of tuner.

C. F. S. M. (Streatham). The pick-up should function satisfactorily (provided that it is not damaged) and we suggest that you make certain that the pick-up connections are intact inside the receiver. A local service agent of the company in question may be able to help you.

L. M. L. (W.14). The condensers are practically identical, and either may be used. The larger capacity will simply tune the receiver to a slightly higher wavelength. Any good make of standard valve may be used.

E. A. (Bingham). We cannot recommend a blueprint unless you use the parts specified by us. What do you include in your term " the usual run of standard components " ? Do you require a receiver using H.F. stages or not ?

G. W. P. (Worcester). A special licence is necessary to carry out the transmitting tests.

J. S. J. (Stenhousemuir). We cannot tell from your remarks which stage is faulty, but it would appear that the circuits are not correctly ganged.

T. B. (Birstall). We cannot identify the types of rectifier, but it would appear that these are dismantled from a commercial receiver, as they are not sold to the public in the form in which you have sketched them. Write to the Westinghouse Company, who may be able to give you some information.

D. B. (Newtown). A resistance in each anode circuit may be used, but the value should not exceed 100 ohms. This type of circuit would, however, be worse than your present arrangement, as you apparently need a more selective set. Why not try the £4 superhet 4 ?

A. J. S. (Bristol). You could use the battery, but it would quickly run out. The resistance would have to be chosen according to the valves you are using and you must find the total current and divide this into 1.5 volts to find the required resistance value.

A. O. (Scarborough). The Hivac DB240 valve costs 15s. 6d., and a standard 7-pin base is fitted. The L.T. required is 2 volts.

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.

International Short-wave Club (London)

THIS organisation has arranged a great Short-wave Listening Contest which will be open to all short-wave listeners. The contest opens on September 28th and closes on November 29th. Prizes will be presented to those who receive the greatest number of stations during this period. The first prize will be a trophy, and there will be many other awards, including special ones for short-wave beginners. So everyone will have a chance. Full details, together with entrance forms, can be obtained from Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

Newbury and District Short-wave Club

THE first meeting of this Club was held on Wednesday, August 26th, and although the attendance was small it was a very successful meeting. We hope to meet every fortnight, and we would welcome any new members from Newbury and district. Further particulars from A. Jotcham, The Parsonage, Compton, Berks.

Newark News Radio Club

EVERY year radio stations in different parts of the world have been dedicating over 500 special programmes to the Newark News Radio Club. The club was organised in Newark, New Jersey, on December 8th, 1927, and this season will see the start of the club's tenth season.

As such the club is the oldest and largest radio club in the world that is run by, and for, its membership. The address is 215 Market Street, Newark, New Jersey.

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).

Reports and QSL's

SIR,—Very many thanks for the interest you have shown in my various S.W. reports. I now have a new sloping aerial, 25ft. high at the east end, 15ft. high at the west end, and 65ft. long. It seems to have a special attraction for DX on 20 m. and below. Here are a few stations I have recently heard. Receiver O-V-2. 'Phones. On 20 m.: PY2EJ, VE1CR, VE1BR, W2MJ, W2HCE, W1IYI, HI7G, CX1OO, W1GBE, W2BTP, W1GED, W1DET, VP6YB, VP3BG, W2DH, VO1I, NY2AE, W2JOA, HB9A, HB9AE, W3EWW, W3GBP, HI5H, W3PC, W1CR, W1CHG, W1JFG, W1CCZ, W3BBB, W1ZE, W1CRW, W4FM, W2CJJ, W1GBE, JVH.

19 m. to 13 m.: W8XK (19 m.), W2XE (19 m.), W2XAD, each at R8. LRU, W2XGB (17 m.), W3XAL (16 m.), PLE (15.9 m.), PMA (15.5 m.), each at R8. W8XK (13 m.).

To each amateur I hear I send a report (not to many Europeans!) on a post card, *with* postage, and I'm being inundated with those precious pieces of wall-paper, W's. VE's VK's, etc. Here's a tip: Intending QSL collectors should go to a stamp dealer of repute and buy the stamps they require for return post-card postage from the country the transmitter is in—i.e., U.S.A. 3 cent, Canada 3 cent, Argentine 10 centav, Bolivia 17½ cent, Brazil 500 reis, Brit. Guiana 3 cent, Chile 120 centav, China 17½ cent, Colombia 8 cent, Costa Rica 15 cent, Cuba 3 cent, Dominca 5 cent, Ecuador 15 cent, Japan 7 sen, Kenya 15 cent, Mexico 15 cent, Paraguay 200 cent, Peru 10 cent, Uruguay 8 cent, Venezuela 25 cent, etc. Letters one-third more. Net saving varies from 25 per cent to 75 per cent. cost! The report *must* be complete and contain useful information, not "hooch"—"Heard you last night PSE QSL" sort of business.

May I congratulate you on the B.L.D.L.C. ?—a jolly good idea—my entry is going in shortly.—E. DE COTTIGNIES (Prittlewell, Essex).

SIR,—First of all, many thanks for so fine a radio journal as PRACTICAL AND AMATEUR WIRELESS. Of course, my chief interest lies in the short-wave side of it, and undoubtedly many of your readers must have gained some vital knowledge from its pages. With regard to the "Letters from Readers" page, I find it most enjoyable reading. In No. 205, Vol. 8, 1936, a Mr. W. T. Cooper (Walthamstow) explains to your readers about QSL cards; every word of his letter is right. I myself am an S.W.L., and have been for a great number of years, but I have only had about six of my reports not replied to. I used to log a station for a month or more and find out how he varied, but if he was always QSA5, R7, T9, he did not get a report. Now, every transmitter knows his signals are heard somewhere, and if he is in QSO, he gets his report from that station. So I think if your readers will again read Mr. Cooper's letter, they will find that a lot of expense can be saved, as QSL cards are *not* a 1d. per 100. Then, again, the amateur transmitters are not millionaires, and their time is taken up with the transmitter, so that reports are hardly any use to them, unless one truthfully logs them, say, for about a month or more, and explains "weather conditions every time," type of "set," "antenna," and where situated.

I'm sure these amateurs would reply more readily if the set in use was a home-constructed one, and not a commercial set. —G. W. MOWER (Hull).

A Suggested Receiver for Overseas Use

SIR,—I note that most of the designs for short-wave sets published in PRACTICAL AND AMATEUR WIRELESS are not quite suitable for use in this country. If you consider your readers in Africa perhaps you would publish a battery short-wave design for overseas use.

I would suggest the following specification:—

Straight battery set. H.T. 1500 from Milnes unit. 2v. Valves, 1 H.F. tuned, 1 Det., 1 L.F., 2 Pentodes in push-pull, and automatic grid bias. Plug-in Coils—13m.-85m. for 9 months of year, and 250m.-550m. for 3 months of year. A good moving-coil loudspeaker with variable matching device.

Sensitivity should be sufficient to separate Daventry and Zeesen on 25 m. All components to be of best quality and to be duplicated where necessary.—T. V. FIELDSEND (Broken Hill, Northern Rhodesia.)

S.W. Reception at Clacton

SIR,—The following notes on short-wave reception may interest other readers.

Havana COCQ

The first time I logged this DX was Saturday, August 1st at R6, about 6.45 a.m.-7 a.m. A great signal on 31.88 m. approx. and in the English language. They closed down with "Goodnight Melody," "Good night, everybody, and pleasant dreams" at 7 a.m.

New Czechoslovakians.

On 19.698 m., 25.51 m., and 49.04 m. this new signal was picked up from Radio Podebrady at R 7-8 on a recent Friday at 8 p.m. till the following day (Saturday) at 8 a.m. at frequent intervals. The wavelength was changed frequently. Address for QSL.—"Radio-Podebrady, Czechoslovakia."

Moscow Wavelengths.

Moscow is now transmitting on 31.5 m., 19.76 m., 20.5 m., 31 m. (only at midnight), and also the 25 m. usual channel. There still seems some difficulty as to the calls. One of your correspondents mentioned that Moscow is on 15,150 kc/s too. There is no mention of this in the list I received from Radio Centre, Moscow. I have heard this call too, but I find that it resembles more of a harmonic than an actual signal.—W. BEARD (Clacton-on-Sea).

56 Mc. Tests from Snowdon

SIR,—I wish to thank you for the excellent preliminary publicity which you so kindly gave, through your journal, to the above experiments, and which assisted in no small measure in their successful conclusion.

You will be interested to know that

G6YQP established two-way contact with EI8G, Dublin (95 miles), G2OIP, near Bury, Lancs (87 miles), G6IA on Snowfell, I.O.M. (85 miles), and G5BY, near Fishguard (83 miles), all of which constitute record distances for British amateur communication on this band.

In addition, reports on the reception of signals from EI8G and G6YQP have been received from Saffron Walden, Essex, the approximate distances being 300 and 200 miles respectively.

Again thanking you, and with an expressed wish for the continued success of PRACTICAL AND AMATEUR WIRELESS.—GEO. A. MASSEY (Prestatyn).

A Suggestion for B.L.D.L.C. Members

SIR,—In reference to my suggestion, which you kindly published in your journal dated August 22nd, I have not received six reports yet, so I suppose a lot of short-wave listeners never keep a log of stations, or is it because they do not keep a log of the data which was given in my list of data required? If this is the case, I will welcome reports from *all* short-wave listeners, even if they can only state the type of receiver, aerial, and signal strength of W8XK, but I would prefer the full list of data if possible. For those who have got the full data in their logs, here is the list again. All reports of W8XK (19.72 m., 15,210 kc/s), for the months of July or August, 1936, will be welcomed at my address; if possible, state type of Rx (receiver), aerial, QRK (signal strength) in the R1-9 code, QSB (fading), QRM (interference), the time in B.S.T. (24-hour system), the date, QRA (address); also, I would like all reports in by September 19th, 1936, if possible.—E. BARRS (4, King's Road, Enham, Andover, Hants).

CUT THIS OUT EACH WEEK

Do you know

—THAT the signals are applied to a control grid in the cathode-ray tube just the same as in a standard valve.
—THAT the efficiency of an H.F. choke may often be improved by inserting an iron core into the former.
—THAT in order to measure the audio output of a receiver an A.C. voltmeter must be employed.
—THAT an oscillator giving a constant output is essential for the accurate alignment of many tuned circuits.
—THAT an energised speaker field may be replaced by a high-resistance L.F. choke, or an ordinary choke in series with a resistance to make up the total resistance.
—THAT a dipole or other short-wave aerial may be coupled to a receiver by means of a single turn coil, or through very small condensers.

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.

Practical and Amateur Wireless

BLUEPRINT SERVICE

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 7½d., 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.

PRACTICAL WIRELESS

STRAIGHT SETS. Battery Operated.

	Date of Issue.	No. of Blueprint
One-valve : Blueprints, 1s. each.		
All-Wave Unipen (pentode)		PW31A
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (trans.))	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Power)	—	PW35
Summit Three (H.F Pen, D, Pen)	8.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow.)	—	PW41
Hall-Mark Cadet (D, LF Pen (R.C.))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (trans.))	*June* '35	PM2
Cameo Midget Three (D, 2 LF (trans.))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (R.C.))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	—	PW64
The Gladiator All-Wave Three	29.8.36	PW66
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF Cl. B)	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen; D, Push-Pull)	—	PW46

Mains Operated.

Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Power)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, D.D.T., Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF, Pen, D, Pen)	11.5.35	PW50
"All Wave" A.C. Three (D, 2LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (H.F. Pen, HF Pen, Westector, Pen)	31.8.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve)	—	PW40
F. J. Camm's 2-valve Superhet (two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (three-valve)	—	PW43
D.C. £5 Superhet (three-valve)	1.12.34	PW42
Universal £5 Superhet (three-valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

SHORT-WAVE SETS.

Two-valve : Blueprints, 1s. each.		
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Power)	—	PW30A
The Prefect 3 (D, 2 LF, RC and Trans.)	8.2.36	PW63

PORTABLES.

Three-valve : Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65
Four-valve : Blueprints, 1s. each.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE

CRYSTAL SETS.

Blueprints, 6d. each.		
Four-station Crystal Set	—	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (S.G., Det., Pen)	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (S.G. Trans)	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-Valver	*July* '36	WM409
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5. 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cossor 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
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple tune Three (SG, D, Pen)	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
P.T.P. Three (Pen, D, Pen)	*June* '35	WM389
Certainty Three (SG, D, Pen)	*Sept.* '35	WM393
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.* '35	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	*Feb.* '35	WM381
The H.K. Four	*Mar.* '35	WM384
The Auto-Straight Four	*April* '36	WM404
The Request All-Waver	*June* '36	WM407
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	*May* '33	WM320
New Class-B Five (2SG, D, LF, Class B)	*Nov.* '33	WM340
Class-B Quadradyne (2SG, D, LF, Class B)	*Dec.* '33	WM344
1935 Super Five (Battery Superhet)	—	WM379

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383
S.G. Three (SG, D, Pen) A.C.	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW439
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	*July* '33	WM329
Harris Jubilee Radiogram	*May* '35	WM386

SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	10.3.34	AW425
Heptode Super Three A.C.	*May* '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	*Apl.* '35	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Two HF. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)	*Aug.* '34	WM367

SHORT-WAVE SETS—Battery Operated.

One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.)	—	AW329
S.W. One-valve for America	—	AW429
Roma Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen)	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	*Jan.* 19, '35	AW463
The Carrier Short-waver	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (HF, Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valve Short-waver	*Mar.* '35	WM338
Superhet. : Blueprint, 1s. 6d.		
Simplified Short-wave Super	*Nov.* '35	WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Shortwaver (D, Pen) A.C./D.C.	*Aug.* '34	WM368
"W.M." Long-wave Converter	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	*Aug.* '35	WM391

MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6)	*June* '35	WM387
Listener's 5-watt A.C. Amplifier (1/6)	*Sept.* '35	WM392
Radio Unit (2v.) for WM392 (1s.)	*Nov.* '35	WM398
Harris Electrogram (battery amplifier)	*Dec.* '35	WM399
De-Luxe Concert A.C. Electrogram	*Mar.* '36	WM403
New style Short-wave Adapter (1s.)	*June* '35	WM388
Trickle Charger (6d.)	*Jan.* 5, '35	AW462
Short-wave Adapter	*Dec.* 1, '34	AW456
Superhet Converter	*Dec.* 1, '34	AW457
B.L.D.L.C. Short-Wave Converter (1s.)	*May* '36	WM405
Wilson Tone Master (1s.)	*June* '36	WM406
The W.M. A.C. Short-Wave Converter (1s.)	*July* '36	WM408

QUERIES and ENQUIRIES

Television Sound Reception

"I was unable to visit Olympia, but should like to know whether there is any 'all-wave' set now being manufactured which will pick up the television sound signals. Could you give me the name of the firm so that I could write for details?"—T. J. (Keswick).

SO far as we can trace at the moment, the only receivers tuning to the low-wavelength mentioned in addition to the normal broadcast wavelengths, is the H.M.V. range. We do not know whether you intend to try to pick up the Alexandra Park transmissions at your address, but we would remind you that the range of the transmissions, so far as is known at the moment, is only a matter of a few miles.

Wearite Universal Coils

"I have a pair of Wearite coils called the Unigen, and was thinking of using these in one of your sets. I believe you used a Universal Wearite coil in the Leader Three set, and I should like to know whether the coils I have got could be included in place of the Universals. Can you tell me the difference between the two types of coil and which is the more efficient?"—E. T. B. (Pakefield).

THE Unigen coils are a later development than the Universal coils and are an improved form of the latter. In addition to being more compact, the windings are modified, and in the Unigen coils the primary winding is tapped and may be switched in addition to the secondary winding, thus providing maximum results on both wavebands. If you wish to use these coils in a standard three-valve circuit we refer you to the Centaur Three published in our issue dated Dec. 7th last, and for which a blue print has been issued, number PW.64.

Making A S.W. Choke

"I am building a 1-valve S.W. set. Is it possible to make my own H.F. choke, using a glass tube? If so, how many turns should I use and what gauge of wire?"—A. E. (No address).

AN efficient H.F. choke of the type mentioned was used in the Simplest One Valver described in our issue dated Sept. 14th, 1935. The tube is a standard chemical test-tube having a diameter of ¾in., and 150 turns of No. 36 gauge enamelled wire should be wound on in five equal sections of 30 turns each. Wind each section as a rough pile and leave a gap of about ¼in. between each pile, and attach the ends of the winding to the tube by means of sealing wax or ordinary insulating tape.

The Invincible S.W.3

"I have built this receiver and should like to know the different wavebands, switching from left to right, and also is there any particular way to wire the centre-tapped resistor, R.3?"—A. D. C. (Milton).

THE switching, turning the switch in a clockwise direction, will cover the total waveband in the following order: When fully turned in an anti-clockwise direction the highest range will be covered, namely, up to 95 metres. When turned to the next stop the range from 24 to 50 metres approximately will be covered, and on the next stop the lowest range, from 12 to 25 metres, will be covered. When wiring the resistor, the ends should be joined so that the L.T. positive lead is joined to the terminal situated closest to the tap terminal. You can, if you so desire, experiment with this component connected either way round, and you will find that in one position reaction will be smoother and sensitivity greater.

RULES

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

(1) Supply circuit diagrams of complete multi-valve receivers.

(2) Suggest alterations or modifications of receivers described in our contemporaries.

(3) Suggest alterations or modifications to commercial receivers.

(4) Answer queries over the telephone.

(5) Grant interviews to querists.

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

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

The Query Coupon **MUST** be enclosed.

Safety Switch

"I should like to fit a switch to my receiver which would act as a lock and prevent the receiver from being used when I am away. I do not want this from any selfish motive, but to prevent the children from using it. Is there any real fool-proof arrangement which is cheap and yet will not damage the apparatus?"—R. Y. (Bordingley).

AN ordinary jack and plug may be used, with the contacts of the plug short-circuited. When inserted this will bridge the contacts and if these are wired in place of the ordinary on/off switch the filament circuit will be made. When the plug is removed the filament circuit will be opened and the set will then be out of action. Alternatively, a simple on/off switch may be modified by filing down the end of the plunger and adapting the contact springs so that the plunger may be removed entirely but when pushed in will make good contact with the spring arms.

A Quality Set

"I am anxious to build a high-quality receiver for the local programmes. What do you consider is the best type of quality set? I am not too perturbed about the H.T. supply, as I can obtain mains facilities, but I believe that the battery H.T. supply is quieter than mains, and I do not want a set which is noisy or which has any sound which will detract from a complete enjoyment of the musical items."—S. D. F. (Perth).

WE suggest that you build the Universal Hall-Mark Four. This employs a push-pull output stage and will give good volume, and distortion will be unnoticeable unless pushed too far. A triode output stage will not produce the same high degree of quality, and slight distortion will produce a more noticeable effect than when a push-pull stage is employed. In the receiver mentioned the high-frequency amplification should enable you to obtain quite good signals, and if built according to instructions no hum or other troubles should arise. A well-designed mains receiver should be as quiet as a battery receiver, but with the added advantage that crackles and other noises set up by a run-down battery will be non-existent.

Hum

"I have a commercial mains receiver in which the hum has always been a most important part. I have not attempted to cure this as I cannot tamper with the circuit, but as the set was of foreign (American) make I do not know whether any part is defective. Is there any way of finding out why it hums and how to cure it?"—W. R. (Bexhill).

THE receiver may be in use upon a mains supply greater than that for which it was intended, or there may be a device such as a hum-dinger with an external adjustable control and this may have become moved. Examine the rear of the chassis for such a device, probably identified in the form of a small slotted spindle viewed through a hole in the chassis, and adjust it with an insulated screwdriver. Check also that it is designed for your mains voltage. Alternatively, have it inspected by a good service engineer or radio dealer.

Universal Dial-light

"I have built your Universal receiver, but wish to fit a dial light. What is the best bulb to use, and how should I wire it into the circuit? I have several ordinary flash-lamp bulbs at home of different ratings and should like to use one of these if possible."—F. H. (Beckenham).

THE trouble with a simple type of dial-light of the type mentioned is that it is likely to blow very quickly, due to the surges which are met with in a Universal receiver when switching on. If you have a 6-volt type of bulb (preferably rated at .3 amps) this could be joined in the heater wiring circuit, but to avoid the surge difficulty a resistance should be joined in parallel with it. The ratio between bulb and resistance may have to be found by test, but generally speaking, the resistance should be of such a value that the current passes as to two-thirds through the lamp and one-third through the resistance. A simpler idea is to use a high-voltage mains lamp, rated at 10 watts, and connect this across the mains leads to the receiver, on the receiver side of the on/off switch. This gives a better light and will last much longer in use.

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

Miscellaneous Advertisements

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

RECEIVERS, COMPONENTS AND ACCESSORIES
Surplus, Clearance or Secondhand, etc.

BIRMINGHAM RADIOMART G5NI.—Everything a constructor requires, lowest prices, no junk; catalogue, 1½d., shows thousands bargains; during summer few only shown below.

RADIOMART. Huge purchase Cossor 1936. Superferrodyne receivers half price, £2/19/6. Stamp for full list.

RADIOMART. Telsen screened dual range coils, 2/6. Pair, 4/6. Milliammeters, 25ma. upwards, 5/9. Super, 6/9.

RADIOMART. American mains transformers, 230 v. fully shrouded, 350/350. 6.3v., 5v., 6/11. Majestic 250/250. 2.5v, 5v, 4/11.

RADIOMART. Heavy duty mains transformer worth 35/-. 350/350. 150 ma.; 4v.2.5ACT., 4v6ACT., 12/6.

RADIOMART, 465 kc/s., IF., transformers, 2/11. BTH. speaker transformers, 2/11. Telsen Ace, 1/11. RG4, Radiogrands, 2/9.

RADIOMART. Utility straight line wavelength dials, 3/11. Telsen H.F. chokes, 1/11.

RADIOMART. Utility 2-gang uniknob and dial, 3/11; 1,500-volt tubular condensers, 6d.; Helsby electrolytics, 8 mf. 500, 2/11; 4 x 4 mf., 1/11; 25 mf. 25 volt, 1/-; etc.

RADIOMART. Smoothing chokes, 20 hy. 120 m.a., 3/11; 100 m.a., 2/11; 40 m.a., 1/11.

RADIOMART. Pushback wire, 6 yds. 6d.; heavy, 9d.; 2 gross solder tags, 6d.; resin-cored solder, 9ft. 6d.

RADIOMART. Centralab pots, all sizes, 1/6; switched, 2/-; tubular glass fuses, 2d.

RADIOMART. Lissen 3-gang superhet kit coils, two I.F.s, ganged condenser, ditto bandpass, ditto 2-gang all-wave, 10/- kit.

RADIOMART. Traders' monster bargain parcels, value £4/10/-, for 10/-; also 5/- parcels.

RADIOMART. Famous Continental A.C. valves, 4/6; American Duotron, etc., all types, 3/6; battery from 2/3.

RADIOMART. Utility 8/6, microdisc dials, 3/11; Radiophone, 0.00016 short wave condensers, 3/6; series gap, twin, 3/9.

RADIOMART. Ceramic all brass microvariables, 15 mmfd., 1/4; 40 mmfd. 1/7; 100 mmfd., 1/10; short wave H.F.C., 9d.

RADIOMART. Order 5/- post free; get our bargain catalogues; General 1½d., Short wave 1½d.—44, Holloway Head, Birmingham. Tel: Mid. 3254.

SOUTHERN RADIO'S WIRELESS BARGAINS. ALL GOODS GUARANTEED AND SENT POST PAID.

SPEAKERS.—Celestion Soundex Permanent Magnet, 10/-; Telsen Permanent Magnet with ten-ratio transformer, 12/6; Blue Spot 99P.M. Extension Speaker, 20/-; 45P.M. Extension Speaker, 17/6; Telsen Loud Speaker Unit, 2/6; all new and boxed.

RECEIVERS.—G.E.C. A.C. D.C. Mains Three-valve sets. Complete with 3 Osram Valves, in exquisite Bakelite cabinet with Osram M.C. Speaker. Ready to plug in to any mains. Fully guaranteed. New, in sealed cartons, £3/5 (list £7/15).

G.E.C. Colpact 3-valve Battery Sets complete with 3 Osram valves, moving coil P.M. Speaker in attractive Bakelite cabinet, makers' 1936 series in original sealed carton, 50/- (list £5/10/0).

TELSEN A.C. D.C. MULTIMETERS (latest 1936 type).—5-range for every conceivable test for radio and domestic electrical appliances, 8/6 each.

COILS.—TELSEN (1936). Iron-cored Coils, Type W349, midget size, 4/-; type W478 (twin), 9/- pair; type W477 (triple), 16/-; type W476 (triple superhet selector and oscillator), 16/- set. All Ganged Coils are Mounted on Base with switch. I.F. Transformer Coils W482, 5/-; Telsen Dual Range Coil with variable series condenser W76, 4/-.

MICROPHONES.—Ace (P.O.) Microphones, complete with transformer, perfect with any type of receiver, 4/6.

TRU-OHM RESISTANCES.—1 Watt. Wire ends colour coded and marked; 36 assorted capacities on card. 6/-.

AMERICAN VALVES.—A full range of valves for all American sets at 7/- each. Brand new, guaranteed.

SOUTHERN RADIO BRANCHES.—271/275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2. All mail orders to 323, Euston Rd., N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren Street Tube). 'Phone: Museum 6324.

ALL goods previously advertised are standard lines, still available. Post card for list free.

VAUXHALL UTILITIES, 163a, Strand, W.C.2. Over Denny's the Booksellers. Temple Bar 9338.

PREMIER SUPPLY STORES

SHORT WAVES.

SHORT-WAVE COILS 4 to 6-pin types. 13-26, 22-47, 41-94, 78-170 metres, 1/9 each with circuit. Special set of 3 S.W. Coils, 14-150 metres, 4/-, with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/-.

COIL FORMERS, in finest plastic materials, 1¼in. low-loss ribbed, 4- or 6-pin, 1/- each.

CONDENSERS, super ceramic S.L.F. .00016, .0001, 2/9 each; double-spaced .000015, .000025, .00005, 3/- each. All brass with integral slow-motion .00015 tuning, 3/9; .00015 reaction, 2/9

SHORT-WAVE KIT for 1 valve receiver or adaptor, complete with chassis, 3 coils 14-150 metres, condensers, circuit, and all parts, 12/6. **VALVE GIVEN FREE.**

2-VALVE S.W. KIT, complete with valves, 19/6.

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Wego 450 v. working 1 mfd. 1/-, 2 mfd. 1/9, 4 mfd. 3/-; 700v. working 2 mfd. 2/-, 4 mfd. 3/6; 1,650 v. working 1 mfd. 3/6, 2 mfd. 5/6.

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'Phone Amherst 4723 (Private Branch Exchange). Callers, as usual, to 20-22, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2381), and 165 and 165a, Fleet St., E.C.4 (next to Anderton's Hotel). (Central 2833.)

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REVIEWED August 8th. New Theory, Experiments, Inventions, Book. Post free 1s. 1d.—D'Arcy Ford, 15, Gandy Street, Exeter.

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CRYSTAL SETS. Burne-Jones. Complete. Guaranteed, 5/6. Ditto, double circuit, 8/-. Large P.O. type, 10/-. Crystal detectors, complete parts, 1/-. Permanent detectors, 1/6.—Post Radio, 183, Caledonian Road, London, N.1.

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3d EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 9. No. 210.
September 26th, 1936.

AND PRACTICAL TELEVISION

Phenomenal Achievement!

F. J. Camm's "LIMIT" All-Wave 4

A.B.C. OF YOUR RECEIVER—*See page 52*

Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. IX. No. 210. September 26th, 1936.

ROUND *the* WORLD *of* WIRELESS

I'll be Seeing You

A NORWICH radio firm is busy planning a scheme which it is hoped will enable local residents to receive television broadcasts in their homes next winter.

Germany's Best

IT is stated that one of the finest radio-gram receivers in Germany is the Siemens Chambermusic II, a seven-valve straight-circuit receiver which, complete with valves, costs 1,500 marks. It has five loudspeakers, and the pick-up, which is a super-lightweight, employs a permanent needle.

New North-East Broadcasting Station

THE new B.B.C. wireless station which is being erected at Stagshaw, Northumberland, is rapidly nearing completion. The steel tower, which will be 500ft. high, will be fitted with a light at the top to warn aviators. It is the highest mast of its kind in the world.

Silence is Golden

THE B.B.C. recently received a letter from an Empire listener who wrote: "When my mother-in-law listens to Big Ben she is silent for ten minutes." No doubt this listener would like Big Ben to strike every ten minutes!

From a Balloon

A COMMENTARY, broadcast from a balloon in flight, was picked up and re-broadcast all over America. It was also heard by many short-wave listeners in all parts of this country. Obviously the balloon did not run short of "gas."

To the Rescue

AMATEUR transmitters came to the rescue during recent Pittsburg floods. Five-metre transmitters were hooked up, and maintained excellent telephonic service between isolated towns.

On the Sea . . .

THE *Queen Mary* is equipped with the most powerful radio telephone equipment afloat. Her call-sign, GBTT, goes round the world.

. . . Air . . .

ALTHOUGH the Zeppelin *Hindenburg* does not cross Great Britain, its transmissions can be received at great strength. It transmits on many wavelengths, according to location.

. . . and Land

A SPECIALLY-BUILT short-wave station at Zeesen (DJD, 19.74 metres) told the world the results of the recent Olympic Games. Many of the events were also televised.

The Bound Volume of "Practical and Amateur Wireless" is uniform with the first volume here shown.

A New Organisation

A WELSH organisation of radio dealers, with its own national council and with branches in all the big centres of South Wales and Monmouthshire, will probably come into existence within the next few months.

Dr. Short Wave

THE Radio Society of Great Britain has been investigating on the efficiency of etheric waves to kill bacteria in food, and their recent experiments show that microbes in milk could be easily annihilated on subjecting a bottle of liquid to short-wave transmissions.

"Stairs to Heaven"

STUDENTS of Scripture know that Jacob dreamt of a ladder stretching from earth to Heaven, and the name of the place where he lay he called "Bethel." This place, now known as "Ramallah," was the site chosen for the new station at Jerusalem. When the natives saw the steel tower of the mast towering into the sky, in wonderment they called it "Stairs to Heaven." Undoubtedly it is an apt appellation.

China Linked to Japan

FOR the time being, Shanghai will be the only place in China connected with the recent inauguration of a radio telephone service between China and Japan.

Listening in France

EVERY month the increase in radio owners in France is estimated at one hundred thousand. The growth of broadcasting is sufficiently reflected in this country undertaking the erections of the *Radio National* transmitter, replacing the *Radio-Paris*, as well as the *Bordeaux-Coutenac* station.

A Robot Stratosphere Explorer

A FINNISH aeronautical expert has constructed a robot stratosphere explorer, which can provide vital meteorological data. The invention consists of a small balloon carrying special instruments and a short-wave transmitter.

Each instrument is so constructed that variations in its readings operate a small variable radio condenser. The scientist calibrates the instrument and its influence on the wavelength before the balloon leaves the ground, so that he might know, for example, that if the transmitter operates on 20 metres the wind velocity is 10 m.p.h., and so on.

Binding Cases and Indexes

BINDING cases and indexes for volume 8 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.

THE PICK of the PROGRAMMES

Chamber Music

ON September 24th, in the National programme, the London String Trio will play a Trio by Jean Francaix, and the Handel-Halvorsen Passacaglia for Violin and Violoncello. A first broadcast performance of Ernest Bloch's Sonata for pianoforte will be given by Charles Lynch on September 25th in the Regional programme. On September 26th, David Wise and John Pauer will play the Strauss violin and pianoforte Sonata in E flat.

Ollerton Colliery Band

THIS well-known Nottinghamshire band will broadcast in the Midland Regional programme on September 29th.

Midland Variety Programme

DAVID GRETTON, who is in charge of outside broadcasts in the Midland region, will compère a variety bill from one of the theatres in the area—probably the Theatre Royal, Worcester—on September 30th. Variety Theatre broadcasts are to be a regular programme feature between now and the end of December.

Recital by Henry Holst

THE famous violinist, Henry Holst, is to broadcast a recital from the Northern Regional on September 29th. His programme will include works by Kreisler, Paganini, and Mozart.

Variety from Liverpool

ON September 30th, excerpts from the variety bill will be broadcast to Northern listeners from the Pavilion Theatre, Liverpool. The bill from which the acts will be chosen includes Nellie Wallace (comedienne); Freddie Dosh (mimic); Harrison Viney (accordionist); Cliff Martell (pianist); Lewis, Payne and Wilcox (comedy act); and the Eight Academy Girls (singing and dancing).

Northern Trio

ALTHOUGH its members are all well known to Northern listeners, the Northern Trio as such will broadcast for the first time on September 30th. The players are Reginald Stead (violin); Leonard Baker ('cello), and Maurice Arnold (piano). Their programme will include Mendelssohn's Trio in D minor, and John Ireland's Phantasie Trio.

Winners of B.M.G. Contest

THE Banjo, Mandoline and Guitar Club Band Contest is being held this year at Blackpool on September 27th, and on October 2nd the winning band is to broadcast from Manchester.

Organ Recital from Torquay

REGINALD PORTER-BROWN, whose organ recitals are a well-known alternate Monday morning feature of the Regional programme, will broadcast from the organ of the Regal Cinema, Torquay, for Western listeners on September 30th.

MAKE THESE DATES WITH YOUR RADIO

THE KING OF SIAM AND HIS SPECIAL H.M.V. RADIOGRAM.

The King of Siam, who is an enthusiastic radio listener, visited the "H.M.V." stand at Radiolympia, and bought a model 485a in a cabinet consisting of mirrors.

"Big Business"

THE many followers of that amusing "Stock Exchange" pair, Bobbie Comber and Claude Hulbert, are to continue their series of "Big Business" broadcasts during the autumn. The book of this excellent buffoonery is by H. E. Kavanagh.

SOLVE THIS!

PROBLEM No. 210.

Robinson wishes to fit automatic bias for the output valve of his battery-operated three-valve set. The current consumption of the valves is 2 m.a., 3 m.a., and 7½ m.a. respectively and the H.T. battery voltage is 120. Where should the bias resistance be connected and what value is required? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2. Envelopes must be marked Problem No. 210 in the bottom left-hand corner, and must be posted to reach this office not later than the first post Monday, September 28th, 1936.

Solution to Problem No. 209.

As the current required by the new valves is higher than that required by the old ones, the value of the heater dropping resistance must be lowered. With a mains supply of 240 volts, a resistance of 670 ohms will be required.

The following three readers successfully solved Problem No. 208, and books have accordingly been forwarded to them: R. Thomas, 24b, St. Charles' Square, North Kensington, W.10; H. Jackson, 22, Hesketh Ave., Didsbury; D. Collins, 47, Kings Road, Newbury, Berks.

The first of their new series will be broadcast in the week beginning October 11th.

Emilio Colombo and His Orchestra

THIS popular orchestra will broadcast from The Grand Hotel, Bristol, on October 3rd.

An Eric Coates Programme

THE B.B.C. Welsh Orchestra, conducted by Mansel Thomas, will give an Eric Coates programme on on September 29th.

Roy Fox and His Band

NORTHERN Ireland listeners will doubtless welcome a broadcast from the Grand Opera House, Belfast, by Roy Fox and His Band on October 1st.

B.B.C. Symphony Orchestra

A CONCERT will be broadcast from the Victoria Hall, Hanley, on October 14th, when Dr. Boult and the B.B.C. Symphony Orchestra visit the town of Hanley for the first time. The programme for this concert will include the "Flying Dutchman" Overture; Schubert's 5th Symphony in B flat; three numbers from Berlioz' "La Damnation de Faust"; Elgar's "Enigma Variations" and Sibelius' Tone Poem "Die Okeaniden."

Orchestral Music

ON September 24th, in the Regional programme, the London Mozart Orchestra, conducted by Clifton Helliwell, will play, among other items, two Interludes from Elgar's "Falstaff" and "Karadec," an orchestral suite by d'Indy, while Kathleen Long will play Mozart's Concerto No. 15 in B flat for piano and orchestra. On September 25th (National), Fritz Hart will conduct Schumann's Symphony No. 2 in C, and a Fantasy by himself entitled "Cold Blows the Wind." Heddle Nash will sing two arias from "The Barber of Seville" and Gounod's "Romeo and Juliet" on September 26th (National), and Clarence Raybould will conduct ballet music from Mackenzie's "Columba" and the Suite Pastorale by Chabrier.

Promenade Concerts

A FEATURE of the concert of Russian music on September 24th will be the second appearance at the "Proms" of Nicholas Medtner, the Russian composer-pianist, who will play his Second Piano Concerto in C minor. On September 25th (Regional) Beethoven's Fourth Symphony will be broadcast, and on September 26th (Regional) Clifford Curzon will be the soloist in Rachmaninov's Piano Concerto No. 2 in C minor, while Miriam Licette will sing "Depuis le Jour" from Charpentier's "Louise."

THE SEPTIMETRE

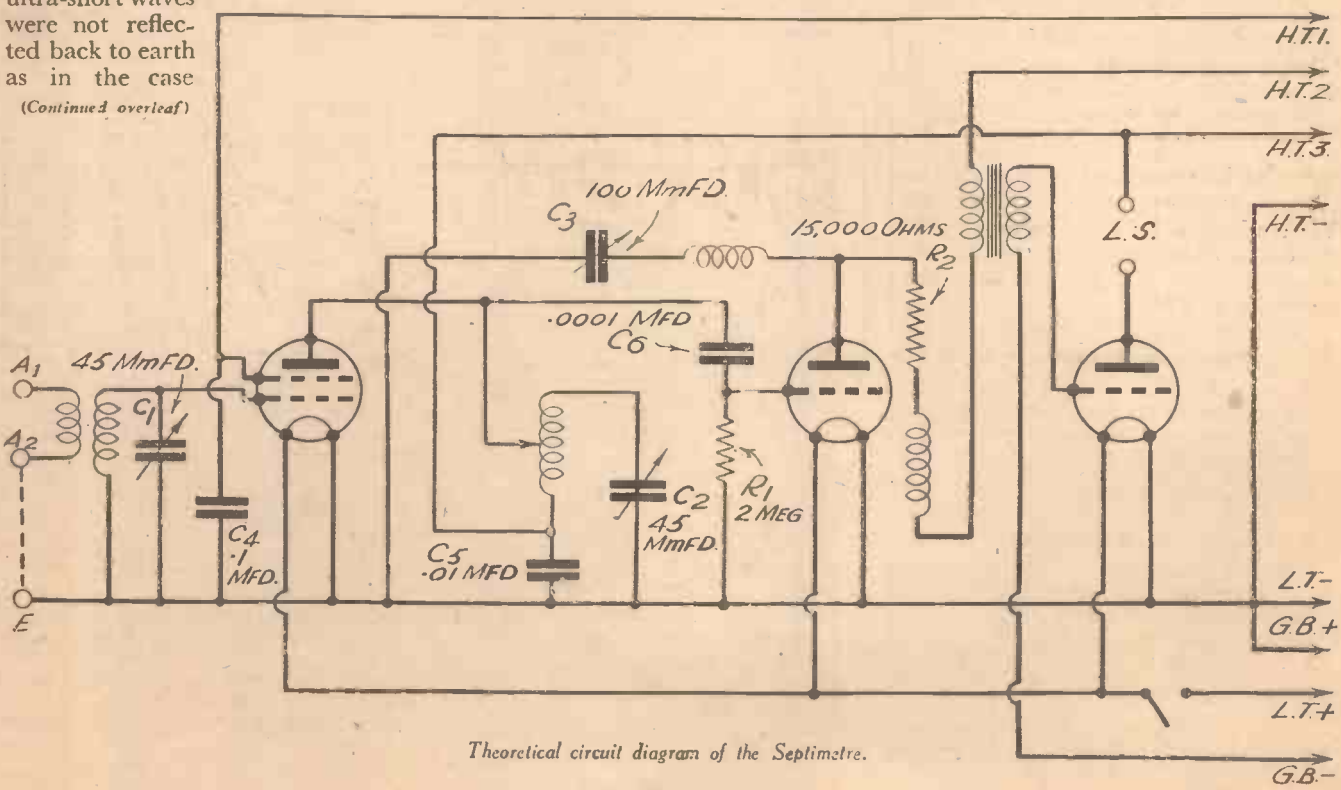
Preliminary Details of a Simple and Efficient Ultra-short-wave Receiver for Reception of the Television Sound Transmission and Amateur Stations

THE average constructor cannot afford to build a complete television receiver, but there is no reason why he should not enjoy the sound programme which will accompany the vision transmission from Alexandra Palace. The wavelength used for this transmission will be 7.23 metres, and therefore coils and tuning condensers have been chosen for the Septimetre to enable the listener to tune between 6 and 8 metres. Two more sets of coils are available, however, for covering the 4 to 6 and 8 to 10 metre bands. The receiver can therefore be adapted to tune between 4 and 10 metres without a break. This is actually a very wide wavelength coverage, and many stations can be tuned in besides the television transmission.

Until a short time ago it was claimed that stations using wavelengths lower than 9 metres could only have an optical range. It was said that the ultra-short waves were not reflected back to earth as in the case

(Continued overleaf)

Three-quarter rear view of the Septimetre, showing disposition of valves and coils.



Theoretical circuit diagram of the Septimetre.

(Continued from previous page)

of the normal short waves. This theory, like many more radio theories of the past, seems to be a fallacy, however. The ranges obtained by amateur transmitters on the ultra-shorts are gradually increasing, and reception of American transmissions has been claimed by many amateurs in this country. Several British amateurs transmit on these wavelengths at regular intervals—details of the times of transmission may be obtained from the Radio Society of Gt. Britain, 53, Victoria Street, London, S.W.1. The main joy of ultra-short-wave listening is not in picking up stations which are known to be on the air, however, but in receiving previously unheard distant stations—one never knows what to expect on these high frequencies.

The Circuit

In the past the super-regenerative circuit arrangement has been very popular for reception below 10 metres. Most super-regenerative receivers have a high noise level, however, and therefore after careful experiment we decided to use the straight reacting-detector circuit arrangement. It is possible to obtain good results from this type of set without using an H.F. amplifying valve, but it was found that an H.F. valve can be used to very good purpose. It stabilises the reaction control and eliminates blind tuning spots. After deciding to incorporate an H.F. stage it was thought best to obtain optimum results from it, and therefore a tuned aerial circuit was employed. This enables the constructor to use a dipole aerial instead of the ordinary single-wire type.

Using Dipole Aerial

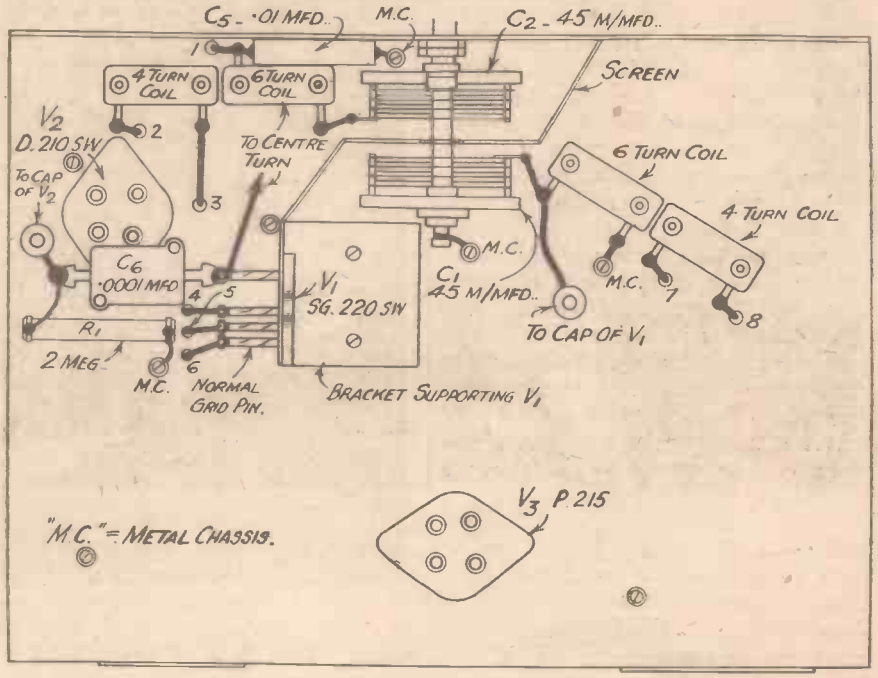
A study of the diagram will indicate that two aerial sockets are provided—A1 and A2. When a dipole aerial is employed the dotted line shown between A2 and E should be ignored and the two ends of the dipole connected to A1 and A2 respectively with the earth connected to E. Listeners who do not wish to use a dipole, however, can obtain satisfactory reception from a short length of heavy gauge aerial wire. This should be connected to A1, and A2 should be joined to E as indicated in dotted lines. If a long aerial is used it will be necessary to connect a very low capacity condenser between the aerial lead and socket A1. It should be carefully noted that the valves used in V1 and V2 positions are of the special short-wave type having low-loss bases. These have their grids connected to the top cap, and therefore care should be taken when wiring the receiver from the theoretical diagram. The screening grid of the S.G. valve is joined to the normal control grid pin, and the anode to the normal screening grid

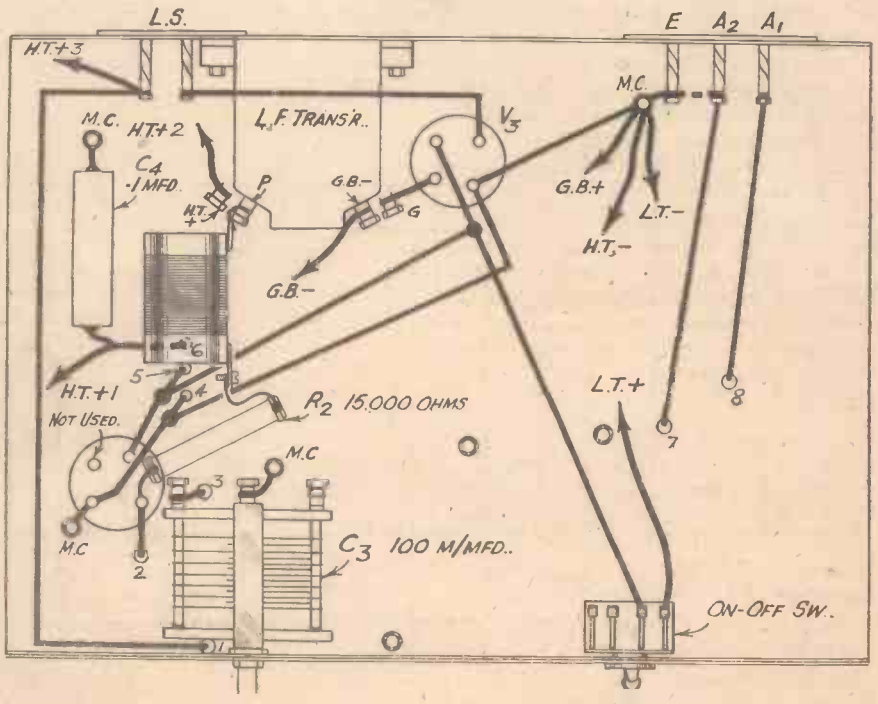
(Continued on facing page)

LIST OF COMPONENTS FOR THE SEPTIMETRE.

Two 6-turn, two 4-turn coils, No. 1,050 (Eddystone).
Four bases, No. 1,051 (Eddystone).
Two-gang condenser, No. 2,149, slow motion (C1, C2) (J.B.).
Midget U.S.W. condenser .0001 (C3) (J.B.).
Three fixed condensers: .1 (C4), .01 (C5) tubular, .0001 (C6), type M (T.C.C.).
Two fixed resistances: 2 meg. (R1), 15,000 (R2) (Erie).
One S.W. choke, 5-100 m. (Raymart).
One L.F. transformer, Niclet 3½:1 (Varley).
Two terminal strips, A¹, A², B: L.S. (Clix).
Three valveholders, 4-pin, S.W. type (Raymart).
Three valves: SG220 S.W., D210 S.W., P215 (Hivac).
Six plugs: H.T.1, H.T.2, H.T.3, G.B.+, G.B.—, H.T.— (B. Lee).
Two spades: L.T.+, L.T.— (B. Lee).
On-off switch (B.T.S.).
Metal chassis and panel, 10 in. by 7½ in. by 2½ in. (P. Scott).
Speaker, type 37J (W.B.).
120-volt H.T. battery (Drydex).
9-volt G.B. battery (Drydex).
2-volt accumulator (Exide).

WIRING DIAGRAMS OF THE SEPTIMETRE





(Continued from opposite page)

pin. The detector has its anode connected to the anode pin, the normal control grid pin being left disconnected.

Rear view of the Septimetre with valves removed.

The Detector

It is usual to employ an H.F. choke in the anode circuit of the H.F. valve, with a condenser coupling the anode to the detector tuned circuit. It was found that better results could be obtained by using tuned anode coupling in this set, however. A large non-inductive condenser is used as a bypass between the earth end of the tuned winding and earth, and the S.G. valve anode is clipped to the centre turn of the winding. The anode can be connected to the grid end of the winding, of course, but it is advisable to use the above-mentioned tapping. Reaction is obtained by means of a normal type of reaction condenser having a low capacity, the moving vanes of this being connected to the metal chassis.

The L.F. Amplifier

It will be noted that a short-wave choke and a resistance are connected in the detector anode circuit. These present a barrier to the H.F. component at the anode of the valve, thereby preventing H.F. currents from passing to the output stage and ensuring sufficient feed-back to the reaction winding. An L.F. transformer is used to couple the detector valve to the output valve in order that good volume may be obtained. A triode has been used in the last stage in preference to a pentode, as it is generally found to provide a quieter background than a pentode. It is customary to connect a .005 or .01 mfd. condenser between the anode of the output valve and the metal chassis in short-wave receivers. This condenser was not found necessary in the Septimetre, but it may be added if it is desired to mellow the tone.

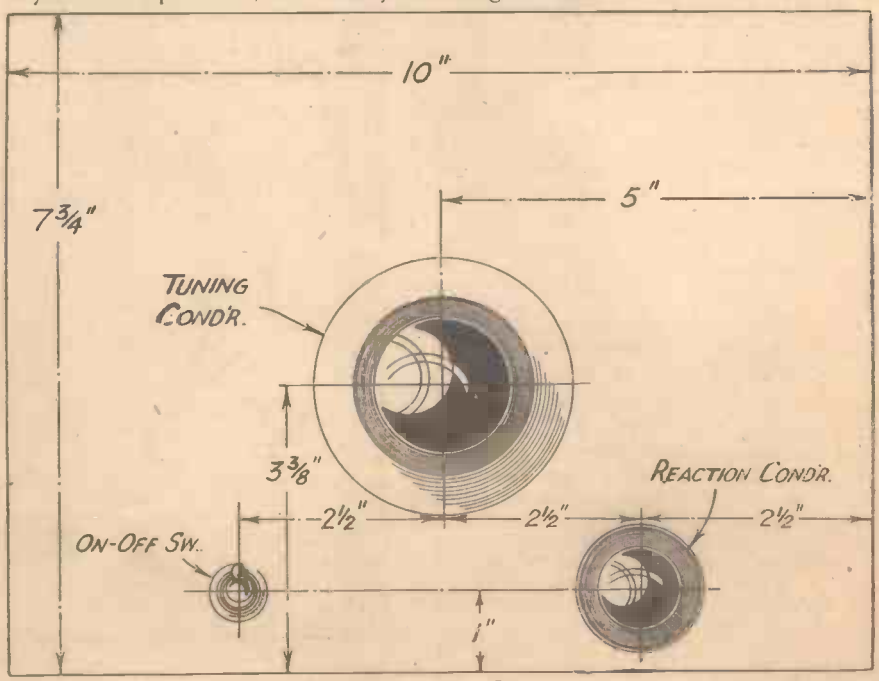
Output Valve

The specified output valve is of the normal small-power type—a special short-wave type is not necessary in this position. The P215 can be relied upon to provide sufficient undistorted output for the average-sized room. Constructors who wish to obtain greater output, however, can use the PX230 super-power type of valve by the same makers. This valve will, of course, require a higher bias voltage than the specified type—a negative bias of 12 volts will be needed when the H.T. voltage is 120. In order to obtain best results it is essential that the speaker be matched to the output valve. The specified speaker has been carefully chosen and constructors are strongly advised to use this or the larger model, the W.B.37S.

Construction

Most readers will be able to wire the receiver without difficulty with the aid of the wiring and theoretical diagrams given in this issue. It is emphasised, however, that it is very important to adhere to the designer's layout, and all leads, especially those to the first two valves and coils, must be kept as short as possible. It is also pointed out that the screen between the two tuned circuits was removed when the photographs were taken in order to show the disposition of the coils more clearly; this screen is supplied with the metal chassis.

Full constructional and operating details of this interesting receiver will be given next week.



Panel layout of the Septimetre.

Four Years of

CAVALCADE OF HOME-CONSTRUCTED RECEIVERS

The set in the top left-hand corner is the "Selectone Three," described in January, 1933. On the right is the famous "Fury Four" (1933), whilst above is the equally popular "Fury Four-Super," (1934).

On the right is a home constructor receiver which set a new standard in low-price with efficiency receivers. It is the "Leader Three," battery model—described in February, 1934.

IT is just four years ago that the first issue of PRACTICAL WIRELESS was published. That issue marked a new era in home construction. It undoubtedly did a considerable amount towards making amateur construction of receivers more popular, but it went much further than that. With the new journal appealing to the practical man came new ideas, simplified systems and improved design. Previously it had been customary to build home-made sets on wooden baseboards—pastry-boards, as the Americans called them—and PRACTICAL WIRELESS immediately proved that this was, as a general rule, far from sound. For one thing, it meant that many of the important connecting leads were longer than they should be, and consequently that efficiency was being sacrificed unnecessarily. Additionally, however, the baseboard-constructed set was cumbersome and had a particularly amateurish appearance.

Chassis-form Construction

Manufacturers had already realised the disadvantages of the old forms of construction, and had adopted metal chassis. Many of those who had been designing receivers for home construction led amateurs to believe that the use of a chassis brought attendant difficulties; PRACTICAL WIRELESS proved otherwise, and introduced to the masses of keen amateurs the plywood chassis. That this was a real improvement is proved by the fact that a year or more later the idea was copied by others!

Looking through the early issues of PRACTICAL WIRELESS, even to-day, one is struck by the fact that many of the receivers described—four years ago, remember—are still far from obsolete. Within the first six months of publication the range of receivers described included: S.G.-Det.-Pen. sets ("Long-Range Express Three," battery and mains versions): S.G.-Det.-2 L.F. ("Sonotone"); Det.-2 L.F. with tone control and selectivity control ("Selectone Three"); 2 S.G.-Det.-Pen. (the famous "Fury Four," battery and mains versions); Det.-Pen. mains radiogram ("Selectone A.C. Two"), and a six-valve superheterodyne ("Supersonic Six"). These were in addition to various short-wave receivers, short-wave converters and the first Class B unit to be described in a home-constructor journal. A rare achievement!

Class B and Q.P.P.

During those first important months the Class B valve and quiescent push-pull were developed, and these provided the first opportunity which the constructor of a battery-operated receiver had of producing at reasonable cost a set which would give an output of over one watt combined with excellent quality. For a time there was a keen struggle between the exponents of Class B and of Q.P.P., eventually to be won by the former. From that time onward the battery-set user was able to obtain reception quite comparable with that of a mains-fed receiver.

Readers of this journal pioneered the new methods of low-frequency amplification and it was almost a year later that there was any number of commercial receivers employing Class B. Almost at the same time as the low-frequency side was receiving so much attention, developments were taking place at the other "end" of the set. Variable-mu valves were introduced, and these permitted the design of a receiver which was not only more stable than before, but in which was incorporated a simple

Home Construction

This is the first efficient and easily-built three-valve superhet offered to constructors. It is the "£5 Superhet," and was described in November, 1934. A.C. and Universal mains models were also described.

A Brief Review of Some of the Important Changes Which Have Taken Place Since "Practical Wireless" Took its First Bow

and distortionless form of volume control. One of these valves was used in the "Long-Range Express," and later sets also made extensive use of them.

The H.F. Pentode

The next surprise arrived when the high-frequency pentode was introduced. This valve, of course, is now used universally and has completely ousted the screen-grid valve which preceded it. The H.F. pentode is similar to the old S.G., but has an additional grid situated between the screening grid and the anode, and connected to the filament or cathode. As a result of this addition the valve gives considerably greater amplification without the attendant disadvantage of instability.

Tone Control

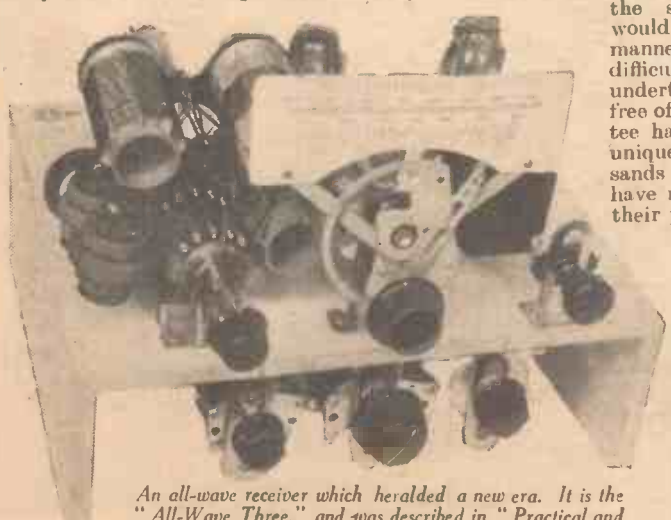
Another innovation about the same time was the use of tone control. It had been for long appreciated that it was impossible to combine a receiver and a loud-speaker which would give reproduction which would meet the requirements of all listeners, and various special transformers were designed by means of which the tone could be made of lower or higher pitch simply by rotating a knob. Basically, these special transformers were of normal type, but combined with the primary winding was a small L.F. choke. This was connected to the anode terminal of the transformer, whilst the other end was joined to one end of a potentiometer. From the other end of the potentiometer a lead was taken to one side of a fixed condenser, of which the other was connected to the anode terminal. The slider of the potentiometer was joined to the other end of the transformer primary winding, so that by moving the slider either the choke or condenser could be made to exert a greater influence on the circuit. When the slider was turned towards the end attached to the choke the pitch was raised, whilst movement in the opposite direction caused the lower frequencies to be emphasised. Thus, a setting could always be found at which reproduction was of the required tone. This formed the basis of variety of tone-control arrangements which have since been developed very considerably.

Iron-Core Tuning Coils

The next move was in the direction of improved tuning coils, which became extremely important due to the greater number of high-power stations in operation, and hence the need for greater selectivity. Special iron cores were used for the coils, the cores being of patented design, so that the usual "iron losses" were not introduced. As a result of using these iron cores it was possible to obtain the required inductance with fewer turns of wire. We published constructional details of several receivers using the new coils, which were destined to become extremely popular. Here again, the constructor led, and set manufacturers followed.

Guaranteed Designs

Within the first six months of publication PRACTICAL WIRELESS had become fully established, and its set designs were regarded as being the "last word." One reason for this was the guarantee that every set made to a published design, and using the specified components, would behave in the same manner as the original; if difficulty was experienced we undertook to service the set free of charge. That guarantee has always, and is still, unique. It has helped thousands of constructors, who have not been unstinting in their praise of our efforts.



An all-wave receiver which heralded a new era. It is the "All-Wave Three," and was described in "Practical and Amateur Wireless" during August, 1935.

Metallised Chassis

As mentioned above, PRACTICAL WIRELESS pioneered chassis-form construction, so it was only logical that it should be first in the field to use metallised wooden chassis. Methods had been evolved for spraying finely-divided aluminium on to, and into wood, this coating providing a good conducting path and acting as an effective screen. The result of using the metallised chassis was that every advantage of the all-metal chassis could be combined with the ease of working of a wooden one. So satisfactory has the sprayed chassis become that it is undoubtedly here to stay.

Automatic Volume Control

Automatic volume control was one of the next developments, which was inevitable if consistent reception of distant stations was to be enjoyed. Fading had been one of the main difficulties which had confronted the designer of long-range sets, and it was found that, by employing the special feature of variable-mu valves, it could be overcome. The idea is that a portion of the signal voltage applied to the detector (or second detector in a superhet) is passed back to the V.M. valve in the form of grid-bias. It is known that the rectified voltage at the detector is proportional to the strength of the signal applied to it; thus, as the signal strength increases the voltage becomes greater. Thus, as the signal increases in strength a greater bias is applied to the variable-mu valve, reducing its sensitivity and the amount of amplification which it can provide. On the other hand, when the signal is comparatively weak—when fading takes place—the bias voltage is smaller and the V.M. valve is enabled to operate at greater efficiency and give more amplification. The final result of this action is that variations in signal strength are "levelled out."

Superhets

One of the first highly sensitive and powerful receivers to employ A.V.C. was the "Luxus Superhet," described in these pages. Thereafter a number of receivers with this feature have been described, and A.V.C. has been almost universally adopted by manufacturers of superheterodynes. Writing of superhets, one is reminded that many readers at one time asked why we had devoted so little attention to this form of circuit. As a matter of fact, our research department had been working on the subject for a long time, but it was not until we were able to produce a design which was entirely foolproof and sensitive, and which would give quality of reproduction as good as that of the "straight" circuit, that we published more than a few designs. The

(Continued on p. 57)

A PAGE OF PRACTICAL HINTS

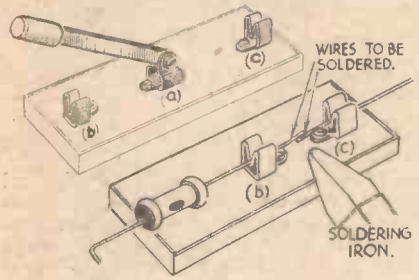
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Useful Soldering Accessory

FOR doing small soldering jobs such as lengthening the wires attached to resistors, some types of fixed condensers, etc., the conversion of a single-pole double-throw switch, as shown in the accompanying sketch, will make a useful soldering accessory.



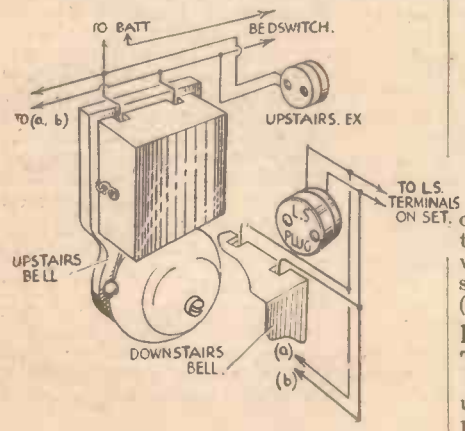
An improvised holder for simple soldering jobs.

The switch arm (*a*) should be removed, and the clip (*b*) inserted in its place. The wires to be soldered can then be held in position by the clips (*b*) and (*c*).

If the clips should not be strong enough to hold the wires tightly when the iron is applied, this difficulty can be overcome by placing a small block of wood of sufficient height between the clips for the wires to rest upon.—S. A. BUNN (Langho).

An Emergency Call Arrangement

IN a previous issue a reader described a dodge by which an emergency call from a sick room upstairs would not be overlooked if a light took the place of the downstairs bell when the set was working. With my dodge it is not even necessary to look for a light or listen for a bell when the set is working. I have two bells in parallel, one in my bedroom for night use, and one downstairs for day use. The connection from upstairs to downstairs is made through the loudspeaker extension upstairs, and the extension wires are permanently in parallel with the loudspeaker terminals on the set. The interference, when the bells are rung, is easily heard anywhere in the house. If no extension wires run from the set, the downstairs bell can be wired in parallel with the loudspeaker terminals on the set. The accompanying sketch shows the connections for this arrangement.—GEO. WINTERBOTTOM (Keighley).



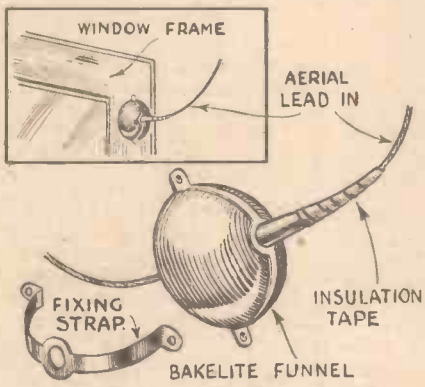
A method of using two electric bells for emergency calls.

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.

An Insulated Lead-in

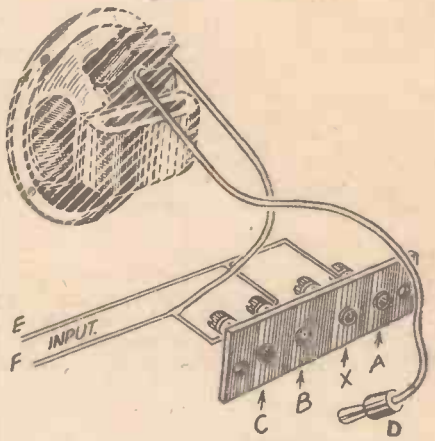
THE accompanying sketch shows an ideal method of insulating a lead-in. The lead-in wire is passed through a bakelite funnel—which may be obtained from a well-known stores for 6d.—which is attached to the window frame by means of a strip of aluminium, and two screws. Insulation tape is bound round the point of the funnel where the lead-in enters so as to make same quite water-tight.—A. G. ACKROYD (Ilford).



A novel insulated lead-in arrangement.

Plugging in Speaker or 'Phones

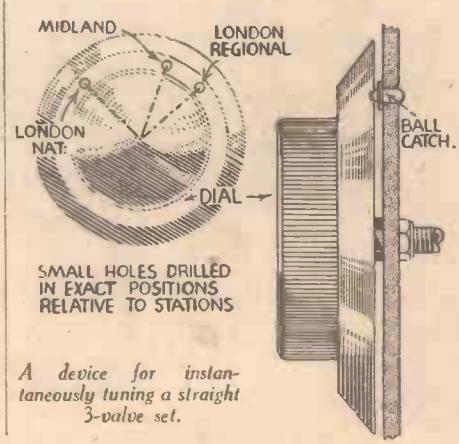
THE simple dodge illustrated in the accompanying sketch should prove useful to those listeners whose sets are powerful enough for loudspeaker reception of high-power transmissions, but need headphones for low-power stations. Four sockets are fitted to a terminal strip fixed to the back of the chassis, and connected as indicated. One of the leads from the speaker terminates in a banana plug which is inserted in socket A when the speaker is in use. When using headphones plug them into sockets B and C, and insert plug D into socket X to prevent the speaker lead hanging loose.—G. CAIREY (Portobello).



A simple arrangement for plugging in speaker or 'phones.

Device for Instantaneous Tuning

THE following method was adopted with success in making a simple positive tuning control on a straight 3-valve set used by elderly folk who had little idea of the accurate setting of the tuning control. An old-fashioned type of knob-dial was used, and a small ball-catch was sunk into the panel behind the dial, as shown in the sketch. On the radius from the middle of the dial to each of the required readings an indentation was drilled so that the protruding ball would coincide with each drilling when the dial was replaced. When this had been done the setting of the condenser proved accurate and easy for the old people, whilst the ordinary use of the set by the more enthusiastic listener was not hindered.—W. D. HENDERSON (Watford).



A device for instantaneously tuning a straight 3-valve set.

FREE ADVICE BUREAU

COUPON

This coupon is available until October 3rd, 1936, and must be attached to all letters containing queries.

PRACTICAL AND AMATEUR WIRELESS, 20/9/36.

Practical Television

September 26th, 1936. Vol. 3. No. 17.

TWO years ago the Fernseh A.G. supplied to the German Reichpost a mobile television scanning unit working on the intermediate-film method, the whole of the equipment being housed in a single motor lorry. The results obtained over a period of time having proved satisfactory, a second unit was ordered and built so that both could be used in connection with the televising of the Olympic Games, and any subsequent events of importance. Naturally, in designing this unit the accumulated experience proved invaluable, and many new features were included. It was constructed in such a way that it could be used in a van or in a studio as desired, and to facilitate transport extensive use was made of light metals.

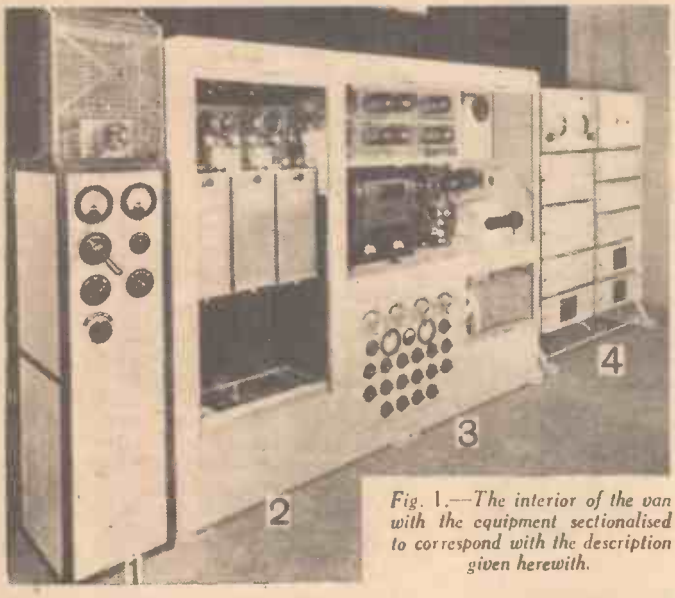


Fig. 1.—The interior of the van with the equipment sectionalised to correspond with the description given herewith.

Principles Involved

The completed van is seen in Fig. 2, the fundamental idea of the whole system being as follows: The scene to be televised is "picked up" by a sound-film camera of special design seen on the roof of the van, the camera, lenses, and unexposed film spool chamber being carried on a turret. From the camera the film, with its complete record of individual pictures and sound track, passes through a light-tight channel into the developing, fixing, and washing tanks, after which the film is dried thoroughly and fed through the scanning unit prior to being wound up for subsequent use. Scanning is effected by means of a disc rotating at 6,000 revolutions per minute in a vacuum casing. A circular trace of 45 holes arranged at an eight-degree angular separation enables the gradations of light and shade from the separate film pictures, projected on to the disc face by an arc lamp, to be focused on to a single photo-electric cell, to be converted into the electrical counterpart of the dissected optical pictures. The resultant vision signal, as well as the line and frame synchronising impulses generated at the same time, are amplified and fed to the modulation amplifiers of the ultra-short-wave radio transmitter via a single cable. The electrically-reproduced sound signals are conveyed to the sound transmitter by means of another cable.

The Camera

The equipment as embodied in the van shown in Fig. 2 is sectionalised into four main parts. The first of these is the sound-film camera constructed to use standard 35 mm. film, but employed in such a way that the separate film frames with complete pictures are only 9 by 10.5 mm. This course was adopted in order to reduce very considerably the operating costs, and also allow ample room for the sound track. The rapid development and fixing of the film as required by this new photographic technique has brought into being the correct type of film required, but as the requirements of the industry are, at the moment, rather small, the film costs still rank high, so that any steps which can be taken to reduce running costs are an important factor in equipment of this nature. Four objective lenses are incorporated in the camera, each with a different focus so that the limits vary between 25 and 550 millimetres. Furthermore, not only does the turret stand permit of a full 360-degree rotation for panning in a horizontal plane, but in addition there is a vertical angular adjustment of plus and minus 30 degrees from the mean position.

Processing Plant

The photographic processing is seen in section 2 of Fig. 1, and includes the drive for the film movement, the separate tanks for developing, fixing and washing the film. By allowing the film to feed into the tanks over the requisite number of "jockey" pulleys, the exact time necessary for producing a perfect negative can be arranged for very easily. The main driving sprockets are held on a rigid framework at the top of the section, and for threading the film or for inspection purposes the separate tanks can be lowered on guides to the base of the section. Only by a close study of the relationships between specially prepared developing and fixing chemicals, together with the correct type of film emulsion, has it been possible to bring the complete photographic processing down to a time which is measured in seconds. All temperature and pressure controls are fitted with automatic alarm signals so that the operators inside the van can rectify any defect that may arise.

Drying and Scanning

After emerging from the last washing tank the film negative is led over a series of rollers in the drying chamber shown at the top of section 3 in Fig. 1. This enables a thoroughly dry and perfect negative to be fed to the scanning unit which is housed in a particularly neat and compact form in the centre of section 3. By rotating the disc in a vacuum a complete absence of white lines in the final television picture is assured, and although rotating at the high speed of 6,000 revolutions per minute the apparatus is perfectly balanced to prevent any vibration or mechanical distortion. Below the scanner and arc lamp projector is the take-up spool for the film, together with the control panel and meter board. Special attention has been given to the convenience of the operators, only the essential controls being brought to the front of the apparatus.

Amplifiers

As the standard of definition at present in use in Germany is 180 lines, 25 frames (and pictures) per second, the amplifiers accommodated in the racks shown as 4 in Fig. 1 have been designed to pass this tele-

(Continued overleaf)

Fig. 2.—The complete van with the camera equipment located on the roof.

(Continued from previous page)

vision signal with a straight characteristic within the prescribed limits. They are capable of being adapted very readily, however, for an increased number of picture lines whether the scan is consecutive or interlaced. The low-frequency section contains a modulation unit in which the synchronising impulses produced from a separate amplifier are injected into and properly mixed with the picture modulation signal prior to being fed to the cable connecting the van with the ultra-short-wave radio transmitter.

A total of eleven panels or sections are accommodated in the double amplifier rack. Apart from the individual power packs and valve amplifiers, together with the necessary corrector units to ensure the correct characteristics referred to in the previous paragraph, there are two separate control sets incorporating four cathode-ray tubes. One of these sets is associated with the mechanical section of the I.F. unit, and enables the resultant picture generated by the scanning device to be observed on the screens of two of the cathode-ray tubes. The outgoing picture signal, together with the injected synchronising pulses which are impressed on the cable linking the van with the ultra-short-wave radio transmitter, is thereby kept under constant observation by the engineer in charge and correct control levels set. The two remaining cathode-ray tubes give the oscillograms of the amplifier unit for vision, and the amplifier unit for sound.

The mains transformer, together with the necessary switching and controlling devices, is housed in unit (1) of Fig. 1, a compensator being included to allow for any voltage drop in the long mains leads that may be required for connecting the van to a suitable electrical source of supply. All the equipment inside the van is located on the centre line so as to be accessible from both sides and give the necessary symmetrical distribution of weight so essential in a mobile unit of this character. The same car was employed with marked success at the Berlin Radio Exhibition for the transmission of exterior scenes, received subsequently in the exhibition hall. Owing to the high standard which has been obtained in this new form of film and rapid photographic processing technique it was possible, even when the illumination was very poor, to secure clear films with good contrast, and so produce first-class television pictures.

TELEVISION NOTES

To What Distance?

ALTHOUGH the Alexandra Palace television station has only been on the air for a very short period, apart from the ten days' regular programme broadcast for the benefit of visitors to Radiolympia, it seems certain that the range over which the vision and sound signals will be seen and heard will be greater than at first thought. On the day prior to the opening of Radiolympia Sir Noel Ashbridge, with characteristic caution, broadcast a short talk on television, in which he stated that it was hoped that most people living within a distance of about twenty-five miles in any direction from the station will be within reach of pictures He also stated that there may be others living farther away who will be fortunate in this respect, while some within the limit stated will find that local conditions may handicap them in getting satisfactory reception. It is appreciated that only time will give the full facts, but already the signals have been received at working strength at certain districts nearly a hundred miles from Alexandra Palace. This may seem quite contrary to the horizon theory, but is no doubt a direct result of the very high ultra-short-wave radio transmitter powers which are being used. It is known that the Baird Company, one of the two firms who have installed the A.P. equipment, are using a radio transmitter rated at 60 kilowatts, having a peak aerial power of 17 kilowatts. These figures have never been approached anywhere in the world before on the ultra-short waves and the next important step is to collate sufficient results to enable a field strength map to be plotted so that reception in any district may be anticipated with a fair degree of accuracy.

Magnetic Shielding

According to details of television receivers so far released, they all, with one exception, use cathode-ray tubes as the picture reproducer. These are operated either through the influence of electrostatic or electromagnetic fields produced by controlled voltages or currents. In consequence, it is very essential to shield the cathode-ray tube from the interfering influence of stray external magnetic fields such as would be derived from the proximity of a transformer or other similar device. This can be done in a variety of ways, but one of the most efficient is to employ shields made of Mumetal, a nickel iron alloy containing a small percentage of copper, this being used to stabilise the alloy and to facilitate heat treatment. Depending on the nature of the electrode assembly incorporated in the cathode-ray tube, so the shields vary in size and shape. The important point, however, is that this particular alloy is remarkable for its low hysteresis losses coupled with high permeability.

The Television Telephone

Although it is very unlikely that both television and the telephone will be combined for home use for many years to come, its use for public calls between selected places is becoming established gradually in Germany. The equipment is rather elaborate, but six months' experience has already shown where simplification can be effected. To give the public a fair idea of how efficient the system has become, the German Post Office established a booth at the Berlin Radio Exhibition. The scanner and amplifier are seen in the accompanying illustration. The former consists of a spotlight machine operating on the scanning disc principle so that as soon as the calling subscriber lifts the telephone receiver a rapidly moving spot of light commences its exploration, and conveys to the distant end the picture of head and shoulders of the person talking. This is worked on a two-way principle so that the person can see and hear and also be seen and heard at the distant booth. The illustration also shows the amplifier racks and power pack units used for the video and audio signals, together with the line and frame synchronising signals. The video signals are fed over specially loaded cables by a system which ensures a complete absence of distortion in spite of the enormously high frequencies involved, and the results have proved most satisfactory. Visitors to the Berlin show were able to make calls to other booths in Berlin—Hardenbergstr. and Potsdamer Platz—and also to Leipzig, and with increasing popularity it seems certain that the service will become a paying proposition to the German Post Office.

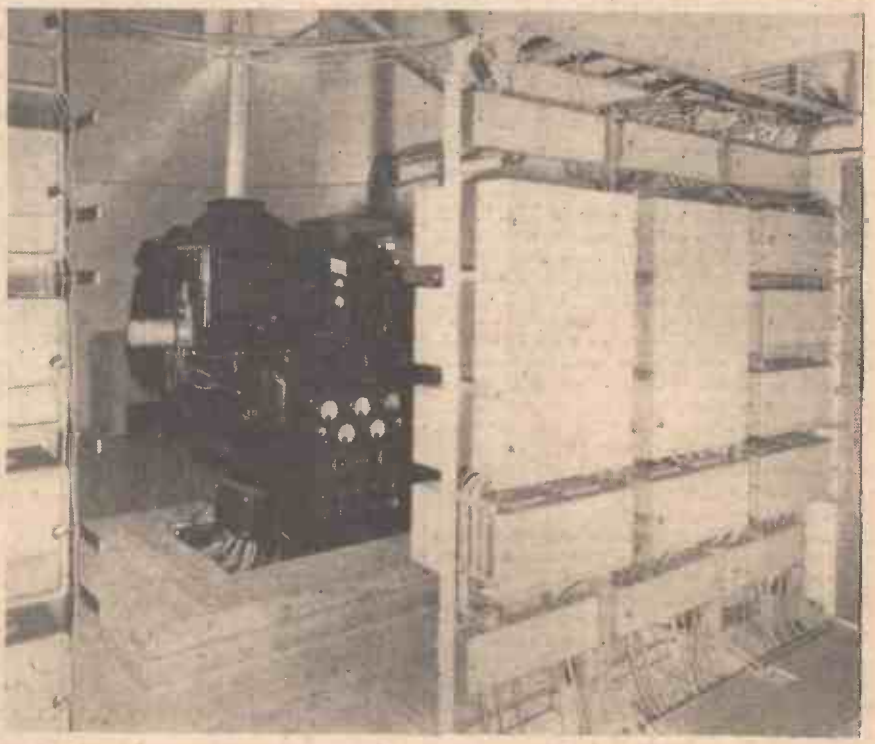


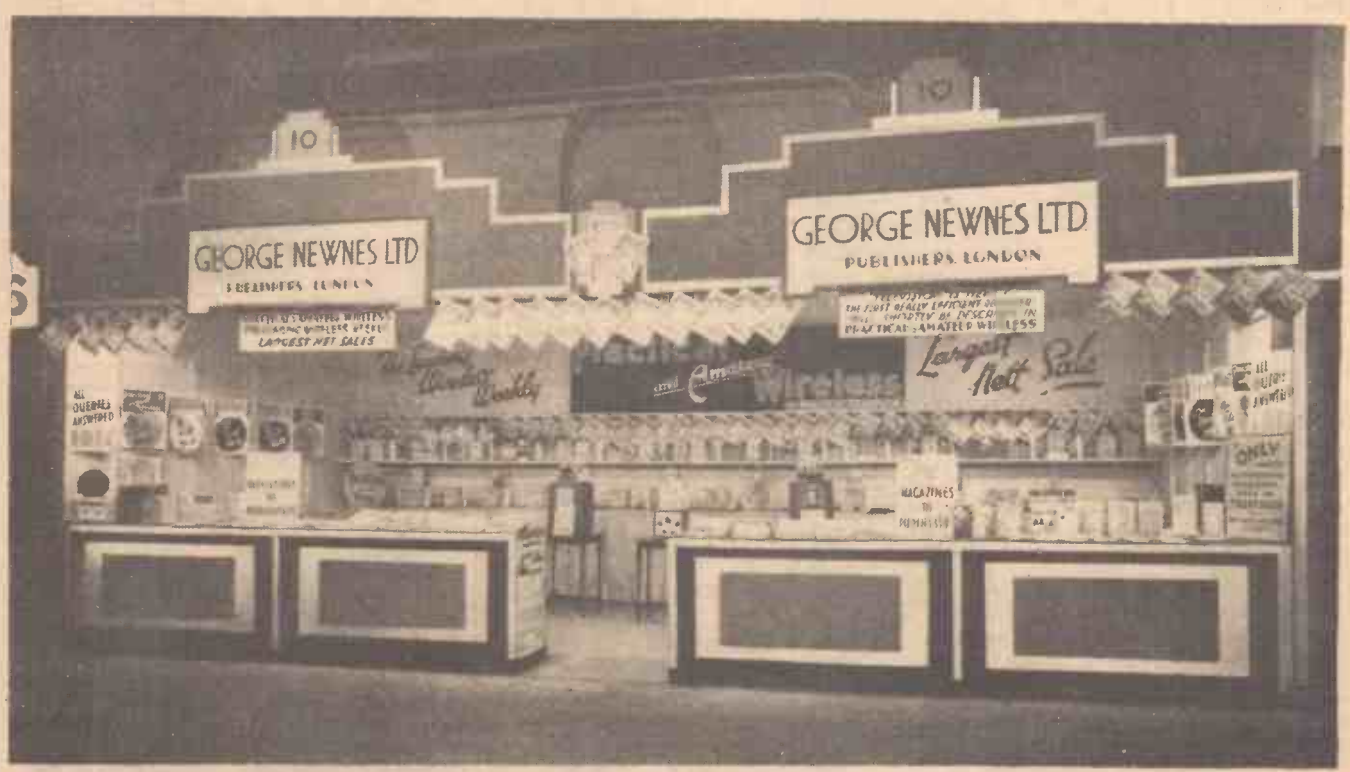
Fig. 3.—The scanner and associated equipment employed at Berlin for the television and telephone booth used for public calls.

On Your Wavelength

By THERMION

Birthday Greetings

IT is appropriate that I, Thermion, should reciprocate the many felicitations and expressions for my continued longevity which I have received from my readers from near and distant parts. Like the "Limit" receiver described in this issue, I receive messages from all quarters of the globe, and I should imagine that my post is one of the most interesting received by any radio journalist. In spite of my splenetic outbursts on occasions I manage to retain the goodwill and enthusiasm of my readers. Although I have not served this journal from its inception, it is still my privilege to address each week those loyal readers who agreed to sail under a new flag when the old journal, which is unfortunately no more, merged with its liver, younger, and more up-to-date rival PRACTICAL WIRELESS nearly two years ago. Although it was the last in the field it quite rightly has become first, and like a well-known make of accumulator it will keep on going when the rest have stopped. Birthdays can be at once occasions for hilarity, retrospect, and sadness. Time which has passed cannot be recalled, for time, like the spoken words and the neglected opportunities, never returns. You may enthuse about things which have passed. They are, however, mere history. A journalist each week is one issue nearer his grave. His paper is always in process of coming out. It must not be late. His work is never done. In producing a journal you have produced something which is out of date within a few days. You have produced nothing enduring, except that nebulous thing known as goodwill. On a birthday it is appropriate to look back and to look forward, like two-headed Janus. I can look back upon the developments in radio from its very earliest days. I can recall its vicissitudes, and its remarkable expansion from a hobby indulged in to save money, to one of a scientific recreation irrespective of money. This birthday precedes by a few weeks the introduction of the first television service, and so, on the fourth anniversary of the birth of this journal, we are on the threshold of a new industry, a new entertainment, and a new hobby, all of which must have an enormous



The "Practical and Amateur Wireless" Stand at Radiolympia. Many thousands of visitors called and the Technical Staff was kept busy dealing with their many queries. Several visitors spoke to their good friend Thermion without knowing it—you see he is not quite like the caricature at the head of this page.

effect upon our national life. This anniversary also sees this journal in a stronger position than ever before. We have outlived some of our older rivals, and sad though it is to think of the departed, one must take a certain amount of pride in the fact that we remain very much alive! So, gentlemen, I reciprocate your good wishes for many happy returns, although it is not in the best of causes to wish a publisher happy returns. We like to feel that we sell out every week. We enjoy the largest net sales, but there are still some unsold copies every week, I understand. Here is a chance for you to show your appreciation in some tangible way by persuading your friends to see that there are no unsold copies in your district.

An Olympia Story

THE Record-io-Gram Company tell me the following story relating to Olympia. On the Wednesday night Mr. Charles Penley, producer of the Radio Olympia Show, suggested to them the possibility of obtaining a record containing a personal message from some of the stars who were appearing in the Show, which could afterwards be played over to visitors at Radio Olympia. They did this on the Thursday afternoon, and among the technical difficulties encountered in producing such a record was the fact that firstly there was no sound-proof room available as a studio, and secondly, the various people who were to make the record could not be assembled at the same time as would normally be necessary for a continuous record. They therefore plugged their transportable recording apparatus into a lighting socket in a small office about five yards away from the stage, and did the recording while a performance was actually in progress. As the artists came off the stage they each made their contribution to what must be one of the most extraordinary records in existence. Commencing with a few introductory remarks by Mr. Penley, the record is continued by Joe Loss, Peter Bernard, Charles Manning, Ann Penn, the Western Brothers, Bennett and McNaughton, Leonard Henry, and finally Les Allen. In order to make a continuous record it was necessary to stop and start the apparatus without breaking up the grooves, and this was achieved in spite of the fact that there was approximately ten minutes' interval between each recording. Another interesting feature of the record is the sound of clapping from the theatre as a background to the voices of the artists.

S.W. Coil Design

MANY constructors like to make their own short-wave coils, and requests are often received by our Query Service for details of the number of turns required on formers of various sizes. As very few turns are used the beginner might be led to believe that short-wave coil construction is a very simple problem. This is not so, however, as a number of important details have to be considered when designing coils for wavelengths below 100 metres. In the first place the turns of the tuned (grid) winding must be spaced in order to reduce the capacity to a minimum. For wavelengths below 50 metres this space should be $\frac{1}{8}$in. or more, and for the ultra-short wavelengths a space of about $\frac{1}{4}$in. is recommended. It must also be borne in mind that the spacing affects the inductance—the greater the space between adjacent turns the lower the inductance. The other factor governing the inductance of the winding is, of course, the number of turns of wire used.

The Reaction Winding

THE importance of the reaction winding is often overlooked. Although the number of turns on this winding is of great importance, the position of the winding with respect to the grid winding is of as great, if not greater, importance. If the two windings are too near each other the operation of the reaction condenser has a marked effect on tuning, owing to the capacity existing between the windings. In commercial coils it is customary to place the reaction winding at the lower end of the grid winding with about $\frac{1}{4}$in. separation between the two. This method is quite satisfactory, but the experimenter can generally obtain better results by using an extra former for the reaction winding. This should be approximately $\frac{1}{2}$in. smaller in diameter than the grid former and should be placed inside the latter. The best position can then be found by experiment; best results are usually obtained when the reaction winding is approximately half-way between the grid and earth ends of the grid winding, but the optimum position varies with different coils.

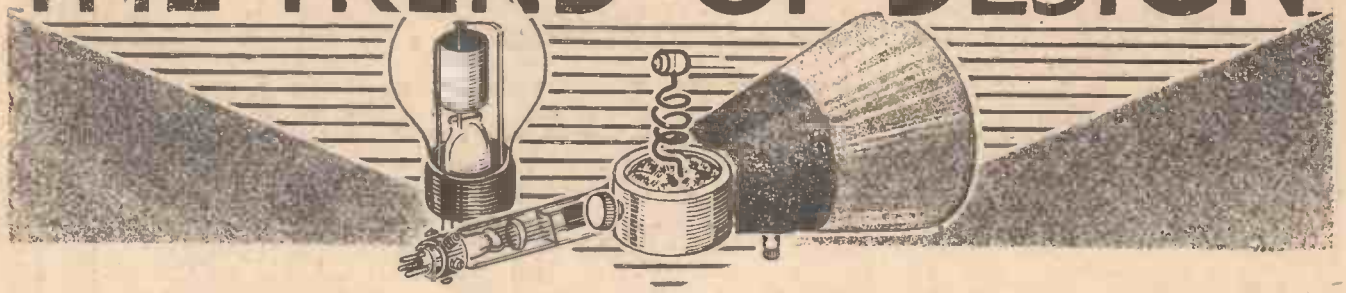
Names

PERHAPS a reader can enlighten me as to why it is that conductors, crooners, and others engaged in radio entertainment should adopt such names as "Lew," "Al," "Joe," "Ed," "Jack," and so on. I can understand this in prize fighting, but think that it is undignified in radio announcements. I see no particular reason why I should call anyone Lew if I did not know him. The initial, or the full name, should be sufficient. Abbreviations are all very well amongst one's friends, but it would be more in keeping with intelligence, and dignity, if Lew became Lewis, Al, Alfred, Joe, Joseph, and so on.

Television Records

I HAVE previously tried television gramophone records, but without obtaining really good reproduction. A few days ago, however, I was privileged to see a private demonstration of home-made television records reproduced on a cathode-ray tube. The records had been made on a home-made film transmitter using a mechanical scanner, details of which I cannot divulge. All I can say is that I was astounded with the clarity of the picture as reproduced from the record. The amplifier and time base used with the cathode-ray tube were of normal type, and I gather that the same record can be used for a large number of times before distortion becomes troublesome. There was slight flicker, but the picture was much better than that previously obtained when using a scanning disc or mirror drum on the 30-line transmissions put out by the B.B.C. I wonder if there might be a future for this kind of thing, for it should not be difficult to synchronise sound and vision records, which could be reproduced together.

THE TREND OF DESIGN



Such an Advanced Stage Has Been Reached by the Present Receiver That One May Well Wonder in What Direction Future Changes Will Take Place. Television Will Probably Play a Part in Answering the Question

THAT receiver design has changed very considerably during the past ten years or so cannot be denied. One is tempted to wonder in what direction future changes will take place, and if the next ten years will be as important as the last. One thing is fairly certain; that is, that the tendency is now towards the use of an increasing number of valves. During the early years of broadcasting, receivers having six, seven and eight valves were not scarce by comparison with the total number in use. Later, however, it was found that equally good reception could be obtained by using four or even three of the more efficient valves in the better and simpler circuits which were by that time available.

Superheterodyne Popularity

Superheterodynes were first fairly popular in this country about 1923 or 1924, but this popularity soon began to wane. Since that time there has been a regular and periodic swing of the pendulum towards and away from the superhet. It appears now that a reasonable state of equilibrium has been reached, for there have been few changes in the relative numbers of superhet and "straight" receivers during the last two or three years. Of the many sets on the market, by far the majority are superhets, but at the other end of the scale it can be said that the "straight" receivers show no signs of becoming obsolete or going out of demand. This is mainly because each type of instrument is made to suit one particular market.

The elaboration of the superhet has gradually led to the use of increasingly larger numbers of valves. Early superhets generally had about five valves in all—plus rectifier in the case of A.C. sets—but three-valve superhets soon came into the limelight following the description of the "£5 Superhet," which proved to be extremely efficient. There were, and still are, several three-valve superhets on the market, but there has been a tendency during the past year or so to increase the number of valves. There are various reasons for this, not least of which is that the public has begun to be more insistent on the question of high-quality reproduction. Another reason is that systems of automatic tuning, different methods of automatic volume control, and volume expansion have been added as refinements.

Tuning and Quality

Another tendency which has become more marked during the past season is also in connection with the quality question. Reference is made to variable selectivity, by means of which the band-width covered by the receiver—and hence the degree of selectivity available—can be varied within certain limits. This became very important as receivers were made to tune more and more sharply, because a very sharply-tuned set cannot give equal response to the full width of audio frequencies up to 9,000 cycles or so. It is of little consequence when listening to distant stations, since the quality could not be perfect in any case, but when the local station is concerned that matter is of tremendous importance. In this case, reproduction which is very near perfection is possible, but it cannot be obtained from a sharply tuned receiver which cuts off the side bands or audio frequencies above, say, 3,000 cycles, as many very selective receivers do. The variable-selectivity device, in the case of a superheterodyne, takes the form of one, or more, intermediate-frequency transformer, of which the coupling between primary and secondary windings is adjustable. In some instances provision is made for rotating one coil, in others coupling is varied by movement of the iron core, whilst in others different methods of introducing "artificial" damping are provided. The effect is the same in every case, for the receiver can be made to be extremely selective when listening to distant stations on which interference would normally be present, or it can be made to tune broadly when listening to the nearby transmitters.

During recent years there has been a tendency towards elaborating the tuning scale. In many ways this is desirable, for it simplifies station selection, but occasionally it has been carried to extremes. That this is realised is shown by the recent reversion in many cases to simple, clearly marked, circular scales with a neat pointer. This arrangement might become still more widely used as the all-wave receiver is developed.

Wavelength Range

In considering the trend of receiver design one must not omit to make reference to the rapid growth in popularity of all-wave receivers. Even three years ago one or two such instruments were available, but they were looked upon as novelties rather than as important contributions to home entertainment. During the intervening period manufacturers have paid increasingly greater attention to the all-wave receiver, so that to-day every well-known maker lists at least one instrument of this type. Most of the so-called all-wave receivers tune from about 13 to 60 metres, 200 to 550 metres, and 900 to 2,000 metres, but there are now about two sets on the market which tune down to the seven-metre band, besides covering both broadcast ranges. It seems likely that it will soon be commonplace for most of the all-wave sets to be designed to cover the ultra-short wavelengths as used for television. We wonder, however, whether this idea will be followed up by others or whether there will eventually be two distinct types of set—one for the reception of sound broadcasting on medium and long waves, and another for receiving both sound and vision on ultra-short waves. On the other hand, perhaps in future all broadcasts will be confined to the short and ultra-short waves. There would be many advantages in this, not least of which would be that it would be possible to use wider "channels" for the various transmissions. This would mean that better quality, or higher fidelity of reception could be anticipated. The obvious disadvantage to such a system is that the range of the ultra-short-wave signals as yet appears to be not greater than about twenty-five miles. Even this objection could probably be overcome by having two local transmitters in each important area, with additional transmitters operating on the normal short waves for other than local services.

Valve Design and Television

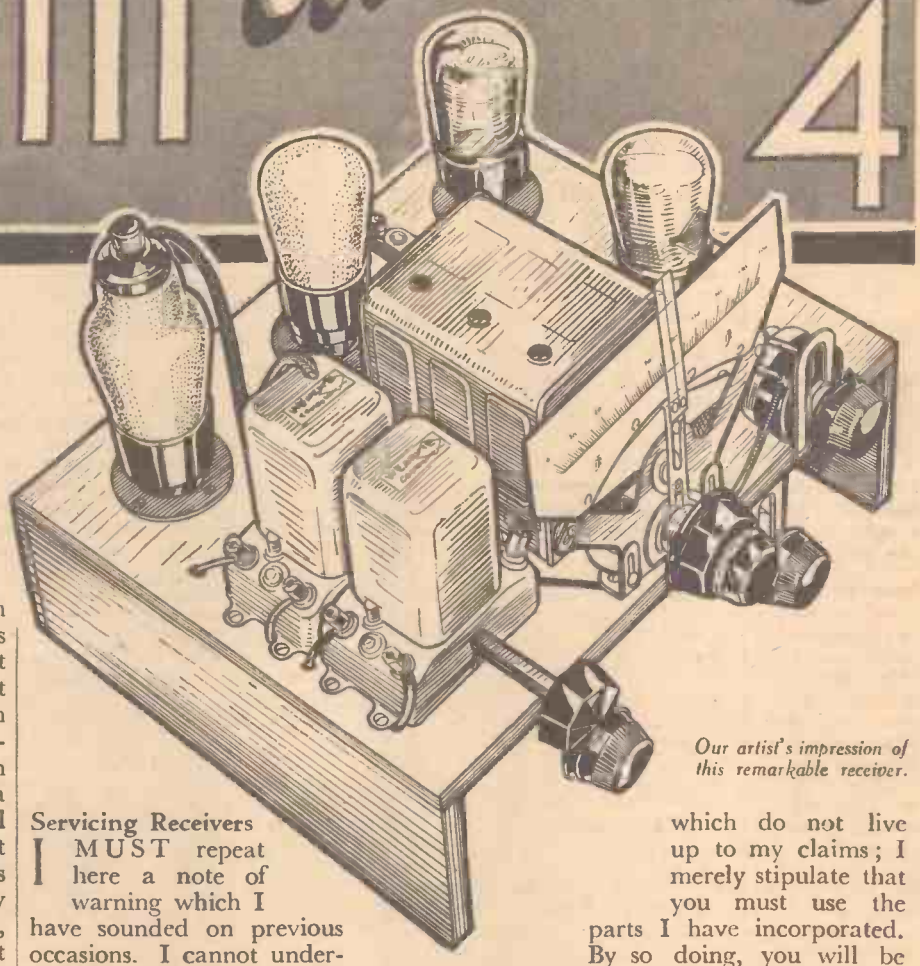
Valves have been improved and changed out of all recognition within comparatively recent years, and one may well wonder if such improvements will continue. It seems certain that they cannot be made at such frequent intervals, so high is the pitch of efficiency which has now been reached. Perhaps similar steps will be taken to improve and cheapen the cathode-ray tubes which are going to play such an important part in television. At present they are very expensive, besides which they require very high voltages—up to 5,000 or more—for their operation. Still, the old "R" valves required a filament current of nearly 1 amp. at 4 volts; this compares with .1 amp. at 2 volts of the modern battery valves. Even so, the present-day valve is considerably more efficient than the earlier types, if efficiency is considered as the ratio of output signal voltage to input signal voltage. It might thus be logical to assume that a cathode-ray tube might be designed in the near future which will operate satisfactorily from a 250 volts H.T. supply, or even from small H.T. batteries.

We must wait and see, but in the meantime we are justified in feeling proud that we home constructors have assisted in the advancement of design, and happy in the knowledge that we can continue to do so.

Presenting F. J. CAMM'S "Limit" all-Wave 4

A Remarkable Receiver with a 5,000-Mile Range

By F. J. CAMM



Our artist's impression of this remarkable receiver.

IN the course of conversation with the many thousands of readers who called at our stand at Radiolympia I learned that whilst they were interested in the design for the Gladiator Three, the construction of which was described in our Show issues, they preferred a four-valve design, and the additional "punch" of such a receiver, without coil changing. There are arguments for and against both systems. Any coil unit which covers the short, medium and long-wave bands must be a compromise between opposing factors. Plug-in coils, on the other hand, require a certain amount of trouble in changing. So efficient, however, are the all-wave coil units now available that there is really very little in it. The demand for a four-valve design was so insistent, however, that I immediately got to work to see what could be done in the way of a receiver which would be worthy of inclusion in our Birthday Number. The "Limit Four" is the result. It is almost unnecessary for me to say that it carries my guarantee of satisfaction. Any reader who fails to make it work, or who is dissatisfied with its performance, has only to write to me, or to send his receiver to me, when he will be speedily extricated from his difficulties.

Servicing Receivers

I MUST repeat here a note of warning which I have sounded on previous occasions. I cannot undertake to service any receiver sent to me by a dealer. It has been my unfortunate experience that in order to gain sales from our readers, dealers have undertaken to assemble for our readers sets described in these pages provided that the components were purchased from them. They, of course, accept no responsibility for the design, and when they fail to make a receiver work the dealer endeavours to evade his responsibility by blaming the circuit. Thereupon they will despatch the receiver to us for free service, but they pass along a charge to the customer. I accept full responsibility for my designs and I do not expect anyone else to do so. I do not *wish* them to do so. It is far easier for me to design a set right than wrong. I do not publish designs which do not live up to my claims; I merely stipulate that you must use the parts I have incorporated. By so doing, you will be assured of results and the benefit of my service and advice if you do not obtain them. I make this stipulation in your interests, as well as my own. You cannot expect me to guarantee a set built from any old junk parts you happen to have by you. It is possible that an odd set of coils, transformers, resistances, and condensers may assemble into a passable imitation of the "Limit Four." On the other hand, it may not. I cannot divine your troubles and difficulties in such cases. I know the performance of the "Limit" when built to specification, and can readily diagnose any troubles you may experience, and suggest a cure. If I find a component defective, upon examination of a reader's set, I am able, owing to the whole-hearted co-operation

A Great Achievement—

accorded me by the component industry, to get it exchanged.

Building to Specification

IF the set is not built to specification, the manufacturer of a defective component may quite rightly insist that such is unsuitable for the circuit, and disclaim all responsibility. I have always been opposed to alternative specifications, nor do I see how it is possible to make such alternative specifications except in comparatively unimportant parts of the circuit. Certainly I shall not do so. I should not care to take the risk of giving my readers dissatisfaction. I stand behind every one of my designs, and, as hundreds of readers know, no one asks my assistance in vain.

The "Limit Four," as its name implies, represents the ultimate in results from the circuit arrangement. The circuit is reproduced on another page for your examination. You do not, of course, have to look at it, for the wiring diagram, given free in the form of a blueprint, shows you where to place every wire. It is interesting none the less to examine the circuit. You will observe that I have used four valves, with triodes in the last three stages. This ensures a low initial cost and low running costs, as well as ensuring cheapness of replacements. These are important points in these days of the competition of the cheap commercial receiver. Low cost is of prime consideration.

The constructor requires a cheap set, but he also expects it to have a high degree of sensitivity and selectivity, especially on the medium-wave and long-wave bands. This accounts for the presence in the circuit of the H.F. pentode acting as a high-frequency amplifier. Additionally, it helps to stabilise the reaction control on the short-wave band and provides a slight degree of amplification.

Simplified Wiring

IN order to simplify the wiring, and the operation, you will notice that the aerial circuit is untuned on the short-wave band. There are undoubted advantages, for which you pay in the form of a slight loss of sensitivity on the short waves. A tuned circuit on the short waves would not, however, outweigh the undoubted advantages of the present arrangement.

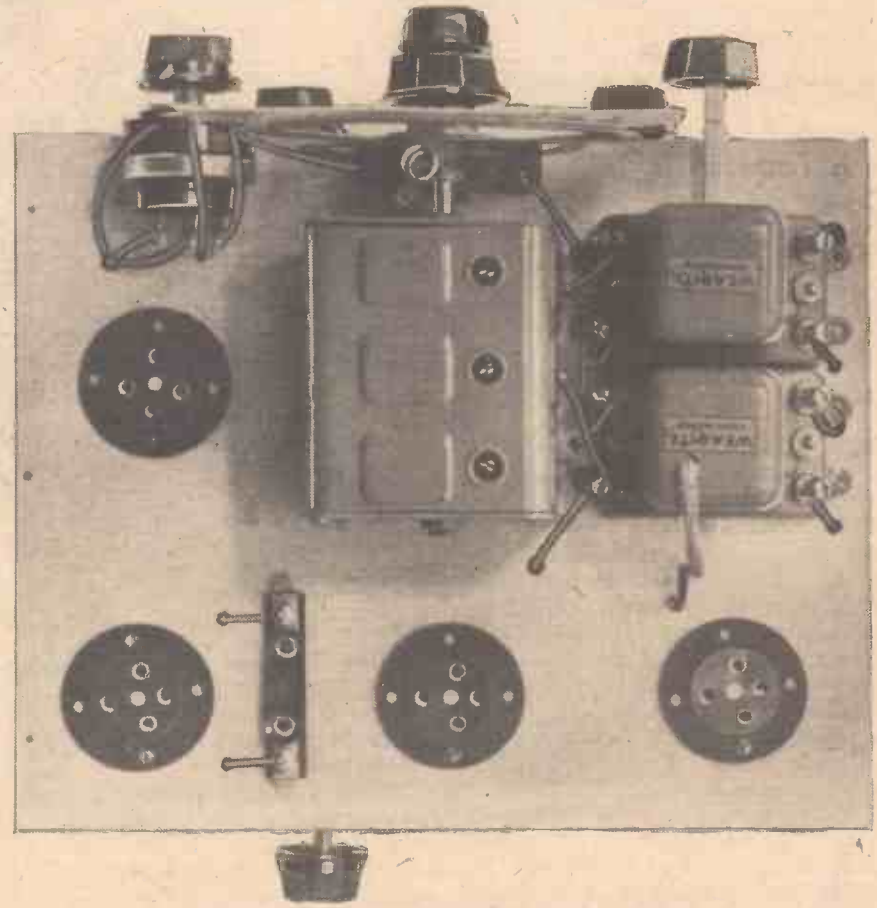
The coil units take care of two short-wave bands, the medium-wave band and the long-wave band without coil changing. This in itself is a great convenience, for you may select your programme with no more effort than is required to operate the coil switch. Here is a distinct improvement upon most of the commercial all-wave sets, in which there is only one short-wave band. Notice also that I have incorporated iron-cored coils on the medium-wave and long-wave bands. The short-wave coils cover from 13 to 26 metres and from 24 to 55 metres, thus ensuring that you will be able to receive most of the worth-while short-wave programmes.

Long-range Reception

THE "Limit Four" receives programmes from incredible distances, and there is no programme too remote for it to pick up. The quality of reproduction is extremely good, and the sensitivity is of a high order.

I have incorporated a special three-gang tuning condenser to obviate the necessity for an extra control for short-wave tuning. This condenser has one .0005 mfd. section and two .00025 mfd. sections, the latter being joined in parallel on the medium-wave and long-wave bands.

You will also observe that I have coupled the detector and L.F. valves by means of the usual resistance capacity arrangement, using a 500,000 ohm potentiometer as a grid leak for the L.F. valve. The great advantage of this arrangement is that this potentiometer can be used as a low-frequency volume control—a refinement not usually incorporated in commercial sets.



This plan view of the chassis shows the clean layout.

A low-frequency transformer is used between the low-frequency and output valves to ensure satisfactory volume from distant stations. Most of the programmes radiated can be heard at comfortable entertainment volume on the loudspeaker.

There are no special points to be remembered in the construction, which follows our normal practice. It is, however, important to remember that the short-wave coil must be mounted with a supporting bracket mounted in the exact position shown on the blueprint.

Use the blueprint to locate the parts on the chassis by laying it over and pricking through to mark the position of the various holes. In this way you will ensure that the layout coincides with mine.

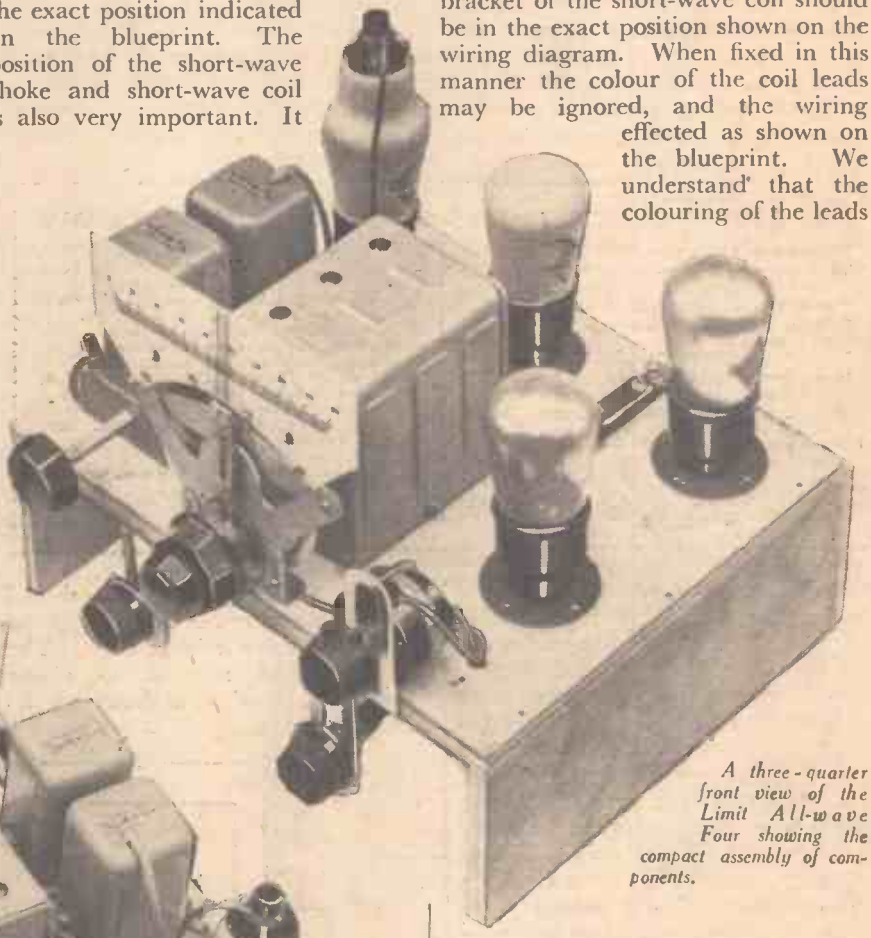
Construction

If the wiring diagram is carefully studied no difficulties should be experienced in wiring this receiver. Before mounting the gang condenser and Wearite coil unit it will be advisable to drill the necessary valve-holder holes. For this purpose a 1in. drill should be employed. After drilling the holes the top edge should be cleaned in order to avoid the possibility of the valve-holder sockets touching the metallised surface of the baseboard. The holes for the terminal strips can now be made, using a ¼in. drill, and a ⅛in. hole may also be drilled in the centre of the back runner so that the battery leads may be passed through. A hole is also required in the back runner for the 500,000 ohm potentiometer R7. It will be advisable to scrape off the metallising around this hole so that the fixing nut of the potentiometer will not come in direct contact with the metallised surface. After these large holes have been completed the small lead-holes can now be drilled, using a $\frac{1}{16}$in. drill.

by a Master Designer

Mounting Components

In order to avoid damaging the coil unit, gang condenser, and drive, the sub-chassis components should be screwed down first. The brackets for the reaction condenser and wave-switch should be carefully placed so that these two components are in the exact position indicated on the blueprint. The position of the short-wave choke and short-wave coil is also very important. It will be noted that the choke is screwed to the side runner, a distance of ¾in. being allowed between the choke and the lower surface of the chassis. The bracket of the short-wave coil should be in the exact position shown on the wiring diagram. When fixed in this manner the colour of the coil leads may be ignored, and the wiring effected as shown on the blueprint. We understand that the colouring of the leads for this component are standardised by the manufacturers, however, and therefore some constructors may like to check this colouring. The blue lead connects to the grid end of the winding, the white lead to the tapping on this winding, and the black lead to the earth end of the winding. The green and orange leads are joined to the reaction winding, the orange lead to be connected to the plate of the valve, the green lead to the reaction condenser.

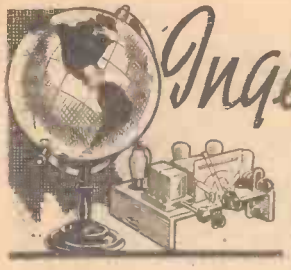


A three-quarter front view of the Limit All-wave Four showing the compact assembly of components.

Another top-chassis view of the Limit All-wave Four with the valves in position.

Wiring

After the sub-chassis components have been carefully mounted the wiring may be commenced. All connecting leads should be kept as short as possible, especially those joined to the multi-contact switch. The wires connected to plate A of



Ingenious Circuit Design—

this switch should be kept well clear of those joined to plate B, as inter-action between these two sets of wires may cause H.F. instability. Instability of this nature was commonly experienced in all-wave receivers designed two or three years ago, due to the use of wave-change switches having a high internal capacity. The switch used in the "Limit Four" has been carefully chosen to avoid this trouble. It will be noted that the two plates are spaced approximately ¾in. apart; the capacity existing between them is therefore negligible. Long extension rods have been used for the reaction condenser and the switch, and it has therefore been possible to mount the components near their associated valves and coils. This is of great importance in short-wave receiver construction, as a long length of lead between the coil and its tuning condenser can greatly affect the minimum wavelength to which the receiver can be tuned. The lower the inductance of the short-wave coil the greater will be the effect of long connecting leads.

Gang Condenser and Coils

The gang condenser and medium-long-wave coils can now be placed in position on the top of the chassis. There are two ways of fastening the condenser to the chassis. Wood screws carefully tightened from the top of the chassis may be used, or bolts may be passed through three holes from underneath the chassis. The easiest way, of course, is to use wood screws. This method has been found quite satisfactory in practice, but great care should be taken not to bend the moving vanes of the condenser sections with the screwdriver—a long, narrow-bladed screwdriver is most suitable for this purpose. When the coil unit is received it will be noted that a spade contact will be attached to the screened lead protruding through the top of the screening can of coil T.I.C. This spade contact should be cut off and a short length of ordinary connecting wire joined to the lead, care being taken to keep the screening cover clear of the lead itself. The best procedure is to bind a short length of thread around the end of the screening cover in order to keep it in position. The extension lead referred to above should then be wired as shown on the wiring diagram.

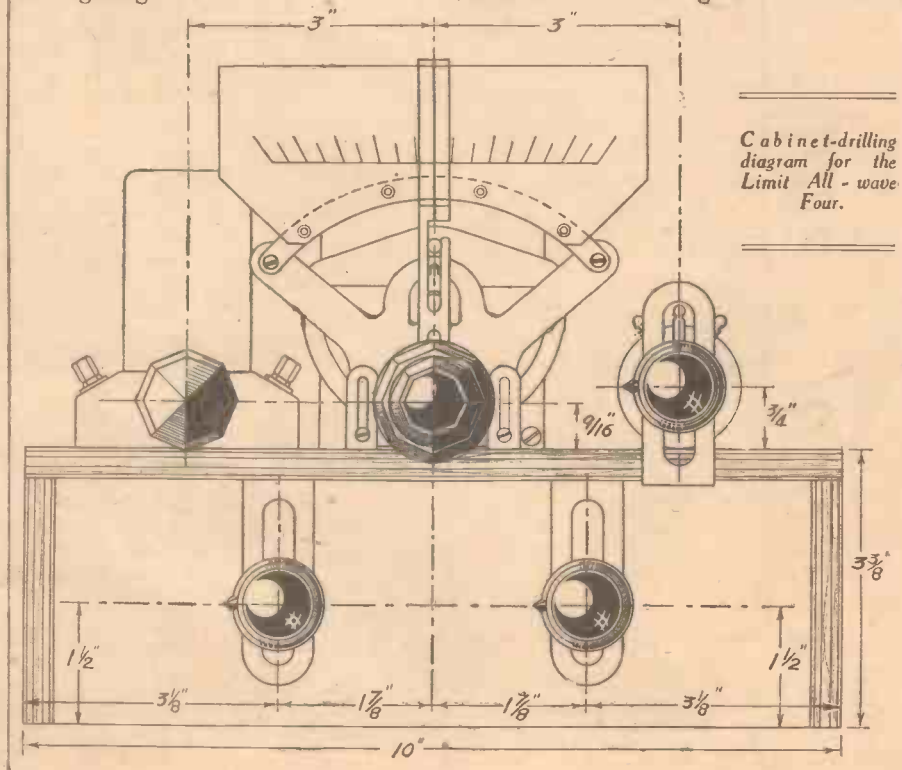
LIST OF COMPONENTS FOR F. J. CAMM'S LIMIT ALL-WAVE FOUR

Two-gang coil unit, type PIC-TIC (Wearite).
Three-gang condenser—one .0005 mfd. (C1), two .00025 mfd. (C2, C3) (J.B.).
Slow-motion drive, type S.L.11 (J.B.).
Differential reaction condenser, .0003 mfd. (C4) (Polar).
Multi-switch, type S223 (B.T.S.).
Potentiometer, 50,000 ohms, type VM60 (R2) (Bulgin).
Potentiometer, 500,000 ohms, type VC63 (R7) (Bulgin).
Two-range short-wave coil (B.T.S.).
Short-wave H.F. choke (B.T.S.).
Six fixed resistances: 1,000 (R4), 20,000 (R6), 75,000 (R5), 100,000 (R8), .5 meg. (R1), 2 meg. (R3), 1 watt type (Dubilier).
Six fixed condensers: .0001 (C8), .0005 (C5), type 690W; .01 (C10), type 670; .05 (C7), .1 (C6), .25 (C9), tubular (Dubilier).
L.F. Transformer, type Niclet, 3½/1 (Varley).
Four valve-holders, 4-pin, type V3 (Clix).
Two terminal strips, AE and LS (B. Lee).
Five component brackets (P. Scott).
One Metaplex Chassis (P. Scott).
Seven plugs: H.T.2, H.T.1, H.T.—, G.B.+, G.B.—1, G.B.—2, G.B.—3 (B. Lee).
Two spades: L.T.+, L.T.— (B. Lee).
Four valves: 210VPT, 210 Det., 210 Det., 215P (Cossor).
Speaker, type 37J (W.B.).
100 m.a. fuse and holder (Microfuse).
120 volt H.T. battery (Drydex).
9 volt G.B. battery (Drydex).
2 volt accumulator (Exide).

Volume Controls

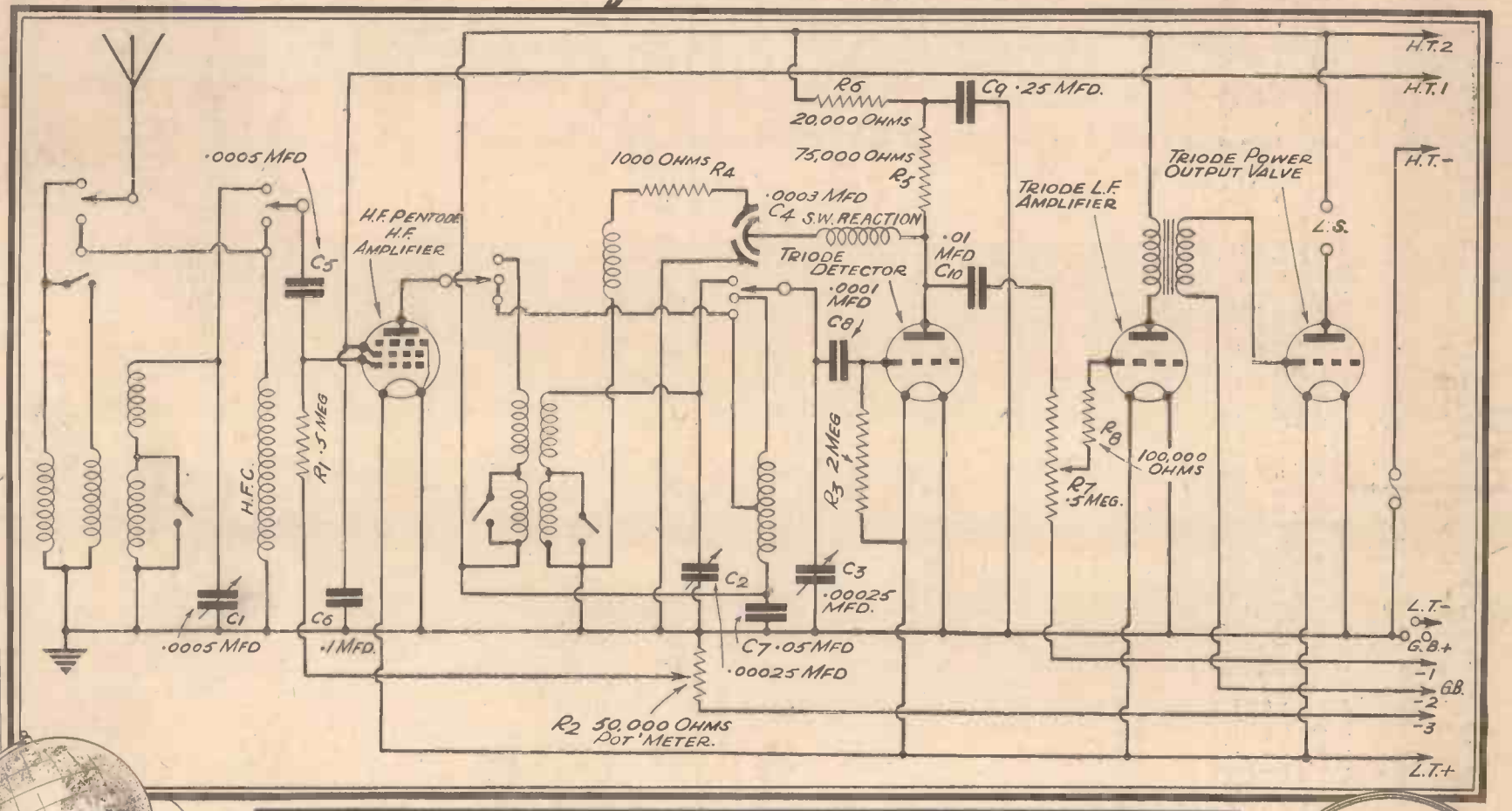
The control spindle of the coil unit is rather low, and therefore if the bracket of the 50,000-ohm volume control is mounted on the chassis surface in the usual manner the spindle of the control will be much higher than that of the coil unit. Constructors are therefore advised to mount the volume control bracket underneath the chassis, and if it is desired to bring the spindles of the two components referred to exactly in line with each other the volume control can be sunk about ⅛in. into the surface of the chassis. The spindle of the potentiometer is insulated from the tags, but in case a short-circuit or a partial short-circuit has occurred inside the component it is advisable to insulate the spindle and its mounting bracket from the metallised surface of the chassis. When the bracket is mounted in the manner instructed it will only be necessary to ascertain that the fixing screws are not long enough to pierce the metallised surface. No special instructions are necessary concerning the 500,000-ohm potentiometer attached to the back runner, as this need only be securely fastened to the runner by means of the nut attached to the control spindle. No difficulty should be experienced in mounting the tuning drive provided that the screws holding the supporting legs are unlocked before the drive is pushed on to the condenser spindle.

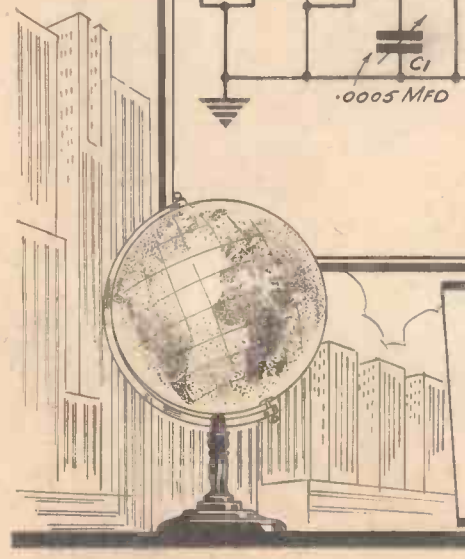
Full operating and adjusting instructions will be given next week.



Cabinet-drilling diagram for the Limit All-wave Four.

Theoretical Circuit of J. J. Camm's "LIMIT" All-Wave 4





FOUR WAVE-BANDS WITHOUT COIL CHANGING.
FOUR VALVES FOR HIGH SENSITIVITY.
IRON-CORE COILS FOR HIGH SELECTIVITY.

Judging Variable Selectivity

An Article Indicating How to Judge the Value of Variable Selectivity in Individual Cases

By H. J. B. C.

AS many listeners are probably thinking about buying or building a new receiver, it may be of service to indicate how they may decide for themselves whether it is of advantage for them to insist on variable selectivity. Most listeners know that the word "selectivity" in radio parlance means the power of receiving stations free from interference by other stations. The various broadcasting stations are spaced out in the waveband at 9 kc/s intervals, and in order to be certain that there is very little interference with any particular station by another working on an adjacent channel, the various tuned circuits of the receiver must be so designed in number and characteristics that they will pass a narrow band of frequencies only 9 kc/s wide. This condition obtains in a highly selective receiver. As a result of this high degree of selectivity, however, all musical notes and harmonics above 4,500 cycles per second are cut off, or seriously reduced in volume, with the result that the music appears low pitched and drummy. For really good quality reproduction, a band width of at least 20 kc/s should be admitted to the receiver, but then the signals from neighbouring stations are permitted to reach the detector, and unless the signal strength of the wanted station is very much stronger than that of its neighbours, interference will be heard.

An Adjustment

In sets fitted with variable selectivity the normal setting of the controls gives adequate selectivity for receiving adjacent channel signals free from interference, but a further control is fitted which will "widen the gate," so to speak, and admit a band of frequencies adequate to give excellent reproduction provided the stations working on the adjacent channels are comparatively weak at the spot where the set is installed. This is achieved by varying the coupling in one of the band-pass filters—usually one of the intermediate-frequency transformers of a superhet receiver.

It will be obvious, from the foregoing that the low selectivity setting, corresponding to high-quality reproduction, can only be employed for stations the field strength of which, at the point of reception, is much greater than the field strengths of the stations occupying the channels on either side of it—it is for this reason that the selectivity is made variable. It will also be understood that the device means extra cost in the price of the receiver, whether bought or home constructed, and adds a further control to the set, one which requires a little skill to use correctly.

Those listeners—fortunately they are becoming fewer every season—whose only desire is the maximum volume from the maximum number of stations, irrespective of musical quality, need only to secure the most highly selective and powerful superhet they can afford, and they will be certain of a good log of noisy foreigners.

Another Class

There is another class of listener for whom variable selectivity must be considered an unnecessary refinement. This is the type of listener who is not greatly interested in a large number of foreign stations, but requires something above the average in quality from his local station with a few of the best Continental programmes thrown in. In the majority of cases, such a listener will obtain all that he requires from a simple straight three-valve receiver. The selectivity of such an instrument is sufficient to give interference-free reception of the local stations and some foreigners, but is not so great as to result in a serious cutting of the upper notes.

Unfortunately, in some parts of the country, the selectivity of a simple T.R.F. receiver is not sufficient to prevent interference with the locals by a powerful foreigner, and in such cases the music-loving listener must have a more selective set of the superhet type. It is here that variable selectivity may prove a boon as the control is variable over a wide range, and it is more than probable that there will

(Continued on following page)

(Continued from facing page)

be several stations which can be received satisfactorily with something less than the full selectivity setting. On the other hand, in particularly unfortunate spots, the maximum selectivity of a good class superhet will always be required, in which case the variable selectivity device will be of no service.

Questions of Cost

In some cases variable selectivity may not be the best way out of the interference-cum-quality difficulty, and that is where the question of cost weighs heavily. If the listener is an enthusiastic amateur with a light pocket, he will probably wish to give his family what they desire by way of listening, which is generally the local stations, Luxembourg, Radio-Normandie, and one or two others, and will also want to be able to indulge in his own fancies, be it for long-distance reception, high-fidelity experiments, or trying various circuit arrangements. The provision of a superhet fitted with variable selectivity would, of course, give the family all they require and permit long-distance searching, but it is doubtful whether the extra expense of the variable selectivity feature would be appreciated. Moreover, the set would most decidedly not be a suitable medium for the experimental proclivities of the amateur. The requirements of such a family would again be best served by a simpler general purpose set for normal use, and the money thus saved would go a long way towards the parts needed by the amateur.

In conclusion, it must not be forgotten that it is the broadcasting authorities of the world who have, between them, brought about the condition of ether congestion which necessitates these circuit refinements, but it is the listener who has to pay for them. It is to be hoped that saner counsels will prevail when the short and ultra-short wavebands come to be fully exploited so that the growing company of listeners who appreciate good music well reproduced will be able to obtain it with comparatively simple equipment.

B.B.C. SYMPHONY CONCERTS!

IN the course of the coming winter and spring the B.B.C. Symphony Orchestra will give fifteen symphony concerts in the Queen's Hall on Wednesdays at 8.15 p.m. The concerts are arranged in three series and the dates are as follows :—

Series A.—October 21st, November 25th, January 20th, February 10th, March 3rd.

Series B.—November 4th, December 2nd, January 27th, February 17th, March 17th.

Series C.—November 18th, December 9th, February 3rd, February 24th, April 7th.

Adrian Boult, the principal conductor, will conduct eight concerts. Four British and two distinguished foreign conductors are to appear as guests, namely, Ernest Ansermet, Sir Thomas Beecham, Sir Hamilton Harty, Leslie Heward, Willem Mengelberg, and Sir Henry J. Wood.

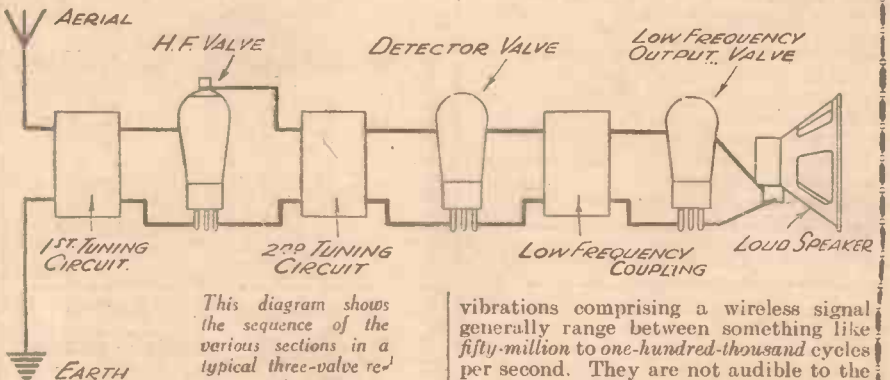
It will be the first occasion on which Mengelberg, Director of the Concertgebouw Orchestra of Amsterdam for nearly a generation, has conducted the B.B.C. Symphony Orchestra, and London will welcome his reappearance after an absence of some years. Leslie Heward will also be making his first appearance at these concerts since the formation of the B.B.C. Symphony Orchestra.

A B C OF THE MODERN RECEIVER—1.

A New Series for the New Reader. The Information Contained in this Feature has been Given Before, but is Repeated in New Form for the Benefit of Those who are Not Conversant with the Fundamental Principles of Receiver Operation, and who want to Understand the Function of the Various Parts of a Modern Set.

WE generally find that the majority of readers take comparatively little interest in purely theoretical considerations affecting set design, but all are anxious to know the "whys and wherefores." It is for this reason that this series of articles is being written. And although a certain amount of theory is essential, even that will be given in the most practical manner possible, reference throughout being made to known factors and known components.

One of the main difficulties of the writer of articles such as this is to know just where to start and with what previous knowledge to credit the reader. In order to make the explanations understandable to everyone, however, regardless of his knowledge of the subject, the matter will be treated from the point of view of those who profess to know nothing about radio principles.



This diagram shows the sequence of the various sections in a typical three-valve receiver.

Principles of Tuning

With this object in view it will be better to start by describing very briefly the whole sequence of events in a simple type of set, from the aerial to the speaker. For this purpose we will take as an example the ever-popular three-valve battery set having one stage of high-frequency amplification (using a so-called H.F. pentode), followed by a detector valve and a low-frequency stage (probably embodying a power or L.F. pentode). It must be understood that electro-magnetic vibrations corresponding with almost every transmission in the world are constantly striking the aerial. Some of these are of such low intensity that they could not be employed, but there are always hundreds of those which could be translated into sound given a sufficiently sensitive receiver. The first question is, therefore, as to how we may select the one transmission required, to the exclusion of all others. As everybody now knows, signals are sent out on a particular wavelength, but it is better to consider this from the angle of a corresponding term—frequency. It is common knowledge that if a piece of metal (a tuning fork, for example) be set to vibrate, it emits a note of definite pitch. It is not always realised that if another similar piece of metal (another tuning fork of the same type) is placed near to that which is vibrating, it also will commence to vibrate in sympathy.

Here, then, is a simple analogy of wireless tuning. It would be possible to make a tuning fork with prongs of which the length could be varied by means of a slider, and if this were placed near to two vibrating tuning forks of different pitch it could be made to vibrate in sympathy with either of them. But whereas the frequency of vibration of a tuning fork for "middle C" is 256 vibrations (or cycles) per second, the electro-magnetic vibrations comprising a wireless signal generally range between something like *fifty-million* to *one-hundred-thousand* cycles per second. They are not audible to the human ear, but a very simple tuning circuit can be devised to respond to them, there being the counterpart of the slider on the variable-pitch tuning fork.

Mixture of Frequencies

The next point which has to be appreciated is that the electro-magnetic vibrations are generally of complex form because, superimposed upon the very *high-frequency* vibrations mentioned, there are others of lower frequency corresponding with the sounds reaching the microphone in the transmitting studio. The *low-frequency* vibrations need not be considered for the moment, but they are later separated from the high-frequency vibrations and changed back into sounds corresponding with the originals.

It is desirable to see the connection between wavelength and frequency, because these terms have frequently to be used. Wireless waves travel at the same speed as light—300,000,000 metres (about 186,000 miles) a second. The vibrations are in the form of waves, and therefore, if there are, say, 1,000,000

vibrations or waves in one second, the length of each wave must be 300,000,000 divided by 1,000,000, or 300 metres. It will be useful to remember that 1,000,000 cycles per second, or 1,000 kilocycles per second, corresponds with 300 metres, because this ratio always holds good. For example, the frequency at half the wavelength is twice as high—2,000 kilocycles—and at twice the wavelength half as high—500 kilocycles.

Sequence of Stages

Having gained a rough idea of the nature of the impulses which strike the aerial, let us examine the sequence of stages in the simple type of set referred to above. It is shown in the illustration on opposite page, from which it can be seen that there is a tuning circuit, followed in turn by a high-frequency valve, another tuning circuit, a detector valve, a low-frequency coupling, a low-frequency valve, and the speaker. The first tuning circuit can be adjusted to *resonate* (equivalent of mechanical vibration) at the frequency of the required signal, so that that signal and no other is allowed to enter the set. The tuning circuit acts as a filter or sieve.

The vibrations at this stage are extremely weak, being at a pressure of a few millionths of a volt. They could not be made to operate a loudspeaker because they would be too weak, and also because, as mentioned above, high and low frequencies are mixed together. It is here that the high-frequency valve, comes into operation and *amplifies* the mixture without in any other way altering it. The valve increases the voltage of the signals, for it is what is known as a voltage-operated device.

Separation of H.F. and L.F.

Next, the amplified signals are passed to another tuning circuit, which further "sifts" them so that if by any chance unwanted frequencies had escaped past the first tuning circuit, they could get no farther. After that operation comes the very important one of "sorting" the low-frequency content from the high-frequency portion, which is referred to as the carrier wave, for obvious reasons. The detector valve, by a rather complicated process, takes out the low-frequency part of the signal, which corresponds to the original sounds, and "destroys" the H.F. The audio-frequency or low-frequency output from this valve is then passed to the low-frequency coupling—generally an L.F. transformer—which has the effect of increasing or stepping-up the voltage. In consequence, the voltage of the signal applied to the output valve is comparatively high (generally from 1 volt upward). The valve further increases this by low-frequency amplification before passing the signals to the speaker.

At this stage, it must be remembered, the electrical vibrations correspond exactly with the sound vibrations occurring in the transmitting studio and striking the microphone. In other words, if a steady note at middle C (256 cycles per second) were being played, the current passing through the speaker would be moving backward and forward 256 times every second. The fluctuating current produces corresponding fluctuations in the magnet system of the speaker and so causes the cone to vibrate at 256 cycles per second, or at any other frequency, according to the nature of the transmission. Thus is the sound produced.

(To be continued.)

SHORT WAVE SECTION

SHORT-WAVE CIRCUITS—1932-1936

A Brief Description of the Circuit Arrangements Which Have Been Developed Since "Practical Wireless" Was First Published

By FRANK PRESTON

IMPORTANT developments in short-wave receiver and circuit design were inevitable four or five years ago, but it is of interest to observe that many experienced short-wave experimenters still favour the old and tried favourite Det.-L.F. arrangement. A typical circuit of this kind is shown in Fig. 1, and this is eminently suitable for the beginner who wishes to make a satisfactory and inexpensive receiver. There are plenty of well-designed S.W. components now available, so there is no need to make shift with ordinary broadcast-receiver parts, as was the case four years ago.

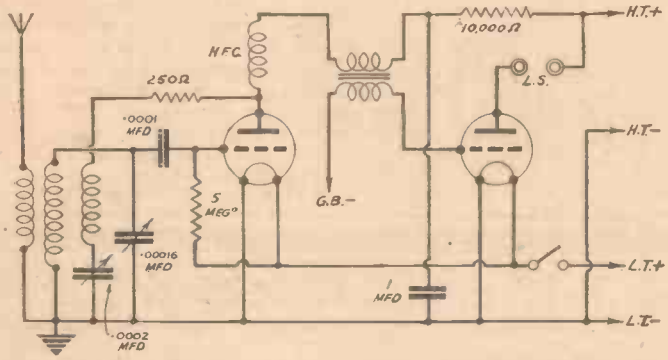


Fig. 1 (left).—A typical detector-L.F. receiver of the ever-popular type.

It is, of course, possible to add several refinements to the circuit shown, and the average constructor to-day would replace the triode detector with an H.F. pentode. Beyond that simple alteration there is no need to elaborate the circuit, for it will permit of almost world-wide reception in capable hands.

Tuned H.F.

When PRACTICAL WIRELESS was first published it was generally agreed that there was little to be gained by using a tuned H.F. stage, but times, and components, have changed. Coils have been standardised to a very noticeable extent, and gang condensers have sections which are so well matched that accurate tuning of two circuits simultaneously is an easy matter. This brings us to the circuit shown in Fig. 2, which shows a typical H.F.-Det combination tuned by means of two coils and a twin .00016-mfd. condenser. Tuned-transformer coupling is used between the valves, and reaction is applied on the well-known Reinartz system, although a 200-ohm fixed resistance is included in the reaction circuit to prevent unwanted oscillation and to prevent the reaction circuit from "taking charge" of tuning. It might sometimes be found worth while to include a 35-m. mfd. variable condenser in parallel with that used to tune the aerial circuit, but that is seldom important, due to the fact that that circuit is generally comparatively "flat." One of the most important points to watch in building a set round a circuit such as this is to see that the connecting leads in the tuning circuits are uniformly short.

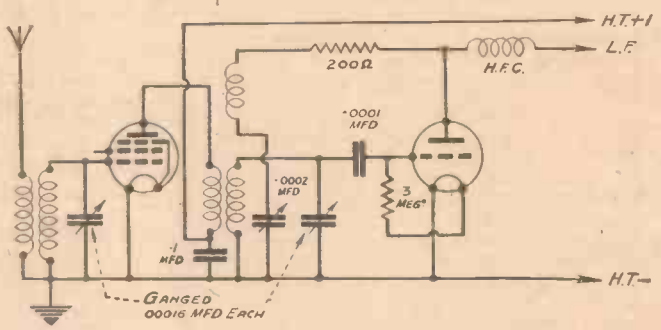


Fig. 2 (right).—Skeleton circuit of a tuned H.F. stage followed by a grid-leak detector.

Band Spread

An improvement which has become popular in connection with the tuning circuit of Det.-L.F. short-wavers is the use of what is known as band-spreading. Although the name given to the system sounds rather grand, there is nothing wonderful in the actual arrangement. It consists only of using two tuning condensers in parallel, instead of one. One of the condensers has a capacity of about .00016-mfd., whilst the other should have a maximum capacity of about one-fifth of this, or 35 m.mfd. The larger condenser is used for "band-spreading," the smaller one serving for the actual tuning operation. In other words, the band-spreading condenser is set to the approximate wavelength of any particular band—19, 30 and 40 metres, for example—whilst the smaller one is used for searching over that band. More accurate tuning can be carried out by the small condenser, and the arrangement makes for simplicity of operation and ease of calibration. The band-spreading condenser need only have a direct drive and a scale, but the tuning condenser should be fitted with a good slow-motion control. Incidentally, it is worth pointing out that there is now available a special band-spreading condenser with a control by means of which it can be turned to one of ten positions by means of a form of ratchet drive. It is an easy matter to calibrate this condenser very roughly after receiving a few stations and then easily and quickly to pick out any required band.

Super Regenerative

The super-regenerative circuit seemed as though it would come back into favour a year or so ago, but it has not become as popular as seemed likely. Despite this, there are many who consider that it can

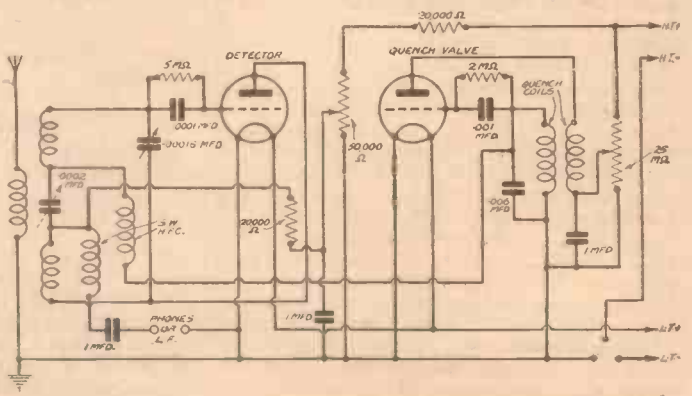


Fig. 3.—Circuit of a two-valve super-regenerative receiver of a type which is particularly suitable for short and ultra-short waves. An L.F. amplifier can, if necessary, be added in the usual manner.

best solve the problem of designing the simple set for reception of the sound channel of the television transmissions. A typical circuit is shown in Fig. 3, and from this it can be seen that two valves precede the L.F. amplifier. The first is a fairly normal detector with reaction, whilst the second is an oscillator which operates at a frequency in the region of 20,000 cycles per second. The oscillations from this are fed into the reacting detector in such a manner that they "break up" the oscillation of the latter. Due to this, the first valve can be maintained in an oscillating condition without the oscillation being audible. And since the valve provides a greater amount of amplification when in this

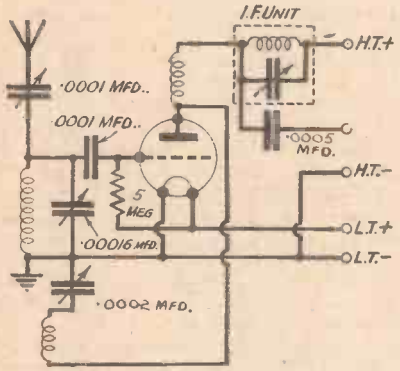


Fig. 4.—This is a circuit for the autodyne frequency changer. The circuit as shown can also be used for an S.W. converter, in conjunction with an H.F.-Det. type of receiver.

condition the circuit is very sensitive. The coils used in the grid and anode circuits of the oscillator are of special type, tuning to a comparatively long wavelength; several firms make the pair of coils in one unit, known as a quench coil.

Superhets

Many early attempts were made to produce a satisfactory superheterodyne short-waver, but most of them failed to give the results which were expected. One reason was that operation was inclined to be "tricky." For one thing, separate tuning condensers for the first detector and oscillator valves (pentagrids, heptodes and the like had not been introduced at the time to which reference is made) were practically essential, whilst difficulty was experienced in keeping the oscillator in steady oscillation over the complete range of wavelengths. A certain improvement in these respects was made possible by the use of an autodyne frequency changer. This consisted simply of a regenerative valve feeding into an intermediate frequency amplifier; a circuit is shown in Fig. 4. The main difficulty here was that the set was not actually tuned to the wavelength of the required transmission, but to a wavelength above or below it—in order to obtain the beat note at intermediate frequency. Thus, each transmission was received at two points on the tuning scale. Despite this, the system was used with fair success in several converters.

Frequency-Changer Difficulties

The introduction of the pentagrid and similar frequency-changer valves, along with the development of accurately-matched tuning coils, overcame most of the superhet troubles. Thus, the circuit such as that shown in Fig. 5 was developed. In this case, a gang condenser was used in conjunction with a pair of ordinary short-wave coils and a trimmer for the aerial section. The output of the frequency-changer is fed into a 465-kc/s I.F. transformer, or similar tuned-coupling device, and an H.F. pentode I.F. valve. This circuit arrangement is extremely valuable when sensitivity is required in conjunction with ease of control. One minor trouble is that there are inclined to be "dead spots" in the tuning range due to the oscillator section going out of oscillation or providing an insufficient output. This can often be overcome by the simple expedient of connecting a triode valve of the HL type in parallel with the triode section of the pentagrid.

An even better method is to use one of the more-recently introduced triode-hexode valves connected in a circuit such as that shown in Fig. 6. This valve, which was specially designed for short-wave use, has proved to be particularly trouble-free; it gives an ample oscillator output and the tuning of the oscillator does not "pull" the tuning of the first-detector portion out of line, as is often the case when using valves of other types. As can be seen from the circuit, the grid of the triode is internally connected to a grid situated between the screening grids of the first-detector hexode. Unfortunately, this valve is made only for use in mains sets, so the battery user must be content with a pentagrid, or pentagrid-triode combination.

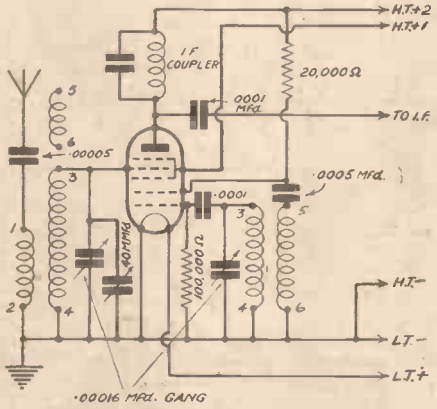


Fig. 5.—The frequency-changer portion of a modern type of superhet using a pentagrid valve. In some cases it is found desirable to connect a triode in parallel with the oscillator section order to maintain uniformity of operation over the wavebands covered.

A.V.C.

Many attempts have been made to apply A.V.C. to short-wave sets, but generally speaking they have not met with success. This is not due to any faults in design or the lack of suitable valves and components, but simply because A.V.C. cannot adequately deal with the rapid fading which is most troublesome on short waves. For this reason it is usually not worth while to incorporate double diodes, but to concentrate on the simpler triode or H.F. pentode, and to design the circuit as a whole for efficiency.

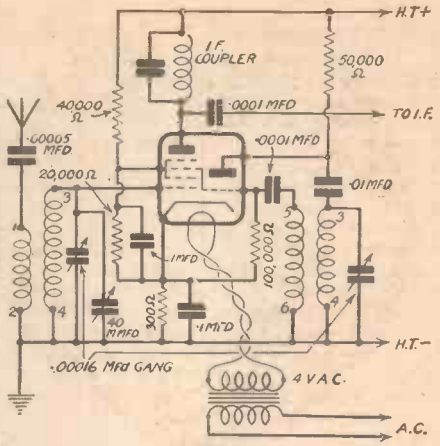


Fig. 6.—A frequency-changer of a modern, high-efficiency type, employing a triode-hexode. This valve is obtainable only for mains operation.

U.S.W. and Television

Many readers are wondering how best they can take advantage of the forthcoming regular television transmissions on about 7 metres. The sound side does not present any serious problems, and any of the circuits described can be used by adding appropriate coils. The vision side presents more difficulties, however, and the matter cannot adequately be treated here. So far, it seems that a superhet is most suitable, but it is necessary to use the special I.F. transformers which have been developed to cover a band width of two megacycles or more. This system is used by manufacturers of commercial television receivers, and most of them use a double superhet for simultaneous reception of the sound and vision frequencies. Roughly, the arrangement is as shown in Fig. 7, there being a common frequency changer which feeds into two separate I.F. amplifiers, one handling the sound wavelength and the other the vision. There are many special points which have to be watched, but readers can rest assured that constructional details of suitable receivers will be published in these pages when the transmissions are available, and when our extensive experiments have been concluded. We consider it better to await the transmissions so that there will be no doubt of the suitability of the sets described for general use. At the moment, it is not an easy matter to make exhaustive tests, due to the temporary nature of the experimental transmissions which are as yet being sent out at odd times.

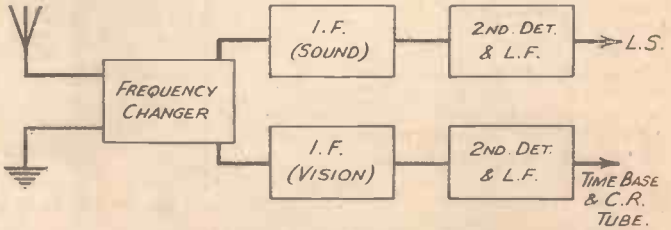


Fig. 7.—The arrangement and sequence of stages used in ultra-short-wave sound-and-vision receivers.

Leaves from a Short-wave Log

THE 40-metre amateur experimental band, already very congested and subject to considerable interference, is witnessing a further intensified invasion by Spanish amateur stations. Apparently, as already reported in these notes, these small transmitters, boosted up to the utmost limit of their energy and in most instances grossly over-modulated, are used not only for the dissemination of war news from both fronts, as well as for inter-communication, but also for the broadcast of private messages. In this direction the writer has picked up communications in both Spanish and French conveying information regarding the safety of individuals and families in beleaguered districts. Even lists of casualties have been heard, and there seems little doubt considering the number of these transmissions now on the air that any apparatus capable of broadcasting telegraphy or telephony has been requisitioned by the belligerents for the purposes mentioned. You will also find the regular medium-wave stations, such as Madrid, Valencia, Seville, on the ether almost throughout the night as well as others which have been opened since hostilities began.

Has Any Reader Heard It?

French listeners report reception of a new North African transmitter with the call *Tunis Experimental* heard between B.S.T. 12.30-14.00 and again between 18.00-20.00 on 41.30 m. (7,624 kc/s). No other details are so far forthcoming.

Further News of South Americans

Listeners report that HJ4ABE, Medellin (Colombia), recently working on 49.20 m. (6,097 kc/s), is closing down pending reconstruction, and on increased power will re-open shortly on 50.59 m. (5,930 kc/s). YV11RB, *Ecos del Orinoco*, Bolivar City, Venezuela, on 45.84 m. (6,545 kc/s), would appear to be a newcomer to the ether; it has been heard broadcasting and asking for reports from YV7RMO, Maracaibo, and YV9RC, Caracas. Finally, OAX4G, Lima (Peru), now increased to 2 kW, and which previously worked on 48.15 m. (6,230 kc/s), is now said to be on 50 m. (6,000 kc/s). The times are B.S.T. 01.00-05.00 daily with an earlier broadcast at midnight on Saturdays.

A Powerful Mexican Signal

XEWI, Mexico City, previously on 50.25 m. (5,970 kc/s) and now on 50.42 m. (5,950 kc/s), gives its call in Spanish and English (*Mi voz al Mundo desde Mexico*—My voice to the world from Mexico). The interval signal reminds you of a turkey gobbler. Announcements are made in Spanish, English, French, German, and Esperanto. If you hear a broadcast between B.S.T. 02.00-06.00 write to Estacion Radiodifusora XEWI, Apartado Postal 2874, Mexico City, D.F., Mexico. A special English programme mainly destined to the U.S.A. is transmitted every Friday between B.S.T. 02.00-03.00. The station also works occasionally on 25.21 m. (11,900 kc/s).

Another Call from Dominican Republic

Although but a small transmitter, HI3U, at Santiago de los Caballeros, on 49.89 m. (6.014 kc/s), is said to have been picked up in Southern England. Announcements are given alternately in Spanish and English, and the usual chimes are used between items in the programme. The time for a search is between midnight and 02.00 B.S.T. The station calls itself: *La Voz del Comercio* (The voice of commerce), and intermittently broadcasts advertisements for local and American products.

Hawaii Calling

So far broadcasts from Hawaii have been heard through the intermediary of U.S.A. stations which have occasionally relayed programmes from Honolulu. Apparently, for publicity purposes, to call attention to the beauties of the island the 40-kilowatt KKP, Kahuku, transmitter is being used for the broadcast of a special programme—*Hawaii calls!*—every Tuesday morning between B.S.T. 05.30-06.00 on 18.71 m. (16,030 kc/s). Such a power gives Europeans an opportunity of getting the transmission direct.

Another Worth-while DX

FO8AA, Papeete (Tahiti), is asking for reception reports from Europe. The wavelength is 42.25 m. (7,100 kc/s). Broadcasts are carried out every Wednesday and Saturday between B.S.T. 05.00-06.00. All announcements are in the French language. Address (if successful!): Poste de Radiodiffusion FO8AA, Le Radio Club Océanien, Papeete (Tahiti).

OUR FREE CATALOGUE SERVICE

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"GOLTONE" COMPONENTS

THE new edition of Ward and Goldstone's radio catalogue also includes a wide range of electrical accessories. In addition to listing various radio components such as H.F. chokes, I.F. transformers, iron-cored tuning coils, coil and switch chassis, switches and terminals, particular attention has been given to suppression devices, including chokes, R.F. inductors, Post Office filter suppression units, and patent air-spaced metal-screened down-leads of the "Metocel" and "Multishell" types. Insulated wire of various kinds, including instrument wires, charging units, small measuring instruments, and a range of bakelite moulded accessories are also included. Interested readers are invited to write for a copy of this useful catalogue, quoting the reference R/135.

EPOCH COMPONENTS

TWO new catalogues have just been issued by Radio Development Company, one dealing with the new season's range of Epoch loudspeakers and microphones, the other giving full details of the Epoch Service, and their short-wave components. Many new features have been added to the already excellent range of loudspeakers, including the Super-Cinema models, the "D4" P.M., the "B7" P.M., and the "New Century" P.M. speaker, which will handle inputs up to 4 watts, and is priced at £1 15s. A popular midget speaker is the Epoch Super Dwarf model, which is only 5in. in diameter and 2¼in. deep. It will handle an input of 2½ watts. Public address horns and output-transformers are also listed, and at the end of the catalogue is a useful table for quickly determining the transformer ratios for correctly matching various speech coil impedances to various loads.

In the other catalogue, which deals with the Epoch Service, is listed a full range of accessories for every conceivable need. The aim of the Radio Development Company is to establish a central house where replacement parts can be obtained promptly, and all the parts in the catalogue are listed at net prices to save the dealer unnecessary work.

FOUR YEARS OF HOME CONSTRUCTION

(Continued from page 35)

first popular and inexpensive superhet, and the first of its type ever to be offered to the home constructor, was the "£5 Superhet"—an astounding receiver described in PRACTICAL WIRELESS in November, 1934. This was made possible very largely by the introduction of the heptode frequency-changing valve, which combines the functions of a variable-mu H.F. pentode and a triode oscillator.

Cheaper Components

Another important development which has taken place in home construction during the past four momentous years is in connection with the reduction in size and price of components. In this respect we claim to have been pioneers, for we first published designs for a number of midget receivers in the "Cameo" range. Our "Leader" series of sets were, on the other hand, produced for the especial purpose of presenting high-grade receivers which could be built cheaply. The first of these was the "Leader Three"; many others have followed, and our latest designs are such that the sets can be made at low cost.

It would be possible to mention many other changes which have taken place in home-constructor set designs since No. 1 of PRACTICAL WIRELESS, but space will not permit. What new developments and important changes shall we be able to report four years hence? It would be difficult even to guess, but it is very likely that the words "television" and "ultra-short" will figure very prominently in the report when it is written.

IMPRESSIONS ON THE WAX

By T. Onearm

A Fine Tenor Record

BENIAMINO GIGLI, the well-known tenor, makes a welcome appearance this month on *H.M.V. DA* 1488. He sings two songs and is accompanied by the Berlin State Orchestra conducted by Alois Melichar. The first is Bach-Gounod's "Ave Maria," as featured in the film of that name, and is an arrangement for tenor and chorus, with a harp accompaniment. The second is Bizet's "Agnus Dei." You should certainly hear this record.

For those who dislike crooning, two songs by Derek Oldham will be a welcome relief. He sings "You Will Remember Vienna" and, with male chorus, "Under the Lilac Bough" from "Lilac Time," that evergreen, now enjoying one of its revivals in London. Derek Oldham has, in the past, appeared in this tuneful operetta. The number of the record is *H.M.V. B* 8477.

"Songs my Mother Taught Me" and "La Fille aux Cheveux de lin" is the latest recording of Yehudi Menuhin, the violinist—two popular pieces by great composers. The number is *H.M.V. DA* 1499.

Peter Dawson's Latest

PETER DAWSON is represented this month by "Empty Saddles" from that very popular film now showing in London, "Rhythm on the Range," coupled with "Covered Wagon Lullaby." Both of these songs are sung extremely well by this artist and he is accompanied by an orchestra—*H.M.V. B* 8475.

Another interesting record is Webster Booth singing two charming ballads entitled "I'll wait for you" and "I'm all alone," on *H.M.V. B* 8476.

From the Films

GRACE MOORE'S new film, "The King Steps Out," which is shortly to be released in London, has music by Kreisler. On *H.M.V.* C 2851 are Vocal Gems from the above film with orchestral accompaniment.

Another selection also appears on *H.M.V. BD* 361. This time from the show, "This'll Make You Whistle." Jack Buchanan is shortly to appear in London in this production. The title is no misnomer. It is an ideal repertoire for the man who insists on singing and whistling in his bath! The selection is played by Louis Levy and his Gaumont-British Symphony Orchestra.

Sam Browne also makes a new record this month on which he sings two sentimental songs. The first, entitled "Would You?" is from the film success "San Francisco." This film will also be remembered for those unforgettable scenes of the big earthquake. The second song is "I nearly let love go slipping through my fingers," from the film "It's Love Again"—*H.M.V. BD* 362.

"The Great Ziegfeld"

ANTON and the Paramount Theatre Orchestra, London, with the assistance of Reginald Foort at the organ, play an engaging Medley from the film "The Great Ziegfeld" on *H.M.V. BD* 364. This film, which is now making its appearance in this country at His Majesty's Theatre, runs for about three hours and has an abundance of good tunes.

New Orchestral Recordings

HERE are two old favourites played by Barnabas Von Ceczy and his Orchestra. The first is "Valse Triste," which is Sibelius's most popular composition. It was written as part of the incidental music to a play by his brother-in-law. The other is the Hindu song "Sadko," which is equally well-known. The number of the record is *H.M.V. B* 8464.

The Boston Promenade Orchestra, conducted by Arthur Fiedler, is represented by "Procession of the Sardar" (No. 4) from "Caucasian Sketches" by Ippolitow-Ivanow, and Verdi's "Aïda" Grand March. These are two of the best-known pieces of processional music and are extremely well recorded on *H.M.V. C* 2849.

Dancing Time

RAY NOBLE and his Orchestra are represented this month by two popular tunes on *H.M.V. BD* 5095. They are "Empty Saddles," from the film "Rhythm on the Range," vocalised by Al Bowlly, and "Stirling Bose." Roy Fox and his Orchestra have also made two new records this month. On *H.M.V. BD* 5096 they play "No Regrets" and "You're Heart and Mine" from the current show "Blackbirds of 1936." The other two numbers are "On the Beach at Bali-Bali" which has been a firm favourite in America, and "An old Hawaiian Guitar"—*H.M.V. BD* 5097.

Dance enthusiasts will welcome "Fats" Waller and his Rhythm in "Let's Sing Again" from the film of that name, and "Cross Patch" on *H.M.V. BD* 5098.

Tommy Dorsey and his Orchestra have recorded an unusual title in "You've gotta eat you spinach, Baby" from the film "Poor Little Rich Girl." The record is coupled with Ruby Newman and his Orchestra playing "We'll rest at the end of the Trail"—*H.M.V. BD* 5099.

Yet another successful number from "Rhythm on the Range" is played by Eddie Duchin and his Orchestra on *H.M.V. BD* 5101. This is "I'm an Old Cow Hand" and on the reverse side is a rendering, by the same combination, of "Take my Heart."

Swing Music

AMONG this month's all-star array of "Swing" music there is an unusual record of two famous bands' versions of the same number. On *H.M.V. B* 8468 that favourite tune "Star Dust" is played by Benny Goodman and his Orchestra, and also by Tommy Dorsey and his Orchestra. The two versions stand out in great contrast. Benny Goodman with his fine precision and biting instrumental effects, with fancy clarinet flourishes against a great saxophone chorus—and Tommy Dorsey, with a slower pace, featuring the finest trombone passages he has ever played.

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.)

Received on a Two-valver

SIR,—I herewith submit my log of amateur short-wave stations, received on a two-valve (two triodes, L21 as det. and LP2 as L.F. valve) set, between 22.35 and 23.10 B.S.T. on Saturday, August 22nd. HI7G, W1AXA, W1FLH, W2HCE, W1BLO, W3EOZ, W2FF, VO1J, W1CCZ, W1BQQ, CO2HY, VE1BR, W2CDG, VE1CR.

On Sunday, August 23rd, 5.45 to 8.15 B.S.T.: W1MX, W3EWW, W2HUQ, W1ARC, W3EAH, NY2AE, F8II, HH2B, and also Australian, VK2QR, using only 20 watts in the final stage, was heard at QSA2-3 and QRK R 3-4. Two Canadians, VE1IN and VE1GH were also heard during the evening. All the usual short-wave broadcasters, such as VK2ME, JVH, JVN, W2XAD, etc., are received regularly.

The antenna is 75ft. long and slopes at an angle of about 45 degrees; maximum height 30ft., lower end pointing N.W., the wire being "doubled" back to form a "V" shaped antenna.—RONALD H. BETTINSON (Leicester).

A S.W. Log from Nottingham

SIR,—As I have not seen any logs from Nottingham readers, I enclose mine for the 26th and 27th of August.

Broadcasting stations: VK3LR, W8XK, W1XK, W2XAF, W2XAD, W1XAL, W2XE, SPW, UPD, HAS3, W3XAL, Zeesen on seven wavelengths, Daventry on five, W3XAU, PRF5, JVM. Amateurs on 20 metres, 20.00 to 00.00: W1DLC, W1KK, W1CHG, W1GXA, W1FLH, W1CH, W1BTL, W1QM, W1LX, W1CND, W1BQQ, W1CCZ, W1TLH, W1GED, W2EDW, W2DFD, W2DW, W2MT, W2GW, W2CQ, W3DAC, W3EMM, W3DPC, W3EOZ, W3DE, W3ARE, W4FM, W5ACD, W6ABF, W8DL, W8DOY, W8DQN, W8LS, W8ELY, W9YGP, W9FJ, W9CLH, W9TB, W10DXA, F8VP, SU1CH, ON4UU, ON4ZW, ON4DK, VE2BG, VE1CN, VE9G (Bermuda), VO1J, VO1I, YV5AA, YV4AC, HI7G, and about a dozen British stations.

I should be pleased to get in touch with any Nottingham S.W. amateurs.—R. F. MELLOR (26, Ramsdale Crescent, Sherwood, Nottingham).

Reports and Postage

SIR,—I have read the letter *re* QSLs by W. T. Cooper (Walthamstow) in the August 22nd issue of PRACTICAL AND AMATEUR WIRELESS. As Amateur Editor of the *British S.W.L. Review* (which has over 300 members) I have always requested members not to report to G stations, or even many Europeans as they are *not* DX to us, and our reports are of little use to them. In fact very few, if any, European stations (phone) are mentioned in members' reports of calls heard.

Finally, I make a *strong* assertion to both W. T. Cooper and Geo. Miller (W. Ealing) that a *good detailed* report sent to a REAL *DX* Station *should* be *worth* a QSL card *at any time, whether postage is sent or not.* And this very often turns out to be the case, as witness many fine QSLs and photos and appreciative letters I possess from amateur stations. To quote only a few —HI7G, 20 m.: Mine was the first phone report he received from Europe (1934) when he was only using 20 watts input. Others of my first time reported QSLs are W6MXW, W9BPK, W9WEL (40 w. input), W7VS, VE5JB, VE4CW, VE4RW, VE4NM, and many others.

On the other hand, I know of a number of stations in Pittsburg and Cleveland area and elsewhere who don't intend to QSL; but still ask for our reports. Also the Gs are very "careless," to use a *mild* term. I have QSLs from VE5DK and several others who asked when *G6LK* was going to send them his QSL as they *all had sent him one.* Incidentally, I have a QSL for G6LK sent me by W6ELR, and which 6LK can have if he sends me postage.—R. D. EVERARD (Weedon, Bucks).

QSLs—A Suggestion

SIR,—Every week I read with interest the letters from readers who send in their short-wave logs and also on the subject of QSL cards. I had sent to me some time ago a supply of Canadian and American postage stamps, which I use instead of reply coupons, and with every report I send to Canada or the United States I enclose a stamp for reply purposes. During the month of July I sent reports to over fifteen amateurs in these two countries and I am still waiting for replies. May I say that I do really enjoy reading your very fine paper.—R. TOWLER (Bingley).

Practical and Amateur Wireless
BLUEPRINT SERVICE

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 7½d., 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.

PRACTICAL WIRELESS

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.

	Date of Issue.	No. of Blueprint
All-Wave Unipen (pentode) ..	—	PW31A

Two-valve : Blueprints, 1s. each.

Four-range Super Mag Two (D, Pen)	11.8.34	PW36B

Three-valve : Blueprints, 1s. each.

Selectone Battery Three (D, 2 LF (trans.))	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Power) ..	—	PW35
Summit Three (H.F. Pen, D, Pen)	8.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow.) ..	—	PW41
Hall-Mark Cadet (D, LF, Pen (R.C.))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D pen), Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (trans.)) ..	*June* '35	PM2
Cameo Midget Three (D, 2 LF (trans.))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (R.C.))	31.8.35	PW55
The Monitor (HF Pen, D, Pen) ..	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P) ..	—	PW64
The Gladiator All-Wave Three ..	29.8.36	PW66

Four-valve : Blueprints, 1s. each.

Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46

Mains Operated.

Two-valve : Blueprints, 1s. each.

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

Three-valve : Blueprints, 1s. each.

Double-Diode-Triode Three (HF Pen, D.D.T., Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All Wave" A.C. Three (D, 2LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56

Four-valve : Blueprints, 1s. each.

A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.

£5 Superhet (Three-valve) ..	—	PW40
F. J. Camm's 2-valve Superhet (two-valve)	13.7.35	PW52
F. J. Camm's £4 Superhet ..	—	PW53

Mains Sets : Blueprints, 1s. each.

A.C. £5 Superhet (three-valve) ..	—	PW43
D.C. £5 Superhet (three-valve) ..	1.12.34	PW42
Universal £5 Superhet (three-valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	—	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

SHORT-WAVE SETS.

Two-valve : Blueprints, 1s. each.

Midget Short-Wave Two (D, Pen)	15.9.34	PW38A

Three-valve : Blueprints, 1s. each.

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

PORTABLES.

Three-valve : Blueprints, 1s. each.

F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) ..	16.5.36	PW65

Four-valve : Blueprints, 1s. each.

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

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE

CRYSTAL SETS.

Blueprints, 6d. each.

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

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.

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

Two-valve : Blueprints, 1s. each.

Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG, Det, Pen) ..	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans) ..	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	*July* '36	WM409

Three-valve : Blueprints, 1s. each.

Class-B Three (D, Trans. Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)	—	AW410
Lucerne Ranger (SG, D, Trans) ..	—	AW422
Cossor 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
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple-tune Three (SG, D, Pen) ..	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans) ..	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
P.T.P. Three (Pen, D, Pen) ..	*June* '35	WM389
Certainty Three (SG, D, Pen) ..	*Sept.* '35	WM393
Minitube 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)	10.9.33	AW402
2 H.F. Four (2SG, D, Pen) ..	—	AW421
Crusaders' A.V.C. 4 (2HF, D, QP21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: blueprints, 6d. each) ..	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	*Feb.* '35	WM381
The H.K. Four	*Mar.* '35	WM384
The Auto-Straight Four	*April* '36	WM404
The Request All-Waver	*June* '36	WM407

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

Super-quality Five (2HF, D, RC, Trans)	*May* '33	WM320
New Class-B Five (2SG, D, LF, Class B)	*Nov.* '33	WM340
Class-B Quadradyne (2SG, D, LF, Class B)	*Dec.* '33	WM344
1935 Super Five (Battery Superhet)	—	WM379

Mains Operated.

Two-valve : Blueprints, 1s. each.

Consolectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)	*Sept.* '35	WM394

Three-valve : Blueprints, 1s. each.

Home-lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383
S.G. Three (SG, D, Pen) A.C. ..	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentagrid-Four (HF Pen, D, Pen) A.C.	23.6.34	AW430
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401

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

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

SUPERHETS.

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

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

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

1934 A.C. Century Super A.C. ..	10.3.34	AW425
Heptode Super Three A.C. ..	*May* '34	WM350
"W.M." Radiogram Super A.C. ..	—	WM366
1935 A.C. Stenode	*Apl.* '35	WM385

PORTABLES.

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

Midget Class B Portable (SG, D, LF Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans) ..	*Aug.* '34	WM367

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.

H. S. W. (Croydon). The eliminator used should have an output of approximately 120 volts at 15 m.a. with an S.G. tapping giving approximately 60 volts. If the eliminator is in order a 20,000 ohms resistance should be connected between R. and H.T. 120 and a 2 mfd. condenser between the juncture of the two resistances and H.T. —.

M. W. (Llanelly). A simple tester for A.C. and battery valves is described in PRACTICAL AND AMATEUR WIRELESS dated 19.10.35 (page 151). A tester capable of giving mutual conductance readings is somewhat complicated, however, and if these readings are desired a commercial tester should be obtained.

H. W. (Brighton). Your .0002 mfd. condensers can be used in the short-wave converter/adapter described in PRACTICAL AND AMATEUR WIRELESS dated 28.3.36.

C. E. (Port Talbot). The circuit arrangement and layout of your receiver is not exactly like those of the Lucerne Straight Four, but it is probable that most of your components can be satisfactorily used in the receiver in question.

H. G. (Goole). We suggest that you build the converter/adapter described in PRACTICAL AND AMATEUR WIRELESS dated 28.3.36. The valve you mention is a Marconi A.C. power type.

L. McK. (Chelsea). A blueprint of a straight 5-valve portable receiver is not available, and therefore we think that the best procedure will be for you to construct an S.G. four-valver such as the Family Portable, AW447.

S. R. R. (Westminster). Thanks for the short-wave log—this is very satisfactory for August. Your suggestion will be carefully considered.

H. G. (London, N.16). The Lucerne coil should work satisfactorily in your receiver, but it cannot be expected to provide greater sensitivity than your plug-in coils if these are of reliable make. We suggest that you obtain the blueprint of the Lucerne Straight Three or Straight Four from our Blueprint Dept. The wiring of the coil is clearly indicated on these prints.

F. N. (Scunthorpe). The addresses of short-wave transmitters will be found in the Radio Amateur Callbook, obtainable from F. L. Postlethwaite, 41, Kinfauns Road, Goodmayes, Essex. Your reports may be sent direct to the broadcast stations—e.g., Broadcasting Station VUB, Bombay, India.

J. A. W. (Cowdenbeath). The secondary terminals of the microphone transformer may be connected to detector grid and G.B. — 1½ respectively. The trouble experienced with your receiver tends to indicate that the first tuned circuit is not accurately trimmed when the earth lead is connected up. The trimmer of the first section of the gang condenser should therefore be adjusted.

G. D. B. (Halifax). If the crackling ceases when the aerial is disconnected it indicates that the noise originates external to the receiver. It is therefore suggested that you fit a screened down-lead (e.g., Belling-Lee).

D. M. (Stornoway). The trouble experienced indicates that the reaction winding is too near the grid winding. The reaction winding should be wound on a small former and placed inside the grid winding former.

B.S.S. (Orpington). The kit you require may probably be obtained from Lissen, Ltd., Angel Rd., Edmonton, London, N.18.

BOOKS RECEIVED

BELLING-LEE RADIO AND ELECTRICAL ACCESSORIES, published by Belling and Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex, price 6d.

THIS 46-page book is one which should be in the hands of every constructor, service engineer, and radio dealer. Printed on stout, glossy art paper it combines the functions of a catalogue with those of technical specifications and blueprints. Details and prices of the extensive range of Belling-Lee electrical and radio connecting devices, plugs, sockets, etc. are given, along with a brief description of each. Extremely good half-tone pictures of the devices are given on the right-hand pages, whilst blueprints giving all dimensions occupy the left-hand pages. Also included are the main extracts from the I.E.E. Regulations concerning fuse data. Throughout, great care has been taken to provide the reader with every possible item of information he might desire. The production is praiseworthy from every point of view.

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

British Sound Recording Association

AT a meeting held at 44, Valley Road, Shortlands, Kent, on Wednesday, September 9th, twelve recording enthusiasts from London and the Provinces unanimously agreed to form the British Sound Recording Association, with a number of objects covering every phase in the fascinating subject of amateur sound recording.

A temporary Committee was appointed to draw up a list of proposed rules to be put before a General Meeting held at the same address on Wednesday, 23rd inst. Officers for the year will be elected and serious work begun without further delay. Anyone interested is invited to apply for further particulars to C. L. Appleby (Acting Secretary), 29, Valley Road, Shortlands, Kent.

North Mancheste rRadio Society

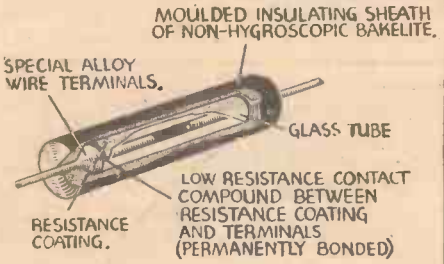
MEETINGS of the above Society have now commenced again at the meeting room at the British Legion, Elm Street, Bury New Road, Whitefield, near Manchester. A meeting was held on September 18th, and on September 23rd a party visited the Radio Exhibition at the City Hall. Another meeting will be held on October 2nd. Further particulars from Mr. R. Lawton, 10, Dalton Avenue, Thatch Leach Lane, Whitefield,

Facts and Figures

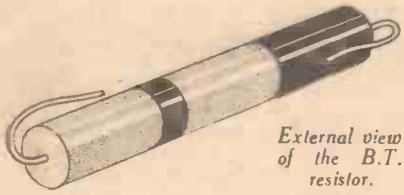
COMPONENTS TESTED IN OUR NEW LABORATORY

Dubilier Metallised Resistances

A NOTEWORTHY addition to the range of resistors manufactured by Dubilier is the new Type B.T. resistor which has several outstanding features. The resistor is of the metallised-filament type, and its overall dimensions and operating temperatures have been reduced below



A sectional view showing the construction of the new type B.T. resistor.



External view of the B.T. resistor.

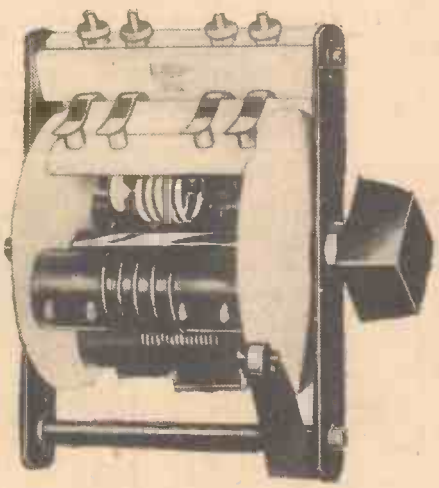
those heretofore used. In the unique design of these resistors the heat-conducting properties of the wire leads are utilised to extract heat from the resistor, and so reduce its operating temperature. The wire leads are thus made to serve the dual function of electrical connectors and cooling agents. The resistance element consists of the well-known metallised filament resistance coating applied to the outer surface of a glass tube. A special bakelite insulating compound is then moulded around the resistance element, affording complete protection and insulation to the element. Type B.T. resistors are made in three sizes and ratings, the ⅛ and ½-watt types having a maximum voltage rating of 350 v. and a minimum resistance of 100 and 200 ohms respectively. The 1 watt type has a maximum voltage rating of 500 .v. and a minimum resistance of 300 ohms.

New Lissen Hi-Q Components

RECENT additions to the range of short-wave components marketed by Lissen, Ltd., include ultra-short and short-wave chokes, a low-loss condenser, low-loss valveholders, an I.F. unit, 4-range rotary coil unit, L.F. transformers, and fixed condensers. The special low-loss condenser has a minimum capacity of 5 micro-microfarads and is noiseless in action. Fitted with a ceramic end piece and brass vanes it is available in two types, 160 mmfd. at 7s. 6d., and 20 mmfd. at 5s. 6d. The low-loss ceramic valveholders which are fitted with double contact nickel springs, are for baseboard mounting, and are obtainable in 5- and 7-pin types, priced at 1s. 9d. and 2s. 3d. respectively. The tuned anode I.F. coupling unit, for a frequency of 50 kc/s, has been specially designed for circuits incorporating the new rotary coil unit, and is priced at 7s. The new coil unit, which is illustrated herewith, is particularly interesting, the coils being of the plug-in type mounted on a rotary assembly. An important feature is that each coil former is provided with studs which make contact with the terminal strips as the control knob is turned, thus dispensing with connecting wires, and adding to the efficiency of the unit. The insulating material is of low-loss ceramic, and the contacts are solid nickel. The complete coil unit covering four wavelengths from 4.8 to 91 metres is priced at 15s. 6d., and an extra coil to cover from 75-175 metres is listed at 2s. 6d.

Mansbridge type fixed condensers, suitable for use on any working voltage up to 250 D.C., are made in capacities of 0.1 and 1 mfd. at 1s. 9d. and 2s. 6d. respectively, and mica fixed condensers are available in six capacities from 0.00005 to 0.002 mfd. at 9d., and in values of 0.005 and 0.01 mfd. at 1s. These condensers are now provided with white bakelite cases, and are particularly suitable for all-wave sets.

Also included in this new range of Hi-Q components is a slow-motion drive intended for ultra-short and short-wave work. The drive has a ratio of about 25-1, and the circular dial is divided into 10 divisions for approximate tuning by a small pointer, each division being sub-divided by a large



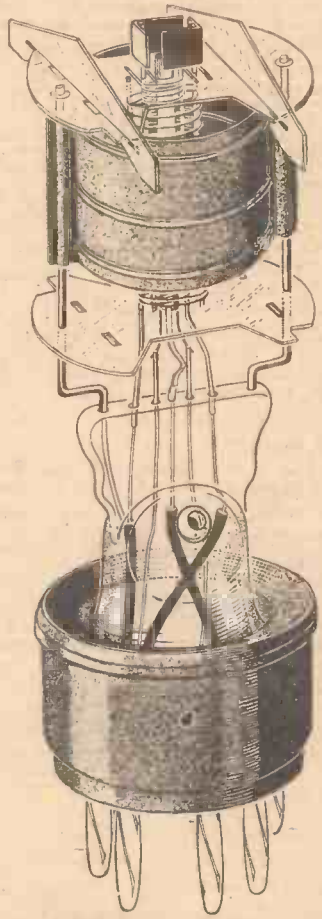
The new Lissen rotary coil unit.

pointer into a further 100 divisions, to enable accurate calibration by decimal readings to be made. This new drive, complete with condenser-fixing bracket, is priced at 12s. 6d.

The Harries Output Valve

THE Harries output valve, one of the latest additions to the Hivac range, should appeal to all battery users who are out to obtain better quality and more volume. In this valve the suppressor grid has been dispensed with, yet undesirable secondary radiation, which the suppressor grid was designed to overcome, has been effectively prevented by setting the anode at a carefully calculated distance. This "critical" spacing of the anode, and removal of the suppressor grid, gives this valve three major advantages over the pentode type: better characteristics, low internal impedance, and low inter-electrode capacity. Thus it will be seen that the Harries valve has the great sensitivity of a pentode type with the low distortion level of a triode.

This firm also includes a complete range of midget valves in their new season's programme. The latest addition to this range is a new Hivac metal-sheathed triode.



Electrode assembly of the Harries output valve.

The following price reductions have taken place in the Hivac range :—

BATTERY VALVES

	Old Prices	New Prices
Y220	10/6	9/6
Z220	10/6	9/6
B230	10/6	9/6
QP240	19/6	17/6
TP230	15/6	14/-
SG215	10/6	9/6
SG220	10/6	9/6
VS215	10/6	9/6
HP215	10/6	9/6
VP215	10/6	9/6

MAINS VALVES

AC/HL	9/6	8/6
AC/DDT	12/6	10/6
AC/L	12/6	8/6
AC/Y	15/6	11/6
AC/Z	15/6	11/6
AC/SL	13/6	10/6
AC/VS	13/6	10/6
AC/SH	13/6	10/6
AC/VH	13/6	10/6
AC/HP	13/6	10/6
AC/VP	13/6	10/6
UU120/500	15/-	12/6
PX41	13/6	12/6

All remaining types of Hivac valves unchanged.

QUERIES and ENQUIRIES

The spare contacts on the switch plates should be left disconnected, as mentioned in the constructional article.

Replacement Choke

"The field winding of my energised moving-coil speaker has burnt out, and as I have been given a good permanent-magnet speaker I should like to use this in place of the energised model. The field winding resistance was 2,500 ohms."—L. T. S. (Rickmansworth).

IF the transformer attached to the permanent-magnet speaker has been designed to match the output valve in your receiver the speaker may be used in place of the energised model. The leads at present joined to the terminals of the field winding should be connected to the terminals of a choke having a resistance of 2,500 ohms and a current carrying capacity slightly higher than the actual current to be passed. If a choke of this resistance cannot easily be obtained, a standard 1,000 ohms choke connected in series with a 1,500 ohms resistance may be used.

U.S.W. Coils

"I wish to experiment on the ultra-short wave-bands, but would like to make my own coils, as I have always had good results from home-made coils on the normal short-wave bands."—E. R. T. (Leith).

ULTRA-SHORT-WAVE coils have to be carefully constructed if a definite wave-band is to be covered. The diameter of the turns and the distance between the turns are of great importance. If it is desired to tune to the sound signals which will be transmitted in conjunction with the vision programme, the grid winding should consist of six turns of 14 s.w.g. wire spaced ¼in. apart and ¾in. in diameter. If the diameter is increased the number of turns must be lowered, of course. The reaction winding for use with this should have one turn less, and the same applies to the aerial coupling coil, if used.

The "Gladiator" Switch

"I am constructing the Gladiator Three but am not quite clear concerning the wiring of the multi-contact switch. The switch diagram is separate from the set wiring diagram and I am not quite certain which view of the switch plates is depicted. The switch I have received has five contacts on each side. Do I ignore all those that are not shown on the switch diagram?"—M. R. (Plymouth).

THE wiring diagram of the multi-contact switch shows the back view of the two plates. If the diagram is checked in conjunction with the accompanying photograph no difficulty should be experienced.

Tuning Indicator

"I should like to fit a tuning indicator to my mains set. The valve sequence is two H.F. pentodes as H.F. amplifiers, followed by a reacting triode detector and a pentode output valve. I would prefer to use a meter for the purpose if this is possible.—T. J. R. (Goole).

A RELIABLE milliammeter having a full-scale deflection of between 7 and 10 m.a. may be used as a tuning indicator. The anode circuit of the detector valve should be broken, preferably between the H.T. terminal of the transformer and the H.T.+ lead. One terminal of the meter should then be connected to the H.T. terminal and the other to the H.T.+ lead. If the detector stage is well designed a reading of between 5 and 7 m.a. will be registered when no signals are being received and a drop of 1 m.a. will occur when a strong signal is received. The exact tuning point is reached when the reading is at minimum. It is assumed that the detector is working on the power-grid principle.

RULES

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

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

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

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

Bandspread Three

"I have built the Bandspread Three short-wave receiver described in a recent issue of "Practical and Amateur Wireless," and find that slightly better volume is obtained when the cap of the first valve is connected to the fixed vanes of the tuning condenser than when joined to the cap terminal of the coil. Is this method of connection in order?"—R. S. (Sudbury Hill).

IT is quite in order to connect the cap of the first valve to the fixed vanes of the tuning condenser, but with this method of connection the primary winding of the short-wave coil is not made use of. In some cases this alteration to the wiring will produce dead spots on the tuning scale and therefore it is advisable to use the coil as an H.F. transformer as shown on the diagram.

Pentode Replacement

"I do not get quite sufficient volume from my mains receiver when listening to Continental stations and would like to know whether I can use the high-amplification type of pentode in place of my existing A.C./Pen.—L. T. B. (Bridgend).

YOU may use the high-amplification type of pentode if resistance capacity coupling is used between the detector and output stages. Its use is not recommended if transformer coupling is employed, however. It will be necessary for you to substitute a seven-pin holder for the existing five-pin type. The bias resistance connected in the cathode circuit of your existing valve must also be replaced. Most high-amplification pentodes require a bias resistance of 150 ohms, but the valve-maker's instructions must be consulted in this connection. It will not be necessary to change the bias resistance by-pass condenser.

Short-wave Valves

"I suffered from blind spots on my short-wave receiver employing an S.G. H.F. valve, a triode detector, and a pentode output valve. I decided to fit one of the new short-wave valves in the H.F. stage—the Hivac SG220SW. Since I made the alteration I have not been able to receive any signals. Can you let me know what is likely to have gone wrong?"—F. O. H. (Leicester).

YOU have overlooked the fact that the short-wave valve you are using has its grid connected to the top cap, and not to the normal grid pin. You have therefore applied a high positive voltage to the grid and have probably damaged the valve.

The Westector

"I have a Westector in my possession, and would like to know if it is possible to incorporate it in a receiver having no H.F. amplification."—S. T. (Nottingham).

THE Westector is the latest addition to the rectifier types. Like the diode this has the disadvantage of producing distortion if the input is too low, and is, therefore, not suitable for use in receivers having no H.F. amplification. It will give very satisfactory results in a powerful receiver having two or more H.F. stages, however, and it is practically impossible to overload it with the input available in present-day receivers.

The coupon on page 36 must be attached to every query.

Miscellaneous Advertisements

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

RADIO CLEARANCE

63, HIGH HOLBORN, W.C.1

TEL: HOLBORN 4631.

ANNOUNCING GREATER BARGAINS THAN EVER IN GUARANTEED RADIO.

Price £8.19.6 PLESSY 6-VALVE ALL WAVE A.C. RECEIVER, wave range 15-2000 metres. 9½" Auditorium speaker. Provision for external speaker and pick-up. Handsome Walnut cabinet of modern design. Brand new. Made for export. To sell at 20 gns.

EXCLUSIVE AMERICAN RIGHTS HELD BY US FOR CONSTRUCTRAD SHORT-WAVE KITS. All kits supplied valves free. 5 Interchangeable coils covering a range from 15-600 metres.

29/6 One-valve battery kit.

37/6 One-valve A.C./D.C. kit.

37/6 Two-valve battery kit.

49/6 Two-valve A.C./D.C. kit.

30/- LISSEN 100-STATION SET, screen grid, detector, pentode, B.A. speaker, shop soiled; few only.

35/- DITTO with moving coil speaker.

35/- ALBA H.F. PEN., DETECTOR, PEN., 3 VALVE CHASSIS, brand new, fitted Mullard valves.

75/- AC/DC AMERICAN MIDGET, 5-valve type, a real quality job, Jensen moving coil speaker, etc., brand new, boxed.

27/6 LISSEN SKYSCRAPER 3 CHASSIS, complete with valves, few only, slightly shop soiled.

17/6 GRAMPIAN P.M. MOVING COIL SPEAKER, 7½" cone, fitted in handsome Walnut cabinet of modern design, 10 range variable volume control Multi transformer.

21/- Similar to above but larger cabinet.

BRYCE MAINS TRANSFORMERS AND CHOKES, standard for the season, finest made, British and guaranteed.

8/6 250-0-250, 80 m.a., 2-0-2 volts, 2.5 amp., 2-0-2 volts, 4 amp.

10/6 350-0-350, 120 m.a., 2-0-2 volts, 2.5 amp., 2-0-2 volts, 4 amp.

12/6 350-0-350, 150 m.a., 2-0-2 volts, 2.5 amp., 2-0-2 volts, 4 amp., 2-0-2 volts, 2 amp.

17/6 500-0-500 volts, 150 m.a., 2-0-2 volts, 2.5 amp., 2-0-2 volts, 6 amp., 2-0-2 volts, 2 amp. 2-0-2 volts, 2 amp.

8/6 H.T.8 transformer, 250 volts, 60 m.a., 2-0-2 volts, 4 amp.

17/6 Ditto with H.T. 8 metal rectifier.

ALL TRANSFORMERS ARE FULLY SHROUDED.

MAINS CHOKES.

4/6 40 m.a. 30 henrys.

6/- 60 m.a. 40 henrys.

10/6 150 m.a. 40 henrys.

21/- 250 m.a. 15 henrys.

6/- 60 m.a. 80 henrys, 2,500 ohms for speaker replacement, etc.

12/6 SPECIAL CLEARANCE CHOKE, 250 m.a. 12 henrys, 100 ohms heavy duty type, interleaved windings, etc. Cannot be repeated.

TRIAD AMERICAN VALVES, highest quality. All types 5/6 each as follows:

01-A, 24A, 27, 30, 31, 32, 33, 35, 37, 38, 39, 41, 43, 45, 46, 47, 53, 55, 56, 57, 58, 59, 71A, 75, 78, 80, 6A6, 1C6, 6F7, 2A3, 5z3, 12A7, 6A7, 6C6, 6D6, 12Z3, 25Z5.

ALL these valves carry a 90-day guarantee and free replacements provided that the filament or heater is intact and the glass is not broken when returned to us.

3/6 LISSEN CLASS B VALVES brand new, boxed.

7/6 SET OF 3 LISSEN BAND-PASS COILS, iron core, screened, without switching, complete with circuit.

9d. LISSEN R.C.C. UNITS.

2/6 8 mfd. AND 4 mfd. ELECTROLYTICS, 450 volt working, 500 volt peak, well-known make.

6d. 1 WATT WIRE END RESISTANCES, well-known make, all values.

15/- WESTON 0-3 A.C. VOLTMETER

15/- WESTON 0-200 VOLT D.C. VOLTMETER.

(*Continued at top of column three*)

PREMIER SUPPLY STORES

SHORT WAVES.

SHORT-WAVE COILS 4- to 6-pin types. 13-26, 22-47, 41-94, 78-170 metres, 1/9 each with circuit. Special set of 3 S.W. Coils, 14-150 metres, 4/-, with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/-.

COIL FORMERS, in finest plastic materials, 1¼in. low-loss ribbed, 4- or 6-pin, 1/- each.

CONDENSERS, super ceramic S.L.F. .00016, .0001, 2/9 each; double-spaced .000015, .000025, .00005, 3/- each. All brass with integral slow-motion .00015 tuning, 3/9; .00015 reaction, 2/9.

SHORT-WAVE KIT for 1 valve receiver or adaptor, complete with chassis, 3 coils 14-150 metres, condensers, circuit, and all parts, 12/6.

VALVE GIVEN FREE. De Luxe Model, 17/6.

2-VALVE S.W. KIT, complete with valves, 19/6.

3-VALVE S.W. KIT, S.G., Det., and Pen. complete with valves, 40/-.

BAND-PASS KIT, 14/6 the lot. Lissen 3-gang coil unit. Utility 3-gang condenser and disc drive, 4 valve holders, chassis and blueprint.

SPEAKERS, MAGNAVOX. Mains energised. '154,' 7" cone, 2,500 ohms 4 watts, 12/6. '154 Magna,' 5 watts, 25/-; '152,' 9" cone 2,500 ohms, 17/6; '152 Magna,' 9" cone, 2,500 ohms, 6 watts, 37/6. Magnavox P.M.'s—'254,' 7" cone, 16/6; '252,' 9" cone, 22/6. Reliable P.M.'s, 10/6; Cossor P.M.'s, 13/6; Blue Spot 29 P.M., 15/-.

MAINS TRANSFORMERS. Premier wire-end type with screened primaries.

H.T.8 & 9 or H.T.10 with 4v. 4a C.T. and 4v. 1a. C.T., 8/6.

250-250v. 60 m.a., 4v. 1a., 4v. 2a. and 4y. 4a., all C.T., 8/6.

350-350v. 120 ma., 4v. 1a., 4v. 2a., and 4v. 4a., all C.T., 10/6.

500-500v. 150 m.a., 4v. 2-3a., 4v. 2-3a., 4v. 2-3a., 4v. 3-4a., all C.T., 19/6.

Any of these transformers with engraved panel and N.P. terminals, 1/6 extra.

AUTO TRANSFORMERS, step up or down, 60 watts, 7/6, 100 watts, 10/-.

MAINS VALVES, famous Europa 4v. A.C. types, 4/6 each. H.L., L., S.G., Var.-Mu-S.G., H.F.-Pens., Var.-Mu-H.F. Pens, 1-, 3-, and 4-watt A.C. directly-heated output Pentodes. Full-wave rectifiers, 250 v. 60 m.a. A.C./D.C. types, 20-volt, .18 amp. S.G., Var.-Mu-S.G., H., H.L., and Power.

Following types all 5/6 each. Full-wave rectifiers 350v. 120 m.a. and 500v. 120 m.a. 2½ watt indirectly-heated Pentodes. Frequency Changers. Octodes and Heptodes.

BATTERY VALVES. 2-volts, H.F., L.F., 2/3. Power, Super-Power, 2/9. S.G., Var.-Mu-S.G., 4 or 5-pin Pentodes, H.F. Pens., V.-Mu-H.F. Pens. 5/-. Class B, 3/6.

AMERICAN VALVES. Genuine American **DUOTRON,** all types, 3/6 each. Hytron super quality, 3 months' guarantee, all types, 5/6.

MILLIAMMETERS, moving-iron flush 2½", all ranges from 0-10, 5/9. Visual tuning, 6 or 12 m.a., 5/-. Moving coil meters, 2½" 0-1 m.a. 18/6; 3½" 0-1 m.a., 22/6. Multipliers, 1/- each. Westinghouse meter rectifiers, 17/6 each.

ELECTROLYTICS. U.S.A. 4, 8 or 12 mfd. 530 v. peak, 1/9 each. **Dubilier,** 4 or 8 mfd. 500 v. 3/-; 50 mfd. 50 v., 1/9; 12 mfd. 20 v., 6d.; 25 mfd. 25 v., 1/-. T.C.C. 4 or 8 mfd. 650 v., 4/-; 15 mfd. 50 or 100 v., 1/-; 50 mfd. 12 v., 1/-.

Paper Condensers. W.E., 250 v. working 4 mfd., 2/-; 2 mfd. 1/-, 1 mfd. 6d.; 250 v. working 4 mfd., 2/6. 2 mfd. 1/6. Dubilier 500 v. working 4 mfd., 4/-; 800 v. 4 mfd. 6/-; 2 mfd. 750 v. 3/-.

Wego 450 v. working 1 mfd. 1/-, 2 mfd. 1/9, 4 mfd. 3/-: 700v. working 2 mfd. 2/-, 4 mfd. 3/6; 1,650 v. working 1 mfd. 3/6, 2 mfd. 5/6.

TRANSFORMERS, latest type Telsen R.G.4 (list, 12/6), 2/9. Lissen Hypernik Q.P.P. (list 12/6), 3/6.

ELIMINATOR KITS for A.C. mains. 120 v. 20 ma., 150 v. 25 m.a., 10/-, tapped S.G. det. and output. Complete Kit with long-life valve rectifier (replacement cost only 2/-).

LISSEN ALL-ELECTRIC A.C.4. S. Grid. Det., Pen. and Rectifier, M.C. Speaker. (List £9.0.0). Our price 65/-.

Potentiometers by well-known makers. All values up to 1 meg. 2/-; with switch 2/6.

GRAMOPHONE MOTORS. Collaro, Gramophone Unit, consisting of A.C. motor, 100-250 v. high quality pick-up and volume control, 45/-; motor only 30/-; Collaro Universal Gramophone Motor, 100-250 v., A.C./D.C., with high quality pick-up and volume control, 67/6; Universal Motor only, 49/6; Edison Bell double spring motors, including turntable and all fittings, 15/-; Cosmocord Gramo unit, comprising A.C. motor, pick-up and volume control (list 55/-), 35/9.

ALL POST ORDERS should be addressed to—JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5.

'Phone Amherst 4723 (Private Branch Exchange). Callers, as usual, to 20-22, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2381), and 165 and 165a, Fleet St., E.C.4 (next to Anderton's Hotel). (Central 2833.)

NOW READY! Send 4d. in stamps for NEW ILLUSTRATED GIANT CATALOGUE AND VALVE LIST.

(*Continued from foot of column one*)

25/- WESTON 0-2 M.A. METER, high grade moving coil.

22/6 0-100 CURRENT SQUARED GALVANOMETERS.

HIVAC VALVES. Complete range stocked, send for list.

9/11 PICK-UP, complete with volume control and rest. Splendid value.

9d. DOZEN LENGTHS FINEST OILED SLEEVING.

1/6 TWO-WAY ELECTRIC LIGHT ADAPTOR, finest quality, British made.

All Orders 5/- and over Carriage Paid. Enquiries must be accompanied by 1½d. stamp if reply expected.

Hours of business 9 a.m. to 7 p.m. week-days, 9 a.m to 1 p.m. Saturday.

RADIO CLEARANCE

63, HIGH HOLBORN, W.C.1

TEL.: HOLBORN 4631.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, or Secondhand, etc.

SOUTHERN RADIO'S WIRELESS BARGAINS. ALL GOODS GUARANTEED AND SENT POST PAID.

SPEAKERS.—Celestion Soundex Permanent Magnet, 10/-; Telsen Permanent Magnet with ten-ratio transformer, 12/6; Blue Spot 99P.M. Extension Speaker, 20/-; 45P.M. Extension Speaker, 17/6; Telsen Loud Speaker Unit, 2/6; all new and boxed.

RECEIVERS.—G.E.C. A.C. D.C. Mains Three-valve sets. Complete with 3 Osram Valves, in exquisite Bakelite cabinet with Osram M.C. Speaker. Ready to plug in to any mains. Fully guaranteed. New, in sealed cartons, £3/5 (list £7/15).

G.E.C. Colpact 3-valve Battery Sets complete with 3 Osram valves, moving coil P.M. Speaker in attractive Bakelite cabinet, makers' 1936 series in original sealed carton, 50/- (list £5/10/0).

TELSEN A.C. D.C. MULTIMETERS (latest 1936 type).—5-range for every conceivable test for radio and domestic electrical appliances, 8/6 each.

COILS.—TELSEN (1936). Iron-cored Coils, Type W349, midget size, 4/-; type W478 (twin), 9/- pair; type W477 (triple), 16/-; type W476 (triple superhet selector and oscillator), 16/- set. All Ganged Coils are Mounted on Base with switch. I.F. Transformer Coils W482, 5/-; Telsen Dual Range Coil with variable series condenser W76, 4/-.

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