

12/Janet

2nd BIG SHOW NUMBER—STAND-TO-STAND REPORT

Practical ^{3^d} and Amateur Wireless

EVERY WEDNESDAY

Edited by F. J. CAMM

AND PRACTICAL TELEVISION

a GEORGE
NEWNES
Publication

Vol. 10, No. 259,
September 4th, 1937.



WB NEW **Stentorian** speaker—
 “AN IMMENSE STEP FORWARD”
 Says Mr. Camm



"HIS MASTER'S VOICE"

1937/38 All-World Radio
at RADIOLYMPIA, Stands 66 & 76



Model 655—AC Armchair Radio, incorporating revolving bookcase and glass-topped table. 10 Valve Model—5 Wavebands—10 Watts Output—Fluid Light, Vernier Scale. Two-speed tuning. Variable selectivity. Separate Bass and Treble Tone Controls. 2 speakers. **36 GNS.**



Model 660—AC Autoradiogram—10 Valve Model—5 Wavebands—10 Watts Output. Fluid Light, Vernier Scale. Two-speed tuning. Variable selectivity. Separate Bass and Treble Tone Controls. 2 speakers. **62 GNS.**

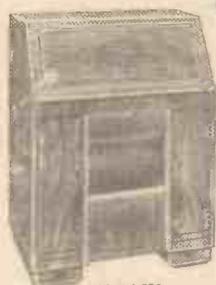


Model 650—AC Receiver—10 Valve Model—5 Wavebands—10 Watts Output. Fluid Light, Vernier Scale. Two-speed tuning. Variable selectivity. **24 GNS.**



Model 801—AC High Fidelity Autoradiogram—10 Valve Model—5 Wavebands—10 Watts Output. Fluid Light, Vernier Scale. Two-speed tuning. Separate Bass and Treble Tone Controls. 3 speakers. **80 GNS.**

AC 6 VALVE MODELS—5 WAVEBANDS



Model 582 Bureau Autoradiogram. Fluid Light, Vernier Scale. Two-speed tuning. Separate Bass and Treble Tone Controls. **50 GNS.**



Model 496 Receiver. Fluid Light, Vernier Scale. Two-speed tuning. Separate Bass and Treble Tone Controls. **19 GNS.**



Model 498 Autoradiogram. Fluid Light, Vernier Scale. Two-speed tuning. Separate Bass and Treble Tone Controls. **40 GNS.**

Model 485a Autoradiogram. Vernier Scale. Two-speed tuning. Separate Bass and Treble Tone Controls. **35 GNS.**

Model 488 Similar model without Auto-Changer. **29½ GNS.**

8 VALVES-4 WAVEBANDS 5 WATTS OUTPUT



Model 469—AC—Receiver. Fluid Light, Vernier Scale. Two-speed tuning. Variable selectivity. Separate Bass and Treble Tone Controls. **19 GNS.**

AC 6 VALVE MODELS—3 WAVEBANDS



Model 495 Radiogram. Two-speed tuning. Continuous Tone Control. **23 GNS.**

Model 492 Radiogram. Two-speed tuning. Three position Tone Control. **22 GNS.**

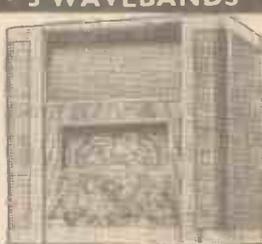
Model 494 Receiver. Two-speed tuning. Continuous Tone Control. **12½ GNS.**



Model 499 Receiver. Fluid Light. Two-speed tuning. Continuous Tone Control. **14½ GNS.**

Model 490 Compact autoradiogram form of Model 499. **34 GNS.**

AC 7 VALVE MODEL 3 WAVEBANDS



Model 482 Receiver. Fluid Light, Vernier Scale. Two-speed tuning. Six position Tone Control. **16 GNS.**



Model 479—AC—Radiogram. Fluid Light, Vernier Scale. Two-speed tuning. Variable selectivity. **33 GNS.**

AC/DC 5 VALVES—3 WAVEBANDS



Model 487 Radiogram. Three position Tone Control. Two-speed tuning. **25 GNS.**

Model 493 Autoradiogram. Similar to Model 487, with automatic record changer. **33 GNS.**



Model 486 Receiver. Three position Tone Control. Two-speed tuning. **13½ GNS.**

"H.M.V." LOUDSPEAKERS

Model 172. All-purpose Permanent Magnet Loudspeaker with inbuilt Volume Control. **3 GNS.**
Model 184. Wide Angle Sound Distribution speaker with inbuilt Volume Control. **£5.17.6**

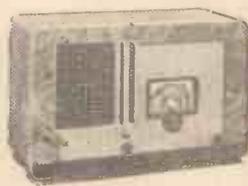
"H.M.V." PICK-UP

with remote volume control and screened connecting leads **32/6**

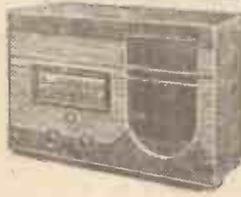
ECONOMICAL BATTERY MODELS



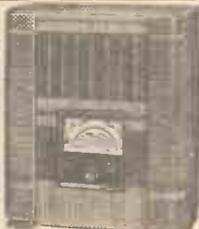
Model 166 Five-valve Superhet. Three wave ranges. Two-speed tuning. Three position Tone Control. **13 GNS.**



Model 167 Three-valve Receiver. 170-580 and 800-2000 metres. Moving Coil Loudspeaker. **7½ GNS.**



Model 149 Three-valve Receiver. Three wave ranges. Two-speed tuning. Two-speed volume. **9½ GNS.**



Model 404 Six-valve Superhet Transportable. 200-550 and 900-2000 metres. Three position Tone Control. **15½ GNS.**

"H.M.V." ANTI-STATIC ALL-WAVE AERIAL



7-2,200 metres. New Type **45/6**

VISIT ALSO THE "H.M.V." TELEVISION THEATRE — No. 14

WHY IGNORE THE FRAME AERIAL?

SEE PAGE 639.

Practical and Amateur Wireless

Second Lower 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. X. No. 259. September 4th, 1937.

Microphone Sentry

A NOVEL method of using a microphone as a burglar detector has been reported from the U.S.A. It is stated that a five-storey, bomb-proof, fire-proof and burglar-proof building on a solid rock foundation was recently completed, and to guard against the one-in-a-million chance of a burglar getting through the many intricate burglar alarms, a microphone has been fitted in the vaults. This is in circuit with an amplifier feeding a speaker in the central guard room, and thus the guards are at all times able to hear the slightest sound in the vault and thus to detect the arrival of an unauthorised person. A two-way radio communication service with the police outside the building is maintained.

American Sets Here

ANOTHER well-known American radio company has concluded negotiations for making their receivers in this country. This time the concern is E. H. Scott, of Chicago, and the English company is to be known as E. H. Scott Radio Laboratories, Ltd. No details are yet available concerning the types of apparatus to be made nor the lines upon which the receivers will be marketed.

Dial Tuning

SEVERAL variations of the method of tuning by dialling are now available on the market. The latest to be released has, however, the additional novelty that when it is desired to tune in the ordinary way, the user of the receiver dials "O" and this cuts out the automatic mechanism.

ROUND the WORLD of WIRELESS

"Private View"

IN the series of talks entitled "Private View," a charabanc driver will come to the microphone on September 8th to tell listeners about some of the people who make use of his services.

Bristol Radio Exhibition

ON September 8th the Bristol Radio Exhibition will be opened at the Coliseum, Park Row, by the Duchess of Beaufort. This is the first of the "local" exhibitions to be opened following the National Exhibition at Olympia.

Three Choirs Festival

THE opening service of the Three Choirs Festival will be broadcast from Gloucester Cathedral (Midland programme),

on September 5th. This is the 217th annual meeting of the choirs of Worcester, Gloucester and Hereford Cathedrals. The preacher at the service will be the Dean of Chichester. The broadcast will open with Elgar's Civic Fanfare; the Magnificat and Nunc Dimittis are by Dr. Lee-Williams; Handel's "Zadok" and Beethoven's

"Hallelujah" are the anthems; and the first movement of Beethoven's "Eroica" Symphony will be played. The conductor

of the Chorus and Orchestra (The London Symphony) will be Herbert Sumsion, Organist and Master of the Choristers of Gloucester Cathedral. The organist will be Melville Cook.

Mouths Only

"MOUTHS ONLY!" is the rule for the programme, "Many Mouthed Music," which Alan Melville will present to Scottish listeners on September 11th. He describes it as "a very vocal variety" and all the noises, with one exception, heard by listeners will be made by the mouth without the aid of instruments. The one exception will be the mouth organ. They will include puit-a-beul, the mouth music of the Isles, and whistling and the imitation of bird calls. Jimmie Ross will accompany on the piano.

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ROUND the WORLD of WIRELESS (Continued)

Radio Operators Wanted

IT is announced that the Royal Air Force require about four hundred boys during the present month for training in the trades of Armourer, Photographer and Wireless Operator. Candidates must be not less than 15½ and not more than 17½ years of age on September 1st, 1937. The initial period of engagement is for nine years after attaining the age of eighteen. Full particulars are contained in Air Ministry Pamphlet No. 54, which may be had free of charge from the Inspector of Recruiting, Royal Air Force, Victory House, Kingsway, London, W.C.2.

Words and Music

THIS is the title of a short variety programme to be provided by Courtney Hope (character impressions) and Fred Adcock and Jack Wilson (violin and pianoforte) in rhythm numbers. Courtney Hope is the pseudonym of a well-known Wellingborough woman, who is a J.P. for Northamptonshire, founder of a Dramatic Company, and author of a number of sketches. This broadcast will be given in the Midland Regional programme on September 9th.

Western Concert Party

THE Good Companions, a Concert Party presented by W. H. Lester in conjunction with Albert H. Grant, will broadcast from the Cosy Nook Theatre, Newquay, on September 7th.

Girls' School Burlesque

ARTHUR MARSHALL has just completed a girls' school burlesque—"The Giddiest Girl in the Coll."—to be broadcast in the Regional programme on September 6th, which should be a panacea for any post-holiday "blues." He, in the way that has made him so popular as a radio-artist, will play the part of the headmistress, and with him in the cast will be Doris Hare, Hermione Gingold, Sheila Kaye and Adeline Hook. The music has been written by Michael North and production will be by Max Kester. The B.B.C. Variety Orchestra and a section of the women's chorus will be conducted by Charles Shadwell. The programme will be repeated on the National wavelength on September 7th.

Yorkshire Concert Party

SALTBURN, on the North Yorkshire coast, is a small but very charming resort possessing a little theatre with a big reputation. The Saltburn Little Theatre Cabaret, which is to be heard by Regional listeners on September 10th, is generally voted a first-class show. For the past seven years it has been directed by Harry Tollfree, on behalf of Mrs. M. O. Osborne,

INTERESTING and TOPICAL NEWS and NOTES

lessee of the Little Theatre. This same Northern Concert Party programme will include excerpts from another excellent

Wilton as Mr. Muddlecombe, J. P., muddling through some further difficult and curious cases. The suffix "J.P.," so far as Mr. Muddlecombe is concerned, might very well mean "Joint Presenter," for he himself writes all his "cases" on original ideas by Barry Bernard. Presentation will be by Max Kester.



The new Ferranti all-wave superhet, Model 1137, in a homely setting.

entertainment: the Ernest Binns's "Redcar Follies" from the New Pavilion at Redcar, which is of course Saltburn's near neighbour and a larger resort perhaps better known to the general holiday-making public.

Mr. Muddlecombe Again

THE Court of Not-So-Common, Please!" will sit again on September 6th and September 20th, when listeners to the National programme will hear Robb

Capitol Cinema, Aberdeen, will be the compère of a light programme entitled "Unaccustomed As We Are," produced by Alan Melville on September 1st. In this, seven well-known radio artists will be heard in rôles with which listeners would never associate them. Taking part are Willie Kemp, John Mearns, James Morgan, C. V. A. MacEachern, Jimmy Ross, A. M. Shinnie, and Marie Sutherland.

Harry Kemp's Summer Show

THE broadcasts from the "summer shows" of the Scottish holiday resorts, which have been a feature of the Scottish summer programmes, are drawing to a close and soon the season of pantomime will be here. On September 9th, Scottish listeners will hear a broadcast from the Cosy Corner, Dunoon, where Harry Kemp's summer show will be playing to a holiday audience. Jack E. Raymond produces the show, of which Dave Bruce is chief comedian. Peggy and Jerry Desmond, Edith Thomson and Margaret Middleton, are also in the company.

Ladies' Orchestra

ST. Annes-on-the-Sea Pier Orchestra is popularly known as the Ladies' Orchestra. Most of the players are women. For the broadcast to be given in the Northern programme on September 8th, the Orchestra will be under the direction of its regular conductor, William Rees, who is well known for his Manchester concerts during the winter.

SOLVE THIS!

PROBLEM No. 259

Edwards built a three-valve A.C./D.C. receiver of conventional design, but as he had three A.C. 4 volt 1 amp. valves on hand he decided to use these instead of the specified A.C./D.C. valves. What was the disadvantage of this modification and what component alteration should be made? Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 259 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, September 6th, 1937.

Solution to Problem No. 258

The Corsor 210VPT requires 60 to 72 volts on its screen grid whereas the VP2 requires 120 to 150 volts. The following three readers successfully solved Problem No. 257, and books are accordingly being forwarded to them: R. J. Stephenson, 3, Geneva Avenue, Lincoln; W. Renfree, 7, Hutchings Way, Teignmouth, Devon; G. H. Hodgkins, Block 4, Room 3, R.A.F. Station, Bicester.

F. J. Camm's Oracle

All-World

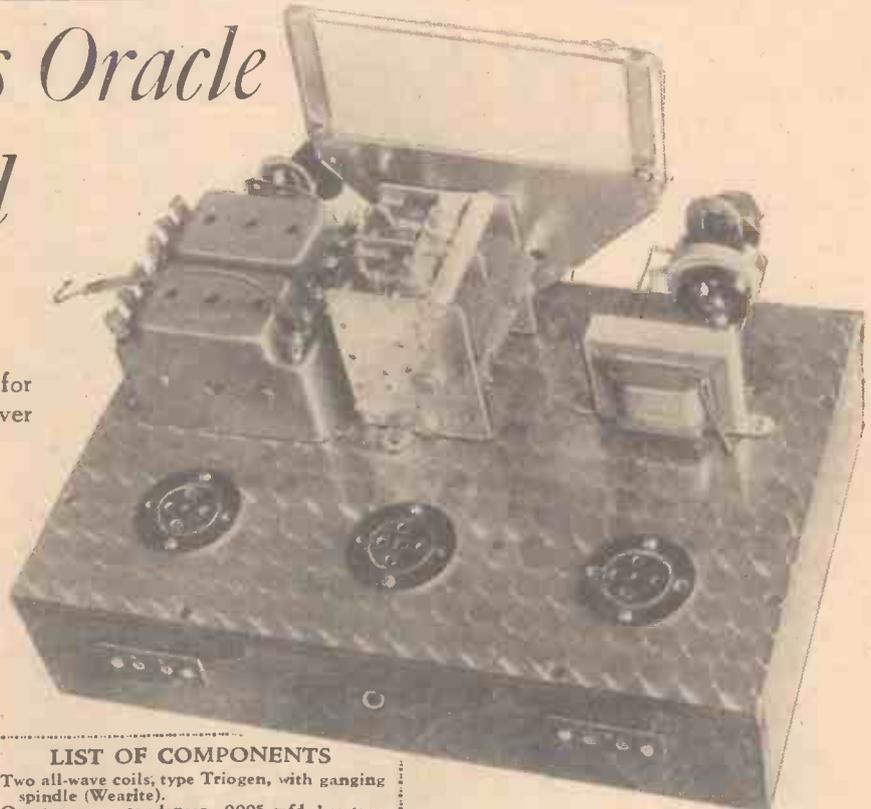
Three

Constructional and Operating Notes for This New Three-Range Battery Receiver

THIS receiver is practically as simple to build as a standard broadcast set built on a wooden chassis. The metal covering to the chassis will, however, have to be drilled in order to enable certain leads to pass through, and it will also be found necessary to pierce or drill through the metal in order that the various holding-down screws may be started into the wood for mounting the condenser, coils, component brackets and transformer. Clearance holes must also be cut for the valveholders, and these should be $\frac{1}{16}$ in. in diameter. An ordinary centre-bit will cut these holes if turned slowly and carefully, the marker being sufficiently long to cut through the aluminium before the cutter comes into contact with it. Thus, you will not blunt the bit provided that you do not press unduly upon it when cutting out the discs. Clearance holes should be drilled in the rear runner of the chassis for the terminal socket strips and for the battery cords, a $\frac{1}{16}$ in. hole being adequate for the latter. Mount the components, using as a guide the above illustration and the wiring diagram published last week, or if you prefer to work from a full size drawing, from the blueprint which may be obtained for 1s. from this office.

Wiring

When all of the top components have been screwed down, mount the reaction condenser on the front of the chassis and the H.F. choke on the rear strip. The remaining components are suspended in the wiring, and attached by means of the wire ends fitted to them. Note carefully that an earthing junction point is indicated in the



A rear view of the Oracle receiver showing the clean layout.

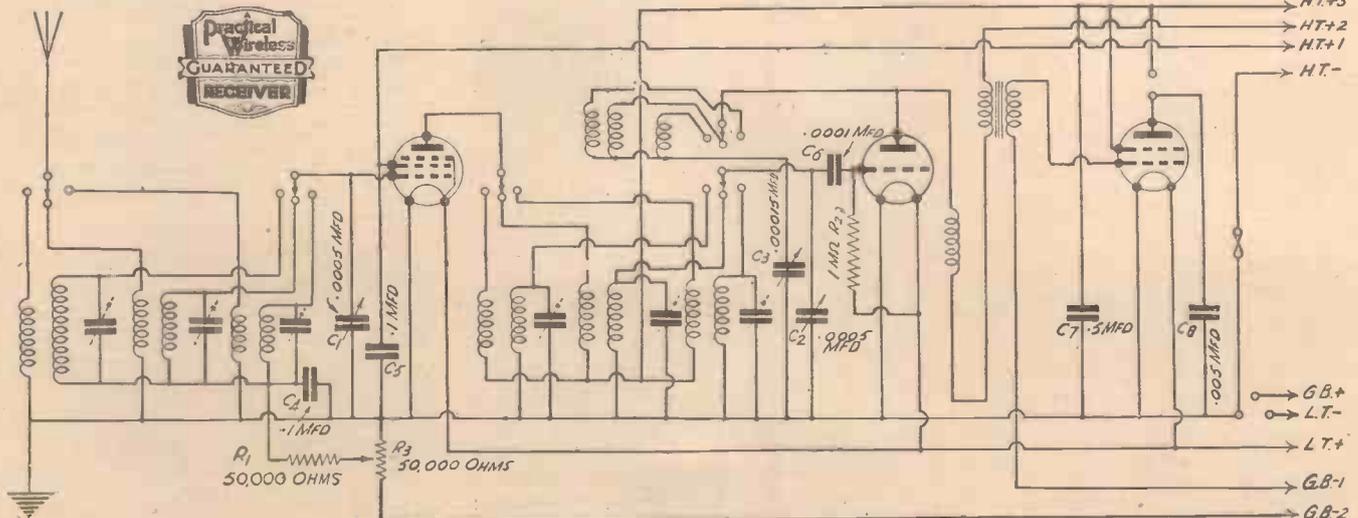
LIST OF COMPONENTS

- Two all-wave coils, type Triogen, with ganging spindle (Wearite).
- One two-gang condenser, .0005 mfd. bar type (C1, C2) (Polar).
- One S.M. drive, V.P. horizontal (Polar).
- Five fixed condensers: .0001 mfd. (C6), .005 mfd. (C8), two .1 mfd. (C4, C5), .5 mfd. (C7)—tubular (T.C.C.).
- One reaction condenser, .00015 mfd., Compax (C3) (Polar).
- Two resistances: 1 meg. (R2), 50,000 ohms (R1) ($\frac{1}{2}$ watt) (Erie).
- One volume control with switch, 50,000 ohms (R3), V.M. 60 (Bulgin).
- One all-wave H.F. choke, H.F.15 (Bulgin).
- One L.F. transformer 4/1, L.F. 37 (Bulgin).
- Two component brackets (Peto-Scott).
- Three chassis valveholders: two 4-pin, one 5-pin (Clix).
- Seven wander plugs: H.T.1, H.T.2, H.T.3, H.T.—, G.B+., G.B.—1, G.B.—2 (Belling-Lee).
- Two spades: L.T.—, L.T.+ (Belling-Lee).
- Three valves: 210 V.P.T. (4-pin), 210 Det., 220 H.P.T. (Cossor).
- One chassis: Plymax, 12in. x 8in. x 2 $\frac{1}{2}$ in. (Peto-Scott).
- One speaker, Stentorian Junior (W.B.).
- One fuse-holder with 60 mA fuse (Microfuse).
- Two socket strips, A.E. and L.S. (Clix).
- 120 v. H.T. battery (Exide).
- 9v. G.B. battery (Exide).
- 2v. L.T. accumulator (Exide).

centre of the chassis, for which purpose a bolt should be passed through the rear mounting bracket of the tuning condenser, and on the underside a double-ended soldering tag should be fitted. Connect up with ordinary tinned copper connecting wire, and where soldering is employed make sure of a good sound joint.

Operating

The operation of this receiver is just as simple as an ordinary broadcast set. The wave-change switch on the coil unit should be turned to the medium waveband for a preliminary test and it will be found that the tuning condenser may then be turned throughout the range to bring in a large number of stations. Trimmers marked 2 should be adjusted for medium waves.



Theoretical circuit of the Oracle All-World Three.

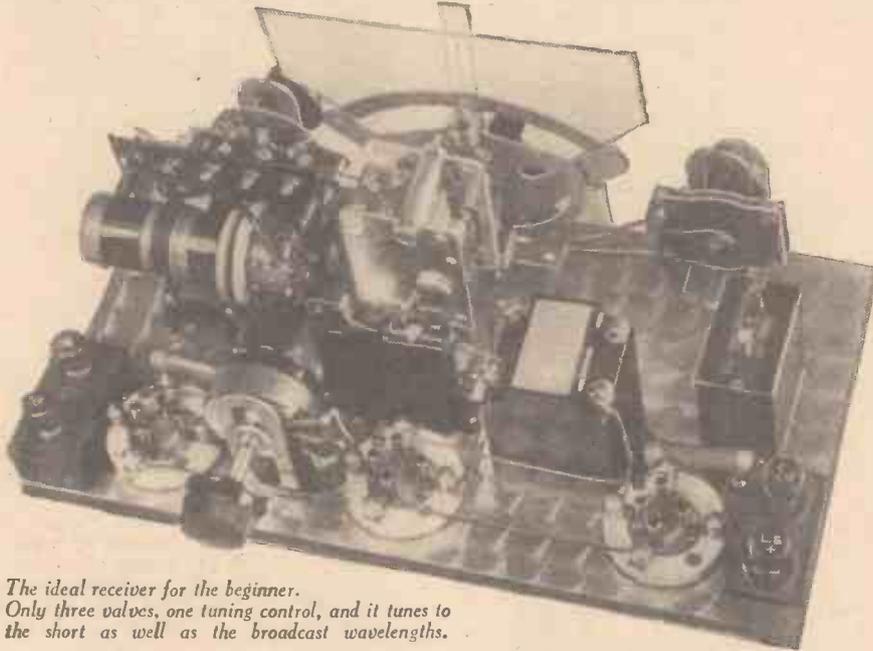
THE TRIDENT

Further Constructional Notes and Operating Details of this Beginner's All-wave Three-valver

THE most essential details concerning the construction of this neat beginner's receiver were given last week. For the benefit of those who are making this their first receiver, however, there are one or two points which should, perhaps, be more fully dealt with. Firstly, the wooden baseboard is covered with a

plywood baseboard and a neat and quite professional job will result. have to make a new hole and upset the arrangement of the parts. Use a twist bit, and drill a hole in the metal which will just clear the plain shank of the screws you are using, but do not, of course, drill right into the wood. In this way the screws will go right home with no more difficulty than when inserting them into an ordinary

the parts a few at a time, and wire up as you go. Thus, screw down the three valveholders and connect the wires as shown in the wiring diagram published last week. You can use bare tinned copper wire (say 18 or 20 gauge) or the standard insulated wire sold for the purpose. In this case you must, of course, scrape away the insulation from the end of the wire where it makes contact with the terminals. Use a fairly blunt knife for this, or you may cut into the soft copper wire and eventually a fault will develop due to the wire breaking where it was partly cut through. When the valveholders are wired, mount the rear control and connect this up. Next screw down the two fixed condensers and the L.F. transformer and wire up all that you can to them, following again the wiring diagram already referred to. A good plan where wiring is done in stages in this way is to score through the wire on the wiring diagram as you place it in position. Use a blue or red pencil so that no mistake can arise and you will then be sure of putting in every wire and not trying to put a wire in the wrong place. Finally mount the coil unit and condenser and complete the wiring.



The ideal receiver for the beginner. Only three valves, one tuning control, and it tunes to the short as well as the broadcast wavelengths.

thin sheet of aluminium, and although aluminium is quite soft, you will probably find a little difficulty in driving in the holding-down screws unless you set about it the right way. It is useless piercing a small hole and hoping that the screw will force its way in; and in this way there is a possibility that the screw will break in half before it is right home and you will

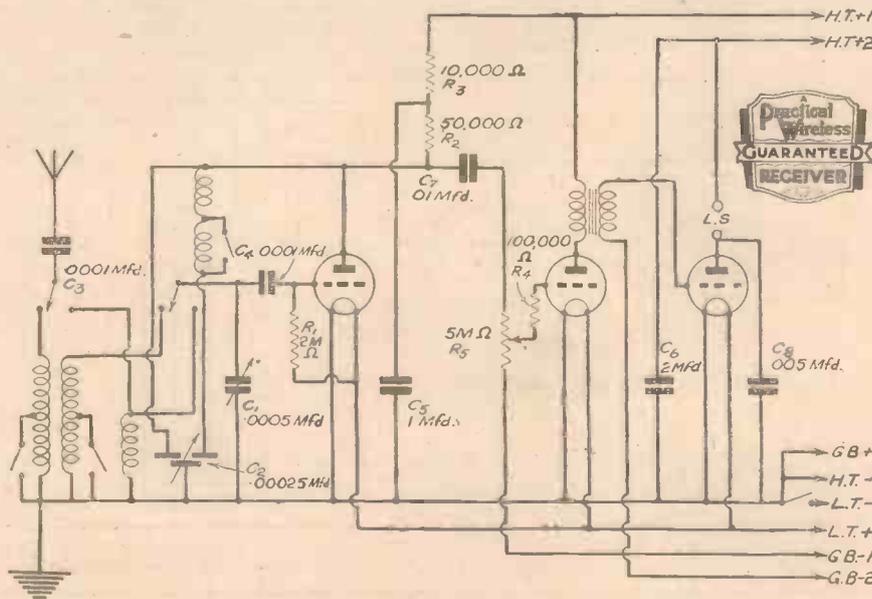
plywood baseboard and a neat and quite professional job will result.

Wiring

If you have not wired a receiver before you will probably find that it is a little difficult to get the wires into the various odd corners of a compact receiver of this type, and therefore a good plan is to mount

Testing Out

Before inserting the valves and connecting up, check over your wiring diagram and make certain that every wire is correctly marked off. Then insert the valves in the order given last week and connect the batteries. Preliminary tests should be carried out on the medium-wave band. Note that when the reaction control is advanced a slight readjustment of the tuning dial will be called for. When tuning on the short waves you will find that the receiver should be kept in its most sensitive condition by adjusting the reaction condenser just short of the oscillating point. You will be able to distinguish this setting by a rushing noise in the loud-speaker.



Here is the theoretical diagram of the circuit employed in the Trident

LIST OF COMPONENTS

- One all-wave coil, type G (B. T. S.).
- One tuning condenser, .0005 mfd., type C.V.1 (C1) (Bulgin).
- One tuning drive, No. 2,134 (J. B.).
- One reaction condenser, .00025 mfd. (C2) (B. T. S.).
- One volume control: 500,000 ohms (R5) (Erie).
- Four fixed resistances: 2 meg. (R1); 100,000 ohms (R4); 50,000 ohms (R2); 10,000 ohms (R3)—½ watt (Erie).
- Six fixed condensers: 2 mfd. (C6); 1 mfd. (C5), (type 65); .01 mfd. (C7); .005 mfd. (C8); two .0001 mfd. (C3, C4) (tubular) (T. C. C.).
- One L.F. transformer—Nictel 3.5/1 (Varley).
- Two terminal brackets with L.S. and A.E. terminals (Belling-Lee).
- One fuse holder with 60 mA fuse (Microfuse).
- Three valveholders, 4-pin, baseboard type (B. T. S.).
- Six wander plugs: H.T.1, H.T.2, H.T.—, G.B.+ , G.B.—, G.B.—2 (Clix).
- Two spades: L.T.—, L.T.+ (Clix).
- Three component brackets (Peto-Scott).
- One Plymax baseboard (11in. by 6in.) with condenser block (Peto-Scott).
- Three valves: D.210, L.210, P.215 (Hivac).
- One speaker—Stentorian Junior (W. B.).
- One pair headphones (Ericsson).
- 120 v. H.T. battery
- 9 v. G.B. battery
- 2 v. L.T. accumulator

(Exide)

TELEVISION INSTALLATION AT RADIOLYMPIA

READERS will no doubt remember that the television demonstrations staged at last year's Radiolympia were shrouded in secrecy. Steadily moving queues of people were permitted relatively short glimpses of two television pictures by walking past a barrier in a semi-darkened booth, and no indication was given to reveal which manufacturer was providing the picture. The effort was really a last-minute organisation, and it did not allow anyone to watch a transmission for sufficient time to form any real or definite conclusion as to picture quality or entertainment value. This year, however, the R.M.A. have been responsible for an entirely different arrangement, and since it was planned carefully some time ahead of the opening of the exhibition, the risk of breakdown was reduced accordingly.

Requirements

The problem to be faced was that of supplying fourteen separate and distinct demonstration rooms with combined vision and sound signals at two points inside each room. This was to allow each of the fourteen manufacturers to demonstrate their own television receivers under conditions which, as far as was possible in the Olympia environment, would simulate reception in the home. The locality is a veritable hotbed of interference owing to the close proximity of motor-car ignition systems passing along the main road by the side of the building. A very careful roof survey was therefore undertaken by two well-known television companies to ascertain the best possible position for the aerial. After suitable measurements of signal strength and actual pictures had been observed from a variety of positions, a site was finally chosen.

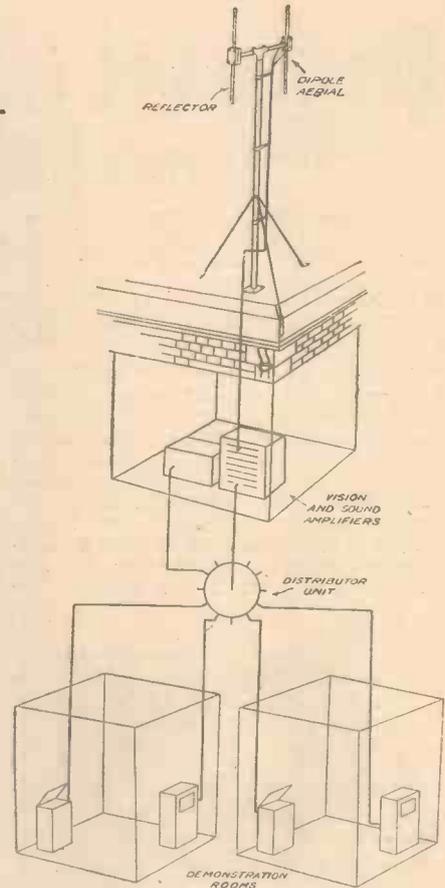
The contract for erecting the aerial and supplying the complete feeder distribution was given to the Baird Television Co., Ltd., and on the flat roof between the glass domes of the National and Main Halls a 45ft. mast was erected and guyed rigidly in position with thick ropes. A dipole aerial complete with a half-wave reflector is secured to the mast at such an angle that the maximum signal-to-interference ratio is obtained from Alexandra Palace. A long length of feeder cable joins this aerial to the E.M.I. amplifiers located on the National Hall gallery immediately above the roofs of the fourteen demonstration rooms. The output from the amplifiers passes to a specially designed Baird distribution box. At this point the combined vision and sound signals are split by means of a resistance network housed inside the cylindrical box. Each of the outlets is so balanced that every feeder cable passing from the box carries an approximately equal signal to each of the required receiver points. The cables for this purpose are run on supports, and pass through the roofs of the separate demonstration rooms to points adjacent to the arranged positions of the sets. In addition a separate cable is passed from the distribution box to a check receiver

situated in the amplifier room. The scheme in its simple form is indicated in the accompanying diagram which shows the dipole aerial with reflector, the vision and sound amplifiers, the distribution box, and the demonstration rooms.

Precautions

Naturally, with a scheme of this nature, extreme precautions have to be taken to ensure that each receiver is capable of operating at its maximum efficiency. A proper specification was drawn up by the R.M.A.'s television sub-committee and the limits as laid down in this document were adhered to by the companies concerned. Adequate screening ensures that the minimum possible degree of interference in the locality is experienced. Furthermore, the ventilating fans operating at the top of each demonstration room are of the commutator-less type, and as noiseless as possible. Concentric feeder of approximately 100-ohm impedance is used throughout, and the magnitude of the television signal in each room is arranged to be of the same order as that obtained by a normal domestic television receiver installation.

The degree of attenuation of the television signal over the whole available band width was limited to that obtained under good reception conditions. The hum level is reduced to a negligible quantity, while steps are taken to ensure that no cross



A simple pictorial diagram showing the scheme adopted for the television installation at Radiolympia.

modulation is possible between the vision and sound carriers,

Distribution

From the wide measure of experience which has already been obtained in distribution systems necessitating the operation of several receivers from one aerial source via an intermediary amplifier, a single distribution box containing all the resistance pads is utilised. This provides a suitable step down for each outlet, and ensures that there is the minimum of feed back from one receiver point to the next. Every receiver feeder cable passing from the demonstration room to the distribution box has a terminating impedance of approximately 100 ohms.

The vision and sound amplifiers are of the automatic time-controlled type to ensure that they are switched into service at the correct times to coincide with the special programme arrangements made by the B.B.C. for this year's Radiolympia. Furthermore, by having a receiver monitor fed direct from the distribution box, the engineer in charge of the amplifiers is able to keep a check on quality and strength.

The Programme Scheme

Each day's television programme of three hours is split up into nine sections so as to give the audience fifteen minutes entertainment. The triple-programme periods commence at 11.30 a.m., 4 p.m., and 9 p.m. At the end of the first quarter of an hour, ten minutes interval occurs to allow the first audience to depart and the second to take its place. This is repeated once more to give the total of nine shows for each demonstration room.

TELEVISION PROGRAMME FOR RADIOLYMPIA.

Included in the special television programme to be given during the last few days of Radiolympia is a fire-fighting demonstration on September 2nd, in which viewers will see a 90ft. all-steel turntable escape at an imaginary fire on the Palace terrace; and on September 4th an open-air display by Prunella Stack and members of the Women's League of Health and Beauty.

Claude Dampier, who has already been televised more than once, will be seen in the afternoon and evening of September 3rd, and Jane Carr, the popular broadcaster, will be seen on September 4th, when Albert Sandler will also appear. Phyllis Robins, the popular singer, will be televised on September 2nd.

Miniature editions of "Picture Page," television's weekly magazine feature, devised by Cecil Madden, will be presented on September 1st, and news reels and cartoon films, including Mickey Mouse, will be transmitted each evening.

The first Radiolympia television transmissions of a year ago will be recalled during the final exhibition transmission on September 4th, when Pogo, the Griffiths Brothers' Wonder Horse, will appear with Miss Lutie. Pogo was one of the first turns ever to be televised from Alexandra Palace.

Practical Television

September 4th, 1937

Vol. 3

No. 65

FUTURE TELEVISION DESIGN

Do the Changes Seen at This Year's Exhibition Show Future Design, or are We on the Wrong Track? By W. J. DELANEY.

NOW that we have seen this year's television models, what lesson can be learnt from the present designs? A year ago, the ordinary listener was rather astounded to think that a picture 10in. by 8in. could be obtained in the home, without tricky adjustments, and to present to him events taking place some distance away. The marvel of television created quite a sensation, not only in this country but also abroad. But after a few months, the

Picture Size

Thus, when the transmissions have been carried on for a few months more, and the receiver designs have been improved, it is quite possible that we shall find that there is a very considerable range to the transmitter at the Alexandra Palace. The second argument—picture size—is a rather difficult point. Critics of television said that people would not be content to sit and look at a tiny picture, when the cinemas were open to them. The answer to this criticism was that the picture was ample for home entertainment. As a matter of comparison, the 10in. by 8in. home television screen, when viewed from a distance of about 6ft., gives the same angle of vision as the standard cinema screen viewed from a seat in the balcony. To offset the criticism of size, however, Messrs. Philips have now produced a projector-type television receiver giving a 20in. by 16in. picture, and it is stated that it will soon be possible to use another system to produce an even larger picture. But is the question of size so important? It would seem that some experts do not consider it so, as it will be noted that the Ultra receivers have been produced in some models to offer a picture measuring only 7½in. by 6½in. There are, of course, some interesting problems connected with picture size. If you own a home cinema, try the effect of producing pictures of different sizes, first without sound, and secondly with sound kept to a low level. You will find, I think, that a picture about 8in. by 6in. projected so that it is viewed on a screen placed at one end of a table, so that you can sit at the other end

and rest your arms on the table in a comfortable position, and with the volume only just loud enough to be able to follow it, will prove very much more intimate and enjoyable than when using a 5ft. screen at the other end of the room with *volume to suit*. I think this is bound up with some psychological effect such as is obtained when listening via the headphones and the loudspeaker. There is something intimate about the closeness to the performer, or picture, which seems to add to the enjoyment. Obviously, however, when it is necessary to entertain a crowd of people a larger screen is necessary, and thus some form of adjustable projector would seem to be an added advantage; but for domestic purposes or family listening there is much to be said for the small picture.

Which System?

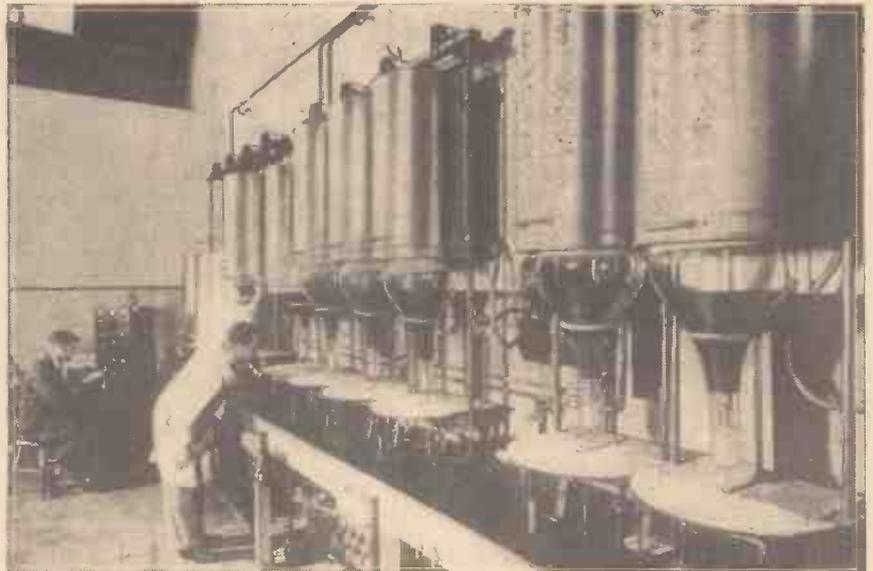
Finally, we come to the system of the technique which is now being employed. Last year, the majority of cathode-ray tube receivers utilised electro-static deflector systems. This year, the majority are using electro-magnetic systems. The optical-mechanical system has not yet been satisfactorily demonstrated on the B.B.C. transmission, the makers claiming that the transmission is not reliably synchronised and the inertia of the receiving system does not, therefore, permit of good synchronisation. After representations to the B.B.C. and the Television Advisory Committee, however, the transmitter is to be fitted with an alternative synchronising system which will not be ready, as announced elsewhere in this issue, until later in the year. Thus, it is not possible to say yet whether this system will show advantages over the cathode-ray tube system. It provides a much larger picture, and requires much lower voltages for operation. Until it has been put into practical use, however, it is not possible to say whether or not it will prove to have advantages over the present receiving systems.

Is there, then, any other system ready for development which will be as simple to operate as the home cinema, will be capable of focusing adjustment to provide picture sizes (projected on to a screen) to suit every requirement, and which will lend itself finally to projection in natural colours?



This is the new Baird Model T.11. Note the novel scheme adopted for concealing the radio controls by hinging the lower part of the front of the cabinet.

“experts” began to criticise the system, and before long even in the lay press arguments were set forth showing why the system was wrong. Among the many complaints levelled at the system was the short range of reception, the size of the picture, and the fact that one had to look in in a darkened room. Taken as they stand, these three arguments would certainly seem to rule out television as a source of home entertainment. But what has happened since those days? First, the original few miles which was thought to be the maximum service area has been very considerably exceeded, and even now it is not possible to say just what is the limit. The various commercial companies who are making television receivers are daily investigating authentic cases of reception over considerable distances and are proving that these cases are by no means freaks. With suitable aerial facilities, for instance, regular reception is being obtained in Brighton and at places just as far away,



A corner of the Cossor Works, showing a number of 12in. cathode-ray tubes in the process of being exhausted or pumped.



On Your Wavelength



By Thermion

New Gramophone Era

THE new method of canning music on a strip of Cellophane, with a track on it somewhat similar to the sound track on a talking film, lifts the gramophone from the archaic to the modern, and I hope that companies sponsoring the idea will prosper. Think of the advantages. It does not require a needle; you do not have the bother of changing records, or arranging them in a particular order; there is no needle scratch, for the sound strip simply passes through a beam of light. Consequently it can never wear out, and unlike disc records it is light, compact, and unbreakable. Although I have not yet witnessed a demonstration I shall take an early opportunity of doing so, for it is my opinion that needle scratch both on gramophones and radio gramophones is one of the greatest bugbears of recorded music. It seems to me, too, that it must have a far wider range of frequencies than the average gramophone, and one of its advantages over a wireless set is that it enables the listener to enjoy a long uninterrupted programme of his own choice. The sound reels already available comprise entertainment to meet every taste—symphony orchestra, chamber music, dance bands, and vocal gems from the operas and musical comedies. It is proposed to have monthly supplementary issues. The reels are non-inflammable, and can be stored without risk. The listener merely inserts the reel, presses a button, when the spool plays according to its size for 6, 30, 60, or up to 90 minutes without stopping! It is incorporated in a variety of models including a playing board, a console, a table console, and a radio de luxe (including all-wave radio with 10 watts undistorted output); the sound reels are so compact that 12 hours of music occupy only 11 in. on a rack. Spools are of three sizes—4, 7 and 9 in.

diameter, thus permitting complete works to be recorded unabridged.

Those Dealers!

HAVING had my say about dealers, I will allow one of my readers, Mr. C. H. R. N., of Kington, Herefordshire, to have his. This is what he says:

"Dear Thermion,—You arouse my admiration for your very plain speaking to the trade and dealers. It is good to see that you are not afraid to point out the shortcomings of those interested in profiting from the set constructor. However, I do not think it is always the fault of the dealer. For instance, I gave my dealer an order for a certain aerial array, which he passed on to his factor only to be told the makers could not supply them. The factor in question is one of the oldest in the trade. One cannot expect a dealer to send single orders to a firm, and consequently I cancelled the order.

In another case he sent one ear-piece of the most famous make of 'phone to the makers for the coils to be rewound; for this they had the impudence to charge 12s. 6d.—exactly a quarter of the cost of a new pair of 'phones. I know it is correct because I saw the invoice marked 'net trade.' My dealer would not accept any profit because he considered it a scandalous charge. I am very keen on short waves, and have constructed a set on my own ideas, and PRACTICAL AND AMATEUR WIRELESS has been my holdfast. The set has received stations from all over the world, in spite of my having a rotten aerial and a 20ft. earth wire."

Whilst this reader is right in saying you cannot expect the dealer to order one item, my reply is that he doesn't! He collects up his orders each day and sends them to his wholesaler, in just the same way as a newsagent collects up his orders for books.

Colour Codes

I HAVE never appreciated, nor have I been able to understand why manufacturers adopt the com-

plicated colour code system for resistances. Why should you have to indulge in mental gymnastics, and investigate the spectrum before you can work out the value of a resistance? Why should not the value be clearly marked—10,000 ohms, or whatever the value is? The manufacturers say that these values either get rubbed off or heat causes them to become obscured. My reply is that they can be indelibly stamped on, or alternatively if heat does cause the markings to vanish the resistances are wrongly made or designed. No resistance should get so hot that it causes such obliteration. In any case, a degree of heat which would cause the markings to vanish must also cause the various coloured dots to become discoloured. The colour code system is really childish, and ought to be abolished. Whilst it has become a standard, however, I congratulate the Erie people on producing a neat little gadget with 3 revolving discs, one governing the body, the other the tip, and the other the dot. By suitably rotating the discs according to the resistance value which is to be found, a direct reading is readily obtained. It is, however, making a complicated job of what ought to be really a simple business.

Licences

DURING July, German licences dropped 44,000, so that as the German total of licences is only 8,229,890, the British total is now above it. Our licences issued during July total 34,666, making the total in force to date 8,269,450.

Service!

I AM so often kicking the nether portions of dealers and manufacturers about service, or lack of it, that I feel I must pass on the enclosed gem which my friend, Taylor, whose name is synonymous with W.B. Speakers, sends on to me. It is a letter from Capt. M. B. Balbi, of Reading, who writes to the W.B. Company as follows:

"Dear Sirs,—On Saturday last the 7th inst, I returned a W.B. Stentorian speaker for service. Today the 10th it arrived back. There

was Sunday in between. This service is so unexpected and unusual from a manufacturer that we are burying four of the staff who died of heart failure."

Friend Taylor tells me that he has sent a suitable floral tribute, and I want to pay a verbal one.

Tuning Controls

LOOKING round Radiolympia I have found considerable interest in examining the tuning controls and scales employed by the various manufacturers. The idea of using a flywheel for moving the pointer and turning the condenser vanes is, I think, a very good one. It will simplify tuning for those who really want ultra-simple operation, and its incorporation certainly helps to improve cabinet design. On the other hand, I doubt if schemes such as this would have any strong appeal to the constructor and experimenter, especially as many of the slow-motion controls which have been used for the past few seasons leave very little to be desired.

I do feel, though, that certain manufacturers would have done better if they had spent their time in producing tuning scales more accurately calibrated so that the stations marked on them can be found at the exact positions indicated. This is of particular importance when the receiver has an effective system of A.V.C., and is not fitted with a system of visual tuning. Still, perhaps it is not too much to hope that these progressive manufacturers who have introduced new controls will have paid equal attention to the other matter at the same time.

Standardised Coils and Condensers

THE constructor can be thankful that the design of coils and tuning condensers for his especial use have at last been made to standard specifications. Coils of definite inductance values used in conjunction with condensers of accurate "law" have made possible the station-calibrated tuning scale which is bound to find favour. Perhaps the average experimenter is quite prepared to draw a tuning graph, or to make notes of station positions on the dial, but other members of his family would, I am perfectly sure, prefer to have a more direct method of finding the transmission required. To the manufacturers who have co-operated to make this possible, I say "thank you!"

Problems of the Radio Engineer

DO you know that before you can safely possess a wireless set that faithfully reproduces the bass



Pentode Detectors

THE H.F. pentode is very commonly used nowadays as a detector in straight receivers, and some of the 1938 commercial receivers employ this type of valve as second detector in a superhet circuit arrangement. We find that many of our readers experience difficulty in obtaining satisfactory reception with an H.F. pentode in the detector stage, however. In most cases poor results are due to the application of excessive voltage to the screen or to the use of a low value load resistance. This type of valve works at its best, in the detector stage, when an anode resistance of approximately 100,000 ohms is used. This high resistance reduces the anode voltage to a low value, and in order to obtain optimum results the screen voltage must be reduced accordingly. When a battery type pentode is used in the H.F. stage it is usual to apply approximately 120 volts to its anode with 72 volts (in some cases 120 volts) to the screen grid.

Supplying the Screen Grid

WHEN the suggested anode load resistance of 100,000 ohms is used, however, the anode voltage drops to approximately 40 volts and the screen voltage should be reduced to approximately 24 volts for best results. This low voltage can be supplied by using a separate H.T. lead for the screen grid and plugging this into the 24-volt socket of the H.T. battery. It is often desirable to use an eliminator for supplying the H.T. voltage, however, and as many eliminators are not provided with a 24-volt tapping it is advisable to feed the screen grid through a suitable potentiometer. This should preferably be of the 100,000 ohms variable type having its end terminals connected to H.T. + 120/150 and H.T.— respectively, and its centre terminal joined to the screen grid of the H.F. pentode detector.

Test Meters

SINCE the publication of constructional details of our latest multi-range tester, we have received enquiries from so-called service engineers who wish to use meters having slightly different characteristics from the specified type but cannot make the necessary calculations for their proposed modifications. Actually, the calculations are very simple. The current shunt values are found by dividing the resistance of the meter (in ohms) by the number of times, minus one, that the full scale current deflection is to be increased. The series resistance for voltage measurement is calculated by dividing the required maximum deflection (in volts) by the full scale deflection of the milliammeter (in amps.).

notes of a cathedral organ, you must build your house as substantially as a cathedral?

I am told that the Mullard research engineers, who have this year achieved an outstanding improvement in loudspeaker designs, recently worked on experimental sets in which the bass notes were so powerful that they shook a parquet floor built in concrete.

In some houses with boarded floors, I was told at the Mullard laboratories, such a set would be really dangerous. The throb of the speaker on the low notes would arouse sympathetic vibrations in the floors and in the fabric of the building which might cause serious cracks and strains. And so the radio engineer, in his endeavours to achieve accurate reproductions, has to remember that he must build a set within certain definite safety limits. He must go neither too high nor too low.

At the top end of the tonal scale he is confronted with a variety of problems, chief among which is the fact that people in Great Britain actually dislike to have the top notes faithfully reproduced. The reverse, I understand, is the case in some Continental countries. An additional problem is that interference by Continental stations becomes greater at the higher frequencies. But tastes vary; and so most radio sets now have a tone control, which appears to enable the user to raise or lower the pitch of the sound at will.

An Acoustical Illusion

NOTHING of the sort happens; but the layman is quite happy because he is deceived by an acoustical illusion. The turning of the tone control merely suppresses altogether the higher notes, and the low ones, which are not altered, then appear to be lower still.

Mullard engineers have this year solved many of these problems by means of an ingenious but simple device that brings radio nearer than ever to musical perfection, and which is of considerable scientific interest. Sit directly in front of the loudspeaker of your radio set, and you will notice that you hear clearly all the high notes of a musical broadcast. Move a few feet to the side of the speaker and you will hear them hardly at all.

The Mullard device causes the high notes to be reflected outwards from the sides of the speaker cone, so that reproduction in every part of the room is properly balanced. This is one of many improvements in a series of sets which have been built.



NEWS

FOR 'FIDELITY FANS'

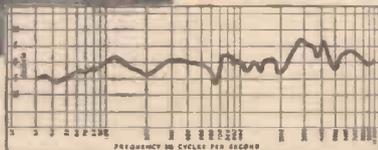
Planoflex

NEW SPEAKER FOR 'QUALITY SPECIAL' SETS

30 cycles to 14 kilocycles—the widest range of frequencies yet covered by a speaker of "domestic" proportions—this new W.B. product covers the band without departing more than a few decibels from the datum line anywhere. BUT—you must have a very high quality special receiver to operate it. Particulars of a suitable set, capable of assembly at reasonable cost, are included with each speaker. For those who can only enjoy the sort of radio which is hardly distinguishable from a personal performance, this new speaker and its set will open up new prospects.



30 cycles to 14 kilocycles



The new Planoflex speaker for special "local station" sets will make a stir among technicians. Price £5 5s. od.

RADIOLYMPIA STAND

75

Shows these and other items



Stentorian ALL WAVE SETS

For those who buy 'ready made' radio

For listeners who are critical, but have not time to build the sort of set they like, this new range of set is marketed.

Although not special "one station" receivers—on the contrary they have world-wide range—their quality of reproduction is well ahead of normal standards.

Prices are extremely moderate as will be seen on examination:—All-Wave Superhet, 9½ gns. for A.C. operation; 8gns. for battery operation (less batteries): All-wave A.C. "straight" 4 valve receiver, 8gns. Self-contained battery sets, 7½ gns. and 6 gns. respectively, including full-size batteries. Attractive H.P. terms are available on all.

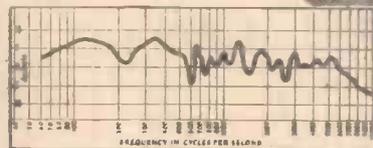
Fidelity and Precision

The makers, in their determination to maintain high quality and precision workmanship, are deliberately restricting output irrespective of demand. There will, however, be enough Stentorian sets to provide stocks for many good dealers.

FOR NORMAL RECEIVERS

Modified Stentorian brings increased fidelity

The New Stentorian and its response curve.



Any improvement on the well-known Stentorian's amazing ability to "straighten" a long range set's output curve has by many been considered unlikely. This feat has, however, been achieved this year in an unmistakable manner—as a few minutes' listening will show you. Prices remain extremely reasonable.

Senior (Type 38S) 42/- Junior (Type 38J) 32/6
Baby (Type 38B) 23/6 Midget (Type 38M) 17/6

The Senior, Junior and Baby are also available in handsome cabinets; the Senior and Junior cabinets incorporate distortionless constant impedance, volume control and push buttons for "Long Arm" remote switching. Your dealer will gladly show them.

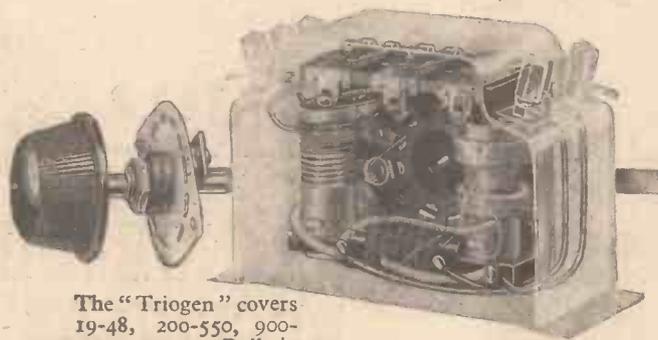
HIGH PRAISE FROM WELL KNOWN EXPERT

Mr. F. J. Cunn, the well-known scientist, has expressed the following opinion:—

"In search for the ideal a product remains the best of its class only whilst there is no other standard by which to judge it. In the design of speakers, as in all scientific matters, we must either progress or regress—we cannot stand still. The measure of progression is the degree of improvement over previous efforts. Once again it is my pleasure to congratulate your engineers on the immense step forward which you have made with the new 1938 Stentorians. This is an even greater improvement on your 1937 models than the latter were over the 1936 models, and the listener is fortunate indeed in having at his command a speaker sensitively responsive from the lowest to the highest frequencies encountered in radio. Good and bad sets will be improved by it. It is an important advance in speaker technique."



THE
WEARITE
 "TRIOGEN"
 THREE-RANGE COILS



The "Triogen" covers 19-48, 200-550, 900-2,100 metres. Built-in trimmers and wave-change switch—incorporating entirely new features.

Switch spindle and position register (separate Unit).

SPECIFIED

for

F. J. CAMM'S
 "ORACLE ALL-
 WAVE THREE"

TWO REQUIRED
 with spindle and
 position register

"ALL-
 WORLD
 ACE"

TWO REQUIRED
 with spindle and
 position register

PRICE EACH
 9'6

Spindle and position register 1/6 extra

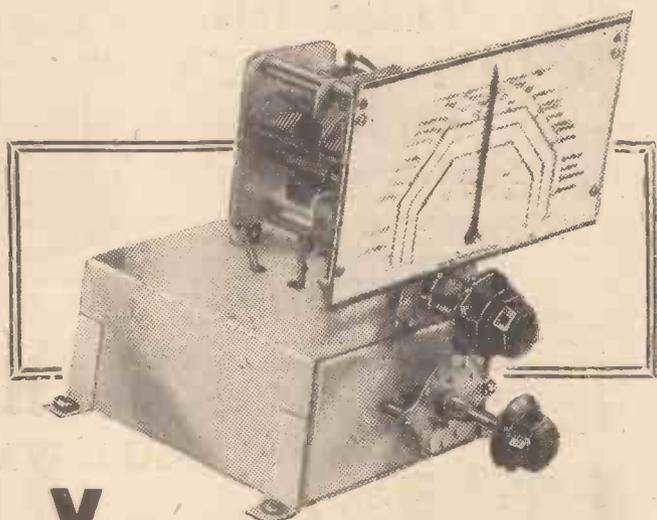
SEND THIS COUPON FOR COPY OF THE NEW WEARITE CATALOGUE

Please send me copy of the book "Wearite Components" Type P.	To Messrs. WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17.
	Name
	Address

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A Promise Fulfilled!

The **J.B.**
 All-Wave
LINACORE
 IS HERE!



YOU'VE been waiting for this! And now the J.B. ALL-WAVE "LINACORE" TUNER is here to bring you vivid world-wide reception as never before. Build an All-Wave Superhet Receiver with the "Linacore" . . . you won't know what real long-distance listening is until you have.

The New J.B. "Linacore" All-Wave Tuner

has been designed by J.B. Engineers after many months' research. Every device known to modern radio has been developed and incorporated to produce a unit of the simplest form, yet which guarantees the best possible results.

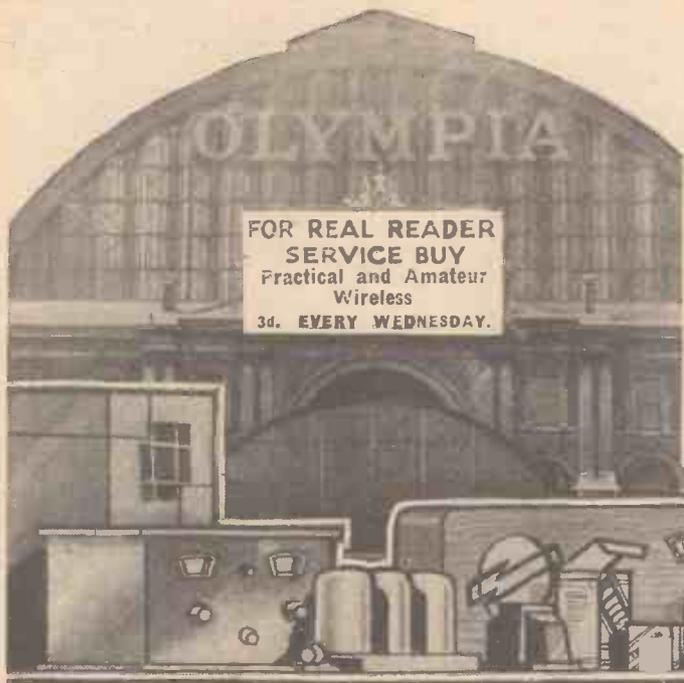
- Wave-range: 16.5-51, 200-550, 800-2,000 metres.
- Full vision two ratio drive ensures accurate tuning.
- Complete with padding condensers, gang condenser, switches, tuning controls.
- Needs no trimming adjustments, every unit being accurately aligned before leaving factory.
- Reduces background noises and whistles, minimises man-made static.
- Superhet circuit ensures efficient short-wave reception without excessively sharp tuning.
- Automatic Volume Control eliminates fading.
- For use in 465 K/c. Superhet Receivers, and designed to employ anti-noise aerial if necessary.

A.C. Mains Model, Type AW ... Price 55/-

OLYMPIA Stand 93

BUILD THIS AMAZING ALL-WORLD RECEIVER! Send 3d. in stamps for "All-Wave Vivid Radio" which describes, with full-size wiring plan, a supersensitive All-Wave A.C.4 Receiver incorporating the new "Linacore". This receiver is going to be the Constructors' Set of the Season.

JACKSON BROS. (LONDON), LTD., 72, ST. THOMAS' STREET, LONDON, S.E.1. Telephone - Hop 1837



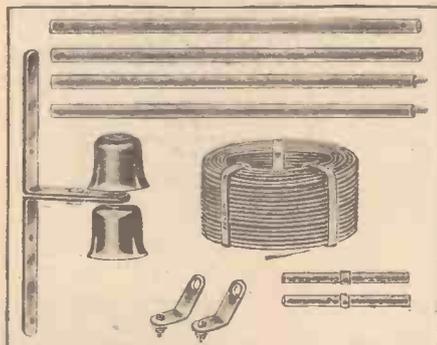
RADIOLYMPIA-

Complete Stand-to-Stand Report

Items of Outstanding Interest on Each Stand By THE TECHNICAL STAFF

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

THE many new components on this stand show the modern trend in receiver design, and crowds of interested constructors are busily making notes with a view to reconditioning their present receivers. The all-wave units, superhet components, aerial kits, and similar items will all play their part next season in giving improved results, whilst the neon output meter



This is the new Bulgin dipole aerial assembly kit. The neat manner in which this takes down for packing and transport is apparent from the illustration.

and similar devices will assist in obtaining the maximum performance in ganged and other intricate receivers. A most interesting range of sundry components is to be seen on this stand.

STAND No. 2
ARDENTE ACOUSTIC LABORATORIES, 11 and 12, Pollen Street, Maddox Street, W.1.

THE exhaustive range of public-address and deaf-aid equipment shown on this stand gives a good idea of the activities of Messrs. Ardente and some very interesting features in design are to be seen. Some of the amplifiers are interesting, not only from an external aspect, but from the circuits employed, and the specialised work carried out by this firm, is well represented.

STAND No. 3
HARRIES THERMIONICS, LTD., 233, Shaftesbury Avenue, W.C.2.

THE new All-stage valves are the centre of interest on this stand, as it is claimed that they remove the necessity for different valve types. They may be plugged into any stage in a receiver designed round them, even in a superhet; and some complete receiver chassis are shown incorporating this new valve.

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

SOME very efficient loudspeakers are to be seen on this stand, together with microphones and other apparatus associated with public-address equipments. The 70in. horn is a very interesting exhibit, and the ingenious features incorporated in the domestic loudspeakers are well worth inspecting.

STAND No. 5
STERLING BATTERIES, LTD., Sterling Works, Dagenham, Essex.

THIS exhibit consists of a comprehensive display of batteries, and the various ranges cover practically every requirement of the modern radio listener.

STAND No. 6
De La RUE, T. & CO., LTD., 90, Shernhall Street, Walthamstow, E.17.

THIS is a most novel exhibit, showing, as it does, the range of moulded components which are now used in modern receivers. The use of special powders which may be injected into moulds in order to make these components, as well as the making of moulded cabinets, is well illustrated on this stand.

STAND No. 8
NEW ERA PUBLISHING CO., LTD., 12-14, Newton Street, Holborn, W.C.2.

STAND No. 9
BRITISH RAILWAYS, Seymour Street, N.W.

STAND No. 10
NEWNES, GEO., LTD., Tower House, Southampton Street, Strand, W.C.2.

ON this stand there is a very comprehensive range of books and periodicals of all kinds, and members of the Technical Staff of this paper are in attendance throughout the day to answer technical questions regarding general radio practice and with reference to the receivers described in these pages. A complete range of blueprints is available, together with the many wireless books published by this firm, including our latest addition, "Wireless Coils, Chokes and Transformers." We take this opportunity of thanking all those readers who visited us during the early days of the exhibition, and for the many suggestions which were offered. As

usual, we are filing these for future use regarding the policy of this paper.

STAND No. 11
HAYNES RADIO, LTD., Queensway, Enfield, Middlesex.

ALTHOUGH the complete television receiver is a high spot on this stand, the various types of amplifier and tuner units are of great interest. These are available separately to enable a constructor to build his own receiver combination, and special amplifiers are also on view. In addition, there are some useful components such as microphones, mains transformers and television accessories.

STAND No. 14
GAMBRELL ELECTRICAL EQUIPMENT CO., LTD., 3, St. James's Square, S.W.1.

THIS is an interesting exhibit, giving a good indication of the wide activities of this firm.

STAND No. 15
TEXALOOM RADIO, LTD., 806, High Road, Tottenham, N.17.

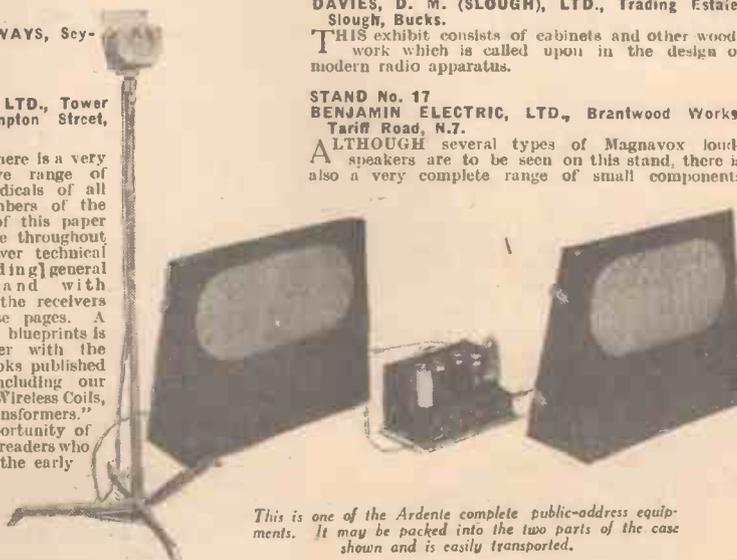
THE novel cabinet designs in woven fibre will, no doubt, appeal to many who are furnishing in the new styles. These cabinets are shown in various designs and will suit different rooms. They strike an entirely new note in radio apparatus, and some ingenious combinations are to be seen.

STAND No. 16
DAVIES, D. M. (SLOUGH), LTD., Trading Estate, Slough, Bucks.

THIS exhibit consists of cabinets and other wood-work which is called upon in the design of modern radio apparatus.

STAND No. 17
BENJAMIN ELECTRIC, LTD., Brantwood Works, Taff Road, N.7.

ALTHOUGH several types of Magnavox loudspeakers are to be seen on this stand, there is also a very complete range of small components



This is one of the Ardente complete public-address equipments. It may be packed into the two parts of the case shown and is easily transported.

suitable for the home constructor. Two or three new lines are to be seen, including new types of valve-holder. Many old friends are, however, still to be seen, including the Transceda, the Autocontrol and other transformers.

STAND No. 18
DYNAPORT RADIO & TELEVISION, LTD., Portadown Works, Corst Road, N.W.10.

ONE of the most interesting features on the receivers shown on this stand is the Rotomatic scale. This is fitted to Model A 58, an all-wave superhet, and provides one of the best indications as to the waveband to which the receiver is tuned. It rotates when the wave-change switch is operated and thus only exposes the appropriate section, the markings, which are internally illuminated, standing out in white from a sepla background.



One of the many novel receivers produced by Dynaport Radio and Television, Ltd., and to be seen on Stand No. 18.

STAND No. 20
HENLEYS TELEGRAPH WORKS, LTD., Holborn Viaduct, W.C.1.

ALTHOUGH there are some interesting examples of radio wires as used in modern radio apparatus to be seen on this stand, the various Solon soldering irons are a great attraction. There are various models ranging from the small 65-watt pencil bit, designed primarily for the use of the home-constructor, to the large commercial models weighing several pounds. A new feature is that the irons are now supplied with a special corrosion-proof finish which greatly prolongs the life of these irons.

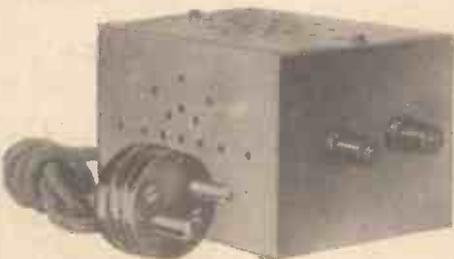
STAND No. 21
FERRANTI, LTD., Radio Works, Moston, Manchester.

IN addition to the many different types of meter to be seen on this stand, there are representative ranges of valves, and transformers. The latter are available in many different types suitable for the constructor and range from small L.F. coupling components to large mains components providing a variety of output ranges.

STAND No. 22
PLESSEY CO., LTD., Vicarage Lane, Ilford, Essex.
THIS exhibit consists of a range of commercial products, such as chassis and odd components. It is primarily of interest to the manufacturer and service man.

STAND No. 23
STRATTON & CO., LTD., Eddystone Works, Bromsgrove Street, Birmingham, 5.

THIS exhibit consists of short-wave and transmitting components of high class. They are all specially designed to provide a minimum of loss and give high



An ingenious midget charger to be seen on the Heyberd stand. This useful piece of apparatus costs only 12s. 6d.

efficiency, and among the new lines are transmitting condensers, low-loss valveholders, an instrument control knob, and a two-piece metal cabinet.

STAND No. 24
RESLO (SOUND EQUIPMENT), LTD., 97, Hampstead Road, N.W.1.

THIS exhibit consists of loudspeakers, microphones, stands and other associated public-address equipment. An interesting feature of the Dynamic speaker unit type S.U.6 is the fitting of a balsa diaphragm,

giving very good production of the low frequencies, down to the limit handled by the horn used with it.

STAND No. 25
HEYBERD & CO., F. C., 30, Finsbury Street, London, E.C.2.

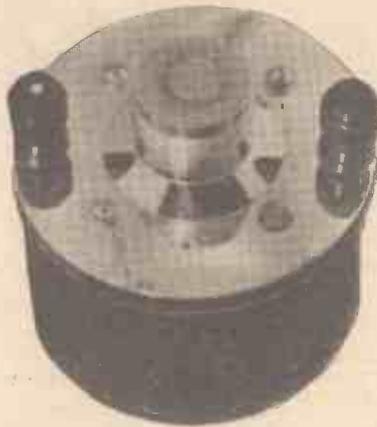
THIS exhibit consists not only of complete mains chargers and eliminators, but also of separate mains components. Among the many chargers to be seen, probably the most interesting is the Dwarf model built into a metal case less than 3in. cube. Mains transformers of all types and for all purposes are also to be seen on this stand.

STAND No. 26
CELESTION, LTD., London Road, Kingston-on-Thames.

ON this stand there is a complete range of loudspeakers, ranging from large auditorium or public address models down to small chassis units suitable for distant listening points in the home. These speakers are seen in chassis form as well as assembled in cabinets of various types, and certain models incorporate a constant impedance volume control to avoid distortion when the volume is adjusted. The speakers may all be obtained with or without a transformer as desired.

STAND No. 27
HIGH VACUUM VALVE CO., LTD., 113-117, Farringdon Road, E.C.1.

A VERY comprehensive range of valves is to be seen on this stand, embracing all types for battery and mains use. In addition, a range of 2-volt



This is a loudspeaker unit supplied by Reslo (Sound Equipment) which may be inspected on Stand No. 24. Note the protective covering over the horn socket and the substantial terminals which are fitted.

Midget multi-electrode valves is seen, and it is claimed that these have revolutionised portable receiver design. The new Hivac Harries All-stage valve is also to be seen on this stand, together with special 2-volt short-wave valves and four or five new types. The Wayfarer portable receivers, which are now being marketed by Hivac, are also exhibited here.

STAND No. 28
AERIALITE, LTD., Castle Works, Stalybridge, Cheshire.

SOME ingenious forms of capacity aerial are to be seen on this stand, together with various wires and aerial accessories. The Coilite Dipole aerial will appeal to those who are interested in the short waves, whilst the special Percollite H.T. batteries also provide an attraction. These are available in various types at very low prices.

STAND No. 29
PARTRIDGE, WILSON & CO., LTD., Davenset Works, Evington Valley Road, Leicester.

THIS exhibit consists of a complete range of Davenset charging equipment, included in which is a dual service station battery charger. This provides an output of 30 volts at 12 amps. and has two separate rectifier sections, each with its own voltage control. Thus it is possible to charge radio or car batteries simultaneously in widely different numbers. It costs 17 gns.

STAND No. 30
AUTOMATIC COIL WINDER & ELECTRICAL EQUIP. CO., LTD., Winder House, Douglas Street, S.W.1.

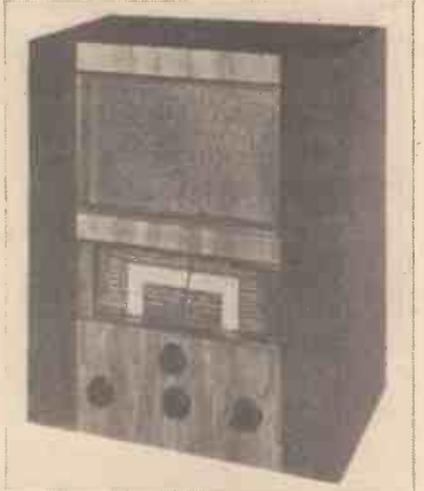
A VERY comprehensive array of measuring and test instruments are shown on this stand. These include many well-known units such as the Avominor, Avometer, and Avo Oscillator. There are also some new units and photo-electric cell devices designed for photographic use. Practically every instrument required by the active service man may be obtained from this stand, and, in addition, a new edition of their book, "Radio Servicing Simplified," is available to show the use of the various instruments under all modern conditions.

STAND No. 31
SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 39, Upper Thames Street, E.C.4.

HERE may be seen a complete range of batteries, designed for every battery receiver on the market, and also for use in torches and other types of lamp. The batteries for radio use include small types for portables and other receivers with a low consumption, and high emission types for apparatus in which Class B or similar high-current-load circuits are utilised. In addition, there are some special accumulators designed for specific requirements to complete the range.

STAND No. 32
CHLORIDE ELECTRICAL STORAGE CO., LTD., Emide Works, Clifton Junction, nr. Manchester.

INCLUDED in the accumulators and high-tension units to be seen on this stand, are those in which the ingenious self-indicating device is fitted. A com-



This is one of the Vidor receivers, having an attractive square type dial clearly calibrated in station names and wavelengths.

plete range of unspillable cells is to be seen, designed in sizes and shapes to fit practically any portable receiver, and there is also a range of unspillable types for midget receivers. The wet H.T. units are shown, and a complete range of the Drydex dry H.T. batteries available in various capacities to suit all requirements. An interesting point about these batteries is that the type number and price is now included on the ends of the cartons in which the batteries are assembled.

STAND No. 33
VIDOR, LTD., West Street, Erith, Kent.

AN interesting range of receivers is shown on this stand, including a novel portable. The receivers incorporate the all-wave feature, and in the new models there is a 5-valve battery all-wave set costing 9 guineas, and an A.C. mains superhet at the same price. The portable, costing £0 19s. 6d., is finished in black and ivory and is claimed to be the best-looking portable yet produced. It is a three-valver and has a self-contained frame aerial, special lightweight H.T. battery, and non-spillable jelly type accumulator.



One of the smallest portables made. This Beethoven model utilises standard valves and a moving-coil loudspeaker. It may be seen on Stand No. 34.

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

ON this stand you will see the smallest, lightest and most compact moving-coil loudspeaker battery portable ever produced. It measures 6in. by 8½in. by

5in., and is complete with four standard valves, 80-volt H.T. battery, non-spill accumulator, and M.C. speaker. It incorporates air-spaced tuning condensers, dial calibrated in station names, ball bearing turntable, and an optional signal light. It costs 7 guineas. Many other interesting receivers are to be seen on this stand.

STAND No. 35
HALCYON RADIO, LTD., Sterling Works, Dagenham, Essex.

HERE is to be seen a complete range of receivers and a new television model. Included in the range is a 3-valve TRF battery receiver with an H.T. consumption of only 8 mA. Radiograms and auto-radiograms are also exhibited on this stand.

STAND No. 36
BRITISH TUNGSRAM RADIO WORKS, LTD., West Road, Tottenham, N.17.

TUNGSRAM are displaying a comprehensive range of valves on this stand, including battery, mains, and car-radio types. Quite a number of new types are to be seen on this stand, amongst which may be mentioned the VX6—a car-radio vari-mu hexode, and a double-diode output pentode for A.C. use, and a similar model for universal (A.C./D.C.) use. High-power valves for public-address work are also represented, and include a 30-watt valve designed for low-loading push-pull operation.

STAND No. 37
GARRARD ENGINEERING & MFG. CO., LTD., Swindon, Wilts.

THIS exhibit consists of a complete range of gramophone motors, turntables, pick-ups and auto-changing mechanisms. Included in the range is the R.C.I. record changer, which takes eight 10 or 12in. records in any order. This changer, which is ready for mounting on the motor board and is complete with pick-up, costs £10 in the A.C. type and £10 17s. 6d. in the universal mains version.

STAND No. 38
TELEGRAPH CONDENSER CO., LTD., Wales Farm Road, North Acton, W.3.

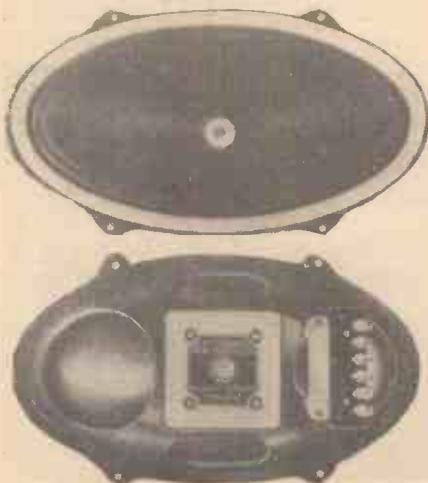
ON this stand there is a most exhaustive range of condensers, including mica and paper types, non-inductive and electrolytic models, and some special voltage-regulating, surge-proof electrolytics. All types of moulded mica condensers are on view, together with various models fitted with wire ends for inclusion in the wiring of a receiver. Special components, such as those designed for use in transmitting, television, or interference-suppressing apparatus, are also to be seen here.

STAND No. 41
BRITISH ROLA CO., LTD., Minerva Road, Park Royal, N.W.10.

THE well-known Rola loudspeakers are exhibited on this stand, and include a midget suitable for use in a portable or other small receiver, and the large G.12 model. This latter has a 12in. diaphragm and may be obtained in a permanent-magnet or energised type. Between these two extremes will be found speakers with 8in., 9in. and 10in. diaphragms, and the prices range from 25s. to £5 5s.

STAND No. 42
BELLING-LEE, LTD., Cambridge Arterial Road, Enfield, Middx.

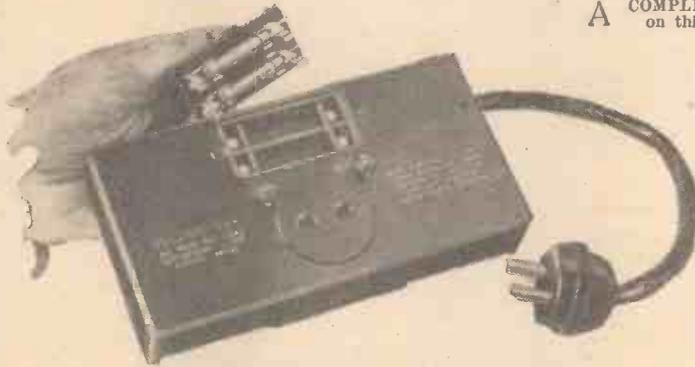
ALTHOUGH there is a host of small accessories for the home-constructor to be seen on this stand, the various interference-suppressing devices are



A novel elliptical loudspeaker manufactured by Goodmans Industries. Extremely good results are claimed for this model, although it is small and compact in size. It lends itself admirably for inclusion in modern cabinet designs.



Here is one of the Tungsram valves. It is a powerful output valve designed to deliver 8 watts when used in a Class A circuit, or when used in a push-pull Class A-B circuit it will deliver 28.5 watts. The name of the valve indicates that it is an A.C./Power/Pentode/40./Extra large.



This is one of the many interference-suppressing devices which are manufactured by Belling and Lee and which is on view on Stand No. 42. It will be noted that this model, designed for inclusion between mains and apparatus, is provided with easily-replaced twin fuses and is fully protected. It is for use with an all-wave receiver.

probably of equal interest. These have been developed after much research and cover every phase of man-made static, so that it is almost an impossibility now to meet a case of interference which cannot be removed by means of one or other of the Belling and Lee accessories. A model of the Interference Measuring apparatus used by the Post Office, and made by Belling and Lee, is also on show.

STAND No. 43
GOODMANS INDUSTRIES, LTD., Lancelot Road, Wembley, Middx.

SOME interesting loudspeakers, microphones and associated public-address equipment is on view on this stand, and probably the most interesting speaker from the home listeners' point of view is the elliptical model. This is claimed to give better reproduction than speakers which are much larger in size, and is easier to mount in the modern receiver cabinet.

STAND No. 44
WINGROVE & ROGERS, LTD., 188-189, Strand, W.C.2.

THIS is another stand which appeals to the home constructor. Here is a complete range of condensers and condenser drives, as well as many smaller components, such as tubular and electrolytic condensers. The modern gang condensers to be seen on this stand are compact and rigid and very suitable for the modern receiver designs. Station-marked dials are also available in various types to suit, and the latest model, designed for all-wave receivers, is also on view. The N.S.F. range of components which is displayed on this stand, includes volume controls, resistances and tubular and electrolytic condensers.

STAND No. 47
BRITISH TELEVISION SUPPLIES, LTD., Faraday House, 8-10, Charing Cross Road, W.C.2.

ON this stand there is an interesting display of constructor aids, television kits and receivers,

chassis and a neat portable. In addition, there are two amplifiers, and some components specially designed for short-wave apparatus. The television units are, of course, the centre of interest, and provide the essential parts for the construction of a modern television receiver utilising a cathode-ray tube.

STAND No. 48
COSMOCORD, LTD., Cambridge Arterial Road, Enfield, Middx.

THE various Cosmocord pick-ups and gramophone units are on view on this stand and include some useful items. These are the playing desks, which enable an ordinary receiver to be used as a radio-gramophone, and which may be obtained in various patterns. The Cosmocord pick-ups are also obtainable in various patterns, with and without volume controls.

STAND No. 52
AERODYNE RADIO, LTD., Aerodyne Works, Tottenham, N.17.

SOME unusual cabinet designs are to be seen in the receivers exhibited on this stand, and one of the most interesting is Model 295, which is designed to incorporate the latest Mazda output valve delivering an undistorted output of 4½ watts. In the all-wave models, the lowest wavelength is 13.5 metres, and this is covered in a four-band tuner giving short waves up to 141 metres.

STAND No. 53
MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, W.1.

ON this stand the new Marconiphone Television receivers are displayed, and the Masterram is probably the most interesting of these models. This is a luxury instrument incorporating in one cabinet a television receiver and auto-radiogram. In the other models the radio receiver section is of the all-world type, and a minimum of controls is fitted.

STAND No. 54
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

A COMPLETE display of Osram valves is given on this stand, and the main setting is the range of new International valves. In addition, there is a complete range of 2-volt types and those designed for special purposes, such as "Acorns," split anode magnetrons, electrometer triodes, etc. There are also transmitting valves and a special feature is the components arranged to show the stages in the technical development of television with examples of complete television receivers adjacent to them.

STAND No. 55
BALCOMBE, A. J., LTD., 52-58, Tabernacle Street, E.C.2.

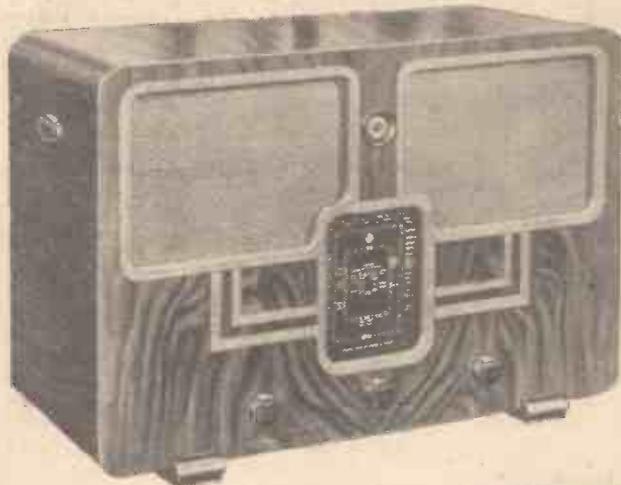
THE most interesting receiver displayed on this stand is the arm-chair model, designed to fit up close to an armchair, with a panel sunk in the top so that a tray may be placed upon it. In addition, there are a number of other receivers, including two battery radiograms fitted with double spring motors.

A portable pick-up and turntable assembly supplied by Cosmocord. This is only one of the many interesting radiogram accessories to be seen on Stand No. 48. You can easily convert your existing receiver into a radiogram by means of one or other of the Cosmocord accessories.



STAND No. 56**INVICTA RADIO, LTD., Parkhurst Road, N.7.**

IN addition to the complete range of receivers to be seen on this stand there are two television receivers—one designed to receive the television signals only and the other complete with an all-wave chassis. In the other receivers, three are designed to incorporate the television sound wavelength in addition to the remaining all-wave tuning extending from 6.5 right up to 2,000 metres with only a small break between 550 and 800 metres. There are battery receivers also to be seen on this stand.



Many of the new McMichael receivers are fitted with twin loudspeakers, and the model on the left is an A.C. table model in which the two loudspeaker openings provide a nicely balanced appearance to the cabinet. The receiver has Polychrome Flying tuning and a Magic Eye.

STAND No. 57**EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, W.C.2.**

HERE you may see a complete range of Mazda valves, B.T.H. pick-ups, loudspeakers, and television tubes and valves. A large diagram is on view showing the construction of the cathode-ray tube, and a model shows the method of converting light into electrical energy. A multi-colour cathode-ray tube shows what can be done in the matter of colour with fluorescent material, and another tube with a long after-glow screen proves both intriguing and interesting.

STAND No. 58**EVER-READY CO. (GT. BRITAIN), LTD., Hercules Place, N.7.**

ON this stand there is a range of receivers and valves. The receivers include mains and battery models and the all-wave feature is incorporated, tuning down in some models to 13 metres. There is also an interesting portable with a tilting speaker housing, enabling the cabinet to be made more compact than usual in a portable model. There is a complete range of replacement batteries for H.T. supplies for all models.

STAND No. 59**McMICHAEL RADIO, LTD., Wexham Road, Slough, Bucks.**

AN interesting feature about the receivers to be seen on this stand is the double speaker openings introduced to balance design where two speakers are employed. These are fitted to table and floor models, and another interesting feature is the large tuning dial which raises when the lid of the cabinet is raised. It is floodlit and greatly simplifies tuning. In other models a form of tuning known as Polychrome Flying tuning is incorporated and provides identification by means of luminous station names and multi-colour light pointers.

STAND No. 60**PYE, LTD., Radio Works, Cambridge.**

AMONG the receivers on this stand are the 3-waveband portable superhets, and QAC2, the QAC5 and a Baby Q portable. The QA receivers are designed for extremely high performance and 93 per cent. natural tone, and the QAC5 model incorporates a television sound channel (5.8 to 12.5 metres). One or two novel cabinet designs are incorporated in these receivers, and the new Pye television receiver is also on view.

STAND No. 61**COSSOR, A.C., LTD., Cossor House, Highbury Grove, N.5.**

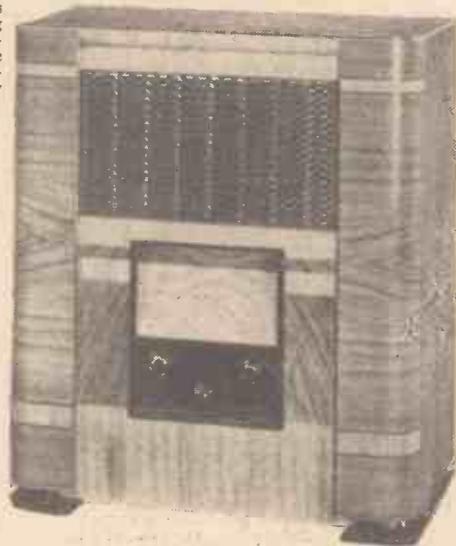
THE Cossor receivers, valves and television apparatus shown on this stand cover a wide field. In the receiver range are all-wave superhets for battery and mains use, tuning down to 10 metres. The Melody Maker range of receivers is seen in the 1938 design, the all-wave models going down to 17.25 metres. In addition, there is the full range of Cossor valves, cathode-ray tubes, oscillographs and associated equipment, together with the complete television receivers, which are also to be seen in the television theatre.

STAND No. 62**GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.**

THE range of G.E.C. receivers is displayed on this stand, and is claimed by the makers to be the

most comprehensive they have yet brought out. There are battery and mains models, with the all-wave feature prominently incorporated. High quality of reproduction is one of the important features of design, and there is a transportable A.C. receiver which is claimed to give a higher quality of reproduction than is usual in a transportable receiver. Two radiograms—one incorporating an automatic record-changing mechanism—are also on view, together with the television receivers, which are also demonstrated in the television theatre. The new table model D.C. television add-on set is particularly novel.

wavelength ranges. The minimum covered on the five-waveband models is 4.85 metres, and this extends up to 107 metres in three steps. Other models are designed just to include the television sound waveband, and an ingenious system of delayed automatic volume control is incorporated.



A new battery transportable de-luxe receiver in the H.M.V. range. Inspect this along with the other 21 new lines on Stand No. 66.

STAND No. 65**KOLSTER-BRANDES, LTD., Gray Works, Sidcup, Kent.**

IN the K.B. receivers exhibited on this stand, one of the most interesting is the K.B.600 A.C. model, designed to provide a high quality output of 8 watts. Some unique cabinet designs are to be seen, and a change has been made in the colour scheme provided for the control knobs. This lends an air of freshness to the general appearance of these receivers.

STAND No. 66**GRAMOPHONE CO., LTD., 98-108, Clerkenwell Road, E.C.1.**

THERE are 22 all-world radio receivers and radiograms on this stand, and they include battery receivers costing only 7½ guineas and an all-world high-fidelity concert auto-radiogram at 80 guineas. Between these extremes there are various models, with all-wave tuning and various output stages amongst which the Armchair model is probably the most interesting. This has a bookcase on one side and is designed to stand on the floor by the side of an armchair, giving a table top covered with glass for trays, etc., two elliptical high fidelity loudspeakers, and a special flat cable designed to go underneath a carpet.

STAND No. 67**RADIOGRAMPHONE DEVELOPMENT CO., LTD., Globe Works, Newtown Row, Birmingham.**

THE R.G.D. receivers cover an interesting range, and tune down to 16.5 metres. Stereoscopically illuminated glass tuning scales are fitted and quality of reproduction has been made an important feature. In one of the models there is an undistorted output of 12 watts. This particular model—an auto-radiogram

(Continued on page 625.)



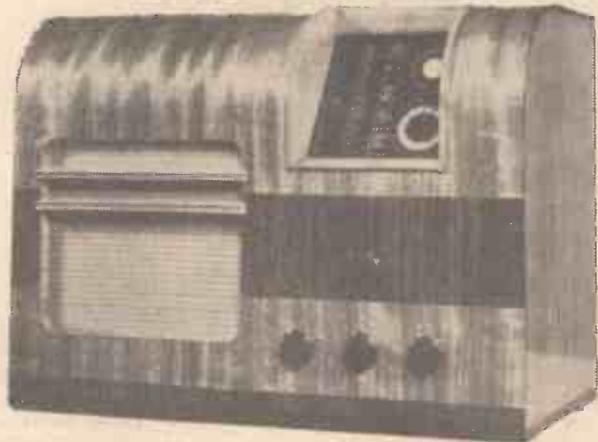
This is one of the new Cossor receivers, Model 538, designed for all-wave tuning, A.C. operation, and in a very compact design.

STAND No. 63**ULTRA ELECTRIC, LTD., Western Avenue, Acton, W.3.**

ALTHOUGH there is a complete range of receivers on this stand the three new television receivers are very attractive, being of much smaller dimensions than other models. This is due to the particular type of tube employed, which has been developed by Ultra and made to their specification by Ediswan. It is of the all-magnetic deflection type. A special synchronising system is employed. Fifteen valves are used in the small model and nineteen in the large model, which incorporates an all-wave superhet for broadcast reception.

STAND No. 64**MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, W.1.**

THE full range of Marconiphone receivers is shown on this stand, and includes some new models with very low



Notice how the dial has been incorporated in this Bush receiver to present a neat appearance and to facilitate tuning. This receiver has a special "magnified" tuning scale for the short-wave ranges.

AVO Precision TESTING INSTRUMENTS

Regd. Trade Mark

BRITISH MADE

RADIOLYMPIA STANDS Nos. 30 MAIN HALL and 166 gallery

Only precision instruments enable you to test accurately and trace radio faults efficiently. "AVO" Instruments are outstanding for precision. They are the outcome of a constant effort to provide amateur enthusiasts and radio engineers with instruments of high accuracy and maximum utility at a moderate cost. If you do not see the comprehensive range of "Avo" Testing Instruments at Radiolympia write for descriptive literature.



THE D.C. AVOMINOR

This accurate moving-coil instrument is 13 meters in one. It has 13 ranges, covering voltage, current and resistance—voltage ranges sufficient for measuring H.T., L.T., Grid Bias, Mains and Eliminator Voltages; Milliamp ranges for testing receiving valves and apparatus; Resistance ranges for all resistance measuring. In case, complete with testing prods, crocodile clips, leads and instruction booklet.

45/-

The Text Book you should have! RADIO SERVICING SIMPLIFIED 6th Edition

A new and greatly enlarged edition of this popular text book is now ready. Entirely re-written in the light of present-day knowledge, it takes the reader by easy stages through the whole routine of testing modern radio receivers. Every test is described in a clear and interesting manner. The wealth of information given includes a lucid explanation of all the faults which receiving and amplifying equipment can develop, the correct use of all testing instruments, etc. 150 pages. Numerous diagrams and graphs. A valuable work of reference for every radio enthusiast.

Price 2/6. Post Free 2/10. Send P.O. for your copy to-day.



The UNIVERSAL Avominor

This compact precision moving-coil instrument provides facilities for all A.C. and D.C. testing. It has 22 ranges covering A.C. volts, D.C. volts, current, and resistance. All readings are direct. Total resistance of meter, 200,000 ohms—ensuring accurate readings. Complete with testing prods, crocodile clips and instruction booklet.

£5 : 10 : 0
Leather carrying case, 10/-

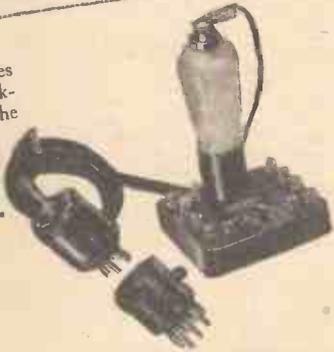
THE AVODAPTER

Simplifies valve testing! Enables all valves to be tested under working conditions. Eliminates the need for severing connections and grovelling about inside the set. Instantly adaptable for 4-pin, 5-pin and 7-pin valves

27/-

9-PIN AVOCOUPLER Attachment (not illustrated) for rendering Avodapter suitable for 9-pin valves

12/6



"AVO" TESTING ACCESSORIES

A valuable adjunct to your testing kit. The boxed set of accessories comprises insulated testing prods, interchangeable crocodile clips, connecting leads, etc. etc. Easier, safer and quicker to use than nondescript lengths of wire.

Price 2/6



IF any radio enthusiast will make it his business to call at Stand 99 in the main hall he will see and hear quite a lot to his advantage. Should he be unable to call personally he can avoid complete disappointment by writing at once for the 1937-1938 catalogue of new Varley components. Anybody who knows anything at all about radio knows that Varley components always have been the best that could be made—and they still are. Varley, Cambridge Place, Woolwich, S.E.18.

A Story That's a Tonic . . .

SUMMER MOONSHINE

by

P. G. WODEHOUSE

Written exclusively for PEARSON'S MAGAZINE by the world-famous humorous writer. A story which is guaranteed to bring hearty chuckles from the least frivolous of people.



Joe decided to cancel the expense bill. "It shall be adjusted at once. . . . Expunged. Struck off the register. Razed to its foundations and sown with salt!"
"Oh! Mr. Busby," she squeaked.

IN THE SEPTEMBER

PEARSON'S MAGAZINE

Of all Newsagents and Bookstalls, or by post 1s. 2½d.
from The Publisher, C. Arthur Pearson, Ltd., Tower
House, Southampton Street, Strand, London, W.C.2.

1/-

(Continued from page 622)

is provided with a synchronous electric clock, compensated lid stay and concealed castors. It costs 120 guineas.

STAND No. 68.
PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.

IN the receivers shown on this stand several novel features are to be found. First, the makers have aimed at a much higher quality than in previous years, and the cabinets have been designed on new lines. A central arrangement of the speaker and controls has been favoured, and the dials are conveniently arranged. Single-knob control, speaker deflector plates, double-cone speakers and a floating gramophone motor are some of the features found in the new models. The projection-type television receiver is also on view and strikes a new note in television receiver design.



Another interesting feature in dial design seen on the Mullard receiver. Note also how the speaker opening has been centralised and all controls combined in one single knob. The dial may be set at varying angles to facilitate tuning.

STAND No. 69.
COLE, LTD., E. K., Ekco Works, Southend-on-Sea.
A NOVELTY in tuning control is introduced in the Ekco receivers, where the customary control knobs have been masked in the cabinet design. The new arrangement has been called Spin-wheel tuning and this describes the scheme which is adopted. A flywheel device removes all difficulty in obtaining a rapid change of tuning settings, and the remaining controls are operated by small inset levers. Moulded cabinets are featured in the Ekco range.

STAND No. 70.
BUSH RADIO, LTD., Power Road, Chiswick, W.4.
ON this stand there is an interesting range of models, in which the tuning scale has been designed to provide simpler tuning. All-wave tuning is introduced in the models, and the cabinet designs are based upon novel lines.

STAND No. 71.
DECCA GRAMOPHONE CO., LTD., 1-3, Brixton Road, S.W.9.



Another midge portable, this one being manufactured by Messrs. Burndepl. Note the method of incorporating the control panel and tuning scale.

STAND No. 72.
MULLARD RADIO VALVE CO., LTD., 225, Tottenham Court Road, W.1.

MULLARD are showing on this stand a complete range of receivers and valves. In the receivers some interesting designs are to be seen, and it will be noted that symmetry has been ensured by fitting the speaker in the centre of the cabinet in most models. The range of valves includes many old favourites as well as a proportion of new components, including battery and mains types.

STAND No. 73.
LISSEN, LTD., Angel Road, Edmonton, N.18.

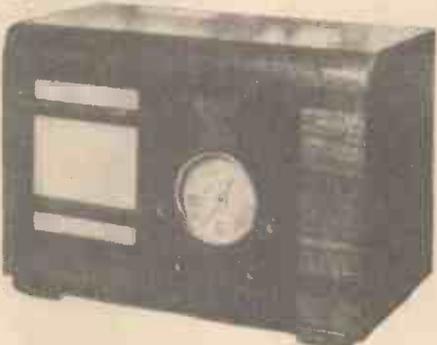
THE receivers on this stand include battery and mains models, and the all-wave feature is incorporated in most of them. The receivers tune down to 13 metres, and included in the range is a four-valve battery portable with Class B output. This has a full-vision dial calibrated in wavelengths and station names, with provision for a gramophone pick-up, but not for an extension speaker. A range of short-wave components and valves is also to be seen.

STAND No. 74.
FERRANTI, LTD., Radio Works, Moston, Manchester.

ON this stand there is a complete range of Ferranti receivers, amongst which the ingenious short-wave tuning indicator is prominently to be seen. This provides a very easy tuning setting and is obtained by means of a projection and lens assembly. Cabinet designs strike a novel note, and a television receiver is also being displayed. It may be seen in operation in the television theatre.

STAND No. 75.
WHITELEY ELECTRICAL RADIO CO., LTD., Mansfield, Notts.

ALTHOUGH the W.B. Stentorian range of speakers is displayed on this stand, the honour is shared by the new receivers which have been made for the first time by this company this year. The speakers include improved extension models with new cabinets, and the improved



This is one of the new Lissen models provided with a "clock-face" tuning scale.

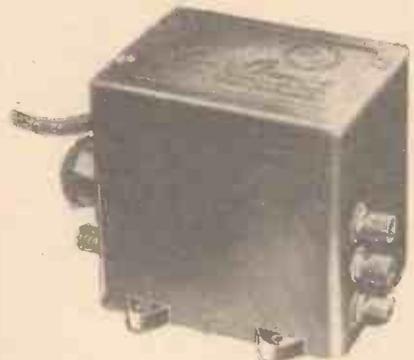
Long Arm remote control device. The receivers are designed to provide high quality and include an all-wave battery superhet, a five-valve all-wave A.C. superhet, a three valve A.C. all-wave receiver, and two self-contained battery receivers for transportable use.

STAND No. 76.
GRAMOPHONE CO. LTD., 98-108, Clerkenwell Road, E.C.1.

ON this stand the H.M.V. company is displaying the television equipment. This incorporates receiver cathode-ray tubes and all the associated items, and the receivers may be seen in action in the television theatre. The super model, in which an auto-radiogram is incorporated, is a luxury model which gives a very good idea of the trend of design of future television receivers.

STAND No. 77.
WESTINGHOUSE BRAKE AND SIGNAL CO., LTD., 82, York Road, King's Cross, N.1.

THE new Metal rectifiers, sold now for the first time without the perforated metal covering, are attracting considerable attention on this stand. Prices are lower, and the overall size is considerably reduced by the new method of assembly. In addition to H.T. models, there are smaller units for I.T. and meter



This is the ingenious Long Arm remote control unit supplied by W.B. for distant-listening purposes.

supplies, as well as high-voltage units suitable for television and similar equipment.

STAND No. 79.
BRITISH BELMONT RADIO, LTD., 4-5, Ridgmount Street, W.C.1.

INCLUDED in the receivers to be seen on this stand is a range of portable or compact receivers. These include a 5-valve A.C./D.C. compact, with self-contained aerial and illuminated coloured dial calibrated in metres and station names. Model 700 is an all-wave receiver tuning from 15.5 metres and fitted with the latest Octal valves.

STAND No. 80.
NEW LONDON ELECTRON WORKS, LTD., East Ham, E.6.

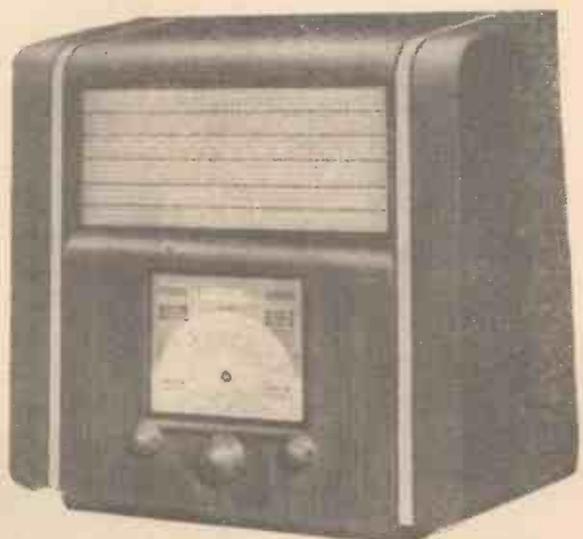
HERE may be seen various types of wire such as are used in modern receivers, together with several ingenious aerial devices and accessories. Quite a wide range is covered and the Globe aerial, consisting of a copper ball suspended from a bracket, is a novel device for overcoming the difficulty usually met with in flats and similar situations.

STAND No. 81.
DUBILIER CONDENSER CO. (1925), LTD., Ducco Works, Victoria Road, North Acton, W.3.

MESSRS. DUBILIER are showing a range of fixed condensers, resistances, and electrolytic components on this stand. In addition to the many different types of resistance, the condensers are also available in different types, including mica dielectric, paper dielectric, tubular, silvered mica types, and so on. There are also oil-immersed paper condensers in special sealed containers, and variable resistances (volume controls) of different types.

STAND No. 82.
BRITISH G.W.Z. BATTERY CO., LTD., Falmouth Road, Trading Estate, Slough, Bucks.

ON this stand you can see the range of G.W.Z. H.T. batteries, grid bias batteries, refills for torches and pocket lamps, replacement batteries for all types of popular sets, and a special range of H.T. and G.B. batteries for oversea purposes.



This receiver by Ferranti employs a novel form of tuning scale for short-waves, where an ordinary circular dial inside the set is magnified and projected by a lens system to offer a much larger scale in the small window seen above the dial.

STAND No. 83.
BRITANNIA BATTERIES, LTD., Union Street, Redditch, Worcs.

THE Pertrix batteries displayed on this stand include replacement models for all popular commercial receivers, as well as standard types in various capacities for general use. There is also a range of torch and flash-lamp batteries, and special alkaline battery headlamps.

STAND No. 84.
PILOT RADIO, LTD., 87, Park Royal Road, N.W.10.

AN interesting range of receivers is to be seen here, including table and floor models. The receivers tune down to 16 metres, and range in price from 8½ guineas to 35 guineas. The latter is a radiogram with automatic changer. Model U.106 is a 10-valve (including rectifier) receiver with tuning beacon, 6 wavebands from 4½ metres, and is designed to deliver an output of 12 watts.

STAND No. 85.
BURNDIPT, LTD., Light Gun Factory, Erith, Kent.
A NOVEL transportable (battery or universal mains operation), a midget portable with M.C. speaker, and a receiver which is claimed to be the first British set to employ electron-coupled output valves and aural tuning may be seen on this stand.



Neat and compact are the main features of this Milnes receiver.

STAND No. 86.
TANNOY PRODUCTS, Canterbury Grove, West Norwood, S.E.

THIS exhibit consists of public-address equipment, and the various types shown illustrate the ground covered by this section of radio. There are amplifiers, loudspeakers and microphones designed for small halls or large open-air displays, and special gramophone amplifiers and turntables may be seen.

STAND No. 87.
BAIRD TELEVISION, LTD., Crystal Palace, Anerley Road, S.E.19.

THE special feature on this stand is the Baird television receiver in which the Baird specially-developed cathode-ray tube is incorporated. This is of the all-magnetic type and is claimed to provide a brighter picture than other tubes. In addition, the special flat installation is of interest, as also is the display of associated television equipment.

STAND No. 88.
MILNES RADIO CO., LTD., Victoria Works, Bingley, Yorks.

SOME interesting receivers are seen on this stand, together with the special Milnes H.T. unit. The receivers are designed on attractive lines, and a special model is available for use in areas where reception is particularly difficult. A special circuit is employed, but is not recommended for normal reception conditions.

STAND No. 89.
SOUND SALES, LTD., Marlborough Road, Upper Holloway, N.19.

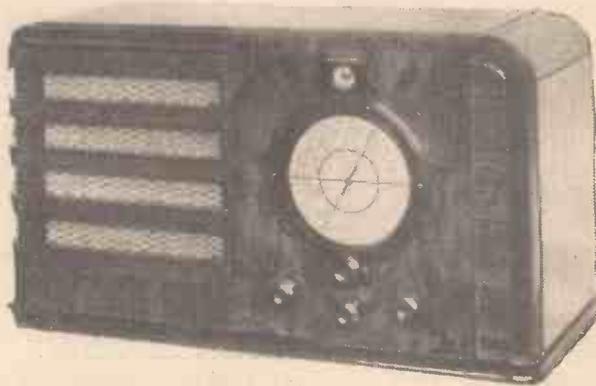
HERE is to be seen a complete range of transformers, chokes and apparatus designed for use in quality amplifiers or public-address equipment.

STAND No. 90.
TELSEN ELECTRIC CO. (1935), LTD., Fitz-george Street, Rochdale Road, Manchester, 9.

THERE are 36 new lines to be seen on this stand, and they range from small components to complete apparatus. There are valve testers, meters, signal generators, capacity analysers, microphones, transformers and other items, in addition to Universal receivers of the miniature semi-portable type.

STAND No. 91.
RAWLPLUG CO., LTD., Rawlplug House, Cromwell Road, N.W.1.

ON this stand there is a range of small items such as heat-proof cements,



A clock-face dial with sectional lighting, operated by the wave-change switch. This is a Pilot model.

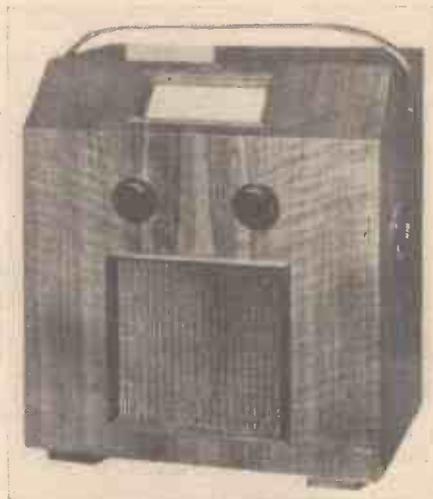
and the popular Rawlplugs designed to ensure right fixtures.

STAND No. 92.
SHAFTESBURY MICROPHONES, LTD., 24, Aldersgate Street, E.C.1.

A RANGE of microphones of all types, together with loudspeakers for public-address work, is shown here, and one of the latter is claimed to be the largest ever shown at Olympia. There are also complete amplifiers and equipment for portable or mains use.

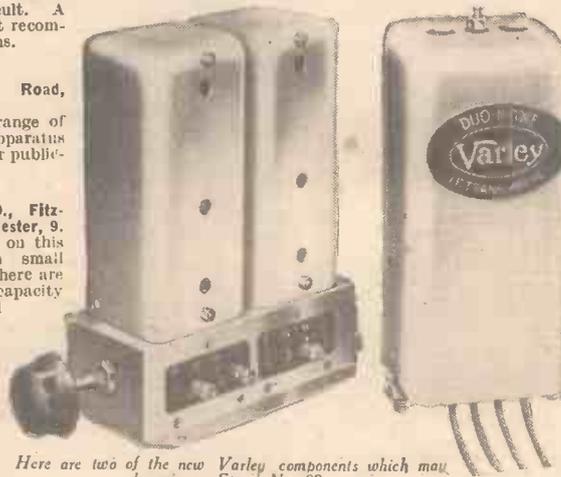
STAND No. 93.
JACKSON. BROS. (LONDON), LTD., 72, St. Thomas Street, S.E.1.

ON this stand Messrs. Jackson are showing a range of condensers and tuning dials. These are all designed for modern apparatus, and include single



A transportable available for battery or universal mains operation, from the Burndeipt range.

and ganged units, and the dials are obtainable in many different types, from those used with an escutcheon and showing only degrees to those of the full-vision or airplane type, with station-name calibrations.



Here are two of the new Varley components which may be seen on Stand No. 99.

STAND No. 94.
BRITISH MECHANICAL PRODUCTIONS, LTD., 79a, Rochester Row, S.W.1.

THE popular Clix components are to be seen here, including the new plugs and valveholders designed for use with the latest Octal valves. The exhibit includes spade terminals, master plugs, chassis and baseboard valve holders, as well as special items designed for short-wave work.

STAND No. 99.
VARLEY (OLIVER PELL CONTROL), LTD., Cambridge Place, Burrage Road, S.E.18.

THE new Varley coils are shown here, together with the complete range of Varley components. These include coils, transformers, chokes and resistances. The transformers are available in types for all requirements, such as L.F. and mains, and the latter are also supplied in several different models with different output ratings.



Here is one of the Fuller accumulator.

STAND No. 100.
FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex.

A GREATLY increased range of accumulators and dry batteries is exhibited on this stand, and in the latter class a battery is available for every popular radio receiver. Certain additions have been made to the jelly and free acid unspillable accumulators, and a range of portable components is shown.

STAND No. 101.
COLLARD, LTD., Culmore Works, Culmore Road, Peckham, S.E.15.

ON this stand is a complete range of gramophone motors and gramophone units. The latter include a turntable, motor and pick-up, and may be obtained ready mounted on a unit plate for inclusion in a radiogram. There are also some interesting automatic record-changing mechanisms available in different types.

STAND No. 102.
TUCKER EYELET CO., LTD., Cuckoo Road, Birmingham, 7.

THIS exhibit consists of a display of eyelets, solder tags, and other metal presswares such as are used in modern radio apparatus.

STAND No. 103.
ACE RADIO, 2-5, Dingley Place, City Road, E.C.1.
SEVERAL interesting receivers are to be seen on this stand, including all-wave superhets tuning down to 11 metres. Radiograms are included in the range, and prices range from 9 gns. to 25 gns.

STAND No. 104.
DYNATRON RADIO, LTD., Perfecta Works, Ray Lea Road, Maidenhead.

ON this stand high-class apparatus is displayed, the chassis for certain receivers being available separately for those who wish to build their own cabinets. Included in the range is a de-luxe radiogram, delivering an output of 15 watts from 17 valves.

This completes the exhibits on the ground floor, and the following stands will be found upstairs in the Gallery.

STAND No. 150.
BRIDGER & CO., LTD., R.O. No. 4 Factory, Shelford Place, Church Street, Stoke Newington, N.16.

ON this stand the display consists of moulded paper diaphragms such as are now employed in modern loudspeakers. The exhibit is of interest in showing the varied range of diaphragms which are now employed.

STAND No. 151
BIFURCATED & TUBULAR RIVET CO., LTD., c/o Exhibitors Service, Ltd., 13-14, Golden Square, W.1.
 THIS exhibit consists of a display of rivets such as are now commonly employed in metal receiver chassis construction, for holding down various components, and in the assembly of ordinary component parts.

STAND No. 152
SEATITE & PORCELAIN PRODUCTS, LTD., Stourport-on-Severn, Worc.
 FOR modern short-wave work ceramic material is now employed for valveholders and for insulation in other wireless parts. On this stand is a representative collection of such moulded parts made in such material as Frequentite and Faradex.

STAND No. 154
MICA & MICANITE SUPPLIES, LTD., Mica House, Barnsbury Square, N.1.
 IN addition to a display of component parts in mica and bakelite there is also an exhibition of the many forms in which this material is available.

STAND No. 155
HUNT, LTD., A. H., Bendon Valley, Garratt Lane, Wandsworth, S.W.18.
 IN addition to the well-known Capacitor Analyzer, the exhibits on this stand include a Signal Generator and other test equipment, together with various types of electrolytic condensers, noise suppression devices and similar items.

STAND No. 156
SCOTT INSULATED WIRE CO., LTD., Queensland Works, Holloway, N.7.
 THE main item in the range of wires displayed on this stand is the special Litz wire which is now so often used in the modern types of tuning coil. In addition an ingenious sample of wire only two-thirds of the diameter of the average human hair is on view.

STAND No. 157
MAY & BAKER, LTD., Dagenham, London.
 THIS exhibit consists of a display of articles made from Rhodoid, a cellulose acetate material. In addition to a display of the various forms in which this material is available there will also be a show of scales, dials, and name plates and component parts produced by moulding from a powdered form of the material.

STAND No. 158
BRITISH METAL ENGRAVING CO., LTD., St. Margaret's Works, St. Margarets, Middlesex.
 A RANGE of scales, dials and name-plates may be seen on this stand, which is primarily of interest to the set manufacturer.

STAND No. 159
RIST'S WIRES & CABLES, LTD., Waveney Works, Lowestoft.
 THE exhibit here consists of a range of wires of all types, screened tubing, connecting wires, mains leads, and various aerial arrays and accessories.

STAND No. 161.
MULLARD RADIO VALVE CO., LTD., 225, Tottenham Court Road, W.1.
 ON this stand Messrs. Mullard are showing a number of measuring and testing devices, including the latest type of valve tester.



See this receiver on Stand No. 104. Note the neat tuning dial.



An unusual speaker fret and tuning escutcheon on one of The Ace Receivers.



This is the new Hunt All-Wave Signal Generator—a valuable accessory for the service man.

STAND No. 162
RADIOMETERS, LTD., Eagle House, Jermyn Street, S.W.1.
 ON this stand there is a complete range of service equipment, including such items as Valve Testers, Resistance and Capacity Measuring Bridges, and other items of use to the service man.

STAND No. 164
EVERETT EDGUMBE & CO., LTD., Colindale Works, Hendon, N.W.9.
 A RANGE of meters is shown on this stand, including an All-purpose Tester, a Valve Tester, an All-wave Oscillator, and similar items of interest to the service man and the keen experimenter.

STAND No. 165
WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17.
 THE new three-range tuning coil is prominently displayed on this stand, together with sundry other components of great interest to the home-constructor. In addition there is a range of test equipment which is of interest also to the service man and the keen experimenter. It includes an oscillator unit, meter unit, and valve-testing unit.



Constructional difficulties are removed by this new Wearite multi-purpose mains transformer.

STAND No. 166
AUTOMATIC COIL WINDER & ELECTRICAL EQUIP. CO., LTD., Winder House, Douglas Street, S.W.1.

FOR the service man this exhibit is of particular interest. It shows a typical service man's bench, with tools laid out ready for servicing a faulty receiver. The equipment consists mainly of products of this company.

STAND No. 167
WESTON ELECTRICAL INSTRUMENT CO., LTD., Kingston By-pass, Surbiton, Surrey.

AMONG the instruments shown on this stand is the Analyzer, which is designed not only for ordinary radio servicing but also for modern television work.

STAND No. 168
SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Silk Street, Salford.

ON this stand there is an interesting range of electrical instruments. These include a "Q" meter, an "I" meter and other items. A range of miniature instruments and radio cores is also displayed.

STAND No. 201
BARRATT & ROBINSON, LTD., 288-310, York Road, N.7.

THIS display consists of a range of miniature, player, grand and upright pianos.

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

A COMPLETE range of battery charging equipment is shown on this stand and is, of course, primarily of interest to the service man.

STAND No. 204
EAVESTAFF & SONS, LTD., W. G., The Autoplayer Factory, Ashfield Road, N.4.

THE Mini-piano and some other interesting designs in modern pianos are exhibited on this stand.

STAND No. 209
ALL POWER TRANSFORMERS, LTD., 8a, Gladstone Road, S.W.19.

A VERY exhaustive range of mains transformers of all types is to be seen on this stand. They include those suitable for transmitters and television equipment and also small items such as are used in light welding, brazing and soldering works.

STAND No. 210
THE 362 RADIO VALVE CO., 324/6, Liverpool Road, Highbury, N.7.

HERE is a range of valves of interest to the keen experimenter. They include transmitting valves, high-power types for P.A. work, and some special valves for battery or mains use in super-regen. circuits.

STAND No. 211
BRITISH PIX CO., LTD., Pix House, 118, Southwark, Street, S.E.1.

THE well-known Invisible Aerial is shown on this stand, in company with other Pix products such as Lightning Arrestor, Selectivity Device, Metallised Earth, and so on. There is also a range of Pix valves.



This is the useful 46-range Universal Avometer.



Another useful service accessory. This is a Weston instrument.

STAND No. 213
DAVIS & TIMMINS, LTD., Brook Road, Wood Green, N.22.

THIS exhibit is primarily of interest to the trade. It consists of repetition work in rolled threads, screws, nuts and other turned parts.

STAND No. 214
RADIO SOCIETY OF GT. BRITAIN, 53, Victoria Street, S.W.1.

ON this stand the products of the society will be displayed, together with certain Amateur transmitting and receiving apparatus.

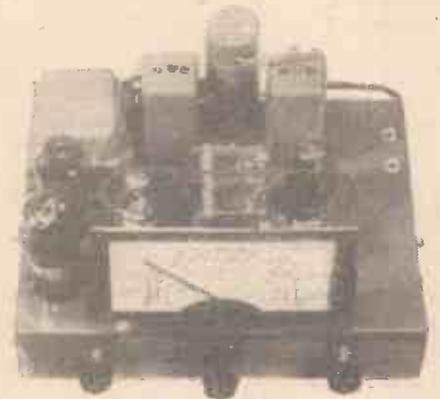
STAND No. 215
MERCANTILE CREDIT CO., LTD., 39-45, Finsbury Square, E.C.2.

THIS exhibit is also primarily of interest to the trade, consisting of a display of documents and details connected with Hire Purchase Trading.

STAND No. 220
ARMSTRONG MANUFACTURING CO., 100, King's Road, N.W.1.

SOME interesting completely-built chassis will be seen on this stand and include various modern all-wave types tuning down to 17.9 metres in some models and 11 metres in others.

There are also a number of stands in the Gallery numbered from T1 to T20 and these are all Trade Exhibits.



An interesting chassis selected from the Armstrong range to be seen on Stand 220.

B.B.C. TATSFIELD STATION

LIKE sentinels of space, six radio experts spend their time at the lonely B.B.C. Listening Post on the summit of a chalk hill at Tatsfield, Surrey. In the main receiving-room ten powerful sets mounted on grey metal panels eight feet high are used for "policing" the ether and for other uses. It is via a series of those sets that listeners hear programmes such as the "Five Hours Back" series picked up from broadcast stations overseas.

Short-wave signals received on a single set working on a single aerial are apt to fade, so nowadays the B.B.C. use three sets, all of them working synchronously but fed by different aerials, each of which is separated from the others by a little more than four wavelengths—say 350 feet.

Half an hour before a relay from America begins they tune in two stations that will be radiating the same programme. The stronger signal is chosen, and "lined up" on the three sets, which, by various technical devices, keep the output constant. On a fourth set the weaker signal is picked up. Then, when the relay begins, the fourth set is tuned in to the weaker station—just in case! In an emergency, or if the weaker station becomes the stronger, a gradual fade-over is made from one to the other, so gradual that it would be imperceptible to the ordinary listener. During the relay the Tatsfield engineer who is looking after it hears, through a complicated but easily-worked switchboard, the station actually being received, the station in reserve, and the output as B.B.C. listeners hear it.

Policing the Air

Many tests take place in that room after midnight in conjunction with the Engineering Research Department and with other listening posts. Tatsfield is also the main listening post for the three groups of British stations which operate on common wavelengths: London National, Scottish National and North National; Scottish Regional and Burghhead; and Welsh Regional and Penmon.

From just before sunset a steady watch is kept on them, and for that purpose special recording equipment in the receiving-room is used. Pens beneath whose inked points paper charts pass trace variations in their "field strength"; other visual and aural apparatus will show any small variation of carrier-wave frequencies on the common-wave stations.

Certain fluctuations here, state the B.B.C. officials, would mean that listeners would

be getting noise like "poofs," "plops" and whistles, and if this happens they are usually able to tell by the type of fluctuation at which transmitter the fault is likely to lie. Then they immediately report it.

Tatsfield is busy, too, when a home station suffers from any type of radio interference. That is dealt with by verifying it, identifying the offender, and passing on the information to the appropriate quarter. Identification may mean playing a waiting game with very selective receivers. Direction-finding apparatus

sometimes helps either to take the bearings of a medium-wave offender, or to cut out a loud local station in order to hear the interference more clearly. Then they measure the offender's wavelength. It is no good telling a station that he is interfering with your programme unless you can quote chapter and verse. And that is where accurate measurement is so necessary. They can measure any frequency to an accuracy of one part in a million, most frequencies to five parts in ten million. They hope to get it better than that one day.

Tatsfield also "keeps an eye" on sunspots.

"We co-operate closely with Greenwich in our investigations into sudden fade-outs of short-wave signals," says Mr. Griffiths.

"When short-wave signals over

a wide band of frequencies suddenly vanish and return only slowly to normal, the cause, apparently, is a tremendous outburst of hydrogen over the sun.

"When such a fade-out occurs, short-wave signals are impossible over long distances, and conditions take at least 15 minutes to return to normal."

Tatsfield is also equipped for vision and sound reception from Alexandra Palace.

"It is interesting," says Mr. Griffiths, "to see the effect of car ignition on television signals. We have had a car ticking over within a few feet of our aerial here and the effect on the picture resembled a white rain."

THE SPIRIT OF RADIO



Miss Elmina Humphreys, in one of the costumes she is wearing at Radiolympia.

THE ALL-WORLD ACE

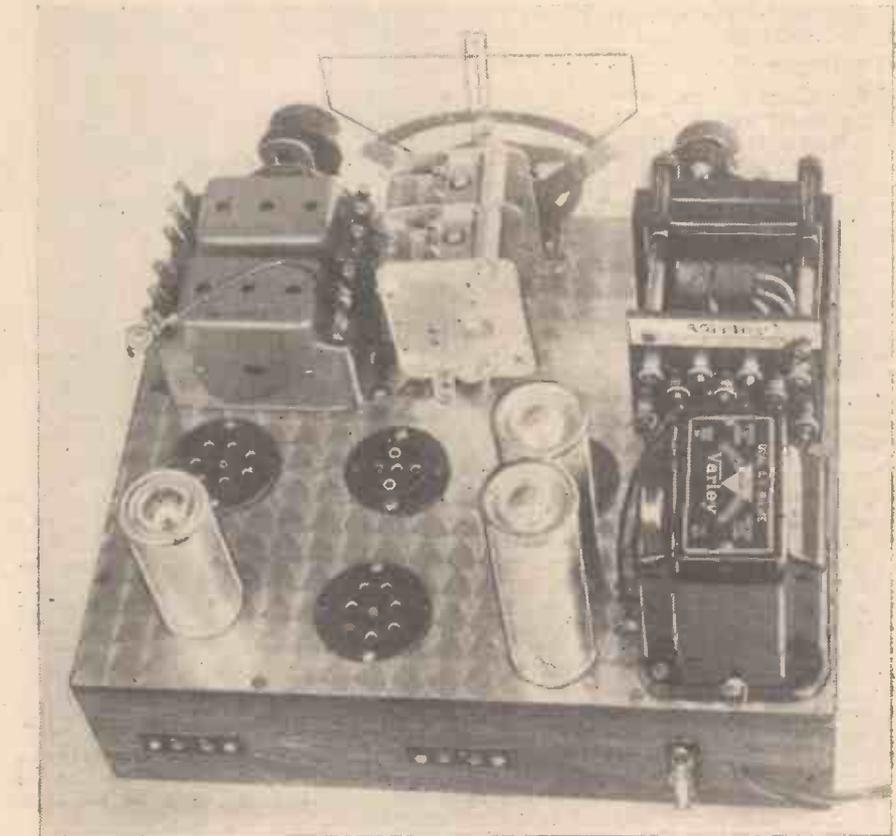
Further Constructional Details and Operating Instructions

It is not likely that experienced constructors will have experienced any difficulties in wiring the Ace from the details given last week, but it is possible, however, that one or two points are not quite clear to beginners. It will be noted that the L.F. choke has four terminals, two of which are joined together, and as the exact position of these terminals cannot be clearly shown on the diagram constructors are advised to wire this component in accordance with the instructions given on the manufacturers' leaflet, using the series method of connection. Lead K is shown joined to the screw holding the choke to the chassis; actually, this lead should be bared and passed underneath the choke base so as to make good contact with the metal surface of the chassis. When making the M.B. connections, care should be taken to ascertain that the metal surface is clean and free from grease. It has been known for polished metal surfaces of this kind to be covered with a thin insulating coating which prevents good contact being made between M.B. leads and the metal. It will, therefore, be advisable to clean the surface underneath each of the M.B. bolts.

Another point which is worthy of mention in connection with metal-covered chassis is that wood-screws are likely to break if forced through the metal surface. A shallow clearing hole should therefore be drilled for the screw in order to avoid this trouble.

Pick-up Connection

A length of screened lead is specified and this is intended for screening the lead to the pick-up socket if a pick-up is to be used. The pick-up socket strip may be mounted between the A.E. and L.S. strips with a screened lead joined from one

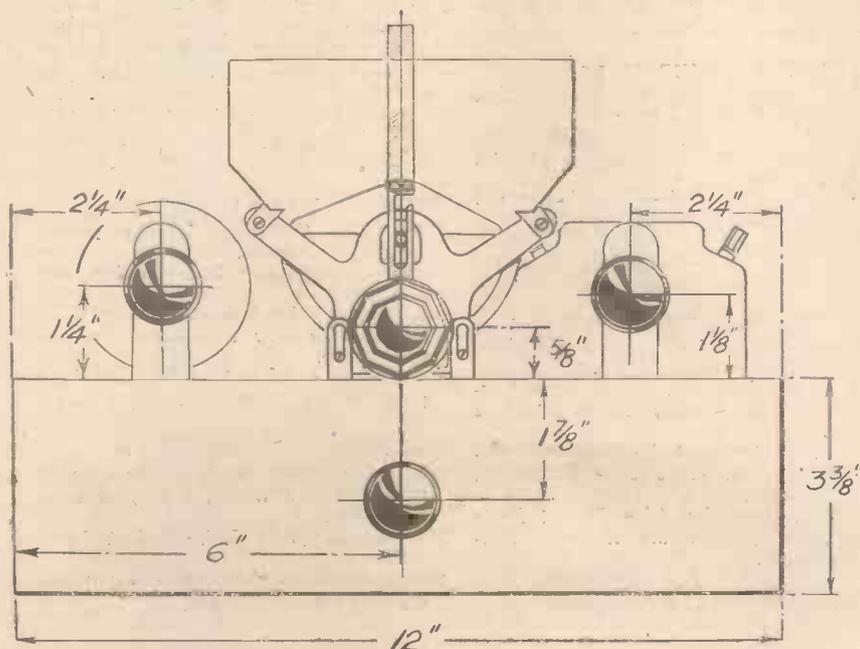


A rear view of the All-World Ace, showing the electrolytic condensers used for smoothing.

terminal to the grid pin of V2 (the junction of C3 and R5) and the other terminal joined to the E terminal. The pick-up

leads must, of course, be removed from the sockets when radio reception is desired, and when the pick-up is in use the volume control R1 should be set at minimum.

The lead from the coil to the cap of (Continued overleaf)



The panel layout of the All-World Ace.

LIST OF COMPONENTS

- Two all-wave coils, Triogen, with 2-gang spindle (Wearite).
- One 2-gang condenser .0005 mfd. Bar type (C1, C2) (J.B.).
- One Drive No. 2134 (J.B.).
- Thirteen fixed condensers: Two .0001 mfd. (C4, C5); Two .002 mfd. (C15, C16); .005 mfd. (C12); .05 mfd. (C9); .1 mfd. (C4); .5 mfd. (C5), (tubular); 4 mfd. (C8); two 8 mfd. (C13, C14), (wet electrolytic); two 25 mfd. (C7, C11), (25v. electrolytic) (Dubilier).
- Eleven fixed resistances: Two .5 megohms, (R5, R9); 100,000 ohms (R10); 2,000 ohms (R11), (F1); 100,000 ohms (R3); 50,000 ohms (R7); 25,000 ohms (R4); 10,000 ohms (R8); 600 ohms (R6); 300 ohms (R2); 150 ohms (R12), (F1) (Dubilier).
- One volume control, 10,000 ohms CP158 (R1) (Varley).
- One reaction condenser, .00025 mfd. (C3) (B.T.S.).
- One L.F. choke DP11 (Varley).
- One mains transformer EP20 (Varley).
- One Q.M.B. switch S80 (Bulgin).
- One fuse-holder and 1 amp. fuse F17 (Bulgin).
- Two socket strips L.S. and A.E. (Clix).
- Two component brackets (B.T.S.).
- Four valveholders: two 7-pin, one 5-pin, one 4-pin (V1 and V2 without terminals) (Clix).
- One Plymax chassis 12in. x 10in. with 3in. runners (Peto-Scott).
- Two ft. metal screened lead (Ward and Goldstone).
- Four valves: A.C./VP1; A.C./HLM; A.C.2/Pen. U.U.3 (Mazda).
- One P.M. speaker, Stentorian Senior (W.B.).

THE ALL-WORLD ACE

(Continued from previous page)

V1 may also be passed through a screening cover, but this was not found to provide a material improvement on our laboratory model. If a screened lead is used in this position the metal covering must be kept well clear of the bare lead and a wire must be connected from the metal covering to terminal SE of the coil. In the case of the pick-up lead the metal covering should be connected to the nearest, M.B. bolt.

Mains Connection

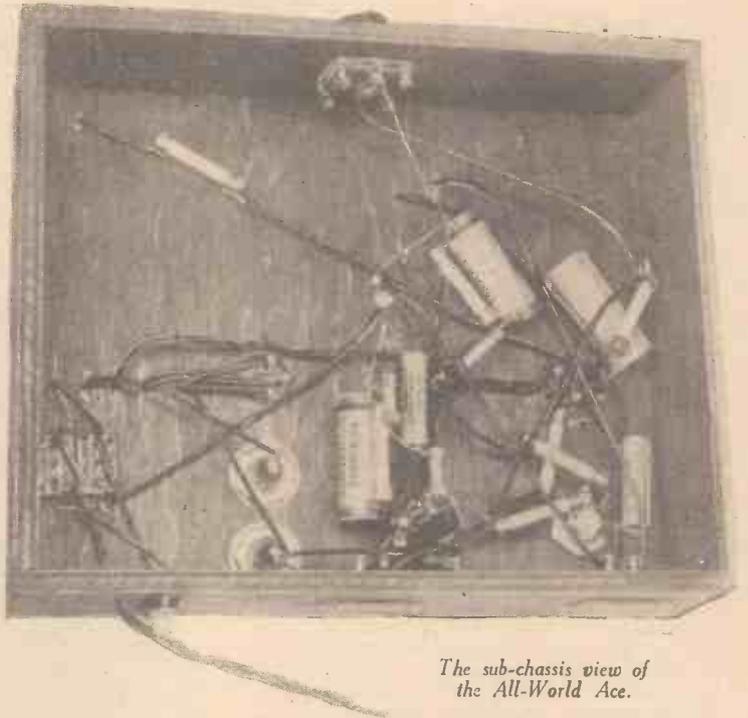
The on-off switch should be mounted in a convenient position at the side of the cabinet, on the side remote from the aerial and earth sockets, this position being chosen to avoid interaction between the mains leads and the tuned circuit leads. Before switching on care should be taken to ascertain that the mains leads are joined to the correct terminals on the mains transformer. Ten-volt tappings are provided from 200 to 250 volts and if the mains supply voltage lies between any of these tapping voltages the higher of the two tappings should be used—for example, if the mains voltage is 235 volts the 240 tapping should be used.

Operating

Volume is controlled by means of the potentiometer R1, the reaction condenser C3 providing an additional control for volume and oscillation. When continuous wave morse signals are to be received the reaction condenser must be set beyond the point at which oscillation occurs, but for telephony and I.C.W. reception maximum volume will be obtained just before the oscillation point is reached. The wave ranges are controlled by the switches incorporated in the coil unit, three positions being obtained—long-wave, medium-wave, and short-wave. It will be noted that there are three trimmers attached to each coil. It is advisable to keep the trimmers

attached to the gang condenser at minimum setting and balance the tuned circuits by means of these coil trimmers. It is only necessary to select a station near the lower end of each waveband and adjust the trimmers in turn for maximum volume, bearing in mind that trimmer No. 1 controls the short-wave band, No. 2 the medium-wave band, and No. 3 the long-wave band.

The trimmers are quite distinct and the setting of one will not affect the other. Remember, however, that when adjusting the trimmers on the detector coil unit the setting of the reaction control may have a slight effect, and thus when tuning in to a weak station you may find that the maximum volume will not be obtained without a slight readjustment. This point must be borne in mind when making the preliminary adjustment, and the reaction control should accordingly be set to a midway position.



The sub-chassis view of the All-World Ace.

It should be noted that the gang condenser required for this receiver is the J.B. Bar type. Owing to a misunderstanding, the Baby type was advertised by the makers in last week's issue. Tuning should be reliable from day to day and the only possibility of trouble, if the receiver has been connected exactly as described, will be the effects caused by movement of the components and wiring beneath the chassis. Therefore, when making these connections, make the leads as short as possible so that the large tubular condensers are held firmly in position.

Important Broadcasts of the Week

NATIONAL (261.1 m. and 1,500 m.)

Wednesday, September 1st.—Promenade Concert: Brahms, from the Queen's Hall, London.

Thursday, September 2nd.—Come Along Liza (A Londoner's Day Trip).

Friday, September 3rd.—Promenade Concert: Beethoven, from the Queen's Hall, London.

Saturday, September 4th.—Radiolympia Variety.

REGIONAL (342.1 m.)

Wednesday, September 1st.—The Playboy of the Western World, a play by John M. Synge.

Thursday, September 2nd.—Promenade Concert: from the Queen's Hall, London.

Friday, September 3rd.—Come Along Liza (A Londoner's Day Trip).

Saturday, September 4th.—Promenade Concert: from the Queen's Hall, London.

MIDLAND (296.2 m.)

Wednesday, September 1st.—Cinema organ recital from the Gaumont Palace, Birmingham.

Thursday, September 2nd.—A programme of Noel Coward's music.

Friday, September 3rd.—String Orchestral programme.

Saturday, September 4th.—A commentary

on the progress of the Tourist Trophy Race, from Donington Park.

WEST OF ENGLAND (285.7 m.)

Wednesday, September 1st.—Musical Comedy: Orchestral concert.

Thursday, September 2nd.—Concert Party programme from the Alexandra Gardens, Weymouth.

Friday, September 3rd.—Badger's Green, a comedy by R. C. Sherriff.

Saturday, September 4th.—The Bus, a short story by Ralph Wotherspoon and L. N. Jackson.

WESTERN AND WELSH (373.1 m.)

Wednesday, September 1st.—Band concert from the Gorse Hall, Swansea.

Thursday, September 2nd.—If Borrow revisited Wild Wales; Down South, a talk.

Friday, September 3rd.—Orchestral programme, from the Jubilee Bandstand, Aberystwyth.

Saturday, September 4th.—Concert Party programme, from the Arcadia, Penmaenmawr.

NORTHERN (449.1 m.)

Wednesday, September 1st.—An eye-witness account of the Harrogate Flower Show.

Thursday, September 2nd.—Variety programmes from the Alexandra Theatre, Hull, and the Lyceum Theatre, Sheffield.

Friday, September 3rd.—Orchestral programme.

Saturday, September 4th.—A Night at the Phoenix, a radio play by George Frederick Johnson.

SCOTTISH (391.1 m.)

Wednesday, September 1st.—A novelty variety Programme.

Thursday, September 2nd.—Variety programme.

Friday, September 3rd.—A Country Miscellany in Verse: Into the Village and Out Again.

Saturday, September 4th.—The Riddle, a play for broadcasting by Philip Blair.

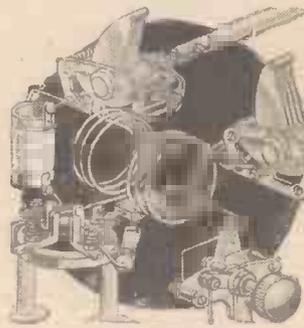
NORTHERN IRELAND (307.1 m.)

Wednesday, September 1st.—The Playboy of the Western World, a play by John M. Synge.

Thursday, September 2nd.—Orchestral programme.

Friday, September 3rd.—Organ recital from the Ritz Cinema, Belfast.

Saturday, September 4th.—Orchestral programme.



Short Wave Section

INTERESTING SHORT-WAVE TOPICS
Among Other Matters Discussed Below Are
Double Detectors, Pentode Decoupling,
Simplified Short-wave Tuning, and a Portable
Short-wave Receiver.

LAST week we devoted our attention to Radiolympia, and we shall have more to write about the newest components later. In the meantime, no doubt many of our readers have been to the Exhibition and made a critical survey of the exhibits. From our correspondence it is evident that the most enthusiastic of constructors and experimenters are taking a very keen interest in short-wave work; that being the case, the stands occupied by Stratton and Co., Bulgin, B.T.S. and Wearite will, among others, have claimed a considerable amount of attention. We have,

uses an H.F. pentode as high-frequency amplifier before the class B detector, coupling this to the second valve through an H.F. transformer. The L.F. portion is

by The Experimenters

on the usual lines, and is fed through a resistance-fed transformer.

Our correspondent endorses the remarks which have appeared in these notes before

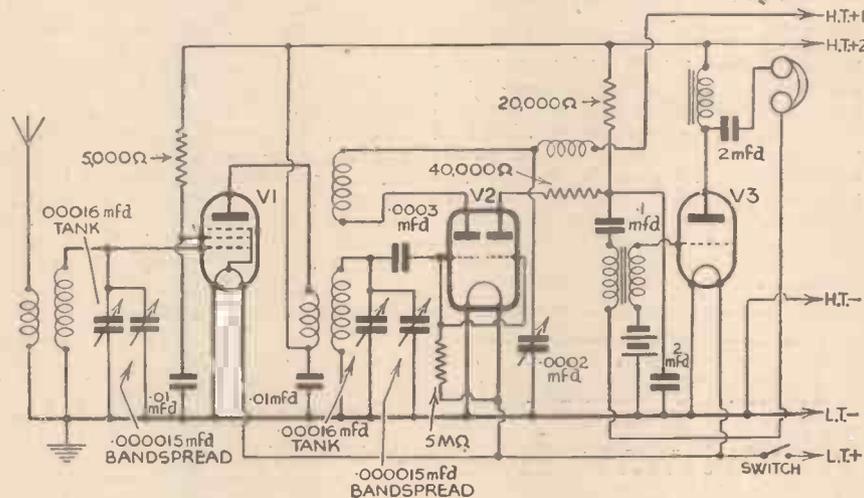


Fig. 1.—This interesting circuit sent by T. J. Evans, uses a class B valve for detection and reaction.

of course, met a number of readers, but as yet none of our number has been recognised.

This week we propose to leave Radiolympia to tell its own tale. Those who cannot be there in person can learn all about the exhibits from the well-illustrated descriptions which appear in this and last week's issues.

Our postbag is still of ample proportions, and we are extremely pleased with the interesting letters that we receive. Although our prime object is to tell you about our own experiments, the boot seems to be on the other foot at the moment, since we get so many excellent hints from our reader friends. Don't think that we mind that—we appreciate every one of them, and shall no doubt profit by your experiments as well as by our own.

Class B Detector

An interesting circuit comes from Mr. T. J. Evans, of Monmouth, and we reproduce it in Fig. 1. The most unusual feature is the class B valve used as detector and separate reactor. Incidentally, it appears that the arrangement of using two valves in this manner is very popular. Our own experiences of the arrangement have certainly been satisfactory. You will see that Mr. Evans

concerning the delightfully smooth reaction obtainable by using the separate reactor valve (the two "halves" of the class B can be considered exactly as if they were two separate valves). Quoting from his letter: "The two tank condensers are ordinary .00016-mfd. short-wave components fitted with pointer knobs and dials, whilst band-spread and reaction condensers are provided with slow-motion dials." Selectivity is stated to be extremely good,

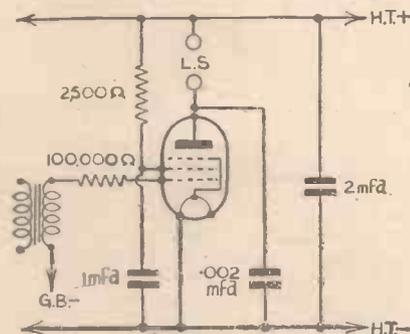


Fig. 2.—By using the connection shown above a pentode can be used very successfully in a short-wave receiver.

although tuning is by no means difficult. As will be seen, a four-pin coil is employed in the aerial circuit.

Triode or Pentode?

A point is raised concerning the most suitable type of valve for the output stage. Our Monmouth reader says that he has tried both triode and pentode valves, and that the triode seemed to produce a quieter background. This follows closely on our own experiences, but we have generally found that background noises when using the pentode were largely due to the lack of adequate decoupling. As a matter of fact, we have in nearly every case found it desirable to decouple the screening grid, as well as the grid, as shown in Fig. 2. Additionally, it has always appeared worth while to connect a .002-mfd. condenser between the anode of the pentode and earth to bypass any stray H.F. When employing standard-capacity batteries there has also been full justification for connecting a 2-mfd. fixed condenser across the H.T. supply. All of these points are illustrated in Fig. 2, where suitable component values are suggested.

Perseverance

Mr. F. Thomas, of Cirencester, sends a circuit of his det.-pen. battery set which, although "built only three nights ago, has brought in something like forty transmissions." The circuit is straightforward, and is similar to one we reproduced a week or two ago. The set tunes down to 13 metres, about which wavelength reception has apparently been very good. This reader has been interested in wireless only since last Christmas, so he has obviously studied his hobby pretty closely in the meantime. He mentions that this is the fifth S.W. set which he has "tried" to make, so we assume that it is the first to prove completely successful. Our congratulations on your perseverance, Mr. Thomas!

Aperiodic Aerial Tuning

Another letter is from an Irish reader, who shall be nameless. He has a four-valve all-wave receiver, built originally from a kit of parts, but bought by him as second-hand. There are separate tuning condensers for the H.F. and detector valves, and he wishes to dispense with one of these because the set is unsatisfactory in its present form. He finds tuning too difficult, and says that the set will have to "lie idle on a shelf" if we cannot help him. Naturally, we are only too pleased to give every assistance, but if the receiver is unsatisfactory we can hardly imagine that it will be transformed into a model of efficiency by dispensing with one tuning control.

However, we replied pointing out that it is a perfectly easy matter to make the aerial-tuning circuit aperiodic, although the

(Continued overleaf)

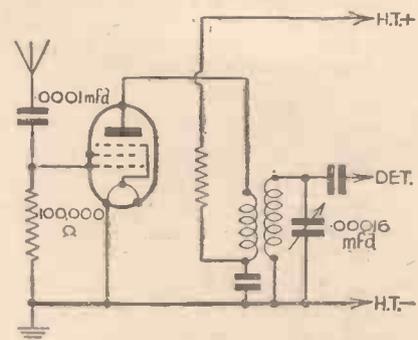


Fig. 3.—Aperiodic aerial tuning for an H.F. Det. receiver.

SHORT-WAVE SECTION

(Continued from previous page)

alteration will result in quite a considerable loss of efficiency and selectivity. All that need be done is to connect a 100,000-ohm fixed resistance between the aerial and earth terminals in place of the coil, as shown in Fig. 3. An alternative to the resistance is a good all-wave choke, with the short-wave section connected to the aerial.

This arrangement is reasonably satisfactory on short waves, for the degree of H.F. amplification provided is comparatively small, but on broadcast bands there will be a great sacrifice of efficiency. One suggestion that we can make, therefore, is to use the resistance or choke for aperiodic aerial tuning until experience has been gained in handling the set. After that it will almost certainly be found that the two separate tuning condensers can be operated quite easily.

Change-over Switching

An alternative idea is to fit the resistance along with a switch by means of which the coil and condenser can be brought into circuit for medium and long-wave reception; tuning is a good deal easier on the longer wavelengths, of course. A simple method of connecting the single-pole-change-over switch is shown in Fig. 4, where it can be seen that the centre terminal is earthed, the other two being joined to the resistance and coil respectively. When the switch is in one position the resistance only is in circuit, and "tuning" is aperiodic. By turning the switch to the other position the coil and condenser are brought into circuit in place of the resistance. A great advantage of this arrangement in the case in question is that stations can be tuned in on the second condenser—the resistance being in the aerial circuit—and then the second tuning system can be brought into

use. Consequently, the aerial condenser can then be tuned without altering the other, both circuits thus being brought into resonance without difficulty.

From An Older Reader

Although there are many youthful members in our "gang" of readers, we also

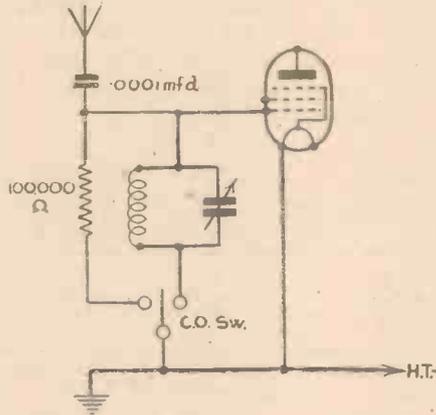


Fig. 4.—A simple switching system for changing over from "tuned" to "aperiodic" aerial-earth circuit.

have not a few of the "old brigade." For example, H. S. H., of Ealing, writes us a very enthusiastic letter in which he makes the remark that he is 66 years old. He took up wireless late in life (1928), but he has apparently made the best of the past nine years of home construction. H. S. H. very kindly says that he appreciates the "friendly appeal" of our articles, which he considers "very chummy and unusually clear, putting technical matters in a way which is rare in

technical articles." That is a very nice bouquet, but we cannot accept all the praise, because you readers make our job both interesting and easy.

However, the main point raised by H. S. H. is that it would be interesting to build an up-to-date short-waver in portable form. He wants a straightforward design which would give good reception of a large number of stations on 'phones, and yet which could easily be carried about. The waveband suggested is from 13 to 50 metres.

Ideas Wanted

From a few preliminary tests which we have made, it appears that these requirements can very easily be satisfied, even when using standard components. After making a few more experiments we hope to give a few constructional details of a set of this type. In the meantime, please let us have any suggestions that you consider useful, especially if you have made receivers of the general style in question. It appears that a good all-wave coil will be perfectly suitable, and that a short "throw-out" aerial will be better than a frame. Two valves should fill the bill, and quite a small H.T. battery will suffice, since only 'phones will be used.

By the way, H. S. H. unwittingly gives some very good advice to many of us younger constructors. He writes: "I am by no means an expert at trouble-tracing and finding out what is wrong afterwards, but I depend on doing things correctly first time." That is sound logic. Fault-finding can be very interesting and instructive, but there is no point in asking for trouble. Care taken in the preliminary lay-out, assembly and wiring of the components is always justified, and usually saves time in the end.

Cheerio for now. Don't forget to give this portable question a thought while you are walking round the Exhibition.

Trujillo City Comes Back Again

DURING the past week or so broadcasts from HIG, Trujillo City (Dominican Republic), on 47.74 m. (6.28 mc/s) have been regularly logged from G.M.T. 23.00 onwards. The station is an easy one to identify as it gives out its call in both Spanish and English, the latter being explained as: *HIG (G, for Germany)* and in Spanish: *Achay-ee-hay en Ciudad Trujillo*. The studio usually closes down at about G.M.T. 02.30, although occasionally it may still be heard broadcasting as late as 03.00. At the moment it is the only Dominican Republic station appearing in the writer's log.

And Slightly Above—Caracas

YV5RC, La Voz de la Philco, Caracas (Venezuela), on 47.83 m. (6.27 mc/s), is now coming in well after midnight. The call is put out in English, Spanish and German and, according to an announcement, all reception reports should be addressed to *La Casa Philco, Apartado Postal, 508, Caracas (Venezuela)*.

New Station in Burma

A listener reports having logged a broadcast from a transmitter recently installed at Rangoon (Burma). The station is working on 49.96 m. (6.005 mc/s). So far experimental transmissions have been carried out between G.M.T. 13.00-14.30, but a daily schedule has not yet been established.

New Amateur International Prefix

Following the adoption of GM for experimental amateur transmitters located in Scotland, the prefix GW has been allocated to their colleagues in Wales.

Leaves from a Short-wave Log

The Two Santiagos

A correspondent informs me that CB615 (formerly CEB), Santiago (Chile), working until a recent date on 24.56 m. (12.215 mc/s) has lowered its wavelength to 24.39 m. (12.30 mc/s). This would account for a certain amount of confusion in regard to the identity of the transmitter, as the latter channel happens to be the second harmonic of COKG, Santiago (Cuba). The Chilean broadcaster can be recognised by its call: *Radio Servicio de Santiago* or, occasionally, *Radio Santiago de Chili*. Interval signal: four chimes. Latest schedule: G.M.T. 21.30-22.30 and 23.00-02.00. Address: Casilla 761, Santiago (Chile).

Spanish Nationalist S-W Stations

Several new transmitters have been added during the past two months to the Nationalist (Revolutionary) short-wave network for the broadcast of propaganda and war news bulletins, in various European languages. Those at present in regular daily operation are given hereunder: Radio Nacional, Salamanca, 41.5 m. (7.229 mc/s); Radio Castilla (Burgos), 48 m. (6.25 mc/s); Valladolid, 42.83 m. (7.006 mc/s); Radio Club, Tenerife, 28.93 m. (10.345 mc/s); Jaca, 41.8 m.

(7.177 mc/s); San Sebastian, 41.65 m. (7.203 mc/s); Requete Frente Madrid, 41.5 m. (7.229 mc/s); Malaga, 42.26 m. (7.099 mc/s); Durango, 41.5 m. (7.21 mc/s).

Paris and Algiers

In view of the proximity to each other of two French broadcasters, some difficulty is encountered in identifying them. Paris, TYA2, on 33.19 m. (9.04 mc/s), nightly relays the Paris, P.T.T. transmission. On the other hand, FVA, Algiers (North Africa) operating on 33.48 m. (8.96 mc/s) takes the medium wave *Radio Alger*, (Algiers) programme. These stations are also used for a public commercial telephony service at other times of the day. FVA, Algiers, also uses a lower channel occasionally, namely, 24.75 m. (12.12 mc/s).

Radio Vatican to go to 50 Kilowatts

Italian newspapers report that HVJ, Vatican City (Rome), has suspended its broadcasts temporarily in order to permit a complete overhaul of the transmitting plant. It is stated that when broadcasts are resumed in the course of a few weeks the power of the station will be raised from 10 to 50 kilowatts.

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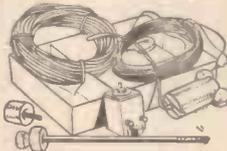
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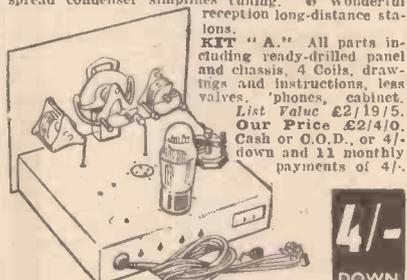


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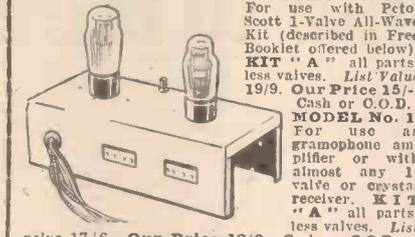


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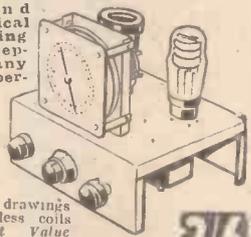


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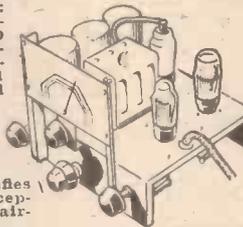


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All-Wave Aerial Amplifiers	Gramophone Motors	Television Kits
Broadcast Kits	Gramophone Pick-ups	Speakers: Permanent-Magnet and Field-Energised
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Trapping those Trespassers!

THE above title hardly seems correct for an article dealing with radio matters. As a matter of fact, it is most applicable, the trespassers being those very undesirable wayward and straying high-frequency currents which, if not trapped and put back on neutral ground, can cause more headaches and frayed tempers than a beginner would realise.

From the time the tiny H.F. currents are set up in the aerial circuit to the time when they reach the grid filament path of, say, a leaky-grid detector, they must be nourished, so to speak, and treated with every consideration. Providing they are given the right conditions, they will carry out their useful work, but they have an inherent desire to dodge the work, if possible, and start running around the

This Article, Specially Written for Beginners, Discusses H.F. Currents, Condenser Reactance, and Bypass Arrangements.
By RADIO ENGINEER

long waves. In fact, one often strikes an H.F. choke which is quite good on the medium waves but not so effective on the long, which, as its frequency is much lower requires a higher inductance to produce the desired effect. If Fig. 1 is examined, it will be seen that it is an ordinary three-valve screen-grid receiver, and the parts

screen-grid valve, and it will be noticed that a resistance has been inserted in the H.T. supplies to the anode and screen circuits to trap or oppose the flow of high-frequency currents into the source of the high tension. It will also be noticed that two fixed condensers C.1 and C.2 have been connected between the valve side of each resistance R.1 and R.2 and earth. These are very important. It must always be appreciated that it is not the slightest use inserting H.F. traps or "stoppers," as they are

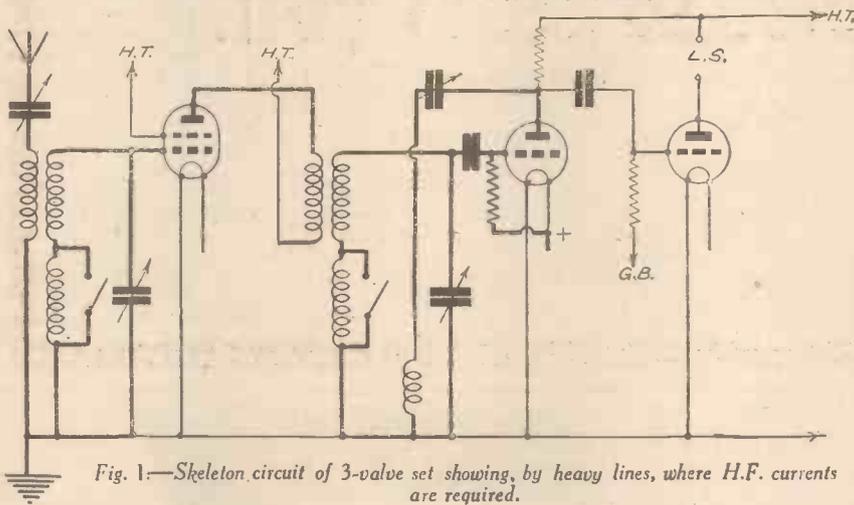


Fig. 1.—Skeleton circuit of 3-valve set showing, by heavy lines, where H.F. currents are required.

paths which offer them the least opposition or resistance. It is, therefore, necessary for the set constructor to take certain measures to keep the H.F. currents to their own area.

It must be clearly understood that the high-frequency currents one is concerned with in radio, are alternating currents which are alternating or changing their direction of flow 150,000 times a second at 2,000 metres; 1,000,000 times a second at 300 metres, and the amazing number of 10,000,000 times a second at 30 metres.

Inductance and Resistance

Two things which these high-speed alternations do not like are *inductance*, i.e., a conductor in coil formation, and *resistance*, as they possess the property of opposing sudden changes in the direction of flow of an electric current; therefore, it would seem that in these two items we have simple means of stopping the path of a high-frequency current.

An ordinary tuning coil exerts the same effect, especially if it is tuned to the identical frequency of the H.F. current, but for "stopping" or "trapping" purposes it is usual to wind a special coil which, in view of the work it is designed to do, is known as an H.F. choke.

Bearing in mind the great difference in frequencies between the long, medium and short wavelengths, it will be appreciated that the same inductance is not required for each waveband. For example, the small amount required on the short waves (higher frequencies) would not be sufficient for the

where the H.F. currents are required are shown in heavy black lines. It can be assumed that the rest of the circuit has to be kept free of H.F., otherwise trouble is likely to be experienced in the form of instability and/or distortion. The circuit given in Fig. 2 shows the precautions necessary with the H.F. stage, i.e., the

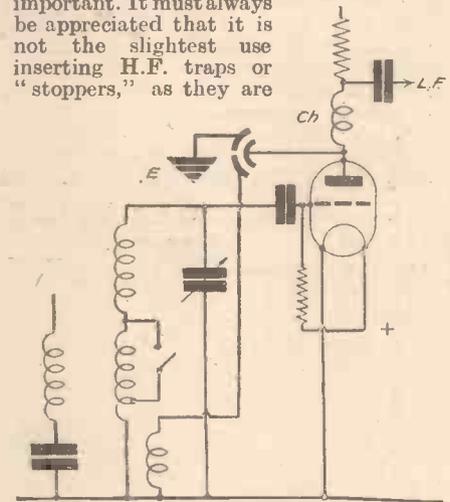


Fig. 3.—Using a differential condenser for reaction purposes.

more usually called, when resistance is used, unless some easy path is provided for the trapped H.F. currents to escape to earth.

Reactance

The condensers provide the easy path, although they can offer some opposition if their size is not suited to the part of the circuit in which they are fitted. For example, every condenser has a characteristic known as "reactance" which is measured in "ohms," and for our purpose this reactance can be considered as resistance. The peculiar part of the reactance of a condenser is that

(Continued overleaf)

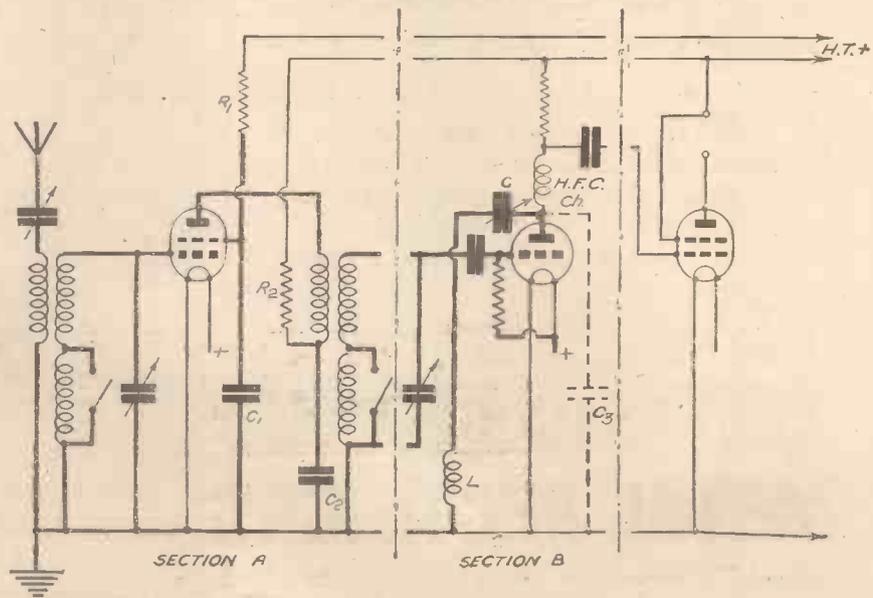


Fig. 2.—3-valve circuit showing by means of heavy lines where the H.F. currents will pass.

TRAPPING THOSE TRESPASSERS!

(Continued from previous page)

it varies with the frequency. To give figures, a .001 mfd. condenser will offer 1,000 ohms opposition at 2,000 metres and only, approximately, 150 ohms at 300 metres.

Considering the next stage of the three-valve receiver, the detector, the precautions necessary are shown in section B (Fig. 2). Although the H.F. currents should confine themselves to the grid-filament circuit, in a detector of the type shown, a certain proportion will usually reach the anode circuit, and it is those which must be prevented from passing on into the output circuit which, as rectification (detection) has taken place, is only concerned with currents of a much lower frequency, i.e., low frequency, or audible frequency.

A very common method of trapping the unwanted H.F. currents is to insert the H.F. choke "Ch," and allow the reaction

circuit "C" "L" to provide the easy path to earth for their escape but, at the same time, making them do some useful work by providing reaction.

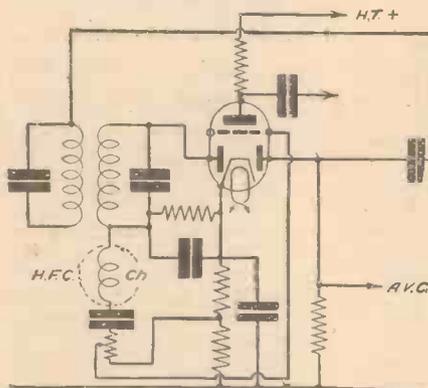


Fig. 5.—Another diode circuit showing how the H.F. choke is included as a "stopper."

With an ordinary reaction condenser, however, no path or by-pass is provided when the condenser is at its minimum setting, so in some circuits the designers embody the additional condenser "C3."

By-pass Condensers

A better arrangement is shown in Fig. 3, where a "differential" reaction condenser is used. With that type of condenser, an easy path is always provided either through the reaction coil or one side of the condenser, according to its setting. Now that diodes and double-diode-triodes are so often used for detection, it is possible to embody very efficient filters in their circuits

to prevent any H.F. from getting into the L.F. side. Two examples are shown by Figs. 4 and 5, use being made of H.F. chokes and by-pass condensers. On the L.F. side of a receiver, especially if high amplification is being obtained, it is sometimes necessary to take even more precautions than those already mentioned. The diagram Fig. 6, shows an ordinary L.F. stage which can represent the output circuit or an intermediate amplifier, and it will be noted that a resistance has been inserted in series with the grid connection, its object being the same as the previous examples—to trap H.F. currents. It is not advisable to use high values of resistance, otherwise the quality of reproduction will suffer; values between 10,000 and 50,000 ohms are usually quite sufficient. Many readers may ask, "What about the by-pass condenser?" In some cases a small additional condenser is fitted, but it is not

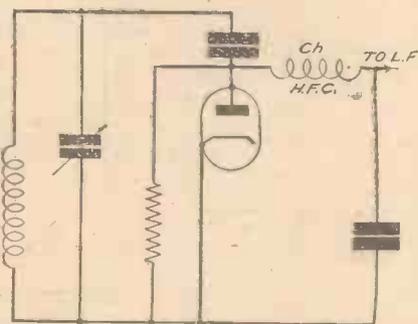


Fig. 4.—In this diode circuit the H.F. choke prevents the H.F. from getting into the L.F. circuit.

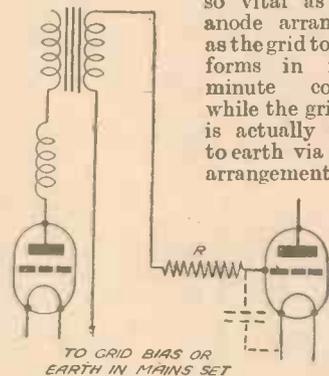


Fig. 6.—Sometimes a resistance is used as shown here to keep H.F. out of the L.F. stage.

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FLASHES FROM AROUND THE GLOBE

New Stations, New Schedules, and Details of a Few Old and Popular Stations

NEW stations are always welcomed by the DXer and, incidentally, he is in luck just now.

From Venezuela news of two new stations comes to hand. YV5RJ operates on 58 metres, and YV5RP upon 47.84 metres. Both stations are located in Caracas. A new Nicaraguan station, YNPR, at Managua, has been heard testing around 2 a.m. If you wish to add this station to your log, search on about 34.5 metres around that time.

Another Nicaraguan station of interest is YNLF, Managua, on 31.27 metres. It is reported to operate between 2 and 3 p.m., 6 and 8 p.m., and 11.30 p.m. to 3.30 a.m. Listen carefully below W3XAU and you may add this rare catch to your log.

Nicaragua and Mexico

Other Nicaraguans often heard well in this country when conditions are favourable are YNGU on 32.26 metres, and YNIGG, Managua, on 45.92 metres. Operation times of the latter station are given as from 1 to 2 a.m.

Two Mexican stations experimenting at the present time are XEWW at Guadalajara, and XETM at Tabasco. The former works upon approximately 26.5 metres, and the latter upon 26 metres. Transmissions are unfortunately irregular.

Speaking of Mexico tempts me to inquire whether you have heard XEWW upon 31.6 metres. Operation times of this station are reported to be from approximately 2 to 6 a.m.

Other Mexican stations worth attention are XEDQ, Guadalajara, on 31.65 metres; XEME, Merida, on 36.63 metres; XECR, Mexico City, on 40.65 metres, and XEXA, Mexico City, upon 43.59 metres.

Latest Schedules

Here are a few of the latest schedules from South America.

YV5RA, Barquisimeto, Venezuela, operates daily (except Sundays) from 4 to 6 p.m. and from 10 to 2 a.m. Wavelength 51.02 metres.

HJ4ABB, Manizales, Colombia, is reported to operate from 2 p.m. to 3 a.m. daily upon 49.1 metres.

The popular station HP5B, Panama, gives its schedule as from midnight to 3 a.m., whilst OAX4G, Lima, Peru, operates from midnight to 4 a.m.

TIEP, San Jose, Costa Rica, operates daily (except Sundays) from 2 to 6 p.m. and from 11 p.m. to 4 a.m. upon approximately 44.5 metres.

An Attractive Card

One of the most attractive QSL cards I have seen for a long time originates from the Mexican station XE2JK at Tampico. Surrounding a map of Mexico are spaces filled with technical details of the transmitter and receiver employed by the operator. The card is of fairly large dimensions, and measures 4 1/2 ins. by 7 1/2 ins.

Speaking of cards tempts me to ask whether you have seen the attractive card of Suva, Fiji. With its waving palms and cool looking beach, it makes the listener long to visit this paradise.

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New 4-valve BANDSPREAD SHORT-WAVE KIT LIST VALUE £3:9:6



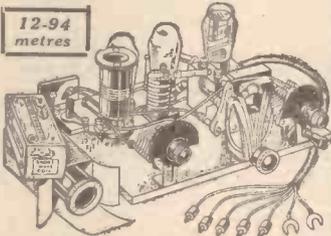
Another wonderful N.T.S. Bargain Short-Wave Receiver Kit. ● Aperiodic H.F. reacting detector, 1 resistance and 1 transformer L.F. Stages. Pentode Output. ● Slow-motion band-spread tuning SIMPLIFIES WORLD RECEPTION! ● Efficient low-loss reaction condenser. ● Air-spaced bandspread and tank condensers. ● SPECIAL ANTI-BLIND SPOT CONDENSER. ● 3 scales calibrated in degrees and tenths. KIT "1" comprises every part for assembly, including 3 6-pin coils, wiring and assembly instructions, less valves only. Cash or C.O.D. Carr. Pd. 42/-, or 2/6 down and 11 monthly payments 4/-. KIT "2" with 4 British valves, £39/0, or 5/- down and 11 monthly payments 6/6.

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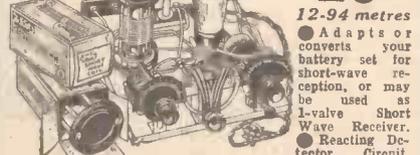
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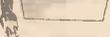
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N.T.S. SHORT-WAVE COILS. Interchangeable plug-in coils. Low-loss material ribbed formers. N.T.S. coils are expertly wound with high-grade copper wire, to ensure accurate distributed self-capacity, 100% efficient. 4-pn: 12-26, 22-47, 41-64, 75-170 metres. List Value 2/9. Bargain Price 1/9. 6-pin wavelength as for 4-pin types. List Values 3/6. Bargain 2/-. For prices of Coils for further wavelengths, post coupon for free N.T.S. Catalogue.

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A PAGE OF PRACTICAL HINTS

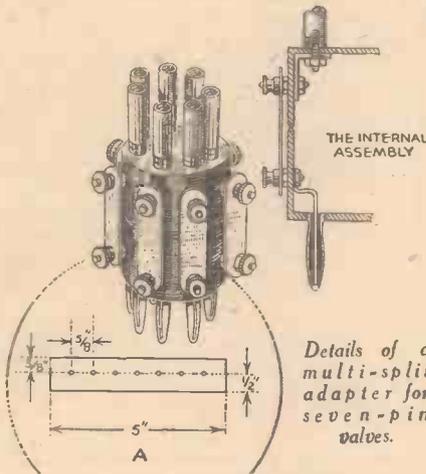
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Multi-split Adapter

THE accompanying sketch shows a multi-split adapter for seven-pin valves. The parts required to make it consist of two seven-pin valve bases, seven



valve-pin sockets (the kind which were used for making your own valve holders); 14 6B.A. nuts and bolts $\frac{1}{2}$ in. long; and 14 6B.A. terminals.

Seven brass strips, $1\frac{1}{2}$ in. long and $\frac{1}{2}$ in. wide are each drilled with two holes $\frac{1}{16}$ in. apart to pass a 6B.A. bolt. Take two strips of gummed paper and mark out as shown in sketch A. Then stick the paper round each valve base with the top edge near the pins, and at each dot drill a hole to pass a 6B.A. bolt. Remove the paper after drilling. Drill all pins out of one valve base and fit the seven sockets in the holes; connect one socket with one bolt passed through hole in side of base, and treat all the other sockets in the same way. Repeat the operation with the other base by connecting each pin with a nut and bolt passed through the side of base. Place the two bases together and fix each brass strip in place, as shown in the sketch.—P. PAULSON. (Cambridge).

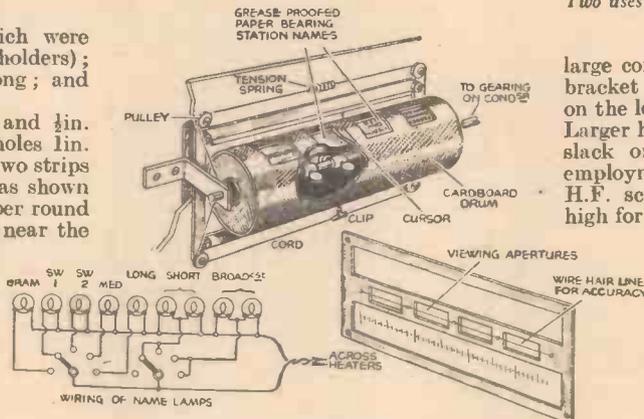
A Novel Tuning Dial

MANY constructors will have been interested in the recent article in this paper on tuning dials, and here is a rather novel arrangement, which can be simply constructed from odds and ends. The escutcheon (which could be taken from a disused dial) is backed with a piece of opaque material in which six slots are cut, two large ones carrying the wavelength scales, and four smaller ones through which the station names appear, the arrangement being intended for a four-waveband set. Behind this a drum revolves, carrying a pulley at one end, which is connected through a string drive to a pointer, made

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from a piece of wire; although it is not shown in the diagram, there is a guide at the top of the escutcheon to keep the pointer straight. Note also that the distance travelled by the pointer is 3.14 times the radius of the pulley, as the drum only makes a half revolution if geared 1:1 to the condenser shaft by a string drive. Inside the drum, which may be made of cardboard, are three partitions, with four bulbs, one in each space, to light up the station names which are written on some translucent material glued over



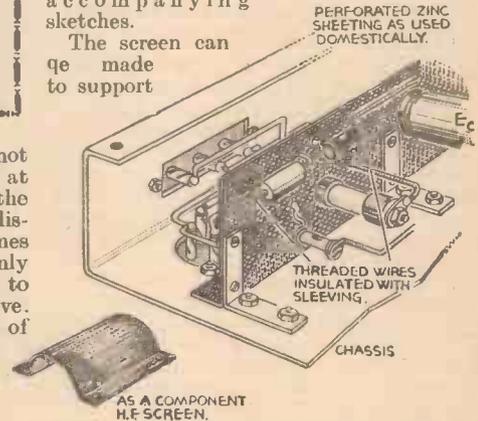
Details of a novel illuminated tuning dial.

slots cut in the drum. These lights, together with four others, two for each wavelength scale, are lit so that only three are in operation at any one time, by control from the wave-change switch. This makes it impossible not to know which waveband the receiver is set to. The simplest method of holding the four lamps inside the drum is to make a small metal clip to attach to the shaft passing through the drum, with a small lead weight (as shown in the sketch) to keep each bulb holder fairly steady. It may even be possible to use the shaft as the common return for all lamps, but this is not recommended. It will be found very convenient to stretch a "hair-line" formed of wire, say 46 S.W.G., across the four name slots, and to make a fine inkline through each station name, so as to give more accurate tuning, if some form of tuning indicator is not employed.—A. M. WILDING (Onchan, Isle of Man).

Uses for Perforated Zinc Sheet

I HAVE found that perforated zinc sheeting as used domestically for food safes, etc.—may be advantageously employed in receiver construction and miscellaneous experiments in radio. Two such adaptations are clearly illustrated in the accompanying sketches.

The screen can be made to support



Two uses of perforated sheet zinc in a radio set are shown in these sketches.

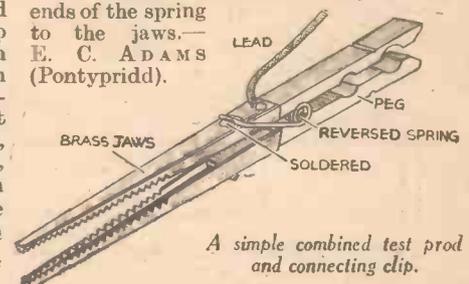
large components by reinforcement with a bracket or two, depending, of course, on the length and pliability of the fitment. Larger holes can easily be drilled, and any slack or play can be remedied by the employment of packing washers. As a H.F. screen, the efficiency is sufficiently high for small components, but I would not recommend this method for coils, etc., owing to leakage, otherwise, its use meets a number of constructional requirements.—B. C. SMITH (London, S.W.11).

Test Prod and Connecting Clip

THE accompanying sketch shows an easily made combined test prod and connecting clip, contrived from a spring clothes-peg.

I first made two "jaws" out of 1/32 in. brass, about 4 in. long, to fit over the ends of the peg. Then I took out the spring and reversed it so that the ends of the peg that are normally held together are now held apart.

To make the job rigid I soldered the ends of the spring to the jaws.—E. C. ADAMS (Pontypridd).



A simple combined test prod and connecting clip.

Why Ignore The Frame Aerial?

In this Article the Theory, Construction and Winding Details of Various Types of Frame Aerial are Discussed

above-mentioned improvements, it is now possible to make the aerial arrangement much more compact than hitherto.

There are, however, numerous occasions (when adequate selectivity is not obtained, when it is not possible to erect an outside or inside aerial, or when some form of

the side of the loop "a" "d" a current will be induced in that part which will flow in the direction shown by the dotted arrow. This current can be depicted by the curve "F" of Fig. 3.

As the waves proceed they cut the other side of the loop "b" "e," the same effect being produced, the direction of the current flow being shown by the thick arrow.

If a moment's consideration is given to the diagram, it will be noted that the two currents are flowing in opposite directions and that a phase difference exists. The curve "G" (Fig. 3) depicts the second current. The resultant effect of these two currents battling against each other is shown by the curve "H" in the same diagram, and it will be noted that its value

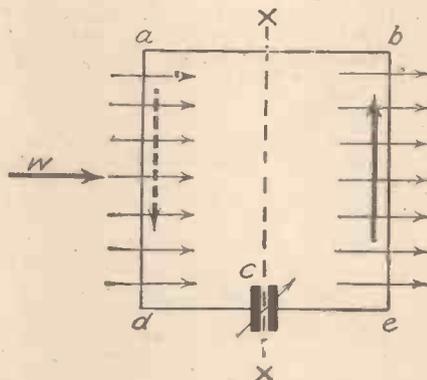


Fig. 2.—Diagram illustrating the directional property of a frame aerial.

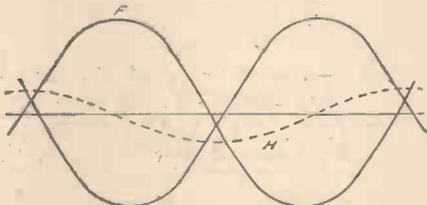


Fig. 3.—A simple current curve.

interference is particularly objectionable) upon which a frame might be used to good advantage. I would suggest, therefore, that this is a subject which offers plenty of scope for experimental work without any costly outlay.

The most simple frame aerial consists of a single turn or loop of some good conducting material, and for the purpose of explaining its operation, we will consider it as such, as shown in Fig. 2, the variable condenser "C" being connected across the two ends for the purpose of tuning the loop to the required frequency of the signal to be received.

Directional Property

If the loop is so arranged that it can be rotated about the axis "x," it will be found that the strength of the signal received—from a given station—will depend on the direction of "a" "b" with relation to the station. If the loop has its plane in line with the transmitter, then the greatest pick-up will be obtained, the reason for this being as follows.

Assuming the arrow "W" to represent the direction of the oncoming waves from the transmitting source then, as they cut

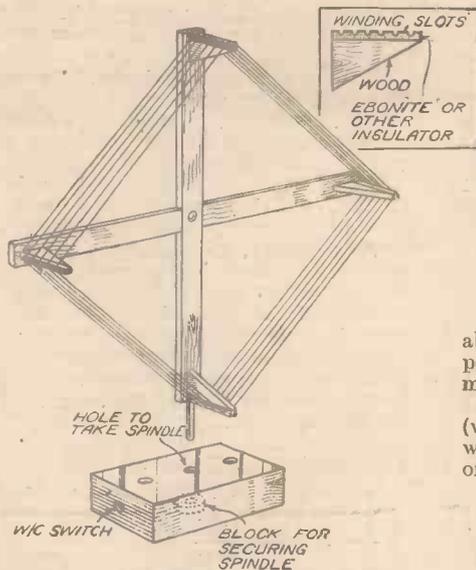


Fig. 1.—A useful form of frame aerial which takes up little space.

A GREAT deal is written nowadays about aerials. There seems to be so many types and so many ways of arranging the 100ft.—or less—of aerial wire permitted by the P.M.G., that one is often perplexed as to which arrangement to use, and why.

In the early days, we were content to make full use of the hundred feet and, what was then a rather clumsy affair, a frame aerial.

In the hey-day of the frame aerial, receivers were, of course, not so selective as they are to-day, and the frame was so often used to cover up that defect in design, by making good use of its directional properties.

Moreover, the valves were not so efficient and the transmissions not so powerful; consequently, the frames were increased in size to try to improve results.

Another reason for their use was the fact that the forerunner of the superhet of to-day had a very nasty habit of radiating and causing unpleasant interference to other nearby listeners; therefore, if one wished to keep the peace with the P.M.G. and the neighbours, it was advisable to use a frame, rather than an open or outside aerial. Conditions to-day are totally different. Receivers and valves are more efficient and the transmissions increased in power but, even so, there is no reason why the frame should be ignored completely.

Advantages

So far as the amateur is concerned, portable receivers are the only ones which make use of a frame, and in view of the

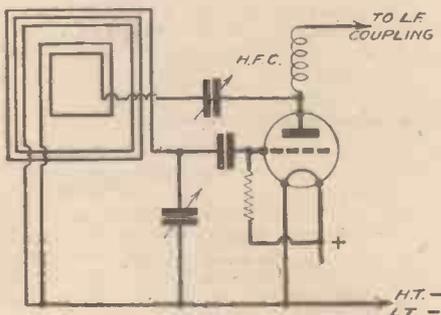


Fig. 4.—Theoretical circuit diagram showing the connections to a frame aerial.

(Continued overleaf)
SLOTS FOR MEDIUM-WAVE WINDING

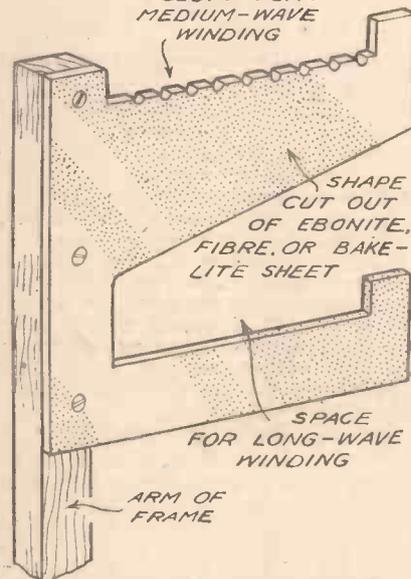


Fig. 5.—One method of fixing insulating strips for supporting the frame aerial windings.

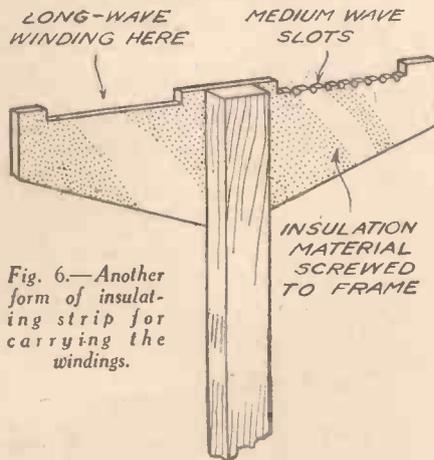


Fig. 6.—Another form of insulating strip for carrying the windings.

WHY IGNORE THE FRAME AERIAL?

(Continued from previous page)

is very much smaller than the individual currents F and G. In fact, it is the difference of the two currents—bearing in mind the difference in phase—and its direction of flow will be the same as that indicated by the dotted arrow, i.e., that created in the side of the frame nearest the transmitting station.

It will not be difficult to see that if the frame is turned so that "a" "b" is at right angles to the station, the oncoming waves will strike each side at the same instant, and no phase difference is then produced or, in other words, H will be negligible.

Constructional Details

The accompanying tables show the number of turns for various size frames, and covering particular wavelengths.

Size of Frame.	No. of turns and wire gauge.		Spacing between turns of M.W.
	L.W.	M.W.	
12 x 10	55 34 S.W.G.26	18	1/16th in.
16 x 13	42 34 S.W.G.26	14	1/16th in.
20 x 18	34 30 S.W.G.24	12	1/8th in.
24 x 20	30 30 S.W.G. 24	11	3/16th in.

Within the limits likely to be reached by home constructors it can be said that the larger the frame the greater the efficiency, and that better results are obtained on the medium waves with the smallest number of turns—consistent with the wavelength concerned, and with the greatest number of turns for the long waves.

Again, it is better if the two windings are kept well apart or, better still, if a separate frame is used for the holding of one of the windings. It is usually found that the presence of the long-wave winding will have a certain damping effect on the medium wave, if they are not well separated.

Spacing Turns of Windings

It is always advisable to space the turns of the medium-wave windings, but it must be remembered that it can only be carried to a certain point, otherwise the inductance

will be reduced, more turns will have to be used, and the H.F. resistance increased. A safe rule is to space the windings a distance equal to the thickness of the wire used. On the other hand, the windings of the long-wave section should have their turns touching.

Another approximation which can be used during experimental work is to use 200 feet of wire for the long-wave and 65 feet for the medium-wave windings, when .0005 mfd. tuning condensers are used.

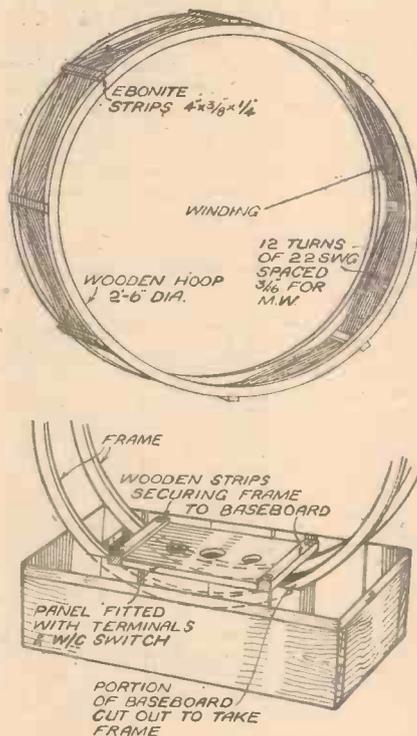


Fig. 7.—Constructional details of a novel but compact form of frame aerial.

The tables "A" and "B" provide the details for several sizes of frames, "A" being for use with receivers employing H.F. amplification, and where reaction is applied to the H.F. coil, and "B" for circuits of the Det., L.F. type, where reaction has to be applied to the aerial circuit.

It is impossible to give constructional details so far as the actual frames are concerned, but I would suggest that strips of

insulating material are used at the corner on which the windings can rest or be let into.

The arrangement shown in Fig. 1 is worthy of consideration when space is not of prime importance. I used it for many months for medium-wave work and can vouch for its efficiency.

If the frame is to be wound for both medium and long waves, it is best to embody the wave-change switch in the frame assembly, and arrange for connections so that both windings are in series for the long wave, and the long-wave section shorted out for the medium wave. By the way, if separate frames are wound for each waveband, it will be necessary to increase the number of turns given for the long wave by adding the number given for the medium wave.

Connection to Receiver

When using a frame with a straight

Size of Frame.	No. of turns.		Spacing between turns of M.W.		Space.	Reaction Winding 34 S.W.G.
	L.W.	M.W.	C.	D.		
12 x 10	52	17	1/16th in.	3/8in.	1/4in.	8
16 x 13	39	13	1/16th in.	1/2in.	1/4in.	6
20 x 18	30	11	1/8th in.	5/8in.	1/4in.	6
24 x 20	28	10	3/16th in.	5/8in.	1/4in.	5

det., L.F. receiver, the connections should be as shown in Fig. 4, it being noted that no tuning or aerial coil is necessary.

The same applies to H.F. and superhet circuits, but it is necessary to make quite sure that any H.F. bias arrangements—if used—are provided with the correct path to the grid of the valve concerned. No earth is, of course, required.

With mains receivers—particularly, the "Universal" type, the chassis will be alive with respect to the H.T. supply, therefore, to avoid the possibility of any surprises when handling the frame, a good make of fixed condenser can be connected in series with each lead of the grid-earth winding. The actual capacity is not critical, and anything between, say, .001 mfd. and .01 mfd. can be used. If these are employed, bear in mind my remarks about bias to the first valve.

ACCORDING to a recent B.B.C. announcement, plans for a series of autumn talks to interest all types of listeners have been arranged. On Mondays, for example, Anthony Bertram will speak on "Design in Everyday Things." For seven weeks Mr. Bertram toured the country observing the shape, not of things to come, but as they are at present. He will talk about everything in the house from the floor to the flower vases, from the candlesticks to the colanders. The external architecture of streets and public places, factories, and office blocks, will also come under review, and, finally, Mr. Bertram will consider such varying types of design as those of buses, clothes, type-faces, Christmas presents, and the other million and one everyday things we all see and use.

"Clear Thinking"

A well-known schoolmaster, R. W. Jepson, will, on Tuesday evenings, give a series of talks on the subject of "Clear Thinking." He is the author of a book with

AUTUMN TALKS

the same title. He will examine such phenomena as deliberate propaganda, vague generalities, advertisement slogans, Press stunts, and will encourage listeners to look into their own minds and consider their own thinking methods, thus preserving in the face of many obstacles their intellectual integrity. Also, on Tuesdays, there will be more talks in the popular series, "I Was There," when eye-witness accounts of such memorable events as the Relief of Mafeking, in 1900 (the speaker being Lord Baden Powell), the Ashanti Campaign of the same year, and the Valparaiso Earthquake of 1906 will be given.

The Coal Industry

On Wednesdays the whole complex subject of coal itself and the industry that

has been built up around its production will be the subject of talks by various speakers. The history of coal mining during the Industrial Revolution, the collier himself as a human being, and as a cog in an enormous industrial machine, the coal itself in its varying qualities, the way it is marketed and recent disputes and developments, the new Act of Parliament dealing with the industry; these are some of the subjects which will come under consideration.

Parliamentary Talks

On alternate Sundays the House of Commons will be the subject of a series of entertaining talks. The broadcasts will describe dramatic moments in the history of Parliament during the last two hundred years and quotations from contemporary speeches will also be given. On the other Sundays cinema talks by a speaker chosen from among those who have broadcast on the subject during the summer will be heard at the same hour.

The BRITISH LONG DISTANCE LISTENERS' CLUB.

SEVERAL members have now obtained A.A. licences and are in doubt concerning the best way of setting about reliable tests and experiments with a view to getting their full licence. It should be remembered that the more you can do on your own, the more you will learn. If you read in a book that a certain circuit arrangement will do a certain thing, you may easily remember that fact, but there may be a faint doubt as to why it does it. If you rig up the circuit, and make the changes indicated, using meters or other devices to make the modifications visible, you will find that the experiment will leave an indelible picture on the mind which will not easily be erased. In future you will be able to remember all the little points leading up to that experiment and will have a much more reliable knowledge of the subject. Similarly, when carrying out your transmitting experiments, should you make a circuit change, keep a careful note of the change and all that led to it and its results. In this way you will make rapid strides and will become familiar with many little details which would otherwise be lost to you.

Short-wave Reception

For reliable short-wave reception a superhet is, of course, hard to beat. If you are anxious to get down to some really good S.W. work, and especially if you are interested in morse reception (either for practice or for keeping a note of working with amateur stations), build a good superhet and fit a variable beat oscillator. With the aid of this accessory you will find that reading even the longest distant station will be made as easy as listening to the local. You may often find that you can pick up, say, an American police car on a home-made S.W. set, but just as he is getting to an interesting statement some serious QRM may arise through which the station is unreadable. In the ordinary way you would have to lose the station. If you are using a superhet with a variable control on the oscillator, so that the regeneration can be controlled, you will find that you will be able to boost the signal and read it through the QRM. Thus these two controls—a B.F.O. and a regen. control—will be found of tremendous use to the really keen S.W. listener.

Members' Results

Here are two interesting letters from members, the first from No. 116, who has built a set recently described in these pages.

"You may be interested to know that I have rebuilt my 2 Pen-v-Pen Short-wave set on a metal chassis as designed in PRACTICAL AND AMATEUR WIRELESS, May 29th, Short-wave Section, with the two screening boxes, and I am quite satisfied with the results.

"Recent 20 metres amateurs, all 'phones' on L.S.: W5FDI, W5YJ, 5ZS, 5FPO, 5DNU, 5AKZ, W6PN, 6OAJ, 6AGJ, 6AL, 6HJU, 6CQI, W7FQK (only one this year), W9UEL, 9BEZ, LU5CZ, PY2ET, HI7I, CX2AK, K4SA, YV1AA, YV5ABE."

The second letter is from Mr. Stevens, at Wellington, Shropshire, and the photograph shows him with his apparatus.

"I am enclosing a photo of myself and station and QSL card (not reproduced). My receivers are Bandspread Three and Bandspread 2-valve. The latter is in its experimental stage. Aerials No. 1 centre tapped 60ft. horizontal span east-west; No. 2 end on copper coil slope 12ft. to 28ft. north-south. The wife, who also is a member of the B.L.D.L.C., and myself would like to hear from other members."



Here is Mr. T. Stevens, of Post Office, Donnington Wood, Wellington, with his transmitter and receiver.

YOU HAVE BEEN WARNED BY RADIO—

Professor Hilton, on November 19th, 1936, from the B.B.C. broadcast a warning. The warning was to the effect that while there are many really good and reliable Colleges teaching by correspondence, there are many others which are colleges by name only. He said some so-called colleges rented a couple of rooms in a large building in a well-known street. Some made great promises which they did not intend to fulfil. Some claimed successes they could not prove. In some cases the names of prominent men were quoted who were in no way connected with the working of the College.

NOW BE ADVISED BY ME.

The big name of a College is no proof of its national standing. The Bennett College has been established over 30 years and our entire building is devoted to Bennett College work. No other business of any kind is either on or attached to The Bennett College. We have seating accommodation for over 10,000. We have a permanent staff of over 190 people on the College premises. Our Professional Staff have all passed their examinations, and our tutors are all experts in their own specialised work. We do not send out any homework to be corrected by tired, spare-time tutors. All students' homework is corrected on the College premises the same day that it arrives, and is returned by evening post. This College is Technical, Scientific, General and Commercial, thus enabling us to cater for all requirements; this is important to Cost and Works Accountants, and all who have to deal with rate-fixing, machining-allowance, and it is also of great importance in many of the Civil Service Examinations. This is an entirely British College. Most of our textbooks are written on the College premises by our own professional staff, especially for tutorial purposes. Our tutors specialise in teaching students for the examinations they themselves have already passed.

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There is a tide in the affairs of man which, if taken at the flood, leads on to fortune and success. There are three things which come not back: the sped arrow, the spoken word, and the lost opportunity—this is your opportunity. If it is your desire to make progress and establish yourself in a good career, write to us for free particulars on any subject which interests you, or if your career is not decided, write and tell us of your likes and dislikes, and we will give you practical advice as to the possibilities of a vocation and how to succeed in it. You will be under no obligation whatever. It is our pleasure to help. We never take students they are suitable. Do not forget of the brilliant. Our experience will to succeed achieves more than



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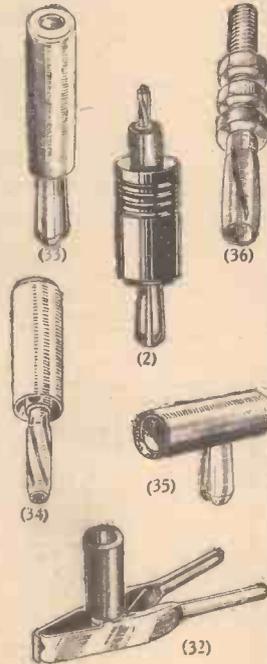
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AN INTERFERENCE PROBLEM

THE following case of "man-made static" will no doubt prove of interest to readers, as it is an actual case and shows how unusual effects can sometimes give rise to considerable trouble. We moved into a new house, and after the radio had been installed it was noticed that when the receiver was adjusted for foreign reception intermittent crackles were obtained. The receiver was primarily for local station work and had only one H.F. stage with an input volume control. It had been noted at odd times that the crackles sometimes were worse when traffic passed the house, but not much attention was paid to this, as the noise only occurred on foreign stations and these were not tuned in very often. After some time a modern commercial superhet was installed, and as soon as this was switched on the noises were found to be very much louder. The aerial and earth were examined without tracing any defect. When the volume control was turned to maximum, and the dial set to a point where no station was obtained, it was found that the noise was fairly considerable, more or less regular in its effect, but increased to an overpowering volume when a car passed the house. The first thought then was that one of the electric-light switches might be defective, and accordingly a tour was made round the house, every switch opened and the locking screws tightened. Back to the receiver, and when switched on there was no difference.

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At the Power Point

Whilst trying the effect on different wavelengths on the receiver, a member of the household went upstairs, and it was then noticed that when he arrived on the upper landing the noise was simply deafening and the set had to be switched off. The volume control was then set to a low value and a visit was paid to the upper landing and the effects noted. Upon arriving two or three steps from the landing the noise began to increase, and reached a maximum when the floor near a power switch-point was trod upon. The power switch was opened and examined. Nothing could be found wrong, and yet the noise was obviously coming from this point, as banging on the floor in the vicinity of the switch would cause the noise to occur. Finally, the floorboards were taken up, and it was found that the lead to the switch was of the twin lead-covered type, running from the stairs straight across to the switch, passing down under the stairs to the mains switchboard below. Running the length of the landing, and at right angles to the electric-light cable, was a gas pipe, and the electric-light cable was only supported where it passed up to the switch and at the opposite end of the landing. Consequently, it sagged of its own weight, and where it crossed the gas pipe it only just touched. Although the gas pipe is "earthed" and the lead covering of the electric-light cable was also earthed, each time the two came into contact they gave rise to the noise in the set. The weight of the cable was such that any vibration such as passing traffic, or footfalls on the stairs or landing, caused the cable to spring and so gave rise to the noise. The two bodies were, therefore, bound together with insulation tape and the noise immediately ceased.

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RADIO CLUBS AND SOCIETIES

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

Bradford Short-wave Club

THE original intentions of this club have had to be unfortunately abandoned. Meetings were to have been held every Friday throughout the summer, but on account of holidays, and the consequent difficulty in getting a worth-while attendance, the month of August has seen a recess of a fortnight. Now the holidays are over meetings will definitely be held as usual.

The club rooms are at the Bradford Moor Council Schools, and meetings will take place every Friday, from 7.30 to 11 p.m., and a very hearty invitation is extended to all interested.—Hon. Sec., G. WALKER, 33, Napier Road, Thornbury, Bradford, Yorks.

Slough and District Short-wave Club

A MEETING of the above club was held on Tuesday, August 17th, at 7 o'clock. A start was to be made on a club receiver, but owing to some misunderstanding among members no parts were brought along. After the chairman had signed the minutes a little code practice was suggested. G6PR took the key and for over an hour the members took down the messages sent out. The meeting continued with discussions upon aerials.

We had the pleasure of welcoming three new members to our club.

The club is still growing, thanks to PRACTICAL AND AMATEUR WIRELESS, and we are always ready to welcome new members.—J. GILBERT, Assn. Sec., 26, King Edward Street, Slough, Bucks.

Weymouth and District Short-wave Club

THE above club, which has recently been formed, is making steady progress, and the interest shown by the members continues to expand. The membership includes five full radiating permits, one A.A., and one waiting to hear about an A.A. It is hoped that the club will have its own transmitter very shortly. The construction of the receiving apparatus is now in progress. Excellent commodious headquarters have been obtained at 15A, Hope Street, where prospective members will be welcomed at the meetings which are at present being held as follows:—Mondays at 7.30 p.m., morse instruction. Wednesdays, at 7 p.m., General Meeting Night and the construction of apparatus. Annual subscription for the Junior section (under 16 years) is 5s., and for the Senior section, 10s., payable quarterly. An entrance fee of 1s. 6d. is charged. Those interested and desiring further particulars are invited to write to the Secretary, W. E. G. Bartlett, 15A, Hope Street, Weymouth.

The Liverpool Short-wave Radio and Transmitting Club

THE above club will hold a general meeting on Monday, September 6th, to discuss the future of the club, and to arrange for various demonstrations and visits to local places of interest. Those already proposed are (1) A lecture by Messrs. Liessen, Ltd., on their H.I.Q. short-wave apparatus; (2) A visit to a local telephone

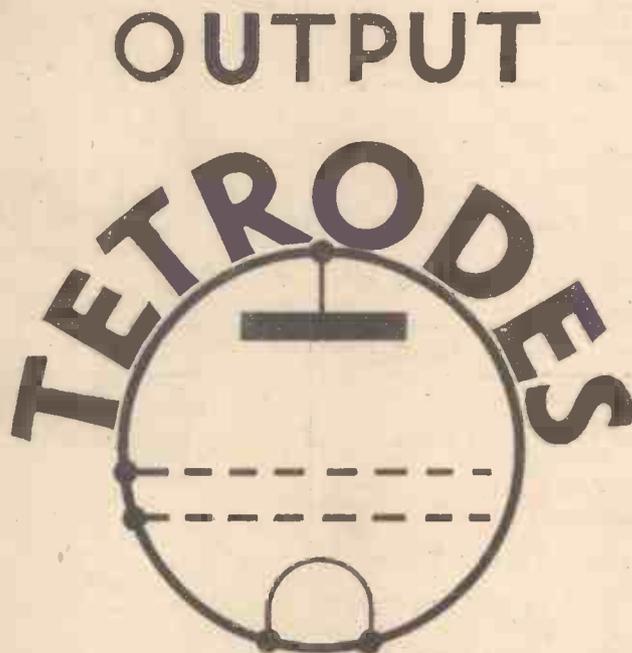
exchange; and (3) If possible a visit to Speke aerodrome to inspect the ultra-short-wave landing gear. Morse classes are now being run for the benefit of members. It is also proposed to hold a junk sale. We have now been able to reduce the subscription rates, but unless we obtain more members we shall have to increase them again. Will any person interested please write to the Hon. Secretary, C. E. Cunliffe, 368, Stanley Road, Bootle, Liverpool, 20, or call at the club rooms at 11, Wavertree Road, Liverpool 7, not later than 8 o'clock on Monday, September 6th.

Torrington and District Short-wave Club

THE above club now holds its meetings every Tuesday evening at the new Club Rooms at 16, South Street, at 7.15 p.m.

The club has been very fortunate in obtaining the services of a qualified telegraphist, Mr. W. Webber, of Well Street, Torrington, as instructor for the morse classes, and steady progress has been registered.

The U.S.W. section of the club has been busy experimenting on 56 m/c reception with various circuits, but no definite data has been collected as yet. For calibration purposes the club assembled the Wave-meter as described in PRACTICAL AND AMATEUR WIRELESS, January 30th issue, and through the kind permission of the author, Austin Forsyth (G6FO), it was checked against his original, and found to be accurate within the specified margin. For further information on the club's activities, the Secretary, Mr. A. E. Cornish, 1, Halsdon Road, Torrington, will be pleased to give details.



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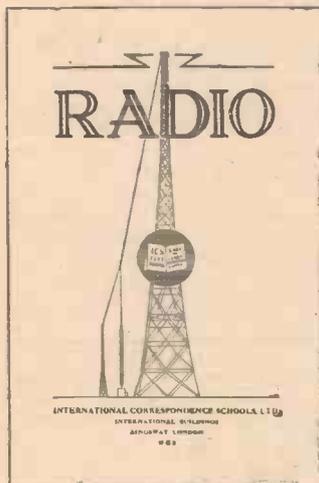
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SEND FOR OUR "RADIO" BOOKLET

And, if you wish, ask for our free advice.

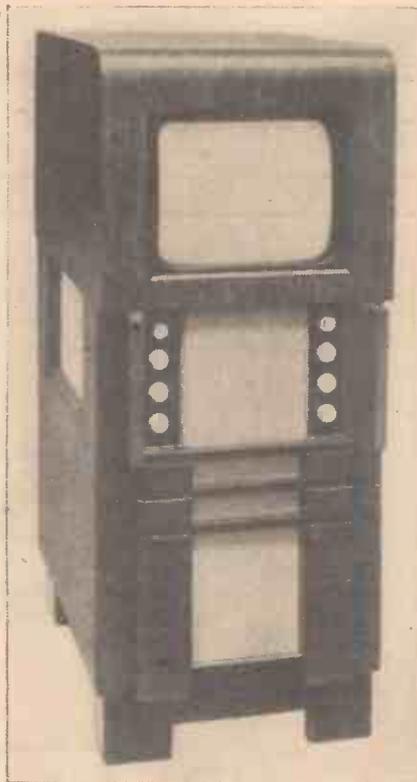


Dept. 94, International Buildings,
Kingsway, London, W.C.2.

LATEST TRADE NEWS

Ferranti Television Receivers

THE accompanying illustrations show the lines of the latest television sets released at this year's exhibition. It will be noted that a very original design has been incorporated in the receiver, the controls



Above is the latest Ferranti Television Receiver, and on the right, the chassis removed from the cabinet.

being covered when not required by small hinged doors forming part of the cabinet design. The speaker openings at the side of the cabinet are also worthy of note. These pictures are the first to be released of the new Ferranti models and they show a distinct departure from orthodox designs.

Voigt Speakers

THE Voigt speaker is being demonstrated whilst the Radio Exhibition is running, at premises in the rear of Olympia. The address is 2, Beaconsfield Terrace Road, just opposite the Olympia main Goods Entrance at the back and the hours are as follows: 11 a.m. to 1 p.m. and 3 to

10.30 p.m. These speakers are, of course, of the cabinet horn-type and are available in various designs.

Osram Valve Guide

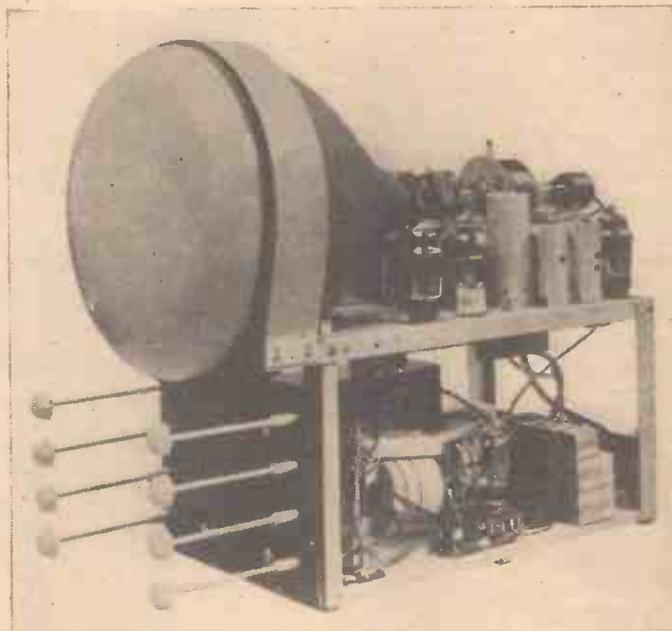
THE G.E.C. announce that the Osram Valve Guide is now available. This book has been published for over ten years and is claimed to be the vade-mecum for all who desire information as to characteristics, applications, etc., of valves designed by the G.E.C. The book gives pin connections and characteristics of all types of valve including the latest International range and may be obtained free on the G.E.C. stand or by application direct to the head office of the G.E.C., Magnet House, Kingsway, W.C.2.

New Ferguson Receivers

AT a lunch given by Ferguson at the Savoy recently, the features of the new receivers were described by Mr. A. W. Kingsley. He said that in future British components were to be employed, but considerable attention had been paid to the short-wave performance and that it was hoped that the new receivers would prove second to none in this respect. Mr. George Allison, of the Arsenal, and Mr. George Graves, the theatrical star, in speeches after the lunch dealt with the many features which are required in modern apparatus, and we hope to have an early opportunity of testing some of the new models.

T.M.C. Condensers

CERTAIN price increases are announced by the Telephone Manufacturing Company, together with some new lines. The price increases are in respect of types numbers T3 to T10—capacities from .0001 to .001, and the new price is 9d. each. Types T11 to T17 (capacities from .0015 to .01) are also increased and now cost 10½d.



The new lines are mainly for interference suppression and are available in various combinations and types.

Wireless Coils, Chokes and Transformers, and How to Make Them; 2/6 or 2/10 by post from George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.



Letters from Readers

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication.)

A Log from Bedford

SIR,—In view of the excellent conditions prevailing lately, I enclose another log, and give the strengths of some of these stations also:—

K6OQE (R3), K6NZQ (R4), K6MVQ (R3-4) (Hawaiian Islands), KA1ME (R8), KA1YL (Philippine Islands), W5ZF, W5YJ, W5PO, W6RA, W6AM, W6LLQ, W6JQ, W6IXD, W6LFU, W6EJC (North America), OA4B, OA4AL, CX2AK, NY2AC, VP9R, TI2RC (R6), TI2KP, TI1AF, XE2AC, CO7VS, CO8YV, K4ENY (R7), K4SA, HP1JW, HP1JE (South and Central America), VS2AK, VS1AI (Malaya), VK4VK, VK2UV, UK3AA, W10XDA, and VE4LX.

These stations were all heard since the beginning of July. South America, of course, has many representatives in Brazil and the Argentine. The three Hawaiians were heard on Sunday, August 15th, between 07.50 and 08.10, with a 7ft. vertical aerial, and a home-designed portable 0-v-1, which gives surprisingly good results. I have now heard 57 countries in my eight months of short-wave listening, beginning with your Simplest Short-waver. My age now is 16½, and it is to your excellent paper that I am indebted for my first practical introduction to the short waves. —P. A. YEATES (Bedford).

A Five-valve Set for Overseas

SIR,—Further to the published letter of Mr. D. D. Wiggill, I also would welcome a five-valve, six-volt battery-operated set, and I am sure a number of other readers wish for the same, especially as practically everybody here uses a car, and, therefore, the current used can be drawn from that battery with no ill-effects.

I may mention that I have been a constant reader of your very interesting paper for many years. I have to-day written to Messrs. Bulgin for prices, etc., of the transformer and vibrator for building the H.T. unit described in your issue of the 17th ult. for using with my home-constructed five-valve set (H.F., detector, first L.F. and Q.P.P. output). This set has been giving me wonderful service for several years, and as I am using Eddystone six-pin coils I get 13 metres quite easily, but would like to bring it up to date from one of your circuits which I know are always good, as I have tried many of them.

I have been using an eliminator where there is electricity, and an H.T. battery of 150 volts where there was no electricity, as I tour practically the whole of India. I hope to see a suitable circuit published in the very near future.

Wishing your paper the success it fully deserves.—M. M. SLADE (Bombay, India).

Valve-testing Panel

SIR,—In your issue of August 14th a reader asks for a valve-testing panel, and this, I think, would appeal to many.

But why for half a dozen valves? Let it be a comprehensive instrument which any service man would be glad to possess. I should think the majority of your readers are small retailers and service men (by virtue of the excellence of your service articles) and these people usually have the greater enthusiasm but lesser means. You will be doing them a service by showing them how to increase their range of high-class service instruments in the cheapest possible manner.

Actually, my greatest need is for an accurate condenser-testing instrument which will denote any possible fault, and will give the true capacity of the condenser under test. It should cover all ranges and be mains operated.

Best wishes to your paper and hoping to see more service articles in the future.—F. J. ANDREWS (Redhill).

"London Nat" and the Fluxite Advt.

SIR,—With reference to the limerick in your advertisement in your magazine, we have had several inquiries from your readers asking how, even with Fluxite, "London Nat" can be got on the "Short Waves." We shall be much obliged if you will intimate in your columns that our tame poet considers himself entitled to considerable poetic licence in connection with technical points.—FLUXITE, LIMITED (London, S.E.1).

CUT THIS OUT EACH WEEK

Do you know

—THAT special I.F. transformers are now readily obtainable in which variable selectivity features are incorporated.

—THAT H.T. up to 250 volts may be obtained from a standard 2-volt accumulator.

—THAT to prevent certain forms of interference in the superhet receiver, special filters are now supplied for inclusion in the circuit.

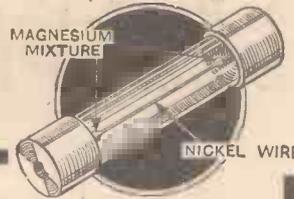
—THAT in the case of instability in powerful receivers it is often advisable to inter-connect all points which are "earthed," thereby cutting out the chassis return leads.

—THAT a properly-designed horn loudspeaker, used with a suitable unit, is capable of better reproduction than the ordinary cone-type speaker.

—THAT such a horn-type speaker is, generally speaking, too large for use in the ordinary home and this accounts for the general use of the cone speaker.

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., Tower House, 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.



MAG-NICKEL FUSE

A real delay fuse for the protection of mains, transformers, etc. The half-amp. rating will resist the same surges as a 1 amp. conventional radio cartridge fuse, and yet will blow on a 75% overload if the overload persists for one second. Should remove all risk of burnt-out radio sets. Colour coded Standard 1¼" size. Cat. No. 338/250 Brown, 3-valve receivers, 250 m/a; 338/500 Yellow, 4- to 7-valve receivers, 500 m/a; 338/750 Green, Multi-Valve sets, radiograms, television receivers, public address apparatus, etc., 750 m/a. All one price, 9d.

Use the **BELLING-LEE** Coupon FOR EVERY RADIO CONNECTION

BELLING & LEE, LTD., Cambridge Arterial Rd., Enfield, Mddx. Strike out item not required.

Please send FREE pocket-catalogue: "Radio Spares and Connections."

Please send catalogue, "Radio and Electrical Accessories"; 8d. remittance enclosed.

NAME ADDRESS

Pr.W. 4/9/37

ALL THE LATEST RADIO EQUIPMENT

to be shown at

RADIOLYMPIA

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LOWEST EASY TERMS

WE GUARANTEE COMPLETE SATISFACTION.

PROMPT DELIVERY. All goods carr. paid.

CASH OR C.O.D. ORDERS delivered by return of post.

★ REMEMBER—WRITE US ABOUT YOUR NEXT REQUIREMENTS

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MCCARTHY CHASSIS always in Stock. New Demonstration Room now open.

Estd. 1925

THE LONDON RADIO SUPPLY COMPANY

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FREE ADVICE BUREAU COUPON

This coupon is available until September 11th, 1937, and must be attached to all letters containing queries.

PRACTICAL AND AMATEUR WIRELESS, 4/9/37.

Practical and Amateur Wireless BLUEPRINT SERVICE

Practical Wireless	No. of	Three-valve: Blueprints, 1s. each.	
Date of Issue.	Blueprint.	Experimenter's Short-Wave Three	
CRYSTAL SETS			
Blueprint, 6d.		(SG, D, Pow) — PW30A	
1937 Crystal Receiver	9.1.37 PW71	The Prefect 3 (D, 2 LF (RC and Trans)) 7.8.37 PW63	
STRAIGHT SETS. Battery Operated.			
One-valve: Blueprint, 1s.		The Bandsread S.W. Three (HF Pen, D (Pen), Pen) 29.8.36 PW68	
All-wave Unipen (Pentode)	— PW31A	"Tele-Cent" S.W.3 (SG, D (SG), Pen) 30.1.37 PW74	
Two-valve: Blueprints, 1s. each.		PORTABLES.	
Four-range Super Mag Two (D, Pen)	11.8.34 PW36B	Three-valve: Blueprint, 1s. each.	
The Signet Two	29.8.36 PW76	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) — PW65	
Three-valve: Blueprints, 1s. each.		Parvo Flyweight Midget Portable (SG, D, Pen) 19.6.37 PW77	
The Long-Range Express Three (SG, D, Pen)	24.4.37 PW2	Four-valve: Blueprint 1s.	
Selectone Battery Three (D, 2 LF (Trans))	— PW10	Featherweight Portable Four (SG, D, LF, Cl. B) 15.5.37 PW12	
Sixty Shilling Three (D, 2 LF (RC & Trans))	— PW34A	MISCELLANEOUS.	
Leader Three (SG, D, Pow)	22.5.37 PW35	S.W. Converter-Adapter (1 valve) — PW48A	
Summit Three (HF Pen, D, Pen)	8.8.34 PW37	AMATEUR WIRELESS AND WIRELESS MAGAZINE	
All Pentode Three (HF Pen, D (Pen), Pen)	29.5.37 PW39	CRYSTAL SETS.	
Hall-mark Three (SG, D, Pow)	12.6.37 PW41	Blueprints, 6d. each.	
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35 PW48	Four-station Crystal Set . . . 12.12.36 AW427	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35 PW40	1934 Crystal Set . . . — AW444	
Genet Midget (D, 2 LF (Trans))	June '35 PM1	150-mile Crystal Set . . . — AW450	
Cameo Midget Three (D, 2 LF (Trans))	8.6.35 PW51	STRAIGHT SETS. Battery Operated.	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35 PW53	One-valve: Blueprints, 1s. each.	
Battery All-Wave Three (D, 2 LF (RC))	— PW55	B.B.C. Special One-valver	— AW387
The Monitor (HF Pen, D, Pen)	— PW61	Twenty-station Loudspeaker	— AW440
The Tutor Three (HF Pen, D, Pen)	21.3.36 PW62	One-valver (Class B)	— AW440
The Centaur Three (SG, D, P)	— PW64	Two-valve: Blueprints, 1s. each.	
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	29.8.36 PW66	Melody Ranger Two (D, Trans.)	— AW388
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36 PW69	Full-volume Two (SG det., Pen)	— AW392
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36 PW72	B.B.C. National Two with Lucerne Coil (D, Trans)	— AW377A
Four-valve: Blueprints, 1s. each.		Big-power Melody Two with Lucerne Coil (SG, Trans)	— AW338A
Sonotone Four (SG, D, LF, P)	1.5.37 PW4	Lucerne Minor (D, Pen)	— AW426
Fury Four (2 SG, D, Pen)	8.5.37 PW11	A Modern Two-valver	— WM409
Beta Universal Four (SG, D, LF, Cl. B)	— PW17	Three-valve: Blueprints, 1s. each.	
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34 PW34B	Class B Three (D, Trans, Class B)	— AW386
Fury Four Super (SG, SG, D, Pen)	— PW34C	New Britain's Favourite Three (D, Trans, Class B)	15.7.33 AW394
Battery Hall-Mark 4 (HF, Pen, D, Push-Pull)	— PW46	Home-built Coil Three (SG, D, Trans)	— AW404
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36 PW67	Fan and Family Three (D, Trans, Class B)	25.11.33 AW410
Mains Operated.			2.12.33 AW412
Two-valve: Blueprints, 1s. each.		£5 5s. S.G. 3 (SG, D, Trans)	— AW417
A.C. Twin (D (Pen), Pen)	— PW18	1934 Ether Searcher: Baseboard Model (SG, D, Pen)	— AW410
A.C.-D.C. Two (SG, Pow)	— PW31	1934 Ether Searcher: Chassis Model (SG, D, Pen)	— AW422
Selectone A.C. Radiogram Two (D, Pow)	— PW19	Lucerne Ranger (SG, D, Trans)	— AW423
Three-valve: Blueprints, 1s. each.		Cosor Melody Maker with Lucerne Coils	— AW424
Double-Diode-Triode Three (HF Pen, DDT, Pen)	— PW23	Mullard Master Three with Lucerne Coils	— AW424
D.C. Ace (SG, D, Pen)	— PW25	£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34 AW435
A.C. Three (SG, D, Pen)	— PW29	Lucerne Straight Three (D, RC, Trans)	— AW437
A.C. Leader (HF Pen, D, Pow)	7.4.34 PW35C	All-Britain Three (HF Pen, D, Pen)	— AW448
D.C. Premier (HF Pen, D, Pen)	31.3.34 PW35B	"Wireless League" Three (HF Pen, D, Pen)	3.11.31 AW451
Ubique (HF Pen, D (Pen), Pen)	28.7.34 PW36A	Transportable Three (SG, D, Pen)	— WM271
Armada Mains Three (HF Pen, D, Pen)	— PW38	£6 6s. Radiogram (D, RC, Trans)	— WM318
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35 PW50	Simple-tune Three (SG, D, Pen)	June '33 WM327
"All-Wave" A.C. Three (D, 2LF (RC))	17.8.35 PW54	Economy-Pentode Three (SG, D, Pen)	Oct. '33 WM337
A.C. 1936 Sonotone (HF Pen, H.F. Pen, Westector, Pen)	— PW56	"W.M." 1934 Standard Three (SG, D, Pen)	— WM351
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36 PW70	£3 3s. Three (SG, D, Trans)	Mar. '34 WM354
Four-valve: Blueprints, 1s. each.		Iron-core Band-pass Three (SG, D, QP21)	— WM362
A.C. Fury Four (SG, SG, D, Pen)	— PW20	1935 £6 6s. Battery Three (SG, D, Pen)	— WM371
A.C. Fury Four Super (SG, SG, D, Pen)	— PW34D	PTP Three (Pen, D, Pen)	June '35 WM380
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37 PW45	Certainty Three (SG, D, Pen)	— WM393
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.36 PW47	Minutube Three (SG, D, Trans)	Oct. '35 WM400
SUPERHETS.			All-wave Winning Three (SG, D, Pen) Dec. '35 WM396
Battery Sets: Blueprints, 1s. each.		Four-valve: Blueprints, 1s. 6d. each.	
£5 Superhet (Three-valve)	5.6.37 PW40	65s. Four (SG, D, RC, Trans)	— AW370
F. J. Camm's 2-valve Superhet	— PW52	"A.W." Ideal Four (2 SG, D, Pen)	10.9.33 AW402
Two-valve	13.7.35 PW58	2HF Four (2SG, D, Pen)	— AW421
F. J. Camm's £4 Superhet	— PW75	Crusader's A.V.C.4 (2 HF, D, QP21)	18.8.34 AW445
F. J. Camm's "Vitesse" All-Wave (5-valver)	27.2.37 PW43	(Pentode and Class B Outputs for above: Blueprints, 6d. each)	25.8.34 AW445A
Mains Sets: Blueprints, 1s. each.		Self-contained Four (SG, D, LF, Class B)	Aug. '33 WM331
A.C. £5 Superhet (Three-valver)	— PW42	Lucerne Straight Four (SG, D, LF, Trans)	— WM350
D.C. £5 Superhet (Three-valve)	1.12.34 PW44	£5 5s. Battery Four (HF, D, 2LF)	Feb. '35 WM381
Universal £5 Superhet (Three-valve)	— PW44	The H.K. Four (SG, SG, D, Pen)	Mar. '35 WM384
F. J. Camm's A.C. £4 Superhet 4	31.7.37 PW59	The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	April '36 WM404
F. J. Camm's Universal £4 Superhet 4	— PW60	Five-valve: Blueprints, 1s. 6d. each.	
"Qualitone" Universal Four	10.1.37 PW73	Super-quality Five (2HF, D, RC, Trans)	May '33 WM320
SHORT-WAVE SETS.			Class B Quadradyne (2 SG, D, LF, Class B) Dec. '33 WM344
Midget Short-wave Two (D, Pen)	— PW38A	New Class-B Five (2 SG, D, LF, Class B) Nov. '33 WM340	

These Blueprints are drawn full size. Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, which are additional to the cost of the blueprint. A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless . . . 4d. Post Paid.
Amateur Wireless . . . 4d. " "
Practical Mechanics . . . 7id. " "
Wireless Magazine . . . 1/3 " "

The Index letters which precede the Blueprint Number indicate the periodical in which the description appears: thus PW refers to PRACTICAL WIRELESS, AW to Amateur Wireless, PM to Practical Mechanics, WM to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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)	—	WM401
Four-valve: Blueprints, 1s. 6d. each.		
All-Metal Four (2 SG, D, Pen)	July '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	May '35	WM386
SUPERHETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	Oct. '35	WM395
The Request All-Waver	June '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets: Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	—	AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	Apr. '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)	—	WM367
SHORT-WAVE SETS—Battery Operated.		
One-valve: Blueprints, 1s. each.		
S.W. One-valver converter (Price 6d.)	—	AW329
S.W. One-valve for America	23.1.37	AW429
Rome 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 (1, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-wave (SG, D, Pen)	Jan. 19, '35	AW463
The Carrier Short-waver (SG, D, P)	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-valver Short-waver (SG, D, LF, P)	Mar. '35	WM383
Superhet: Blueprint, 1s. 6d.	—	WM397
Simplified Short-waver Super	Nov. '35	WM397
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C.-D.C.	—	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
Listeners' 5-watt A.C. Amplifier (1/6)	—	WM392
Radio Unit (2v) for WM392	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-)	Dec. '25	WM399
De-Luxe Concert A.C. Electrogram	Mar. '36	WM403
New Style Short-Wave Adapter (1/-)	June '35	WM388
Trickle Charger (6d.)	Jan. 5, '35	AW462
Short-Wave Adapter (1/-)	Dec. 1, '34	AW456
Superhet Converter (1/-)	Dec. 1, '34	AW457
B.L.D.L.C. Short-wave Converter (1/-)	May '36	WM405
Wilson Tone Master (1/-)	June '36	WM406
The W.M. A.C. Short-wave Converter (1/-)	—	WM408



QUERIES and ENQUIRIES

Accumulator Care

"I am finding now that my accumulator does not last as long as it did when I first bought it. I keep it charged with a trickle charger and it now only seems to last half as long as before, although I give it the same time on the charger. How can I test whether it is in need of replacement, or find out what is wrong?"—F. E. S. (Deal).

THE trouble may be due to a variety of causes. Firstly, the valves may now consume more current, although if they have been properly used this is a remote possibility. Secondly, the accumulator acid may have spluttered out and you may have added ordinary water as replacement. Thirdly, you may have added acid to replace the loss by evaporation instead of using distilled water and this will have modified the condition of the cell. On the other hand, the collection of sludge at the bottom of the cell may be short-circuiting the plates, and it is necessary to clean or empty out the cell periodically to avoid this trouble. If you have been using it continuously it would be advisable to take it to a good accumulator service station and have it overhauled and perhaps filled with fresh acid.

Aerial Results

"Is it correct, as I have been told, that an inside aerial down from roof of house between the walls, when out of use does not need to be earthed? I am using a good outside aerial, as the interior one did not give power on foreign reception. With a three-valve S.G. set North Regional is good but Droitwich only faint. We are only 25 miles from North Regional, but of course farther from Droitwich. Is that result what you would expect, for I rather expected the opposite, as Droitwich is the more powerful station?"—Rev. H. C. W. (Walshaw).

IF the aerial is inside the house it is hardly likely to be affected by lightning and therefore does not need earthing, as in the case of an outdoor aerial. With regard to your results, it is necessary to remember that your outside aerial may be erected so that it is directional to the North Regional station, in which case, of course, it will be non-directional to Droitwich. It is also important to make certain that your receiver is working correctly, as there is a possibility that it is not functioning well on the long waves—a common failing with many simple three-valve circuits of the type you are using.

Short-wave Reception

"I am very keen on getting good short-wave signals, not only of distant broadcasting stations such as those in America, but also of many amateurs. I eventually wish to go in for transmitting, and want to get good practice in Morse, and would like the receiver to be really well designed so that I could keep it for use when I am on the air. What type of receiver do you recommend, not considering expense?"—F. R. (Hythe).

FOR your requirements there is no doubt that a specially-designed short-wave set is called for. We would recommend what is known commonly as a "communications type" receiver, employing seven or eight valves and fitted with output meter and other refinements. We have not published designs for a receiver of this type and cannot supply a blueprint.

H.F. Leakage

"I am rather puzzled by a peculiar fault in my home-made receiver. This is of the baseboard type with an ebonite

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.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

terminal strip along the rear edge for the aerial, earth and battery terminals on it. This has been in use about five years, but I find that now I can get louder signals by putting the aerial straight on the coil. There is no fixed condenser to cut out by this means and I am uncertain what it indicates. Can you help me?"—W. W. R. (Sheffield).

AS there is no aerial condenser to be cut out by the connection you mention, the indication is either that the connection from coil to aerial terminal is faulty or that a more serious defect has arisen. As the set has been in use for five years, the ebonite strip may have become coated with deposit or deteriorated and thus losses are occurring. These may take the form of a leakage film from the aerial to the earth terminal, or even throughout the whole strip, and you may even find that the H.T. battery is also leaking through the material. Make a careful test, by joining a new wire from the aerial terminal to the coil, and also include a good sensitive milliammeter in the H.T. negative lead and check the H.T. consumption.

Testing a Valve

"I have a feeling that one of the valves in my set is becoming worn out and should like to know the best way of testing this without going to a service man. Once before I did this and was told that a valve needed renewing, but when a new valve was tried it was no better. How can I make a reliable test for myself without elaborate apparatus? I have a good

milliammeter and voltmeter and I think these should be adequate to find the condition of the valve."—G. P. (Leicester).

ALL that is needed is a good L.T., G.B. and H.T. battery. Connect up the valve with L.T. and H.T. and include the milliammeter in the anode lead. Apply various values of grid bias, and make a careful note of the anode current changes with changes of bias. You can also make a note of the changes caused by variation of H.T. You can then prepare a set of curves such as are issued with the valve and make your comparison. This test does not, of course, test the insulation of the valves, and such a test may be necessary in the case of a mains valve.

Re-radiation

"I am interested in some short-wave results obtained on my set under unusual conditions. The set does not include a short-wave tuning section, but I can often hear a short-wave amateur and sometimes a short-wave broadcaster, when the set is tuned to the local station. Can you explain how this is?"—G. T. (S.W.8).

ALTHOUGH your receiver may be so flatly tuned that short-wave amateurs below 200 metres are heard, we think it is more likely that an amateur near to you is using a receiver in a state of oscillation, and that he is accordingly re-radiating the signals. This can quite easily be done with Morse signals, although usually when telephony (music and speech) is being received the quality would be very poor. A few judicious inquiries among your neighbours may enable you to trace the listener, and you will probably find that he is using a simple reacting detector stage.

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. F. S. (S.W.20). We have no other receiver using the parts at present employed. We can, of course, only recommend our blueprints when the specified parts are employed, and, therefore, in this case it would be preferable to dispose of the complete receiver and obtain the necessary parts for a more up-to-date model.

F. N. D. (S.W.17). We cannot supply complete lists of parts and circuits as suggested, but we recommend that you build an A.C. three-valve such as the All-wave Three or the Mains Record Three. These are up-to-date and include the short waves which would be very useful for the purpose mentioned in your letter.

F. J. (Malesowen). We regret that we cannot advertise for surplus components. We suggest you insert a small advertisement in our advert. columns for your purpose.

P. J. H. (Parkstone). With the particular coil in question there is little that can be done to improve matters. The leads are not unduly long for the wave-band covered in this particular set, and the coil has been designed especially for that purpose. The best thing to do if you wish to improve matters is to dispose of the receiver and build an up-to-date model with a modern all-wave coil, or build a special short-wave set with interchangeable coils.

N. W. (Abington). The receiver is not one of our designs, and we are, therefore, unable to recommend modifications. No doubt the coil could be replaced by a simple plug-in short-wave coil but we have no details of the receiver now available, and cannot, therefore, recommend the alterations which may be required.

R. D. B. W. (N.6). The recent article on using modern all-wave coils will, no doubt, have been of use to you in converting your receiver. We regret that we cannot advertise for the disposal of surplus components, and a small advert. should be taken for this purpose.

T. D. (Kirkdale). The books referred to are encyclopedias and we think "Wireless, the Magic Carpet" would be more useful in your case to start with, obtaining the Encyclopaedia afterwards, and then closely following the articles in this paper.

The coupon on page 645 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," Tower House, Southampton Street, Strand, London, W.C.2.

RECEIVERS, COMPONENTS AND ACCESSORIES
Surplus, Clearance or Secondhand, etc.

RADIOMART SHORT-WAVE MANUAL

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7d. including catalogue.

1937 Short-wave Catalogue only (3 times enlarged) price 1½d., post free.

44, HOLLOWAY HEAD, BIRMINGHAM 1

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

WARD, 40, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

REPAIRS to Moving Coil Speakers, Cones and Coils fitted or rewound. Fields altered. Prices Quoted including Eliminators, Loudspeakers, 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.

THE largest stock of components in England, over 500 lines, new catalogue now ready 1½d.—**J. Bearfield, 105, Upper Street, London, N.1.**

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.

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CELESTION Soundex Permanent Magnet Speakers, 10/-; Telsen speakers with 10-ratio transformers (for any type receiver), 12/6; Telsen speaker units, 2/6; Telsen (1937) iron cored coils, W340, midsize, 4/-; W478 (twin ganged), 9/-; W477 (triple ganged), 10/-; W476 (triple ganged superhet), 16/-; I.F. transformer coils, W482, 5/-; Telsen dual range coils, 2/0, with aerial series condenser incorporated, W76, 3/9; Telsen A.C./D.C. multimeters, 5-range (tests anything radio or electrical), 8/6.

HEADPHONES, 4.000 ohms, 3/-; Ace (P.O.) microphones, ready for use with any receiver, 4/6.

GARRARD Record Changers, A.C. 200-250 volts, changes eight 10 inch or 12 inch records, 46/-; Garrard A.C. motors with pick-up, 42/-; Collaro A.C./D.C. with pick-up, 50/-.

FULL range of Valves for all American Receivers, 6/- each; bargain parcels of radio components, including coils, chokes, condensers, circuits, etc., etc., to the value of 21/-, 5/- per parcel.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1; and 46, Lisle St., W.C. All mail orders to Southern Radio, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). 'Phone: Euston 3775.

HEADPHONES.—Brown, Ericsson, G.E.C., B.T.H., Standard Telephones, Nesper, Western Electric, Sterling, etc. 2,000 ohms, 2s. 6d. 4,000, 5s. Postage 6d.

SPECIAL. Ericsson, 4,000 ohms, as new, 7s. 6d. Telefunken, lightweight, adjustable, 7s. 6d.

CRYSTAL SETS. Burne-Jones, Complete, Guaranteed, 5s. 6d. Ditto, double circuit, 8s. Sensitive permanent detectors, 1s. 6d. Crystal Detectors, complete, 1s. Crystals with silver cat's-whisker, 6d. Postage 1½d.—**Post Radio, 2, Copenhagen Street, London, N.1.**

BANKRUPT Bargains. List free. Large stock of receivers and components, replacement valves of all types. All brand new goods. Write for particular requirements. Halcyon Short-wave converters with A.C. valve, £1. Decca A.C. 6v. 1937 superhets, £6. Latest Ferguson and Truphonic all-wavers in stock. Plessey 5v. A.C./D.C. superhet 5v. chassis, with valves and speaker, £4 10s. Battery ditto, £4. 8 years advertiser.—**Butlin, 60, Stanford Avenue, Brighton.**

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All goods guaranteed perfect; carr. paid over 5/-; under 5/- postage 6d. extra.

ALL POST ORDERS TO JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5. 'Phone: Amhurst 4723.

CALLERS, AS USUAL, TO 165 & 165a, FLEET ST., E.C.4 (Next door to Anderson's Hotel), Central 2833. New Branch: 50, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2381).

Have you had our **GIANT ILLUSTRATED CATALOGUE AND VALVE LIST?** Send 4d. IN STAMPS FOR THIS BARGAIN LIST.

The New "Premier" Short Wave CONDENSERS, with Tritulit insulation. Certified superior to Ceramic. All-brass Construction, 40 mmfd., 1/7; 100 mmfd., 1/10; 160 mmfd., 2s. 0d., 2/6; Double Spaced 15 mmfd., 2/9; 40 mmfd., 3/6. S.W. H.F. Chokes, 9d.; screened, 1/6. All-Brass S.W. Condensers, with integral slow-motion, .00015 Tuning, 3/9; .00015 Reaction, 3/8.

NEW 1937 1-VALVE SHORT-WAVE RECEIVER OR ADAPTOR KIT, 13 to 86 metres without coil changing. Complete Kit and Circuit, 12/6. VALVE GIVEN FREE!

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SHORT-WAVE COILS, 4- and 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/- set, with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 38-95 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/6.

COIL FORMERS in finest plastic material, 1½in. low-loss ribbed, 4- or 6-pin, 1/- each.

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AMERICAN VALVES. Genuine American HYTRON and TRIAD, first-grade Valves, 3 months' guarantee. All types in stock, 5/6 each. 210 and 250, 8/6 each. New Metal-Glass Valves, all types, 6/6 each. Genuine American DUOTRON Valves, all types, 3/6 each. Valve holders for all above types, 6d. each. OTOLO bases, 6d. each.

3-WATT A.C. AMPLIFIER, 2-stage for mlke or pick-up. Complete kit of parts with 3 valves, 40/- . Wired and Tested, 42/5/0.

7-WATT A.C./D.C. AMPLIFIER, 3-stage high-gain, push-pull output. Complete kit of parts with 5 specially matched valves, £4 4s. Completely Wired and Tested, £5/5/0.

COSMOCORD PICK-UPS, with tonearm and volume control, 10/6 each. PICK-UP HEADS only, 4/6 each.

PREMIER MAINS TRANSFORMERS, wire-end type with screened primaries, tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. 4 a. C.T. and 4 v. 1 a. C.T., 8/6. 250-250 v. 60 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 8/6. 350-350 v. 120 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 11/- . Any of these transformers with engraved panel and N.P. terminals 1/6 extra. 500-500 v. 150 m.a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 17/6.

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- 15/11d. 1 Valve Battery Kit, complete with Valve.
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Orders for the above Kits must be accompanied by 1/- as part payment for postage.

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ALBA UNIVERSAL ALL-WAVE AC/DC RECEIVER. Originally listed at 17 gns. This Receiver represents the best in modern Superhet design. Wavebands covered, Short Wave 19-49 metres, Medium 200 to 550 metres, Long Waves 800 to 2,000 metres. 2 Speed Drive is incorporated, First-Class Visual Tuning, fitted on one side of the Main Tuning Dial, the other side of the dial is balanced by an illuminated Window showing the various positions of the switch, i.e., Short Wave, Medium Wave, Long Wave and 1 gram, Combined Volume Control and Mains On/Off Switch, Provision for Extension Loud-speaker and, of course, Pick-up which, as explained above is switched. Mains Aerial etc., Valve combination as follows: UHIC, C1, Pen 30C, 2 D13C, VP13C, VP13C, FC13C. Here is your chance to buy a first-class All-Wave, All Mains Receiver at a reasonable price. To clear, £7 12s. 6d. Carr. Paid. **FEW ONLY, BUSH A.C.23.** 4-Valve A.C. Mains Band Pass Receiver, fitted in a Handsome Cabinet finished Dark Walnut. This little Receiver is selective and provides plenty of Volume from many stations. Our price to clear 4 gns., Carriage Paid.

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350-0-350, 120 m.a., 2-0-2 volts, 2.5 amp., 2-0-2 volts, 4 amp, 10/6.

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., 11/6.

500-0-500, 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., 18/6.

H.T.3 TRANSFORMER, 250 volts, 60 m.a., 2-0-2 volts, 4 amp., 8/6.

BRUCE MAINS CHOKES.

40 m.a., 30 Hys, 500 Ohms, 3/6.
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RADIO CLEARANCE, 63, HIGH HOLBORN, W.C.1. HOLBORN 4631.

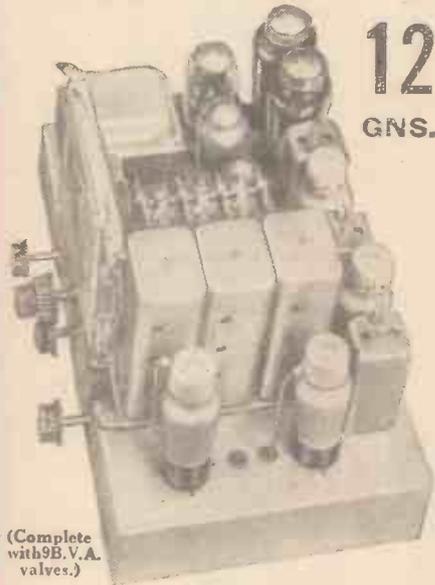


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LOUDSPEAKER repairs, British, American, any make, 24-hour service; moderate prices.—Sinclair Speakers, Alma Grove, Copenhagen Street, London, N.1.

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THE AMATEUR SET DESIGNER--See page 651.

Practical and Amateur Wireless

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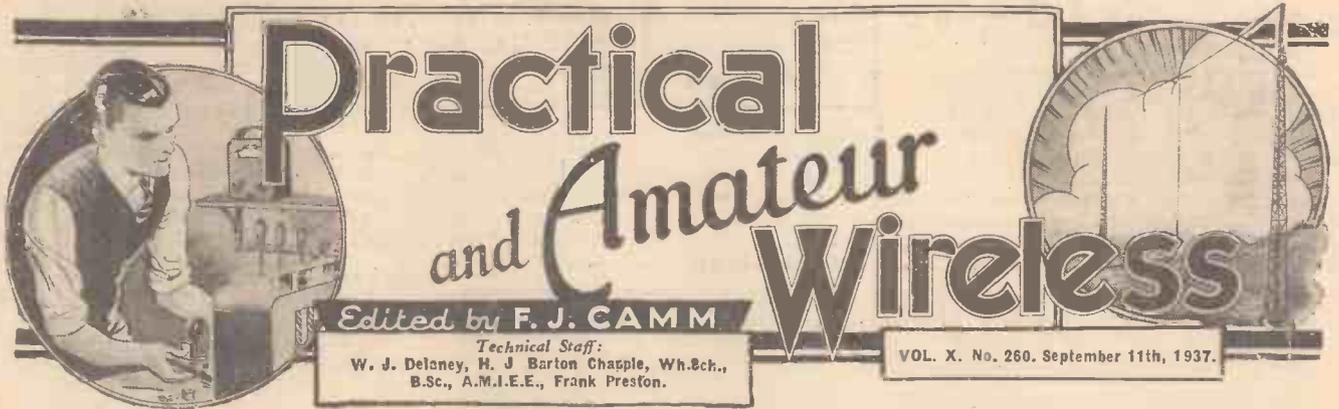
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INCREASING THE RANGE—See Page 669



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chasple, Wh. Sch.,
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VOL. X. No. 260. September 11th, 1937.

ROUND *the* WORLD of WIRELESS

Problems of Design

THE amateur set-builder is often faced with the difficulty of making a decision when building a receiver to his own design. What type of circuit shall he build? The use to which the set is to be put may easily solve this problem, but the arrangement of the various stages will set new problems which, in the case of the output stage, for instance, may not easily be solved. Shall he use a single valve and, if so, shall it be triode or pentode? If a single valve will not suffice, shall he use a push-pull or a parallel stage? These are only a few of the difficulties which may be encountered, and in this issue we commence a new series of articles dealing with the general principles of design which will be of interest to the amateur set builder. The main principles of the various L.F. stages are dealt with first, as it is most logical to start from the output stage when designing a receiver. It is necessary to settle first upon the volume of output which is required, and having decided upon this you can work backwards so that the output stage will receive a suitable signal voltage and precautions taken in the design to avoid overloading.

Manchester Radio Exhibition

THE Northern Radio Exhibition will be opened at the City Hall, Deansgate, Manchester, on September 14th, and will continue until the 25th. This will be run on similar lines to the National Radio Exhibition and will feature variety shows with leading artists and other important attractions.

Monday at Seven

THIS popular item, which has hitherto been broadcast as a fortnightly feature, will, during the autumn, be produced weekly. It will include a number of serial features, comedy and dramatic sketches, leavened with music. The exploits of Inspector Hornleigh are likely to continue for some time yet, and it is possible that the feature will include a serialised musical comedy divided into ten-minute episodes over a period of weeks.

Dance Music Exchange

ON September 15th English listeners will hear a programme of dance music relayed from Berlin, and played by

Eugen Wolff and his Orchestra. Immediately this relay ends, the line will be utilised to relay to German listeners a programme played in this country by Henry Hall and his Dance Orchestra.

New Car Radio Valves

THE General Electric Company have developed some new valves for use in car radio sets of British or foreign origin, and these follow the new International Range design. An Octal base is fitted to

success of the contract has led to the present installation.

Hunt Ball in the Studio

A NOVEL idea is shortly to be presented in the Television programmes. Harry Pringle, who devised the successful "Cabaret Cruises," has hit upon the happy idea of staging a Hunt Ball in the studio, with a pack of real hounds to give the final touch of realism. The studio will be decked out as a typical country house, where the company will be making merry in preparation for the next morning's meet.

Wired Wireless

SOME years ago it was proposed to design apparatus which would enable a standard broadcast programme to be carried via the ordinary sound telephone wire system for subsequent reception at the houses of subscribers. The idea was adopted in America for use in hotels, and it is now stated that in Germany apparatus has been perfected so that the public telephone system may be used as a carrier of the wireless signal. A small separating box, installed near the subscriber's telephone, separates the radio and 'phone signals and an ordinary radio set is connected to the separator in order to pick up the programmes.

Bristol Radio Exhibition

VARIETY will be broadcast from the Bristol Radio Exhibition on September 11th. The exhibition is being held this year at the Coliseum, Bristol, from September 8th to September 18th. The artists include Jean Melville, Harry Hemsley, and the Band of the Royal Marines, Portsmouth Division. The variety artists to be included in the second broadcast programme on September 13th are Beryl Orde, Stanford and McNaughton, Pat O'Brien, Phyllis Smale and the Band of the Royal Marines, Portsmouth Division.

Buenos Aires' New Time Schedule

PROGRAMME times of radio transmissions sponsored by LRI, *Radio el Mundo*, Buenos Aires (Argentine Republic) have now been fixed as follows: LRU on 19.62 m. (15.29 mc/s) from G.M.T. 12.00-14.00; LRX, on 31.06 m. (9.66 mc/s) from G.M.T. 14.30-04.30 daily.

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them and the heater wattage is only 1.9 compared with the standard 4 watts of the ordinary mains valves.

Stock Exchange Amplifier

THE Trix Electrical Company has recently secured an important contract for the supply of a complete amplifying system to be installed in the London Stock Exchange. The equipment includes multiple loudspeaker points throughout the building with double channel amplifier and radio and microphone inputs. This company was called upon at less than an hour's notice to provide P.A. equipment at the Stock Exchange on the occasion of the abdication of King Edward VIII. The

ROUND the WORLD of WIRELESS (Continued)

Belfast Radio Exhibition

"BELFAST'S RADIOLYMPIA" is to be opened on September 17th. This is the twelfth annual radio exhibition held in Belfast under the auspices of the Ulster Radio Traders' Association, Limited, a body which comprises the leading radio dealers in Northern Ireland, and it has been arranged to broadcast the opening ceremony. Listeners will hear speeches by Mr. William Law, Chairman of the Ulster Radio Traders' Association, and by Mr.

INTERESTING and TOPICAL NEWS and NOTES

Bonn, the Hebrew vocal raconteur, who is one of John Sharman's own "discoveries"; the Viennese Singing Sisters; Major and Minor (Alec McGill and Fred Yule); the Western Brothers, complete with Old School Tie; Anóna Winn; and the ever-popular Flanagan and Allen. The B.B.C.

Variety with Accordion

THE accordion, one of the most popular of instruments with Scottish listeners, will be included in a variety bill on September 13th. It will be in the hands of Jack Kynoch, a well-known Glasgow player. On the same bill will appear Elliot Dobie, singer, William McCulloch, and Gordon Stephen, who besides acting as compère will give a short "turn" with Bert Brisband.

Orchestral Music

ON September 12th (National) the celebrated Hungarian composer Zoltán Kodály, who is to conduct his Suite "Hary Janos" at the Promenade Concert the night before, will conduct a concert of his works in a B.B.C. studio. John McKenna will sing two of Kodály's songs with orchestra, and the composer will conduct the B.B.C. Orchestra in his "Dances of Galanta" and "Summer Evening."

On September 15th (National) the B.B.C. Orchestra will be conducted by Sir Dan Godfrey, and will broadcast a Suite by Percy Fletcher entitled "Famous Beauties." The Suite is in three parts: (1) A Vision of Aphrodite; (2) In the Palace of Old Versailles; and (3) At the Court of Cleopatra.

Morecambe Night's Entertainment

THIS heading covers a broadcast from the famous Lancashire resort on September 14th, when the microphone will visit the Winter Gardens Theatre for variety excerpts, and will then go to the Winter Gardens Ballroom for the music of Lionel Millard and his Band. Then follows the "1937 Frolics" from the Palace Theatre, the "Arcadian Follies" from the Arcadian Pavilion, and the "Central Pier Revelry" from the Central Pier.

The Holiday Parade Concert Party

THE Holiday Parade Concert Party will give their second broadcast this season in the Welsh programme on September 8th. The programme will come from the King's Hall, Aberystwyth, and will include items by popular artists.



A glimpse of Radiolympia, showing some of the stands in the Main Hall.

Charles E. White, President of the Belfast Chamber of Trade, who will perform the opening ceremony, and on the previous evening George C. Nash, well-known humorist and broadcaster, will give a short talk about the Exhibition.

Favourites of the Famous

TUNES chosen by celebrities in all walks of life—architects, footballers, film stars, boxers, tennis players and journalists—will be heard during the next programme of "Favourites of the Famous," to be broadcast on the National wavelength on September 9th. They will be interpreted by Jack Payne with his band and several well-known guest artists.

Jack Payne himself is presenting this series of programmes. "You may hear us at any moment," he says, "playing the favourite tune of a dustman or a duke."

Glastonbury Town Silver Band

IRENE BAKER (soprano) will be the vocalist at a concert from the Bristol studios by the Glastonbury Town Silver Band on September 9th.

"Music Hall"

BEFORE John Sharman left a few days ago for his holiday in the Mediterranean, he completely cast the first show that he will produce on his return—"Music Hall," to be broadcast in the Regional programme on September 18th. It will bring to the microphone a number of established stage and radio favourites, including Issy

Variety Orchestra will be conducted by Charles Shadwell.

Organ Recital by Harold Combs

HAROLD COOMBS, the popular Sheffield-born organist of the Capitol Cinema, Aberdeen, will be "on the air" on September 10th, when he will play four pieces. The first is a march, "The Spirit of Youth," by Gilbert; the second a foxtrot, "A Sailboat in the Moonlight"; the third, "Scène du Bal," from the Miniature Suite by Eric Coates; and the fourth a "Hit Parade," by Connelly.

A Pioneer Broadcaster

MISS DOROTHY CHALMERS, who will play Mozart's Concerto in D for violin and orchestra on September 17th, in the Scottish programme, was one of the first violinists to broadcast in Great Britain. She was one of the performers at the Marconi experimental station in 1922, and later she played regularly at Savoy Hill.

Cora Goffin's Songs

THE well-known musical-comedy star, Cora Goffin, who is the wife of Emile Littler, of the Prince of Wales Theatre, Birmingham, will sing numbers from her stage successes on September 17th. These will include "No, No, Nanette," "The Girl Friend," "Prince Charming," "Hold Everything," and "Out of the Bottle." She will be accompanied on two pianos by Jack Hill and Harry Engleman.

SOLVE THIS!

PROBLEM No. 260

Elliott could not get any results from his A.C./D.C. receiver and when tests were made it was found that voltages at all points were normal except at the anode of the H.F. pentode used as I.F. amplifier. Where was the defect? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 260 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 13th, 1937.

Solution to Problem No. 259

As the consumption of the A.C. valves is 4 volts at 1 amp., a current of 1 amp. would have to be passed through the heater circuit, and, therefore, the total consumption would be approximately five times greater than with A.C./D.C. valves in use. The value of the dropping resistance would have to be lowered. The following three readers successfully solved Problem No. 258 and books are accordingly being forwarded to them: L. Elliott, 13, Station Street, Tow Law, Bishop Auckland, Co. Durham; H. Forster, 64, Beaconsfield Road, Magdalen Road, Norwich; P. J. Allaker, Elmhurst, Main Road, Sidcup.

First Article of a New Series

The Amateur Set Designer

In this Article the Problems Connected with the Various Types of Output Stage are Dealt With

THE amateur set designer has a number of alternatives to choose from as regards the system of the output stage, each having its particular merits. Before he starts to examine the various possibilities he should make up his mind as to the limit of H.T. consumption that he is prepared to allow the output stage and also fix upon some approximate figure for the maximum audio-frequency power that is to be delivered to the speaker.

It is necessary that the designer should thoroughly understand the general requirements with regard to impedance matching; this matter is one, of course, which crops up with any type of output stage. The fact that the output stage has to develop audio-frequency power is one which renders the operation of the output stage different from that of any other stage in the receiver.

For a given output valve the amount of power supplied to the speaker depends not only upon the working characteristics of the valve and upon the amplitude of the input grid voltage, but also upon the effective load impedance set up in the anode circuit by the speaker. For constant input voltage the power in the speaker will be maximum when the load impedance is equal to the anode impedance of the valve. Distortion, however, sets a lower limit, so the designer must aim at maximum undistorted power rather than maximum possible power.

The fact that for maximum undistorted power there is an optimum ratio between the load and the valve, impedances must be allowed for when going into the details of the output stage design.

Impedance Matching

As regards the moving-coil speaker the actual useful power consumption takes place in the speech coil. The effective load impedance represented by the speech coil is normally, however, much too low to match up with an output valve, but the effective load presented to the anode circuit of the valve can be raised to the correct value by using a transformer of suitable ratio.

If R_L ohms is the effective load impedance of the speech coil (see Fig. 1) and N is the ratio of the primary to secondary turns of the transformer then,

$$R_L = N^2 R$$

where R_L is the actual load impedance set up in the anode circuit of the valve. (See Fig. 2.)

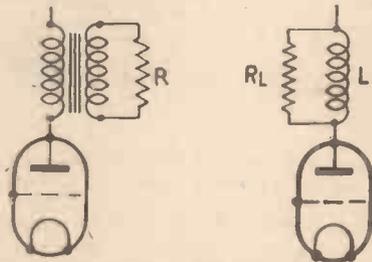
It is, of course, desirable that R should be equal to the load value which is the optimum for the valve in use.

Thus, for a given optimum load value and a given speech coil impedance the correct ratio of the output transformer will be,

$$N = \sqrt{\frac{\text{Optimum load}}{\text{Speech coil impedance}}}$$

From the amateur designer's point of view the turns ratio of the output trans-

former is the outstandingly important factor, but there are actually other considerations. From Fig. 2 it will be appreciated that the impedance of L (the primary inductance) acts effectively in parallel with R_L . If the impedance of L is of too low a value the joint impedance of R_L and L in parallel will fall too far below the optimum load value. The impedance of L decreases with frequency so it is to be expected that any trouble caused by L being too small will be at the low-frequency end of the range of audio frequencies handled by the output stage. The designer must keep his eye on this point when giving any consideration to the matter of the low note reproduction of his receiver.



Figs. 1 and 2.—Diagrams showing the load impedance of the speech coil, and the anode circuit of a valve.

For very good quality reproduction the value of primary inductance should not be less than the value which makes

$$\omega L = 2R_L$$

where $\omega = 6.28 \times$ lowest frequency.

For more ordinary purposes it will probably be satisfactory if

$$\omega L = R_L$$

It should be remembered that any care exercised over the matter of primary inductance when choosing an output transformer may be wasted if the transformer is used with far too big a value of primary current, causing core saturation. This is a point, however, that is only likely to become important if it is proposed to use an output valve of the heavy anode current class. When examining the specification of an output transformer any information given regarding the maximum permissible primary milliamperes is, in any event, worth noting.

Low magnetic leakage is, of course, a desirable attribute of the transformer. Definite information as to the leakage characteristics of any given transformer may not be readily obtainable, but it is to be anticipated that an output transformer of reputable make will be satisfactory. Excessive magnetic leakage will have a decidedly adverse effect upon the performance at the upper end of the frequency scale.

Single Triode Output

The single triode is not so commonly used now as in the past for output pur-

poses. In general popularity the pentode has taken the place of the triode, mainly because the latter valve has the higher sensitivity and greater power efficiency (ratio of power output to total H.T. power consumption).

The triode is much more tolerant than the pentode in the matter of load matching. The optimum load is not highly critical and, moreover, is greater than the valve impedance, which is all to the good in so far as the effect upon the dynamic characteristic of the valve is concerned. The triode must be regarded as being of comparatively low impedance, and this happens to be a useful attribute if the speaker has any tendency for pronounced resonant peaks. By "reflection" through the output transformer the valve impedance has a damping effect upon the speaker and, if the valve impedance is comparatively low, this damping will be considerable and useful in swamping resonant peaks.

A triode output valve does not call for any load-correcting devices, additional to the output transformer, in the anode circuit.

Thus the idea of using a triode in the output stage is well worth much more than a passing thought if the designer does not happen to be going all out for sensitivity or high-power efficiency.

Amplitude distortion in a triode is of a character that is largely that of the production of a second harmonic. The optimum load for any particular triode can easily be ascertained, for it is the practice of the valve manufacturers to supply such information in the valve data. In an average case the optimum load will be found to be between two and three times the specified value of valve impedance.

If the load is made appreciably smaller than the optimum value noticeable amplitude distortion will be set up, due to the second harmonic percentage becoming too high, but if the load is made greater than optimum the amplitude distortion will actually be reduced, although the output power efficiency will fall off. On the whole, therefore, if the actual load impedance cannot conveniently be made exactly equal to the specified optimum value it is better for it to be higher than lower.

In practice the load impedance of a loudspeaker does not remain constant over the frequency range, making it advisable to work in terms of average value. The load impedance rises with increase of frequency (ignoring resonant peaks) but the effect of this is not bad with a triode, the net result being equivalent to a certain amount of frequency distortion (the power efficiency being somewhat lower at the upper end of the frequency range compared to that at the lower frequencies.)

If he does decide to use a triode output valve the designer must consider how he can get the best possible results from it. The matter of impedance matching has already been discussed and it remains for the designer to arrange that the voltage operating conditions will be correct. It is most necessary that the valve be supplied with anode and negative grid bias voltages in the correct proportion as specified by the valve manufacturer. Severe distortion will be caused if, during reception, the valve is allowed to drive into grid current, and with single triode (or single pentode, for that matter) grid current must be avoided.

The value of grid-bias voltage gives an approximate indication of the maximum permissible peak value of the signal input voltage. Twice the grid bias gives approximately the maximum permissible value of grid voltage "swing." Actually,

(Continued on next page)

THE AMATEUR SET DESIGNER

(Continued from previous page)

the voltage figures indicated may err a little upon the side of over-estimation as appreciable grid current may commence just before the grid reaches zero potential. It must be noted, too, that the full rated power output will not be obtained from the valve unless the input signal voltage is at its maximum permissible value.

Single Pentode Output

As previously stated, the output pentode is characterised by comparatively high sensitivity and high-power efficiency. As a matter of fact, there are pentodes available of such sensitivity that they are used directly after a diode detector without there being any necessity for a stage of L.F. amplification.

The pentode, of course, demands a screen current supply in addition to anode current, but even so the ratio of power output to total H.T. power consumption is much higher than the triode can provide.

Thus if the designer is looking to keep the input signal volts applied to the output stage down to a minimum, or if he wants the maximum of useful power for every milliamp. of H.T. current supplied to the output stage, then there is little doubt but that the pentode will be his choice.

The fact that the designer has got to face squarely is that the pentode is exacting in its load matching demands. The amplitude distortion produced by a pentode is such that of the harmonics produced (even and odd) there is a pronounced third harmonic. The optimum load, to give minimum total harmonic distortion, is considerably less than the valve impedance. The latter is of a comparatively high value but is not normally specified in valve data sheets, as it varies so much with operating conditions, but the value of optimum load for normal operating conditions is, however, usually specified. Distortion will increase if the actual load is made either greater or less than optimum, and the fact, previously mentioned, that the effective load impedance of a speaker is not constant over the frequency range can cause trouble with a pentode, unless corrective steps are taken. One bad tendency is for distortion to be caused, and another is for very high A.C. voltages to be developed in the anode circuit when the effective load rises.

It will normally be necessary, in order to avoid "shrillness" of reproduction and to keep down the upper frequency A.C. voltages, to shunt the output transformer with something the impedance of which decreases with rise of frequency. A condenser has this property and C of Fig. 3 may be satisfactory, but there is the possibility, if a condenser alone is used, that the total effective anode load may drop too much at the higher frequencies. By connecting a resistance in series with the condenser this effect can be corrected, and the CR shunt of Fig. 4 is a very commonly used arrangement. There is no hard-and-fast rule which can be given as to suitable values for C and R. Much depends upon the characteristics of the speaker and also upon the frequency characteristics of the pre-output stages.

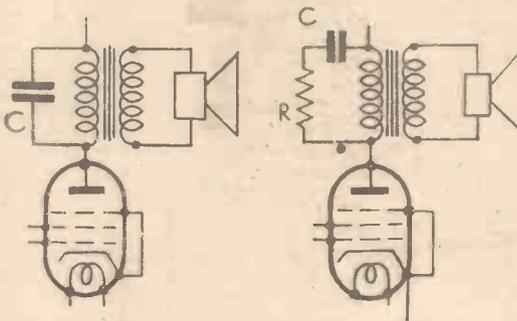
The output tetrode can be regarded as coming under the heading of pentode, although it is not, of course, actually a pentode type of valve. The output tetrode, which is, by the way, rapidly coming into popular favour, requires similar treatment to a pentode in several respects. It requires a slightly different impedance from that of

the corresponding pentode, and it has less inter-electrode capacity.

Parallel Valve Output

The idea of using more than one valve in the output stage, with the object of gaining an increased maximum power output, is an obvious idea, and it is possible to use two or more output valves in parallel. Normally, valves of similar type will be used and, since the valves are in parallel, the effective joint valve impedance will be that of a single valve divided by the number of valves in parallel. The optimum load will correspondingly be reduced, and this fact must be allowed for where the output transformer is concerned.

It is hardly likely that more than two output valves would ever be required for a domestic receiver, and if we restrict our considerations to a pair of output valves it is to be said at once that the designer will most probably pass over the parallel arrangement in favour of push-pull. The best that can be said of an arrangement of



Figs. 3 and 4.—Circuit diagrams of tone control arrangements as applied in a pentode output stage.

two output valves in parallel is that it will enable the maximum power output to be doubled, but the push-pull system can do this (and more) and also confers decided advantages in respects other than that of increased maximum power output.

Push-pull

The normal push-pull system involves two similar triode valves. The two valves each simultaneously supply power to the loudspeaker, a fact that will suggest that the two valves together will give twice the undistorted power output of one valve. Actually, it is possible, by suitable design, to run the maximum undistorted power output up to rather more than twice that of one valve.

Fig. 5 is a basic diagram of a push-pull output stage. The H.T. feed current splits into two equal parts at the primary centre tap of the output transformer and these flow in opposite directions through the two halves of the primary. As a result, the net magnetising effect of the H.T. feed current is zero, so, even though the transformer is carrying the D.C. components of two valves, there is no risk of core saturation. Furthermore, any hum ripple component in the H.T. feed will be balanced out in the output transformer, so the designer does not have to give much consideration to the output stage when he is designing the smoothing equipment of a mains outfit.

It will be clear from Fig. 5 that, of the total signal voltage developed in the secondary of the input transformer, each of the two valves will receive half and, secondly, that the two grid potentials will fluctuate in anti-phase, one becoming more negative while the other becomes less negative. Correspondingly, the two anode

currents will fluctuate oppositely, the current through one valve increasing at the time that the current through the other valve is decreasing. A little thought should make it clear that the actual anode current signal component consists of an A.C. component passing right through the whole primary of the output transformer, first from valve A to valve B and then from valve B to valve A. With perfect balancing there would be no signal component of current at all in the H.T. feed line. In practice, whatever signal component there may be that works out into the H.T. feed line will be so small that the usual tendency for output signal potentials to feed back to earlier stages by common impedance coupling effects will be negligible. One benefit of this is that the decoupling of the receiver will be made a much easier proposition than with other output systems.

The fact that the two valves of the push-pull system work in opposite phase has a most important consequence. In the combined output signal current the second harmonic distortion components of the two valves cancel out, thus making two triodes in push-pull a combination capable of giving very high quality reproduction. Incidentally, this balancing out of the second harmonic is really the reason why it is possible to get out of a push-pull output system actually more than twice the normal maximum undistorted power output of one valve.

In favour of the push-pull system must be reckoned the fact that it is capable of giving less distortion and, at the same time, much greater maximum power output than can be obtained with one of the valves alone. Where high-quality reproduction of local broadcasts, or of gramophone records, is the designer's chief ambition, it will pay him to give very serious consideration to push-pull. A consideration that may influence the designer against push-pull is that the H.T. feed current demand is heavy.

Harmonic Distortion

With the thought of sensitivity in mind,

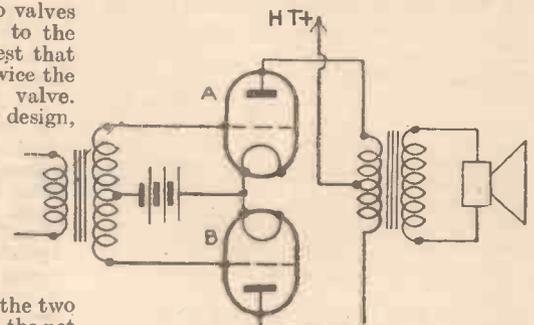
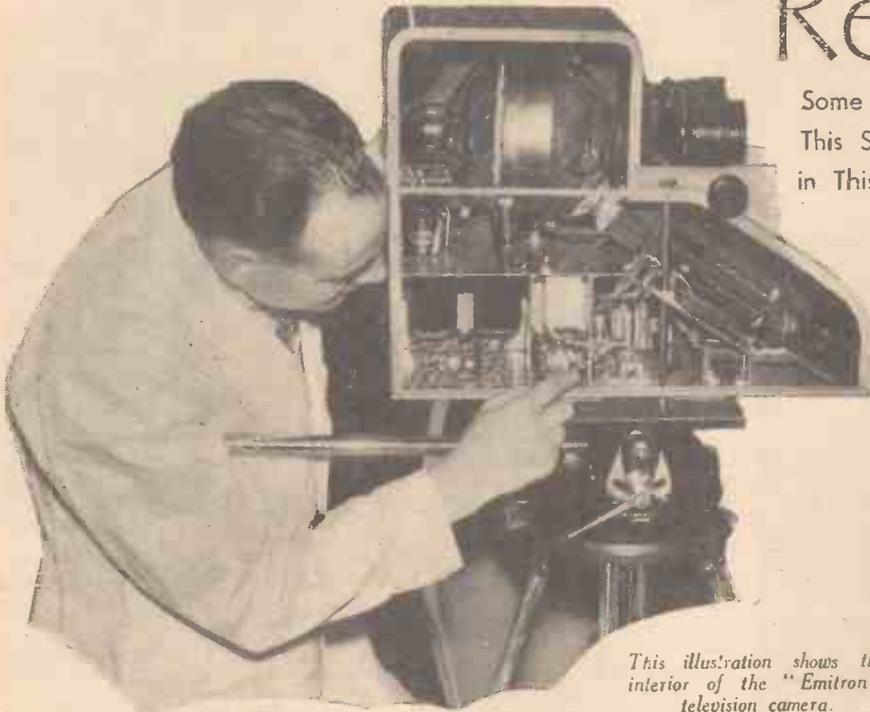


Fig. 5.—Circuit diagram of a push-pull output stage.

the idea of using a pair of pentodes in push-pull may occur to the designer. It can be done, but there is one very big disadvantage. As previously stated, third harmonic distortion is a pronounced factor with a pentode and, unfortunately, there is no cancelling out of a third harmonic brought about by the push-pull system. It is to be assumed that freedom from amplitude distortion is to be regarded as one of the chief attractions of the push-pull system and, that being so, it is hardly likely that the designer will be very interested in push-pull pentodes. (Pentodes in quiescent push-pull are different.)

The New Television Sets Reviewed

Some of the Principal Features of a Few of This Season's Television Receivers are given in This Article - - By W. J. DELANEY



This illustration shows the interior of the "Emitron" television camera.

SEVERAL new television receivers have made their appearance at this year's radio exhibition, and a study of the specifications of these reveals a number of novel details. The most interesting set at the exhibition was the Haleyon 40-guinea model. This is a complete all-wave receiver plus television equipment, housed in a cabinet slightly smaller than the usual floor model. It has been called a dining table set, owing to the fact that it will provide a picture at just the right height for viewing whilst at dinner or tea, and thus brings a more intimate atmosphere to the received picture. It incorporates on the television side a 9in. Ediswan cathode-ray tube, masked to produce a picture approximately 7½in. by 6½in. in black and white. Electrostatic scanning is employed, and the sound and vision signals for television are pre-tuned so that it is only necessary to turn the wave-change switch to television in order to produce a clear image and clear speech from Alexandra Palace. In order to ensure that everything is received at its best, the makers have provided two panel controls for the television signal, one regulating the contrast of the picture and the other a line sync. control. The all-wave radio chassis is standard, and the price of 40 guineas includes the installation of a special television aerial and free maintenance for one year.

G.E.C. Table Model

Another outstanding television exhibit is the G.E.C. converter model—designed for use in conjunction with an ordinary broadcast receiver. This particular set consists of an 8in. cathode-ray tube, time-base generator, mains pack and superhet converter circuit incorporating in all 15 valves. It is connected to the aerial terminal of an A.C. receiver in the same way as an ordinary superhet converter, and the frequency changer is designed to operate so

that the television signal is converted to approximately 500 metres. The existing receiver is, therefore, tuned to that wavelength, and when the apparatus is switched on the television sound signal is heard from the existing receiver and the picture is produced on the cathode-ray tube. The actual size is about 6½in. by 4½in. Electrostatic scanning is employed and there are



The new Ultra television receiver which also incorporates an all-wave chassis.

five controls—tuning, contrast, line, and frame hold. This complete unit costs 35 guineas, and, of course, may be used with practically any receiver capable of being used with an ordinary superhet converter.

Cossor Table Model

Another table receiver for television is now issued by Cossor, and this is a complete television sound and picture receiver as distinct from the previous model reviewed. It is intended merely as an accessory to the present broadcast receiver, and consequently tunes only to the Alexandra Palace transmission. There are six controls—tuning, contrast, focus, volume and on/off switch, and the tube built into the cabinet is of the 10in. type, providing a picture approximately 9in. by 7in. Electrostatic scanning is



The Cossor all-wave television receiver, Model 337T.

employed, and the price is 45 guineas. This also includes the standard television aerial equipment, maintenance and guarantee for 12 months.

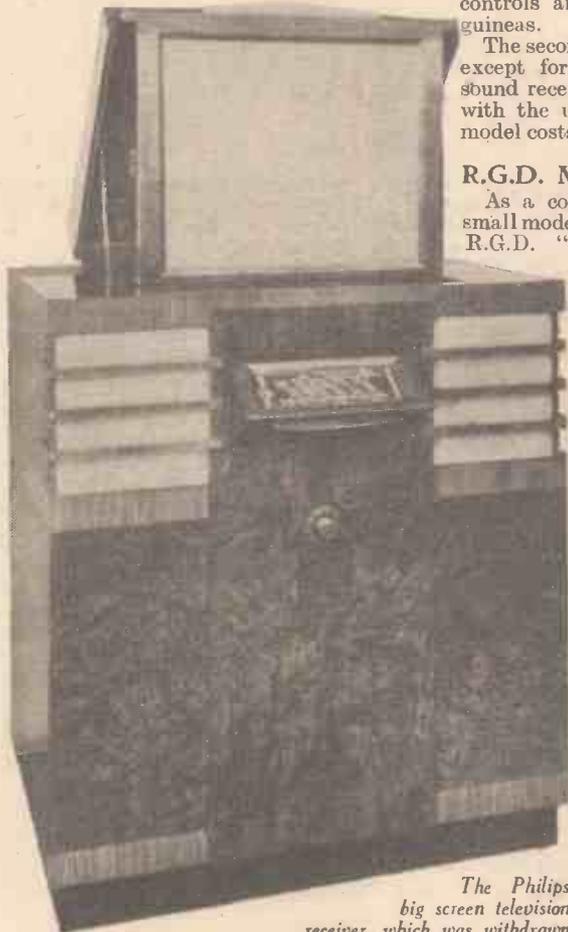
Ultra Models

Two small models have also been produced by Ultra Electric, one providing only the television sound and vision signals, and the other including also an all-wave receiver. These two models are, of course, as in the case of the other sets already referred to, in addition to large standard models. The smallest Ultra model incorporates a special 9in. Ediswan cathode-ray tube, developed by the Ultra engineers and built for them. It is shorter than the standard tube and thus enables a compact cabinet to be adopted, and in addition, a special time-base generator is employed. This utilises

THE NEW TELEVISION SETS REVIEWED

(Continued from previous page)

only four valves, compared with six or more used in other double time-bases. Electro-



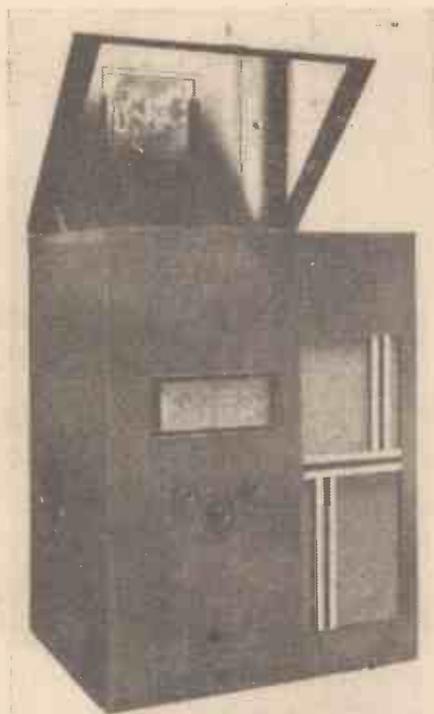
The Philips big screen television receiver, which was withdrawn from Radiolympia two days after the Exhibition opened.

magnetic deflection is employed, and the patented synchronising circuit is claimed to hold the picture perfectly, even through the most intense interference. Eight valves are used on the ratio chassis and only four controls are provided. The price is 38 guineas.

The second Ultra model is exactly similar except for the addition of the all-wave sound receiver, which is a 7-stage superhet with the usual circuit refinements. This model costs 50 guineas.

R.G.D. Model

As a contrast to these low-priced and small models, mention must be made of the R.G.D. "Aristocrat." This is a most expensive instrument incorporating, besides the television equipment, a complete automatic radiogram. The television section is a 15-valve superhet in the standard model, but where the apparatus is to be used within 10 miles of the transmitter, an alternative 10-valve chassis is available. A 12in. Ediswan tube is fitted to this receiver, providing a picture 9½in. by 7½in., with electrostatic scanning. It is interesting to note that the makers in this model have provided a smaller mask than is usual with a 10in. tube in order to ensure that a "flat" picture is obtained, and have avoided the corner and edge distortion sometimes found when using a larger picture area. Thyratrons are employed for both line and frame time-base circuits, and several controls are provided. These are for contrast, focus, brilliance, and picture and frame control. A separate mains switch is fitted so that the television section may be



The 40-guinea Halcyon television receiver complete with all-wave radio.

isolated when using the broadcast section or gramophone.

Other Models

In addition to these particular sets there are, of course, models which have already been reviewed by us, such as the Marconiphone, H.M.V., Pye, Baird, and K.B., in all of which an all-wave radio receiver is incorporated. The majority of manufacturers supply special television aerials with the receivers.

Important Broadcasts of the Week

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, Sept. 8th.—Concert Party programme.

Thursday, Sept. 9th.—Dance Band programme.

Friday, Sept. 10th.—Promenade Concert from Queen's Hall, London.

Saturday, Sept. 11th.—A running commentary on the first part of the Midland Automobile Club Hill Climb at Shelsley Walsh.

REGIONAL (342.1 m.)

Wednesday, Sept. 8th.—Commentary on the St. Leger.

Thursday, Sept. 9th.—Promenade Concert from Queen's Hall, London.

Friday, Sept. 10th.—Tzigane Music relayed from Hungary.

Saturday, Sept. 11th.—Promenade Concert from Queen's Hall, London.

MIDLAND (296.2 m.)

Wednesday, Sept. 8th.—Variety from the New Theatre, Oxford.

Thursday, Sept. 9th.—Choral and instrumental programme.

Friday, Sept. 10th.—English Writers: Michael Mullinar, vocal programme.

Saturday, Sept. 11th.—Melody or Rhythm? A contrast in Dance Music.

NORTHERN (449.1 m.)

Wednesday, Sept. 8th.—Northern Nationalities—3, Scots; a programme of dance and song.

Thursday, Sept. 9th.—The Presentation by Sir Montagu Butler of the Grand Prix Trophies from the Villa Marina, Douglas.

Friday, Sept. 10th.—Northern Concert Party, including excerpts from Concert Parties at the Little Theatre, Saltburn, and the New Pavilion, Redcar.

Saturday, Sept. 11th.—Promenade Concert from Queen's Hall, London.

WEST OF ENGLAND (285.7 m.)

Wednesday, Sept. 8th.—A Sonata Recital.

Thursday, Sept. 9th.—Short Story by L. A. G. Strong.

Friday, Sept. 10th.—Speedway: Bristol v. Birmingham; a running commentary on part of the National Provincial League Match, from the Knowle Stadium, Bristol.

Saturday, Sept. 11th.—Variety from the Bristol Radio Exhibition at the Coliseum, Bristol.

WELSH (373.1 m.)

Wednesday, Sept. 8th.—Holiday Parade:

A merry mixture of fun and song from the King's Hall, Aberystwyth.

Thursday, Sept. 9th.—A Sonata Recital.

Friday, Sept. 10th.—Y 'Steddfof Hynod Hon: This Wonderful Eisteddfod; a light programme of song, parody, debate and limerick.

Saturday, Sept. 11th.—Variety by Welsh artists.

SCOTTISH (391.1 m.)

Wednesday, Sept. 8th.—Scots Songs.

Thursday, Sept. 9th.—Concert Party programme, from the Cosy Corner, Dumoon.

Friday, Sept. 10th.—Gaelic Concert.

Saturday, Sept. 11th.—Many-mouthed Music, a very vocal variety.

NORTHERN IRELAND (307.1 m.)

Wednesday, Sept. 8th.—Orchestral programme.

Thursday, Sept. 9th.—Organ recital from the Cathedral Church of St. Patrick, Armagh.

Friday, Sept. 10th.—Tzigane Music, relayed from Hungary.

Saturday, Sept. 11th.—Concert Party programme, from the Floral Hall, Bellevue, Belfast.

Special Stand Features at Radiolympia

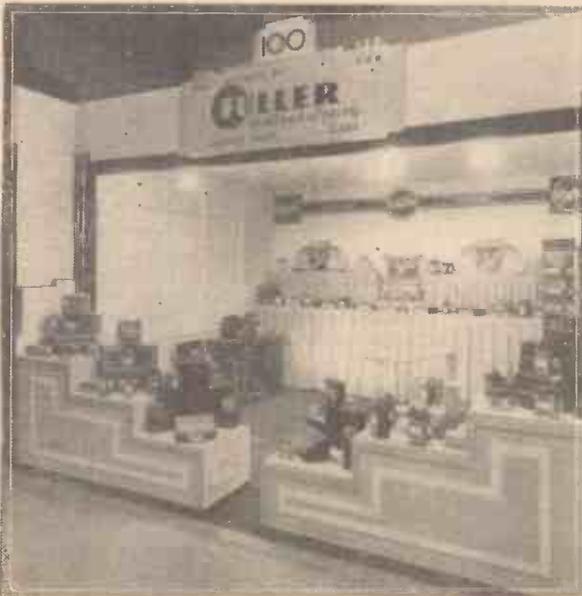


The stand above gives a good idea of the immense range of Pertrix batteries which are available from the Britannia Battery Company. It will be seen that they range from the very small single unit torch cells to the large super power H.T. batteries.

The stand illustrated below is the Fuller stand and it also shows a large range of batteries of various types. The popular Fuller accumulator may be seen prominently displayed on this particular stand.



The above illustration shows an historic exhibit on the Exide stand. This is the battery which was used on the golden State Coach during the Coronation Procession and which kept the interior illuminated to enable the public better to see their Majesties during the drive.



On the right is one of the mystery exhibits at Olympia. This is a 2 volt standard Exide cell connected to a meter with a push-button in series. Visitors were asked to press the button, when the voltmeter indicated a voltage of 6 volts from what is apparently only a simple single cell. Visitors could, if they desired, bring their own meter and the cell still would indicate 6 volts. Can you solve this problem? The solution will be given next week.



The New Cossor Superhet

AMONG the receivers of outstanding merit seen at Olympia this year must be included the new Cossor Model 584. While fundamentally it is a 4-valve (plus rectifier) superhet, it has a number of important innovations and improvements which show the careful thought and research work which has been put into it.

Dealing with the circuit in logical order, the aerial coil must first engage attention, and is worthy of mention, as it is a band-pass circuit on medium and long waves, the former being iron-cored coils while the short-wave aerial coupling is of single circuit type to give the maximum signal-to-noise ratio.

The frequency-changer is a Cossor 41 STH, the circuit arrangements being conventional. Coupling before and after intermediate amplifier (Cossor MVS/Pen.) is achieved by transformers of a very special design tuned to 465 kc/s. They are, of course, band-pass, but differ from the more conventional type inasmuch as alignment is achieved by varying the inductance, and not the associated capacities. The manufacturers were fully alive to the danger of trimming condensers varying their capacity either by vibration or through age, and therefore used in their stead fixed condensers made by anodically deposited silver on mica, forming a condenser quite incapable of capacity variation. In each of the windings there is a screwed "dust" iron core which forms a permeability pre-set tuning device, which, when set to give correct response by cathode-ray testing devices, is prevented from turning by wax sealing.

Variable Inductive Coupling

The first IF transformer, in addition to the advantages outlined above, has mechanically variable inductive coupling to provide the receiver with variable selectivity. In order to avoid confusing the novice by continuously variable selectivity, the control has eight "click" positions, four of which represent variation in coupling and give the following approximate bandwidths:

- No. 1—14 kc/s
- No. 2—12 kc/s
- No. 3—9 kc/s
- No. 4—5 kc/s

The last four positions of this control (i.e., positions 5-8) do not vary the coupling but actuate an LF tone control, giving varying degrees of top-note cut.

The third stage used is a DDT double-diode-triode valve, which is used in its normal manner, except that an interesting variation is introduced, the A.V.C. diode being taken to the primary of the second IF transformer. The primary is not so selective as the secondary, consequently as the dial is rotated and a station approached, the A.V.C. voltage comes into play before the edge of the acceptable band width is reached. This effectively prevents side-band shriek, which is so unpleasant on some superhets just before the correct tuning point is reached.

Tetrode Output

The triode section of the DDT is resistance-coupled to the output tetrode Cossor 42 OT which, by virtue of its low anode to earth capacity, gives a slightly better high-note response than that available from a pentode. It is interesting to note that the LF tone control is not connected to the anode of the output valve, as it is considered that the use of variable capacity in this position brings about undesirable effects by varying the impedance of the output circuit; consequently fixed compensation is included in this position and variable capacity is introduced between anode and cathode of the preceding triode. The moving-coil loudspeaker is of special design, giving exceptionally linear output which, with the tetrode output valve, gives a really remarkable fidelity curve when the

through which the anode current to the AVC controlled MVS/Pen. must necessarily pass. The rise and fall of the anode current in these valves varies the saturation of the iron core, which in turn varies the output to the lamp.

Chassis Construction

The chassis is of particularly robust construction, and great precautions have been taken against microphony. The triple gang condenser is mounted by means of four double live rubber bushes to a sub-chassis. The sub-chassis is in turn mounted by four similar rubber bushes to the chassis which, judging by results, entirely achieves the desired freedom from microphony. As a further precaution the driving rod between the tuning knob and the condenser is broken by a soft rubber coupling to prevent vibration being conveyed from the cabinet.

Arrangements are made to use either a standard aerial and earth, or a doublet aerial and earth, and there is a special extension speaker plug which, when pushed half in, permits both extension speaker and built-in speaker to function, but when pushed right in, leaves only the extension speaker connected.

Performance

The performance of Cossor Model 584 leaves nothing to be desired and the tremendous advantage of the wide band-width variation made possible by using the control became immediately apparent. We found that the best method of tuning was to turn the band-width control to the most selective position, i.e., position No. 4, tune in the station, and then turn the band-width control towards the high fidelity position as far as practicable on the station being received; this procedure ensures that the station is accurately tuned.

The sensitivity of the receiver is most satisfactory; only 27 microvolts input was required to give 200 milliwatts output on 300 metres. The sensitivity on the short-wave band is relatively high. At 15 metres, for example, an input of 32 microvolts will provide an output of 200 milliwatts. Such high short-wave sensitivity is unusual, and accounts for the very high performance on this band. On several consecutive nights, when conditions were not too good, a really satisfying number of programmes were obtainable on this band, and the A.V.C. is most efficient and capable of holding during really bad fading.

On medium waves, a wide range of stations was readily available, and the band-width control a delight to use.

On long waves, excellent quality was obtained from Droitwich using the 14 kc/s position, while Luxembourg could be received completely clear of interference by using the 5 kc/s position.

The quality of reproduction is decidedly above average with the band-width control in the high-fidelity position; the price is 13 gns., or the receiver may be obtained on hire purchase terms.



The new Cossor 4-valve Superhet (Model 584), priced at 13 guineas.

variable band-width control is in position No. 1, i.e., maximum quality. The power pack is built around a heavy duty mains rectifier, which is provided with ample smoothing to ensure a quiet background. Controls are few in number, and consist of an "on-off" switch recessed into the left-hand side of the cabinet, and a 30-1 gear tuning control recessed into the right-hand side of the cabinet. The three-way wave-band selector is disguised as a pendant ornament under the tuning escutcheon, while the two controls to the left and right are the variable band width tuning referred to above, and the volume control. The three wavebands are: 18.7-5.75 megacycles (16-52.2 metres), 196-566 metres and 968-2,050 metres. The scale is illuminated, each waveband being printed in different colours, while at the top left-hand corner there appears a tuning indicator, which, while simple in character, was found to be very efficient. It consists of a dark red window behind which is a bulb fed by AC current through a small transformer which has a common core with another winding



On Your Wavelength



By Thermion

Undiscovered!

ANOTHER Show has passed with my identity still undiscovered. One or two readers almost challenged me, and I stood by quite a number of times to hear the correct challenge issued to the wrong person. I must confess to being amused at the comments of some of the readers on crooners, and jazz, and my other pet annoyances. One or two readers even challenged the Editor of this journal! One thing was very apparent, however—that the enthusiasm of our readers so sincerely manifest during the first Exhibition at which this journal was represented remains unabated. What a year that was. The home constructor was almost sated with wireless journals, and then a further journal flashed across the journalistic firmament. Its early death was, of course, predicted by those who were most interested in seeing the paper die. Although we were the last in the field, we at once shot into the lead and remained there. Unfortunately, many of our competitors went to the wall. It is obvious that the policy of the paper was planned on sound lines. It still has the largest net sales, and our correspondence shows that the interest of the readers is maintained. To apostrophise the well-known Exide slogan we “Keep on going when the rest have stopped.” Radiolympia acts as a tonic to me. I like to get amongst my readers and hear them chat. I was able without disclosing my identity to take some of them to the bar, and although many of them asked me about Thermion none of them seemed to think that I could possibly be he.

Queer People

THERE was one thing which I particularly noticed at the Show and that was that there were fewer people trading on what I

might call *effect*. A few years ago a callow youth with about a month's experience of the radio trade would grow a moustache, wear velvet trousers and suede shoes, purchase a pair of horn-rimmed spectacles with plain glass, stow a slide rule in his pocket, and disport himself upon the stand of his employer with the air of a scientist who has just stepped from his laboratory to oblige the public with gems of wisdom from his inexhaustible fount. These people, of course, labelled themselves as scientists or wireless technicians and spoke learnedly about their laboratory, the laboratory usually being a corner of the kitchen table, which was equipped with a fretwork clamp and saw, a cheap drill, and a rasp. You can readily imagine that I have met practically everyone in the radio industry, and as a trained man myself I am well able to appraise the mental as well as the manual skill of an individual. I therefore say, and I am prepared to support it, that in the early days 99 per cent of the so-called scientists and experts and technicians, particularly those claiming to possess “laboratories,” knew something less about radio than a schoolboy. They were not equipped mentally to understand the first thing about it. I have often wondered whether such people as will transform their vacuous exteriors to something queer and curious so that they can be thought scientific, and will adorn themselves with horn-rimmed glasses and slide rules which they cannot read, and wear curious clothes and grow moustaches at the age of 21 or so with the idea that it lends a professorial veneer to their stupid countenances, are not mental!

I well remember, a few years ago, when I was sufficiently misguided to take an engineering job where I did all the work for none of the credit and little of the cash, as well as supplying all of the ideas, that several juniors not yet out of their teens were taken on to learn the business. They arrived, armed to the teeth with slide

rules, pocketsful of propelling pencils, and all the impedimenta of ignoramus anxious to create an impression. Now, unfortunately for them, it so happened that I am fairly slick with a slide rule, having spent a useful proportion of my life in the drawing office designing apparatus for unskilled people to spoil. When I questioned these youthful members of the genus swankosaurus it was obvious that they did not know the first thing about it. They were not equal to performing calculations in simple arithmetic. So vain, however, did they become that they had their names entered in all the yearbooks as scientists, grew moustaches, and lapsed into the long periods of silence associated with the ignorant but which the unwary are likely to mistake for deep thought. None of these queer people are now in the radio trade. I know that I have an obtuse outlook, but I am compelled to feel sorry for any individual in his twenties who affects horn-rim glasses, though possessed of perfect sight, and grows a moustache for effect. It should be made illegal for anyone to grow a moustache; they are unwholesome, unhygienic, undecorative, and offend the public eye. If they must grow moustaches they should, like nudists, be segregated behind high fences, far from the vulgar gaze. The public is sufficiently wideawake to the simplicities of radio not to need to be impressed by such artifices.

If any of my readers happen to have moustaches, of course I am not referring to them!

Philco—First Musical Mixx

NOW that car-radio owners are much more numerous than they were in Great Britain a few years ago, it is interesting to recall the days when this type of wireless set was first introduced in this country. Although there are now more than 21,000 Philco car-radio sets in British owned cars, in August, 1933, the first car wireless receiver was installed.

After several months of exacting trials and experiments, Hillman Motor Car Company, Ltd., approved a

car-radio set designed especially by Philco Radio for the Hillman small car, the Minx, as standard optional equipment. In the autumn of 1933 the first Philco car-radio was installed in the 1934 Minx.

Following this, all the 1934 closed models of the Minx leaving the Coventry factory were equipped with concealed aeriols in their roofs, and other preliminary installation arrangements were provided to enable radio sets to be put in within one or two hours. The sets only weighed 20½ lbs. each, were 10½ ins. long by 7½ ins. wide by 6½ ins. deep. They cost 20 guineas, as compared with the latest up-to-date set made by Philco which now sells for 14 gns.

At the Motor Show at Olympia in October, 1933, a number of car manufacturers featured car-radio sets. Among them were Chrysler, Humber, Hillman, Dodge, Packard, Renault, M.G., and Rolls-Royce. Some of the exhibitors provided radio-equipped cars for demonstrations, visitors being driven to music around the city streets.

Discharge Rate

A LEAD-ACID cell which will give, say, 100 ampere-hours when discharging continuously at 10 amperes will give about 200 ampere-hours when discharging at, say, 20 amperes. If the discharge be intermittent the total capacity yielded will be increased appreciably, though to a less extent at the slow rate than at the high rate. Instructions issued with a battery usually state the final voltage below which it is unwise to discharge continuously at specified rates. It is quite permissible to take out the additional capacities obtained at intermittent rate, provided the discharge be not extended beyond the prescribed minimum final voltages. Such discharges do not signify overwork or over-discharge of the battery, provided the discharge is not carried below the minimum permissible voltage for the particular rate of discharge.

The full capacity is not necessarily dependent upon the initial specific gravity of the electrolyte, but is dependent upon the presence of sufficient free acid in the electrolyte. It is not necessary to have sulphuric acid of an exact specific gravity, but the lower the specific gravity employed, the greater will be the required volume of electrolyte per cell.

If there is a wide disparity in the capacity of the positive and negative plates, insufficient charging may lead to sulphation of the negative plates. The acid taken up by the negative



Notes from the Dust Bench

Fitting Bias Potentiometer

MANY readers will probably have battery type receivers employing an S.G. valve in the H.F. stage, with the volume controlled by means of a reaction condenser only. Reception can be improved by fitting a variable mu H.F. pentode in this type of set, provided that the coils are effectively screened. The lead joined to the grid of the H.F. valve should be removed and connected to a .0005 mfd. fixed condenser and the other end of this condenser connected to the valve grid. A 500,000 ohm resistance should then be connected between the valve grid and the centre tag of a 50,000 ohm volume control with the end tags of this joined to G.B.—9 and earth terminal respectively.

Potentiometer Switch

IT will then be advisable to fit a three-point on-off switch instead of the existing two-point type, connecting G.B.+ to the third terminal of this. If a three-point switch is not fitted there will be a leakage from the battery when the set is not in use. A potentiometer volume control of this type may also be fitted to a modern receiver having A.V.C. The centre tag of the potentiometer should be joined to the junction of the frequency-changer and I.F. amplifying valve grid decoupling resistances.

Tuning Scale Readings

WE sometimes get complaints from constructors concerning the wavelength markings on their tuning scale. They find that stations will not tune in at the correct wavelength settings. When full details of the receiver are obtained, however, it is generally found that old coils are being used in conjunction with a modern gang condenser and tuning drive. If stations are to tune in at the wavelength markings on the scale the coils must be of a type designed to work in conjunction with the gang condenser and the tuning drive.

THE WIRELESS CONSTRUCTOR'S

ENCYCLOPÆDIA

By F. J. GAMM 4th Edition 5/- net.
(Editor of "Practical and Amateur Wireless")

Wireless Construction, Terms, and Definitions explained and illustrated in concise, clear language.

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will reduce the specific gravity and the amount of free acid in the electrolyte. Eventually it may be that the electrolyte is quite exhausted before the positive plates. That is the opportunity for the dope merchant, for by pouring out the exhausted electrolyte and filling in his panacea, which usually is mainly sulphuric acid of quite a high specific gravity, the positive will yield further discharge, even without first recharging!

The disastrous after-effects on the plates are not realised, or are ignored, but naturally if all the original acid is combined with the plates and a fresh supply of acid is added, the specific gravity attained on the following recharge will be altogether too high.

Sold Out

HEREWITH a letter I have received from H. B., of Leigh-on-Sea: "With reference to your remarks in a recent issue of PRACTICAL AND AMATEUR WIRELESS about difficulty in purchasing the journal, I would mention that on Monday the 9th inst. at three bookstalls on King's Cross Station I could not get a copy but managed to obtain one at Fenchurch Street. Sold out!"

"I have always bought my copy on Wednesday mornings since No. 1 was published, but this last week I was away from town."

Why not place a regular order?

World-wide Tributes to British Broadcasts

I UNDERSTAND that world-wide tributes to the quality, power, and entertainment value of the British short-wave broadcasts poured into Radiolympia. Cabled messages were received direct on a teleprinter installed on the G.E.C. stand. They came from private users through the G.E.C. service depots and agents established throughout the world, and graphically revealed the keen interest taken by far-distant listeners in programmes transmitted from Britain. Their enthusiasm was shown by the care with which they reported the items they heard, the wavelength, and time, power and quality of reception.

Santa Cruz (Patagonia), 9,000 miles away, reported "incomparable performance morning, noon and night" on a battery set. Bombay cabled that "despite monsoon the Empire transmissions are being heard at full strength." Penang welcomed "perfect reception of home news" at quarter volume with indoor aerial, while Buenos Aires gave the prize to Frank Newman's organ recital received clearly, even without an aerial.

A PAGE OF PRACTICAL HINTS

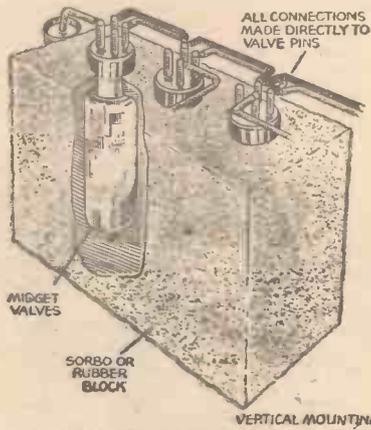
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Mounting Midget Valves

THE accompanying illustration depicts a simple method of mounting midget valves when constructing small receivers, and it will also be seen that the whole

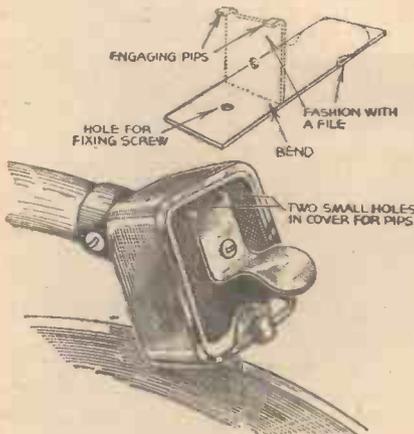


A novel method of mounting midget valves.

assembly is securely held by the wiring. Having just utilised this idea, there is another asset in this assembly which becomes prominent—namely, the fact that this "unit" may be lightly compressed to fit confined areas, without any damage to the valve envelopes. The construction embodies the added advantage of shock absorption, and owing to all valve wiring being effected without the medium of holders and connections being soldered directly, efficiency is increased with obvious resultant qualities in reproduction.—H. FREEMAN (Effingham Junction, Surrey).

A Pick-up Lifter

I HAVE found that a useful pick-up lifter may be made from a short length of 1/8 in. x 1/4 in. brass strip, and the accompanying drawing shows the completed device. The measurements are omitted since they vary according to the different sizes and shapes of pick-ups, but the device

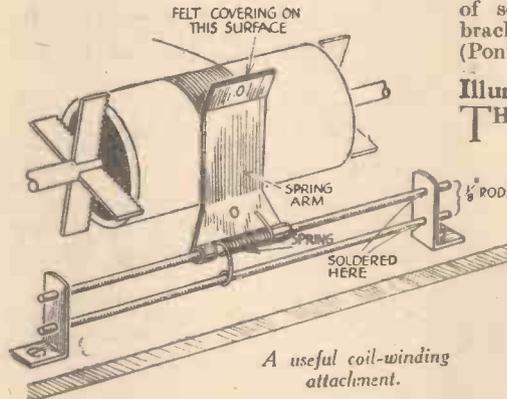


A simple pick-up lifter.

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., Tower House, 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 wrinkles.

illustrated will no doubt be of some use to those contemplating a fitment of this nature. The "pips" will prevent turning and working loose of the lifter, and this method obviates the use of more screws and metal, which, if of steel, might upset the characteristics of the unit. Risk of



A useful coil-winding attachment.

"slipping" and record damage is reduced by the employment of this fitment.—A. G. WHITE (Bedford).

A Coil-winding Attachment

I RECENTLY built a coil-winding machine which was described in PRACTICAL AND AMATEUR WIRELESS on a "Readers' Wrinkles" page, and afterwards I devised the simple attachment shown in the sketch. When this attachment is in use, much time is saved if the wire breaks whilst winding a coil, as it prevents the broken end recoiling around the former, and consequently spoiling most of the winding already done. Also, the constructor can leave the work at a moment's notice, without fear of the wire loosening.

The construction is simple and requires

NOW READY!

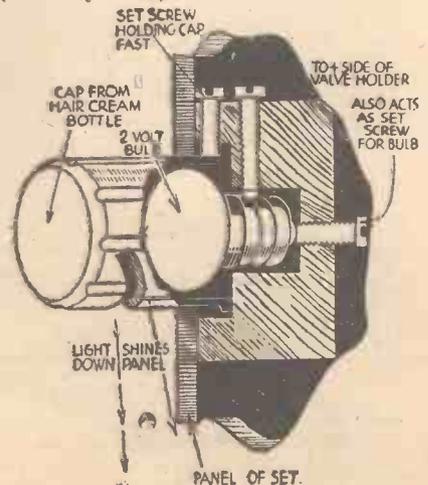
WIRELESS COILS, CHOKES AND TRANSFORMERS, AND HOW TO MAKE THEM.

2/6, or 2/10 by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

only scrap-box materials. Two brass brackets are required, 1/4 in. wide, and should be made to stand up about 1 in. from the baseboard. Two holes, 1/4 in. apart, are drilled to receive two 1/4 in. rods of brass or steel. The next part is the spring arm, which can be made from sheet brass, to dimensions according to the size of the winder. The part that runs on the former is covered with a strip of felt, which is secured by two screws. The spring need not be very strong, unless heavy gauge wire is to be used. The arm is pressed against the windings by the spring, one end of which is looped around the bottom rod, the other pressing against the arm. The rods enable the arm to traverse the whole length of the winder, and a little hook screwed to the edge of the baseboard enables it to be held away from the coil when necessary. The rods require a touch of solder where they pass through the brackets to keep them firm.—E. C. ADAMS (Pontypridd).

Illuminating a Panel

THE accompanying sketch shows a novel method of illuminating a front panel of a set which is not provided with an illuminated dial. I have found it particularly helpful at night time. The device consists of the bakelite top of a hair-cream bottle which is placed over a bulb mounted in a small block of wood fixed to the back of the panel, as shown. An inclined slot is cut in the underside of the bakelite cap so that the light from the bulb shines down on the dial. The flange at the base of the dial keeps it in position, but if desired a screw fitment can be made up to facilitate bulb replacements. A similar scheme may be adopted for illuminating the needle on the record in a radiogram, and will avoid damage to the record.—D. L. JONES (Finsbury Park).



This method of illuminating a panel will be found useful where an illuminated dial is not provided.

Philco master unit is housed in an attractive walnut cabinet and costs 12 guineas, complete with one speaker.



Room-to-Room Communication

Details of An Interesting Radio Side-line which is Daily Growing, and which is Now Available in This Country

man. The general principles of service will, of course, follow those met with in standard radio practice—on the L.F. side.

Costs

The initial costs and upkeep charges for the apparatus will, of course, vary according to the general design, but the following details of the Philco and the Ardente apparatus will give some idea of the general costs. The Philco model, consisting of one Master unit and one distant point, costs

ALTHOUGH not strictly radio, the inter-department or room-to-room loudspeaking telephone system is now becoming one of the side lines of the radio manufacturer. In America all of the big radio firms now market these communication systems in various types, and two good designs are now available on the English market. One of these is produced by the well-known Philco company, and is illustrated on this page, and the other is a development of the Ardente laboratories. The main idea underlying the design of this type of equipment is that it is possible to talk from one place to

particular line. In the various designs the number of separate lines varies, from two or three up to a dozen or more, and in some models it is possible to speak on any group of lines at once so that a business chief, for instance, may speak to his factory manager, sales manager and other departmental heads without the necessity of calling them all into his office.

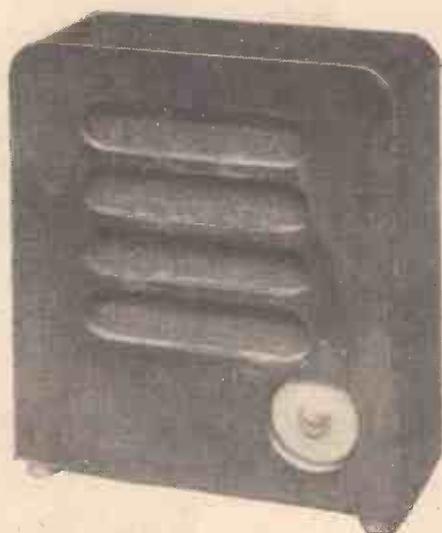
General Features

In addition to these selector switches a volume control is provided so that, when necessary, the message may be heard only by the person nearest to the speaker, and the volume available from the amplifier is generally sufficient to enable a room to be filled when desired. Two-way circuits are fitted so that the remote speaker may be used as a microphone, and it is thus possible for the speaker to carry on a conversation with another person without any need for change-over switching or other changes. It will be seen, therefore, that this type of apparatus opens up an interesting field for experiment for those amateurs who have a considerable amount of spare wireless apparatus on hand, and also represents a new field for study for the keen service



This is the Ardente "Master" showing the switches and controls.

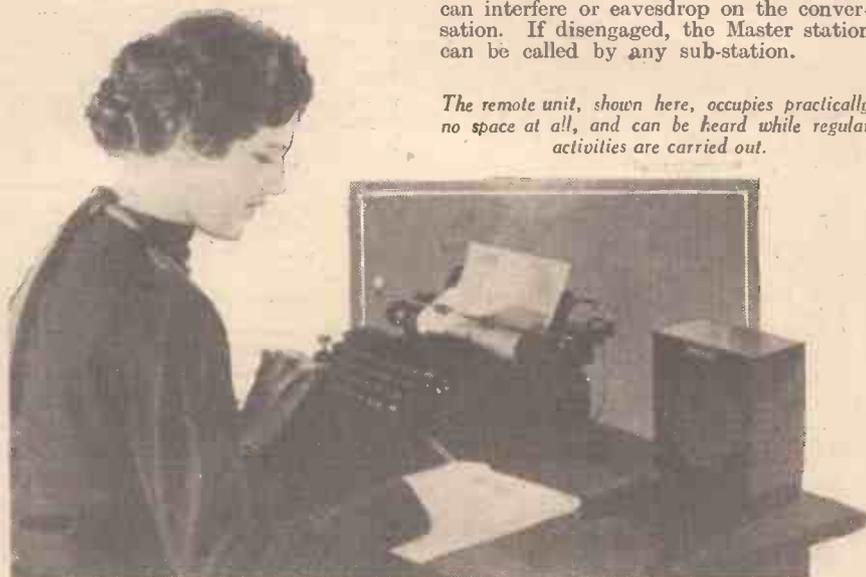
12 guineas. The additional speaker units are available for 2 guineas each. The mains load is only 45 watts, which, of course, is only taken when the apparatus is switched on and is not continuous. The Ardente Master unit costs £12 12s., and the additional points, known in this case as sub-units, cost £2 2s. The price of inter-connecting cable is £1 1s. for 50ft. A feature of this system is that during conversation between the Master and any particular sub-station, no other sub-station can interfere or eavesdrop on the conversation. If disengaged, the Master station can be called by any sub-station.



One of the Ardente sub-units.

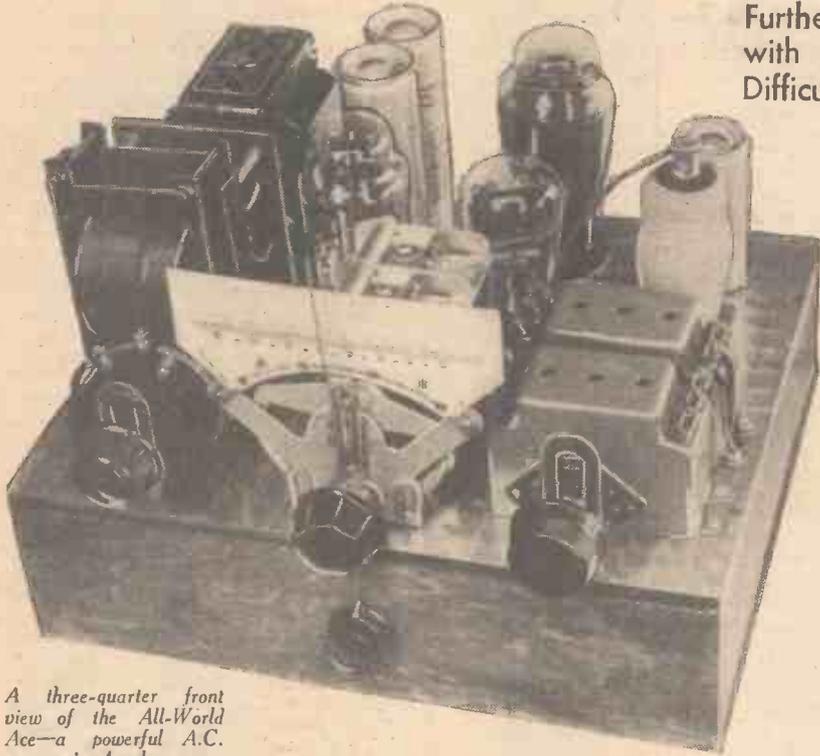
another without the necessity of holding an *carpicce* and without being encumbered in any way with telephone apparatus of the usual type. The illustrations are representative of the equipment, from which it will be seen that one unit, known as the Master, incorporates the necessary amplifiers built on standard radio lines, and the additional units are simply loudspeakers of the small cabinet type. The apparatus is designed to operate from either A.C. or D.C. mains, and in addition to the equipment housed in the Master unit a selector switch is provided so that the user may speak on any

The remote unit, shown here, occupies practically no space at all, and can be heard while regular activities are carried out.



THE ALL-WORLD ACE

Further Details of This Simple Mains Receiver, with an Explanation of Some of the Difficulties Which Might Be Encountered



A three-quarter front view of the All-World Ace—a powerful A.C. mains 4-valver.

ONE or two complaints were made by readers who visited us at Olympia concerning the fact that the theoretical circuit of this receiver was published on the reverse side of the page which carried the Speaker competition in our issue dated August 28th last. Consequently, when cutting out the competition, the circuit diagram was mutilated, and as a number of readers prefer to keep the theoretical diagram inside the receiver cabinet lid or in some other easily accessible position, we are publishing it again this week. It will be noted in the diagram that there are apparently a large number of variable condensers, certain of which have no values marked upon them. These are, in fact, pre-set condensers mounted inside the coil screens and are numbered by the

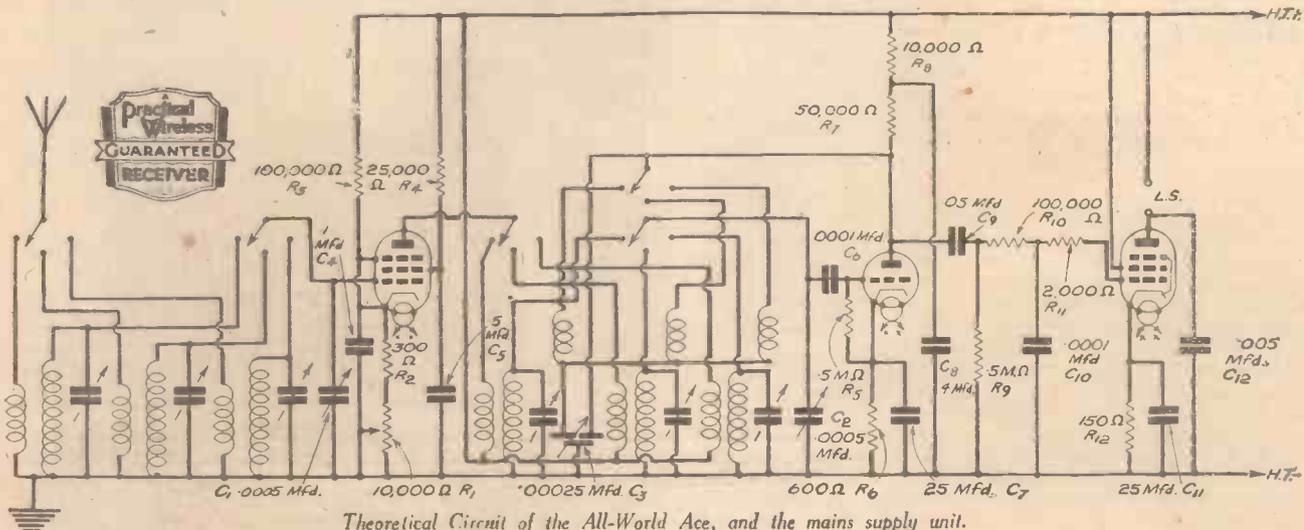
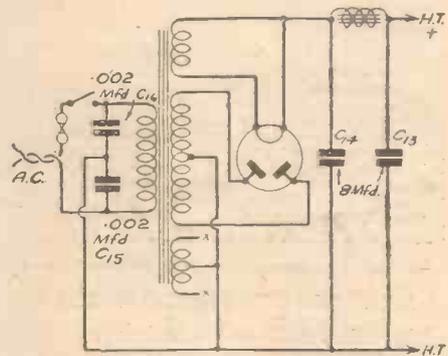
makers 1, 2 and 3. Number 1, as explained last week, trims the coils on the short-wave band; number 2 trims for the medium waves; and number 3 trims on the long-wave range, and it is essential that these trimmers be adjusted on each of the coils, irrespective of the ganged condenser trimmers. These will only compensate for external wiring irregularities and the high minimum which is usually expected will render it very difficult to carry out an accurate setting for the short-wave range. Consequently, as already mentioned, the trimmers on the ganged condenser should be opened to their maximum position, and the necessary trimming on each waveband then carried out on the small coil trimmers.

Operation Notes

When these trimmers are correctly adjusted it should be found possible to turn to any position on the dial, on any of the three wavebands, and no further adjustment of the ganged condenser should be required. There will, however, be found to be a slight difference as the reaction control is adjusted, due to the fact that the reaction coupling is fairly tight. You should, therefore, adjust the reaction condenser to a position which gives just enough increase in volume for normal use, when trimming the three condensers on each band. Any excessive volume on the local stations will, of course, be taken care of by the variable-mu control in the H.F. stage.

A point which has apparently confused some readers is that the detector valve is provided with a bias resistance in the cathode lead. This has been done so that the receiver may be used for gramophone record reproduction, although no pick-up terminals or switching is shown on the theoretical diagram. It was thought desirable to include the bias circuit to enable this valve to act as an L.F. stage, and to keep the diagram clear by omitting the necessary switching or connections for a pick-up. All that is required for record

(Continued overleaf)



Theoretical Circuit of the All-World Ace, and the mains supply unit.

THE ALL-WORLD ACE

(Continued from previous page)

reproduction, however, is that a pick-up be joined from the grid of this valve to earth, and this connection should preferably be made by means of plug and sockets at the rear, or by means of an adaptor in the valveholder. If the connection is to be left permanently on the receiver, a switch is necessary to change over from radio to pick-up, otherwise loss of volume will occur on radio, and breakthrough may be experienced on records. A simple single-pole change-over switch is all that is required and the grid of the valve is joined to the pole or arm of the switch. One side of the pick-up is then joined permanently to earth and the other side to one of the switch terminals, the grid-leak and condenser (R5 and C6) then being joined to the remaining switch contact. The switch, together with the pick-up sockets or terminals, may be mounted on the rear runner of the chassis, as close to the detector valveholder as possible.

LIST OF COMPONENTS

Two all-wave coils, Triogen, with 2-gang spindle (Wearite).
 One 2-gang condenser .0005 mfd. Bar type (C1, C2) (J.B.).
 One Drive No. 2134 (J.B.).
 Thirteen fixed condensers: Two .0001 mfd. (C4, C5); Two .002 mfd. (C15, C16); .005 mfd. (C12); .05 mfd. (C9); .1 mfd. (C4); .5 mfd. (C5) (tubular); 4 mfd. (C8); two 8 mfd. (C13, C14) (wet electrolytic); two 25 mfd. (C7, C11) (25v. electrolytic) (Dubilier).
 Eleven fixed resistances: Two .5 megohms (R5, R9); 100,000 ohms (R10); 2,000 ohms (R11); (F1); 100,000 ohms (R3); 50,000 ohms (R7); 25,000 ohms (R4); 10,000 ohms (R8); 600 ohms (R6); 300 ohms (R2); 150 ohms (R12), (F1) (Dubilier).
 One volume control, 10,000 ohms CP158 (R1) (Varley).
 One reaction condenser, .00025 mfd. (C3) (B.T.S.).
 One L.F. choke DP11 (Varley).
 One mains transformer EP20 (Varley).
 One Q.M.B. switch S80 (Bulgin).
 One fuse-holder and 1 amp. fuse F17 (Bulgin).
 Two socket strips L.S. and A.E. (Clix).
 Two component brackets (B.T.S.).
 Four valveholders: Two 7-pin, one 5-pin, one 4-pin (V1 and V2 without terminals) (Clix).
 One Plymax chassis 12in. x 10in. with 3in. runners (Peto-Scott).
 Two ft. metal screened lead (Ward and Goldstone).
 Four valves: A.C./VPI; A.C./HLM; A.C.2/Pen; U.U.3 (Mazda).
 One P.M. speaker, Stentorian Senior (W.B.).

NEW COSSOR PHOTO CELLS

PARTICULARS and specifications have just reached us of four photo-electric cells manufactured by A. C. Cossor, Limited. These cells have been developed at the company's laboratories at Highbury and employ several ingenious features. There are two mains types, G.1 with a cathode area of 1 sq. in. and G.2 with a cathode area of 3 sq. ins., both gas filled and the corresponding vacuum types G1V and G2V.

While G.1 (or G1V) is suitable for normal requirements, G.2 is recommended where severe mechanical vibration is involved; it is claimed that the latter type possesses rigidity unequalled by any photo cell now on the market.

A. C. Cossor, Ltd., state that under suitable running conditions a useful life of thousands of hours can be obtained. All types possess high sensitivity and very low dark current, i.e., the total current passing under working conditions when no light falls on the cathode is only .05 microampere; the cathode emitting substance is a very thin film of caesium on a prepared surface of oxidized silver and is equally responsive to visual light or infra-red rays.

TelevIEWS

Television from Pinewood Film Studios

ACCORDING to a recent B.B.C. announcement the mobile television unit will be stationed at the Pinewood Film Studios, Iver Heath, Buckinghamshire, from September 30th to October 5th, to give direct shots of films in the making.

Jessie Matthews, Maurice Chevalier, Adele Astaire, and other stars of the screen will be seen during actual filming, so that viewers will obtain a first-hand impression of how a big picture is built up. Transmission from the film stages will be given on three nights. The first will show Sonnie Hale directing the new Gaumont-British picture, "Sailing Along," with Jessie Matthews, Jack Whiting, Roland Young and Barrie McKay. On another evening, Monsieur René Claire, the distinguished French director, will be seen at work on a new Jack Buchanan picture, with Maurice Chevalier and Adele Astaire on the set. The third stage shot will show a British Paramount film in production.

During the afternoon transmissions from Pinewood, which will be given daily, viewers will be taken behind the scenes to see the workshops, the power house, the plasterers' shop, and the boardroom of the Pinewood Film Studios Limited. This is actually the rebuilt saloon of the *Mauretania*. The cutting rooms will also be visited, as well as the twenty-two-acre garden which has figured in many of the films which have come from the Pinewood Studios since they were opened twelve months ago. During the television inspection, of the models department, it is hoped to stage a train smash.

The tour will include the dressing-rooms, and it is hoped that such stars as Nova

Pilbeam, Will Hay, Lili Palmer, and the boy actor Desmond Tester may act as guides. Mr. Alfred Hitchcock, the eminent director, may also face the television camera.

"Behind the Beyond"

A play with a play will be televised on September 10th and 14th in the evening and afternoon programmes respectively, when Stephen Leacock's problem play, "Behind the Beyond" will be presented. As readers of this delightful piece of extravagance will remember, "Behind the Beyond" takes the form of a commentary by a sophisticated man of the world who sits beside us, as it were, in a theatre and describes the pulsating drama enacted before an audience "buzzing with brilliant conversation, illuminated with flashes of opera-glasses and the rattle of expensive jewellery, with here and there the crackle of a shirt-front."

Multi-camera work and a battery of sound effects will, it is hoped, convey the authentic atmosphere of the stage and auditorium. Unlike most commentators, our sophisticated friend is not a bore; rather, he makes an almost unbearably trite play into a masterpiece of satire. At the end the audience are saying, as they surge out in great waves of furs and silk, that it is a perfectly rotten play, but very strong. But, as the narrator reminds us, just inside the theatre, in the office, is a man in a circus waistcoat adding up the "ready" with a blue pencil, and he knows that the play is all right.

Read To-day—Buy To-morrow

"Read To-day—Buy To-morrow" will be a talk by Richard Osborne on the methods of present-day advertising. Mr. Osborne, who finds advertising amusing and interesting work, has been in the advertising world since he came down from Oxford, except for a short period which he spent as editor of a magazine. This will be televised in the evening transmission on September 9th.



WORLD-FAMED TELEVISION CHIEFS AT THE RADIOLYMPIA

This illustration shows five world-famed television chiefs photographed before leaving Radiolympia after having discussed the prospects of television for the coming season. Left to right: Richard Haig, Esq., British General Manager H.M.V.; Alfred Clarke, Esq., E.M.I.; Sir Louis Sterling, Managing Director E.M.I.; Mr. Fisk, Amalgamated Wireless of Australia, and David Sarnoff, Esq., President R.C.A. of America.

Practical Television

September 11th, 1937. Vol. 3. No. 66.

C.R. TUBE PROJECTION PROBLEMS

Television Pictures Projected on to a Separate Screen by Means of a Special Type Tube Have Been in the News Lately. This Article Deals with Some of the Problems Involved

WITHIN the last three or four months the protagonists of cathode-ray tube picture reproduction have furnished their answer to the larger type television pictures reconstituted through the medium of mechanical scanning methods. In many quarters it had been widely stated that only with the aid of mechanical scanning schemes coupled with brilliant light modulation would it be possible to show large size television pictures capable of being received in comfort in a large room or a small hall. The projection-type cathode-ray tube had been dismissed as incapable of undertaking such

The harnessing of the electron beam in a cathode-ray tube of special design for the production of large pictures is certainly one of television's major developments, and although certain factors at the moment make it a high-priced product, greatly in excess of normal cathode-ray tube television receivers, there is no doubt that in the future the scheme will become a practical commercial proposition.

Development

It is opportune, therefore, to examine some of the problems involved, and see how the modern projection C.R. tube



Fig. 1.—An example of the Baird projection tube, as shown at the Science Museum, South Kensington.

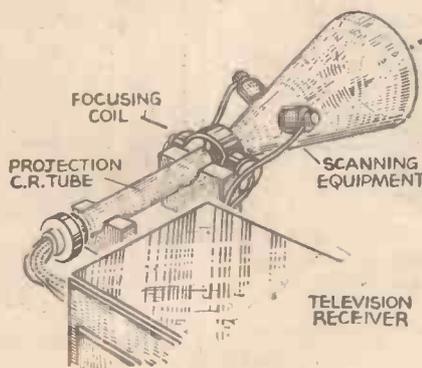
a task, but recent developments have probably given the answer to the critics.

More Recent Demonstrations

For some time these projection C.R. tubes have been working in different companies' laboratories, but little information has been forthcoming because the problems associated with large television picture reconstitution by electronic methods have been both diverse and intricate. That very material progress has been made, however, was substantiated when at the opening of the television exhibition at the Science Museum, South Kensington, the Baird Company installed a complete television receiver, incorporating a projection tube and a remote screen.

Perfectly satisfactory pictures had been shown on this set in the laboratories, but at the exhibition in question it was displayed in a section where actual reception of the B.B.C. pictures was not allowed. The brilliant and large scanning field, however, seen by those members of the public operating the apparatus left no doubt as to its technical efficiency.

differs from its earlier prototype. The first cathode-ray tubes used for picture reconstitution on the fluorescent screen at the large end of the conical-shaped glass envelope gave images which were not very brilliant. Very careful investigation into the chemical combination of the powders used for the screen, coupled with accurate design of the electrode assembly, and the application of final anode voltages in the neighbourhood of four to six thousand volts soon overcame this difficulty. Many of the pictures seen on the sets shown at this year's Radiolympia were outstandingly brilliant; so bright, in fact, that they could be watched comfortably and without eye-strain either in daylight or with ordinary



room lighting. This has removed the objection of room activity restriction which followed the earlier necessity for complete darkness when watching the B.B.C. television transmissions.

The tubes themselves were then reduced in size, and the brilliance of the picture reproduced on the screen still further increased without, however, losing the quality or detail of the resultant image. In other words, by paying very careful attention to the primary scanning field size it has been found possible to reduce the effect of defocusing in the picture highlights to an almost negligible quantity. The actual tube itself differs from the ordinary cathode-ray tube. For example, the Baird projection tube now showing at the Science Museum is a bulb made from Hysil glass, having a uniform thickness of the order of 5 millimetres. The screen end is seen to be carefully ground and polished optically flat on the outside, the diameter at this end of the tube being about five inches, while the total length is nearly twenty inches. An excellent example of the form taken by the tube is shown in Fig. 1. A conical section connects to a long neck terminating in a cap and socket. The high voltage anode terminals are brought out on long insulators to minimise brush discharge and voltage breakdown.

Details

For the purpose of focusing the brilliant picture on the tube screen a solenoidal coil surrounds the cylindrical glass neck. Through this is passed a direct current, and by varying this current the resultant uniform magnetic field produced causes the electrons in the beam passing from the orificed anode to follow helical paths, yet be in exact focus at the plane of the fluorescent screen.

Owing to the relatively high anode voltages employed in tubes of this character every precaution has to be taken to ensure that the tube screen is free from all suggestion of fatigue and burning. A very fine grain powder is employed for if this was not the case the picture, when enlarged to the required size on a remote screen, would be coarse and lacking in the fine detail and definition so essential for sustained entertainment appeal as distinct from novel technical achievement. Modulation of the electron beam is undertaken in the standard manner, that is by altering the intensity of the minute but brilliant

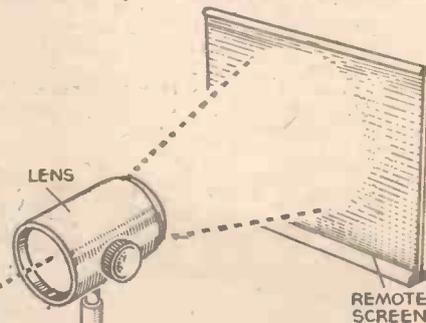


Fig. 2.—The fundamental arrangement of the projection C.R. tube television picture reception.

spot as it travels across the screen at uniform velocity in a series of adjacent lines. In order to modulate the tube fully from black to the highlights it is in some cases found necessary to have an increased signal output from the receiver, but in the latest tubes the output from a standard set is found sufficient for the purpose. Due to the higher anode voltages necessary—

(Continued overleaf)

PRACTICAL TELEVISION

(Continued from previous page)

10,000 to 15,000 volts—special design is required in building the power units feeding the supplies to the tube itself, but suitable safety precautions eliminate any possibility of danger when working with these rather high potentials. It seems certain, however, that subsequent research will find methods for reducing the magnitude of these anode voltages without impairing the picture brilliance. At the moment the rather more elaborate associated apparatus is responsible for the increased cost of the equipment when compared with the ordinary type of domestic direct-view cathode ray receiving apparatus.

Synchronising the picture presents no difficulty since there is no question of the momentum of moving mechanical parts to consider. Rock steady pictures free from any objectionable hunting in either the line or frame scan direction are observed, and either sequential or interlaced scanning is undertaken without any measure of difficulty.

Projection

The actual size of the picture built up on the projection tube screen varies according to conditions but may be anything between 2in to 4in. wide, the depth being settled automatically by the ratio of width to height in the radiated picture which is being received. The actual composition of the screen powder used by different manufacturers to permit of the intense bombardment of the electron stream for long periods is naturally a secret, but at the R.C.A. demonstration in America it was stated to be primarily zinc orthosilicate of

fine crystalline structure. The resultant picture reproduced by this powder has a yellowish green hue, but the Baird tube shown at the Science Museum has a close approximation to the more popular black and white colouring.

Special Lens

In order to maintain the high quality of the brilliant picture reproduced in miniature on the flat tube face and ensure freedom from any optical distortion, a high quality lens is essential. This has an aperture of the order $f/1.5$ and is placed relatively close to the tube. Various types of screens can be used and their fundamental construction will depend primarily on whether the observed picture is to be front or back projected. The scheme in simple form is shown in the accompanying pictorial diagram, Fig. 2. According to the type of lens employed and the distance of the equipment from the screen, so the resultant picture size can be varied. Pictures have been shown on a crystal beaded screen of a somewhat similar character to that used for home cine projection, this being in the case of front projection. For back projection, the screen is semi-transparent, and has to be designed to give the largest diffusion angle, coupled with an adequately brilliant and clear picture. Loss of light has to be guarded against, otherwise the picture size will not magnify to the desired dimensions. For normal home use a 2ft. picture width is adequate with C.R. tube projection, but three or four times this

magnification is essential when using equipment of this nature in a hall.

Important Points

Without the slightest doubt all the fundamental problems of this type of television picture reconstitution have been solved. These are many and various, and among the most important can be mentioned adequate picture brilliance to meet all conditions of viewing without defocusing occurring in the highlights. Maintenance of picture detail and a full range of contrast between black and full white through all the intermediate half tones is also essential. No doubt readers observed that with the earlier types of C.R. tubes, if the picture was run too bright then contrast was reduced and a general overall flatness of the results was apparent. This has to be avoided with projected pictures, which of necessity must have a brilliance at least comparable with a good quality home cine.

Another factor is the life of the tube, which must be sufficient to avoid the necessity of frequent replacement and the consequent high running costs. Proper attention to details in manufacture, that is a satisfactory electrode system; ample strength in the glass envelope and freedom from flaws so that the vacuum is maintained; proper screen powder of fine grain and one which will not burn when the tube is used correctly. All these points and many others are engaging the attention of television research engineers throughout the world, for the importance of ample picture size coupled with adequate brilliance and detail has never been lost sight of by the protagonists of electronic methods of picture reconstitution.

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THE CYCLIST
2d. Every Wednesday

Flat Spin . . .

It is a mistake to suppose that pipe-enjoyment is necessarily limited by the price one is prepared to pay for one's tobacco.

With a pipe of Player's 'Airman' for example, the smoker may take his 'fill' of pleasure and still have the satisfaction of paying only a moderate price. 'Airman' brings him out of the 'flat spin' of diminishing enjoyment to a tobacco which fills every reasonable need of the pipe-smoker. There are four varieties to choose from—all equally good.

**PLAYER'S
AIRMAN
NAVY CUT**
ALSO MIXTURE OR FLAKE



P.A. GOB



THE ELECTRICAL ENGINEER POCKET BOOK

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CORRECTION	

Illustrations:—This handy pocket volume contains a profusion of diagrams and sketches together with graphs. Also included for convenience is a small section of blank pages for notes and calibrated pages for graphs, so that the pocket book can contain information of a particular or personal nature as well as being a reference book of general facts.

The Book Itself:—The Pocket Book is strongly bound in durable art. leather—deep red, richly grained and embossed in gold. The book measures approximately 6 $\frac{1}{2}$ x 4 inches, and has rounded corners, so that it is in the truest sense of the word a pocket book. The paper has been specially chosen to give the minimum bulk consistent with good printing, again making for convenience in handling.

★ The Electrical Engineer Pocket Book can be obtained from all good newsagents and booksellers at 3/6 net, or in cases of difficulty direct from the publishers, George Newnes Ltd., Book Dept., Tower House, Southampton Street, Strand, London, W.C.2, at 3/8 post free.

RADIO AND THE RAILWAY

THE Great Western Railway is making increasing use of the system's loudspeaker equipment for controlling crowds at its stations during busy periods.

Paddington and Birmingham Snow Hill stations have already been equipped and the company is now to extend the system to Cardiff.

Proposed Cardiff Installation

The Cardiff installation will have six speakers over platforms Nos. 1 and 2, six over "down" platforms Nos. 3 and 4, and five in the booking-halls and the passenger subway—seventeen in all. There will be separate announcing points for the "up" and "down" sides, but both announcers will be able to connect with the subway circuit.

Special attention will be given to the directional qualities of the speakers used, as it is proposed to make simultaneous announcements on the "up" and "down" sides.

The company has now under consideration similar installations at other big stations on its system.

Portable Unit

In addition to permanent loudspeaker installations, the Great Western Railway has recently brought into use a portable unit for service at any of its stations where large football, racing or holiday crowds are anticipated.

Loud-speaking telephones are used in a number of signal boxes for the reception of messages from members of the staff outside the box.

Wireless "Paging" System for Hotel

At the company's Royal Hotel, Paddington Station, loudspeakers have been installed which will supersede the old system of "paging" guests.

G.W.R. Takes Wireless Time

Clocks throughout the Great Western Railway system from Paddington to Penzance, Fishguard, and Birkenhead are checked daily by the 10.30 a.m. time signal received from Broadcasting House.

G.W.R.'s Early Link with Wireless

Few know that the Great Western Railway has one of the earliest associations with wireless or that one of its principal and most famous trains—the Cornish Riviera Express—was "born" on a wireless wave.

The first wireless signal was sent in 1901 by the late Marchese Marconi across the Atlantic from Poldhu, Cornwall, to St. John's, Newfoundland. Two years later the late King George V and Queen Mary (then Prince and Princess of Wales) opened the first big wireless station at Poldhu, and the Great Western Railway arranged a special train for the Royal Party from Paddington to Cornwall. This special was to make railway history. As a result of this the Cornish Riviera Express came into being with a run to Plymouth which for 21 years remained the longest non-stop run in the world and set the fashion, since copied throughout the world, for long non-stop runs.

PETO-SCOTT

EVERYTHING RADIO—CASH C.O.D. or EASY TERMS

Peto-Scott HIGH FIDELITY MOVING-COIL SPEAKERS (Permanent Magnet)



Setting an entirely new standard of high-fidelity loudspeaker reproduction, 4 new speakers bringing reproduction of a quality that must be heard to be believed. Each is supplied with the appropriate attached transformer for securing the maximum efficiency.

Model GPM/396 (illustrated), 10" reinforced diaphragm handling 6/8 watts peak audio load, ensuring smooth frequency response, nickel aluminium alloy magnet, high flux density of 10,000 lines. Speech coil 15 ohms. Cash or C.O.D. **39/6**
Or 4/- down and 11 monthly payments of 3/6. Special Multi-Ratio Transformer 12/6 extra.

CHARGE your L.T. for 1/2d. A WEEK!

Peto-Scott TRICKLE CHARGER

- 12 months guarantee
- Nothing to wear out or go wrong
- Modern metal rectifier
- Air-cooled mains transformer
- Charges at 1 amp.
- 7 days' approval against cash.



End outlay for accumulator re-charging. Never be "left without your Radio" because your L.T.'s run down. The new Peto-Scott 1-amp. Trickle Charger will charge your 2-volt accumulator at 1 amp. while you sleep. Wonderfully efficient and simple to use: A.C. Mains. 200/240 volts, 40/100 cycles. Cash or C.O.D. 12/6. Overall dimensions: 3 1/2" high, 2 1/2" diam.

CASH **12/6** PRICE

Peto-Scott H.T. Eliminators are also the best possible value for money. Model A.C.12 for all 3-volt sets. Output 120v. 12 m/A. Cash or C.O.D. 30/- or 2/8 down.

Peto-Scott 1938 ALL-WAVE RADIO

BRITAIN'S BEST ALL-WAVE RADIO for £4:15:0 or 5/- DOWN!

Only Peto-Scott can offer this astounding value! Twenty years' experience in radio-by-mail, supplying direct to the British Public, and cutting out middle profits, enables us to produce Guaranteed and Trouble-free All-Wave Radio with a performance, tonal quality, reliability and value for money nowhere else obtainable. Send for illustrated literature on Peto-Scott 1938 Broadcast and All-Wave Radio. Models from £3:17:8 to £18:18:0.



Peto-Scott ALL-WAVE BATTERY STRAIGHT3
MODEL 8011 (on left)—18-2,000 metres, 3 British Valves, New reacting detector circuit followed by 2 R.C.C. Stages feeding into pentode output valve. New Duplex Epicyclic Full-vision slow-motion tuning. Low H.T. consumption. 8in. zone 2-M. Moving-coil Speaker. Walnut veneered cabinet. Less batteries only. Cash or C.O.D. **£4:15:0**
Or 5/- down and 18 monthly payments of 5/0.

ALL-WAVE Super A.C. SUPERHET
MODEL 8051 (on right)—18-2,100 metres, 4 British Valves; Variable-Mu H.F. Pentode, High Efficiency Detector and high Efficiency output pentode and Rectifier. New Duplex Epicyclic Full-vision slow-motion tuning. "Tone compensated" M.C. Speaker. Walnut veneered cabinet. For A.C. Mains 200/250 volts. Cash or C.O.D. **£8:5:0**
Or 8/6 down and 18 monthly payments of 10/3.



Peto-Scott ALL-WAVE 4-valve BATTERY BANDPASS KIT

Save £1 by Buying the Complete Kit.

● Waveranges 18-52, 200-550, 900-2,100 metres. ● The ideal Kit for the Constructor desiring greater selectivity than obtainable with a 3-valve circuit. ● Bandpass coils and 3-ganged condenser ensure better station separation. ● Additional audio stage increases volume and quality on distant stations.

KIT "A" comprising complete Kit of parts, with ready-drilled chassis, easy-to-follow instructions and drawing, less valves.

List Value £5:0:0. Our Price **£3:19:6** 7/6 DOWN
or 7/6 down and 11 monthly payments of 7/4.

KIT "B" as Kit "A" but including Valves. Cash or C.O.D. £5:6:6 or 10/- down and 11 monthly payments of 9/6.

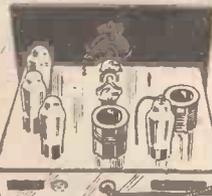
HIGH FIDELITY 6-7 Watts AMPLIFYING (P.A.) SYSTEM



A super-efficient general-purpose system for Dances, Meetings, Sports, Tournaments, home broadcasting and radiogram reproduction. ● MODEL A.G.87 AMPLIFIER. 4 valves: Triode Resistance, Transformer-coupled to 2 triple Grid Power Amplifier Valves, in Push-Pull, Full Wave Rectifier. Mains consumption approx. 60 watts. A.C. Mains 200-250 volts. 40/100 cycles. Output 6-7 watts undistorted. ● CARBON MICROPHONE (Transverse current type), with separate transformer. ● PETO-SCOTT Model G470 SPEAKER, 10in. diam. Field Energised Resistance 1,250 ohms.

COMPLETE SYSTEM Cash or C.O.D. **£9:10:0**
Comprising all above with 25-ft. microphone extension wire and 50-ft. 4-way speaker lead. Ready for instant installation and working. Or £1 down and 11 monthly payments of 17/8.

The PILOT "SHORT WAVE EXPERIMENTER"



A booklet of 24 pages, illustrating and describing a range of nine wonderful new PILOT Short-Wave Kits. Each of these designs incorporates a standard chassis and panel. Commencing with a modest but super-efficient 1-valve Adapter-Converter, you may, whenever you please, build this up, on the same chassis, into varying forms of 1, 2, 3, and 4-Valve Short-Wave Receivers, complete in steel cabinet. No short-wave fan can afford to miss the fascinating hours this booklet will bring him. Featured here are two of the wonderful short-wave receivers described in the "Experimenter."

PILOT Short-wave 4-valve RECEIVER
MODEL 464 (on left). (For highly efficient D.X. work on short waves, an equally useful on the normal broadcast bands. Aerial inductively coupled, tuned H.F. and detector Grid circuits controlled by ganged main tuning and band-spreading condensers, producing amazing selectivity, sensitivity and volume. "Phone Jack and loudspeaker sockets. KIT "A" less valves, cabinet, coils. List value £3:12:11. Cash or C.O.D. **£2:12:6**
Or 4/6 down and 11 monthly payments of 4/10. Set of 4, 4-pin, 4, 6-pin coils for above, 8.5-97 metres, 18-.



PILOT Short-wave 1-valve RECEIVER
MODEL 160 (on right). Employing 6-pin Coil providing for inductive coupling between aerial and Grid circuits, tuned grid and reaction. Produces maximum possible selectivity with single valve. Provides amazing range of short wave stations from all parts of the world. KIT "A" less valves, coils, cabinet. List value £2:1:8. Cash or C.O.D. **£1:12:6**
Or 3/- down and 11 monthly payments of 3-.

Set of 4 6-pin Coils for above, 8.5-97 metres, 10-.

Send 1d. in stamps to cover postage for your free copy of this 6d. booklet.

F. J. Camm's Oracle All-World Three

A Few Problems Solved in Regard to
the Building and Operating of This
Three-valve Battery Set



Note the apparently small amount of wiring in this simple three-valver.

ALTHOUGH we are repeatedly stating that we do not recommend the use of alternative components in our published designs, there still appears to be a few readers who wish to compromise in building a published design. It should be emphasised that when a receiver has been built it is only after certain combinations and layout arrangements have been tried, and you can rely upon us to carry out all the experimental work that is required in this connection. Consequently, when you feel that you would prefer to use one of your old ganged condensers, for instance, rather than buy a model specified by us, you are likely to run into all kinds of trouble. As an instance of the difficulties which you may meet it should be mentioned that at the present time tuning coils are built to a special design, the inductance of coils made by reputable firms being standardised. Similarly, the tuning condensers are also standard and will tune with a modern coil to a definite wavelength. If you can look up some old tuning condensers you will find that the vanes are of a different shape and various other slight differences will be apparent. Consequently, although the condenser will tune with these new coils, you may find that the crowding of wavelengths in certain parts of the dial will be such that the reception of stations at that point will be practically impossible.

This is, of course, only one component, but there are many little similar points which can be found in regard to all of the components, and thus we think you will agree that it is more straightforward to obtain those parts which we know will work together and which have been tried, and so avoid all doubts which might arise should

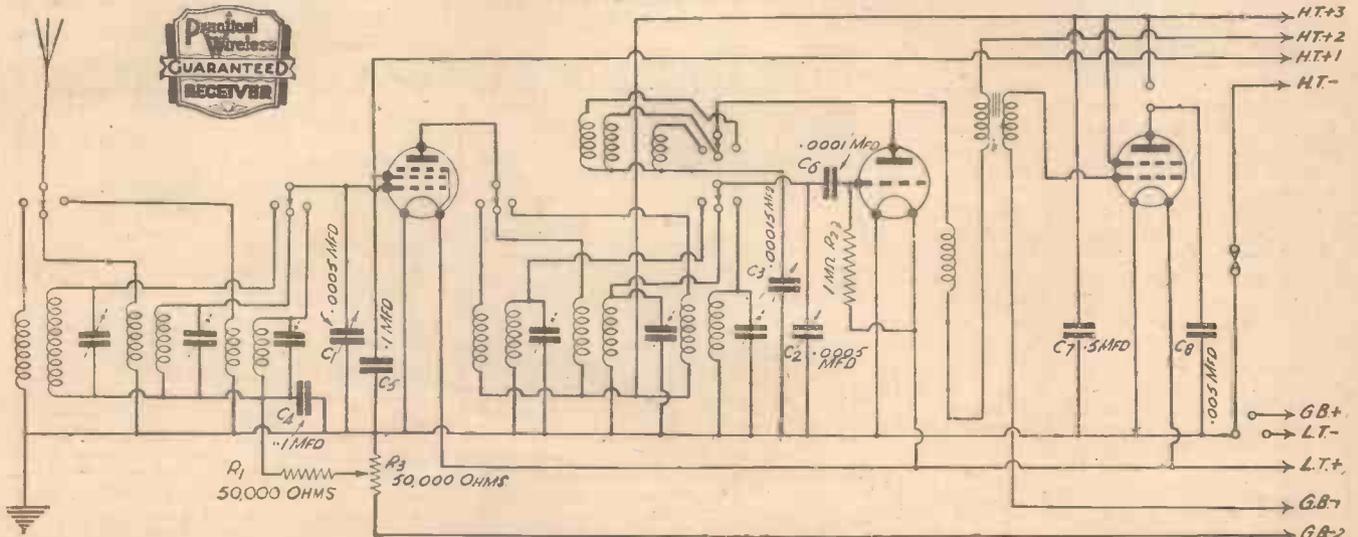
the receiver be built from mixed parts and fail to function satisfactorily.

Ease of Construction

Although we recently described a beginner's three-valve set, several beginners are anxious to adopt the Oracle as their standard receiver owing to the fact that the range will be greater because a high-frequency amplifying stage is provided. They wonder, however, whether it is more difficult to handle a receiver of this type and whether the single-tuning condenser type of receiver is a more appropriate model. Actually, of course, this is merely a matter of opinion. There is nothing really difficult about the construction of this receiver, except that the wiring is carried out both above and below the chassis. Naturally, this requires a little more care than when building a flat-baseboard set, but there is actually no more wiring to be done and there are no pitfalls in a receiver of this nature. Remember to drill holes in the chassis where the leads pass through sufficiently large to enable the lead to clear the sharp edge of the metal, and if you care to take the extra

LIST OF COMPONENTS

- Two all-wave coils, type Triogen, with ganging spindle (Wearite).
- One two-gang condenser, .0005 mfd. bar type (C1, C2) (Polar).
- One S.M. drive, V.P. horizontal (Polar).
- Five fixed condensers: .0001 mfd. (C6), .0005 mfd. (C8), two .1 mfd. (C4, C5), .5 mfd. (C7)—tubular (T.C.C.).
- One reaction condenser, .00015 mfd., Compax (C3) (Polar).
- Two resistances: 1 meg. (R2), 50,000 ohms (R1) (½ watt) (Erie).
- One volume control with switch, 50,000 ohms (R3), V.M. 60 (Bulgin).
- One all-wave H.F. choke, H.F.15 (Bulgin).
- One L.F. transformer 4/1, L.F.37 (Bulgin).
- Two component brackets (Peto-Scott).
- Three chassis valveholders: two 4-pin, one 5-pin (Clix).
- Seven wander plugs: H.T.1, H.T.2, H.T.3, H.T.—, G.B.+ , G.B.—1, G.B.—2 (Belling-Lee).
- Two spades: L.T.—, L.T.+ (Belling-Lee).
- Three valves: 210 V.P.T. (4-pin), 210 Det., 220 H.P.T. (Cossor).
- One chassis: Plymax, 12in. x 8in. x 2½in. (Peto-Scott).
- One speaker, Stentorian Junior (W.B.).
- One fuse-holder with 50mA fuse (Microfuse).
- Two socket strips, A.E. and L.S. (Clix).
- 120 v. H.T. battery (Exide).
- 9v. G.B. battery (Exide).
- 2v. L.T. accumulator (Exide).



Theoretical circuit of the Oracle All-World Three.

trouble, a short length of insulated sleeving slipped over the lead and wedged into the hole in the chassis will ensure that no difficulties will arise in future due to the wire short-circuiting to earth through the metal surface of the chassis. When mounting the valve-holders, turn the chassis upside down and carefully align the valve-holder so that the legs are centrally disposed in the hole in the chassis. Then mark the point for the fixing screws. Failure to take this precaution when mounting the holder may result in the under side of the valveholder sockets being brought into contact with the metal surface of the chassis, with a consequent short-circuit when the receiver is switch on. One method suggested by a reader at Olympia to avoid this risk, and which he said gave a neater appearance, was to mount the valve-holder underneath the chassis, but we have found that this means that a much larger hole must be

drilled to permit the valve base to pass down sufficiently low to allow the legs to make good contact.

Tuning

When the trimmers on the coils have been adjusted, remembering that there is a separate trimmer for each wave-band, the receiver will tune quite simply with the single control. Trimmer 1 is used to balance the two coils on the short waves, trimmer 2 for the medium waves, and trimmer 3 for the long waves. As the short waveband may prove new to you, remember that the slightest electrical friction may produce noisy reception. Thus, when mounting the gang condenser make certain that there is no dirt or dust between the vanes. Keep the condenser out of the way whilst you are drilling the holes in the chassis to make certain that no aluminium will find its way into the condenser. If you are at all

doubtful regarding the condition of the condenser, use a pipe-cleaner or a feather to wipe between the vanes, but do not use any oil or grease as this will only cause dust to adhere and give rise eventually to troubles. Make certain that all connections are really sound, and if soldering has not been adopted, tighten all terminal connections really thoroughly. The slightest movement between connections will result in scratching and grating noises on the short waves, which would probably be unheard on the ordinary broadcast wavelengths.

Turn the dial slowly and, when making your first tests on the short waveband, use a little reaction to keep the set in a sensitive condition. This may easily be heard as a form of "breathing" or a rushing sound, and as soon as a station is located the reaction should be slackened off to enable the speech or music to be clearly heard.

New Philco Set

In order to meet the demand of the public for a de luxe horizontal table radio set, Philco Radio have announced a new model known as A.638 Baby Grand. This addition brings the Philco line up to a total of 29 models, which is the most complete and comprehensive range on the market. The new model sells for 15 guineas, and deliveries will be made about the middle of September.

A distinctive cabinet of highly figured butt walnut houses the chassis. Fluted pilasters of solid walnut decorate each end of the set. The entire cabinet has a hand-rubbed finish which gives it a lasting and pleasing appearance. The cabinet is 22 1/2 ins. long, 13 1/2 ins. high and 11 ins. deep.

The A.638 is a six-valve all-wave superhet with unusually high efficiency. It is fitted with micrometer tuning as well as Philco's exclusive shadow tuning. This combination makes short-wave tuning especially simple and accurate. Micrometer tuning enables the listener to find the decimal reading of megacycles as easily as the full numbers.

The dial is illuminated in three colours, red, white and green. There is no glare from the concealed dial lights.

The speaker is an 8 in. electro-dynamic moving coil. Sockets are provided for extension speaker and gramophone pick-up. There is a connection for all-wave aerial. The set is designed for A.C. mains with a simple tapping device which enables it to be operated on anything from 200 to 250 volts.

The dial covers the short-wave range from 6 to 18 megacycles, the medium range from 550 to 1,600 kilocycles and the long wave from 160 to 300 kilocycles. Station names are printed on the dial and the wave-band indicator also shows the frequency of the band indicated.

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The owner-driver's journal which tells you how to repair, overhaul, and obtain the best performance from your car.

3d.—every Friday.

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The only English journal of its type. It deals with every branch of Science, Mechanics, Invention, Model-Making, Chemistry, Astronomy, Photography, Television.

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The leading weekly for every Cyclist, Clubman, Utility Cyclist, or Tourist. Join "The Cyclist" Road Club and also take advantage of the FREE Insurance offered.

MORE N.T.S. BARGAINS!

Brand new lines at amazing bargain prices. Opportunities galore to meet every requirement. N.T.S. Short Wave apparatus is designed by specialists and backed by a technical service second to none.

New 2-Valve Bandsread SHORT-WAVE Kit



12.94 metres. List Value 59/6 Bargain 32/6 Assembled in an evening, this wonderful receiver, of entirely new and unique design, will bring you a lifetime of fascinating short-wave entertainment. Delivery from stock.

- Reacting Detector and Transformer coupled circuit. Power Output.
- Slow-motion bandsread tuning.
- SIMPLIFIED WORLD RECEPTION 1 ● Low-loss reaction condensers.
- Air-spaced bandsread and tank condensers.
- SPECIAL ANTI-BLIND SPOT CONDENSER.
- 3 scales calibrated in degrees and tenths.

KIT "1" comprises every part, including 34-pin coils, wiring and assembly instructions, less valves only. Each or C.O.D. Carr. Paid. 32/6, or 2/6 down & 11 monthly payments of 3/-. Kit "2" With 12 British Valves, £22/3, or 4/- down and 11 monthly payments of 3/10.

GRAMOPHONE CONVERTERS



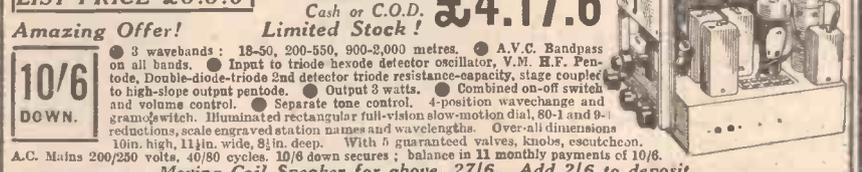
Instantly converts your radio into a handsome Radiogram. Beautiful Walnut cabinet with Garrard A.C.6 Unit and pick-up fitted and mounted on sliding platform, facilitating operation. Automatic stop and start and needle cups fitted. All metal parts finished Florentine bronze. Overall dimensions: 16 1/2 in. wide, 15 1/2 in. deep, 9 1/2 in. high.

A.C. Mains Model (as illustrated), 100/130 and 200/250 v., 50/60 cycles. £3:17:6 Or 5/- down and 11 monthly payments of 7/6.

D.C./A.C. Model.—Pick-up, Garrard Universal Motor, needle cups. For D.C. or A.C. Mains, 100/250 v., 25/60 cycles. Automatic stop and start. £4:17:6 Or 7/8 down and 11 monthly payments of 9/-.

Battery Model.—Similar in appearance to A.C. Model, with pick-up and Garrard double-spring motor. Automatic stop and start. Plays two sides of 12 in. record at one winding. Needle cups fitted. All metal parts finished Florentine bronze finish. £3:17:6 Or 5/- down and 11 monthly payments of 7/6.

5-Valve ALL-WAVE A.C. SUPERHET Chassis



LIST PRICE £8:8:0 BARGAIN Cash or C.O.D. £4:17:6 Limited Stock!

Amazing Offer!

10/6 DOWN.

- 3 wavebands: 18-50, 200-550, 900-2,000 metres.
- A.V.C. Bandpass on all bands.
- Input to triode hexode detector oscillator, V.M. H.F. Pentode, Double-diode-triode 2nd detector triode resistance-capacity, stage coupled to high-impedance output pentode.
- Output 3 watts.
- Combined on-off switch and gramophone with illuminated rectangular full-vision slow-motion dial, 80-1 and 9-1 reductions, scale engraved station names and wavelengths. Over-all dimensions 19 in. high, 11 1/2 in. wide, 8 1/2 in. deep. With 5 guaranteed valves, knobs, escutcheon.
- balance in 11 monthly payments of 10/8.

A.C. Mains 200/250 volts, 40/80 cycles. 10/6 down secures; 11 monthly payments of 10/8. Moving Coil Speaker for above, 27/6. Add 2/6 to deposit.

COMPONENTS & ACCESSORIES

SHORT WAVE COILS. Highly efficient and employing low loss formers. Wave-ranges quoted are when using a .00016 mfd. condenser. Suitable for all circuits. 4- and 6-pin types 9-14, 12-26, 22-47, 41-94, 76-170, metres, 1/9 each. Coil Bases, low loss, 4-pin, 1/-, 6-pin, 1/2. Formers only, 4- and 6-pin, 1/- each. Threaded 8 t.p.i., 3d. extra.

VARIABLE CONDENSERS. Short wave tuning and band-spreading, all brass single-end, suitable for ganging. .000025 mfd., 2/6; .000045, 2/8; .00016, 3/8; .0002 (double-end), 3/6. Polar 5 mfd. .0005, .0005, all brass, 2/6.

Ormond, .00035 Log, 1/9. All brass, 8/M. .0005, with knob and dial, 1/9.

Plessey Bar Type 8/M 3-gang .0005 mfd., each section 6/11. Telsen and other type reaction, all capacities, 8d. .00015 and .00075 4W, 9d. .0005 mfd. solid dielectric tuning with 8/M scale 0/100 knob, escutcheon and bracket, 2/6.

VOLUME CONTROLS or POTENTIOMETERS. Well known makes, all values up to 1 meg., 2/-, with switch, 2/6. Varley Power type 25-watts all values, 500-3000 ohms, 3/-.
VALVEHOLDERS. Chassis type paxolin, 4- and 5-pin, 2/4., 7-pin 3/4., Octal, 6d. Baseboard 4- and 5-pin type with terminals, 3/4.

SPEAKERS, ENERGISED. Brand new, astounding offer. Celestion, 8 in., 2,500 ohms., Pent. Trans., 4-watt., 12/6; P.M. SPEAKERS, Goodmans' Limited stock. For Power, Pent. or Class "B" (state which), 7/6. 8 in. for power, pentode, and terminals for low impedance matching Tor extension purposes, 13/6. Similar speaker for Class "B" and low impedance matching, 13/6.

HEADPHONES. New light-weight, super quality, ideal for short-wave work and testing, 3/6.

B.T.S. SHORT-WAVE ADAPTOR

LIST PRICE £2:12:6 BARGAIN



Brand New and Ready for Instant Use. Nothing to Assemble 39/6

America Direct on your Present Receiver! This amazing unit simply plugs into your battery or A.C. Mains set. No alterations necessary. 100-1 ratio aerial tuning; slow-motion reaction for use either as Plug-in or Superhet Adaptor. Walnut finished Cabinet (illustrated). With 2 plug-in coils, 12-26, 22-47 metres. Ready assembled. Yours for 2/6 down and 10 monthly payments of 4/-.

3 BOOKS FREE!

(1) Short-Wave Constructor's Book. (2) N.T.S. General Bargain Catalogue. (3) N.T.S. Short Wave Bargain Catalogue, describing in full, with actual photographs, 5 entirely new N.T.S. Bargain S.W. Kits, including the 2v. Bandsread Kit above. Each packed with information and wonderful opportunities. Send name and address with 2/6 (stamps) to cover postage for all 3.

A New 40-Page Booklet—Free



This booklet gives particulars of the many opportunities open to trained men engaged in the Radio industry. It also gives full information about the specialized instruction offered by the I.C.S. This instruction includes American broadcasting as well as British wireless practice, and provides ambitious men with a thoroughly sound training.

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P.M.G. Certifs. in Wireless Telegraphy.

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Efficient Servicing is of first importance to every wireless dealer and his assistants.

The Service and Sales Course enables the salesman to hold his own with the most technical of customers.

Television will soon be a tremendous branch of the industry. Our Course deals adequately with this subject.

I.C.S. Courses do not cost more than those of other reputable schools teaching by correspondence; indeed, in some cases they cost less. An important consideration lies in the fact that all I.C.S. instruction books and special textbooks are supplied without extra charge. The students of many postal concerns have to buy the books required, that often involving an additional expenditure of several pounds.

SEND FOR OUR "RADIO" BOOKLET

And, if you wish, ask for our free advice.

**INTERNATIONAL
CORRESPONDENCE
SCHOOLS LTD.**

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Kingsway, London, W.C.2.

"PILOT" S.W. EXPERIMENTER

THE experimenter is often faced with the difficulty of deciding upon a suitable short-wave circuit, and wonders whether a single detector stage will bring in all that he requires, or whether a three- or four-valve set would be desirable. The problem, too, of the H.F. stage is also often met in a rather haphazard manner, by using an add-on unit which is roughly put together in order to try it out. Messrs. Peto-Scott have now tackled the problem for the experimenter by producing a novel series of short-wave kit sets, all built round a single chassis and cabinet, designed on the "progressive" system. The chassis is ready drilled and the panel is provided with an escutcheon clearance hole and the control spindle holes. The chassis is provided with six large holes which will accommodate valve-holders or coil holders and a number of smaller holes are also drilled in this 20 gauge steel unit. At the rear a rubber grommet is provided for battery cords and paxolin aerial-earth and loudspeaker-phone sockets are provided. The metal cabinet to accommodate this chassis is made of similar material and is finished in an attractive black crackle, with ventilating louvres at each side and a lift-up lid. The panel forms the front of this cabinet and is finished in the same manner.

The smallest kit, Model 120, consists of a single valve adapter-converter, utilising a reacting detector with series aerial condenser for smooth reaction control. The coil is of the 4-pin plug-in type, and the

condenser is a .00016 mfd. short-wave model with a slow-motion reaction condenser and .000016 mfd. band-spreading condenser.

Other Units

The complete kit for this model, with all necessary condensers, leads, sockets, plugs, screws, etc., and a set of easy-to-follow instructions costs £2 1s. 7d. A special free gift is made with the kit, consisting of an envelope in which will be found 16 wiring diagrams, eight theoretical drawings, calibration chart and an up-to-date list of world-wide short-wave stations in wavelengths and kilocycles. Other units are obtainable for building a 1-valve receiver, 2-valve receiver, 3-valve receiver, with either 6-pin or 6 and 4-pin coils, and a 4-valve receiver with alternative coil combinations. The kit for the most comprehensive 4-valve model costs £3 12s. 11d. Finally, in order to cater for those who are anxious to be able to build any type of receiver and who may wish to change from one arrangement to another from time to time an "All-in" kit is available for £5 11s. 5d. This contains every item necessary for building all of the sets described in the book.

A complete 23-page book of all of the receivers, illustrated with pictures of the completed receivers, and of the various parts available under this scheme will be sent free to any reader who writes to Messrs. Peto-Scott, at 77, City Road, London, E.C.1.

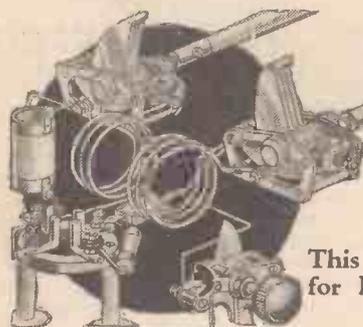
NEW B.T.S. COMPONENTS

SEVERAL new items are announced by the British Television Supplies company and were to be seen on their stand at Radiolympia. For the benefit of those who were unable to attend the exhibition the following details may be studied. Among the most important items were the complete chassis of all-wave receivers, available in 8-, 9- and 12-valve combinations. Each chassis has one stage of R.F. amplification, followed by the frequency changer, which is of the triode-hexode type. In some models a single intermediate-frequency stage is employed, and in others there are two I.F. stages, followed by the second detector. In order to make these chassis right up to date A.V.C. is included in the circuits and is applied to all valves preceding the second detector. The most elaborate of the chassis, the 12-valve model, incorporates quiet A.V.C. together with an electron-ray tuning indicator. The output stage of each amplifier is fed from a resistance-capacity unit delivering 7 watts. In the case of the 12-valve chassis a further refinement in the shape of a variable-selectivity control is also fitted, whilst all models are provided with a tone control adjustment. For those who desire to obtain complete equipment these chassis may be obtained in cabinets finished in various woods and in various patterns.

In addition to these complete receiver chassis Messrs. B.T.S. can also now supply some interesting amplifier chassis, one delivering 6 watts and the other 14 watts, each making use of a push-pull output stage. The Little Princess Portable, at £8 8s., is also to be prominently featured during the coming season.



The compactness and attractive appearance of the new B.T.S. "Little Princess" Portable are evident from this illustration.



Short Wave Section

INCREASING THE RANGE

This Week Our Contributors Give Some Ideas for Easy-to-Tune H.F.-Det.-L.F. and Superhet Circuits.

WE seem almost to have taken possession of this Section, but it so happens that we have been spending the bulk of our time during recent months in carrying out short-wave experiments of different kinds. Additionally, the large amount of correspondence which our reader-friends have been kind enough to provide makes it quite evident that short waves are more popular than ever they were. And since no complaints have

out of it; reaction adjustments are critical; accurate setting of the tuning

by The Experimenters

condenser—often at the same time as the reaction control is operated—is essential,

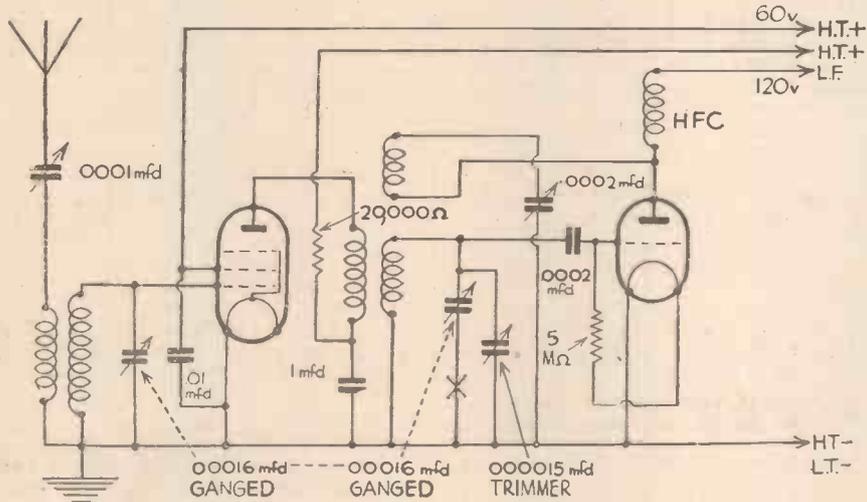


Fig. 1.—The H.F.-Det. circuit described.

been received concerning our use of these pages, the Editor has raised no objection to our continued articles on short-wave subjects. (By the way, that probably gives a hint to anyone who is tired of our jottings.)

Among the subjects that our correspondents have raised recently, the most popular appears to be that of increasing the range of a short-wave receiver. Frankly, we are not in favour of using a large number of valves for this purpose, although many have views which differ from ours. We have always maintained that for 'phone reception there is nothing to beat a good Det.-L.F. set, carefully "tuned-up" and expertly used. Recent tests with different arrangements have not led us to alter our ideas, but we do appreciate that there are many comparative beginners who do not claim to be expert in handling S.W. receivers, and also who prefer to employ a loudspeaker.

With the object of passing on some useful information to such readers we have been making a number of tests with simple superhet circuits, as well as with multi-valve "straight" circuits. As most of you are well aware, a plain detector with reaction calls for a good deal of skilful manipulation if you are to get the best

and a sound aerial-earth system is very desirable.

Gang-Tank and Trimmer

If you add an H.F. stage all difficulties in these respects are halved, if not removed altogether. That is the chief advantage of a pre-detector stage, for we still consider that the degree of amplification provided in normal circumstances is quite small. However, if you would like to try a set having a tuned H.F. stage, a circuit we can recommend is shown in Fig. 1; the L.F. side is not shown, because it can be perfectly standard.

You will see that a double-gang .00016-mfd. condenser is used as the main tuning device, but a

.000015-mfd. condenser is connected across the second section for fine tuning. In other words, the gang condenser is used as a tank or band-spreader, and the small one is for making final adjustments. Our reason for using this idea is that tuning is then carried out exactly as it is when using band-spread tuning with a Det.-L.F. receiver. That is, you select the waveband required by means of the gang condenser, and then find the individual stations with the .000015-mfd. component.

Theoretically, there are two main objections to this idea. The first is that the aerial circuit is not finely tuned, and the second is that the total condenser capacity across the second coil is greater than that across the first. In practice, the first of these objections seems to fade away. The second can be practically overcome by connecting a .001-mfd. fixed condenser in series with the second condenser section at the point marked X in Fig. 1.

The effect of the series condenser is to reduce the effective maximum capacity of the .00016-mfd. section, the reduction again being made good by the trimmer. Even this "refinement" is by no means essential, and often makes little or no difference to the results obtained.

It will be seen from the circuit that the coil used between the first and second valves is of the six-pin type, and is used as an H.F. transformer. The aerial coil can be of the same pattern, not using the reaction winding, or it can be a corresponding four-pin coil. Obviously, both coils must be designed to cover exactly the same waveband, and should, therefore, be of the same make.

A Good Compromise

We are not giving this as an "ideal" arrangement, but as one which is an excellent compromise. If ganged tuning were not resorted to, the set would be still more difficult to operate than one without the H.F. stage, and consequently an inexperienced person would not gain anything by its use. Those who wish to go a stage further can add a trimmer to the first condenser section, and try the effect of using this, after turning the other to its optimum position.

Our own experiments have shown, though, that the aerial circuit rarely need be tuned critically if reaction is not applied to it. In any case, we invite you to try out our suggestion and let us know how successful you are with it. The gang condenser

(Continued on next page)

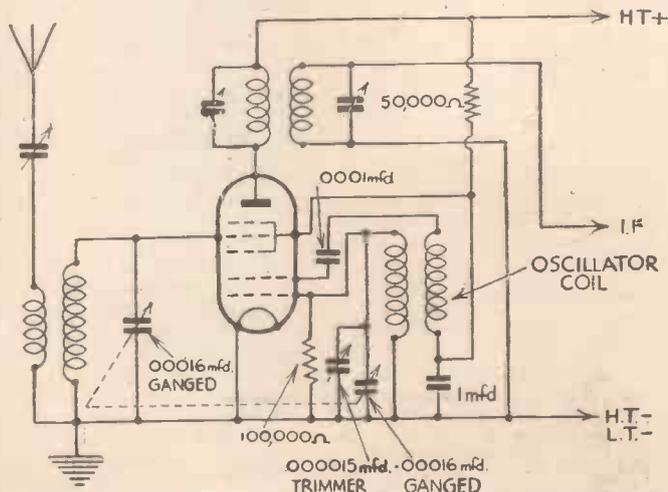


Fig. 2.—Skeleton circuit of an "easy-to-tune" superhet frequency changer for S.W. reception.

SHORT-WAVE SECTION

(Continued from previous page.)

should be fitted with a low-reduction slow-motion control, and the trimmer should have a really good high-reduction drive. In tuning, the tank (gang) condenser should be moved in steps of a few degrees, searching then being carried out on the trimmer, which should normally be set to about its midway position.

Should it be suspected that the aerial circuit is tuning more sharply than is usually the case, it might be worth while to damp it slightly by connecting a fixed resistance of about 50,000 ohms across the aerial-coil grid winding. That will flatten tuning to a certain extent without causing any great loss of efficiency. Even if the receiver does not prove to be very much more sensitive than before H.F. was added, it will certainly be easier to operate.

A Superhet

A similar tuning system can be employed in a superhet, by employing a circuit similar to that in Fig. 2. In this case a matched pair of S.W. superhet coils is used, but only the oscillator coil is sharply tuned. Again, this does not result in any pronounced loss of efficiency, and reception is better than when the aerial circuit is completely aperiodic—as it is when the aerial coil is simply replaced by a fixed resistance.

We show only the skeleton arrangement of the superhet, because most of our readers will be familiar with the details. It is recommended that 465-kc/s I.F. transformers be used, and a pentagrid frequency-changer is adequate down to about 16 metres. When going down to lower wavelengths it is sometimes desirable to connect a triode in parallel with the oscillator section of the pentagrid to ensure easy oscillation right down the scale.

"Simplest Two-Valver"

We received a letter the other day from a reader who has been using the "Simplest S.W. Two-Valver" for some time with

complete satisfaction. He has been able to log a large number of stations on the Continent, but has not been so fortunate where American stations are concerned. Therefore, he says, "would it not be worth while to add an H.F. stage; and if so, how?" We consider it likely that this reader has a rather poor aerial system, or

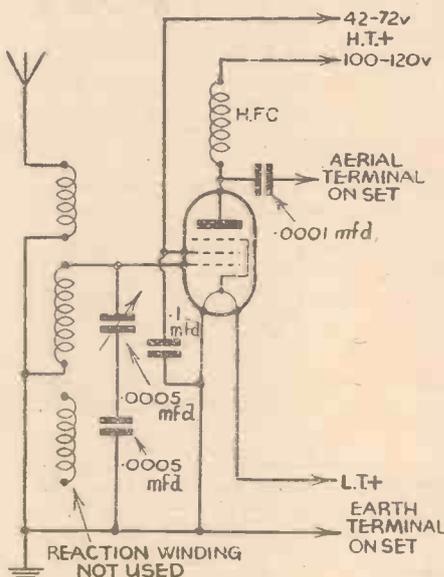


Fig. 3.—An H.F. stage suitable for use with the "Simplest Short-wave Two."

that he is in a bad reception locality, since scores of other readers who have built this little set have reported reception of all Continents.

Anyhow, we can see no reason why an H.F. amplifier should not be added very easily, and without making extensive alterations. Our suggestion was that he should fit an H.F. pentode and "repeat" the tuning circuit, only omitting the

reaction winding from the aerial coil. The circuit that we gave him is shown in Fig. 3, from which you can see that it is simple enough. In our reply we advised him to mount the new aerial coil with the axis horizontal, so that it would be at right-angles to the coil in the original set. By so doing there should be little trouble due to unwanted oscillation, as long as the two coils are not close together, and screening should not be necessary.

We are awaiting a reply telling us of the results obtained, but we think that they will justify the addition.

That Portable

Before our allotted space is exhausted we want to make further reference to the question we raised last week in respect of the portable short-waver with which we are experimenting. Already we have had a few replies, and we have made a careful note of the suggestions offered. But we want some more, so don't forget to give us your views. The first experimental set we have made consists of two units—one for the set itself, and the other containing the batteries and 'phones, as well as a short throw-out aerial. By using two valves in conjunction with an all-wave tuner, the results have been gratifying, and we have been able to keep the dimensions of the set down to approximately 7in. by 5in. by 5in.

One trouble is, however, that short-wave tuning is not as "nice" as we should like when using a .0005 mfd. variable condenser in conjunction with a trimmer. We are therefore wondering whether or not it will eventually prove better to use short-wave-only coils or to use a .00016 mfd. tuning condenser for all wave-bands, making provision for switching two other fixed condensers of similar capacity into circuit for medium- and long-wave tuning. At the same time we are anxious to avoid any complications, so perhaps one of you can suggest a solution to the present problem. More letters, please! Over to you O.M.s, 73's.

Leaves from a Short-wave Log

Siam on the Air

BETWEEN G.M.T. 14.30-19.30, on Mondays, tune in to 15.77 m. (19.02 mc/s) to hear a broadcast by H88PJ, Bangkok. You should pick up the announcer's call: *This is the Experimental Station H88PJ, in Bangkok, Siam*, to which he adds the wavelength and frequency. A news bulletin in English is transmitted from G.M.T. 14.15-14.25. The interval signal consists of three chimes on an ascending scale (soh-doh-me doh-me soh-me). Programmes are of a distinctly oriental type comprising Siamese orchestral music, and vocal soli of a somewhat similar nature to those heard from Japan.

Listen to Manila

KZRM, Manila, a 6 kW. station in the Philippine Isles, styling itself Radio Manila, with English and Spanish announcements, is now broadcasting daily from G.M.T. 13.00. The wavelength is 31.35 m. (9.57 mc/s). Relays are carried out regularly of the programme transmitted by the local 50 kW. medium-wave station. The main radio entertainments are transmitted at G.M.T. 22.00-02.00 and 04.15-06.15.

La Voz de Nicaragua

YNLF, Managua, is possibly the most important of the Nicaraguan broadcasting stations inasmuch as it is the one most frequently mentioned by U.S.A. listeners. Working on 31.26 m. (9.595 mc/s) its daily schedule is: G.M.T. 12.45-13.45; 17.15-19.15; 23.15-02.45 to 03.00. Interval signal: chimes. The studio closes down with a military march strong in bugles and drums. Address: Señor Moises Le Franc, Calle de Setiembre, 206, Managua, Nicaragua. Approximate distance from London is 5,430 miles.

Two Nearby Colombians

Some difficulty is sometimes experienced in disentangling HJ1ABJ, Santa Marta, from HJ3ABH, Bogota, inasmuch as the two stations operate on nearby channels, and have adopted the same interval signal, namely three chimes. The Santa Marta studio works on 49.86 m. (6.018 mc/s), the Bogota transmitter on 49.9 m. (6.012 mc/s). In view of the similarity of interval signal, it is only by their respective calls that they may be clearly identified. HJ1ABJ will be heard: as *Aqui Radioemisora HJ1ABJ en Santa Marta*, followed by the aforesaid three chimes which precede every announcement. HJ3ABH, on the other

hand, calls: *La Voz de la Victor*, and closes down with the playing of Schumann's *Träumerei*. Their respective programmes are broadcast at (1) G.M.T. 23.00-03.00, and (2) G.M.T. 16.30-19.00 and 23.00-04.00.

El Prado, Ecuador

Although seldom logged for several months the Prado station (HC1FG) at Riobamba, Chimborazo, Ecuador, was recently picked up in the early hours of the morning. The station continues to transmit on 45.33 m. (6.618 mc/s), with a power of 2 kW. every Wednesday and Friday from G.M.T. 02.00-04.55. Announcements made by Señorita Judy are given out in both Spanish and English at regular intervals. (You are listening to Radio Station Prado.) Under the call-letters HC1FG, the owner also transmits in the 40-metre amateur band. Address: P.O. Box 30, Riobamba, Ecuador.

New International Prefix

The letters XZ have now been allocated officially to transmitters in Burma (British India).

New High-power U.S.A. Short-wavers

It is reported that the Schenectady (N.Y.) stations W2XAD and W2XAF, have been authorised to increase their power to 100 kilowatts. From the same New York source comes the news that the Mormon Church at Salt Lake City has been granted a permit to instal a 50-kilowatt transmitter to work on 13.98 m. (21.46 mc/s) and 19.68 m. (15.243 mc/s).

LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication.)

Station W6XKG

SIR,—While recently reading the June 5th issue of your paper, I noticed a slight error in the Leaves from a Short-Wave Log page. The notes stated that W6XKG was the short-wave outlet for KCFG. That should be KGFJ. Also your readers may be interested to know that W6XKG is on the air twenty-four hours of the day. This station is on 11.56 metres or 25.95 mc/s.. At the present time a new transmitter is being put into operation under the call W6XRE. It transmits on the assigned frequency of 120,000.

If any English listener wishes to send a report to the station the address of KGFJ is 1,417, South Figueroa, Los Angeles, California. I am not affiliated with the station, and I cannot assure the verification of reports. I feel fairly sure, however, that they will verify the report in some manner.

W6XKG has been heard in England by a friend of mine, Mr. Peter Atkinson, Birkenhead, Cheshire. His report on a two-valve set was QSA3 (R4-6).

I hope this information will be of some use to interested readers.

I enjoy every copy of PRACTICAL AND AMATEUR WIRELESS.—KYHL S. SMEBY (Los Angeles, California, U.S.A.).

An Interesting Log from Swindon

SIR,—I logged the following stations between July 3rd and August 1st inclusively, on the 20- and 40-metre amateur bands, and hope the log may be of interest to you. None of these stations had been heard previously.

CTIGU, CTIPX, HB9AA, PA0LR, SM5SV, SV1CA; EA8AE, CN8MB, VE1CA, 2BG, 2JK, and 2NI; also twelve G stations.

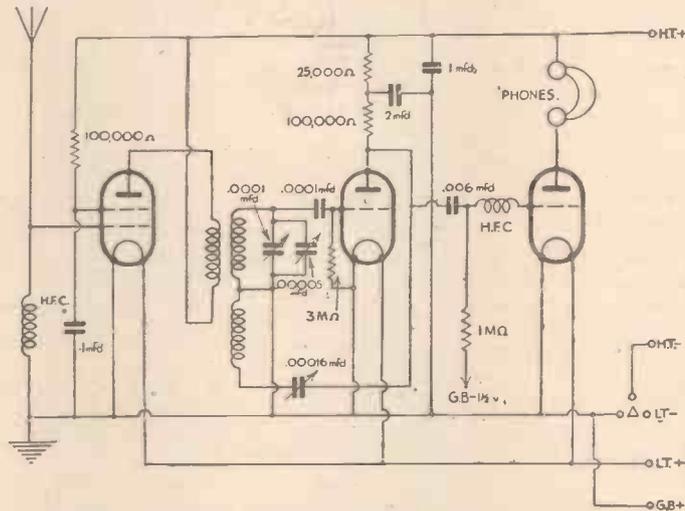
U.S.A.: W1DAY, 1DFE, IHKK, IIXO, 1JUG, 1JCX, 1KKP, 1TW; W2AZ, 2BKK, 2DX, 2ENO, 2EUI, 2GSC, 2HID, 2IWT, 2JRR; W3AIB, 3FKD, 3HN; W4COD, 4EJ, 4KR, 4KU, 4TJ, 4UK; W5AEB, 5BJO, 5BVH, 5EEN, 5EEY, 5EIL, 5FBI, 5FNA, 5FPO, 5YJ, 5ZS; W6AL, 6CC, 6AMG, 6GCT, 6JKR, 6LFD, W7DNP (Oregon), 7FQK; W8BYF, 8DLB, 8FHU, 8GGG, 8GSC, 8HXQ, 8JNU; 8LUQ, 8MOL, 8MPX, W8NKY, 8OMJ, 8QZX; W9ARK, 9DM, 9FQP, 9HKU, 9NLP, 9RNV, W9WEE, and 9WOU; LU1QA, LU7AW; PY1BC, PY1DK, PY1MK, PY2DV, PY2EW, PY2PN, PY2FF, PY3BR, PY5AF; CEILR; HC1JW; XE1Y; VK2OJ, VK3AL; and K6NZQ (heard on July 25th, 29th, 30th). Also XEWW on 31.58 metres. Receiver 0-v-1 (or 0-v-1-pen and moving-coil loud-speaker). Aerial 50ft. in roof. The W7's are, I think, alone sufficient testimony to the good DX conditions.—N. J. RUTTER (Swindon).

Five Thousand S.W. Stations!

I REFER to your invitation to send to you circuit diagrams of favourite receivers. Here is mine. I do not claim

any originality for the circuit for it is a modified version of one supplied by the Eddystone people.

At first I used the set solely for telephony listening on 10, 20, 40, 80 and 160 ham bands, and used a single valve as described in PRACTICAL AND AMATEUR WIRELESS a



Circuit diagram of an untuned H.F. receiver, referred to in Mr. V. H. Thomas's letter.

long time ago for C.W., as I could not at first get a good listening note. Then I hit on the idea of using 'phones, 4,000 ohm resistance, that gave me a better C.W. note and also gave speech a more pleasant sound than the small M.C. speaker hitherto used. Now I just lay the 'phones on the table and tune in to anywhere in the world and the set brings anything that is going.

I should like to say that I have logged more than 2,000 stations from U.S.A., including 107 on the 7 Mc. band on C.W. Altogether, I have logged more than 5,000 stations outside the British Isles since coming to Aldershot from Northern Ireland last Christmas. The most difficult stations to receive, I find, are K7's and VE5's, but I only listen from 22.00 hrs. to 23.00 hrs. each day.

However, carry on with the good work. I have learned all I know from PRACTICAL AND AMATEUR WIRELESS, and I hope to have a VU station working from Jabalpur in the near future as I understand I sail to India on October 6th.—V. H. THOMAS, Cpl., Opr. 2CUR (Aldershot).

[The Experimenters] thought that other readers would be interested in Cpl. Thomas's circuit, and asked that it be published. They send their congratulations on the excellent reception obtained.—Ed.]

Valve-testing Panel

SIR,—As a regular reader of PRACTICAL AND AMATEUR WIRELESS, I, like several other readers, would like to see published details of how to make a valve-testing panel suitable for English and American valves (battery and mains type) to work off A.C. mains, and also a battery model suitable for places where electric current is not available.—R. HAMILTON (Carlisle).

[In response to a number of requests from readers we hope to publish an article on the construction of a valve-testing panel in the near future.—Ed.]

Progressive Superhet Construction

SIR,—I feel it would be instructive and helpful to a great number of readers were you to publish a series of articles on the construction of a superheterodyne receiver. The first article could start with the construction of the simplest form of superhet, using headphones, and subsequent articles could enable this simple set to be expanded, at the same time explaining faults which crop up in superhet design, and how they can be overcome.

The final set could be a 5 or 6-valve all-wave superheterodyne embodying A.V.C., visual tuning and any other refinements considered necessary.

Should the final set be too ambitious for the pockets of some readers, they should, if the series of articles was planned accordingly, be able to stop after any particular stage and still have a set which would work satisfactorily.—M. H. WALTERS (Peshawar, India).

CUT THIS OUT EACH WEEK

Do you know

- THAT when using a tuning condenser for the ultra-short waves frictional contacts should be avoided.
- THAT if a pigtail connection is employed in the above case it should be of such a type that it is short-circuited to avoid inductive effects.
- THAT an ordinary output meter may be calibrated to provide "R" strengths for direct reading.
- THAT an ordinary milliammeter may be used in the detector stage to gauge comparative signal strengths.
- THAT the efficiency of an aerial system may be measured by means of one of the above devices.
- THAT the field-strength of a station may be measured by means of a single-valve detector arranged to form a Field Strength Meter.

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 Nernes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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for switching anything by hand or auto.

Light duty switches for wave change. Semi-rotary, 6d. Yarley and Rex Wavechange D.P. 3-way roll contact, 1/3. Bulgin 3-point wave change, 9d. Tune well 8.P. on-off, 8d.

NO LOSS ultra s/w switches with D.P.C.O. contacts on rib pedestals, 7/6.

Aerial-Path D.P.C.O. on ebonite, 3/6.

STUD SWITCHES. Box panel by 1/1.

for meter ranges, etc., 7/6. Larger type G.P., 4 sets of 10-way studs, 2 arms and rings on panel, 5/6.

R.A.F. Switch, 3-way boxes, rocker type, 1/3. 8-way rocker toggle, 2/-. 8-way ditto, 3/6.

7 STUD Panel Switch, 2 1/2 in. sq. 3 amps.

4 plug sockets, 1/9. 10-way D.P. ebonite mount, 8 amps, 5/6. 12-way 3.P. 5 amps, 4/-. 20 STUD Panel Switches, contact arm and rings for 10 amps, 6/6.

Ditto, on iron box, fitted 300 ohm. 1 amp. 20 tap resist. 10/8.

BIG PANEL SWITCHES for 50 amp. C.O. power type, 25/-.

10 amp. D.C. Ironclad O.E.C. linked, 3/-. Large selection of switchgear for all purposes, starters and regulators.

REMOTE SWITCHING. Magnets for making contacts, 2/6.

A.C. ELECTRO-MAGNETS for 230 volts 30 m/a, holds 14 ozs., 2/6.

SOLENOIDS for remote work or relay, 4 and 6 volts, 1/2. stroke and 1 oz. pull, silk covered coil, metal frame, 3/6. Transmitters, magnetic key, 10-amp. contacts, 6 v. coil, 15/-. Magnet operated Selector, 6 gangs of 25 contacts, each 8/6. Magnetic trip or overload switches, 1 to 10 amps, any voltage, 7/6. Auto-Cut-out and Cut-in battery switches, 15/-. Max. and min. circuit breakers, battery auto., pump float switches, extra high voltage switches, all in stock. Specify your wants.

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POCKET HEADPHONES, W.D. all leather headband, strap and cords, 2/6 pair. Wireless type with aluminium headbands, 2/9. 4,000 ohms, 4 1/2 House, Office and Field Telephones, wall and table.

DESK PHONES, 15/-.

CONSTRUCTORS. Hand geared drills to 1/2 in., 1/3. Ceramic 8/W lead-in, brass stem, 8d. 3in. stand-off 8/W insulators, 6d. Portable valve sets like assembled, in suitcase, partly wired, 1/2. Metal Rectifiers, chassis type, 180 v. 30 m/a output, 5/-. Lightning Arrestors, make aeriels safe in summer storms, 1/- ea. H.M.V. Mains Transformers, 100/250 v. to 700 C.T. 60 m/a, 4 v. 1 a., 4 v. 2 a., 10/6. 30 Hy. Chokes, 50 m/a, 4/-. 1 amp. Chokes, 10/-. Projection Lanterns, on Stand, with 250-watt focus bulb, 25/-. Arc lamp, slide lanterns, film projectors, and sound heads.

2-VALVE METAL B. CHASSIS. Drilled and fitted 2 valve holders, transformer, coil, etc., 2/8 each.

SLOPE FRONT TEAK CABINETS. New, make fine instrument panel, 10 x 7 x 11, 3/- each.

OAK CABINETS for Short-Wave Battery Receivers, 2 or 3 valve, polished Jacobean finish, 13 1/2 in. x 7 in. x 6 in. deep, oval front, crackle black aluminium panel fitted geared .0005 mfd. condenser, with sunk dial, 3-way coil switch and a single plate condenser. Sliding back and 10 terminal Strip, new, manufacturer's liquidation stock, 15/-.

PANELS. Aluminium, 16 and 18 gauge, one side enamel, 12 in. x 12 in., 3/-. 18 in. x 18 in., 5/6. 4 in. Ebonite, 24 in. x 24 in., 5/6.

EXPERIMENTERS 150 WATT TRANSFORMERS. 150 watts. For any input or output 40 v. to 300 v. 19 taps, fitted 2 panels with 11 stud switch, 45/-.

SOUND RECORDING AT HOME at a reasonable cost. No fancy prices for elaborate gear. The Feigh records on any discs. The FEIGH RECORDER fits any Gramo, has positive drive by worm gear and rack. The Recording Stylus is tracked across blank at the exact grooving spiral. Price complete, as illus. with Tone Arm and cutter with real diamond, 37/6. All-Metal discs, 4/- doz.

UNIVERSAL Gramo. Recording Motors with 12 in. turntable, 200/250 volts, 23/10/-.

A.C. Gramo-motors and turntable, 25/- and 50/-.

GARRARD RECORD CHANGER AND GRAMO-MOTOR, A.C., 45/7/6.

VALVE BARGAINS. Mains Universal 7-pin Freq. Changers, 4/6. A.C. ditto, 4/6. Universal H.P. 7-pin Pentode, 4/6. Power Valves: Ediswan VT13B 30-watt, Fil. 6 v., 1,500 v., Mag. 33, under half price, 10/6. T50 45 valves, 7 v. Fil., 3,500 v., P., Mag. 30, 22/6. AT40, 10 watt, 0 v., Fil., 4/-.

H.T. Rectifiers up to 10,000 v. NU2, 5 v. Fil., 230 watts, 35/-. 100 watt T2A, 40/-. Half-wave W.D. Rectifier, 200/1,000 v., 50 m/a., 2/6.

COILS, 8/W Coils, plug-in, 1/8 ea. L.W. 2-pin, 1/-.

Reaction, various, 9d. Philips Superhet, set of three in carton, 3/-. Cossor 3- and 4-pin Coils, 1/-.

Interference cutting 8 1/2" Twin Chokes, 2/-.

Spark Transmitter shortwave set for model boat remote control, 17/-.

CONDENSERS. Variable lowloss F type, .0005, 1/9. J.B., .0003, 2/-. Reaction varia., 1/3. Fye .0003 with 8.M. dial, 5/-. 2-gang varia., all aluminium, 3/- only. Fixed condensers 2 mid. 250 v., 10d., or 6 for 4/-, 4,000 v. 1 mid., 6/-, etc.

CRYSTAL SETS. Are great fun. No battery or valves wanted. Quiet and efficient reception. 500 shop-sold sets cheap. Enclosed type, 5/6 and 7/6 each. Battery Portables, 30/-. 1,000 other Bargains in our Illustrated List "N" Free.

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Telephone: Central 4611

speaker, aerial, and all parts, ins. valves, 21/-. Metal Rectifiers, chassis type, 180 v. 30 m/a output, 5/-. Lightning Arrestors, make aeriels safe in summer storms, 1/- ea. H.M.V. Mains Transformers, 100/250 v. to 700 C.T. 60 m/a, 4 v. 1 a., 4 v. 2 a., 10/6. 30 Hy. Chokes, 50 m/a, 4/-. 1 amp. Chokes, 10/-. Projection Lanterns, on Stand, with 250-watt focus bulb, 25/-. Arc lamp, slide lanterns, film projectors, and sound heads.

2-VALVE METAL B. CHASSIS. Drilled and fitted 2 valve holders, transformer, coil, etc., 2/8 each.

SLOPE FRONT TEAK CABINETS. New, make fine instrument panel, 10 x 7 x 11, 3/- each.

OAK CABINETS for Short-Wave Battery Receivers, 2 or 3 valve, polished Jacobean finish, 13 1/2 in. x 7 in. x 6 in. deep, oval front, crackle black aluminium panel fitted geared .0005 mfd. condenser, with sunk dial, 3-way coil switch and a single plate condenser. Sliding back and 10 terminal Strip, new, manufacturer's liquidation stock, 15/-.

PANELS. Aluminium, 16 and 18 gauge, one side enamel, 12 in. x 12 in., 3/-. 18 in. x 18 in., 5/6. 4 in. Ebonite, 24 in. x 24 in., 5/6.

EXPERIMENTERS 150 WATT TRANSFORMERS. 150 watts. For any input or output 40 v. to 300 v. 19 taps, fitted 2 panels with 11 stud switch, 45/-.

SOUND RECORDING AT HOME at a reasonable cost. No fancy prices for elaborate gear. The Feigh records on any discs. The FEIGH RECORDER fits any Gramo, has positive drive by worm gear and rack. The Recording Stylus is tracked across blank at the exact grooving spiral. Price complete, as illus. with Tone Arm and cutter with real diamond, 37/6. All-Metal discs, 4/- doz.

UNIVERSAL Gramo. Recording Motors with 12 in. turntable, 200/250 volts, 23/10/-.

A.C. Gramo-motors and turntable, 25/- and 50/-.

GARRARD RECORD CHANGER AND GRAMO-MOTOR, A.C., 45/7/6.

VALVE BARGAINS. Mains Universal 7-pin Freq. Changers, 4/6. A.C. ditto, 4/6. Universal H.P. 7-pin Pentode, 4/6. Power Valves: Ediswan VT13B 30-watt, Fil. 6 v., 1,500 v., Mag. 33, under half price, 10/6. T50 45 valves, 7 v. Fil., 3,500 v., P., Mag. 30, 22/6. AT40, 10 watt, 0 v., Fil., 4/-.

H.T. Rectifiers up to 10,000 v. NU2, 5 v. Fil., 230 watts, 35/-. 100 watt T2A, 40/-. Half-wave W.D. Rectifier, 200/1,000 v., 50 m/a., 2/6.

COILS, 8/W Coils, plug-in, 1/8 ea. L.W. 2-pin, 1/-.

Reaction, various, 9d. Philips Superhet, set of three in carton, 3/-. Cossor 3- and 4-pin Coils, 1/-.

Interference cutting 8 1/2" Twin Chokes, 2/-.

Spark Transmitter shortwave set for model boat remote control, 17/-.

CONDENSERS. Variable lowloss F type, .0005, 1/9. J.B., .0003, 2/-. Reaction varia., 1/3. Fye .0003 with 8.M. dial, 5/-. 2-gang varia., all aluminium, 3/- only. Fixed condensers 2 mid. 250 v., 10d., or 6 for 4/-, 4,000 v. 1 mid., 6/-, etc.

CRYSTAL SETS. Are great fun. No battery or valves wanted. Quiet and efficient reception. 500 shop-sold sets cheap. Enclosed type, 5/6 and 7/6 each. Battery Portables, 30/-. 1,000 other Bargains in our Illustrated List "N" Free.

ELECTRADIX RADIOS

218, Upper Thames Street, London, E.C.4

Telephone: Central 4611

speaker, aerial, and all parts, ins. valves, 21/-. Metal Rectifiers, chassis type, 180 v. 30 m/a output, 5/-. Lightning Arrestors, make aeriels safe in summer storms, 1/- ea. H.M.V. Mains Transformers, 100/250 v. to 700 C.T. 60 m/a, 4 v. 1 a., 4 v. 2 a., 10/6. 30 Hy. Chokes, 50 m/a, 4/-. 1 amp. Chokes, 10/-. Projection Lanterns, on Stand, with 250-watt focus bulb, 25/-. Arc lamp, slide lanterns, film projectors, and sound heads.

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H.T. Rectifiers up to 10,000 v. NU2, 5 v. Fil., 230 watts, 35/-. 100 watt T2A, 40/-. Half-wave W.D. Rectifier, 200/1,000 v., 50 m/a., 2/6.

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HAVE YOU HEARD . . . ?

A Few Details of Ultra-short-wave Stations, Their Schedules and Wavelengths

ULTRA-SHORT-WAVE reception is becoming more and more popular, and if you have not already enjoyed the thrills these wavelengths offer, it is time you thought about constructing a receiver, or adapter, to operate below 10 metres.

Five-metre Stations

We will commence at the bottom of the wavelength ladder where we find America's lowest-waved station, WIXEG at Storrs, Connecticut. Operating upon the incredibly short wavelength of .75 metres it is very unlikely to be heard in this country.

Next we come to 2.5 metres. This band is becoming more popular and, in our opinion, it is only a matter of time ere American stations are heard in England upon this band as regularly as upon 5 metres. Two particularly active amateurs, W2CPA, Westfield, and W2BYW, Tenafly, New Jersey, have conducted excellent two-way telephony between the two towns, whilst some real DX work has been carried out.

On 5 metres we find many British and foreign amateur stations.

G2MV, G2AW, G2RD, G2TI, G2NK, G2VT, G5RD, G5BL, G5WW, G5BY, G5IB, G5OX, G5HF, G6NF, G6QB, G6UB, G8FD and G6OW all operate on 5 metres (using 'phone) and if you are in a high locality you are likely to pick up something of interest.

News from America is to the effect that W2IXV, a New York amateur, intends to operate regularly upon 5 metres during the coming winter. He is optimistic of being heard on this side of the "pond", so keep an eye, or rather an ear, open for him.

Television Stations

The Alexandra Palace television stations offer fine scope for the DX enthusiast. Excellent reception of the sound and vision transmissions have been experienced in South Wales, Swindon, Brighton and Newcastle, whilst, incredible though it seems, American and South African listeners have heard the transmissions.

Going up the scale we come upon W8XKA, Westinghouse relay station of KDKA, which operates irregularly upon 4.96, 5.41 and 9.494 metres, being frequently heard upon the latter wavelength.

A television sound station, W6XAO, at Los Angeles, has been reported as received in this country—though it is not clear how it is identified. It operates upon 6.667 metres.

W2XDV, Wayne, is the Columbia Broadcasting System's ultra-short-wave outlet. Operating upon 7.32, 7.78 and 8.45 metres, it is occasionally heard upon the latter wavelength.

Broadcast Stations

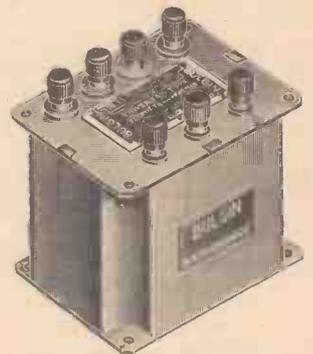
And now we are amidst the 10-metre (so called) broadcast-band stations.

Firstly, we have W1XKA at Chicapee Falls, Mass. This station may occasionally be heard relaying medium-wave broadcasts. Its power is 500 watts. Nearly every 10-metre listener has heard W9XAZ at Milwaukee. Operating upon 26.4 mc/s it transmits (according to a late report from them) from 6 p.m. to 5 a.m. with a power of 500 watts. It generally relays medium-wave station WTMJ.

BRITISH LONG DISTANCE LISTENERS' CLUB

Speaker Matching

MANY listeners still appear to experience difficulty in obtaining satisfactory results from a receiver and speaker, simply on account of the fact that the speaker is not correctly matched to the output valve. Although this appears to be a simple matter, we have found that many listeners connect the speaker to the output terminals of the receiver without considering in any way whether the impedance is correct. In many cases the matching is sufficiently accurate for all normal purposes, but with some valves the effect of mis-matching is to produce a peculiar form of distortion, and in other cases a reduced volume is obtained. It is, fortunately, now possible to purchase a loudspeaker without a transformer, and by using one of these



The new Bulgin Output Meter referred to in these notes.

models, in conjunction with an output-matching transformer, any particular valve and any type of speaker may be used without difficulty. A very effective component of this type is now found in the Bulgin range and is illustrated above. This particular component gives ratios of 120, 70, 60, 45, 35, 32, 28, 22.5, 20, 16, 14 and 10 to 1, and has a practically constant inductance up to 80 mA D.C. In addition to these valuable features, it is provided with a centre-tap so that it may be incorporated in a push-pull stage. The price is 17s. 6d.

Local Clubs

Members are still anxious to form local clubs in various parts of the country, and although we are prepared to put members in touch with one another, it should first be ascertained whether there is already a radio club in the district. It is obviously not in the best interests of the hobby to have two similar bodies in a district, as doubts may arise in the minds of members as to which club is the better. Amalgamation of a local B.L.D.L.C. chapter with a radio club will result in increased interests and greater facilities will be obtainable. The Tottenham Short Wave Club, which is the North London Chapter of the B.L.D.L.C., are still open to receive applications for members from those readers who live in the district. The address of the Hon. Sec. is 60, Walmer Terrace, Firs Lane, Palmers Green, N.13, to whom applications should be sent.

FREE ADVICE BUREAU COUPON

This coupon is available until September 18th, 1937, and must be attached to all letters containing queries.

PRACTICAL AND AMATEUR WIRELESS, 11/9/37.

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268 PAGES

PROFESSOR A.M. LOW

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Write for this enlightening Hand-book to-day FREE and post free. British Institute of Engineering Technology, 409, Shakespeare House, 17, 18, 19, Stratford Place, W.1.

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.

Proposed Club for Grimsby

READERS residing in the Grimsby district who may be interested in the formation of a junior radio club are invited to communicate with G. Jennison (Junr.), 28, Park Drive, Grimsby, Lincs.

Tottenham Short-wave Club

THIS club has now moved its premises to 64, Morley Avenue, N.9, and is anxious to hear from all those interested in short-wave work.

Further particulars can be obtained from the Hon. Sec., Edwin Jones, 60, Walmer Terrace, Firs Lane, Palmer's Green, N.13.

The Leicester Amateur Radio Society

THE social outing of this society took place at Donington Castle and proved to be a great success. The party, although not as large as it might have been, was 22 strong, the transmitting side of the society being well represented.

On Sunday, September 12th, there will be a D.F. field day on 160 m. using a portable transmitter operated by G6VD. All who are interested are invited to come along, with or without apparatus; meet at Bishop Street G.P.O. at 2.0 p.m. Hon. Sec., Talbot Cribb, 55, Knighton Drive, Leicester.

NOW READY!

WIRELESS COILS, CHOKES AND TRANSFORMERS, AND HOW TO MAKE THEM.

2/6, or 2/10 by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

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., Tower House, 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.

Dubilier Condensers and Resistances.

A WIDE range of these well-known components is given in the new Broadcast Catalogue just issued by the Dubilier Condenser Co., Ltd. The most popular standard designs of interest to the home constructor and service engineer, together with an extensive selection of condensers suitable for replacement purposes, are listed. Included in the range are oil-immersed paper dielectric condensers; non-inductive tubular paper condensers; high-voltage and low-voltage dry electrolytic condensers; and dry electrolytic condenser blocks. A range of metallised resistances; the new metallised volume controls; anti-interference devices; and car radio suppressors are also dealt with in this catalogue, which should be particularly useful to set constructors and experimenters.

REPLIES IN BRIEF

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

A. T. (Winson Green). You should disconnect the leads to the grid circuit of the driver valve and connect a volume control there, with a change-over switch for the gramophone pick-up. Connections are standard and will be found in our last Christmas number, December 5th, 1936.

H. C. K. (Leytonstone). The makers now are Beethoven Radio, Ltd., Chase Road, North Acton, N.W.10.

R. C. P. (S.W.11). The blueprint is no longer obtainable and the set is now obsolete. It would be very difficult to modernise this particular design and we suggest you consider the construction of a more up-to-date superhet.

M. K. (Dublin). The device enables you to make records from a mike or from a radio programme and is very simple to operate. Battery or mains sets may be used, but naturally a fairly loud signal output is required for satisfactory results—say, 4 watts or so. An article on the subject was published in our issue dated March 20th last.

E. C. M. (Deal). The lead-in is rather on the long side and may prove too much for satisfactory short-wave reception. The single length (20ft.) from set to the first window is probably all that is needed and we suggest you try this alone for short-wave signals.

E. R. B. (Barking). The coils are all made to standard inductance values, and therefore, it should be possible to gang the condenser with all coils in circuit.

J. G., Jnr. (N.19). So far as we can trace there is no book on the subject available in this country.

J. F. (Killybegs). The valves supplied by Messrs. Cossor may be obtained with either 4- or 7-pin bases, but if you have obtained the 7-pin types you may fit 7-pin valveholders to accommodate them.

J. M. (Launston). So far as we can trace the set is not on the market but was merely exhibited at Olympia to show how a compact receiver may be constructed.

L. H. (Bracknell). Your call-sign is not correct. The Straits Settlements call-signs are VSS, etc., and were previously VSIA, etc. However, we believe that VS3AC, T. G. Laver, Supt. Govt. Electrical Power Station, Johore Bharu, Johore, the BERU representative for Malaya, will redirect your report if you send it to him. The Amateur Call Book may be obtained from F. L. Postlethwaite, Radio G5KA, 41, Kinfawns Road, Goodmanways, Iford, Essex.

E. H. M. (Bournville). We regret that there is no receiver in our blueprint service which utilises the coils referred to in your letter.

W. B. (Winton, Bournemouth). We regret that we cannot recommend a blueprint for the odd components mentioned in your letter. We do not build receivers round parts dismantled from a commercial receiver and the valves are only a small item. We suggest that you dispose of the complete receiver and obtain parts for a set described in our blueprint list.

F. C. (Kenton). G.B. minus is the negative potential applied to the grid. The grid is, in other words, made negative in respect to the filament. A valve oscillates when the energy in the anode circuit is fed back to the grid circuit in sufficient quantity. Equivalents are rated so far as concerns the general characteristics. There are obviously slight differences which may easily reveal themselves in certain special circuits. We cannot give coil connection details without a type number.

W. B. (W.12). We can supply the coil details if you desire to build the receiver in question, together with a list of the components required. We suggest you enquire from the Customs authorities regarding tax and give full details of the receiver and the purpose for which it is being sent.

R. A. (S.W.19). We cannot give circuit diagrams of commercial receivers. The drawback to the gang condenser for the home-constructor is to be found in the difficulty of making the frame aerial to match the coil unit.

A. O'L. (W. Croydon). The list is published each week and is up to date. The blueprints are 1s. each and where a dash appears by the side of the blueprint number it indicates that the issue describing construction is now out of print.

A. C. W. (Stokes Croft). We regret that we cannot insert your request in view of the large number of issues you require. We suggest you insert a small advertisement.

E. R. N. (Long Marston). The values given were the most usual, and although larger capacities may be used there are various drawbacks. Resonant circuits may be formed giving boomy reproduction, or the values of the grid leak may be found very critical. You can, of course, experiment when the set is working satisfactorily with a view to finding better combinations.

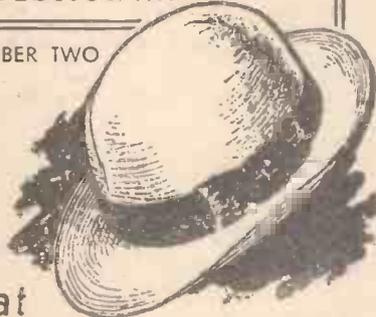
P. J. N. C. (Wafford). The converter should function satisfactorily provided that all wiring is kept very short and thick and rigid connections are adopted. The H.F. pentode should work as well as the S.G. valve specified.

D. H. (Grange). There may be some leakage between your aerial and earth leads which would account for the effect. You will probably find that the earth or aerial lead has developed a break in the insulated covering, or has become loose inside the receiver at the A.E. terminal strip.

S. W. (Catterick Bridge). We regret that we have no blueprints which will enable you to incorporate the coil referred to.

Quaint IDEAS YOU ACCEPT WITHOUT QUESTION....

NUMBER TWO



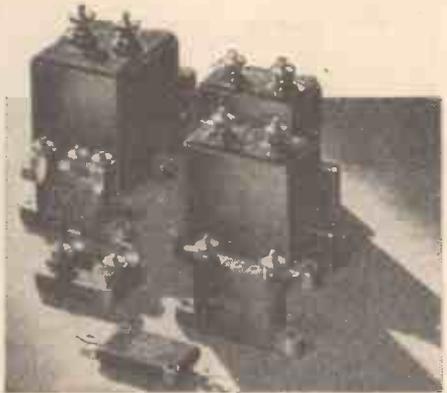
that PANAMA HATS are made in Panama

A REAL Panama hat, which costs anything up to £20, comes not from Panama but from Ecuador or Colombia. Wear an honest Panama or an imitation, as a head covering either serves equally well.

With condensers it's a different story. A condenser must fulfil a hundred and one different conditions, unfailingly it must answer as many critical demands. Condenser making is a specialist job... there is no substitute for a T.C.C. So when you need a condenser, be guided by this—

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The Telegraph Condenser Co. Ltd., Wales Farm Road, N. Acton, W.3.

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS	No. of	Three-valve: Blueprints, 1s. each.	
CRYSTAL SETS	Date of Issue. Blueprint.	Experimenter's Short-Wave Three (SG, D, Pow)	
Blueprint, 6d.		The Prefect 3 (D, 2 LF (RC and Trans))	PW30A
1937 Crystal Receiver	0.1.37	The Bandsread S.W. Three (HF Pen, D (Pen), Pen)	PW63
STRAIGHT SETS. Battery Operated.		"Tele-Cent" S.W.3 (SG, D (SG), Pen)	PW68
One-valve: Blueprint, 1s.			PW74
All-wave Unipen (Pentode)	—		
Two-valve: Blueprints, 1s. each.			
Four-range Super Mag Two (D, Pen)	11.8.34		PW30B
The Signet Two	20.8.36		PW76
Three-valve: Blueprints, 1s. each.			
The Long-Range Express Three (SG, D, Pen)	24.4.37		PW2
Selectone Battery Three (D, 2 LF (Trans))	—		PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))	—		PW34A
Leader Three (SG, D, Pow)	22.5.37		PW35
Summit Three (HF Pen, D, Pen)	8.8.34		PW37
All Pentode Three (HF Pen, D (Pen), Pen)	20.5.37		PW39
Hall-mark Three (SG, D, Pow)	12.6.37		PW41
Hall-mark Cadet (D, LF, Pen (RC))	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		PM1
Cameo Midget Three (D, 2 LF (Trans))	8.6.35		PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35		PW53
Battery All-Wave Three (D, 2 LF (RC))	—		PW55
The Monitor (HF Pen, D, Pen)	—		PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36		PW62
The Centaur Three (SG, D, P)	—		PW64
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	20.8.36		PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36		PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36		PW72
Four-valve: Blueprints, 1s. each.			
Sonotone Four (SG, D, LF, P)	1.5.37		PW4
Fury Four (2 SG, D, Pen)	8.5.37		PW11
Beta Universal Four (SG, D, LF, Cl. B)	—		PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34		PW34R
Fury Four Super (SG, SG, D, Pen)	—		PW34C
Battery Hall-Mark 4 (HF, Pen, D, Push-Pull)	—		PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36		PW67
Mains Operated.			
Two-valve: Blueprints, 1s. each.			
A.C. Twin (D (Pen), Pen)	—		PW19
A.C.-D.C. Two (SG, Pow)	—		PW31
Selectone A.C. Radiogram Two (D, Pow)	—		PW19
Three-valve: Blueprints, 1s. each.			
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—		PW23
D.C. Ace (SG, D, Pen)	—		PW25
A.C. Three (SG, D, Pen)	—		PW29
A.C. Leader (HF Pen, D, Pow)	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)	—		PW33
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35		PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	17.8.35		PW54
A.C. 1936 Sonotone (HF Pen, H.F. Pen, Westector, Pen)	—		PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36		PW70
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)	24.7.37		PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35		PW47
SUPERHETS.			
Battery Sets: Blueprints, 1s. each.			
£5 Superhet (Three-valve)	5.6.37		PW40
F. J. Camm's 2-valve Superhet Two-valve	13.7.35		PW52
F. J. Camm's £4 Superhet	—		PW53
F. J. Camm's "Vitesse" All-Waver (3-valver)	27.2.37		PW75
Mains Sets: Blueprints, 1s. each.			
A.C. £5 Superhet (Three-valver)	—		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	31.7.37		PW59
F. J. Camm's Universal £4 Superhet 4	—		PW60
"Qualtone" Universal Four	16.1.37		PW73
SHORT-WAVE SETS.			
Two-valve: Blueprint, 1s.			
Midget Short-wave Two (D, Pen)	—		PW38A

Three-valve: Blueprints, 1s. each.	
Experimenter's Short-Wave Three (SG, D, Pow)	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37 PW63
The Bandsread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36 PW68
"Tele-Cent" S.W.3 (SG, D (SG), Pen)	30.1.37 PW74
PORTABLES.	
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F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	— PW65
Parvo Flyweight Midget Portable (SG, D, Pen)	19.6.37 PW77
Four-valve: Blueprint 1s.	
Featherweight Portable Four (SG, D, LF, Cl. B)	15.5.37 PW12
MISCELLANEOUS.	
S.W. Converter-Adapter (1 valve)	— PW48A
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Full-volume Two (SG det., Pen)	— AW392
B.B.C. National Two with Lucerne Coil (D, Trans)	— AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	— AW388A
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A Modern Two-valver	— WM409
Three-valve: Blueprints, 1s. each.	
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New Britain's Favourite Three (D, Trans, Class B)	15.7.33 AW394
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Fan and Family Three (D, Trans, Class B)	25.11.33 AW410
£5 5s. S.G. 3 (SG, D, Trans)	2.12.33 AW412
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"W.M." 1934 Standard Three (SG, D, Pen)	— WM351
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The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	April '36 WM404
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Practical Mechanics	7 1/2d.	"
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Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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S.G. Three (SG, D, Pen) A.C.	— AW390
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A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34 AW439
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Holiday Portable (SG, D, LF, Class B)	1.7.33 AW393
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S.W. One-valver for America	23.1.37 AW429
Rome Short-Waver	— AW452
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Ultra-short Battery Two (SG, det., Pen)	Feb. '36 WM402
Home-made Coil Two (D, Pen)	— AW440
Three-valve: Blueprints, 1s. each.	
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Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34 AW438
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"W.M." Band-spread Short-waver (D, Pen) A.C.-D.C.	— WM368
"W.M." Long-wave Converter	— WM380
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Four-valve: Blueprint, 1s. 6d.	
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35 WM391
MISCELLANEOUS.	
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The W.M. A.C. Short-Wave Converter (1/-)	— WM408



QUERIES and ENQUIRIES

Modifying Mains Apparatus

"I have an 8-valve mains set with 4 watts output and with 6F6 as a single output valve. I wish to add another 6F6 to have a push-pull output. The rectifier valve is a 5Y3 and speaker is electro-dynamic with a field resistance of 2,500 ohms. Would I have good results if I were to make this change to my set, and would I have to make some other alteration? What output will I have, approximately?"—O.G.C.S.T. (Malta):

THERE are several difficulties in the way of your proposed modification. Firstly, the total current load of the present valves may be fully loading the rectifier, or choke, or other component in the H.T. positive line. Therefore, the additional current would overload the rectifier, reducing the voltage applied to the receiver and the volume reduction thereby obtained would leave you without any increase from the extra valve. Furthermore, distortion might easily arise due to the lowered voltages. Secondly, the present coupling would have to be changed to utilise a push-pull transformer and although this is not necessarily difficult it may lead to trouble in removing one component and replacing another. The speaker may not be fitted with a push-pull transformer, and thus a new speaker transformer would have to be fitted. If all of these difficulties can be overcome, the extra valve would enable you to obtain slightly more than twice the output given by the present output valve.

Grid-bias Battery Markings

"There are, I find, two types of G.B. battery—at least in the matter of marking. Some have the plus at the side and the other tappings down the centre ending with minus. Others have the minus at the side and the tappings down the centre, ending in the plus. Has the plus in the first instance to be kept constant and the minus kept constant in the second instance, or has the minus in each case to be kept constant when the other plug is moved—or again, does it not matter either way?"—H. C. W. (Walshaw).

THE markings on the various types merely indicate the positive and negative ends of the battery, and therefore it is quite immaterial into what sockets the positive and negative plugs are inserted, provided they are kept to their respective ends. Thus, supposing, for example, you need to apply $1\frac{1}{2}$ volts G.B. to a certain set. In the ordinary way the positive lead from the set (joined to the H.T. negative line) would be inserted into the positive (plus)

socket on the G.B. battery, and the negative lead would be plugged into the 1.5 volt socket. But you would also apply 1.5 volts, negative if you inserted the negative lead into the negative end of the battery and inserted the positive lead into the next socket (assuming the battery to be tapped, as usual, at each 1.5 volts). Similarly, you could insert the negative lead into the 6-volt socket and the positive lead into the 4.5 volt socket and still only be applying

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.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

the correct 1.5 volts in the correct polarity. It is general to mark the voltages on the G.B. battery, counting from the positive end.

Meter Modifications

"Having just purchased a millammeter which reads up to 100 mA I find I have to adapt it to read up to 250 mA. Recently I read in one of your issues 'A 0-10 mA meter can be made to read up to 20 mA by using a resistance equal to that of the meter, or it can be made to read up to 30 mA by using a resistance equal to half that of the meter, and so on.' Now although an amateur, I fail to see how half the resistance value can increase the reading. Should it not read 'one and a half that of the meter'?"—A. A. (Parkstone).

THE instructions given in the issue in question are quite correct, and you will see, if you make a rough sketch, how the circuit works. If the meter reads up to 50 mA and is connected to a circuit where 50 mA of current flows, the needle will rise to the highest setting on the scale. If, now, a resistance is connected across the meter, and the value of that resistance is identical to the meter resistance, then the current will divide and

flow in equal portions through the meter and resistance, and accordingly the needle will fall and indicate half of the previous reading—namely, 25 mA. Thus the meter readings are doubled. If, now, a further equal resistance is joined across the present resistance and meter, the current will divide into three equal streams, passing one-third through each resistance. This may be continued until eventually the current flowing through the meter is so small that the needle will hardly move. You should remember that when resistances are connected in parallel the sum of the resistances is equal to the reciprocal of the sum of the reciprocals. Therefore, in the hypothetical case mentioned in the article the meter scale is increased from 10 to 30 mA, or three times. Therefore, assuming that the resistance is 1,000 ohms, by connecting another 1,000 ohms in parallel the scale would be doubled, and a further 1,000 ohms connected in parallel will divide the current into three equal portions, one-third flowing through each resistance. The additional two parallel resistances may be considered as one having a value of 500 ohms, or if you prefer to consider it another way, when a resistance of half the value is joined across the meter, two-thirds of the current flows through the resistance and only one-third through the meter.

Short-wave Results

"I am thinking of building a short-wave receiver (1-valve), but my conditions around are not very good. Tram-cars, buses, and motor-cars are passing every few minutes. Could you tell me if I would obtain satisfactory results?"—L. C. B. (Hockley).

IT should not be impossible to obtain satisfactory results with care in the erection of your aerial and the choice of circuit. You must, of course, put the aerial as far from the road as possible, and if you can, erect it so that it is non-directional to the roadway. If this is not in itself sufficient, you will have to use one of the special anti-interference aerial systems, although a non-directional aerial and a transposed feeder line may prove adequate to reduce the trouble to a minimum. The receiver should not be too sensitive on the H.F. side.

Battery P.A. Equipment

"Would you please let me know if any of your periodicals ever published a blueprint of a battery-driven Public Address Amplifier, preferably Class B output 5 watts? If not, could you please let me know where such a blueprint could be obtained?"—W. McQ. (Paisley).

WE think you are too ambitious to expect 5 watts from a battery-operated amplifier. The highest rating for a Class B valve is 3.2 watts, and to get anywhere near 5 watts with battery supplies you would have to employ two pentodes in ordinary push-pull, and then the anode current would run to the order of 60 mA or more, or else use the A.C. mains type of valve and use a large accumulator for the supply to the heaters.

NICORE COIL UNITS

Build an efficient Battery or Mains Set with one of the famous Nicore Coil Units. These ganged units are giving excellent results with the following:—

- No. 1 (BP 111) Mains Superhet (110 k.c., I.F.)
- No. 2 (BP 112) Battery Superhet (465 k.c., I.F.)
- No. 3 (BP 113) 3-valve Mains receiver with band-pass tuning. One H.F. valve.
- No. 4 (BP 114) S.G. Battery 3 with Pentode Output valve.

Write for circuit blueprints of the above sets, 6d. each (BP 114 is 3d.) POST FREE.

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Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7d. including catalogue.

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44, HOLLOWAY HEAD, BIRMINGHAM 1

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.

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REPAIRS to Moving Coil Speakers, Cones and Coils fitted or rewound. Fields altered. Prices Quoted including Eliminators, Loudspeakers, Re-paired, 4/- L.F. and Speech Transformers, 4/- post free. Trade invited. Guaranteed. Satisfaction. Prompt Service. Estimates Free.—L.S. Repair Service, 5, Bulham Grove, London, S.W.12. Battersea 1321.

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CALLERS, AS USUAL, TO 165 & 165a, FLEET ST., E.C.4 (Next door to Anderson's Hotel), Central 2833. New Branch: 50, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2381).

Have you had our **GIANT ILLUSTRATED CATALOGUE AND VALVE LIST?** Send 4d. IN STAMPS FOR THIS BARGAIN LIST.

The New "Premier" Short Wave CONDENSERS, with Trolift insulation. Certified superior to Ceramic. All-brass Construction, 40 mmfd., 17; 100 mmfd., 1/10; 100 mmfd., 250 mmfd. 2/6; Double Spaced 15 mmfd., 2/9; 40 mmfd., 3/6. S.W. H.F. Chokes, 9d.; screened 1/6. All-Brass S.W. Condensers, with integral slow-motion, 5,00015 Tuning, 13/9; .00015 Reaction, 3/2.

LEW 1937 1-VALVE SHORT-WAVE RECEIVER OR ADAPTOR KIT, 13 to 86 metres without coil changing. Complete Kit and Circuit, 12/6. VALVE GIVEN FREE!

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SUPERHET CONVERTER KIT, 12/6. De Luxe Model, 18/6. S.W. SUPERHET CONVERTER KIT, for A.C. Mains Receivers, 20/-. A.C. Valve given FREE!

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SHORT-WAVE COILS, 4- and 6-pn types, 13-26, 22-47, 41-84, 76-170 metres, 1/9 each, with circuit. Special set of 3 S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 38-88 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/6.

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AMERICAN VALVES. Genuine American HYTRON and TRIAD first-grade Valves, 3 months' guarantee. All types in stock, 3/6 each. 210 and 230, 8/6 each. New Metal-Glass Valves, all types, 6/6 each. Genuine American DIOTRON Valves, all types, 3/6 each. Valve holders for all above types, 6d. each. OCTOL bases, 9d. each.

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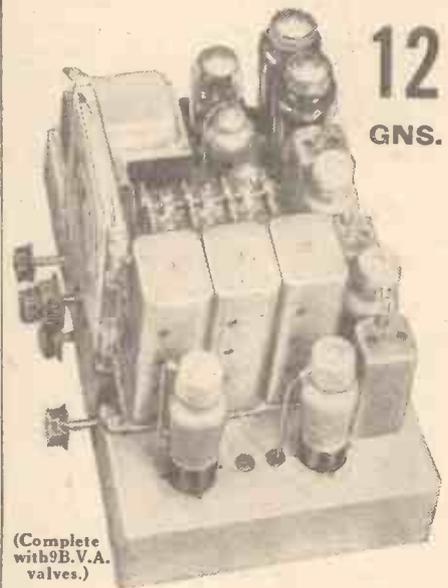


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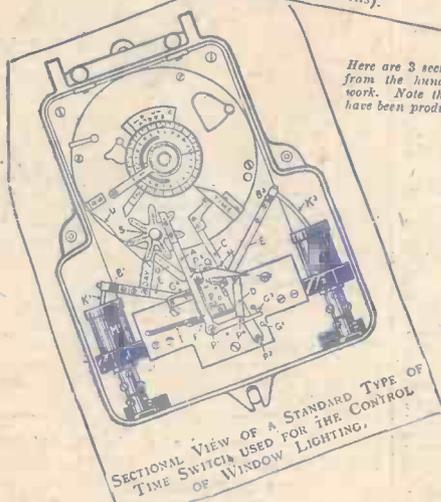
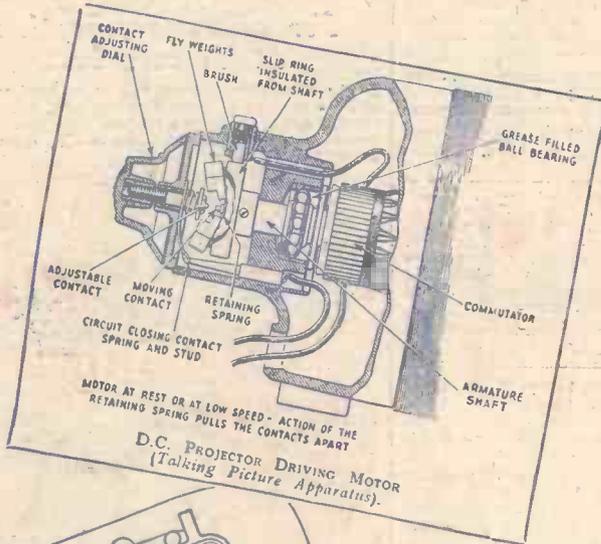
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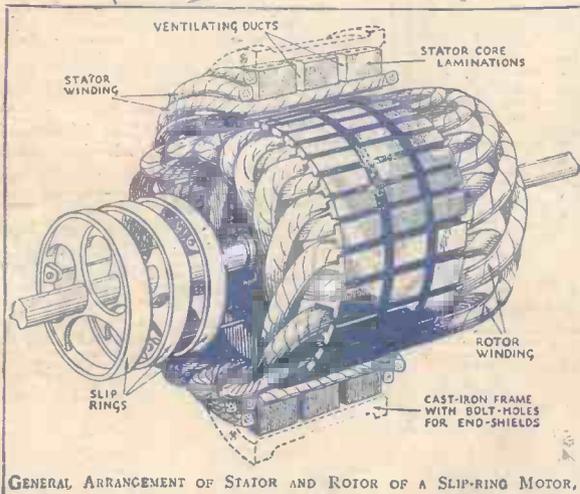
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SIGNAL-TO-NOISE RATIO—See page 14.

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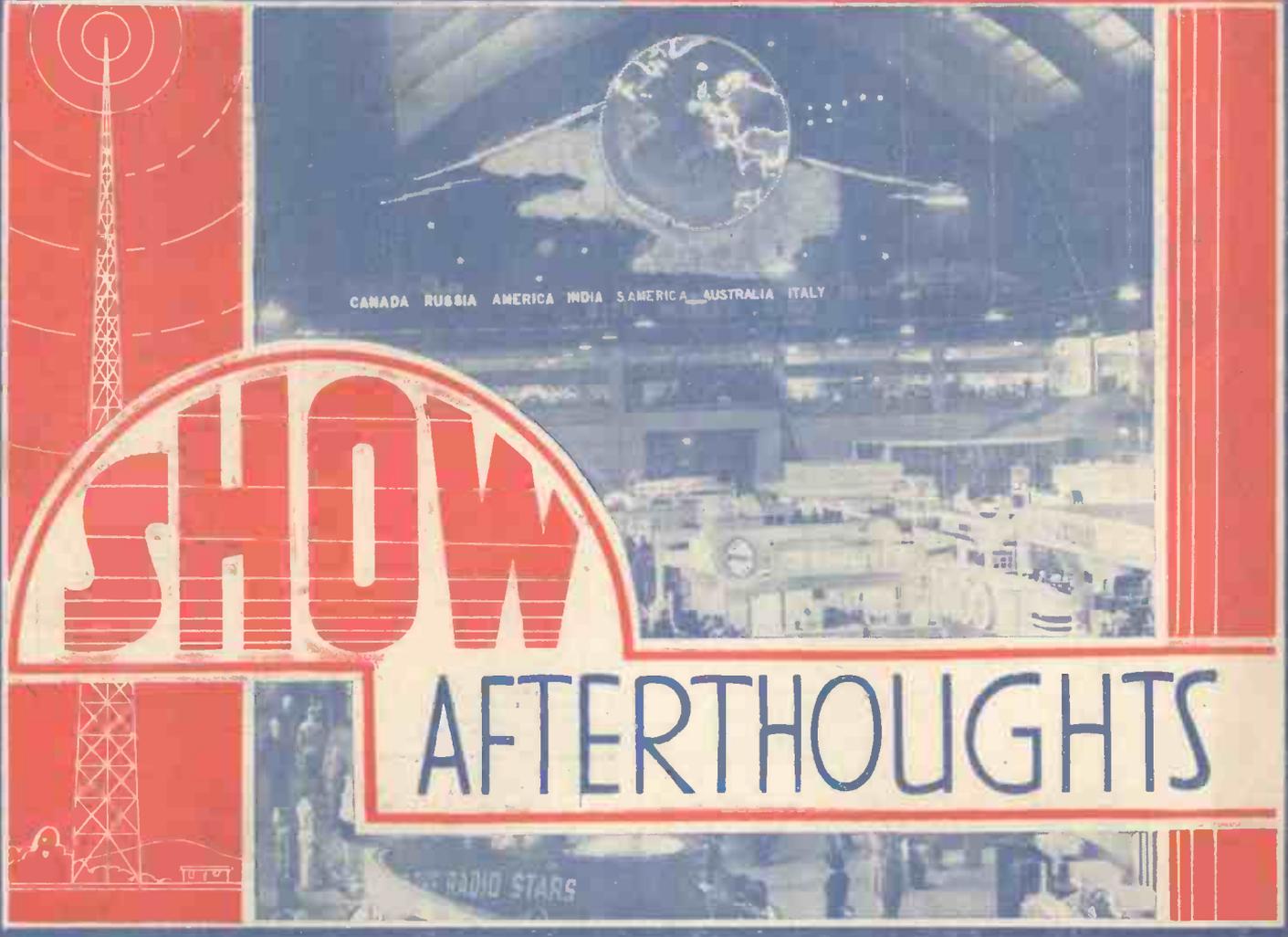
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Edited by **F. J. CAMM**

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Vol. 11. No. 261.
September 18th, 1937.

AND PRACTICAL TELEVISION



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Making a Beat-Frequency Oscillator Unit See page 5.



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Edited by F. J. CAMM

Technical Staff:
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VOL. XI. No. 261. September 18th, 1937.

ROUND *the* WORLD of WIRELESS

Olympia Afterthoughts

WHEN the excitement and interest of the Radio Exhibition have died down, many interesting facts emerge from the confused "first impressions," which the ordinary visitor obtains. So many items are presented to his gaze during the few hours that he is able to be present, that it is difficult to isolate, afterwards, those items which are of the greatest value to the individual. When one is able to go round the Exhibition day by day, and collect various catalogues, the task is much simpler, but no doubt there are many who afterwards remember some particular feature which they intended to inspect during their visit and slipped from mind owing to the interest created by other exhibits. In this issue our popular contributors, the Experimenters, have collected those details which most impressed them during their visits on different days, and consequently their notes will prove of value not only to those who were fortunate enough to be able to visit this national exhibition, but to those who from force of circumstance were unable to make an inspection of the exhibits which were housed this year at Olympia. Turn to page 12 and see what the Experimenters recall in their afterthoughts.

New Commercial Radio Station

IT is announced that Radio-Toulouse will join the list of continental stations being used for English sponsored programmes from October 1st next. An English announcer has been engaged so that the normal programmes from that station may be announced in English in addition to the usual announcements, and thus provide an easily-received alternative programme for listeners in this country.

One Man Wants 70 Radiograms.

AT Radiolympia a visitor to the G.E.C. stand surprised the salesman by asking for seventy radiograms. He was Capt. the Hon. Richard Norton, managing director of the Pinewood Studios. "Captain Norton arrived with Miss Hazel Terry, the Paramount B. & D. film star," said Mr. J. Nilson, who was in charge of the G.E.C. exhibit. "He spent some time studying the radiogram and having its features explained.

"He told us that the intention was to install an all-wave radiogram in each of the star dressing-rooms at Pinewood. Between shots film artists like to be soothed by music. Stars who have radio in their dressing-rooms

are less temperamental than those in silent rooms; but it is no use having a central set with the programmes relayed to each room as the stars' tastes naturally differ, and instead of soothing them it might upset them to be given a programme they didn't like."

Gypsy Melody

THE B.B.C. announces that Eric Maschwitz, former Director of Variety, is preparing a programme of gypsy folk lore.

England programme, a waiter who makes his living behind the Snack Bar will describe to listeners a few of his customers.

National Band Festival

ON September 25th, the National Brass Band Festival is to be held. Formerly the Crystal Palace was the scene of this annual event, but due to the fact that this was ruined during the recent fire, the event will now have to take place at the Alexandra Palace. Northern Listeners will be given an eye-witness account of the event by a northern journalist, as the majority of the contestants are from the north of England.

Speedway Broadcast

ONE of the most exciting of sports enters broadcasting news again on September 18th, when Bernard Gray will give a running commentary, from Belle Vue, Manchester, on part of the speedway match North versus South.

Promenade Concerts

ON Tuesday, September 21st, the first part of the programme, devoted to works of Richard Strauss, will be broadcast on the National wavelength. Elisabeth Schumann will sing songs with orchestra, and the programme will include the symphonic poem "Till Eulenspiegel" and the Love Scene from "Feuersnot."

Foden's Band

FODEN'S Motor Works Band—for many years now the holders of a proud place in the front rank of the brass band army—are to broadcast on September 21st, in the Northern and Regional programmes, under the conductorship of Fred Mortimer, himself as famous as the band. The name of Mortimer can hardly be separated from that of this band, and in the broadcast concert Alec Mortimer figures with a euphonium solo.

Autumn Broadcast Talks

DAYTIME talks will include Mr. C. H. Middleton's popular Sunday series, "In Your Garden;" practical talks on some of the elements of housewifery under the title, "For the Young Housewife;" a series of six talks on children as seen from varying points of view; and another series entitled, "Before They Go to School," dealing with children between the ages of two and five.

ON OTHER PAGES

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and music called "Gypsy Melody," which will be broadcast on October 17th.

When Mr. Maschwitz relinquished his post of Variety Director, it was arranged that he should continue to contribute to programmes, and "Gypsy Melody" will be his first programme since his departure.

Gypsy Petulengro is providing the folk lore and will also take part in the broadcast, while Rae Jenkins is responsible for the music, and is forming a gypsy orchestra to play in the programme.

"Private View"

HUNGER does not always make for politeness, and catering for snack-appetites is not the least exacting of summer duties. On September 20th, in the West of

ROUND the WORLD of WIRELESS (Continued)

A "Baby" Presented to a Centenarian!

ON the eve of Radiolympia Mr. Henry Cook, of Charndon, Bicester, Oxon, who is seen in the accompanying illustration, reached his 100th birthday, and to commemorate this very auspicious occasion he was presented with a Pye "Baby" Q.

For such a presentation to take place at his time of life is, of course, quite an event, and for the first time Mr. Cook listened with obvious enjoyment to a Baby which spoke many languages, in a natural and unassuming voice, was most obedient, and could be taken anywhere without any trouble. This midget portable is Pye's smallest receiver. It has a four-valve circuit and moving-coil speaker, and is ideal for use in the home, on the river, by the sea, or in the car. Mr. Cook received numerous other gifts and telegrams—one from His Majesty the King—with congratulations and best wishes. He is one of a family of 22 and with his brother—aged 81—is the joint survivor. Most of his time now is spent in his country cottage, so that the Baby Q will be a constant source of entertainment, and will help to pass the time very pleasantly for himself and his two daughters.

Cabaret Show

WESTERN Cabaret will be broadcast from the Royal Bath Hotel, Bournemouth, on September 22nd. This will include: Rudi Grasl, "the amazing young man from Vienna," who imitates all kinds of instruments; Jack and Eddie Eden, in light comedy, and dancing to Harry



Mr. Henry Cook, of Charndon, being presented with a Pye portable receiver on his 100th birthday.

Roy's "Lyricals," directed by Maurice Kasket, with Mona Brandon and John Harris.

Value of Empire Broadcasts

THE value of the B.B.C. short-wave transmissions as a medium for British propaganda throughout the Empire was stressed by Mr. M. J. Railing, Vice-chairman and Joint Managing Director of the General Electric Company, during a visit to Radiolympia. He stated that since the Show

INTERESTING and TOPICAL NEWS and NOTES.

opened the G.E.C. had received messages from towns and villages in all parts of the world as far apart as Nairobi, Rangoon, Penang, Singapore and Durban—to mention a few—praising the broadcasts during Radiolympia, and showing the keenest interest in British affairs. "In these

grammes from Britain, we ought to develop this aspect of short-wave radio if we are not to be crowded off the air in our own possessions."

Dance Music from Germany and America

BRITISH listeners will hear relayed in the Regional programme for half an hour on the night of September 15th dance music from Germany. Eugen Wolff and his Orchestra, playing in Berlin, will have their programme relayed to Britain from



Oscar Rabin, and his popular Romany Band, who were heard recently in the late night dance music programme.

short-wave transmissions," he said, "we have a powerful weapon, which so far has perhaps not been fully appreciated, to combat anti-British propaganda disseminated by other countries. Since the messages we have received reveal a preference in these overseas countries for pro-

the Deutschlandsender Germany. Immediately the relay ends Germany will take, on the same line, a relay from this country of Henry Hall and his Dance Orchestra. On September 29th Benny Goodman and his Band will be relayed from New York in the "swing" series, "America Dances."

Jack Strachey's Music

IN a programme devoted entirely to the music of Jack Strachey, well-known composer, to be broadcast in the National programme on September 17th, are several songs which will be broadcast for the first time. Two of them are "Toujours" and "Thank You," both of which have lyrics by Rex Newman and Clifford Grey. The second of these will be sung by Patrick Waddington, accompanied by Jack Strachey himself at the piano. Another item in the programme will be a song which Strachey wrote with Eric Maschwitz, former B.B.C. Variety Director, for last year's Christmas Revue—"Paris is not the same"—which seems likely to become a worthy successor to their "These Foolish Things."

Variety from Bath

IN the feature "Theatres of Variety," a programme will be broadcast from the stage of the Palace Theatre, Bath, on September 24th. This is the opening week of the rebuilt theatre: the original hall opened in 1886 as the "Pavilion"; it later became the "Lyric," and, in 1903, the "Palace" Theatre.

SOLVE THIS!

PROBLEM No. 261

Budd obtained a short-wave adapter for his three-valve broadcast band receiver employing three pentode valves. The adapter plug was inserted in the detector valveholder in the manner suggested by the adapter manufacturers, but no reception could be obtained. Why? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 261 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 20th, 1937.

Solution to Problem No. 230

The primary winding of the I.F. transformer following the I.F. valve was broken. The following three readers successfully solved Problem No. 230 and books are accordingly being forwarded to them. W. A. Smith, 91, Wilsham Street, Notting Hill, London, W.11; H. Bridge, M.O.P. Hospital, Mossley Hill, Liverpool; J. Juniper, 68, Plymouth Road, Penarth, Glam.

The Amateur Set Designer

In this Second Article of the Series the Problems of Q.P.P. are Discussed

To get the best out of a push-pull system the two valves used should, ideally, have identical characteristics, and if a pair of valves are to be purchased for a push-pull stage, it is very advisable to specify a "matched" pair. If there is any appreciable lack of balance between the two valves, compensation by grid-bias adjustment is desirable. When carrying out the first tests with a push-pull output stage, a milliammeter check should be made of the two anode D.C. values. They should be equal. The fact of their proving to be so does not necessarily indicate that the valves are perfectly matched over the whole range of signal voltage swing, but it is important to see that at least the mean anode currents are balanced up. The output transformer should be electrically symmetrical about the centre tap, and the input transformer, or resistance capacity feed system if such is used, should also be electrically balanced on the two sides.

As with all output stages, the question of load impedance must be gone into thoroughly. From Fig. 5, it should be apparent that the two valves are effectively in series as far as the A.C. component of anode current is concerned. This means that the two valve impedances are acting in series and, therefore, that the optimum load, which must be set up by the speech-coil output transformer combination is twice the value suitable for one valve. To take the normal optimum load specified for one of the valves and to double it to obtain the optimum load (plate to plate) for the two valves in push-pull is correct enough up to a point. The only difficulty, if the limit of output power is being aimed at, is that the normal load specified for a single valve is largely governed by the need to keep down the second harmonic content, but in push-pull this problem does not arise. The amateur who finds himself with a pretty free hand over choice of components would be well advised to consult the valve manufacturer as to the optimum plate-to-plate load for the maximum of undistorted power output.

When a transformer is to be used for coupling to the previous stage, it must be remembered that each of the two output valves receives only the signal voltage developed by one half secondary. The choice of over-all transformer ratio had better be deferred until the designer has sketched out more of the design of the receiver as a whole, because the best ratio for the input transformer is naturally partly dependent upon what voltage is going to be available at the primary.

Resistance-capacity input to a push-pull output stage merits serious consideration under certain circumstances, but we will deal with this under the heading of L.F. voltage amplification, as it is a matter more intimately concerned with the pre-output stage.

With a push-pull output stage there is

some risk of "parasitic" oscillations at very high frequency occurring in the system, and it is generally advisable to take precautionary measures. Fortunately, although the effects of parasitic oscillations are troublesome enough, the cure is neither difficult nor expensive. "Stopping" resistances at each grid will normally be effective and values of 1,000 to 5,000 ohms should be tried. Alternatively (or possibly additionally), resistances of some 100 ohms or so at each anode can be tried.

Q.P.P. (Quiescent Push-Pull)

At the outset it must be understood that Q.P.P. has very marked differences from normal P.P. (push-pull). A theoretical diagram of a Q.P.P. output stage may appear to amount to two valves (generally pentodes) in push-pull, but there is a great difference in operation between the two systems. Furthermore, Q.P.P. transformers are, in the main, of different type to those used for P.P.

Although the two grids of two Q.P.P. valves are supplied with signal voltages in anti-phase and each valve supplies half the total power output to the speaker, the two valves do not work simultaneously as in

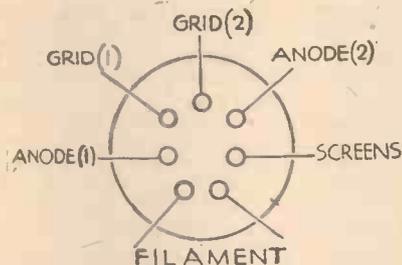


Fig. 6.—Connections of a standard 7-pin Q.P.P. valveholder.

P.P., but work *alternately*. Again, whereas in P.P. the two half primaries of the output transformer both carry the signal component of current together, in Q.P.P. the two half primaries carry the signal current alternately. In brief, while one valve is active the other is "dead," from the signal point of view. A basically important difference between P.P. and Q.P.P. is that in P.P. the two valves are biased as for normal amplification (centre-point biasing), but in Q.P.P. the two valves are biased right back to an operating point near the foot of the anode-current grid-volts characteristic. Such a bias condition would mean the most severe distortion with one valve alone, but with Q.P.P. gives not only satisfactory quality of reproduction but confers a very particular advantage.

The Q.P.P. system is primarily intended to overcome, for the battery user, what is one of the great disadvantages of all other battery-operated output systems (with the exception of Class B, which is allied to Q.P.P.). With any single valve, parallel

valve, or normal push-pull output stage, the mean anode current taken by the stage is more or less constant during reception. It makes no difference whether a local or a distant station is being received, or whether the depth of modulation is great or small, or whether the volume control is turned up or down, there is the same mean anode current being taken all the time. Even during a pause in the broadcast being received, there is still the same mean anode current value being drawn from the H.T. battery. This means that the average designer must consider any other than comparatively small output power as prohibitive with the more ordinary output systems, if the receiver is to be battery operated.

With the Q.P.P. system, however, the mean anode current varies with the amplitude of the signal voltage applied to the output stage. With no signal the "quiescent" current is very small indeed, three milliamps. of no-signal current for a pair of pentodes capable of giving a maximum power output of over 1 watt being quite a normal figure. Compare this with a typical triode output valve rated at less than $\frac{1}{2}$ watt output and taking a mean anode current of nearly 20 milliamps.

Anode Current Fluctuations

With increasing applied signal voltage, the mean Q.P.P. anode current rises. Thus, during reception, the mean anode current goes through very considerable fluctuations. On a strong signal and at a moment of deep modulation, the mean current can be up to 30 to 40 milliamps., but—and this is the whole point of Q.P.P. working—taking an average over a period, the total drain on the H.T. battery is remarkably low, considering the power output which is obtainable. Furthermore, the user can have that comfortable feeling that the more he "turns down the wick" the less will be the H.T. consumption of his receiver. It is amusing to think of the number of people who think that this is so with any type of receiver, but it is certainly the case with Q.P.P., or Class B output. With regard to Q.P.P., it is a common fallacy among the non-technical to imagine that the anode current is always small. Considering the power output obtainable with Q.P.P., it would indeed be a miracle if this were the case, but the existence of such an idea has led many people to make the mistake of using unsuitable H.T. batteries with Q.P.P. receivers. The fact that the anode current peaks run momentarily to high values must not be disregarded, and the H.T. battery chosen must be capable of delivering these current peaks without appreciable voltage drop.

Triode output valves may be used in Q.P.P., but although such a system gives the typical Q.P.P. benefit of good power output with economy of H.T. consumption, it is probable that the designer will pass triodes in favour of pentodes, as the latter give much greater efficiency. Triodes are, however, used for Class B working. The general popularity of pentodes in Q.P.P. has led the valve manufacturers to give us the familiar Q.P.P. valve which really consists of two matched pentodes in one bulb. The connections of a standard 7-pin Q.P.P. valveholder (viewed from above) are shown in Fig. 6. Note that the two screens are internally joined together so that there is only one screen terminal.

From the details of Q.P.P. given above it should be appreciated that there is no balancing out of signal current components in the common H.T. feed line, so it must be anticipated that a receiver using a Q.P.P. output stage will need more extensive

THE AMATEUR SET DESIGNER

(Continued from previous page)

decoupling than one using normal push-pull.

The fact that, at any instant, the signal current component is flowing in one-half only of the output transformer primary has a considerable bearing upon the correct ratio for the output transformer. Actually, the plate-to-plate load is a "transformed load" for one valve, the centre tapped primary acting in itself as a transformer of 2 to 1 ratio. Thus the plate-to-plate load is four times the load for one valve. Inspection of valve data will reveal that the specified optimum plate-to-plate loads for Q.P.P. valves are comparatively high values. This is due not only to the internal transformer action of the centre-tapped primary, but is also due to the fact that the high biasing of the two pentode sections gives the latter greater impedance values than would be the case for ordinary amplification conditions.

The big variations of mean anode current are a necessary feature of Q.P.P., but it is most important that the anode voltage should not have similar wild fluctuations. This implies that the resistances of the external anode circuits must be kept as low as it is possible to make them. This consideration is another that has an important bearing upon the design of the output transformer, for it should be obvious that its primary resistance must be kept low, something of the order of 400 to 800 ohms representing what is required. The maximum permissible value is dependent upon the valve type.

The input transformer of a Q.P.P. stage must have a higher ratio than that suitable for P.P. The necessity for large signal voltage across each half secondary of the input transformer should be apparent when it is considered, first, that one valve is "dead" while the other is supplying power to the speaker and, secondly, that the biasing back of the valves to the foot of the anode current-grid volts characteristic gives a much greater length of characteristic to be covered for full output.

It is necessary to adopt corresponding measures to prevent rise of load impedance as we found to be necessary with single pentode output, and a capacity-resistance filter connected between the ends of the output transformer primary is a usual feature of a Q.P.P. stage.

Grid stoppers should be used (try .1 meg.) or, alternatively, a resistance in the common grid bias lead (try .2 meg.).

Class B Output

Class B is closely allied to Q.P.P. In the case of Class B, however, two small triodes are used with characteristics such that the operating point (near the foot of the characteristic curve as with Q.P.P.) is obtained either with zero grid bias or with a very small negative bias, according to the particular Class B valve used. A Class B valve, of course, consists of two matched triodes in one bulb. Fig. 7 gives the connections of the standard 7-pin valveholder, viewed from above.

The feature which is peculiar to Class B operation is that the two triodes are allowed to drive into grid current under the action of the signal voltages. When using a triode output, in other than a Class B stage, grid current must be avoided at all costs, as previously stated, but in Class B operation the grid voltages can be allowed to run right into the grid current range and no trouble is caused, with one most important provision. When the grid of an output

valve is kept negative so that grid current is never established we can regard the grid circuit as one of no power consumption, but once grid current is set up it imposes a power demand which has got to be met somehow or other. With Class B the difficulty is met by placing in front of the output stage an L.F. stage which is primarily intended to supply the power requirements of the grid circuits of the Class B valve. We usually refer to the pre-output valve as the "driver" valve, and it must be remembered, when planning the receiver, that the Class B output stage is essentially a power-consuming load on the driver stage. The driver valve will either be a small power valve or a valve of the L.F. amplifying type, according to the actual power demand of the Class B valve.

Before proceeding with further details it will perhaps be advisable at this juncture to deal with the "Q.P.P. or Class B"

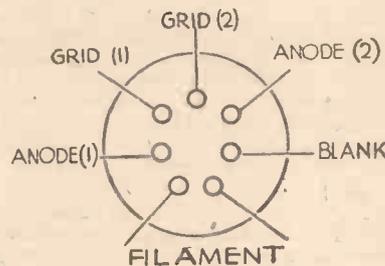


Fig. 7.—Connections of a standard 7-pin Class B valveholder.

question. It is rather a vexed question, too, and a certain amount of personal prejudice or preference is bound to colour any comments on the matter. There is one definite fact about Class B which may,

THE EXIDE MYSTERY

LAST week we published an illustration of a mystery exhibit on the Exide stand at Radiolympia. This consisted of what was apparently a perfectly standard 2-volt cell which gave a reading on any voltmeter of 6 volts. Visitors were very interested in this exhibit and many experts were heard to give their opinion as to how it was done. It is, of course, well known that the voltage of an ordinary single low-tension cell of the type exhibited is only just slightly over 2 volts. Exide make it quite clear that the millennium in accumulator design has not yet arrived, and the exhibit was merely a stunt to show what can happen to a cell under certain service conditions, and demonstrates how deeply the Exide people go into these things. A minute inspection of the cell gives no indication of the reason for the extra 4 volts and the Exide experts explain that it is possible for some such condition to arise accidentally in service—although the possibility is very remote.

The terminal pillars were purposely broken and compound put in the top of the cell so that a space was left between the "breaks" forming cavities round the broken ends. These cavities were filled with acid and the broken ends became "formed" by the passage of current on discharge and charge, and so became definite positive and negative electrodes. Although the two cavities possess very little capacity they furnish just as high a voltage on open circuit as a high capacity cell and, as the circuit is composed of three independent cells connected in series, the resultant voltage is six.

under certain circumstances, influence the designer against this system and that is the necessity for incorporating a driver stage in the receiver. The driver stage, however, must not be looked upon as a source of heavy current consumption for the grid power demand of a Class B valve is not heavy, and normally the driver valve can be kept fairly heavily biased. On the other hand, the driver stage must not be regarded in the light of a normal amplifying stage, contributing considerably to the over-all sensitivity of the receiver. From the latter point of view it is best to disregard the driver stage. Its job is to meet the grid power load of the Class B valve and no more should be expected of it.

The output transformer for Class B, like that for Q.P.P., must have a low primary resistance, something of the order of 400 to 500 ohms. As with Q.P.P., the plate-to-plate load is four times that for one valve. When a Class B valve is used (as distinct from two separate triodes) the optimum plate-to-plate load is readily ascertainable from the makers' data, and the output transformer ratio should, of course, be chosen accordingly. The conditions under which the triodes work in a Class B stage are responsible for a rise of effective load at the upper frequencies causing shrill reproduction unless corrective steps are taken. A capacity shunt may be used across each half of the output transformer primary. Equal condensers should be used and .005 mfd. represents a value that may be worth trial. Alternatively, two resistance-capacity filters can be used, one across each half primary.

The input transformer that couples the driver valve to the Class B stage demands special consideration for, unlike the usual inter-valve transformer, the driver transformer has to transfer power. There are two special requirements: first, that the ratio shall be such that the "transformed" grid circuit load of the Class B triode shall (when referred back to the primary) be the optimum value for the driver valve and, secondly, that the secondary resistance of the driver transformer shall be low. The latter requirement must never be disregarded. About 300 ohms is a usual value.

Only one-half of the driver transformer secondary is carrying grid current at any particular instant, so the centre-tapped secondary acts as a 2 to 1 transformer, just like the centre-tapped primary of the output transformer. Thus, the effective load across the whole secondary is four times the actual grid circuit load of one triode. N^2 times the effective load across the whole secondary must equal the optimum load for the driver valve, where N is the over-all ratio (whole primary to whole secondary). Usually a 1 to 1 ratio will be suitable, but sometimes the ratio required will be step down. The amateur may save himself some trouble by consulting the valve manufacturer, for the latter can advise him not only as to the best type of driver valve for a given Class B valve but also as to the correct driver transformer ratio.

Grid-stopping resistances must not on any account be used in the grid circuits of the Class B stage. Parasitic oscillations will, however, be prevented by the capacity shunts on the half primaries of the output transformer.

The tendency for high-pitched reproduction may necessitate employing a capacity shunt (or resistance capacity filter) across the driver transformer secondary, in addition to the anode shunts. There will be room for a little experimenting here.

Building a Beat-Frequency Unit

Constructional Details of a Useful Accessory Which May be Added to Most Types of Superhet for the Reception of C.W. Signals. By W. J. DELANEY

MANY amateurs are now using commercial or other types of superhet receiver and will no doubt have found that it is not possible to tune in a C.W. signal on this type of receiver. If you are anxious to pick up amateur transmitting stations using code signals, or if you wish to improve your Morse speed, you will, of course, require to pick up such signals. By using some form of back-coupling in the second detector stage you can receive these signals, and one of the simplest plans is to connect a wire from the anode of the second detector back to some part of the grid circuit. The position of the wire, and the coupling obtained, will govern the degree of feed-back or oscillation, and will thus control the pitch of the signal note which you hear. Alternatively, you can connect a very small neutrodyne condenser between anode and grid and use this for the purpose. This arrangement—whilst it works very well in the majority of cases—is not completely satisfactory, and a much better plan is to make use of what is known as a beat frequency oscillator. In its simplest form this consists of a valve arranged somewhat after the manner of an ordinary detector with reaction, and the anode circuit is connected through a small capacity to the grid circuit of the second detector. If the circuit is chosen to oscillate at a frequency slightly different from that to which the second detector grid circuit is tuned, then a beat note will be set up, and if the beat-frequency oscillator (abbreviated to B.F.O.) is provided with a variable tuner so that the resonant frequency can be altered, then the pitch of the note given by the code signal will alter, and this will prove of great value.

Cutting Out Interference

Sometimes it will be found when listening on the amateur band that another signal will be heard in the background of the particular signal you wish to hear, and it may be noticed that the note is very similar in pitch. If your receiver is provided with a variable B.F.O. you will be able to adjust this so that the beat note set up by the required station will vary, and it will be possible to make such a difference in the note of that and the interfering station that it will be quite a simple matter to read the desired signal. This circuit is, therefore, well worth the trouble of building, if you are keen to get some fun and experience out of your superhet. The requirements for a B.F.O. are a valve, preferably of the type which will oscillate fairly easily, a tuned circuit covering approximately the band covered by the I.F. transformer, and the associated resistances and condenser. The tuning adjustment may be carried out either by a microcondenser of very small capacity, or by a small condenser made up from a dismantled reaction condenser, using two or three plates only with a fairly

wide separation. A circuit of a suitable arrangement is given in Fig. 1, but there are several variations of this device which may be regarded here as in its simplest form. It is imperative to keep all of the wiring and components of this unit well clear of the remaining wiring of the superhet, and the coupling between the set and unit must be made by means of an extremely small capacity. By building the entire unit inside a screening can these requirements may easily be satisfied, and the following will no doubt be found the best means of making up a suitable unit.

Construction

Obtain from B.T.S., or any other firm specialising in the components, one valve or coil-screen, complete with lid. To the inside of the lid a standard valveholder of the chassis-mounting type should be bolted so that when a valve is inserted the remainder of the screen will fit over it and remain in position. A convenient point will have to be found on the chassis near the

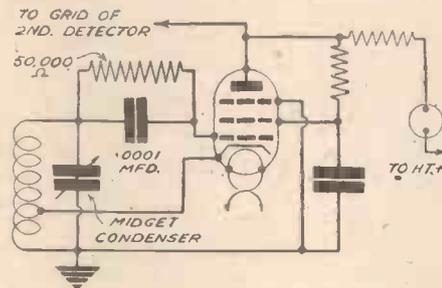


Fig. 1.—Circuit diagram of the beat-frequency oscillator.

second detector to accommodate this screening can, or alternatively it may be mounted on a very small chassis and the wiring for heaters and H.T. run through a screened cable to the receiver. In this case room may be found for the unit on the inside of the cabinet. To the top of the screening can attach the B.F.O. condenser, and attach the grid condenser and lead to the fixed terminal of the condenser. The voltage applied to the anode will depend upon the valve, and here it may be necessary to experiment with a view to finding the most satisfactory series resistance to use. It will be noted that a simple on/off switch is indicated in the H.T. lead, and this will be needed if the unit is installed permanently inside the cabinet, as it will enable the unit to be switched out of use when not required. If this is not done, then the H.T. lead will have to be disconnected to cut out the unit. For the coupling to the second detector the best plan is to make use of the twisted wire capacity such as we have used from time to time in band-pass tuners in sets described in these pages. A length of about 1½ in. of ordinary insulated

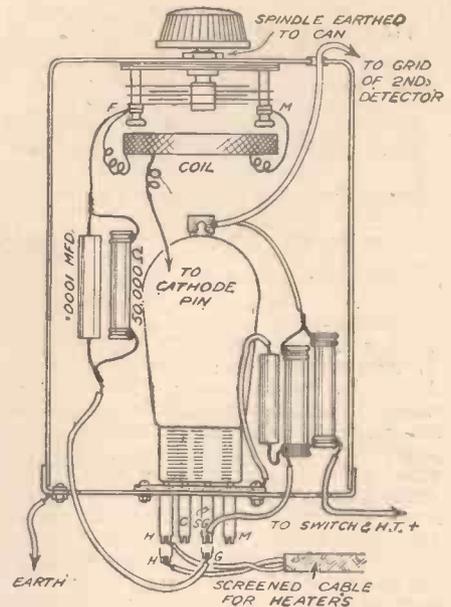


Fig. 2.—Proposed method of mounting valve and components inside a coil-screening can.

connecting wire will generally be found most suitable.

The Coil

The most important item in the circuit is the tuning coil, and this may be home-made, or one of the latest Wearite coils, designed especially for the purpose, may be used. This is known as type B-FO, and costs 1s. 6d. Alternatively, if you have on hand an old I.F. transformer of the frequency used in your receiver, you can take this down and use one of the windings—either primary or secondary. It would be preferable to use a tapped-secondary transformer winding, as this would enable you to make use of the tapping for the reaction winding. If this is not provided you will have to make a tapping, and to save unwinding the coil you can locate a suitable point by carefully scraping points on the edge of the coil until you locate a suitable one. Connection may be made temporarily and afterwards soldered. For those who wish to make their own coil the following details will prove suitable.

For the former a 1½ in. diameter tube is needed, and this may be a simple paxolin tube or a ribbed ebonite former. Three slots are cut in the latter, each ¼ in. wide and about the same depth, in which to wind the wire, but if the solid or smooth surface tube is employed three rings will have to be cut from paxolin or card board to enable the winding to be split into three heaps. Into each slot or section forty turns of 36-gauge d.c.c. wire should be wound. If desired, enamelled wire may be used, but in this case care must be taken not to damage the enamel surface and thereby introduce short-circuits. The tap should be made at two or three points so that the best connection may subsequently be found, and the most suitable tapping points are at the centre of the complete winding, at the end of one section (40 turns) and half-way through that section (20 turns).

In use, the unit is simply switched on, and the condenser on top of the can adjusted to produce the required pitch or note. If desired, of course, it may be so mounted that the condenser becomes a panel control, in which case the condenser is always available should it be found that a great deal of listening on the amateur bands is indulged in.

LOUDSPEAKER EXPERIMENTS

A Few Interesting Modifications Which can be Carried Out Without Difficulty and Which May Prove Worth While

IT is now possible to obtain quite cheap loudspeakers from certain dealers in surplus stocks, and in many cases it will be found that the diaphragm has been seriously damaged—hence the low cost of this type of surplus component. In some cases, amateurs also have a spare loudspeaker lying idle—perhaps because they have become dissatisfied with the results and have obtained a new one. These spare speakers may be used as a basis for some interesting experiments and may prove capable of giving really good results when modified in certain ways. If the cone is

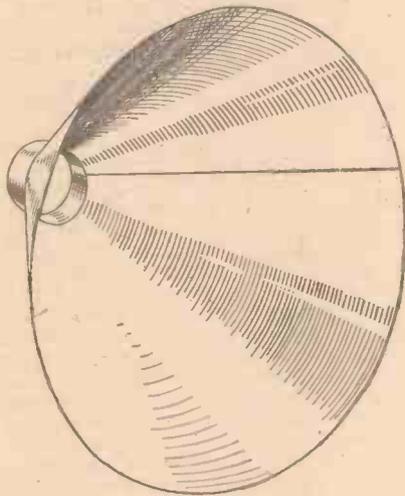


Fig. 1.—A straight cone seam.

destroyed, it will be necessary, of course, to fit a new one, and practically any good stiff paper may be used for this purpose. The method of joining the two edges of the cone may form the first basis for experiments, and it will be found, if a good amplifier is employed, that the reproduction obtained when the seam in the cone is straight as in Fig. 1, will not be so good as when the seam runs across the cone as in Fig. 2. Various forms of joint may be tried in this connection.

Split Cones

A feature which is now being more commonly employed is to use two separate cones for the reproduction of the high and the low notes. One very simple manner in which this arrangement may be adopted, and which will provide hours of interesting experiment, is to cut round the cone and to join the cut together again with a very thin, flexible material such as ordinary silk. In some cases thin paper may be used, but I have found that there is a distinct tendency to buzz when this is used and some form of silk or thin linen is preferable. In some earlier experiments ordinary thin rubber (obtained from a child's balloon) was employed but again this was inclined to buzz or give rise to chatter. The method of cutting and joining the cone is shown in

Fig. 3, and the two cut edges should be separated by a very slight gap. If the joining material is too thin the cone will not be held central in the gap, and thin strips of paper may then be joined at equal distances round the gap in the cone as indicated in broken lines in Fig. 3.

Dual Cones

The Philips receivers are this year fitted with a speaker which has a small narrow-angle cone attached to the centre and a paper cone of this type can easily be affixed to an existing speaker for experimental purposes. The attachment should

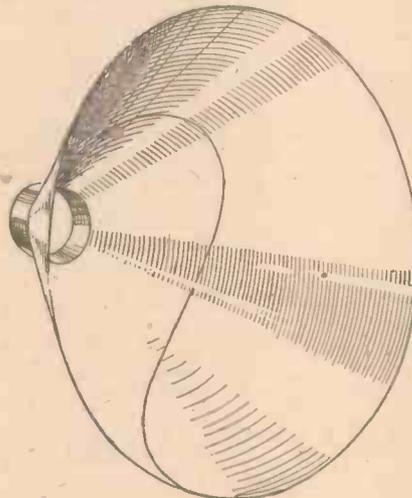
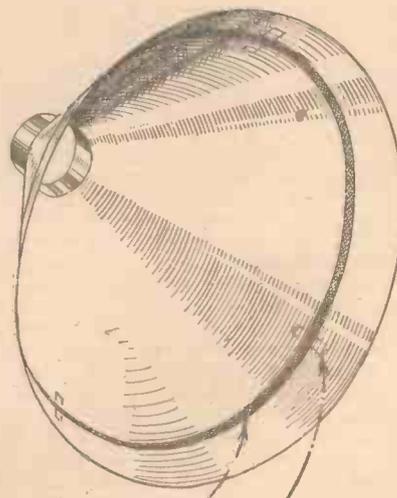


Fig. 2.—A spiral seam in the cone, as shown here, will be found an improvement.



THIN LINEN PAPER OR SILK STIFFENER

Fig. 3.—By cutting round the cone, and joining it together with a flexible material as indicated here, improved results may be obtained.

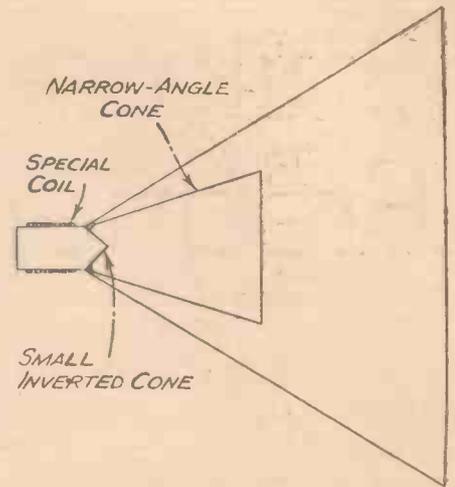


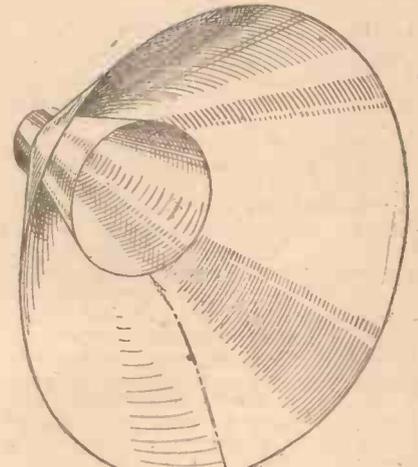
Fig. 5.—By closing the centre as shown here—the tone is modified.

be made by means of some form of cellulose adhesive, or alternatively a bottle of the special Speaker Repair Cement, supplied by Messrs. Holliday and Hemmerdinger, of Holmer Works, Dolefield, Bridge Street, Manchester, may be used. In experiments which I have carried out with this type of cone I have found that much better results were obtained when the centre of the cone was closed. A flat disc produced a peculiar form of lifelessness in speech, but a richness was imparted to music, whilst a shallow cone, fitted in with the apex pointing outwards as shown in Fig. 5, improved speech but did not seem so good for musical items. No doubt a compromise can be found and the shape of this will perhaps depend upon the angle of the small cone. The best length in the tests which I carried out was half the depth of the speaker cone.

Speaker Cabinet Designs

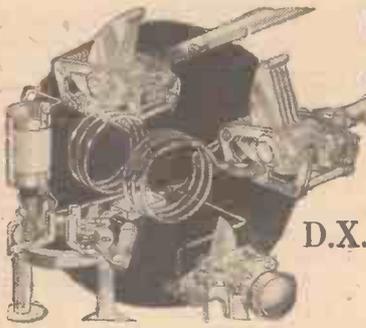
If the speaker is correctly designed it may even then fail to produce the best results due to the wrong design of cabinet. A great deal depends upon the air loading on the cone, and it will be found that in many cases the advantages of a really good baffle—produced by a nice large cabinet—are offset by the large radio or amplifier chassis which is enclosed within it. This obviously means that a separate cabinet for the speaker is required, and this will, in

(Continued on page 19)



NARROW-ANGLE CONE

Fig. 4.—A small, narrow-angle cone, mounted inside the normal cone for improved top-note response.



Short Wave Section

D.X. LISTENING ON THE ULTRA-SHORT WAVES

THE perfect ultra-short-wave receiver has yet to be designed, nevertheless, slowly but surely ultra-short-wave technique is evolving its own particular type of receiver, somewhat different from that used in normal broadcast practice. During the last few weeks the writer has been receiving the B.B.C. television signals at a distance of over 100 miles from the Alexandra Palace, and has therefore had ample opportunity to study the effects of comparatively long-distance reception on the ultra-high frequencies.

In view of the above remarks it would appear that ultra-short-wave reception is by no means confined to within optical or quasi-optical distances from the transmitter; reception of amateur signals across the Atlantic on 5 metres definitely proves this, though naturally such reception may be put down to freak conditions. Even so, given a receiver of sufficient sensitivity it should be possible to tune in the television signals from the Alexandra Palace almost anywhere in Great Britain. This reception does not apply to vision but only to the sound transmission. Receiving vision proper, at long distances, is hardly possible at the present stage of television technique; neither the receivers nor the transmissions themselves are equal to it.

Intermediate Frequency

Those who are interested in long-distance reception on the ultra-high frequencies will be aware that, as in broadcast reception, the superheterodyne principle of receiving has the greatest possibilities. If, however, the experimenter converts a standard superhet to receive on the ultra-short waves merely by substituting suitable coils and tuning condensers, he will find it extremely difficult to receive any stations at all. The most important point here is the choice of the intermediate frequency. To obtain easy tuning, even when working down to 5 metres, the wavelength of the intermediate amplifying stages must not be above 50 metres, which represents a frequency of about 6 megacycles.

Any suitable intermediate frequency in this region can be chosen, and it is quite easy to wind suitable I.F. transformers. As a guide, thirty-five turns of No. 30 d.s.c. wire on a 1in. former will give an I.F. wavelength of about 45 metres, both primary and secondary being close wound and spaced $\frac{1}{4}$ in. to $\frac{1}{2}$ in. from each other. There must not be any capacity added to either winding, as the capacity due to the windings themselves will be sufficient to peak the frequency. Where it is desired to use several I.F. stages, there is an alternative method of coupling the I.F. valves. Instead of using the conventional transformers, resistance capacity coupling may be used.

R.C. Coupled Stages

Here, a word of explanation is necessary, as it may not be apparent how the superheterodyne principle of amplifying at an intermediate frequency is obtained. The

connecting of the R.C. I.F. stages is similar to ordinary audio R.C. coupling, but the capacity of the coupling condenser is very much smaller so as not to pass the audio frequencies, though no impedance is offered to the radio and supersonic frequencies. The curve of such an I.F. stage will be

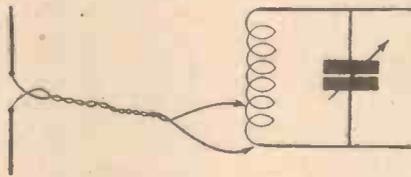


Fig. 1.—Showing the method of tapping feeders from a dipole aerial direct into the grid circuit.

comparatively flat, and will cover a wide range of frequencies. The amplification that is obtained will entirely depend on the values of the coupling components, and is not a function of frequency as in the case of transformer-coupled I.F. stages.

Several stages of R.C. coupled I.F. may be used with excellent stability. It is therefore obvious that this type of I.F. amplification is particularly adapted for use in an ultra-short-wave superhet. One commercial concern has already on the market a special ultra-short-wave superhet, using resistance coupling all the way

coupling could very conveniently be combined when using two stages of I.F. amplification. Fig. 2 shows a suitable circuit which could very easily be made up in the form of an experimental I.F. unit. It will be seen that the first stage consists of suitably valued components for resistance coupling, and the second stage is transformer-coupled to the second detector. An I.F. transformer wound up on the lines already given will do very well, though when using an intermediate frequency in the region of 6 megacycles it will be necessary to broaden the response curve out somewhat by means of resistances across both primary and secondary. It may be necessary to experiment with the value of these, though 10,000 ohms will be found quite suitable for a start.

The reasons for using transformer coupling in the second stage of this I.F. unit are twofold. First of all a little more amplification can be obtained than with the resistance-coupled method, and also it is very easy to add regeneration to the second detector, if necessary, by means of the usual coil and condenser, and, hence, both amplification and selectivity may be controlled to a certain degree. It will be seen that the two I.F. valves are H.F. pentodes, which type of valve is, of course, absolutely necessary here. Any make can be used, though there are one or two specimens on the market which have a very high μ and are particularly suitable.

It will be observed that the I.F. and second detector stages only of an ultra-short-wave superhet have been considered here. There are several first detector oscillator circuits suitable for ultra-short-wave reception, and these will, no doubt, be familiar to the experimenter (making use, for instance, of a triode-hexode valve), but as these circuits require special treatment, they will not be dealt with here. As a matter of fact, an autodyne will give very good results on the ultra-short waves; that is to say, a simple reaction circuit which will act as a combined oscillator detector.

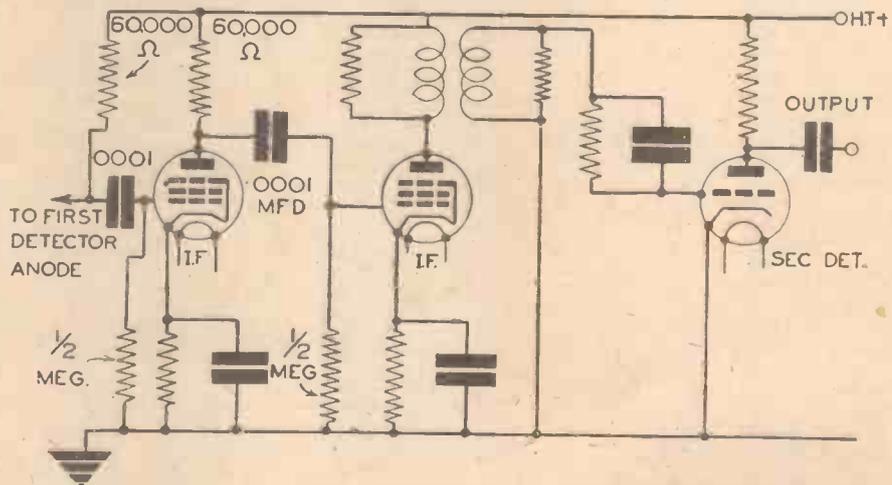


Fig. 2.—Circuit diagram of a two-stage I.F. and second detector unit for an ultra-short-wave superhet, using R.C. coupling in the first stages.

through, and it is predicted that this type of receiver will become very popular before long, owing to its excellent D.X. possibilities.

An Experimental I.F. Unit

Turning once again to suitable I.F. stages for ultra-short-wave superhets, it is thought that both transformer and R.C.

Noise Silencing

One interesting feature of an ultra-short-wave superhet is the noise level, which, unfortunately, is apt to be rather high in a receiver using six or eight valves. However, when a signal is tuned in, a certain amount of this background noise disappears, even at D.X., and gives one the impression that

(Continued overleaf)

SHORT-WAVE SECTION

(Continued from previous page.)

a super-regenerative receiver is being used. To make long-distance listening really effective on the ultra-high frequencies, some form of noise silencing will have to be evolved, otherwise weak signals are still apt to be lost in the background mush.

When listening for long-distance transmissions with an ultra-short-wave superhet, it is most essential to use an aerial cut to frequency. Although an ordinary broad-

cast aerial will bring in signals, there is a 50 per cent. increase in signal strength when using a tuned aerial system. When erecting experimental aerial systems, it is generally convenient to use ordinary lighting flex for feeders, instead of the more expensive concentric cable or spaced feeders. When using the twisted flex an increase in signal strength can be obtained by tapping the feeders on at the low potential end of the grid coil. One end of the feeder is taken direct to the earth side of the coil, while the other should be tapped about half a turn up the coil. The best

results can easily be determined by experiment, of course, as the tapping point will vary with the detector circuit used. (Fig. 1.) There is no doubt that for long-distance listening on the ultra-short waves a superhet receiver of the type already outlined has many advantages, and if progress is to be made in breaking down the distances that can be covered on the ultra-high frequencies, the simple super-regenerative type of receiver must give way to specially designed superhets of high sensitivity, as ultra-short-wave transmission and reception represents radio in its most advanced form.

Leaves from a Short-wave Log

League of Nations Broadcasts

BETWEEN September 13th and October 3rd, during which period the League of Nations will be holding an Assembly, the Frangins transmitters will broadcast daily, in various languages, a précis or news bulletin in which will be fully described the work which is being carried out. The stations to take this service are: HBL, 31.27 m. (9.59 mc/s); HBP, 38.48 m. (7.78 mc/s), to which will be added HBF, 15.83 m. (18.95 mc/s); HBJ, 20.64 m. (14.535 mc/s), and HBO, 26.31 m. (11.402 mc/s). These, so far as broadcasting is concerned, have only been brought into operation for the relay of programmes from European centres to the United States of America and other distant parts of the earth.

Transmissions from the *Normandie*

Arrangements have now been made to carry out broadcasts from this crack trans-Atlantic liner on the following dates: September 18th, 22nd, 23rd; October 2nd, 6th, 7th; November 3rd, from G.M.T. 16.00-16.30. On September 20th, and on October 4th and 18th, special transmissions will be made between G.M.T. 11.00-11.30. According to circumstances and conditions prevailing at the time two of the following channels in regular use by the *Normandie* will be chosen, namely 65.72 m. (4.565 mc/s), 33.98 m. (8.83 mc/s), or 22.29 m. (13.457 mc/s). As these are the frequencies adopted for ordinary traffic with Pontoise (France) on or before the dates mentioned above, listeners will, no doubt, be interested in picking up experimental tests. Communication between the French land station and the liner is carried out regularly on 74 m. (4.225 mc/s), 38.96 m. (7.70 mc/s); 33.19 m. (9.04 mc/s); 24.56 m. (12.215 mc/s), and 23.08 m. (13 mc/s). The broadcasts will be passed over for re-transmission to French and other European listeners through the P.T.T. network.

New South African S.-W. Stations

It is reported that a 5-kilowatt transmitter has been installed at Pretoria and that tests are now being made at irregular intervals on 33.71 m. (8.9 mc/s). It is also stated that the African Broadcasting Corporation is experimenting with a new short-wave transmitter at Cape Town; the channel is 49.83 m. (6.02 mc/s).

WIXAL's Twin-beam Transmissions

WIXAL, Boston (Mass.), owned by the World Wide Broadcasting Corporation, is endeavouring to obtain a permit from the

U.S.A. Federal Communications Commission to operate an additional 10-kW station to supplement the 20-kW transmitter already in existence. Two of WIXAL's channels with new equipment of a series of beam aerials will be brought into operation as soon as possible, for the relay of programmes to the South American continent.

Plethora of Italian Signals

On the short-wave bands, listeners now

Tripoli, Libya, and Ethiopia (Abyssinia) through IBC, 17.03 m. (17.62 mc/s); IBT, 18.44 m. (16.27 mc/s); IBS, 20.72 m. (14.48 mc/s); IBD, 24.99 m. (12.005 mc/s), and IBF, 33.08 m. (9.07 mc/s).

Egypt Wants a Powerful Short-waver

The Egyptian Government is considering the installation of a 15-kW short-wave transmitter in the immediate neighbourhood of Cairo for the purpose of relaying the Arabic programmes broadcast by the main station to all parts of the world. One of the most popular features of the day is the reading of excerpts from the Koran, and it is believed that for this portion of the programme alone the construction of a special transmitter would be justified.

RADIO FROM MOUNT SNOWDON



Mr. William Jones, of Colwyn Bay, recently broke the British transmission record for a two-way contact on the ultra-short wavelength of 5 metres. With the assistance of three companions Mr. Jones operated his transmission station GW6OK on the summit of Snowdon in connection with a series of special tests organised by the Radio Society of Great Britain. Contact was established with several 5-metre stations and the tests are proving of great value. The illustration shows the radio enthusiasts at work on the summit of Snowdon.

find numerous Italian telephony stations at all times of the day and night; they are in communication with either shipping or with the African colonies. The channels worked by IAC, Coltano (Pisa) are: 16.89 m. (17.75 mc/s); 16.95 m. (17.699 mc/s); 23.32 m. (12.865 mc/s); 45.20 m. (8.515 mc/s), and 68.79 m. (4.355 mc/s). The last named carries the traffic to Italian ships in the Mediterranean. In addition, Rome-San Paolo may often be heard working with

New Aerials for Boundbrook

The N.B.C. short-wave transmitter at Boundbrook (New Jersey) is being equipped with new directional aerials which should mean much better reception of the broadcasts by European listeners. The power of the signals now transmitted by this station on 16.87 m. (17.78 mc/s), and 49.18 m. (6.1 mc/s), is already much improved, and in the near future a considerable increase in strength should be noted.



On Your Wavelength



By Thermion

New President of the B.L.D.L.C.

BEHOLD in me, the one and only Thermion, the new President of the British Long Distance Listeners' Club, at your service and ready to turn a willing hand to any job which comes along in connection with it. Its members, I see, are located in all quarters of the globe, and I shall welcome letters from every member and, moreover, promptly reply to them. Everything within my power which can be done to further the interests of a club, which has a larger membership than any similar organisation in the world, shall be done. I have been approached on many occasions to become President of this, that, or the other society, and I have for various reasons had to decline the honour. This particular Presidency I accepted with alacrity, for it is a national organisation and

one to which I propose to devote considerable time and attention. So I should like to make your acquaintance, and if you have time to drop me a letter I hope you will do so.

Service Charges

IN our issue dated September 4th I published a letter from C. H. R. N., of Kington, Herefordshire. I am asked by Messrs. S. G. Brown, Ltd., the makers of the well-known headphones, to state that they have not charged the sum of 12s. 6d., either to this reader or his dealer, for the repair of his earpiece. They have carefully checked their records and they are able to offer proof beyond all doubt that if C. H. R. N. is under the impression that this charge was made by Messrs. S. G. Brown, Ltd., the impression is erroneous. Perhaps C. H. R. N. will communicate direct with Messrs. S. G. Brown, Ltd., or get his dealer

to do so, as a mistake seems to have occurred somewhere.

A Generous Offer

I HAVE received a very generous offer from Lt.-Col. Puck-Beresford. Since 1921 he has been an enthusiastic set constructor, but as he is moving to a new district he has on hand a great deal of wireless apparatus, much of which is perfectly sound and usable. He wishes me to find a suitable home for it, and I cannot do better than suggest that wireless clubs, or boys' institutes, or working men's clubs should write me a letter setting forth particular reasons why they should receive it. I will consider each letter and act accordingly. Incidentally, Lt.-Col. Puck-Beresford, who called at the Stand for me at a time when I was not there (the inner man has to be satisfied sometimes!) tells me that he is one of the few people who does *not* want to meet me, as he is content to read my articles each week and enjoy them, except when I rant against subjects with which he is in disagreement.



The "Practical and Amateur Wireless" Stand at Radiolympia—a popular meeting-place for all constructors, where all their technical needs were satisfied. "Thermion" was in regular attendance, and stood at the left-hand side, behind the front counter. No attempts were made upon his life and his copy appears, as usual, this week.

Show Attendances

ALTHOUGH the official figures indicate that the daily attendances at the Exhibition are fewer than last year, it is significant that the attendance at our Stand was greater. Does this indicate a revival of home construction this season? Judging from the sale of blueprints and issues in which construction is dealt with I should say that it does; and I hope that this great increase in business will not catch the manufacturers of components unawares, as it has done in the past. The complaints regarding lack of delivery and long delays has been chronic during the past year. The manufacturer can now make amends. In any case he should not accept orders which he cannot execute within a few days. I hope also that there will be fewer complaints of wrong parts being supplied, and that the standard of inspection will be even higher than it has been hitherto.

Publicity

ALTHOUGH some new artistes complain of the lower pay they receive from the B.B.C., it is my opinion that many of them are grossly overpaid, particularly the unknown ones, for the B.B.C. does them a good service in lifting them from obscurity and providing them with opportunities and publicity which the stage would never accord them. Their voices may be good and their patter excellent, but their stage appearance and deportment are simply abominable. You can prove this by comparing the number of successful B.B.C. artistes who have deserted broadcasting and gone on to the variety stage. Very few of them are really successful. They draw a crowd for a couple of nights, but the crowd does not go to see them because of their ability as artistes but merely out of idle curiosity to see what they look like. Nearly always the public is bitterly disappointed. What is going to happen when television is the accepted form of radio entertainment? Surely many of those artistes who have only their voices upon which to rely will be out of engagements. The fact that they continue to broadcast indicates the truth of the old adage that anything will succeed if you plug it enough. You can make the public believe that a thing or a person is good even when it is rotten. A band leader will announce that he is going to play "That very popular number . . ." whether it is popular or not. Having told you that it is popular you believe it without question. What the band



Notes from the Test Bench

Problem No. 259

WE were surprised by the number of incorrect solutions that were received in connection with this problem. Readers were asked to decide the disadvantages of using A.C. valves in place of the A.C./D.C. type, and the component substitution necessary when making a modification of this nature. A very large proportion of readers stated that the value of the mains dropping resistance would have to be increased owing to the increase in current consumption of the valves! In practice it is not advisable to use A.C. 4-volt 1-amp. valves in place of the normal A.C./D.C. type. The latter have a consumption of .2 amp. for most makes, and, therefore, if the valves are connected in series the total wattage dissipation will be one-fifth of the mains voltage considered as watts, plus the H.T. consumption. With 4-volt 1-amp. valves in use the L.T. consumption is increased five times. This increase in current consumption necessitates a reduction in the value of the heater dropping resistance, and the wire used must, of course, be capable of carrying 1 amp. Apart from the fact that the use of 1 amp. valves increases the consumption, the heat dissipated is excessive and the cabinet is likely to be damaged.

The Oracle Coil Unit

SOME readers are experiencing difficulty in operating the wave-change switch on the Oracle. With this type of switch the position of the locating plate with respect to the switch contacts inside the coil unit must be correctly adjusted before the plate is locked. For example, if the coil switch is set at the short-wave position, the spring contact must rest in the corresponding groove of the locating plate. After the correct position has been found, the plate must be securely locked, by means of the fixing nut, to the component bracket, and when the spindle is rotated the locating plate must remain quite rigid.

Class B, Q.P.P., or Push-pull?

IF best quality of reproduction is desired from a battery-operated receiver, a straight push-pull output stage should be used—preferably two power valves. The current consumption is somewhat high when this circuit arrangement is employed, however—about 15 mA for the output valves if two power valves are employed. H.T. current economy can be effected by using a Q.P.P. or Class B arrangement, but the quality will be definitely inferior to that obtainable from straight push-pull.

leader really means is that he has received a nice fat fee from some music publisher to plug the song, and because he continues to play it you presume that it is popular. If he took the trouble to take a census of popular opinion he would find that the public hates the song. If a song is popular it does not quickly die, and the average life of the so-called popular number is only a few weeks. You cannot say that songs which are so ephemeral are popular. If they are popular will you please define to me an unpopular song? And what is the essence of unpopularity? A short life, surely! Another point: Why should I be compelled to listen to a song which the conductor says he has been "requested" to play. Because one person asks him to play a particular number, has the conductor any right to presume that everyone wishes to hear it? And why should one person be specially favoured in this way? And ought not we to be told who has made the request? It may be just a subtle way of saying that he has been requested to do so by the music publisher, who has complained that it has not been sufficiently plugged. And do, please, save me from the conductor who says "We will now play you" instead of "We will now play to you." I do think that before a conductor is allowed to announce he should be given some lessons in English and elocution; perhaps electrocution is the word I should have used.

Band conducting is the most over-rated, overpaid occupation in the world. I will not call it a profession, as I should have to apologise to all the other professions. The average bandsman is a person attracted to the job by a desire to do as little work as possible for as much money as possible. The sort of person who likes dancing because it puts him amongst the ladies, and who plays tennis because it enables him to dress up in flimsy, feminine attire and play pat-ball with the ladies. Tennis, like crooning, is just an occupation for the effeminate. Rude letters relating to this paragraph will be dropped into the W.P.B., for all intelligent people will agree with me.

Another Record Broken

I AM told that among the records broken at Radiolympia this year is the amount of technical literature carried away by visitors. More than 60,000 brochures and leaflets were taken from the G.E.C. stand alone. Literature concerning the £35 television unit was in the greatest demand.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Clock-dial Tuning Indicator

THE accompanying sketch, Fig. 1, shows how a clock-dial tuning indicator can be made from a cheap watch which has ceased to function as a time-keeper.

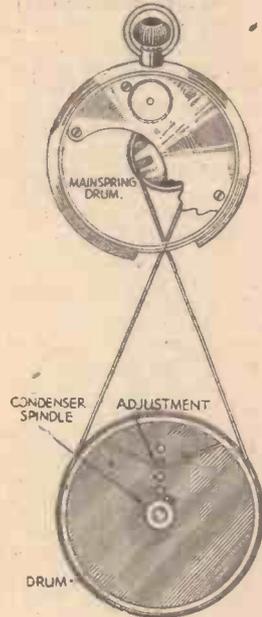


Fig. 1.—General arrangement of a clock-dial tuning indicator.

First of all, the back plate screws are slackened a little, and the balance wheel and intermediate pinions are removed. A slot is cut at the bottom of the casing to allow the cord to pass through, as shown in sketch. In the watch I used, when the mainspring drum was rotated, the hands of the watch turned through four hours per revolution, so I made the driving drum on the condenser spindle three times the size of the mainspring drum. The cord is passed over the mainspring drum, crossed over, and then passed twice round the driving drum. It is necessary to cross over the cord so that a clockwise rotation of the condenser will turn the hands of the watch in the correct direction. The ends of the cord are passed through holes in the drum and tied together, and adjustment in tension is made by means of the holes drilled on the drum,

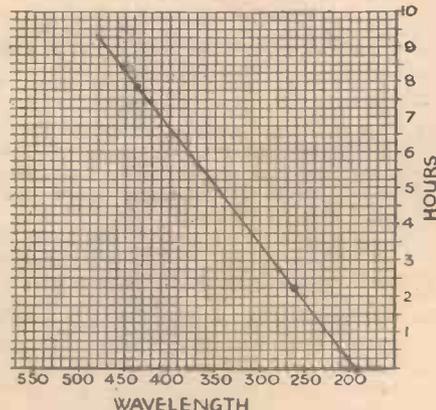


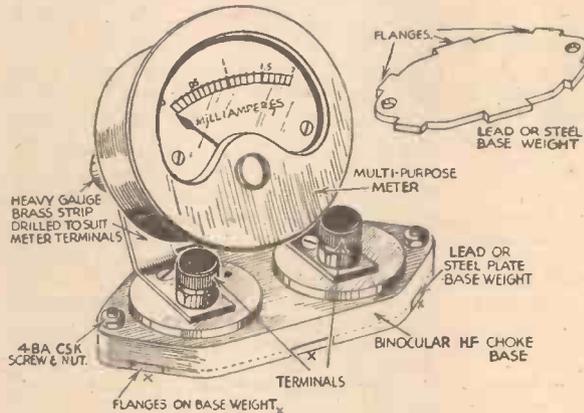
Fig. 2.—Graph showing the relation of dial readings to wavelength, and used in conjunction with the clock-dial tuning indicator.

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., Tower House, 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 wrinkles.

as indicated. A small pin under which the cord is passed can be inserted into whichever hole is suitable.

To ensure that the cord shall not run off the drum in the watch it is desirable that a piece of rounded tin be inserted at the back of the slot in the watch and rounded



A handy weighted meter stand.

off to prevent wear on the cord, which can be made to bear lightly against it by adjusting the position of the drum on the condenser spindle.

A graph, showing the relation between the reading of the dial to the wavelength to which the condenser is tuned, can be drawn, as in Fig. 2. Taking any two stations of known wavelength and marking their position on the graph by means of the position of the hands of the watch when they are tuned in, a straight line drawn through these two positions will show at a glance the setting of the dial for other wavelengths.

Initial setting of the hands of the watch can be carried out by the ordinary working of the timepiece.—J. H. MARR (Bathgate, West Lothian).

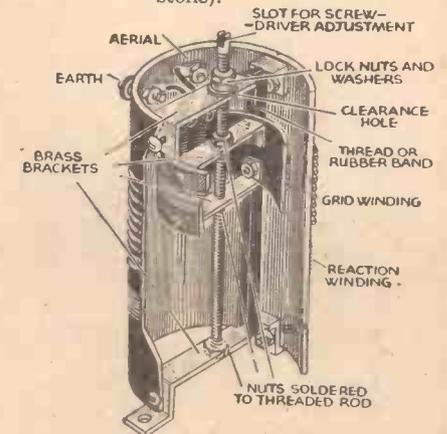
A Simple Meter Stand

THE simplicity and attractiveness of this idea will be evident from the accompanying sketch. I have adapted this fitting to meet many requirements which would otherwise be difficult, and with an element of danger to an unmounted meter. The assembly is self-explanatory, but with regard to the weight, this should be constructed of thick steel plate or lead,

allowing, of course, sufficient room for the locking nuts of the terminals, the shanks of which, in my case, are cut down low. Owing to the moulding being reinforced where the weight-fixing screws are fitted, this must be drilled to accommodate the nuts to avoid fouling the base edge, and possibly causing the fitment to be unstable.—S. R. CHARLES (Morden).

Adjustment for Aerial Coupling

WHILE experimenting with my short-wave receiver I found it advisable to have a form of adjustable aerial coupling. This I did by putting the aerial coil on a separate former which could be made to travel up and down on a threaded rod inside the grid and reaction windings. The materials needed are a piece of threaded rod about 5in. long, four brass strips, and some small nuts and screws. The brass strips are bent and assembled to the formers as shown in the sketch. The right-hand bottom screw in the small former is fixed with the head inside the former and is longer than the others. The projecting part of the elastic band or thread, and this prevents the small former from turning while adjusting the coupling. The protruding part of the threaded rod is slotted with a hacksaw so that adjustment may be carried out with a screw-driver. This considerably lessens the effect caused by the hand being near to the coil.—P. WATSON (Wealdstone).



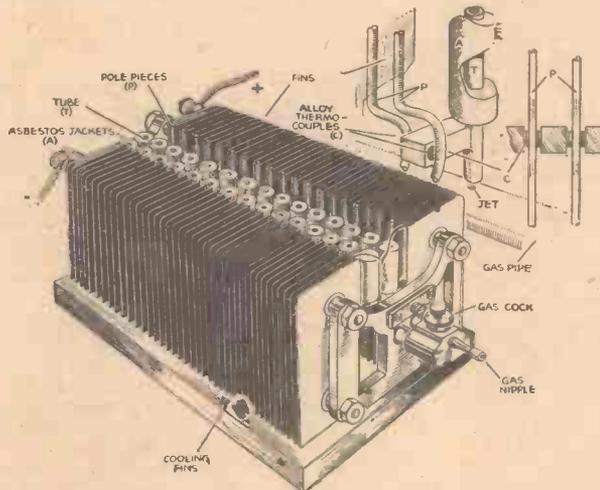
This sectional view shows a method of adjusting an aerial coupling.

WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA

5/- or 5/6 by post from George Newnes, Ltd., Tower House, Southampton St., Strand, London, W.C.2.

BY now a large number of our readers will have been to Radiolympia and made a careful survey of the exhibits. Those who have been unable to attend will have gained a very good impression of the items which were on show by studying the comprehensive reports which have appeared in these pages.

Nevertheless, we feel justified in giving you some of our impressions of Radiolympia. They may not agree with your own, but you would probably find it impossible to find any two persons whose reactions to the show were identical. Let us say right away that we visited the exhibition as constructors—not as students of handsome electro-mechanical furniture. Our first impressions were that the public showed far less interest in new receivers than they did a few years ago. The time

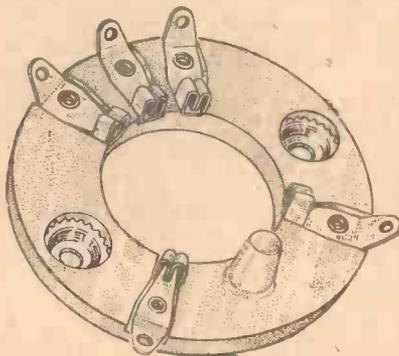


Something new—the Milnes thermo-charger, which operates from the gas supply.

has arrived when the wireless industry and science is awaiting a new lead from constructors and experimenters.

A New Lead Wanted

In previous years when new sets were of chief interest because of the novel circuits which they incorporated they attracted a considerable amount of attention; this year visitors could see little beyond attrac-



New Clix ceramic acorn valve holder for 60-degree and 90-degree anode-grid spacing.

tive woodwork and a few—quite a few—well-polished chassis. Many may differ from our views, but we think that manufacturers would do well in future years to concentrate more on the technical features of their sets than merely upon their new tuning controls and scales.

SHOW AFTER

“The Experimenters” Look Back at the Show and Describe Attraction. Naturally, Most of their Time was Spent in Ex-

In short, there must now be a new wave of technical publicity. At the same time, we consider that the time is ripe for a new era in home construction. There are fewer manufacturers of components than there were, but those which remain are able to supply the most exacting requirements of the public. You might call it a survival of the fittest, for the component people who are still in active production are certainly “fit,” and we see no reason to suppose that they are other than prosperous. They merit our support—and yours.

Electricity from the Gas Pipe

If we were asked what item in the whole of the exhibition fascinated us most, we should find it difficult to give an answer, but there was a unit on the Milnes Radio stand which was definitely intriguing. For years there has been talk of operating a wireless receiver from the gas supply. In most instances any such suggestion has been derided, but at last it has been shown that what might

be called a foolish dream has come true. It is a long time since Milnes introduced their special H.T. accumulator that can be charged from the L.T. accumulator, and this unit has proved its value. But even the L.T. accumulator has to be charged; and that means that a source of electrical power is needed. Thus, a person living out in the wilds was still dependent on a charging station.

But now (or at least very soon, for the device is not ready for marketing in numbers at the moment) you can buy a generator of electricity which operates from the ordinary gas supply. The output is up to 3 amp., which is adequate for charging quite a large-capacity battery. Thus, you light the burners and charge the L.T. accumulator, and then use that to heat the filaments and also to keep the H.T. unit fully charged. Sounds incredible, doesn't it, but it's true. The principle is that of the thermo-couple, which some of you will remember from your school days. Two strips of dissimilar metals are placed together and heat is applied to their junction; as a result, a potential difference is set up between them.

Thermo-couple

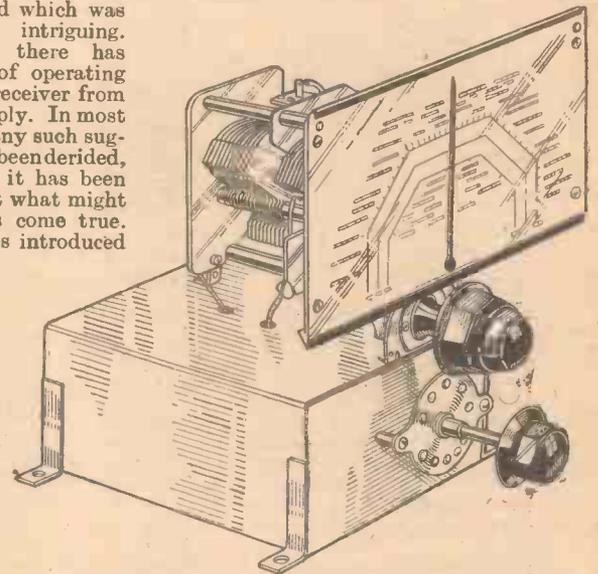
In the school experiments, it was shown that if the metals were connected to a very

sensitive galvanometer a reading could be obtained when the metals were exposed to a source of heat. But the principle has always been extremely difficult to apply in practice, because of the infinitesimally small current and voltage which could be produced. By using a number of thermo-couples of special design, Milnes have been able to obtain just the effect which has been sought for at least fifteen years.

By the way, please do not write to ask us for constructional details of a device such as this. If we wanted, we could not possibly tell you how to make one. It has taken a very long time to perfect, and a patent has been applied for in connection with it.

Your Own All-wave Coil

On the Wearite-Polar stand we “met” an attractive line in the form of miniature, high-efficiency unscreened coils. They are about $\frac{3}{4}$ in. overall diameter and less than $2\frac{1}{2}$ in. total length, and can be obtained in eight sizes to cover all wavebands from 12 to 2,000 metres. Moreover, the price is only



The J. B. “Linacore” tuning unit, which has a station-calibrated scale.

1s. 4d. for the smallest sizes, up to 1s. 9d. for the largest. They are made to specified inductance values, and can be used in any numbers and combinations to produce a complete multi-waveband tuner covering any desired ranges.

Besides being made in “ordinary” types for aerial and inter-valve tuning, they can be obtained as H.F. transformers or as superhet oscillator coils. In every case complete sets can be matched with complete accuracy by means of midget trimmers, which can be soldered directly to two of the connecting tags. They certainly open up interesting possibilities for the constructor and experimenter.

THOUGHTS

Some of the Exhibits that they Found of Particular
 Interesting Home-Constructor Components and Accessories

5-10-Metre Tuning

While on the subject of all-wave tuners (and this subject seemed to permeate the whole show this year) we must mention the new Bulgin unit which covers the five

number of years. They have coils, condensers, valveholders, and everything else that the short-wave constructor requires; their booklet also is interesting, for it shows how a standard B.T.S. chassis can be used for building a number of alternative receivers. Some of these we studied at Radiolympia, and found them particularly interesting. A special feature is that the aluminium chassis is drilled and stamped in such a manner that any component can be fitted without further drilling being required.

Calibrated Tuning Pack

Jackson Bros. have always been friends of the home constructor, so we could not resist going over to their stand. Most important of their new components is the "Linacore" all-wave tuning pack. It is for use in super-het circuits, and comprises a complete screened coil assembly, tuning from 16.5

to 51, 200 to 550, and 800 to 2,000 metres, a double-gang condenser, and a rotary switch. It has a full-vision tuning scale of ample proportions, and this is station calibrated. It is designed for the popular I.F. of 465 kc/s. As every unit is accurately trimmed and adjusted before leaving the works, the construction of a highly-efficient modern receiver is as easy as it could be.

Varleys had their usual wide range of components, but here again we were struck by the new double-gang three-band super-het coil unit, which costs 19s. 6d. The short-wave range is from 18 to 45 metres, this being additional to the two broadcast bands. There is a neat, chassis-mounting I.F. transformer for use with it, and this is fitted with convenient through-chassis flexible-lead connectors.

Stopping Static

After spending a considerable amount of time at the Belling-Lee stand we found

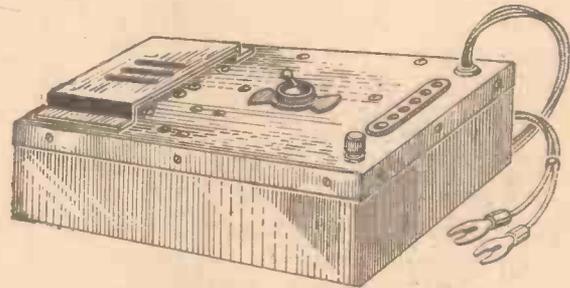
that there were still many items that we had not seen. Anyhow, we did come to the conclusion that they have devices for preventing any and every form of electrical interference that could possibly be experienced, even if the set had to be used in the Barking power station. By means of a cathode-ray tube, they showed you just what interference is, and what effect the various suppressor devices have. This firm tackled "man-made static" in a very thorough manner, and they can be considered as among the foremost experts in this branch. But they still make millions of small connectors, spade terminals, and wander plugs which you and we have used ever since we took up radio.

Super Anti-vibration

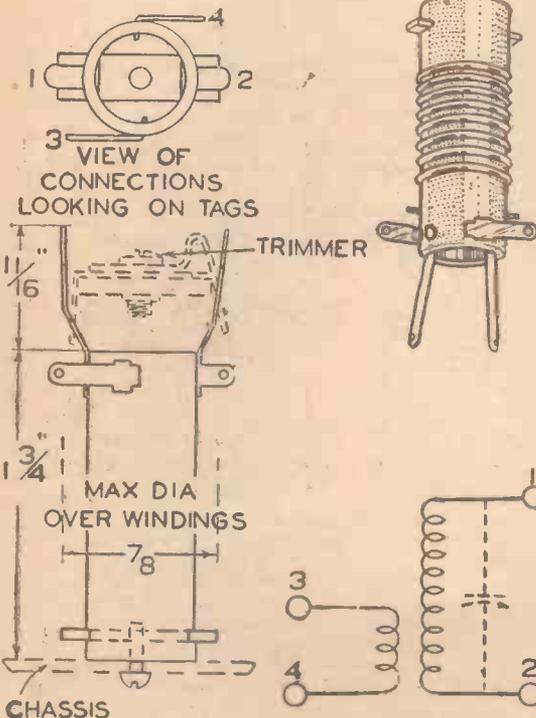
On the Cossor stand we came across an

by The Experimenters

bands: 5-10 metres, 12-85 metres in two ranges, and the two broadcast bands. Quite small, and fitted with high-efficiency rotary switch bases, these tuners cost 21s. for aerial tuner and 30s. as oscillator coil. Both are matched, and a square switch rod can be fitted to operate as many units as necessary at the same time. We have previously stated that all-wave coils of the future must include the television band; well, here we are. Even if you are not greatly interested in television as such, you will like to receive the sound portion of the transmission, as well as listen to the many



New Bulgin vibrator eliminator—it supplies H.T. from the L.T. source.



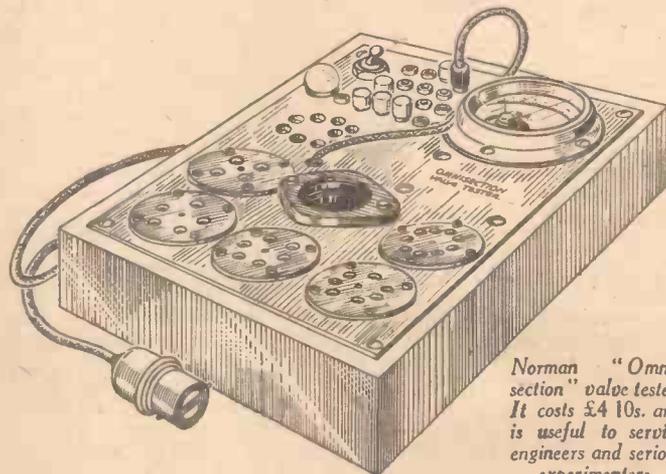
Principal details and dimensions of the Wearite type P coils for use in all-wave sets.

amateurs who are now working around 5 metres.

One Chassis—Many Sets

The British Television Supply stand occupied a fair share of our attention, for the occupiers have been concentrating on S.W. and television components for a

item of interest. We noticed that the gang condenser on a particular receiver chassis was mounted on a baseplate by means of soft-rubber bushes, the base-plate being attached to the chassis itself by means of similar bushes. Why double-flexible mounting? we asked. In answer we were shown what would happen if the condenser were mounted rigidly. When the set is packed for despatch a metal bracket is used to protect the condenser, and it holds this firmly against the box. The set was switched on without removing this bracket, the wave-change switch being set to S.W.; result: unbelievable howling. Next the



Norman "Omni-section" valve tester. It costs £4 10s. and is useful to service engineers and serious experimenters.

bracket was removed, as it is intended to be when the set is in use. The set was as docile as it could be, and there was not the slightest suggestion of a howl.

Just shows what a trace of vibration of the condenser vanes can do, doesn't it? Cheerio.

Signal-to-Noise Ratio

IF the above title sounds dull and rather uninteresting, I can only say that the subject which it introduces is by no means dull, nor is it confined to technical considerations. The importance of the ratio between the strength of the signal impulses and the H.F. currents representing "noise," or interference, cannot be overstressed, for the most sensitive receiver which it is possible to produce might be no more effective in bringing in weak signals than the simplest two-valver if the ratio is low.

Let me explain that point more fully. Suppose you have a highly-sensitive superhet, the sensitivity of which is given as 5 micro-volts. Without going into the minute details of the position, that means that the set will give a certain "standard" output when the signals applied to the aerial-earth system have an H.F. voltage of 5 micro-volts. A receiver of that type would be classed as extremely good for long-distance reception. Nevertheless, if the "signal strength" of local interference were equivalent to 10 micro-volts, the proper signal would be "swamped." In consequence, the weak, long-distance signal could not be utilised to produce anything

Contrary to Common Ideas, the More Sensitive Receivers are Made the More Difficult is the Problem of Suppressing Interference. One of the Most Useful Methods of Eliminating Interference is by Installing a Special Aerial System, of which Several are Available

By FRANK PRESTON

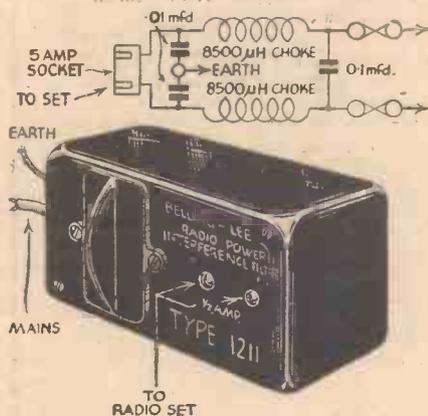
but the reproduction will in most cases be far less satisfactory than that obtained with a less-efficient instrument fed from a moderately-good outdoor aerial.

There are two main reasons for this. The first is that, in the average home with electric wiring, there is always a certain amount of "interference" actually in the house. It might be caused by an imperfect contact between a lamp bulb and its holder, by a bad contact between switch points, or by a vacuum cleaner or other electrical appliance. The second reason is that, when using the unsatisfactory aerial, the receiver volume control has to be turned up much further than is the case when using a more efficient aerial system. As a result, noises generated in the set—by the valves, due to imperfect connections, or even due to the presence of dust—is of greater proportion than when the set is not working "all out."

You might care to try a little experiment. With the receiver connected to an outdoor aerial—an improvised one thrown across the garden will do—tune in a signal that can be

brought up to good strength with the volume control in about its midway position. Next, replace the extended aerial with a length of wire loosely placed around the skirting board. Turn up the volume control, and re-tune if necessary, until the same signal is brought back to approximately its original volume.

The test may prove deceptive, because it might appear that the original volume is not restored even when the control is turned to its maximum point. The reason will probably be that in this case there is so much background noise that signal is partly obliterated. If a few tests are made in connection with the position of the indoor aerial, it is by no means unlikely that it will be found that when the wire is in some positions reception is almost as good as



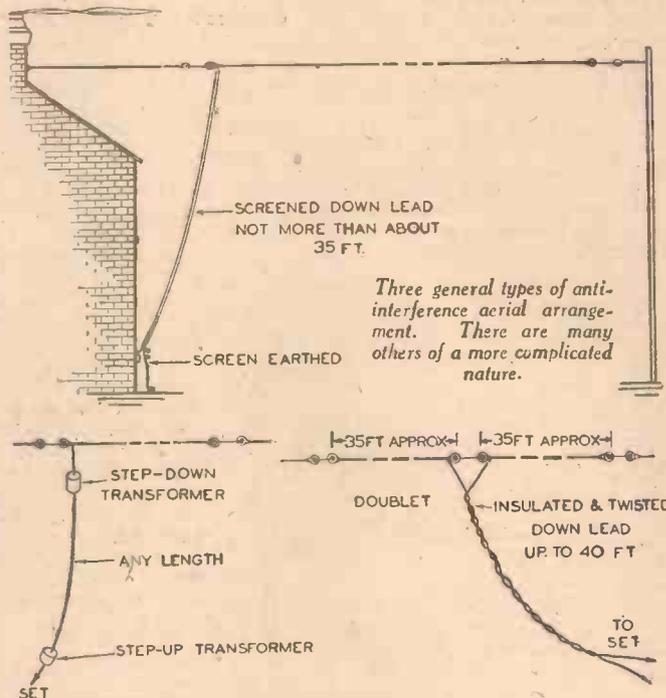
A Belling and Lee interference filter employed on the input circuit to a receiver. Other makes of suppressors such as "Goltone," T.C.C., T.M.C., and Dubilier are available.

approaching entertainment. In fact, a receiver of lower sensitivity would be just as good, if not better, for the purpose.

On the other hand, if the strength of the interference were, say, 2 micro-volts, the signal could probably be received very satisfactorily on the sensitive receiver, whereas it would be unintelligible when using a receiver of lower sensitivity. For example, if the receiver had a rated sensitivity of 20 micro-volts, it would probably not respond to the signal; even if it did the resulting reception would scarcely be of entertainment value.

Aerial—Good or Bad

This brings us to the important question of a suitable aerial system. It is generally considered that a sensitive modern receiver will operate with perfect satisfaction when fed from a short length of wire thrown across the room. Of course, the sensitive receiver will bring in a large number of transmissions when operated in this manner,



Three general types of anti-interference aerial arrangement. There are many others of a more complicated nature.

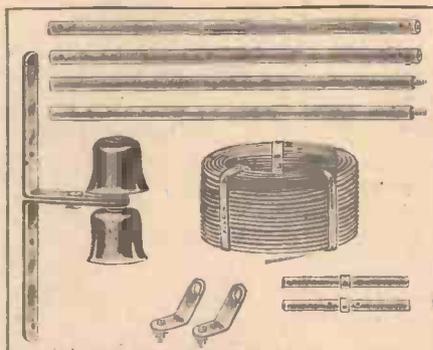
when using the outside wire. In any case, before erecting a permanent indoor aerial it is a good plan to gauge the performance of the set when connected to an outside wire isolated as far as possible from the building.

If an indoor aerial must be employed, it should be placed at the highest convenient point, and preferably just below the roof, for in this position it is at the greatest distance from electrical leads and devices in the house.

Interference Pick-Up

Even a good outdoor aerial will not necessarily be free from interference, but it has the best chance of not being acted upon by interference originating on your own premises. The only part of it which is likely to be within a strong "interference field" is the downlead, and this can easily be screened by using one of the special metal-braided lead-in connectors. This will reduce the signal strength of most stations to a certain extent, but it will be still more effective in eliminating "interference signals," so that the signal-to-noise ratio of the H.F. impulses applied

(Continued on opposite page)



The new Balgoin aerial assembly kit. It is a collapsible dipole intended for ultra-short-wave reception.

A 50,000-MILES TOUR

AS a result of orders for sets taken at Radiolympia, Mr. R. Moxham, G.E.C. radio engineer, is undertaking a 50,000-miles tour, and the main object of his trip will be to give instructions and advice on service to G.E.C. dealers and agents in all parts of the world. Wherever new business is being done by G.E.C. Mr. Moxham will visit the area, no matter how remote it may be.

"We claim that we can give service after sales in any part of the world," said Mr. Moxham, "and my trip is intended to ensure that that claim is literally true."

The journey will not be a new experience for him, for he carried out a similar tour a few years ago. In seven months he travelled 50,000 miles (10,000 of them by air) and visited Palestine, Egypt, East and South Africa, India, Burma, Malay, and Dutch East Indies. As well as instructing service people, Mr. Moxham will also test reception under all conditions.

SIGNAL-TO-NOISE RATIO

(Continued from previous page)

to the receiver will be noticeably increased.

There are, of course, many special anti-interference aerial systems on the market, and the installation of one of these is amply worth while in many situations, especially when the house is near to such sources of interference as picture houses, electric signs, trolley buses and trams. In passing it should be mentioned that certain praiseworthy municipalities have fitted their public-service vehicles with interference-suppression devices.

Impedance-matching Devices

One principle which has been widely employed in the design of anti-interference aerials is that of fitting a step-down transformer between the horizontal span of the aerial and the lead-in, and a corresponding step-up transformer between the lead-in and the set. The lead-in is screened, but signal loss due to the proximity of the screen and the lead-in is infinitesimally small because of the low voltage of the signal transmitted along the wire. A number of the more-recent types of anti-interference aerial are of the doublet type, with twin lead-in and either with or without matching transformers. The design of such systems for all-wave working is somewhat involved, and the construction cannot well be tackled by the average amateur. It is well, therefore, that several manufacturers can supply the necessary fittings.

A simple doublet aerial consisting of two end-to-end horizontal spans about 35ft. long each, and twisted wire lead-in is very effective in reducing interference in milder cases. The lead-in wires must, of course, be insulated from each other and the aerial itself, as with all anti-interference systems, should be erected as high as possible. By this means it is lifted out of the interference field, and static picked up by the lead-in is almost completely cancelled out due to the "balanced" conductors. Although most widely employed for S.W. reception, the doublet is equally good on the broadcast bands; it is certainly worth a trial if fairly slight electrical interference is experienced.

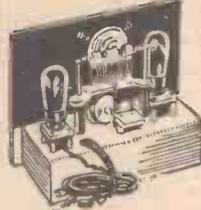
Well known among makers of special anti-interference aerial devices are Ward and Goldstone, Bulgin, and Belling-Lee; any of these firms will supply details of their equipment.

PETO-SCOTT EVERYTHING RADIO—CASH C.O.D. or EASY TERMS

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PORTABLE 5-metre TRANSCIVER KIT

For the transmission and reception of telephony within the range of 10-20 miles. This unit brings the opportunity to indulge in transmitting research work within the means of every keen amateur experimenter. Entirely self-contained and available in portable cabinet with collapsible carrying handle.



KIT "A" comprising complete kit of parts including ready drilled panel and chassis. Less valves and cabinet. Cash or C.O.D. **£2:12:6**
Or 5/- down and 11 monthly payments of 4/10.

N.B.—A Post Office Transmitting licence is necessary for the operation of this unit. We will be pleased to furnish further details as to procedure to be followed in applying for a licence.

1-valve ALL-WAVE KIT

Ideal for the All-Wave Beginner!
Save 11/-—buy a Complete Kit.



● A unique All-Wave single-valve combining simplicity of assembly with extraordinary efficiency and low cost.

● Waveranges 18-52, 200-500, 900-2,000 metres.

● Ready assembled tuning-unit incorporates all windings and switching and needs only six simple connections for incorporation.

KIT "A" comprises complete kit of parts for building, including ready-drilled steel panel and chassis, drawings and instructions, less valves and cabinet.

List Value £2:0:10 OUR PRICE **29/6**

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KIT "B" with valves £1:13:3 or 3/- down and 11 monthly payments of 3/1.

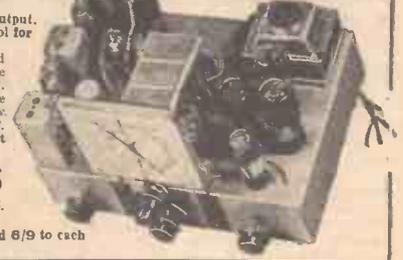
NEW 7-watt HIGH-FIDELITY 9 valve ALL-WAVE A.C. MAINS SUPERHET

4 WAVEBANDS: 10-21, 20-53, 200-550, 800-1,000 metres. The first British Octal Valve Superhet! Another triumph for Peto-Scott Engineers embodying an entirely new form of chassis building, with amazing sensitivity and selectivity on every wave-band.

● Screened E.F. and I.F. valves. ● 7-watt undistorted high-fidelity output. ● Large dial calibrated stations and meters. ● Volume and tone control for radio and gram. ● Rationalised tri-unit construction. Circuit comprises 9 octal-base British valves, pre-H.F. selector coupled to radio frequency amplifier with transformer coupled to octal triode hexode frequency changer, band-pass L.F. transformer coupled to 2 I.P. diode triode, providing rectification, automatic volume control and low frequency amplification following phase reversing valve feeding 3 L.F. power pentodes, providing 7 watts undistorted fidelity output. Highest grade components. Every chassis rigidly tested on actual broadcasting. Size: 10ins. high; 10ins. wide; 3 1/2ins. deep. For A.C. mains 200/250 volts, 40/50 cycles. Cash or C.O.D. **£11:19:6**
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KIT "A" comprising complete kit of parts for building, including drawings and instructions, less valves, cabinet, speaker, and batteries. Cash or C.O.D. **£1:17:6**
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General Purpose Amplifier to earn you extra money!

MODEL A.C. 67.—4 valves; Triode, Resistance Transformer-coupled to 2 triple Grid Power Amplifier Valves, in Push-Pull. Full Wave Rectifier. Special precautions have been taken in design to avoid parasitic oscillation in output stage. Fixed and Screened Mains Transformer. Electrolytic condensers. Volume Control. Mains consumption approx. 60 watts. With microphone, speech easily heard at over 500 feet. Tapped for A.C. Mains 200-250 volts, 40/100 cycles. Output 6-7 watts undistorted. Complete with Valves. Ready to connect to microphone or pick-up. Cash or C.O.D. **£4:10:0**
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A booklet of 24 pages, featuring 9 new PILOT Short-Wave Kits, one of which is described below. Each of these designs incorporates a standard chassis and panel. Commencing with a 1-valve Adaptor-Converter, you may, when you please, build this up, on the same chassis, into varying forms of 1, 2, 3, and 4-Valve Short-Wave Receivers. Post coupon now for your free copy of this 6d. booklet.

1 VALVE SHORT WAVE

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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)			AW417	
1934 Ether Searcher: Chassis Model (SG, D, Pen)			AW419	
Lucerne Ranger (SG, D, Trans)			AW422	
Cosior Melody Maker with Lucerne Coils			AW423	
Mullard Master Three with Lucerne Coils			AW424	
£5 5s. Three: De Luxe Version (SG, D, Trans)		10.5.34	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)			WM362	
1935 £6 6s. Battery Three (SG, D, Pen)			WM371	
PTP Three (Pen, D, Pen)		June '35	WM389	
Certainty Three (SG, D, Pen)			WM393	
Minute Three (SG, D, Trans)		Oct. '35	WM400	
All-wave Winning Three (SG, D, Pen)		Dec. '35	WM396	
Four-valve : Blueprints, 1s. 6d. each.				
65s. Four (SG, D, RC, Trans)			AW370	
"A.W." Ideal Four (2 SG, D, Pen)		16.9.33	AW402	
2HF Four (2 SG, D, Pen)			AW421	
Crusader's A.V.C.4 (2 HF, D, QP21) (Pontode 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 (SG, SG, D, Pen)		Mar. '35	WM384	
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)		April '36	WM404	
Five-valve : Blueprints, 1s. 6d. each.				
Super-quality Five (2HF, D, RC, Trans)		May '33	WM320	
Class B Quadravine (2 SG, D, LF, Class B)		Dec. '33	WM344	
New Class-B Five (2 SG, D, LF, Class B)		Nov. '33	WM340	
Mains Operated.				
Two-valve : Blueprints, 1s. each.				
Consoelectric Two (D, Pen) A.C.			AW403	

These Blueprints are drawn full size. Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, which are additional to the cost of the blueprint. A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless .. 4d. Post Paid.
 Amateur Wireless .. 4d. " "
 Practical Mechanics .. 7d. " "
 Wireless Magazine .. 1/3 " "

The index letters which precede the Blueprint Number indicates the periodical in which the description appears: thus PW refers to PRACTICAL WIRELESS, AW to Amateur Wireless, PM to Practical Mechanics, WM to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Economy A.C. Two (D, Trans) A.C.			WM286
Unicorn A.C.-D.C. Two (D Pen)			WM394
Three-valve : Blueprints, 1s. each.			
Home-Lover's New All-electric Three (SG, D, Trans) A.C.			AW383
S.G. Three (SG, D, Pen) A.C.			AW390
A.C. Triodyne (SG, D, Pen) A.C.		19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen, A.C.)		23.6.34	AW430
Mantovani A.C. Three (HF Pen, D, Pen) A.C.			WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)		Jan. '36	WM401
Four-valve : Blueprints, 1s. 6d. each.			
All-Metal Four (2 SG, D, Pen)		July '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)		May '35	WM386
SUPERHETS.			
Battery Sets : Blueprints, 1s. 6d. each.			
Modern Super Senior			WM375
Varsity Four		Oct. '35	WM395
The Request All-Wave		June '36	WM407
1935 Super Five Battery (Superhet)			WM370
Mains Sets : Blueprints, 1s. 6d. each.			
1934 A.C. Century Super A.C.			AW425
Heptode Super Three A.C.		May '34	WM359
"W.M." Radiogram Super A.C.			WM366
1935 A.C. Stenode		Apr. '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
Tyros Portable (SG, D, 2 Trans)			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		23.1.37	AW429
Rome Short-Waver			AW452
Two-valve : Blueprints, 1s. each.			
Ultra-short Battery Two (SG, det., Pen)		Feb. '36	WM402
Home-made Coll 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)		30.0.34	AW438
Experimenter's Short-wave (SG, D, Pen)		Jan. 19, '35	AW463
The Carrier Short-waver (SG, D, P)		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-valver Short-waver (SG, D, LF, P)		Mar. '35	WM383
Superhet : Blueprint, 1s. 6d.			
Simplified Short-waver 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 Short-waver (D, Pen) A.C.-D.C.			WM369
"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
Listeners' 5-watt A.C. Amplifier (1/6)			WM392
Radio Unit (2v) for WM392		Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-)		Dec. '35	WM399
De-Luxe Concert A.C. Electrogram		Mar. '36	WM403
New Style Short-Wave Adapter (1/-)		June '35	WM388
Trickle Charger (6d.)		Jan. 5, '35	AW402
Short-Wave Adapter (1/-)		Dec. 1, '34	AW456
Superhet Converter (1/-)		Dec. 1, '34	AW457
B.L.D.L.C. Short-wave Converter (1/-)			
Wilson Tone Master 1(-)		May '36	WM405
The W.M. A.C. Short-Wave Converter (1/-)		June '36	WM406

SEEN AT THE SHOW

Below is seen the "His Master's Voice" Model 499 A.C., a new six-valve all-world receiver which is being marketed at 14 guineas. This model incorporates many interesting features, including tuning knobs of an entirely new type, and fluid light tuning.



Leonora Corbett, star of "Sarah Simple" at the Gaiety Theatre, wearing one of the "Merry Widow" hats, when she visited the W.B. Radio stand at Radiolympia. Below is the Bush All-wave Console. There are two alternative chassis, the sets being known as models S.U.G. 43 and D.U.G. 43.



Fred Archer was an attraction at Radiolympia. All day long he sat on the H.M.V. stand looking like a wax figure. He has the ability of sitting perfectly still with immobile features, and visitors often wondered whether he was alive or not.



A New 40-Page Booklet—Free



This booklet gives particulars of the many opportunities open to trained men engaged in the Radio industry. It also gives full information about the specialized instruction offered by the I.C.S. This instruction includes American broadcasting as well as British wireless practice, and provides ambitious men with a thoroughly sound training.

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RADIO CLUBS AND SOCIETIES

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

The Golders Green and Hendon Radio and Scientific Society

FOR the twelfth year in succession this society recently held a direction finding meeting, culminating in the Annual Open Competition, which was won by the Southall Radio Society, represented by Mr. Swan. This position was very closely contested there being only a difference of 2 per cent. in the marks of the first and fourth positions.

The Judges were Group Captain G. Straun Marshall, R.A.F., Lieut.-Col. H. Ashley Scarlett, D.S.O., and Mr. H. B. Dent. Mr. P. H. Barfield, of the National Physical Laboratories, after watching the operations closely, examined the apparatus used, expressing surprise at the very high standard of workmanship and design exhibited. Elasticity in design was strikingly demonstrated by the fact that the wavelength used was at very short notice altered from 3,750 kc/s to 7,500 kc/s, but results handed in showed an average error of only 1.25 degrees.

Apart from the increased frequency a new type of transmitting aerial was used,

consisting of a single brass rod about 2½ in. in diameter and about 30ft. high. A short feeder coupled this to the power amplifier tank coil.

General remarks on the contest were as follow :

1. A considerable increase of outside interference made observations at times most difficult.
2. Field strength of signals was greater.
3. Sharpness of minima improved.
4. Some competitors reported a distortion of time zero when body was close to or in between the transmitter and the receiver aerial; others were unable to note such an effect.
5. Most receivers used one stage of H.F., some using push-pull H.F. amplification.
6. Two groups situated with a main line of telegraph wires running towards the transmitter were unable to pick up any signals whilst so situated.

Wallasey Junior Radio Society

A MEETING of this newly formed society will be held at the address given below on Wednesday, September 15th, at 7.30 p.m. The society is intended for young persons under the age of 18, although the presence of a few "old hands" as honorary members will be welcomed. The society will be a development of that which has been running in the Grammar School here for about a year.—A. M. Wilding, 2, Wallace Road, Wallasey, Cheshire.

Important Broadcasts of the Week

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, September 15th.—'Opping 'Oiday, an excursion to the hop gardens of Kent.

Thursday, September 16th.—The Pursuit of Pleasure: Three centuries of fun, by Lance Sieveking.

Friday, September 17th.—Concert Party programme, from the Pier Pavilion, Skegness.

Saturday, September 18th.—Promenade Concert, from Queen's Hall, London.

REGIONAL (342.1 m.)
Wednesday, September 15th.—Dance Music relayed from Germany.

Thursday, September 16th.—Promenade Concert, from Queen's Hall, London.

Friday, September 17th.—The Belle of New York, a musical comedy.

Saturday, September 18th.—Music Hall programme.

MIDLAND (296.2 m.)
Wednesday, September 15th.—Choral and Organ programme, from Southwell Minster.

Thursday, September 16th.—Brum—To Come: a nonsensical nightmare, by C. H. Averill and Alan Fitton.

Friday, September 17th.—Play That Again—vocal programme.

Saturday, September 18th.—Band concert.

NORTHERN (449.1 m.)
Wednesday, September 15th.—A violin recital.

Thursday, September 16th.—A Backside Chronicle—Dying, We Live, by Zachariah Briggus.

Friday, September 17th.—Children's Variety programme for Grown-ups.

Saturday, September 18th.—Progress: A story.

WEST OF ENGLAND (285.7 m.)
Wednesday, September 15th.—The Children's Art Exhibition at Bath: A talk by Lord Waldegrave.

Thursday, September 16th.—The Incorporation of Weston-super-Mare, a recorded summary of the ceremony in Grove Park.

Friday, September 17th.—Choral programme.

Saturday, September 18th.—West Country Composers: Jack Knapman—instrumental programme.

WELSH (373.1 m.)
Wednesday, September 15th.—Vigil, a radio play, by Emyln Williams.

Thursday, September 16th.—Lleislaw's Blymyddoedd—1897 (A Welsh Scrapbook of 1897).

Friday, September 17th.—Instrumental programme.

Saturday, September 18th.—Concert Party programme, from the Pavilion Theatre, Rhyl.

SCOTTISH (391.1 m.)
Wednesday, September 15th.—Gaelic Concert.

Thursday, September 16th.—Scots Songs.

Friday, September 17th.—Programme of Piping.

Saturday, September 18th.—Scottish Dance Music.

NORTHERN IRELAND (307.1 m.)
Wednesday, September 15th.—Eye-witness account of Belfast Championship Dog Show.

Thursday, September 16th.—Instrumental concert.

Friday, September 17th.—Band concert.

Saturday, September 18th.—Dance Band programme from the Grand Central Hotel, Belfast.

LOUDSPEAKER EXPERIMENTS

(Continued from page 6)

fact, often prove a worthwhile change. Although we have dealt previously with such details as an inclined baffle, and tone resonators inside the cabinet, there are other features which may not be so obvious. It will be noted, for instance, that the effect of different notes in the musical scale is more pronounced at certain distances, and that the high notes are directed

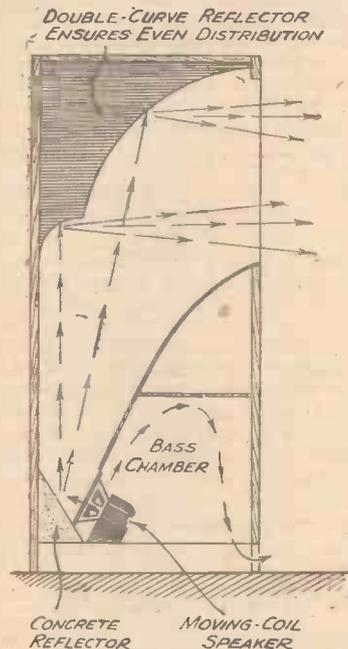


Fig. 6.—The well-known Voigt loudspeaker, in which the low notes are made to follow a longer path to the listener than the high notes.

straight forward in a beam, whilst the lower notes radiate or flow outwards in all directions. In this way, if you are listening at one side of the cabinet some of the higher notes are lost. A cone-shaped inset to the speaker baffle, with the apex pointing in towards the speaker will serve to direct the higher notes outwards but will not always produce an even radiation. If two loudspeakers are employed, one small one for the high notes and a large one for the lower notes, it may prove interesting to place the former directly in the centre of the baffle, and the latter pointing downwards so that the sound has to issue from beneath the cabinet. The height of the cabinet from the floor may be found by experiment, and in most cases will depend upon the volume of the output which is normally employed. The greater the volume the nearer to the floor must the speaker be to avoid swamp- ing the high notes.

NEW PORTADYNE RECEIVER

A VERY interesting model in the Portadyne range is the A58. This is a 5-valve (including rectifier) all-wave superhet priced at 11 guineas. It is fitted with the special Portadyne Rotomatic tuning dial, which has a separate scale for each of the three wave-bands. As only the stations on the particular band to which the receiver is switched are visible on the dial at one time, tuning is greatly simplified. In our issue of September 4th, page 627, we gave a photograph of this receiver, but inadvertently mentioned that it could be seen on Stand 104—this should read Stand 18.

TOPICAL NOTES

A Cause of Instability

INSTABILITY in short-wave receivers sometimes arises through intervalve coupling between one heater and the next; this can be overcome by earthing the appropriate heater through a condenser to chassis. It is usually sufficient to connect a condenser to a point on the heater chain between the two interacting valves, although it is sometimes necessary to shunt a heater with two condensers in series and earth the mid-point. The heater receiving such attention should be the one where the trouble arises and can only be found by trial. As this type of instability only appears at very low wavelengths, a small condenser must be used; .0001 to .001 will be found

suitable. It must, of course, be a non-inductive type, preferably flat.

A Television Refinement

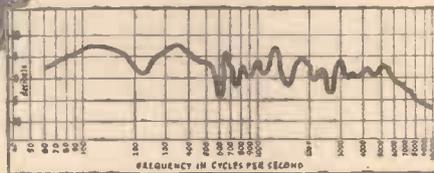
AN interesting television refinement seen at Olympia was a circuit arrangement to lessen interference. It consists of a valve used as a limiting device which prevents the screen (or any part of it) from being made brighter than the brightest part of the picture. Thus, if interference is imposed on an area that is the maximum brightness, it does not appear. If it is imposed on a grey or black section, it can drive it to white, but no further, so the dazzling effect caused by interference is completely eliminated.

Manchester Radio Exhibition

The *Evening Chronicle* Radio Exhibition, which opened at the City Hall, Deansgate, Manchester, on September 14th, remains open till September 25th.

Satisfied with your reproduction?

WAIT TILL YOU HEAR THIS!



Make no mistake—here is no mere superficial alteration in design.

An observant glance at speech coil, centring device, and cone will show you a few of the differences; and two or three minutes of listening will show you many more! Another 600 cycles of top response—complete absence of 300 cycle peaks—slight gain in average sensitivity—it takes a keen ear to analyse this new smoothness and fidelity, but no ear can fail to detect it!

Prices (at present) remain at the old low level—17/6 to 42/-. Get your new Stentorian speaker now!



Read Mr. Camm's Opinion

"Good and bad sets will be improved by it. It is an important advance in speaker technique."

J. J. Camm

ANOTHER NEW



Stentorian

DIFFERENT—& BETTER STILL

WHITELEY ELECTRICAL RADIO CO., LTD. (technical. dept.), MANSFIELD, NOTTS.

LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

A Fine Log from S. Devon

SIR,—As reports from this district seem few and far between, I am taking the liberty of enclosing my log of stations received on the "American One-Valver," plus pentode output. Between May 25th and August 22nd I have received, among others, the following stations: SU1CH, VE1CR, W4CBY, W3BBO, W4EEG, HA8N, W3DDD, W3DLL, W8CNY, SU1RO, LX1TW, IITKM, F3DN, F8PV, SPIHH, CE3EW, W3EMM, CO2LY, W4AH, LA1G, SU1KG, SU1SG, CT1AY, W8JOE, W3FAM, W4AZK, W5CO, VE1JA, W8AZU, VE1LR, SUZ, W4BMR, W3MD, VE3ED, CO6OM, W3MB, W4BY, W4DIS, PAZHN, ON4SS, W3CHE, SPW, YI2BA, W4TO, W4DZB, W9GED, VE1DC, IIFAG, K4SA, SM5SV, SM5WK, W4CRA, W4DLH, W3APO (Portable), W3CUD, W3LN, CO2WW, W4GW, W3EYC, LA5N, CX2AX, W3AH, VE1GP, W3FIH, W9ZDO, TI2RC, CO7VT, JZK, VE1BR, PY2EJ, CE1AR, W8LPG, W8GGG, W3BBB, VO1I, EA8AE, VE2NI, VP5PZ, VE3BK, W3DNZ, SP1CC, VK2XU, VK4BB, W4IS, HI5X, HI7G, EA9AH, YV5AK, W3ASG, W8CMA, W8NXQ, W8QGW, W8BIA, W8DPZ, and also 73-W1s and 2s. I have built two other S.W. receivers but have gone back to the old one each time. Thanks to your fine weekly I have logged six hundred stations since Feb. 7th.—J. E. BOWDEN (Paignton, Devon).

Valve-testing Panel

SIR,—With reference to the recent correspondence published in your "Letters from Readers" column, I am in entire agreement with two of your readers, that a blueprint for a valve tester for mains use would be greatly appreciated. I have many calls from various friends and neighbours who wish me to test their valves. I can only do this for filament, and not emission. During my visit to Radiolympia I observed several instruments, and in particular one for mains and battery valves, but the price was, I thought, a trifle too much for the constructor. So if you can publish details of a cheap instrument to test H.F. pen., triodes and output pentodes, I am sure you will receive many grateful thanks from a host of the instructors you cater for. The first mains set I made was the Universal Hall-Mark 4, and it has been in use until

quite recently, when the makers discontinued their .18 amp. valves.—E. C. THOMAS (Wapping, E.I.).

A 20-metre Log: Correspondent Wanted

SIR,—I have been a regular reader of your excellent paper for over six months, and I only wish I had taken it years ago. I have not seen a 20-m. log from my district, so I enclose mine:—W1AXA, W14CLO, W1APA, W1CHG, W1DLA, W2IXY, W3FIH, W3BMA,



A corner of Mr. J. E. Bowden's receiving station.

W3DLL, W4CYU, W4BYY, W4DLH, W4AZK, W8MFS, W9GBC, W9PDJ (Portable), W9GBC, W2GBX, PY1EW, PY5AQ, VK3LA, SP1CC, SM5SX, SM5YS, SV13A, OE6DK, K4SA (Porta Rica), OE3AH, SPIHH, and YI2BA.

These stations were received between 18.00 and 21.00 G.M.T. The receiver in use is a home built 0-v-2 with a 30ft. inverted-L aerial. As I am only a beginner on the short waves I should like to correspond with any reader who is also interested in short-wave listening.—P. CARPENTER (49, Whyke Road, Chichester, Sussex).

Another 20-metre Log

SIR,—Not having seen a short-wave log from this district before, I submit mine. All stations were heard on the 20-metre band. CE3DW, YV5ABE, LU1AB, KA1ME, PY2BA, CO2RH, SU1CH, H8AM, SPIHA, CT1AY, CT1JW, VONI, VE1GP, VE1DR, VE2KI, VE1LR, F3JD, F3MF, F8XT, SM7YA, SM5SV, and fifty W stations. My receiver is an 0-v-1.—C. RIDGE (Angus).

A Five-valver for Overseas!

SIR,—I would very much like to add my request to that of D. T. Smith's, appearing in a recent issue of PRACTICAL

AND AMATEUR WIRELESS, asking for a medium- and short-wave super receiver containing five or six valves, the H.F. stages to be sufficient to give A.V.C. Now India is to have several medium- and short-wave transmitters of medium power, quite a lot of people will be considering suitable receivers. There are plenty of American all-wave sets on the market, but only a very few are suitable for this country, as the majority do not tune below 16 metres, and long-wave listening is out of the question altogether in this country. I am the only home constructor in this place, so I was not surprised to receive several requests to recommend a suitable receiver. Up to now I have not been able to recommend any set really suitable for India. The best I could find was one of your straight fours with a converter on one side of the baseboard. This has given me good service for several years, but of late it is not so good on the selectivity side.

I have told my friends to sit back and wait a while, when they will, no doubt, be rewarded with a circuit worth having. Just a word about the coils; the short-wave coils should tune from about 12 up to 100 metres, as we understand the Indian stations will transmit on a wavelength of about 90 m. at night time, and of course we want to tune England in on 13.97 m., which is about the best receiving wave from home, especially in the evenings.

Wishing you and your paper every success.—T. GOULD (Panch Mahals, India).

CUT THIS OUT EACH WEEK.

Do you know

—THAT a static screen between the aerial coupling coil and the grid winding will reduce man-made static on the short waves.

—THAT a modern tetrode can be used in a battery receiver in place of a pentode without altering the wiring.

—THAT a permanent magnet speaker can be used in place of an energised type provided that the field winding of the latter is replaced by a choke.

—THAT when using a small meter for signal indication a resistance shunted across it will enable the reading to be kept within the scale.

—THAT it is often found undesirable to connect a pick-up to a ready-made commercial Universal receiver owing to the fact that the pick-up may be "live" in respect to the mains.

—THAT when desirous of using a pick-up with the above type of receiver the makers should first be consulted concerning the best method of connection.

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 to: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, 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.

FREE ADVICE BUREAU

COUPON

This coupon is available until September 25th, 1937, and must be attached to all letters containing queries.

PRACTICAL AND AMATEUR WIRELESS,
18/9/37.

BOOKS RECEIVED

RADIO SERVICING SIMPLIFIED. 150 pp., 16 illustrations. Published by the Automatic Coil Winder and Electrical Equipment Co., Ltd. Price 2/6d.

THIS is the 6th edition of a most useful book for the service man or experimenter. It has been entirely re-written for modern apparatus and is a valuable work of reference. It takes the reader through the whole routine of testing and servicing modern radio apparatus in a most simple and easy manner, and in addition gives a wealth of detail relative to the more usual types of fault met with. Commencing with a very lucid explanation of Ohm's Law, the book passes on to deal with definite applications of the use of the special Avo apparatus. Every amateur, service man and dealer should obtain a copy of this book without delay.

TELEVISION ENGINEERING, by J. C. Wilson. 492 pp. 276 illustrations. Published by Pitman. Price 30/.

THIS is claimed to be the first work written as a comprehensive text-book on television. Although written primarily from the engineering point of view, it covers all the essential details of the modern television equipment and will prove a valuable guide to a proper understanding of the methods now used for transmission and reception. The theoretical and practical aspects of television are fully dealt with and the descriptions of modern apparatus such as is now used are exceedingly clear and concise. Among the subjects described are scanning, optics, photo-cells, the cathode-ray tube, colour television, synchronising, and amplifying equipment. A foreword by J. L. Baird explains that the new industry which is growing round television will call for the assistance of skilled technicians and thus the book will prove particularly useful to those who are anxious to take part in this development of the radio industry.

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., Toicer House, 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

TWO new season's folders have just been issued by British Mechanical Productions, Ltd., one giving a range of the popular Clix plugs, sockets, terminals and connectors, while the other folder gives full particulars and prices of valveholders and connecting strips. In the range of connectors is included a handy plug adaptor in which the plug portion gives perfect contact with all types of supply sockets. There is also a fuse plug for low-power circuits up to 5 amp. This plug is fitted with Clix patent self-centring non-collapsible pins, and has single-screw assembly. A loudspeaker "plug-switch" is also listed, suitable for controlling either a set speaker or extension speaker, or both. It is fitted with a quick make-and-break switch operated by a slight side movement of the plug. The other folder includes valveholders and chassis mounting strips.

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. A. (S.E.11). There would appear to be a short-circuit in the mains section and the set should not get as hot as you state. We suggest you have it overhauled by the makers or a good local service agent.

A. T. (Dundee). The address is Transreceivers, Ltd., Surbiton, Surrey.

R. H. C. (S.W.6). The best receiver for your purpose would be the Simplest One-valve described in our issue dated December 12th last.

J. E. (West Melton). We suggest that you check the voltage applied to the anode of the detector valve. Disconnect the decoupling resistance and connect the H.T. direct to the coupling resistance as a first test. Make certain that the connections to the coil are in order, and reverse the connections to the transformer secondary to cut out the L.F. whistle.

M. E. (Bournemouth). We regret that we cannot supply a diagram of a set for long waves only. We

believe the makers of your receiver can modernise it by fitting new coils for the purpose.

W. J. McC. (Londonderry). The trouble may be due to the damping of the aerial, or an unsuitable H. F. choke. Try also increasing the value of the grid leak. The fuses, if they are to be inserted in the mains leads, should be of the 1/2-amp type.

M. T. (Palfrey). We cannot supply blueprints of commercial receivers, and we suggest therefore that you write direct to Messrs. Lissen.

W. D. M. (Reddish). We often receive applications from readers for back numbers which are out of print and should be glad to avail ourselves of your offer to supply these. We cannot purchase back issues, however, and if you wish to sell the complete files we suggest you insert a small advertisement.

R. H. (S.W.8). We cannot trace the station referred to and think it may be a local amateur carrying out re-broadcasting experiments. This is contrary to the terms of the ordinary Amateur licence.

K. H. (Worcester Park). The 21-watt transmitter should meet your requirements and full details were published in our issues dated December 26th and January 2nd last.

W. G. (Sheffield). We do not publish a book on the subject, but a long series of articles dealing with transmitting commenced last November.

-AMAZING SET BARGAINS!

Buy your New Receiver from N.T.S. at an amazing Bargain Price! The wonderful offers below cannot be made indefinitely. Stocks are limited and IMMEDIATE ORDERING IS ESSENTIAL!

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with 4 Valves, Speaker, Cabinet and batteries.

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● 4 BRITISH VALVES of guaranteed life.
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with 3 Valves, knobs and escutcheon.

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● Screened Grid, H.F. Detector and Pentode Output Valves.
● Screened coils
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● Illuminated and Wavelength Calibrated Dial.
● Wave range 200-2,100 metres.
● Complete with Valves, black escutcheon and all knobs.
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● COMPLETE RECEIVER in walnut-veneered table cabinet with moving-coil speaker, less batteries only. List Price 26:6:0. Bargain £3:7:6 or 5/- down and 12 monthly payments of 5/9.



2/6 DOWN

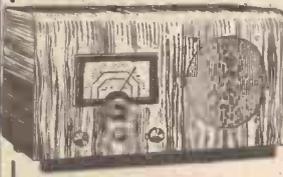
-A.C. BANDPASS S.G.4 RECEIVER

With 4 VALVES, CELESTION Field-Energised Moving-Coil SPEAKER and Walnut-Veneered CABINET

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Wonderful selectivity and sensitivity. 4 matched British valves. Screened Band-pass Coils. Slow Motion Tuning, illuminated dial. Wavelength calibrated. Gramo pick-up sockets. 2 1/2 watts output. Wave range 200-650, 1,000-2,000 metres. For A.C. Mains ONLY, 200-250 volts, 40/50 Cycles. Complete with beautiful walnut-veneered cabinet with airplane dial illustrated, and Celestion Field Energised Moving-Coil Speaker. READY TO PLAY. Cash or C.O.D. £5:12:6. Or 5/- down and 18 monthly payments of 6/11. Or 5/- down and 12 monthly payments of 9/11.



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with 3 Valves, Speaker, Cabinet, less Batteries.

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● New type highly selective Straight Battery 3 circuit.
● Slow motion illuminated dial.
● Pick-up sockets.
● Metal chassis.
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5/- DOWN

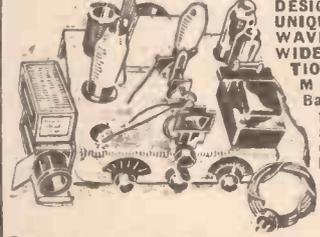
-D.X. FANS' A.C.4-

SHORT-WAVE KIT 75/-

LIST VALUE £5:10:0 **BARGAIN**

ENTIRELY NEW DESIGN giving UNIQUE ALL-WAVE WORLD-WIDE RECEPTION 12-94 METRES. Bands pread tuning with air space condensers for efficiency on every wave-band.

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● For A.C. Mains 200-250 volts, 40-100 cycles.
● KIT "1" comprises every part for assembly, including 3 pairs 4 and 6-pln coils (12-94 metres), wiring and assembly instructions, less valves only. Cash or C.O.D., 75/- or 5/- down and 11 monthly payments of 7/-.
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New light weight super-type HEADPHONES highly recommended for short-wave work. List value 15/- **BARGAIN 3/6**



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EST. **NEW TIMES SALES CO.,** 56 (Pr.W.32) Ludgate Hill, London, E.C.4. 1924.

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GARRARD RECORD CHANGER AND GRAMO-MOTOR, A.C., 55/7/8.

METERS. For fault finding, etc. Bargain line in portable moving coil by Everett Edgecumbe, 40 to 120 volts, for home conversion to multi-range, 21/8. Western flush panel milliammeters, 0-30 or 0-100, 17/8 each. E.E. voltmeters, A.C. 240 v., 25/-.

NEW PANELS. Polished aluminium, 18 and 18 gauge, bright or enamelled, 12in. x 12in., 3/-. 18in. x 18in., 5/8. Ebonite 4in. panels 24in. x 24in. for 5/8.

2-VALVE METAL B. CHASSIS. Drilled and fitted 2 valve holders, transformer, coil, etc., 2/8 each.

SHOE FRONT TEAK CABINETS. New, made fine instrument panel, 10 x 7 x 11, 3/- each.

OAK CABINETS for Short-wave Battery Receivers, 2 or 3 valve, polished Jacobean finish, 13 1/2in. x 7in. x 6 1/2in. deep, oval front, crackle black aluminium panel fitted geared .0005 mfd. condenser, with sunk dial, 3-way coil switch and a single plate condenser. Sliding back and 10 terminal Strip, new, manufacturer's liquidation stock, 15/-.

CONDENSERS. Variable lowloss F type, .0005, 1/8. J.D. .0003, 2/- Reaction varia., 1/3. Pyc. .0003 with S.M. dial, 5/-. 2-gang varia., all-aluminium, 3/- only. Fixed condensers, 2 mid. 240 v., 10d., or 6 for 4/-, 4,000 v. 1/2 mid., 0/-, etc.

Projection Lanterns, on stand, with 250-watt focus bulb, 25/- Arc lamps, 27/8. Spark Transmitter shortwave sets for model boat remote control, 17/-.

COILS, Philips Superhet set of 3 in makers carton, 3/- set. 8-W. coils plug-in, 1/8. Ribbed formers, 9d. Long-wave and B.C. 2-pin, 1/-, Concor 3 and 4-pin coils, 1/-. Reaction tuners, 9d. H.F. twin chokes, mains dual, Rugby and other coils in stock.

All wave-lengths in 2-pin, 1/8. Brownie dual-range 200/2,000, 1/8. M.I.C. concert coils, set of 4, 2/8; aerial, react., long, short and multiple, 1/8. S/W Formers ribbed and slotted, 4d.

RESISTANCES. H.M.V. in glass tube, wire ends, 10,000, 25,000, 50,000, 100,000, 500,000 ohms and 1 meg. 1/8 set of 6.

CRYSTAL SETS. Still the best Radio Receiver. No battery or valves wanted. Quiet and efficient reception. 500 shop-sold sets, cheap. Enclosed type, 5/6 and 7/6 each.

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1 VALVE CABINET AMPLIFIERS, 15/-.

CONSTRUCTORS. Hand geared drills to 1in., 1/8. Ceramic S/W lead-in, brass stem, 8d. Sin. stand-off 8/W Insulators, 6d. Portable valve sets kits assembled in suitcase, partly wired, speaker, aerial, and all parts, less valves, 21/-. Metal rectifiers, chassis type, 180 v. 30 ma, output, 5/-. Lightning Arrestors, make aerials safe in summer storms, 1/- each. H.M.V. Mains Transformers, 100/250 v. to 700 C.T. 80 ma, 4 v. 1 a., 4 v. 2 a., 10/8. 30 Hy. Chokes, 30 ma, 4/- 1 amp. Chokes, 10/-.

VALVE BARGAINS. Mains Universal 7-pin Freq. Changers, 4/6. A.C. ditto, 4/6. Universal H.F. 7-pin Pentode, 4/8. Power Valves: Edison VT18B 30-watt, Fil. 6 v., 1,500 v. Max. 55, under half price, 10/8. T50 25 valves, 7 v., Fil. 1,500 v., P., Max. 30, 22/8. AT40, 19 watt, 8 v., Fil. 4/-, H.T. Rectifier up to 10,000 v. NUP, 5 v. Fil., 250 watts, 35/-, 100 watt T2A, 40/-, Half-wave W.D. Rectifier, 200/1,000 v. 50 ma, 2/6.

SOLENOIDS, 6-volt for model work or distance switch, core travel 1in. pull 1 oz., 3/6. A.C. Magnets, 230 volts, 30 ma, 14 oz., 11/-, 2/6.

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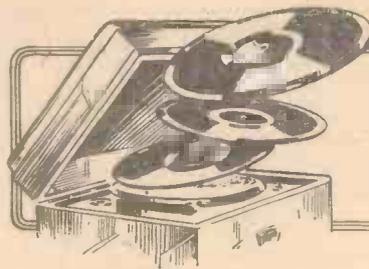
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Impressions on the Wax

Parlophone

RICHARD TAUBER heads the Parlophone list this month with two tunes, both of which are sung in English. They are "Fear Nothing" and "The Old Tree," on Parlophone RO 20343, sung in typical Tauber style. A number of records have also been added to their classic series. "Vienna Blood," a selection in two parts, is a remarkably fine record introducing Maria Hesber (soprano) and Herbert E. Groh and Max Schipper (both tenors). These three famous singers are accompanied by a full chorus and orchestra, and sing in German. The number of the record is Parlophone R 2369. Joseph Schmidt, tenor, also appears in this series with "Listen to the Old Wells Rippling" and "Sweet Confessions," on Parlophone R 2370. The Grand Symphony Orchestra (Paris) has recorded a "Romeo and Juliet" selection on both sides of Parlophone R 2373, and the Rhythm Symphony Orchestra, conducted by Otto Dobrindt, plays "Serenade in Blue" on both sides of Parlophone R 2374.

Ronald Frankau and Tommy Handley, with Monte Crick at the piano, make a new Murgatroyd and Winterbottom recording this month on Parlophone F 865—"If you Pretend You're Blue," and "Scientifically, Of Course." Leslie A. Hutchinson, or "Hutch," as he is more familiarly known, appears on Parlophone F 866 singing "In an Old Cathedral Town" and "The Greatest Mistake of My Life." He has also recorded an "On the Avenue" selection on both sides of Parlophone F 873.

Decca

The Street Singer, who is at present on a tour of this country, sings two popular numbers. "The Greatest Mistake of My Life" and "When the Harvest Moon is Shining," on Decca F 6452.

Charlie Kunz presents his Piano Medley No. 6, on Decca F 6455, and like its predecessors, contains an array of tunes that are popular at the moment, and, of course, Charlie Kunz plays as attractively as ever.

The new series of records of popular tunes in strict dance tempo that Josephine Bradley and her Ballroom Orchestra are making for Decca are proving outstandingly successful. The tunes are played in a straightforward manner and, in fact, are accurate in every way for dancing requirements. Her latest record is "September in the Rain," coupled with "Toodle-oo," on Decca F 6441.

Ambrose and his Orchestra have made five new records this month. Decca F 6456 comprises "Sing a Song of London" and "Hometown"—two tunes from the new London Palladium show, "London Rhapsody," which has had a very successful preliminary run at Brighton. "Ten Pretty Girls," which appears on one side of Decca F 6457, is a most attractive tune, and Decca F 6447 presents "This Year's Kisses." The other records are equally interesting.

Brunswick

As mentioned in my last review, Brunswick have now introduced special souvenir

records. The artistic labels on these discs take the form of a picture from the film with which the songs recorded are concerned. The artists thus featured this month are Bing Crosby and Grace Moore. Crosby sings four tunes from his new film, "Waikiki Wedding." They are "Sweet Leilani" and "In a Little Hula Heaven"—Brunswick 02443, and "Blue Hawaii" coupled with "Sweet is the Word for You"—Brunswick 02444.

Grace Moore sings "Our Song" and "The Whistling Boy" on Brunswick 02400, both tunes being from her film "For You Alone."

The Mills Brothers, who are at present in England, have made their latest record at the Decca London studios. This record, which is Brunswick 02460, features "Organ Grinder's Swing" and "Let Me Dream." The "Organ Grinder's Swing" is the main feature number of the stage act the Mills Brothers are presenting during their present tour of Great Britain.

Alice Faye, who appears with Dick Powell in the film "On the Avenue," sings two numbers from the film on Brunswick 02454. The tunes are "This Year's Kisses" and "Slummin' on the Avenue."

Rex

Gracie Fields adorns the current Rex list with three records from her new film, "The Show Goes On." "Smile When You Say Good-bye" and "I Never Cried So Much in All My Life," on Rex 9095; "We're all Good Pals Together" and "The Song in Your Heart"—Rex 9096, and "My Love for You" coupled with "In a Little Lancashire Town" on Rex 9097. Fine songs these, perfectly presented by the one and only Gracie Fields.

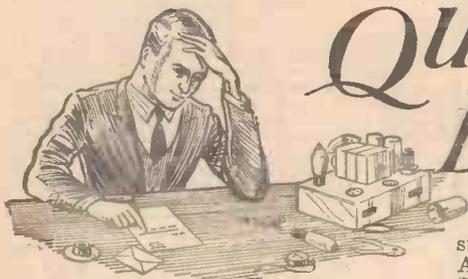
The eminent popular vocalist, Brian Lawrence, in association with Fred Hartley and his Orchestra, has made two new records. Rex 9094 concerns itself with two numbers from "On the Avenue," the new Dick Powell film.

"Sandy, the Detective" on Rex 9091, is the latest humorous sketch made by Sandy Powell for Rex. Sandy as a detective is probably the most farcical guise he has yet adopted.

Bob Mallin, the popular singer of cowboy songs, tries two new ones on Rex 9081. Accompanied by his guitar he sings "Prairie Romeo" and "There's Only Five Bullets in My Old Six-shooter."

Vocalion

Whatever you think about swing music, even if you have never bought a swing record before, there could be no more delightful introduction to this style than the selection of Vocalion recordings of Irving Berlin's songs from the film "On the Avenue." All these hits—"I've Got My Love to Keep Me Warm," "Slummin' on Park Avenue," "This Year's Kisses," "He Ain't Got Rhythm," and "You're Laughing at Me"—have vocal choruses and are brilliantly played by the cream of America's orchestral talent. They are all in rhythm throughout, and, regarded as records for dancing or for listening, they are suitable in every respect.



QUERIES and ENQUIRIES

Using an Eliminator

"I have built your Vitesse receiver but cannot get satisfactory results. There seems to be a lack of punch and stations come in only faintly. I am running the set from an eliminator—make unknown, which has several tappings and these may not be suitable. What is the best way of finding the output and correct voltages for each stage so that I can use this unit?"—G. R. (Wembley).

THE only satisfactory scheme is to find exactly what the valves require for best working conditions in your particular case. For this purpose obtain an ordinary H.T. battery—quite a cheap one will do as it will only be used for a short test. Take out separate H.T. leads for each valve and plug these into the battery at approximate values as recommended by the makers of the valves. When satisfactory results are obtained, insert a good milliammeter in each H.T. lead and ascertain the current flowing. The voltage will be approximately that marked at the tapping on the battery, and thus you will be able to ascertain the voltage to be dropped from the maximum H.T. output of your mains unit. From the current flowing you can then work out the value of resistance to insert to drop this voltage—dividing the voltage to be dropped by the current flowing expressed in amps.

Signal Indicator

"I am anxious to make really good systematic reports upon amateur signals, and as I propose to work regularly with some other amateurs I should like some form of reliable signal strength indicator. I am unable, at the moment, to afford a very big expense, and should be glad if you could tell me of a simple low-priced signal strength indicator which would answer my purpose."—F. R. (Manchester).

ALTHOUGH a good output meter is the best arrangement, quite a number of amateurs use an ordinary milliammeter in the anode circuit of the second detector. If you use a superhet—as presumably you will if you are going in for serious listening on the amateur bands—then the best plan is to use a triode working as an anode-bend detector in the second detector stage, and a 0.1 milliammeter in the anode circuit will give you quite a good indication of the volume of a received signal. A variable resistance may be joined in parallel with it, if desired, to enable a zero reading to be obtained when an unmodulated carrier is tuned in, or you can adopt any other similar scheme to provide a datum upon which to calibrate your signals.

A Valve Coupler

"I made up, some time ago, a valve testing panel, but at the time I only arranged it for 5-pin valves. I am now anxious to test up to 9-pin valves, but do not want to unscrew the panel and make inside alterations. Is there yet available a form of adaptor which will enable me to make the tests with various types of valve?"—K. A. S. (S. Shields).

MESSRS. BULGIN can supply a set of adaptors, or you can obtain a single adaptor for the purpose from the Automatic Coil Winder and Electrical Equipment Co. This costs 12s. 6d., and is a 9-pin attachment which can be rendered instantly suitable for making tests. It is designed primarily for use with the Avo-Dapter, and if you are familiar with this tester, you will be able to see how the new coupler operates. With the aid of the Avo-Dapter it is possible to test either 4, 5, 7 or 9 pin valves without difficulty.

All-wave Coils

"I am building another receiver in which I should like to incorporate all-wave tuning, but am not satisfied with the published

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.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

details of the all-wave tuners you have so far reviewed. I am aiming at really high efficiency, and wish to build a superhet to cover from about 10 or 12 metres to the long-waves, without too many gaps. Would you favour the use of modern dual-range iron-core coils, with plug-in short-wave coils of the standard type and a multi-contact switch for the wavechange, or some other idea? I should be glad if you could give me some idea of the cheapest and most efficient procedure for my purpose."—E. F. G. (York).

A SERIES of coils has just been announced by Messrs. Wright and Weaire which would apparently just answer your purpose. These are their standard coils supplied without screens, and may be obtained in three types—airial coils, H.F. transformers and oscillators. They are known as "P" type coils, and cover from 12 to 35, 34 to 100, 91 to 261, 250 to 750, 700 to 2,000, 200 to 557, and 16 to 47 metres, tuned with a 450 mfd. tuning condenser. Prices are from 1s. 4d. to 1s. 9d., and the makers supply details which would enable you to build a set round them.

The Colt All-wave Three

"I have just finished building the Colt receiver, but find that I have now lost the list of parts and am uncertain regarding the valves used in this set. Can you please give me these details, type numbers and name."—J. K. (E.13).

THE valves specified for this receiver were Hivac types D.210, L.210 and P.215. These are detector, L.F. and Power and are inserted in that order starting from the left (viewing the chassis from the panel).

Lucerne Coils

"I have been given two coils which are partly stripped, but which are labelled Lucerne models. I should be glad to know what these coils are, how to repair them if they are suitable for modern requirements, and if you have any sets or blueprints in which I could incorporate them. There are two formers in each coil and they are wound with green wire. There have been some letters near the terminals, but these are rubbed out."—F. Y. U. (Kenton).

THE coil is no doubt one of the designs produced by *Amateur Wireless*, in 1934, to enable full or better advantage to be taken of the Lucerne broadcast plan. They may not be found ideal for modern conditions, although they will certainly give very good results. The details of the windings are too intricate to enable them to be given in the form of a reply, but we published the circuit and connection data in our issue dated March 13th last, and from our Blueprint list you will see that there are two or three sets (three and four-valvers) still available for the use of these coils.

Multi-connectors

"I am carrying out some experiments and wish to obtain some multi-connectors. The ordinary seven-pin valveholder and plug is quite good but I need something with more contacts and capable of carrying a higher load. Can you make any suggestions regarding the supply of suitable items for my requirements?"—Y. S. E. (Colwyn Bay).

THERE are two possible solutions to your query. Messrs. Bulgin can supply a twelve-point plug designed primarily for television purposes and this may be of use to you. A socket is also obtainable, and the pins are of the flat type. Messrs. Belling and Lee can also supply five- or ten-pin plugs and sockets which may be of use to you. We suggest you obtain catalogues from these firms and examine the specifications of the plugs in order to make your choice.

Tone Control

"I have built a Q.P.P. stage, but am not satisfied with the tone of reproduction. All the best parts are used, and I have adopted the straightforward circuit enclosed. Can you suggest how to improve the quality?"—F. T. (Cheshunt).

YOUR circuit is devoid of all decoupling and tone-control components, and therefore you may be experiencing instability as well as excessive high-note reproduction from the two pentodes. We suggest that you decouple the first L.F. and the H.F. stage, and at the same time add a tone control to the output circuit. Probably the addition of a .001 mfd. fixed condenser across the two anodes of the output valves will be all that is needed to reduce excessive high-note reproduction, but if you wish to make a more comprehensive control a .01 condenser may be used in series with a 100,000-ohm variable resistance, the two being joined across the two anodes.

The coupon on page 20 must be attached to every query.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

RADIOMART

SHORT-WAVE MANUAL

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7½d. including catalogue.

1937 Short-wave Catalogue only (3 times enlarged) price 1½d., post free.

44, HOLLOWAY HEAD, BIRMINGHAM 1

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.

THE largest stock of components in England, over 500 lines, new catalogue now ready 1½d.—J. Bearfield, 105, Upper Street, London, N.1.

SOUTHERN RADIO'S Wireless Bargains—all guaranteed and sent post paid.

CELESTION Soundex Permanent Magnet Speakers, 10/-; Telsen speaker units, 2/6; Telsen (1937) iron cored coils, W349, midsize, 3/6; W478 (twin ganged), 9/-; W477 (triple ganged), 14/6; W476 (triple ganged superhet), 14/6; I.F. transformer coils, W482, 4/-; Telsen dual range coils, 2/9, with aerial series condenser incorporated, W76, 3/9; Telsen A.C./D.C. multimeters, 5-range (tests anything radio or electrical), 8/6.

HEADPHONES, 4,000 ohms, 3/-; Ace (P.O.) microphones, ready for use with any receiver, 4/6. **G**ARRARD Record Changers, A.C. 200-250 volts, changes eight 10 inch or 12 inch records, £6; Garrard A.C. motors with pick-up, 42/-.

A FULL Range of Valves for all American Receivers, including coils, chokes, condensers, circuits, etc., etc., to the value of 21/-, 5/- per parcel.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1; and 46, Lisle St., W.C. All mail orders to Southern Radio, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). 'Phone: Euston 3775.

BANKRUPT BARGAINS. List free. Plessey 5v AC/DC superhet chassis with Mullards and MC speaker, all fittings, 90s. Ditto 4v battery superhets, 80s. Decca 6v AC 1937 superhets, £6. Ormond 5v AC superhet, £5 10s. Halcyon AC short-wave converters, 20s. American 4v table models AC/DC, 70s. Decca 1937 battery 5v superhets, £4 18s. 6d.; ditto 3 pentode type, £3 17s. 6d. Decca 6v AC superhet radiogram 1937, 12gns. Burgoyne table type 1937 radiogram, £8 10s; Altham 3v Allwave HF sets valves and MC, 70s. Large stock replacement valves and components. All new goods.—Write for anything radio to Butlin, 6, Stanford Avenue, Brighton, Sx.

BANKRUPT STOCK.—Mains Transformers, Components, Valves, Speakers, Etc., cheap. Special Kits, All-World Ace, 27 7s., Trident, 66s. 6d. Oracle, 95s. complete. Lists free.—Ford Radio Service, Queens Place, Hove.

ALL goods previously advertised are standard lines, still available. Post card for list free. **V**AUXHALL UTILITIES, 162a, Strand, W.C.2, Over Denny's the Booksellers, Temple Bar 9338.

RADIO CLEARANCE

63, HIGH HOLBORN, W.C.1. Holborn 4631.

Announcing special bargains for the Home Con-structor. We would remind our many friends that we still carry one of the largest stocks of all types of components in the United Kingdom. Every need of the enthusiastic constructor is catered for, let us have your enquiries for any parts you may need. Remember, our prices will be seen and our goods are in every case brand new surplus stocks.

3/11d. Lissen Iron Cored Band Pass Coils, Set of 3.
6/3d. Sets of two for Aerial and H.F.
3/3d. Single Coil for Aerial or H.F.

These Coils are the very latest in design, core is composed of a special powdered iron, they are compact, fully screened, and suitable for all types of circuits. Each Coil is packed in its individual carton with circuit diagram, Switching, etc.

Special offer of American Constructrad Short Wave Kits. These Kits cover a Wave Band of 15 to 600 metres by means of 5 Interchangeable Plug-In Coils, same are easily assembled and are sent out sealed as from the makers, complete with stamped metal chassis, metal

(Continued in column three)

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All goods guaranteed perfect; carr. paid over 5/-; under 5/- postage 6d. extra.

ALL POST ORDERS TO JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5. Phone: Amherst 4723.

CALLERS, AS USUAL, TO 165 & 165a, FLEET ST., E.C.4 (Next door to Anderton's Hotel), Central 2833. New Branch: 50, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2381).

Have you had our **GIANT ILLUSTRATED CATALOGUE AND VALVE LIST? Send 4d. IN STAMPS FOR THIS BARGAIN LIST.**

The New "Premier" Short Wave **CONDENSERS** with Trolin insulation. Certified superior to Ceramic. All-brass Construction, 40 mmfd. 1/7; 100 mmfd. 1/10; 160 mmfd. 250 mmfd. 2/8; Double Spaced 15 mmfd., 2/9; 40 mmfd. 3/6. S.W. H.F. Chokes, 9d.; screened, 1/6. All-Brass S.W. Condensers with integral slow-motion, .00015 Tuning, 3/9; .00015 Reaction, 3/3.

NEW 1937 1-VALVE SHORT-WAVE RECEIVER OR ADAPTOR KIT, 13 to 86 metres without coil changing. Complete Kit and Circuit, 12/6. VALVE GIVEN FREE!

DE LUXE MODEL 14 to 150 metres, complete Kit with Chassis, 4 Coils and all parts, 17/6.

SUPERHET CONVERTER KIT, 12/6. De Luxe Model, 18/6. S.W. SUPERHET CONVERTER KIT, for A.C. Mains Receivers, 20/- A.O. Valve given FREE!

NEW 1937 2-VALVE S.W. KIT, 13 to 86 Metres without coil changing. Complete Kit and Circuit, 19/6. VALVES GIVEN FREE!

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SHORT-WAVE COILS, 4- and 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/- set, with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/6.

COIL FORMERS in finest plastic material, 1½in. low-loss ribbed, 4- or 6-pin, 1/- each.

Famous **EUROPA MAINS VALVES, 4 v. A.C. and 20 v. 18 Universal.** All standard types, 4/6. I.H. Pentodes and F.W. Rectifiers, 5/6.

BATTERY VALVES, 2 volts, H.F., L.F., 2/3. Power, Super-Power, 2/9. Var-Mu S.G., 4- or 5-pin Pentodes, H.F. Pens., V-mu-H.F. Pens, 5/- Class B, 5/-.

AMERICAN VALVES. Genuine American HYTRON and TRIAD, first-grade Valves, 3 months' guarantee. All types in stock, 5/6 each. 210 and 250, 3/6 each. New Metal-Glass Valves, all types, 6/6 each. Genuine American DUOTRON Valves, all types, 3/6 each. Valve holders for all above types, 6d. each. OCTOL buses, 9d. each.

3-WATT A.C. AMPLIFIER, 2-stage for mlke or pick-up. Complete kit of parts with 3 valves, 40/- Wired and Tested, 22/5/0.

7-WATT A.C./D.C. AMPLIFIER, 3-stage high-gain, push-pull output. Complete kit of parts with 5 specially matched valves, £4 4s. Completely Wired and Tested, 25/5/0.

COSMOCORD PICK-UPS with tonearm and volume control, 10/6 each. **PICK-UP HEADS** only, 4/6 each.

PREMIER MAINS TRANSFORMERS, wired-net type with screened primaries, tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. C.T. and 4 v. 1 a. C.T. 8/8. 250-250 v. 60 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a. all C.T. 8/6. 350-350 v. 120 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T. 11/-. Any of these transformers with engraved panel and N.P. terminals 1/6 extra. 500-500 v. 150 m.a. 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-1 a., all C.T. 17/6.

SPECIAL OFFER PHILIPS MAINS TRANSFORMERS. 250-250 v. or 300-300 v. at 80 m.a., 4 v. 5 a. C.T.; 4 a. 1 a., Tapped Primary 100-250 volt., 6/11. 450-450 v. at 150 m.a. or 500-500 v. 100 m.a. 4 v. 4 a. C.T. 4 v. 4 a. and 4 v. 3 a. Screened Primary. Tapped input 100-250 v., 12/6. **AUTO TRANSFORMERS, step up or down. 60 watts, 7/6; 100 watts, 10/-. SMOOTHING CHOKES 25 m.a., 2/9; 40 m.a., 4/-; 60 m.a., 5/6. 150 m.a., 10/6. Speaker Replacement Chokes, 2,500 ohms, 60 m.a., 5/6.**

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MAGNAVOX MOVING COILS. Mains energised. "154." 7in. cone, 2,500 ohms, 4 watts, 12/6; "152." 9in. cone, 2,500 ohms, 17/6. "150 Magna," 9in. cone, 2,500 ohms, 6 watts, 37/6. Magnavox P.M.'s—"254," 7in. cone, 18/6; "253" 9in. cone, 22/6.

ROLA latest type P.M.'s, 15/-.

Special offer **ETH** Energised Moving Coils 10½in. diam., 1,650 ohms field, Power or Pentode transformer (state which), 14/6

All Goods previously advertised, still available.

(Continued from column one)

panel, and all necessary parts to make up a successful short-wave receiver.

15/11d. 1 Valve Battery Kit, complete with Valve.
22/11d. 2 Valve Battery Kit, complete with Valves.
37/6d. 3 Valve Battery Kit, complete with Valves.
22/11d. 1 Valve AC/DC Kit, complete with Valve.
42/6d. 3 Valve AC/DC Kit, complete with Valves.
42/6d. 3 Valve A.C. Kit, complete with Valves.

Orders for the above Kits must be accompanied by 1/- as part payment of postage.

BRUCE MAINS TRANSFORMERS AND CHOKES, standard for the season. These Transformers are British made and are fully guaranteed for 6 months. A comprehensive range of all types is carried in stock.
8/6d. 250-0-250, 80 m.a., 2-0-2 volts, 2.5 amp., 2-0-2 volts, 4 amp.
10/6d. 350-0-350, 120 m.a., 2-0-2 volts, 2.5 amp., 2-0-2 volts, 4 amp.

11/6d. 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.

16/6d. 500-0-500, 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.

3/6d. **H.T.B. TRANSFORMER, 250 volts, 60 m.a., 2-0-2 volts, 4 amp.**

BRUCE MAINS CHOKES.

3/6d. 40 m.a., 30 Hys., 500 Ohms.

5/- 60 m.a., 40 Hys., 500 Ohms.

5/3d. 60 m.a., 80 Hys., 2,500 Ohms, for Speaker replacement, etc.

3d. each, 4 and 5-pin Chassis mounting Valveholders, first-class make.

6d. each, 7-pin ditto. 3d. each, 4 and 5-pin Chassis or baseboard mounting type valveholders. 3d. each 7-pin ditto.

3/- a dozen, large quantity of **POLAR .1 TUBULAR CONDENSERS.** 9d. each, .0005 Mica dielectric reaction condenser, Cossor.

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1/3d. each, Lissen 126 K/C I.F. Transformers, fully screened.

9d. each, **LIMITED QUANTITY OF CENTRALAB VOLUME CONTROLS** in the following sizes: 100,000 and 3 meg.

1/6d. Twin Centralab Pots: 5,000 and 100,000.

6d. each, **LISSEN R.C.C. UNITS,** boxed, brand new. 6d. each, **LISSEN H.F. BY-PASS UNITS,** Brand new, boxed.

3/6d. each, **UNIVERSAL CHASSIS,** fitted with 2 coils (Aerial and H.F.), two 7-pin Valveholders and two 5-pin, H.F. Choke, Aerial and Earth strip, Mains Aerial strip. 8d. each, Handy size chassis, drilled for Valveholders.

6/- each, **SPECIAL CLEARANCE OF BRUCE TRANSFORMERS,** ex. large manufacturer's order. 300-0-300, 80 m.a., 4 volt, 4 amp, C/T, 4 volt, 2 amp, Mains Input 200-250, adjustable.

4/6d. each, **PLESSEY 2,500 Ohm Field, Energised Speaker, fitted Pentode Transformer, 7½" Cone, splendid job.**

21/-, **ROLA P.M. MOVING COIL SPEAKER,** latest type, circular magnet, 10" Cone, fitted Power or Pentode Transformer.

11/6d., **W.B. MANUFACTURER'S TYPE P.M. MOVING COIL SPEAKER, 7½" Cone, Pentode Transformer, 1/- To Clear. Limited quantity of AMERICAN VALVES,** types 1223 and 6B7.

This season we are able to offer a comprehensive range of **Electrolytic Condensers,** by well-known manufacturer. The following condensers have a peak voltage of 500, working voltage 450.

2/3d., 4 mfd.; 2/3d., 6 mfd.; 2/6d. 8 mfd.; 2/6d., 4 plus 4 mfd.; 2/9d. 6 plus 4 mfd.; 2/9d., 8 plus 4 mfd.; 3/3d., 8 plus 8 mfd. All the above, Cardboard Containers. 2/11d., Aluminium Case, 1 Hole Fixing, 8 mfd. Type 902, 500 working.

SPECIAL! SPECIAL!! SPECIAL!!!
HUGE PURCHASE OF LISSEN VALVES, Brand New, Boxed, Fully Guaranteed.

2/6, H.L.2.; 3/3d., P.220 Power; 4/9d., P.P. 225 Pentode. Aluminium faced ply, ideal for making chassis, etc. Approximate size 16" x 10", 1/- per piece, postage 3d.

Lissen Model 8115, 3 Valve Battery Receiver, H.F. Pentode, Detector, Pentode Output, fitted in Upright Cabinet of modern design, Dark Walnut Finish, Clock Face Tuning, etc., Magnavox P.M. Speaker, 52/6d., Carriage Paid.

Lissen Model 8113, 4 Valve Universal Receiver, similar to above but all Mains A.C. and D.C., £2/19/- First-class Walnut Speaker Cabinets, modern design, constructed of heavy timber throughout, to take any Speaker up to 10" cone, 9/11d.

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RADIO CLEARANCE, 63, HIGH HOLBORN, W.G.1. HOLBORN 4631.



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High Efficiency plus Economy!

5-VALVE ALL-WAVE SUPERHET



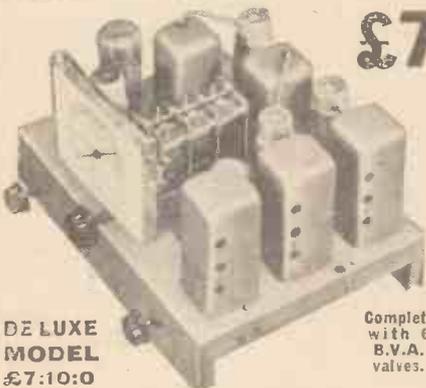
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(Complete with B.V.A. valves)

This moderately-priced 7-stage 5-valve all-wave receiver utilises a remarkably efficient superheterodyne circuit which provides exceptional sensitivity on all three wavebands—19-50, 200-550, 1,000-2,000 metres.

Circuit includes: Latest type triode-hexode frequency changer, vari-mu pentode I.F. amplifier, double diode-triode operating as diode detector and I.F. amplifier, and providing full A.V.C. High-slope 3 watts output pentode. Wave-change and gram. switch. As illustrated, but with new-type dial with principal station names.

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Radio interference can be suppressed on all 3 wavebands

It may be that the low-priced All-wave Set Lead Suppressor will, in two minutes, put an end to your trouble; you may need the All-wave "Eliminoise" anti-interference aerial—which is as easy to erect as an ordinary aerial—or, if yours is a very bad case, both may be required. One way or the other—so long as you do something about it—you can put an end to "frying-pan" music."

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2-VOLT BATTERY
VARIABLE-MU
H.F. PENTODE
TYPE W21

THE Osram W.21 is a 2-volt screened Pentode valve with variable-mu characteristics, particularly suitable for economical and sensitive H.F. or I.F. amplification in Battery sets.

An advantage of the new W.21 valve is the high working screen voltage—of similar value to the working anode voltage thus enabling a common tap in the H.T. Battery to serve for both anode and screen supplies and simplified operation.

A further simplification is afforded by the facility of a 4-pin base and internal suppressor grid connection.

CHARACTERISTICS

Filament voltage	...	...	...	...	2.0
Filament current	...	...	...	...	0.1 amp.
Anode voltage	...	...	...	...	150 max.
Screen voltage	...	...	...	...	150 max.
Mutual conductance	1.4 ma/volt

List Price 11/-

Fitted with 4-pin or 7-pin base,
 anode top cap connection.

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Valves

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Sold by All Radio Dealers

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12 June

PRACTICAL POINTS FOR THE CONSTRUCTOR See page 27.

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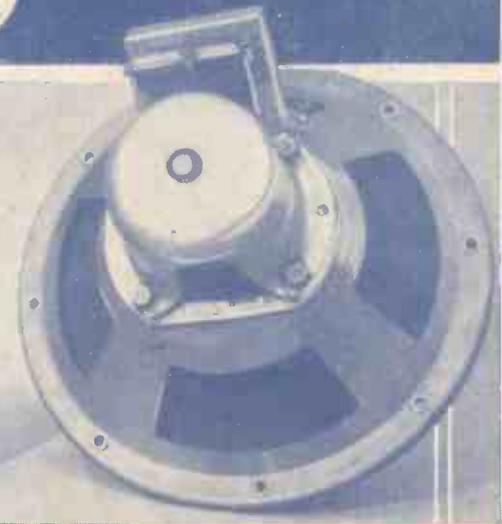
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Vol. 11. No. 262.
September 25th, 1937.

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P.M. OR ENERGISED?—See page 38



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. XI. No. 262. September 25th, 1937.

ROUND *the* WORLD of WIRELESS

A NEW VOLUME

WE are now well on our way with a new volume, and readers are notified that Binding Cases and Indexes for Volume 10 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.

London and North National Transmitters

THE B.B.C. announce that the English medium-wave national transmitters (London and North Nationals) on 261.1 metres, will, beginning on Saturday, September 25th, be opened throughout all programme hours on Saturdays and Sundays. They will continue to be closed up to 5 o'clock from Monday to Friday, inclusive, during school term time, but will open every day before 5 o'clock when the holidays begin. From Monday, September 20th, the West Regional transmitter will be open daily to transmit the National programme before 5 p.m. All these arrangements apply when there are alternative programmes.

Coastal Short-wave Telephone Service

THE Postmaster General announces that short-range telephone service with trawlers, coasters and other small craft off the east and west coasts, which are equipped for wireless telephony, is now available to and from subscribers in all parts of the United Kingdom. The service is operated through the Post Office coast wireless stations Humber Radio (near Grimsby) and Seaforth Radio (near Liverpool). Its normal range at sea is about 100 miles from the coast wireless station, but this distance may often be exceeded under favourable conditions.

The inclusive charge for a conversation of three minutes to or from subscribers in any part of the United Kingdom is 7s., plus 2s. 4d. for each additional minute. Subscribers wishing to use the service should ask their exchange for "Humber Ships Telephone Service" for ships off the east coast or "Seaforth Ships Telephone Service" for ships off the west coast

The existing telephone service operated with certain liners at sea via the Post Office high-power wireless station at Rugby is not affected.

A Much-travelled Broadcaster

MR. GORDON BRYAN, a pianist, who recently gave a recital in the Irish programme, has broadcast on over 200 occasions in Australia, New Zealand, India, South Africa, and from all the B.B.C.

broadcast from the Northern Regional on October 1st, when in the afternoon he is to address, at a luncheon, the annual meeting of the Union of Lancashire and Cheshire Institutes in Blackburn's Public Hall. A recorded version of what he has to say on this occasion about "Fifty Years Ahead" will be given in the Northern programmes the same evening. A peep into the future with a "forecaster" of Sir Francis' calibre should be well worth the listening.

Dunlop Works Band

ARTHUR TOMLINSON is to conduct the Dunlop Works Band in a popular programme from Birmingham on the National wavelength on September 29th. Mona Cartwright (soprano) is the soloist and will sing two groups of songs. She has taken part in oratorios and concerts in Staffordshire.

"Looking Back"

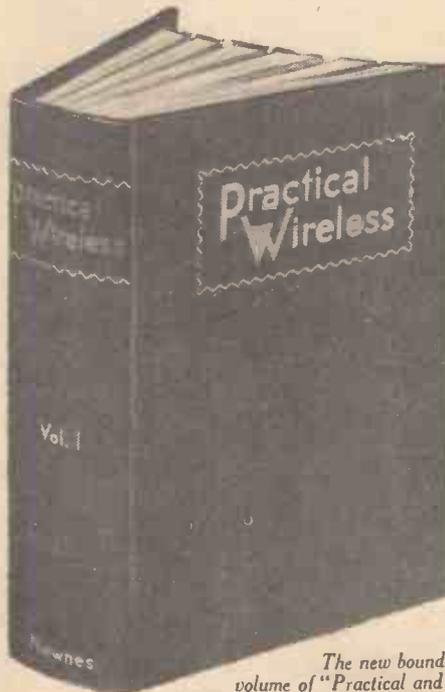
IN a talk entitled "Looking Back," to be broadcast in the Western programme on September 27th, G. F. Brough will describe his experiences "down south with an American Circus." When he was in America forty years ago he joined a circus. Mr. Brough, who lives at Torquay, spoke some time ago in the series "True Stories," and previously gave a talk on Fishing off the coast of Siberia.

North's Little Orchestra

A CONCERT on September 28th by North's Little Orchestra will be included in the main Regional programme. The Orchestra will, as usual, be under the direction of Jack Hardy, who is also the pianist of the combination. William Bernard (tenor) and Wilfrid Pickering (bass) will be the vocalists.

Metropolitan Works Band

THIS band was the first brass band to broadcast from the Midland station—in the days of the Witton studio—and has periodically appeared from that date. It was formed in 1911 and was for a time attached to the 1st Warwicks Heavy Battery R.C.A. It has competed regularly in the championship class at the Crystal Palace and won many prizes. Harry Heyes has conducted the band since 1931. The soloist in the programme to be broadcast on September 30th will be Geoffrey Dams (tenor).



The new bound volume of "Practical and Amateur Wireless" is uniform with the first volume here shown.

stations. In the past seven years he has travelled more than 200,000 miles, going twice round the world. He has just returned from his sixth long trip of 40,000 miles which took 40 weeks, through India and Africa.

"Fifty Years Ahead"

AN important speech by Sir Francis Joseph, one of the best-known industrial leaders in the North of England, will be

ROUND the WORLD of WIRELESS (Continued)

"Some Other Listeners"

WE are informed that many interesting photographs were submitted by listeners overseas to *B.B.C. Empire Broadcasting* in a competition entitled "Some Other Listeners." *B.B.C. Empire Broadcasting* is a weekly journal, containing details of Empire programmes, and it circulates among listeners to Daventry overseas. The first, second and third prizes in this photographic competition were five, three, and two guineas respectively and entries were received from listeners all over the world including Nigeria, the Sudan, Nyasaland, the Gold Coast, British Columbia, Tanganyika, India, Syria, Kenya, and the Argentine. An interesting group of dusky listeners in South Africa is seen in one of the illustrations on this page.

An Interesting Broadcast

"FAREWELL TO SUMMER" will be produced by Cyril Wood on September 30th. This Western Regional programme, written for broadcasting by Herbert Farjeon, with a poem by Robert Herrick, and music specially composed by Reginald Redman, was broadcast two years ago, but it was felt that one hearing was not sufficient. Mr. Farjeon picks out pet weaknesses with such subtlety, and yet with such delicate humour, that no one can ever resent his malicious digs. Farewells will be taken of Cricket on the Village Green, the Seashore, the Swallows, School Holidays, with a glimpse at Holiday Snaps and the Harvest Home.

First Woman to Broadcast

IT is interesting to note that the first woman ever to broadcast was hostess at a cocktail party given at Radiolympia to many stars of the air. She was Mrs. Donisthorpe, wife of Captain H. d'A. Donisthorpe, of the General Electric Company, and she first broadcast in 1917, five years before commercial broadcasting began.

"I was stationed in Worcester where soldiers were learning wireless," Captain Donisthorpe explained, "and during the day they received only Morse, and in the evenings we broadcast a programme of music on a telephone set. My wife announced the items and also sang a song. There were



Some listeners to the B.B.C. Empire Station in Nigeria. This picture was submitted in the competition organised by "B.B.C. Empire Broadcasting" entitled "Some Other Listeners."

INTERESTING and TOPICAL NEWS and NOTES.



The well-known broadcaster, Tommy Handley, listening to his *Cossor*, Model 857, all-wave radiogram.

various receiving stations around Worcester, and the soldiers gathered there each evening to listen to our programmes. There were no gramophone pick-ups in those days and

we played our records direct into the microphone. Although our audience was small it was a hundred per cent. enthusiastic."

Besides being a pioneer of radio, Captain Donisthorpe is an expert on pigeons and a feature of this party was a pigeon race, the birds being released by Miss Elmina Humphreys, "The Spirit of Radio."

"After Dinner" Cabaret

WHEN "After Dinner," the cabaret show which has taken a popular place in the North's programmes, makes its fourth appearance on September 27th,

it will be broadcast for the entertainment of Empire listeners also. There is also a possibility that a distinguished guest artist will be "on the bill." In any event, good fare will be provided by The Three Semis,

Violet Carson, Henry Reed, Johnny Rosen and his Four Chaps, and Taylor Frame. Joyce Lustgarten is again doing the lyrics.

Promenade Concerts

THE first part of the Schubert-Schumann programme on September 28th will be broadcast on the National wavelength. Schumann will be represented by his Piano Concerto (with Myra Hess as soloist), Schubert by two symphonies: No. 5 in B flat and No. 9 in C.

Egon Petri will play the solo part in Brahms's B flat Piano Concerto on September 29th (Regional). The first (broadcast) part of the concert also includes the "Allegro molto" from Brahms's First Serenade and Brahms's Fourth Symphony.

On September 30th (National) Arthur Bliss will conduct his "Colour Symphony" and Moiseiwitsch will be the soloist in Rachmaninoff's "Rhapsody on a Theme of Paganini" for piano and orchestra.

Gilbert and Sullivan Programme

REGINALD BURSTON will conduct the B.B.C. Midland Orchestra on September 24th in a Gilbert and Sullivan programme, and George Gibbs, the Wolverhampton baritone, will sing a group of Bab Ballads.

SOLVE THIS!

Problem No. 262.

Hughes used an energised speaker having a field winding resistance of 2,500 ohms in the All World Ace in place of the specified permanent magnet type. Explain fully why results were unsatisfactory. Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 262 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, September 27th, 1937.

Solution to Problem No. 261.

The adapter was designed for use in conjunction with a receiver having a triode detector valve. The anode lead of the adapter should have been connected to the cap leads of the pentode detector.

The following three readers successfully solved Problem No. 260 and books are accordingly being forwarded to them: M. Brading, 5, River View, Penweris Lane, Falmouth; G. R. Grant, 3, Burnett Place, Aberdeen; F. Berry, 51, Muriel Road, Norwich.

PRACTICAL POINTS FOR THE CONSTRUCTOR

WHILE these notes are really intended to assist the beginner, there are many of the more experienced constructors who would do well to follow some of the suggestions offered.

It is a surprising fact that plenty of amateurs of many years standing can prepare most efficiently an elaborate circuit on paper, but when it comes to the actual constructional part of the business, their handiwork is anything but a workmanlike job.

However good a circuit, it should always be remembered that a very great deal depends also on the layout and construction, and that it is a very easy matter to ruin its efficiency by carelessness, lack of knowledge or experience, and slap-dash methods in the actual making up of the receiver.

Let us examine some of the faults which do occur in the making up of apparatus usually associated with a receiving station.

Layout

The layout of the components is of paramount importance; it is simply asking for trouble if no consideration is given to the placing of the various parts.

Always remember that a receiving circuit consists of separate sections, each having its own particular work to do, and each demanding complete freedom from interference from adjacent sections. For ex-

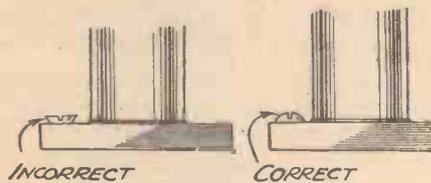


Fig. 1.—Use the right kind of fixing screws.

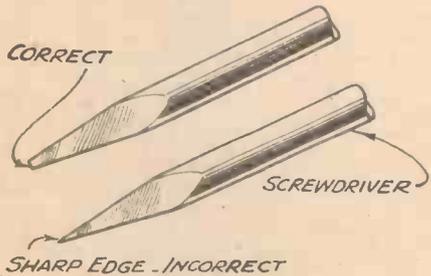


Fig. 2.—Showing the correct form of screwdriver to use.

ample, there is the H.F. side, which covers the aerial circuit and/or any stages of H.F. amplification preceding the detector. In a superhet circuit this would be extended to cover pre-H.F. stages, frequency-changer and I.F. stages, though, strictly speaking, they should be considered as additional sub-sections each requiring particular attention. Next comes the detector circuit which does not want to be interfered with by the H.F. stages preceding it, or the L.F. stages which follow. Thirdly, there is the L.F. and/or output stage or stages which, once again, are best if they are allowed to handle L.F.

Among the Subjects Dealt With in This Article are Layout, Wiring, and Chassis Construction

By L. ORMOND SPARKS

currents only, and finally, if mains are employed, there is the rectifying section which must not be allowed to introduce any trace of mains interference into any part of the circuit.

If a circuit is thought of in this manner, and sufficient care and thought given to the placing of the respective components and

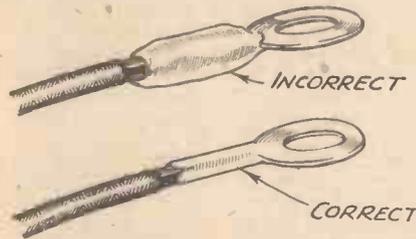


Fig. 3.—Neat soldered joints are more efficient.

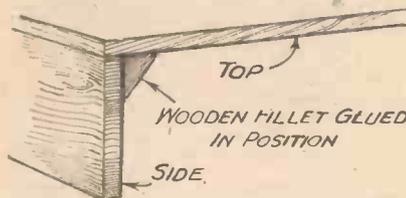


Fig. 4.—Showing the use of fillets in chassis building.

the shielding of the individual sections, much will have been done to eliminate the majority of snags which can arise from faulty constructional design.

Of course, if one is working to a blueprint, it is safe to assume that the designer has attended to such matters but, even then, there is not the slightest excuse for the components to be half fixed in position and free to vibrate and move about their fixings, as I have seen in so many cases. This brings us to the little matter of screws and bolts. Don't—if you have any pride in your work—use screws or bolts that are far too big or too small for the work they have to do. Nothing is more unsightly or unsafe.

If the fixing calls for a countersunk head use one; if, on the other hand, the hole is not recessed then use round or cheese-headed screws or bolts (Fig. 1). Again, select the length to suit the job; use a good screwdriver and so prevent the slot being burred over. (Fig. 2.) Use box-spanners for tightening nuts and not pliers, and see that all fixings are sufficiently tight to really hold the component quite firm.

Connections

An electrical connection can only be considered to be good when it is constant and introduces no appreciable resistance into the circuit. To obtain such qualities—

and they are very essential in radio circuits—all points of contact must be clean and firmly clamped or soldered together.

Terminals—providing their shanks are secure, surfaces clean, and the heads properly tightened down on the wire and wires correctly turned round them—are quite all right, but if such conditions do not exist, then a good deal of trouble can be caused.

Personally, I would strongly advise all constructors to concentrate on soldered connections, using, if and when necessary, soldering tags which allow modifications to be made quite easily.

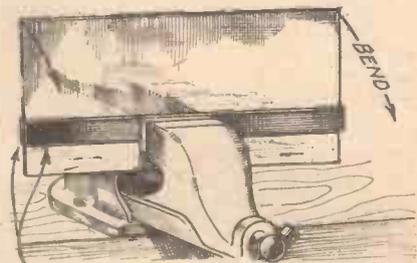
Many amateurs cannot get on with soldering; it is, however, not difficult, and the reason why so many fail to master the simple art is due, no doubt, to them ignoring the essential details. It is not possible in this article to deal with the subject exhaustively, therefore the main essentials must suffice.

Use an iron having a good quality copper bit; don't overheat it—never let the copper get red hot. Never use "killed spirit" as a flux for any electrical work; use an anti-acid flux such as Fluxite, and use it sparingly. The same applies to the solder, don't use a heap of it when a small neat amount will be far better (Fig. 3). Keep the copper bit clean and properly tinned; see that all parts to be soldered are also clean and free from grease. When the solder tends to drag or become like paste re-heat the iron, otherwise a "cold" joint will result.

Wiring

All wiring should be as direct as possible, especially grid and anode wires—this must be remembered when planning the layout. Avoid long, straggly wires carrying H.F. or L.F. currents, and see that all leads carrying raw A.C. are kept as remote as possible from other wires. It is advisable, as in the case of the heater wires, to twist them together—properly insulated, of

(Continued on page 47)



FLAT IRON BARS CLAMPING METAL
Fig. 5.—Method of bending sheet aluminium.

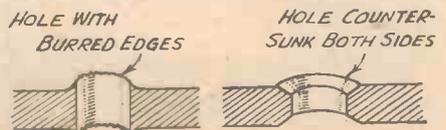


Fig. 6.—How to finish the edges of holes drilled in sheet metal.

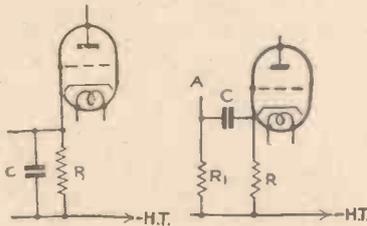
The Amateur Set Designer

This Third Article of the Series Deals with Biasing Arrangements for the Output Stage and L.F. Voltage Amplification.

Auto-Biasing in the Mains Receiver

THE indirectly heated output valve lends itself to simple and effective auto-biasing.

The bias resistance R (Fig. 1) is joined between cathode and negative H.T.; generally chassis and negative H.T. are common. The grid return lead, not shown in Fig. 1, is also taken to negative H.T. The bias voltage is the P.D. developed across R by the mean anode current (sum of anode and screen currents if a pentode



Figs. 1 and 2.—Auto-biasing arrangements for an indirectly-heated output valve.

or tetrode is used) of the output valve. The anode current during reception can be analysed into two components, a D.C. component and an A.C. signal component. Naturally, it is the former component that is required to do the biasing, and normally it is necessary to keep the A.C. component out of the bias resistance. A low impedance by-pass across the bias resistance will do this successfully, provided that the shunt impedance is sufficiently low compared with the resistance of R. A large capacity condenser C (Fig. 1) is commonly used, and a low-voltage electrolytic condenser represents the most convenient type. Values of from 25 mfd. to 50 mfd. are generally used, although higher values are employed on occasions. The lower the value of the bias resistance the larger is the minimum capacity that will be satisfactory.

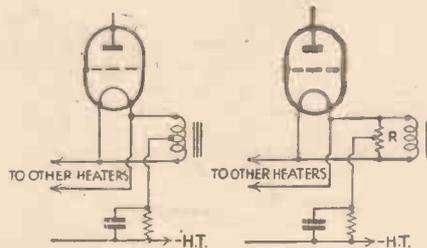
The value of R should be such that the product of R, in ohms, and the current, in amps., equals the bias voltage required. The valve data sheets generally specify a suitable value of bias resistance.

If a grid decoupling resistance-capacity combination is used, as shown in Fig. 2, a much smaller condenser will suffice. 0.1 megohm to 0.5 megohm for R1, and 0.1 mfd. to 1 mfd. for C, represent the order of values that can be tried. In the case of such an arrangement as that of Fig. 2 the grid return lead would be taken to point A. It should be noted that as far as the actual grid decoupling action is concerned this will be more effective with ordinary transformer intervalve coupling than with resistance-capacity or shunted transformer couplings.

There is one particular advantage in biasing a valve with a voltage developed by its own anode current. To a certain extent there will be a compensating action, and should there be a tendency for the

mean anode current to alter, for some reason, there will then be a tendency for the bias voltage to alter too, and in such a sense as to counteract the current change.

If the output valve is of the directly-heated type, and if it is the only indirectly-heated valve in the receiver (the rectifier can be ignored) it can be biased by a method which, in principle, corresponds with Fig. 1. A workable arrangement is shown in Fig. 3. Here the bias resistance and by-pass condenser are connected between the centre of the mains transformer heater winding and —H.T. We are assuming that the other valves are of the indirectly-heated type, so the fact that their heaters are in parallel with the filament of the output valve does not introduce any complications. It should be obvious, however, that no direct earth connection must be taken to the heater circuit, but if the output valve filament is supplied by an independent winding of the mains transformer, then, of course, there would be no objection to an earth connection being taken to the heater circuit of the other valves. Fig. 3 shows a heater winding with a centre tap. The necessity for a centre tap on the winding can be avoided by the method shown



Figs. 3 and 4.—Methods of biasing a directly-heated valve.

in Fig. 4, in which R is a centre-tapped resistance (25 to 30 ohms usually) placed across the winding. Alternatively, a centre-tapped choke can be used.

A method of biasing in which advantage is taken of the fact that there is a D.C. potential difference across the smoothing choke (frequently the field winding of the speaker) is shown in Fig. 5. In this case, the choke must be placed in series with the negative H.T. lead from the mains transformer. The sum total of anode and screen currents passing through the winding develops a voltage drop across the latter, and if this voltage is not less than the bias voltage required by the output valve, the whole, or part, of it can be applied to the output valve for bias purposes. Fig 5 covers the case where the voltage across the winding is in excess of the bias voltage required. The total resistance of R1+R2 should be sufficient to prevent too much current being diverted from the winding, and the fraction

$R1/R1 + R2$ should equal to the required ratio of bias voltage to the total voltage across R1 + R2. The grid return lead should be taken to point A.

Auto-Bias in the Battery Receiver

If the bias required by the output valve is not very high, and a decrease of the effective H.T. voltage by the amount of this bias voltage can be tolerated, then it is possible to obtain bias for the output valve by a method (see Fig. 6) which, in principle, corresponds with Fig. 5. In series with the negative H.T. lead is placed a resistance R of such a value that R ohms, multiplied by the total H.T. current, in amps., equals the bias voltage required.

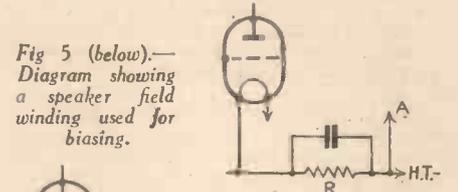


Fig 5 (below).—Diagram showing a speaker field winding used for biasing.

Fig. 6.—Auto-bias arrangement for the output valve of a battery-operated receiver.

The resistance must be very thoroughly bypassed, and a high capacity electrolytic condenser should be used. The grid return lead should be taken to A.

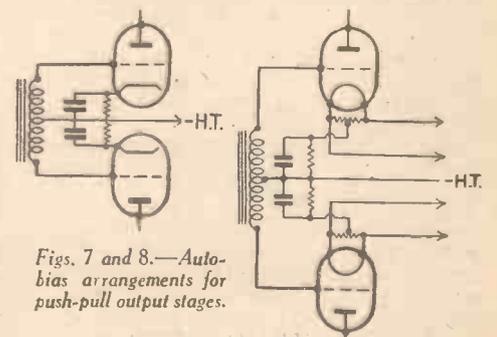
Bias for the Push-pull Output Stage

With a pair of indirectly-heated valves the simple method of Fig. 7 gives independent biasing for the two valves. If directly-heated valves are used, and they are supplied by two separate mains transformer heater windings, then Fig. 8 shows a convenient method of independent biasing.

If separate mains transformer windings are not available, but the valves are matched sufficiently well for common biasing, then the simple arrangement of Fig. 9 is worth noting. Bypassing of R is not necessary for the reason that the signal-current components of the two valves are in anti-phase and balance out in R. Remember, however, that R carries the D.C. components of two valves, a fact which must be allowed for in determining the correct value for R.

With a battery-operated push-pull output stage with transformer input, independent biasing of the two valves is most conveniently obtained if the input transformer has two separate secondary windings, as shown in Fig. 10.

It should be noted that when using Q.P.P. with the normal Q.P.P. standard
(Continued on opposite page)



Figs. 7 and 8.—Auto-bias arrangements for push-pull output stages.

THE AMATEUR SET DESIGNER
(Continued from facing page.)

seven-pin type of valve, the two valve sections are closely matched (assuming that the valve is not faulty) and common bias will be perfectly satisfactory.

L.F. Voltage Amplification

In order that the questions as to whether an L.F. stage is necessary and as to the type to be used if required shall be viewed in the right perspective, it is useful to know something of what has happened in the past.

In the early days of broadcast receivers great dependence was placed upon L.F. amplification, and two or three stages of transformer-coupled L.F. were quite common in receivers, but the frequency characteristics were poor. The maximum stage gain obtainable from a resistance-capacity coupled stage is much less than that obtainable with transformer coupling, but the better frequency characteristics of resistance-capacity couplings led to the battle-cry, "R.C.C. for quality." The valve manufacturers obliged by producing triodes with comparatively high amplification factors (and high internal impedance too, unfortunately) and R.C.C. L.F. amplification came very much to the fore.

In the meantime, the transformer manufacturers were not idle, and better and better transformers were produced. Naturally, this led to the transformer-coupled stage returning to popularity where L.F. stage gain was the factor of importance.

But a new phase developed. Vast improvements were being made where H.F. amplification was concerned, and presently the amplification that could be obtained in front of the detector reached such a degree that "Don't have any L.F. stages and save valves" became a big idea. Again the valve manufacturers obliged, and gave us the range of high-slope output pentodes that are now so familiar to us.

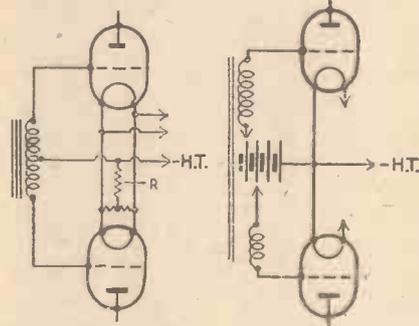
Obviously, to have no L.F. amplification (voltage amplification), i.e., to work the output valve directly after a diode detector, makes it necessary to have highly-efficient stages in front of the detector if good over-all sensitivity is to be obtained, and there is quite a chance that the amateur designer may be "cutting it a bit fine" if he sets his mind solidly against having any voltage amplification on the L.F. side of the receiver. It is interesting, too, to note the statement in the pre-show issue of PRACTICAL AND AMATEUR WIRELESS that most of the new commercially built receivers have an L.F. stage. (See Mr. Idris Evans' article on "The Trend of Design," August 28th). The amateur designer certainly need not allow himself to be prejudiced against incorporating L.F. voltage amplification on the score that it will necessarily increase the number of valves in the receiver. The double-diode-triode is a widely used type of valve, and this one valve combines two diodes and an L.F. triode as well, and is an example of a case where detection and L.F. voltage amplification (regarding the latter as a stage separate to the detector) can be obtained with the one valve.

It is to be understood that the existence of L.F. voltage amplification does not necessarily imply that there is a distinct L.F. stage in the receiver. A grid detector detects, but it also amplifies at low frequency as well, so whenever a grid detector is used there is some L.F. voltage amplification operating in the receiver, even if it has no L.F. stages, as such.

When considering the question as to

whether an L.F. stage is to be incorporated, the amateur designer will find it useful to make a note of such particular cases where the answer is reasonably certain, in the light of usual practice. If a high slope pentode is to follow a grid detector, the L.F. voltage amplification derived from the latter should be sufficient. If a diode detector is to be used with a P.P. or Q.P.P. output, an L.F. stage should be incorporated. If a diode detector is to be used with a triode or a low-slope pentode, an L.F. stage should be used.

The possibility of having to use more than one L.F. stage has not so far been commented upon, but such a case is unusual with modern receiver circuits, and when



Figs. 9 and 10.—Further bias arrangements for mains and battery-operated push-pull output stages.

particular circumstances call for an extreme degree of L.F. amplification, the designer will almost certainly find the need for such sufficiently obvious.

Intervalve Coupling

We now come to the matter of choice of L.F. intervalve coupling. The two most commonly used are resistance-capacity and transformer couplings. Transformer coupling will definitely give greater stage gain than is obtainable with resistance-capacity coupling, and the transformer should be chosen if a gain greater than the amplification factor of the valve is required. As previously mentioned, there are transformers now available which have very good frequency characteristics, so the designer need not feel unhappy about using trans-

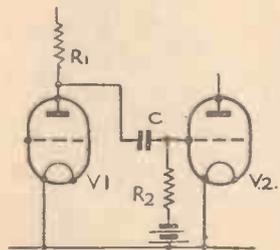


Fig. 11.—Circuit diagram showing the arrangement of resistance-capacity L.F. coupling.

former coupling if increasing the overall sensitivity is what he is chiefly after. At the same time, it must be acknowledged that carefully designed resistance-capacity coupling gives a better frequency characteristic than any other form of coupling. So the matter boils down to the simple issue of using transformer coupling for high stage gain, and resistance-capacity coupling in other cases, ignoring, for the meantime, any special tone-correcting stage that may be required.

To the amateur there is one fact about resistance-capacity coupling which will appeal—the coupling components are resistances and condensers. These are com-

paratively inexpensive items, and the amateur usually has several spare ones in his wireless den; consequently, experimenting with component values in an R.C.C. stage is a job that should not be inconvenient or expensive.

Resistance-capacity L.F. Coupling

The fact that the alternative of transformer coupling with modern components is not the unsatisfactory proposition of the early days of broadcast receivers should keep the designer from trying to get too much amplification from an R.C.C. stage. By avoiding the attempt to force up the amplification unduly, the designer makes the position much easier for himself in aiming at a good frequency characteristic. Moderate amplification and good frequency response should be the aim if resistance-capacity coupling is used.

Fig. 11 shows the basic arrangement of resistance-capacity coupling. Actually the action of the circuit, taking the whole range of audio-frequencies into consideration, is not so simple as the diagram suggests, and where avoidance of distortion is concerned there are a number of very pretty design formulæ which can be used. Looking at the matter from the amateur's point of view, however, the writer considers that the best plan is to take a broad view of the various factors affecting amplification and frequency response, and to make as good a guess as possible as to suitable component values, leaving final decisions to be made upon the results of experiment.

Ignoring possible effects of stray capacitances, and any shunting effect produced by R2, the gain from grid to anode of V1 is:—

$$\mu \times \frac{R1}{Ra + R1}$$

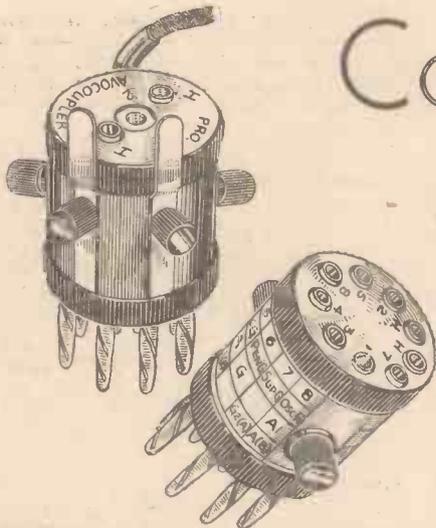
where μ = amplification factor of valve.
Ra = impedance of valve (A.C. resistance of valve).

At first sight this may suggest that it would pay to make R1 of very high resistance value, but this is not so. The alternating component of voltage developed across R1 is the output voltage as far as V1 is concerned, but it must not be overlooked that there is a D.C. voltage drop as well, developed by the D.C. component of anode current. If such a high value of resistance for R1 is used that the D.C. voltage drop becomes excessive, then either V1 will be starved for anode voltage, or the need for very high voltage H.T. supply will arise. From the formula given above, it can be seen that gain increases if R1 is raised, but actually, commencing with a small value of R1, although increasing the resistance will give at first a rapid increase in gain, the rate of increase then slows off, and improvement will not be very noticeable (even assuming constant anode mean voltage). After all, the gain could never exceed the amplification factor of the valve, however high R1 might be raised. If R1 is made too small, compared to Ra, trouble will be caused due to amplitude distortion, quite apart from any question of low gain.

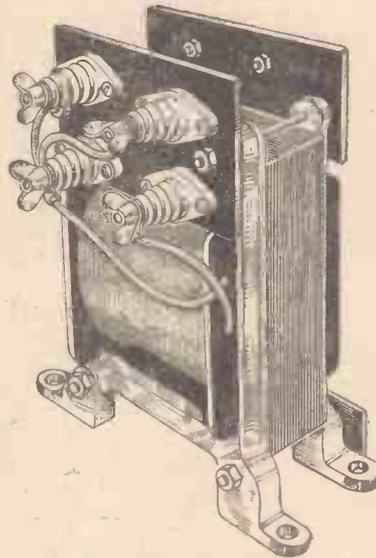
When considering stage gain, the reader will probably have one eye on the amplification factor of the valve, and may give a thought to the idea of using a triode with a high amplification factor. But again the writer would advise the designer to have moderate ambitions where stage gain is concerned. The use of a triode with moderate amplification factor and impedance will make the situation much easier from the frequency response angle.

(To be continued)

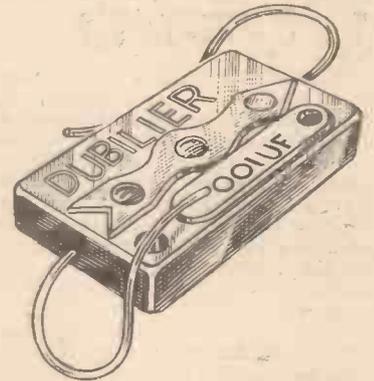
Components Seen at Radiolympia



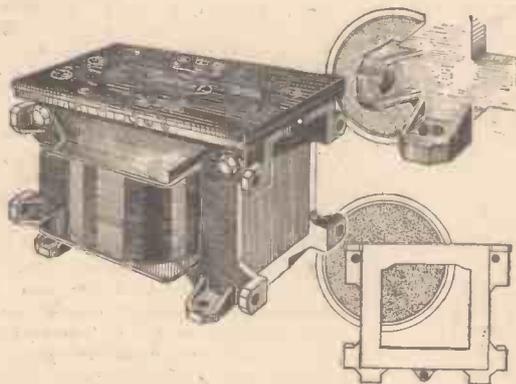
A 9-pin attachment for use in conjunction with the AvoDapter for making tests on 9-pin valves. It is marketed by The Automatic Coil Winder and Electrical Equipment Co., Ltd., at 12s. 6d.



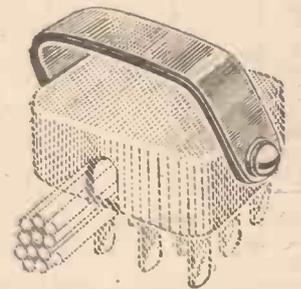
The Sound Sales television transformer Model Tel/EHT. It is designed for mains supplies of 200 to 240 volts, 40 to 100 cycles, and has a secondary output of 1,750 volts at 20 mA. The price of this component is £2 18s. 6d.



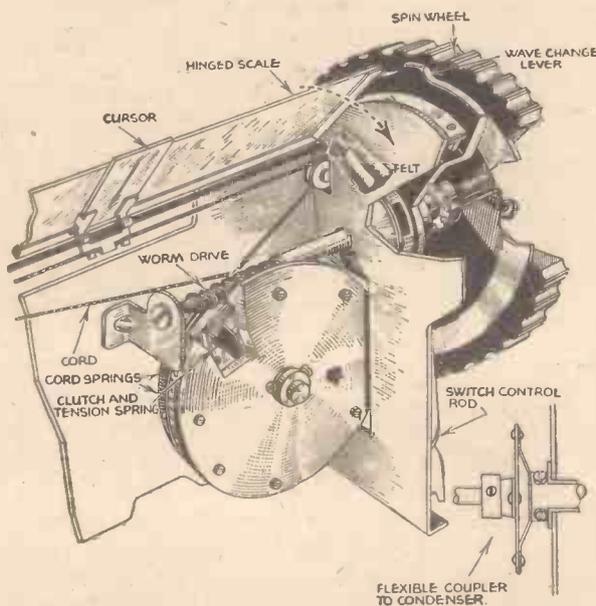
A Dublier type 690W Condenser. Capacities from .00005 mfd. to .002 mfd. can be supplied, the peak working voltage being 350v. D.C., and the prices range from 8d. to 1s., according to capacity.



The above illustrations show the Davenset shell type transformer and some of its component parts. This type has secondary winding ratings of from 12 v.a. to 500 v.a.



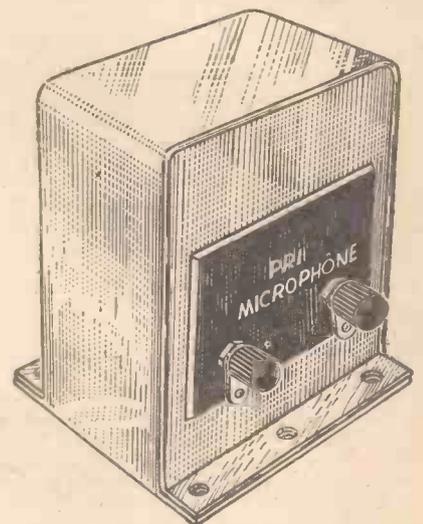
A Bulgin high-voltage television cable plug. It is non-reversible, and has six poles for 750 volts and six poles for 2,500 volts, with a test voltage rating of 7,500 volts.



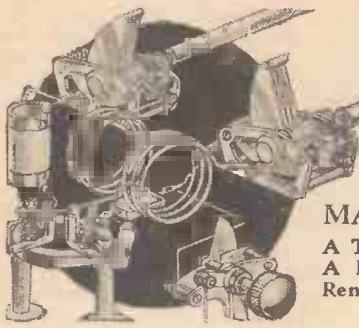
This illustration shows the mechanism of the Ekco flywheel tuning control. The drive has machine-cut gears (40 to 1), and the rim, which is 14in. in circumference, permits very accurate settings to be obtained.



A de-based type SR2 valve made by The 362 Radio Valve Co., and priced 5s. It is claimed to be the first valve specially designed for super-regenerative reception.



This is an Eddystone microphone transformer designed for use with their hand microtelephone. It is fitted in a welded steel case, and is tropically finished.



Short Wave Section

MAKING A SIMPLE S.W. PORTABLE

A Two-valve Two-range Receiver for 14 to 55 metres. A Novel Form of Construction is Employed Which Renders the Components Easily Accessible When Building and Testing.

By "THE EXPERIMENTERS."

WHEN we first mentioned in these columns the idea of producing a useful little portable receiver, we asked for readers' suggestions. For once, you have let us down. Plenty of you have expressed a desire for constructional details of such a set, but very few have passed on helpful hints which might have been picked up as a result of your own experiments.

the broadcast bands around 19 and 31 metres.

With this object in mind we used a couple of the new Wearite type P, unscreened coils which were illustrated in our notes last week. We used the two-winding type, choosing the coils listed as PA.3 and PA.5. When tuned by a .00015-mfd. condenser of low minimum capacity, the first of these

winding on the coil, a .0001-mfd. fixed condenser is included in series with the aerial lead. The aerial, by the way, can be a length of insulated wire that can be thrown out in any convenient spot.

For tuning, we suggest the Polar type C .00015-mfd. short-wave condenser. It is fitted with a good slow-motion drive and neat circular dial, whilst it is a high-efficiency component quite suitable for inclusion in a short-wave circuit. For reaction the Eddystone special .0002-mfd. reaction condenser with pointer and 10 to 1 slow-motion drive is as good as any. You will notice that we do not specify particular components to the exclusion of all others, because many of you will wish to employ parts which you have on hand. But please do be sure that they are of suitable pattern and of low-loss construction.

Simple Detector

After trying S.G., H.F. Pen. and a pair of triodes for detection, we came to the conclusion that for our present requirements we could not beat the old and well-tried simple triode. A Det. type of valve such as the Cossor 210 Det. is perfectly satisfactory. You can, of course, use other makes of similar type. This is followed by a transformer-coupled steep-slope small power valve—Cossor 220 P.A., for example. We decided to use automatic grid bias, because that saves the trouble of a G.B. battery, and also ensures that the bias is correct regardless of the state of the H.T. battery. A 1,000-ohm resistance, shunted by a 50-mfd. (12-volt working) tubular electrolytic condenser, provides a bias voltage which is sufficiently accurate for any H.T. voltage that might be used.

As to the rest of the circuit, it is perfectly straightforward. The detector valve is decoupled by means of a 20,000-ohm, 1/2-watt resistance and a .5-mfd. tubular condenser. A midget type of L.F. transformer is suitable, since the anode current taken by the detector valve will not exceed about 1.5 mA when using an H.T. battery up to about 100 volts.

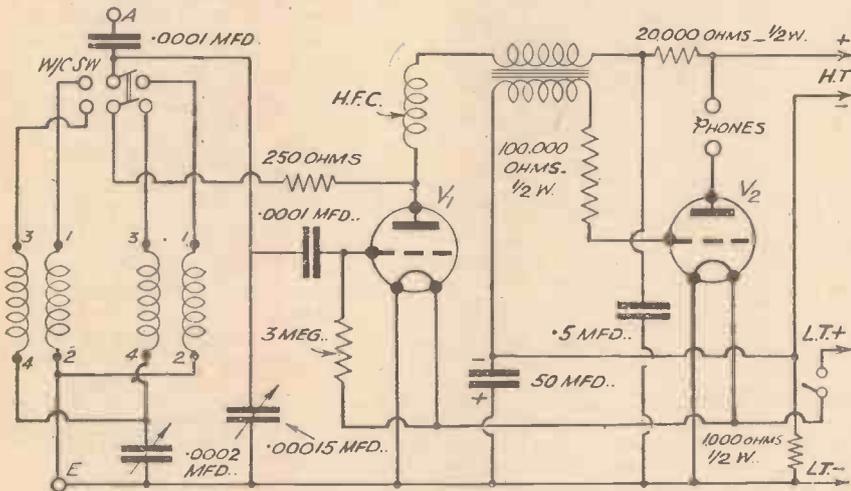


Fig. 1.—Circuit used for the simple two-valve portable. A throw-out aerial is required.

One or two have written to say that they are building a short-wave portable, and that they will advise us of the progress made; to them we say: "don't forget!"

You will remember that when this question was first raised we were hoping that it might be possible to make a reasonably simple and satisfactory receiver, not only for short-wave reception, but for the broadcast bands as well. Further tests have shown that this would not be desirable, despite the fact that fairly satisfactory results can be obtained by employing one of the latest types of all-wave tuner. But as our object was to keep down the cost of the set, and at the same time to ensure a fairly high degree of efficiency on S.W., it was eventually found best to keep strictly to short waves, and to forgo any additional advantages that might accrue from the inclusion of two other wavebands.

All-important Wavebands

In any case, we felt that most builders of a short-wave portable would wish to cover a fairly wide wavelength range; that is not possible when using an all-wave coil unless a .0005-mfd. condenser is employed for tuning. Since a maximum capacity as high as that is inclined to detract from the overall efficiency, we decided against it. Instead, we tried to obtain a tuning range wide enough to include the two main amateur bands (20 and 40 metres) as well as

coils will tune from about 14 to 30, and the second from about 28 to .55 metres. The actual ranges will vary to a certain extent according to the tuning condenser employed and to stray capacities in the wiring, but the figures mentioned represent a fair average. The main requirement is, of course, that there should be a slight overlap.

Wave-changing and Tuning

In order to change from one coil to the other it is necessary to use a double-pole change-over switch, and an ordinary toggle Q.M.B. switch such as the Bulgin type S.127 is satisfactory. As there is not a separate aerial

(Continued overleaf)

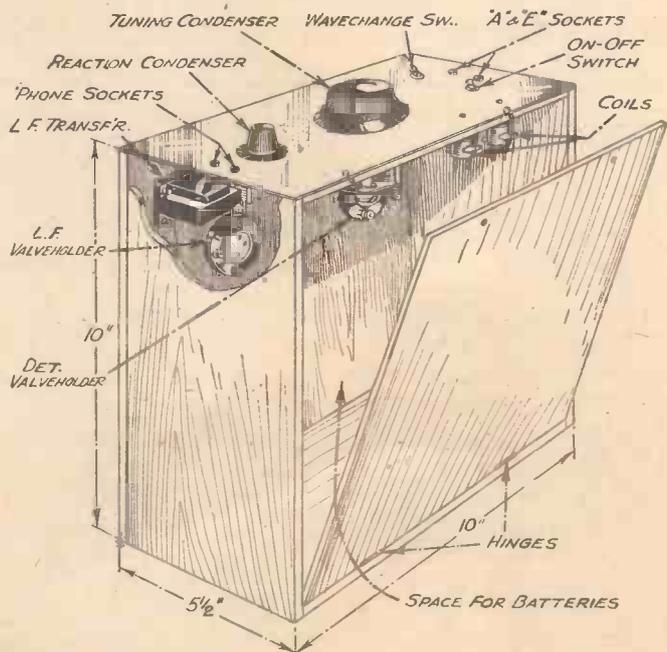


Fig. 2.—This illustration gives a good idea of a suitable form of construction for the self-contained receiver.

SHORT-WAVE SECTION

(Continued from previous page.)

The full circuit is shown in Fig. 1, and this is simple enough not to call for any further explanation.

The Carrying Case

We hit upon what we thought to be a rather unusual form of construction for a portable, but one which we think you will like. The panel is of sheet aluminium, and is first attached to a five-ply baseboard, measuring 10in. by 10in. This serves not only as a baseboard for a few of the components, but also as one side of the containing case. By following this system, the set can be made as an ordinary "fixed" model at first; after all preliminary experiments have been carried out the carrying case can easily be built round it. The general idea is shown in Fig. 2.

It will be seen that the two variable condensers, as well as the coils, two switches (on-off and wavechange) and insulated terminal sockets, are attached to the metal panel. The valveholders, L. F. transformer, H.F. choke, and other odd parts, are then fixed to the baseboard. All baseboard components should be placed as near as possible to the panel, without overcrowding, so that there is ample room for the small unspillable accumulator and "portable" H.T. battery in the base of the completed carrying case.

After making the set itself, it should be tested with a throw-out aerial, and also both with and without earth connection. Once you are satisfied that it is operating properly the carrying case can be built round the set. You will see that we show the panel to be 5½in. high. This is ample for most valves, but certain types will call for a deeper panel if they are to be accommodated within the carrying case. Actually, the valves, when inserted into their holders, should be about ¼in. lower than the top of the panel; this is to leave room for the hinged front. By the way, take care to use valveholders of the anti-vibration

pattern which grip the valve pins quite firmly.

The sides should be of such a width that they come exactly in line with the top of the panel. In other words, they should be 5½in. wide, less the thickness of the plywood baseboard. Attach them to the upper surface of the baseboard with about five 1in. screws, and pass a couple of screws into them through the metal panel. The base can be screwed to the baseboard and sides,

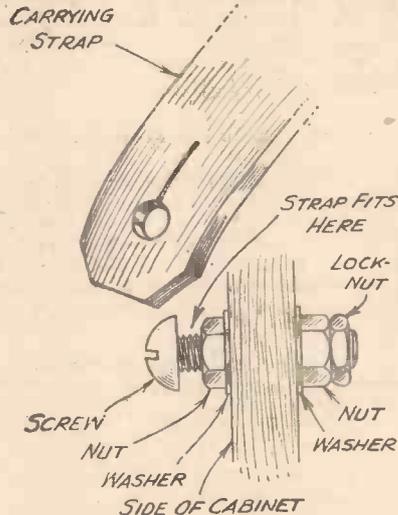


Fig. 3.—How the carrying strap is easily fitted to the case.

but it might be desirable to strengthen the fixing by using small metal angle brackets inside the case. A cross-piece should be fitted to the front of the case just below the panel, and then the hinged front can be dealt with.

Hinged Front

As you can see from Fig. 2, it is attached to the bottom of the case by means of a couple of 1in. brass hinges, which should be recessed into the base and also into the

hinged lid. The lid can be fixed in the closed position by means of two hooks and eyes. It is very important, however, that the lid should be a good fit. It is also a good plan to screw two wooden stops to the inside of the case to prevent the lid from being pushed too far inward. Those who are of a more mechanical turn of mind might prefer to fit two ball catches to the sides to hold the lid nicely in the closed position.

When this stage has been reached, the whole of the outside of the carrying case should be well rubbed down with fine glass-paper, after which it can be stained and varnished. As an alternative, you might prefer to cover it with leather cloth, or even imitation leather cloth made of paper.

The Batteries

A carrying handle will be required, and this can consist of a strap of soft leather, the ends of which are punched and slit—key-hole fashion—to fit over the heads of bolts passed through the sides of the case. These should be held in place by fitting a nut both inside and out, a washer being placed under the head of each. If they are well fitted, they will easily support the weight of the set and batteries. See Fig. 3.

We have refrained from specifying batteries, because they will have to be chosen to fit the available space, and this is governed to a certain extent by the components employed, and the spacing between them. In any case, there should be ample room for a small 100-volt battery as well as a 2-volt accumulator such as the Exide type PRP3, which measures 2½in. by 1in. by 2½in. high. There will generally be sufficient space for a pair of 'phones and a length of flex for the aerial, in addition.

It is very unlikely that any difficulty will be experienced, but do not forget that batteries, however small, weigh quite a few pounds. For that reason the case should be well made and reasonably strong. If you do experience any trouble, we shall be glad to be of assistance.

We should like to hear of your results.

Leaves from a Short-wave Log

The Danish Short-wave Relays

IN addition to the experimental transmissions which are being carried out daily on 25.41 m. (11.805 mc/s), OXY, Skamlebaek, is now broadcasting nightly on 31.51 m. (9.52 mc/s) with a power of 6 kilowatts. Programmes destined to South America and the Far East are given from G.M.T. 19.00-21.00, and for Greenland and North America from G.M.T. 21.00-23.40. It is also proposed to effect a radio service every Sunday on 25.41 m. (11.805 mc/s) between G.M.T. 13.00-15.50, for the Far East and Latin America.

WABC Broadcasts Heard Nightly

W2XE, Wayne (N.J.), U.S.A., the main short-wave outlet of the Columbia broadcasting system of which WABC is the "key" station, now possesses not only new transmitters, but also directional aerials which make the capture of the programmes an easy matter in the greater part of Europe. The daily schedule should be noted, namely: On 13.94 m. (21.520 mc/s) from G.M.T. 11.30-14.00; on 19.65 m. (15.27 mc/s) from G.M.T. 19.00-21.30, and on 25.36 m. (11.83 mc/s) from G.M.T. 22.30-23.00.

With the exception of the last channel a further broadcast of 30 minutes at the end of the transmissions destined to Europe is specially beamed on South America. On 25.36 m. (11.83 mc/s), however, the broadcast lasts from G.M.T. 23.00-04.00.

More War News from Spain

Although no location is given in the call, listeners may hear on 42.74 m. (7.02 mc/s) at G.M.T. 23.30 nightly a war news bulletin broadcast which would appear to emanate from Valencia. Another broadcast on 7.015 mc/s or about 42.76 m., giving the call *Radio Norte del Union Radio Madrid*, and heard at G.M.T. 22.30, seems to be a relay by Barcelona of a Spanish Government transmission in the capital.

Search for Burma

Reports reach me that a broadcast by the Burmese Government Radio station at Mingalodon, Rangoon, has been logged by a listener in the British Isles. The channel was 49.96 m. (6.055 mc/s), and the transmission was at its best between G.M.T. 14.15-14.40. The programme closed down with the playing of *God Save the King*.

Sweden's New Schedule

SBG, Motala, now uses two channels in addition to the test broadcasts made almost daily on 19.8 m. (15.155 mc/s). The autumn schedule has now been fixed as under: on 25.63 m. (11.7 mc/s) on week-days from G.M.T. 12.00-13.00, and from 16.00-18.30; on 49.46 m. (6.06 mc/s) from G.M.T. 18.30 to 21.30. All programmes emanate from the Stockholm studio.

How and When to Hear Lisbon

Although difficulty is sometimes experienced in picking up the Portuguese National programmes via the medium-wave Lisbon station, it is always possible to capture them through the CSW short-wave transmitter. From G.M.T. 16.00-22.00 the broadcasts are made on 27.17 m. (11.04 mc/s), and from the latter hour until G.M.T. 01.30 on 30.18 m. (9.94 mc/s). A woman announcer gives out the details in Portuguese and French, and occasionally in English; the interval signal consists of chimes. As a rule the studio opens with a short melody on a bugle; the call is *Lisboa, Emissora Nacional*.

VK2ME or VK6ME?

As both Sydney and Perth work on the same channel, namely 31.28 m., it is well to note the fact that the former, identified by its quaint Kookaburra signal, only operates on Sundays. VK6ME, Perth, Western Australia, is on the air daily, except Sundays, between G.M.T. 11.00-13.00.



On Your Wavelength



By Thermion

Our Birthday

DID you notice that the volume number of this journal changed with last week's issue, and that we are now at the commencement of volume 11? It only seems yesterday that a bombshell was dropped into journalistic circles in the form of rumours that, in spite of the large number of constructor journals then available, yet another was to be published. I can well remember the consternation it caused in my particular office, for I was then serving a competitive journal—the old and now defunct *Amateur Wireless*, now merged into this journal. I was writing a topical feature for that paper, and the scribes of Fleet Street alternated between quiet smirks that the publishers and editor should have the courage as well as the impudence to enter a field which they regarded as their particular stronghold and in making forecasts as to how long the new journal would last, and the maximum seemed to be three months. My own private opinion was, however, that a new journal planned on the rumoured lines would indeed be a serious competitor. I knew the editor, and had worked with him many years ago. I knew that he did not embark upon ventures of the mare's nest variety, and, with a long history behind him of successful ventures, I was filled with fear for some of the journals, for I knew one at least must go to the wall. I did not suspect that so many of them would crumple under the extremely fair but intensive competition which the new journal raised. When the first issue of *Practical Wireless* appeared it was, of course, severely criticised, and I have no doubt that it suffered from the usual imperfections of a first issue. Most of the editorial people on competitive journals were snooping around on the day before publication endeavouring

to obtain advance copies. Juniors, with that air of worldly wisdom associated with extreme youth, smiled and wagged their heads when they saw it. Three months went by, and saw the journal making considerable progress week by week. At the end of six months, the whole of the advertisers had appreciated the sterling worth and the clean-cut editorial policy of the new journal. At the end of twelve months a fresh thunder-bolt shot into the wireless firmament in the form of a Net Sales Certificate for *Practical Wireless*. This showed that the journal had in one year attained the leading position and the largest net sales. It is a position which it has held consistently ever since. It is one of the romances of journalism, and some day when your editor has retired I hope he will be persuaded to write his reminiscences. You can believe me when I say that he is rich in them, and he has a good story to tell of the histories of a good many journals and journalists. I did not think that I should serve the new journal, nor that it would live to absorb one of its oldest competitors. Life is like that.

I well remember when *Amateur Wireless* was launched at the top of the building in the sacred precincts of the old-established publishing company of Cassell, in La Belle Sauvage, Ludgate Hill, in the shadow of St. Paul's. I was present at its birth, and had a great deal to do with it. I can well remember the surprise which was felt when a competitor appeared on the scene one day before it. Those were indeed hectic days. The hobby had not created a sufficient supply of contributors, and copy as well as news was short. Gradually the hobby developed, new firms sprang up, reader interest grew.

Queer components were offered and made fabulous sums for the manufacturers. Those were indeed interesting days.

My thanks to those many readers

who have wished us many happy returns of the right sort!

A Queer Ad.

I NOTICE the following in the Car Sales column of a daily paper: "Austin Seven Saloon; any trial; 15 valves." I knew that wireless sooner or later would invade the motor industry, and I am surprised that the technical department of this journal has not published details of the circuit used to propel a car by means of a wireless set.

A New Gramophone

I PUBLISHED a paragraph recently, dealing with the new photo-electric cell type of gramophone, and this has called forth a letter from J. D., of London:

"Your reference to the imminence of a revolutionary system of gramophone reproduction is interesting. But—is it true? For some years past I've read, here and there, in popular and scientific journals of the same thing. Nothing happens. The systems are born and die, generally of infantile paralysis, though sometimes they are overlaid by their big foster-mother, the Merger Gramophone Company.

"H.M.V., Columbia, Parlophone, have given us great recordings; they have spent lots of money in improving the disc and issuing fine music. The price we pay is more than for the purchase of instrument and records. It is in that tacit assumption to accept the present system of recording and reproduction as finality of development and design. True, as a sop to the restless or well-to-do, there is a mechanical record-changer, a new toy, but apt to be troublesome.

"Needle-hiss is a nuisance. To cut it out destroys the balance between treble and bass. I use fibre needles as a solution. These are often unsatisfactory—a lack of brilliance, and maybe, a breakdown on heavy passages.

"My own pet grievance is the lack of playing-time on each side of the wax. No symphony will stand being broken into a series of three to four minutes' play; its continuity is

destroyed, and the listener remains unsatisfied. Since Pemberton Billing tried to increase the effective value of the disc, how many patents have come into the hands of the Combine!

"The interested public can expect nothing from any monopoly run on a purely profit-making basis. This is commercial law and common sense, and the gramophone companies will look with a very jaundiced eye on 'revolutionary methods.'

"And so, Sir Thermion, knowing the power of money, I am a little mistrustful."

Tuneray Tuning

INSTANT and scientifically precise tuning of short-wave transmissions and weak stations on all wavebands is now made possible by an entirely new Tuneray tuning indicator introduced by the G.E.C.

This is a cathode-ray device so highly sensitive that absolutely accurate tuning of stations on all wavebands can be obtained in silence; that is, with the volume control at zero. It takes the form of a luminous ring, about an inch in diameter, mounted on the tuning dial.

When no station is in tune, a wide darkened sector appears, but as a station is brought into tune the darkened sector narrows until it becomes almost a line. Since the shadow definition is effective at all signal strengths the indicator adds greatly to the ease and speed of correctly tuning stations on every waveband.

Moreover, the Tuneray indicator is mounted centrally on the dial, on which, of course, the listener's attention is fixed and where all the control settings can be seen simultaneously—particularly the position of the new rotavernier microtuning control, which gives distinct vernier readings of hairbreadth precision on all wavebands.

An Interesting Television Programme

IAM informed that a new type of television programme will be transmitted on September 28th, when, by a combination of studio performance and specially prepared film, viewers will be given a complete story of the arrival and departure of a great liner at Southampton.

The liner is the *Empress of Britain*, and for the purpose of "Turn Round," as the programme is called, a television producer and photographers have made a film record at Southampton. The vessel was first "picked up" as it neared Calshot; shots were taken from the



Notes from the Test Bench

S.W. Superhet

OWING to the high frequency of the incoming signals it is easier to design the tuned circuits of a short-wave superhet than those of the broadcast-band type. In a receiver designed for reception below 100 metres it is by no means essential to use special superhet coils and tuning condensers—the oscillator and aerial coils can be of the same type and they can be tuned by a straight two-gang condenser. The normal type of four-pin coil used in a simple one-valve receiver is quite suitable, the reaction winding being used to produce oscillation in the oscillator stage.

Adding Trimmer

IF the tuning condenser sections are alike, however, it will be necessary to connect a low-capacity trimmer condenser across the input circuit tuning condenser, in order that this circuit can be tuned to a frequency different from that of the oscillator circuit. This difference in frequency must, of course, be equal to the intermediate frequency to which the I.F. transformers are tuned. By using a trimmer condenser having a capacity of approximately .00005 mfd. satisfactory results can be obtained with an I.F. of 110 kc/s on wavelengths up to approximately 100 metres, but if an I.F. of 465 kc/s is used the maximum wavelength to which the receiver will tune will be approximately 55 metres.

Drilling Plymax Chassis

SEVERAL readers have written to inform us that they have difficulty in screwing components to the Plymax baseboard used in our recent designs. They complain that screw heads break off when they have attempted to tighten them. This is a very common trouble when using brass screws in aluminium, and, therefore, with this type of chassis a small hole should be drilled through the aluminium before the screw is inserted. Another rather surprising trouble is sometimes experienced with this type of chassis; the surface of the aluminium becomes covered with a thin layer of insulation. It is, therefore, advisable to clean the metal surface underneath earthing screws before these are tightened down.

One or Two L.F. Stages?

IN modern battery receivers it is customary to use one L.F. stage with a pentode output valve. If the receiver is well designed, however, better results can be obtained by using two L.F. stages with a power or super-power valve in the output stage.

captain's bridge and later of the passengers landing, the unloading of the luggage and cargo, and the complicated manoeuvre of turning round in dock until the liner once more had her nose towards Quebec.

An amusing story links all these scenes together, the principal characters being the young Canadian actress, Joan Miller, known to viewers as the "Picture Page Girl," who takes the part of Mrs. Homer B. Guggenheim, and Guy Glover, as the oppressed husband whose search for his elusive wife seriously endangers the smooth-working efficiency of the liner. Some of the scenes in this domestic drama were filmed at Southampton; the others will be enacted in the television studio with scenery designed to dovetail into the actual pictures at the dock.

This is the first time that a film unit has gone "on location" to secure material for a television programme. The script of "Turn Round" is by S. E. Reynolds, and production is in the hands of Eric Crozier.

Radiolympia of the North

ANY of my readers who are fortunate enough to visit the North National Radio Exhibition will no doubt be impressed with all the interesting exhibits on view, together with a variety programme of radio stars unsurpassed in the North.

Practically every stand at the Exhibition boasts all-wave sets of cunning design and wonderful performance. The stands are fully representative of the Trade, and the goods shown are being confined to those of British manufacture. Almost all the firms who showed at Radiolympia are showing again at the City Hall, and in many cases have transferred their exhibits lock, stock and barrel.

Everyone who visits the City Hall can rely upon seeing the world's best and most up-to-date radio apparatus under ideal conditions, and in circumstances which allow direct comparison between the various models of the most famous manufacturing firms. Even a casual glance at the new array of sets will be enough to bring home the fact that radio craftsmen have gone one better in set construction than last year, in order that radio in the home will become more perfect and more fool-proof. Every phase of broadcasting is represented at the Exhibition, and interesting attractions are exhibits by the Services, and competitions with substantial money awards. The exhibition is open till September 25th.

Practical Television

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Vol. 3.

No. 67.

A Reply to the Article Published Recently Dealing With Television Receiver Design



A recent television thrill was a demonstration of modern fire-fighting methods outside the Alexandra Palace. In the illustration Leslie Mitchell is seen operating the hose from the top of the tall fire escape ladder.

THE author of the article on future television design, which appeared in PRACTICAL AND AMATEUR WIRELESS, dated September 4th, has attempted to deal with a very intriguing problem. A very close study of the events of the past twelve months culminating in Radiolympia, together with the Science Museum television exhibition, has taught many lessons, and the author of the article quoted has not taken all of these into full account when drawing up his conclusions.

While agreeing that the so-called "experts" have played their part by criticising the television service, a careful analysis reveals that the bulk of the criticisms are associated with programme values which do not yet possess the sustained entertainment value so necessary for the success of this new but growing industry. It is an undisputed fact, however, that the bulk of those who are still making an acquaintance with television reception are amazed at the quality of the pictures shown by the first-class receivers. Public interest has not waned in the slightest. At Radiolympia the accommodation provided for those genuinely desirous of seeing the latest results was grossly inadequate—this in spite of the fact that at least 25 per cent. to 30 per cent. of those who passed the turnstiles saw pictures. Add to this the fact that an average of 20,000 people visit the Science Museum television exhibition each week; while, when any London store or radio dealer organises a visual display of television reception, queues form to see the pictures, and it is quite apparent that interest, novelty appeal, and even astonishment at the achievement are, still being shown by the general public.

Improvement in Reception

Engineers with experience in television transmission and reception on the ultra-short waves were convinced that the B.B.C.'s pessimistic estimates of the service

range of the Alexandra Palace transmitter would be wrong, and subsequent events have proved their point. No change whatsoever has been made in the power of the radio transmitter installed at the station, and the distances over which signals have been seen and heard are due entirely to improved receiver sensitivity and aerial design. With added experience the engineers have

not only made considerable strides in adding to the sensitivity of vision and sound receivers, but a very careful study of reception technique coupled with research into the efficiency of different types of aerial has trebled the range of reception, except where the contour of the intervening country gives a very marked shadow effect to the ultra-short waves. Surveys with field strength equipment at what were regarded previously as borderline cases have enabled satisfactory aerial sites to be chosen, while directional and reflector-type aerials have stepped up the signal strength, and at the same time decreased the level of the interference signals. This factor has no doubt had a very great influence on the design of the receivers themselves, and it is stated quite openly that if only the B.B.C. would increase the present power of the station the results inside the extended service area

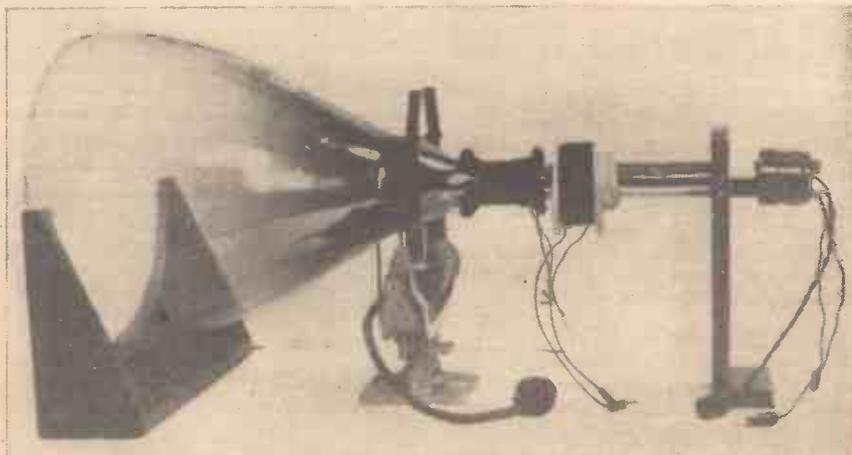
would improve very materially, while towns and cities at present outside the area would find reception possible.

The Importance of Picture Brightness

The author of the article in question is quite right when he says that picture size is a difficult problem to deal with. He failed to mention, however, that linked up with this is the question of picture brightness. No matter what size the picture shown in the home, viewers will not be content to watch transmissions unless there is adequate picture brightness, as it brings about an undue strain on the optic nerve systems. A brilliant picture, 10in. by 8in., can give far more television entertainment value than one twice the size which has the wrong colour and inadequate brilliance, assuming equal definition and an absence of distortion in both cases. A very small picture may be intimate, but it restricts the number of people who can look-in comfortably, and when crowd scenes are portrayed the figures on the screen become too small for sustained entertainment.

The marked improvements in cathode-ray-tube screen brilliance revealed at this year's Radiolympia, especially by one firm in particular, showed quite clearly that room darkening is by no means necessary. The measured candle power is of such a high order in one case that ordinary daylight or normal room lighting is possible while looking in, provided no brilliant light is thrown on to the picture-reproducing screen. Restriction on the activities of any members of the family who do not wish to watch the transmissions is thereby removed, and this fact was quite well demonstrated in the viewing rooms at Radiolympia. In the opinion of the writer, picture size and brilliance cannot be segregated into two separate arguments; they are linked together irrevocably, and one without the other gives a loophole for criticism.

(Continued overleaf)



Showing the type of C.R. tube, cap and socket, scanning and focusing equipment used for electromagnetic operation.

PRACTICAL TELEVISION

(Continued from previous page)

Just as in the case of loudspeaker volume being under the control of the receiving set user to suit the family taste, so there is reason in the argument that it may be found desirable to give viewers similar facilities for altering picture size. This can be met, however, by an adjustment of the viewing distance, and assuming that the original picture size is not too small, then a satisfactory arrangement should be possible by this method. The viewing angle must be adequate and certainly no less than that obtained in the medium-priced seats of a cinema.

C.R. Tube Operation

It is not possible to enter here into a controversy concerning the merits and demerits of optical electrical receivers (cathode-ray tubes in one form or another as the picture reproducers) as against optical mechanical receivers, since the latter have yet to be compared with sets of a commercial type working on the present B.B.C. standard, but there is one point raised by the author of the previous article which needs expansion. This refers to the operation of the cathode-ray tubes by electro-static or electro-magnetic methods. In the early days of cathode-ray tubes the former method was used for nearly all laboratory equipment, this being practically the only market where C.R. tubes were employed. The rapid advance of television, and an appreciation of the requirements of this new science, resulted in larger and better quality tubes; but they were in effect just enlarged versions of their laboratory brothers. The demands of television proved rather rigorous in character, and although the protagonists of electro-static operation took steps to overcome the earlier defects, it became apparent to others that another way of meeting the situation was to redesign the tubes entirely and operate them, at least for scanning and focusing purposes, electro-magnetically. The advantages of this latter scheme soon became very obvious, and no doubt this accounts for the majority of the present commercial receivers using electro-magnetic systems.

There are many advantages which can be cited in support of this scheme, but if a few of these are stated it will enable the reader to appreciate why so many of the receiver manufacturers show a preference for the system. First of all, the electrode system is much simpler, while in the case of the tube's terminating cap and socket there are only four contacts to consider. This is illustrated in the accompanying photograph, which shows an electro-magnetically operated tube. From the

socket only four leads pass, these being two for the cathode heater, one for the modulator electrode, and one for the high voltage anode which accelerates the electrons to the front picture screen. The overall cost of the complete tube can be reduced in this way. Again, by using magnetic focusing, together with line and frame scanning, the receiver costs can be reduced, since the time-base generator equipment,

equipment can be replaced very readily when it is external to the tube.

Any tendency towards keystone distortion in the scanning field, or even astigmatism, can be prevented when solenoidal coil-focusing is employed. This is a very material advantage, for very often when these defects occur in electro-static tubes it is not possible to effect a cure without replacement. There is always a tendency

TELEVISION FOR THE DEAF AND DUMB



For some time past the General Electric Company has been interesting itself in the problem of the deaf. As a result a G.E.C. television set was installed at the Tower House Home for Deaf and Dumb Men, Belvedere, in June this year following the suggestion that it appeared to offer great possibilities to those to whom radio meant nothing. The experiment has now been taken a stage further and headphones have been provided so that those who are not completely deaf might be able to hear as well as see. Our illustration shows inmates of the Tower House Home enjoying a recent television programme.

together with the apparatus for focusing, are of simpler design and cheaper to make.

Further Advantages

With the scanning and focusing apparatus external to the tube, as shown in the illustration, the installation engineer, as a general rule, finds it much easier to set up the receiver in the home in which installation is taking place. Slight irregularities in scan, line focus or complete field distortion are remedied by small repositionings in the coils, etc., located on the long tube neck. The pre-set controls in the receiver are also less in number, while should such a necessity arise the scanning or focusing

for the alteration in spot brightness which must occur when building up a picture by intensity modulation to cause some degree of defocusing, but the general opinion seems to be that this is not so noticeable, or as serious, as with some types of electro-static tubes. In addition, some of the high voltage equipment essential to the operation of electro-static tubes is not required when electro-magnetic operation is employed. No doubt a careful consideration of some of these reasons has at least for the time being influenced the trend of design in the present types of commercial receiver, and only the passage of time will show whether this policy is the correct one.

Low Resistance of Iron Cores

IRON cores, such as are used in modern I.F. transformers, are composed of incredibly fine iron powder mixed with a suitable binding material which must necessarily be non-ferrous and non-metallic. It is therefore curious that these iron cores should have such a low D.C. resistance; often only a dozen ohms or so.

Audible Frequencies

WE read in a national newspaper that a few people can hear sound much above 20/30,000 cycles. Personally, we have never met anybody who can hear much above 14,000 cycles. This "inspired" writer suggests the strange effect which some people experience when listening to music caused by sound above this range

TOPICAL NOTES

which the ear cannot detect. It has presumably not occurred to this gentleman that people are often affected in the way he outlines when listening to wireless sets which are totally incapable of reproducing anything at all above 5,000 cycles.

New B.B.C. Station at Stagshaw

THE B.B.C. announce that the Newcastle Station is to be abolished, and a 60 kW. station will come on the air in October at Stagshaw on the old Newcastle wavelength of 267.4 metres. How nice for those listeners in the north who enjoy the

programme from Radio Normandy, which works on a wavelength of 269.5 metres; only 9 kilocycles separation!

New Form of Aerial

WHAT are the strange-looking masts that we notice being erected near Brookmans Park? We are informed that it is a new form of aerial, the radiation from which is largely a ground wave, there being very little sky-wave radiation. Nice, of course, as a means of improving the service area round the station, but if such an arrangement were internationally adopted, there would be very little reception on the medium waves, as stations which are receivable at night, and not during the day-time, are received by means of their sky wave only.

A PAGE OF PRACTICAL HINTS

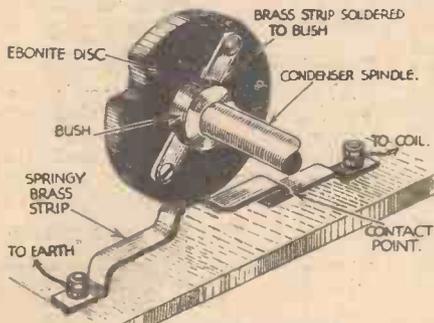
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Automatic Wave-change Switch

Now that the medium-wave National transmitter does not open until late afternoon, I have come across several

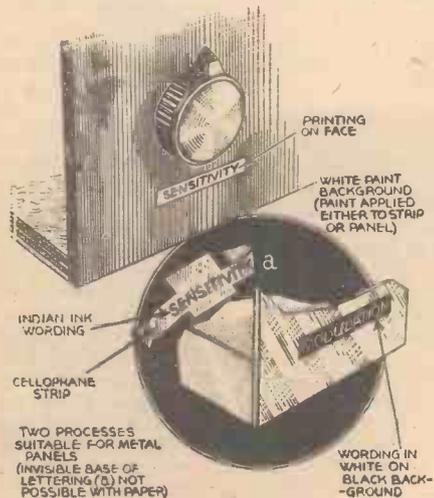


A simple wave-change switch.

elderly people who cannot get used to switching to long waves for the alternative Droitwich programme. By fitting the arrangement illustrated to the tuning condenser spindle, the set is automatically switched to Droitwich, at a point just above the Regional wavelength. This idea is mostly suitable for the "Local Station" set, with only one tuning coil, but it can be used for two or three tuning coils by adding extra contact springs and contact points. The construction of the device is clearly shown in the illustration.—COLIN GANTZER (Billericay, Essex).

Panel Control Designation Strips

PANEL wording may be effectively accomplished in the following manner. A sheet of Cellophane is utilised as the background for the Indian ink lettering as shown in the accompanying drawing, the ink, once dry, being immune from any effects of moisture. In one sketch it will be seen that white paint or enamel forms the background relieving

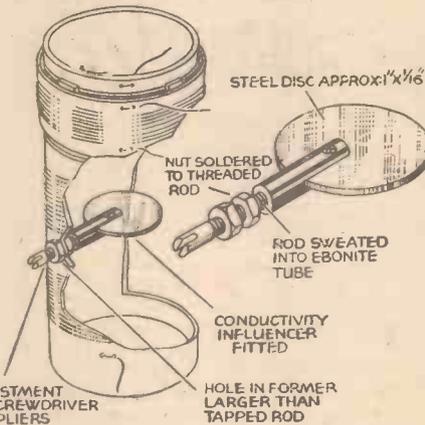


A novel method of lettering panels.

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., Tower House, 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 wrinkles.

the lettering when on a black panel, whilst on a metal panel, white lettering on a black background forms the basis of the designation strip. The paint or enamel may be brushed on to the back of the Cellophane strips, or neatly applied to the panel with a plain worded strip affixed finally. As indicated by (a), an invisible but glossy background can be attained by simply printing the wording on to the



A method of varying the inductance of a coil.

face or back of strip (wording in the latter instance reversed) and gluing to the panel without further paint preparation.—P. T. BRAGG (Andover).

Varying the Inductance of a Coil

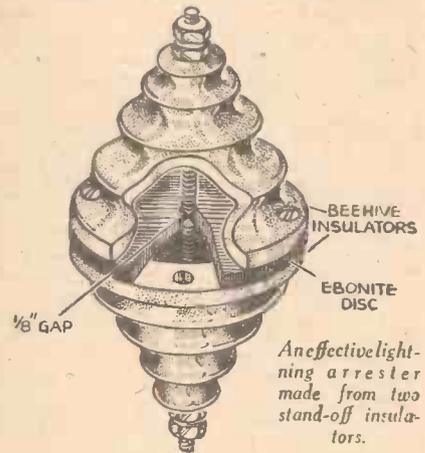
It is well known how the inductance of a coil will be influenced by the proximity of a piece of metal, and this effect is utilised to advantage in radio coil construction, since by variation in the inductance, wavelength and sensitivity may be adjusted to a critical degree, particularly in matching.

The above sketch clearly shows one method which I have put into use on a number of occasions when instability has been the cause of trouble. Again, I have found it particularly useful for bandpass coil final matching.—R. O. WENDRALE (Luton).

A Lightning Arrester

THE accompanying sketch shows a useful lightning arrester made from two beehive insulators, a disc of ebonite,

a length of threaded rod, 2 6BA bolts and 8 nuts. In the centre of the ebonite disc, which is of the same diameter as the base of the insulators, is drilled a 1/2 in. hole. The two pieces of threaded rod are next screwed on to the insulators, so that when placed together, as shown in sketch, there is a 1/8 in. gap between the pointed ends. Round the edge of the ebonite disc are drilled 3 or 4 holes so that the 2 insulators can be mounted back to back, separated by

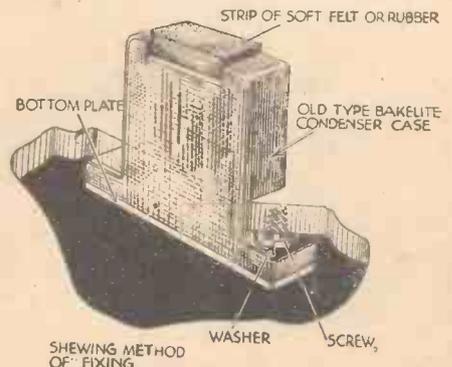


An effective lightning arrester made from two stand-off insulators.

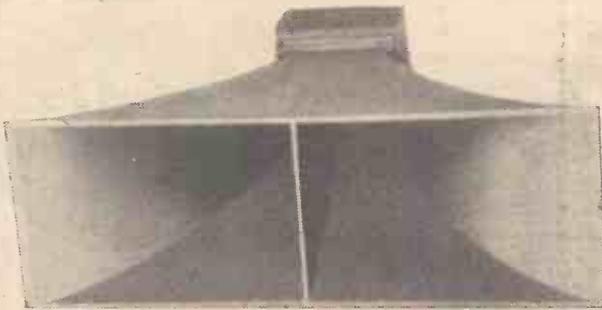
the ebonite disc, and secured by the nuts and bolts. The gap between the pieces of threaded rod may be decreased to 1/16 in. if necessary.—R. J. N. MARCH (Shoreham-by-Sea).

A Pick-up Rest

AN old bakelite condenser case, with the terminals removed and the bakelite filed away, makes a good pick-up rest with the addition of a strip of soft rubber or felt, and a flat plate drilled for fixing to underside of motor board. As shown in the accompanying sketch the device can be fixed without any screws or bolts showing, being fitted from underneath.—Geo. R. HENSON (Bristol).



A neat pick-up rest contrived from an old condenser case.



A Reslo loudspeaker used for public address work.

P.M. OR EN

When, When

A Simple Explanation of the Choice of Moving-coil Loudspeaker

ALMOST every reader knows perfectly well that there are two principal types of moving-coil loudspeaker. These are known as P.M., or permanent-magnet, and energised. Actually, both depend upon the use of a magnet, for it is within the field of this that the moving coil—attached to the cone—moves. The audio-current output from the receiver is fed into the speech coil, as it is called, and produces a fluctuating magnetic field round the coil. As the coil is close to a powerful magnet system, the fluctuating magnetic field acts on the fixed field, this causing the speech coil, and hence the cone, to vibrate.

That is a very sketchy outline indeed, but it should suffice to clarify the statements that will be made later. It should not be hard to appreciate that the effect on the speaker cone must be more pronounced if the audio currents passed through the speech coil are increased in intensity. That simply means that a greater receiver output provides increased signal strength—there is nothing obscure about that. A point that might not be quite as obvious is that the intensity of the steady magnetic field acting on the speech coil also has a considerable effect on the loudness of reproduction. This means that a greater output can be obtained from a given input to the speaker if the strength of the magnet is increased.

Actually, it is not just the strength of the magnet that is important, but the effect of the magnet on the speech coil. And the effect is proportional to the magnet strength and also to the distance between the magnet and the coil; the closer the two can be placed, the greater is the effect of the magnet on the coil.

Kinds of Magnet

There are two forms of magnet that can be employed to provide the steady mag-

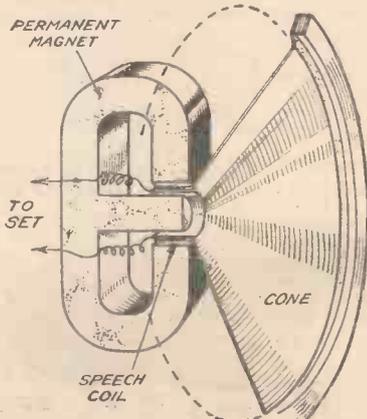


Fig. 1.—Essentials of a permanent-magnet speaker.

netic field: a permanent magnet, and an electro-magnet. A permanent magnet is a magnetised piece of alloy-steel, whereas an electro-magnet consists of a piece of soft iron, or special iron alloy, which does not itself "hold" or retain any magnetic properties, but which can be magnetised temporarily by passing an electric current through a length of wire coiled round it. See Figs. 1 and 2.

In practice, a fair amount of electrical energy is required to energise or magnetise an electro-magnet of the type used for a loudspeaker. An average minimum figure for a smallish speaker is 5 watts, but 7 to

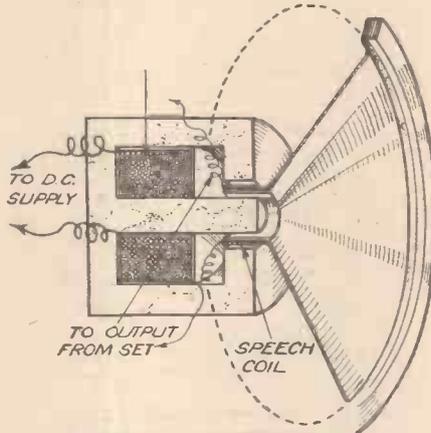


Fig. 2.—Main details of an energised speaker. Compare with Fig. 1.

10 watts is desirable. When the moving-coil speaker was first developed, it was generally accepted that an energised or electro-magnet speaker was more sensitive than one of the permanent-magnet type, because the field strength could be made so much greater. This idea is still held by some, but it is rapidly becoming less and less true. The reason is that a considerable amount of research work has been carried out in connection with the production of highly-efficient permanent magnets, with the result that it has been possible to make them in such a manner that a tremendously strong field strength can be obtained. Incidentally, the makers of the W.B. "Stentorian" speakers have been pioneers in this field, and are now making even public address and auditorium types of P.M. speaker.

It would not be true to say that the P.M. speaker is more efficient than an energised model of equally-sound design, but it can be stated without fear of contradiction that the P.M. type can to-day be as good as the energised pattern. Consequently, the reader might ask why energised speakers are still employed in large numbers by both constructors and

receiver manufacturers, and this brings us to the choice of the more suitable type for various purposes.

Energising Current

A source of electrical energy is, of course, required to operate an electro-magnet speaker, and that would appear to be a disadvantage. It is, when dealing with a battery set or even with a mains set fed by a power-supply unit capable of giving

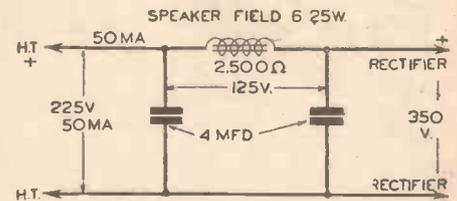


Fig. 3.—How a speaker-field winding can often be energised in an A.C. receiver.

just the correct voltages and currents for H.T. and L.T. But in many instances the power unit can provide rather more power than is actually needed by the receiver. In that case, the surplus can well be employed to energise the speaker. Moreover, it can be used very economically, because the magnet winding—referred to as the field coil—can be used as a very effective H.T. smoothing choke. Thus, the normal smoothing choke is not required.

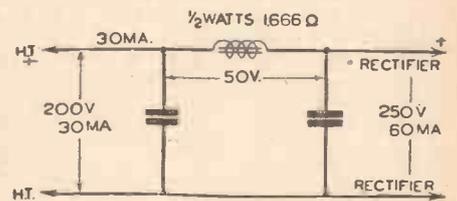


Fig. 4.—In this example the energising wattage available would be inadequate and a P.M. speaker should be used.

That means a saving in the cost of components; additionally, an energised speaker can generally be made rather more cheaply than a P.M. speaker of similar power-handling capacity.

But there are several points which have to be considered before a final choice can be made. The first is concerning the amount of energising power that can be spared. As mentioned above, a small moving-coil speaker needs at least 5 watts for energising; a larger speaker to handle an audio output of, say, 6 watts needs something like 10 watts minimum; whilst a public-address speaker, to deal with an audio output of 20 watts needs not less than 15 watts, and should have about 30 watts for maximum efficiency.

ENERGISED— e, Why?

and Correct Use of the Two Kinds
By FRANK PRESTON



A Goodman loudspeaker. For outdoor P.A. work a loudspeaker horn of this type is particularly suitable.

Some Practical Examples

Fig. 3 shows a skeleton circuit, where a 2,500-ohm energised speaker field is used for smoothing the H.T. supply in an A.C. receiver. It is assumed that the output from the rectifier is 350 volts at not less than 50 mA, and that a voltage of about 225 is required for H.T. purposes. In this case, 50 mA is passed through the field winding, which then produces a voltage drop of 125 volts (Ohm's Law—voltage drop equals current times resistance). The wattage dissipation of the field is therefore 125 multiplied by 50/1,000 (voltage times current in amp.), which is 6.25 watts. That would just be sufficient for a small speaker, and efficiency would be about as high as when using a P.M. model.

But now look at Fig. 4. The circuit arrangement is the same, but the output from the rectifier is 250 volts, 60 mA, whereas the receiver valves require not less than 200 volts, 30 mA. for efficient working. By using Ohm's Law again, we find that the field should have a resistance of 1,666 ohms to give the necessary voltage drop of 50, when passing a current of 30 mA. In these conditions the dissipation of the field winding would be about 1½ watts. In the first place, the required field resistance is non-standard, so it would be necessary to use a speaker with either a 1,500-ohm or a 2,000-ohm field; in the second place,

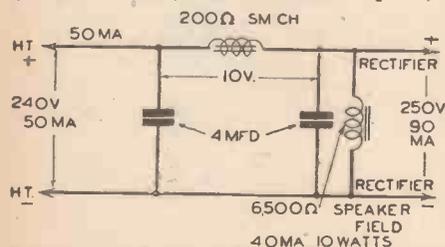


Fig. 5.—A 6,500-ohm speaker-field connected in parallel with the H.T. supply in an A.C. or D.C. receiver.

however, the energising wattage would be entirely inadequate. In consequence, a permanent-magnet speaker would be a



One of the latest Rola permanent magnet speakers. Model F.742.

practical essential in these conditions.

Smoothing would then be performed by either a 1,500-ohm smoothing choke, or by means of another standard 30-henry choke of lower resistance in series with a fixed resistor to bring the resistance up to the required value.

Parallel Field Connections

Now let us look at Fig. 5. In this case, the voltage output from the rectifier is

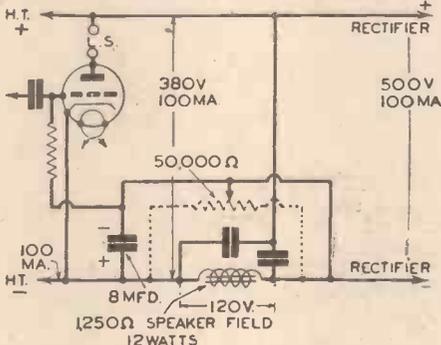


Fig. 6.—"Free" bias by inserting the field-winding in the negative H.T. line.

only slightly too high for the set, but the current is much greater than is necessary. We could very well make use of a 6,500-ohm energised speaker (the resistance generally used for direct connection to D.C. mains). By connecting this field-winding across the H.T. output from the rectifier, we can "absorb" a current of nearly 40 mA, so that the required 50 mA is still left for feeding the valves. Although the field-winding in this instance does provide a certain smoothing effect, it is not sufficient for this purpose. A normal 200-ohm choke is therefore connected in series with the positive supply lead.

This method of connecting a speaker-field is not usual, but it is very convenient in an example such as that considered. Additionally, it has the advantage of acting as a "load" on the rectifier when the set is first switched on; this is most valuable when the valves are of the indirectly-heated type and the rectifier is a directly-heated one, or a metal-oxide pattern. It is often recommended, when using this form of connection, or when feeding the field directly from a D.C. mains supply, that a neon lamp be connected in parallel with the field to prevent back E.M.F., due to the inductance of the winding. From the various figures on the diagram, it will be seen that the speaker-field receives 10 watts energising power, which is adequate for speakers of medium size.

"Free" Bias

Another method of using a speaker-field for energising is shown in Fig. 6, where the winding is in series with the negative H.T. lead. The H.T. voltage required is nearly 400 at 100 mA., and the rectifier provides 500 volts at 100 mA. We could thus use a standard 1,250-ohm field-coil, which would produce a voltage drop of slightly more than 120 volts when passing 100 mA (1/10 amp.). The voltage drop can, however, be used for biasing the output valve, by connecting the grid-return lead to the negative side of the winding, as shown. In the example taken, the G.B. voltage—120—would be too high, but in many cases it would be possible to choose a field-winding more appropriate to the G.B. needed.

Even in our example, however, the correct value of bias could be obtained by connecting a 50,000-ohm potentiometer across the field-winding, and taking the grid-return lead to the slider of this; the connections are shown in broken lines. It will be seen that an 8-mfd. electrolytic bypass condenser is used in conjunction with the bias-voltage supply system.

In the Heater Circuit

We will take just one more example of the use of an energised speaker. This is with a D.C. receiver having indirectly-heated 16-volt valves, as indicated in Fig. 7. In this instance, the field-winding is used to drop the voltage applied to the heaters from the D.C. mains supply. As 170 volts has to be dropped, the current being .25 amp., a resistance of approximately 700 ohms is required. This is a standard field-coil resistance in some makes of energised speaker, so it could be used very conveniently. If an increased voltage drop were needed, a small fixed or tapped resistance could be connected in series with the field-winding. There is no great advantage in this method of using an energised speaker, but it is mentioned as a matter of interest.

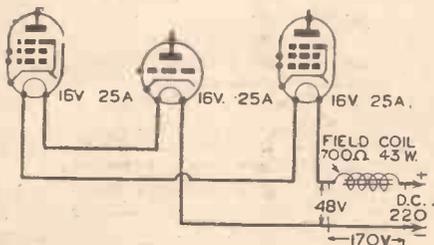


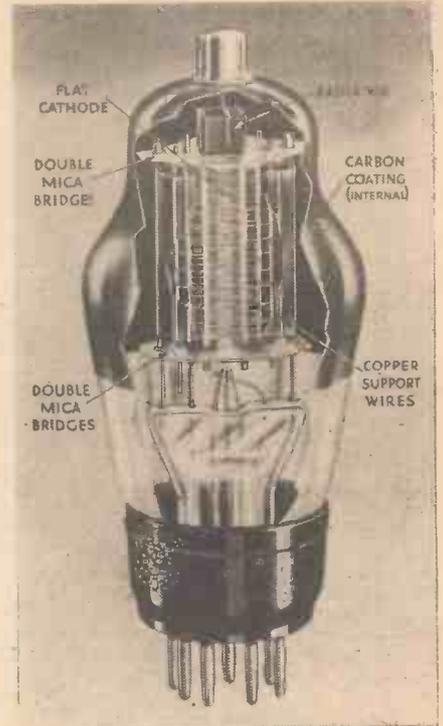
Fig. 7.—For D.C. sets only. Speaker-field in the heater circuit. Few speakers could take the 38 watts indicated without overheating, but the circuit could be modified to overcome this difficulty by using a field of lower resistance in series with a resistor.

What Output Shall I Use?

In this Article the Various Output Systems Applicable to Battery or Mains Working are Discussed - - - By PERCY RAY

WITH the advent of tetrodes, and the wide variation of sensitivity required in the output stage, selection from the many available output systems has become increasingly complicated. The battery user may select a triode, a tetrode, a pentode, or either of the quiescent output systems, namely, quiescent push-pull, or Class "B" output. The mains user, on the other hand, may choose a triode, tetrode, pentode, bottom bend push-pull, usually referred to as Class "C," or normally biased push-pull valves,

50 per cent., the resulting distortion is noticeable only to the chosen few. Its principal disadvantage is its poor efficiency, the output delivered being only about 10 per cent. to 20 per cent. of the power consumption; a serious disadvantage when viewed by the battery user. Anode consumption of, say, 10 milliamps, will give seldom more than a 150 milliwatt output. Another disadvantage is lack of sensitivity, but this can, of course, be overcome by providing adequate gain in the preceding stages.

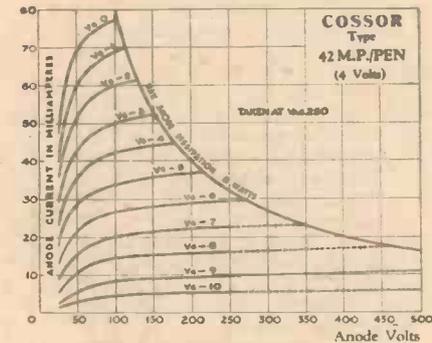


Internal construction of the 402 pentode.

to find a pentode and a triode with approximately similar output, the triode having less sensitivity than the pentode. The pentode will usually be chosen in a mains set where a large output is required, and the use of an adequate triode is restricted either by the H.T. current available, or cost.

Pentodes

When the pentode was introduced some ten years ago, it was greatly misunderstood, a disadvantage under which it labours even in these enlightened days. There are still many people who calmly remove a triode and substitute a pentode and hope, with unmerited optimism, for good results. It is stated above that the triode is tolerant of an incorrect anode load; it is equally true to say that the pentode is very intolerant. So intolerant, in fact, that it practically precludes the use of a moving-iron speaker, while almost every moving-coil speaker needs to be shunted by a resistance and condenser in series in order to check the tendency for its impedance to rise at the higher frequencies. The great advantage of the pentode is its high efficiency, being of the order of 40 per cent., or more than double that of the triode valve. In the case of the higher impedance-battery pen-



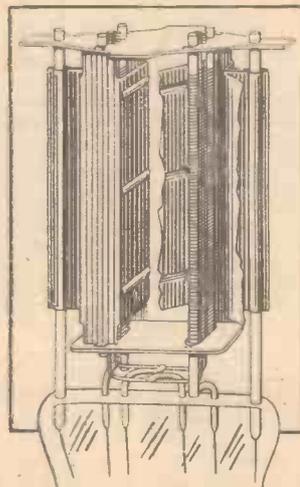
Characteristic curve of the Cossor 42 M.P./Pen. This illustration is for comparative purposes with the curve of Cossor 42 O.T.

usually referred to as Class "A," unless, of course, one of the fancy output arrangements are adopted, which eventually it is not the intention of the writer to discuss, as it is outside the scope of this article.

Certain secondary complications arise, inasmuch as Class "A" or Class "C" push-pull could make use of triodes, tetrodes or pentodes. It is therefore highly desirable to clear up the output question, and to indicate which type of output is appropriate for any set of conditions. It is desirable, but not essential, that the output stage should have high sensitivity. It is exceedingly important that no frequency distortion be introduced, i.e., the output valve must amplify irrespective of frequency. It is equally necessary that the output arrangement chosen shall accommodate the desired volume level without distress, and unless it is convenient to arrange the output stage to accommodate the highest instantaneous peak voltage, it is essential that occasional overloading will not be unduly noticeable to the listener. This latter is unquestionably a compromise, but for the battery user there is no reasonable alternative. For convenience, each type of output is dealt with separately, commencing with those which are applicable to either mains or battery working.

Triode Output

Triode output has the unquestionable advantage of simplicity. It will work with anode load grossly unsuited to its needs with little noticeable distortion, and when overloaded on transient to the extent of

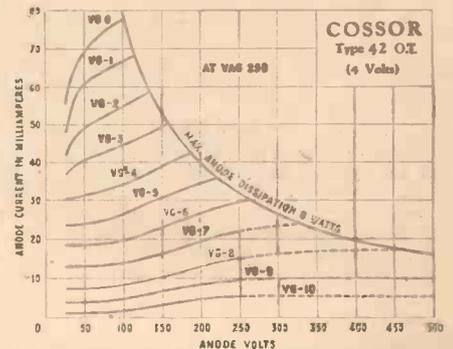


The electrode system of a Class "B" output valve.

todes, colloquially known as "economy pentodes," it has the additional advantage of remarkable sensitivity. In battery receivers where high sensitivity and reasonable output is required, it is an excellent choice where one or other of the quiescent systems cannot be used. Mains pentodes, however, are not necessarily more sensitive than mains triodes; in fact, in one well-known valve-maker's range, it is possible

The Output Tetrode

The tetrode follows logically from the pentode, and differs from it only in that it has no suppressor grid. The absence of this electrode necessarily results in the anode being further away from all other electrodes, and possessing, therefore, less capacity to "earth." The difference between a pentode and tetrode of equivalent characteristics is simply that reproduction when the latter valve is used will be slightly



Characteristic curve of the 42 O.T. Compare it with the curve of the 42 M.P./Pen, and note the great similarity.

better in the top register. In a receiver where there is considerable top feed into the output circuit, the substitution of a tetrode for a pentode will give a marked increase in the brilliancy of reproduction. It is purely a matter of personal taste, therefore, which valve is used. Where a tone control is provided there is no question but that the tetrode should be used, as,

(Continued on opposite page)

WHAT OUTPUT SHALL I USE?

(Continued from facing page)

furthermore, this type of valve tends to minimise base resonance. Having dealt with what may be termed "solo" output valves, the question of the various forms of push-pull output comes under review. Since the application in battery and mains working differs, it will be necessary to deal with each class separately.

Battery Class "B" Output

From the point of view of efficiency, i.e., speech output, against energy consumption, the class "B" valve is still unchallenged. With suitable precautions, and a carefully chosen loudspeaker, quality is really good, but it has the serious disadvantage of poor sensitivity, as the average class "B" valve with driver requires several times the input necessary to load a quiescent push-pull pentode. Under average conditions, however, really good quality is more easily obtained with Class "B" output than with a quiescent push-pull.

Pentode Quiescent Push-pull

As already intimated above, the quiescent push-pull output stage possesses comparatively high sensitivity. So sensitive is the small quiescent push-pull pentode that a most excellent local station receiver may be made by using an H.F. pentode followed by a double-diode detector, and finally a quiescent pentode, although for Continental reception the double-diode would, of course, be substituted by a double-diode triode. It has, however, a slightly smaller speech output for a given H.T. consumption, and is also intolerant of incorrect anode load, but quite excellent reproduction is obtainable providing a good loudspeaker is used, having the necessary impedance, and both halves of the speaker primary are shunted by suitable condensers.

Mains Push-pull

In the writer's opinion there is little excuse for using either pentodes or tetrodes as push-pull amplifiers in a mains receiver. The use of these multi-electrode valves in either class "A" or class "C" push-pull is very unsatisfactory, owing to the considerable precautions that have to be taken to obtain even average quality. It may therefore be assumed that those desiring to use push-pull will use triodes, and choose between the class "A" or class "C" methods of working. Class "A" push-pull, i.e., two valves in push-pull with normal bias, has the great advantage of exceedingly high quality reproduction, but has the disadvantage of low sensitivity; so low that when using large triodes a low frequency stage is used to provide the necessary input, normal detector arrangements being quite unable to provide the necessary grid swing. Class "C" push-pull is the logical variation of class "A" push-pull when insufficient H.T. current is available. By biasing the valves so that anode current is relatively negligible when no signal is being received, the efficiency of the arrangement is nearly doubled; therefore for a given H.T. current speech output from a class "C" amplifier is nearly double that from a class "A" amplifier. It has, however, the disadvantage of being even less sensitive.

Economy, sensitivity and quality do not go hand-in-hand. For example, push-pull triodes give the best quality, and are the most wasteful, whereas the more economical output arrangements do not give such good quality. The modern commercially built receiver often makes use of pentode or tetrode output.

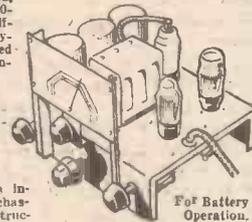
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BRIEF SPECIFICATION: Screened R.F. and I.F. Valves, 3-watt high fidelity output. Large dial calibrated station names and metres. Volume and tone control for radio and gram. Rationalised tri-tune construction. Circuit: Pre H.F. selector, radio frequency amplifier, triode hexode frequency changer, I.F. amplifier, double diode triode, phase reversing and output power pentode valves, 3-watts audio output. Rigidly tested and complete with valves, knobs and escutcheon. For A.C. Mains 200-250 volts, 40-80 cycles.

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WITH 4 BRITISH VALVES
3 WAVEBANDS: 18-52, 200-550, 900-2,100 metres



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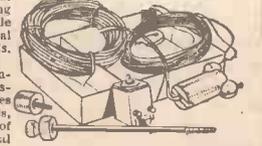
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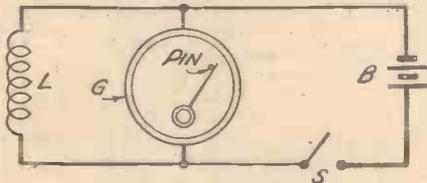
LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

Signal Surges

SIR,—I am interested in the discussion as to why the output of a battery receiver increases at the time of switching off. In my opinion it is due to self induction in either the L.T. or H.T. circuits. By Lenz's Law, the induced currents set up will tend to weaken an increasing current, and to strengthen one which is diminishing. The momentary tendency of the current to continue when the circuit is broken is represented by the spark which appears at the point where the circuit is opened.

The effect may be observed in the following way. A galvanometer G (or ammeter) is connected up to a battery B, and to a



The diagram referred to in Mr. G. W. Parkes' letter.

load L, as shown in the diagram. The switch S is closed, and a pin is put at the back of the meter needle to prevent it from returning to zero when S is opened. On opening S, the needle will move slightly away from the pin, showing that there is an induced current which is strengthening the one (caused by B) which is diminishing. —G. W. PARKES (Worcester).

Quality Set for Local Stations I

SIR,—I have read with interest your readers' inquiries for a multi-valve testing panel. I should also like to build one of these as I have several moving-coil meters on hand, which could be put to good use in this manner, also an "Avo-Minor," which is a very fine instrument. By the way, when are we going to have details of a really first-class local station quality set for battery users (who are on D.C. mains, and can use an eliminator for H.T., or a Milnes H.T. unit)? I have seen several articles recently in PRACTICAL AND AMATEUR WIRELESS describing sets, but not a real set for the two local stations and record playing giving a real good quality up to about two watts, the final stage to use push-pull output, with large output two-valve valves, such as Cossor 230X.P.'s. —C. PALLONZA (Kentish Town).

[An article on this subject will probably be published in the near future.—Ed.]

"London Nat." and the Fluxite Advt.

SIR,—In reference to the letter of Fluxite Ltd., in PRACTICAL AND AMATEUR WIRELESS, dated September 4th, I should like to sympathise with the writer of the limerick in question. If bad connections were present, the man would definitely

have difficulty in receiving the "London Nat." It comes in here at about R6 on L.S. in the evenings, roughly between 90 and 100 metres. I can also get the Welsh station on a slightly lower frequency than that used by G5LM, when on the seventy-five to eighty metre band. This is not break-through, as they have definite tuning points. Therefore, I believe, they must be first or second harmonics. —JAMES BROWN (Edington, Somerset).

A.P.A. Amplifier

SIR,—In a recent issue of PRACTICAL AND AMATEUR WIRELESS, I noticed in the Replies to Queries column that you mention building a P.A. amplifier with PX25A in push-pull, and I may add that this design has been wanted for a long time.

A while ago many readers of PRACTICAL AND AMATEUR WIRELESS were giving their opinion as to which was the best way to build a set, on either baseboard or the commercial type of chassis. It might interest some readers to know that my P.A. amplifier, which gives over 10 watts, and is easily adaptable for any battery or A.C. circuit, is built on a flat chassis, consisting of 1/2 in. plyboard with ordinary tin screwed on, and 3 in. runners at each end. All wiring is on top and easy to see and check, with the exception of filament wiring, which is underneath. Also I might mention that most of the components can be had at very low cost from a number of reliable firms who advertise on the last two pages of PRACTICAL AND AMATEUR WIRELESS. An amplifier using R.C., an L.F. valve of 3,000 to 5,000 impedance; Ferranti A.F.5.C, and two PX25A in push-pull feeding a Magna 66 speaker is what I find gives excellent results. An amplifier as described above could be used for years. —H. HILL (St. Helens, Lancs.).

A Good Twenty-metre Log

SIR,—I have not seen a report of reception in your paper from Hanwell, so I am submitting mine. All reception was on 20 metres between 5 and 8 a.m., and 23.00 to 24.00 from the 3rd to 31st of last month.

W stations—7 W2, 6 W2, 7 W3, 4 W4, 6 W5, 2 W6, 2 W7, 5 W8, 5 W9, and W10XDA (the schooner *Morrissey*, which is in the Arctic at present), 1 VO1.

S. America—3 CO2, 3 CO7, 1 HC1, 2 TI2, 1 TI1, 1 TI3, 2 OA4, 1 XE2, 1 K4.

Australia—2 VK2, 4 VK3, 1 YK4.
Europe—1 YI1, 1 II, 1 SV1, 1 HA1, 1 HA4, 2 HA5, 1 HA8, 1 EA8, 1 EA9, 1 PI, 1 LA1, 1 OZ3, 1 SM5.

These are my best "catches" of the month. My receiver is a 6-valve superhet all-waver of a popular make, and the antennæ used were a matched dipole, and an inverted-L directed N. to S.

Wishing every success to your popular paper, which is second to none for information. —H. EDWARDS (Hanwell).

A New Russian Q.S.L. Card

SIR,—I have just received a rather novel Q.S.L. card from RNE, Moscow, which commemorates the historical Moscow-North Pole-San Francisco flight, by the four Russian airmen in the ANT-25 aeroplane. It shows the globe with the Russian flags flying from the North Pole, and also four head-and-shoulder photographs of the famous airmen. The card is glossy and finished in colours. —J. WOOD (Conisborough, Yorkshire).

New Cuban Stations

SIR,—Perhaps the following information regarding some new Cuban broadcasting stations which have recently come on the air will be of interest to other readers.

First COCM, on approximately 30 metres. English is fairly often used, and the following announcement is usually given every quarter of an hour: "CMCM long-wave and COCM short-wave, P.O. Box 33, Havana, Cuba." This station is very well received up to about 07.00 B.S.T., when it closes down.

COJK, at Camaguey, is also well heard, and usually announces in English every few minutes. This station broadcasts on approximately 34 metres.

Next, there are two stations with calls which are somewhat confusing, namely COBZee and COBC. There is no doubt that they are separate stations, for besides being on different wavelengths, COBC closes down at 06.00 B.S.T., whereas COBZ usually continues until about 06.30. COBZ, on 33.32 metres, uses English fairly frequently, the announcement being: "CMBZ long-wave and COBZ short-wave in Havana, capital of the Republic of Cuba." The address is P.O. Box 866, and reports are requested. The slogan R.C.A. Victor is sometimes used. COBC, which can be found on approximately 32 metres, is situated in Havana, and uses English very rarely. I should also like to mention that HCJB, Quito, Ecuador, is now using a new transmitter on 33.53 metres. They broadcast a programme for English listeners every Sunday morning at 04.00 B.S.T. —DOUGLAS L. PELHAM (Mill Hill).

CUT THIS OUT EACH WEEK.

Do you know

—THAT the short-wave type S.G. valve has its grid connected to the top cap.

—THAT two insulated wires can be twisted tightly together to form a low-capacity condenser.

—THAT a battery-type triode power valve can be inserted in a five-pin holder in place of a pentode without the necessity for altering the wiring.

—THAT a high resistance contact in the on-off switch can cause distortion.

—THAT reception of ship-to-shore transmissions on 600 metres can be obtained by connecting a .0003 mfd. fixed condenser across each .0005 mfd. section of the tuning condenser.

—THAT a permanent-magnet moving-coil speaker may be used as a microphone.

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., Tower House, 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

PRACTICAL WIRELESS
Date of Issue. Blueprint
CRYSTAL SETS

Blueprint, 6d.		
1937 Crystal Receiver	9.1.37	PW71
STRAIGHT SETS. Battery Operated.		
One-Valve : Blueprint, 1s.		
All-wave Unipen (Pentode)		PW31A
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
The Signet Two	29.8.36	PW76
Three-valve : Blueprints, 1s. each.		
The Long-Range Express Three (SG, D, Pen)	24.4.37	PW2
Selectone Battery Three (D, 2 LF (Trans))		PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))		PW34A
Leader Three (SG, D, Pow)	22.5.37	PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen)	20.5.37	PW39
Hallmark Three (SG, D, Pow)	12.6.37	PW41
Hall-mark Cadet (D, LF, Pen (RC))	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	PM1
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (RC))		PW55
The Monitor (HF Pen, D, Pen)		PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)		PW64
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	29.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	PW72
Four-valve : Blueprints, 1s. each.		
Sonotone Four (SG, D, LF, P)	1.5.37	PW4
Fury Four (2 SG, D, Pen)	8.5.37	PW11
Beta Universal Four (SG, D, LF, Cl. B)		PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)		PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)		PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)		PW18
A.C.-D.C. Two (SG, Pow)		PW31
Selectone A.C. Radiogram Two (D, Pow)		PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)		PW23
D.C. Ace (SG, D, Pen)		PW25
A.C. Three (SG, D, Pen)		PW20
A.C. Leader (HF Pen, D, Pow)	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)		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 (RC))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, H.F. Pen, Westector, Pen)		PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
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)	24.7.37	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47
SUPERHETS.		
Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve)	5.6.37	PW40
F. J. Camm's 2-valve Superhet Two-valve	13.7.35	PW52
F. J. Camm's £4 Superhet		PW58
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	PW75
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	31.7.37	PW59
F. J. Camm's Universal £4 Superhet 4		PW60
"Qualitone" Universal Four	16.1.37	PW73
SHORT-WAVE SETS.		
Two-valve : Blueprint, 1s.		
Midget Short-wave Two (D, Pen)		PW38A

Three-valve : Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)		PW30A
The Project 3 (D, 2 LF (RC and Trans))	7.8.37	PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen)	29.3.36	PW68
"Tele-Cent" S.W.3 (SG, D (SG), Pen)	30.1.37	PW74
F. J. Camm's Oracle All-Wave Three (H.F., Det., Pen)	28.8.37	PW78
PORTABLES.		
Three-valve : Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)		PW65
Parvo Plyweight Midget Portable (SG, D, Pen)	19.6.37	PW77
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)	15.5.37	PW12
MISCELLANEOUS.		
S.W. Converter-Adapter (1 valve)		PW48A
AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.		
Blueprints, 6d. each.		
Four-station Crystal Set	12.12.36	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 Loudspeaker One-valver (Class B)		AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)		AW388
Full-volume Two (SG det., Pen)		AW392
B.B.C. National Two with Lucerne Coil (D, Trans)		AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)		AW388A
Lucerne Minor (D, Pen)		AW426
A Modern Two-valver		WM409
Three-valve : Blueprints, 1s. each.		
Class B Three (D, Trans, Class B)		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)		AW417
1934 Ether Searcher : Chassis Model (SG, D, Pen)		AW419
Lucerne Ranger (SG, D, Trans)		AW422
Gossor Melody Maker with Lucerne Coils		AW423
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)		WM362
1935 £6 6s. Battery Three (SG, D, Pen)		WM371
PTP Three (Pen, D, Pen)	June '35	WM380
Certainty Three (SG, D, Pen)		WM393
Minitube Three (SG, D, Trans)	Oct. '35	WM400
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)		AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2HF Four (2 SG, D, Pen)		AW421
Crusader's A.V.C.4 (2 HF, D, QP21) (Pentode and Class B Outputs for above : Blueprints, 6d. each)	18.8.34	AW445
Self-contained Four (SG, D, LF, Class B)	25.8.34	AW445A
Lucerne Straight Four (SG, D, LF, Trans)	Aug. '33	WM331
£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM371
The H.K. Four (SG, SG, D, Pen)	Mar. '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	April '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	May '38	WM320
Class B Quadrydne (2 SG, D, LF, Class B)	Dec. '33	WM344
New Class-B Five (2 SG, D, LF, Class B)	Nov. '33	WM340
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.		AW403

These Blueprints are drawn full size.
Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, which are additional to the cost of the blueprint. A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless	4d. Post Paid.
Amateur Wireless	4d. "
Practical Mechanics	7d. "
Wireless Magazine	1/3 "

The index letters which precede the Blueprint Number indicate the periodical in which the description appears: thus PW refers to PRACTICAL WIRELESS, AW to Amateur Wireless, PM to Practical Mechanics, WM to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Economy A.C. Two (D, Trans) A.C.		WM286
Unicorn A.C.-D.C. Two (D Pen)		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	AW394
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	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	May '35	WM386
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior		WM375
Varsity Four	Oct. '35	WM395
The Request All-Waver	June '36	WM407
1935 Super Five Battery (Superhet)		WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.		AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super A.C.		WM366
1935 A.C. Stenode	Apr. '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)		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	23.1.37	AW429
Rome 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-wave (SG, D, Pen)	Jan. 19. '35	AW463
The Carrier Short-waver (SG, D, P)	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-valver Short-waver (SG, D, LF, P)	Mar. '35	WM383
Superhet : Blueprint, 1s. 6d.		
Simplified Short-waver 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 Short-waver (D, Pen) A.C.-D.C.		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
Listeners' 5-watt A.C. Amplifier (1/6)		WM392
Radio Unit (2v) for WM392	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-)	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram	Mar. '36	WM403
New Style Short-Wave Adapter (1/-)	June '35	WM388
Trickle Charger (6d.)	Jan. 5. '35	AW462
Short-Wave Adapter (1/-)	Dec. 1. '34	AW450
Superhet Converter (1/-)	Dec. 1. '34	AW457
B.L.D.L.C. Short-wave Converter (1/-)	May '36	WM405
Wilson Tone Master (1/-)	June '36	WM406
The W.M. A.C. Short-Wave Converter (1/-)		WM408

RADIO CLUBS AND SOCIETIES

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

The Clackmannanshire Short-wave Club

THE above club will reopen for the season on Sunday, September 26th, at 2 p.m., in the Drill Hall, Alloa. All intending members are cordially invited to attend. Members will be enrolled at meeting. Full particulars can be obtained from the Secretary: David McIntosh, 10, Cobble-crook Gardens, Alva.

Bradford Short-wave Club

ON Friday, September 10th, the Bradford Short-wave Club held their usual meeting. At rather short notice a debate

was held and some very interesting ideas on aerial arrays were suggested. A suitable design for an enclosed type of crystal holder to be made at home, was also discussed, and it is believed that two of the A.A. licence holders are to try out the ideas.

Members of the club are reminded that the Annual General Meeting will be held on Friday, October 1st. All are to be notified by post, but this announcement will avoid any misunderstanding. The club holds its meetings at the Bradford Moor Council Schools, Thornbury, from 7 to 11 p.m., and the usual cordial invitation is extended to prospective members. Hon. Sec., G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

Peterborough and District Short-wave Radio Society

THE annual meeting of the above society was held at the "Bird-in-Hand," Tuesday, September 7th, 1937.

In future, the society will meet fortnightly on the first and third Wednesdays of the month, at 8 p.m. Mr. Carter (2NJ) proposed Mr. H. E. Daft as President, in view of his great service as secretary since its inception, and this was carried. Other appointments were: Chairman, Mr. W. Carter (2NJ); Vice-Chairman, Mr. W. Kendrick; Hon. Sec., Mr. W. T. Conwell (2ACP); Treasurer, Mr. C. Boyce; Committee, Messrs. S. Vaggers (2AVX), and H. Lyon.

The hon. sec. would be pleased to hear from any local B.L.D.L. Club members or anyone interested in short-wave work.

The society recently had two interesting visits to the B.B.C. station at Daventry, and the G.P.O. Station at Baldock during the summer, and hope to have other interesting trips in the future. Hon. Sec., W. T. Conwell, 80, Elmfield Road, Peterborough.

Radio Society of Northern Ireland

WE give below the result of the R.S.N.I. Leonard Trophy Contest.

Winner of Trophy and replica: 1st E. A. Donovan (EI2M), Dublin, I.F.S.; 2nd F. A. Robb (GI6TK), Belfast, N.I.; 3rd A. R. Irwin (GI5TK), Ballygowan, N.I.

The winner of Gold Medal for highest scorer outside Ireland:—1st K. Karkauskas (LY1KK), of Kaunas, Lithuania; 2nd (Winner of Silver Medal), J. P. Jessup (W2GVZ), of Ridgewood, N.J., U.S.A.

Over 200 amateurs entered for the contest and stations from all over the world; the scores were as follow:—

EI2M. 113 contacts with 27 countries. Points: 3672.

GI6TK. 61 contacts with 41 countries. Points: 3256.

GI5TK. 107 contacts with 18 countries. Points: 1926.

The R.S.N.I. wish to thank all who took part, and hope that they and many other amateurs will enter for the next Leonard Trophy contest.

The society held its annual meeting on September 1st. After all the members had enjoyed tea, the following trophies were presented:—

Leonard Trophy to E. A. Donovan (EI2M).

Stevenson Trophy to J. Cowan (GI5OY).

Robinson Trophy to S. H. Pattison (2AQU).

The following officers were elected for the year 1937-8:—President, V. Leonard, Esq.; Vice-President, T. Stevenson, Esq.; Committee, J. M. Lowden (GI8MI), J. Cowan (GI5OY), R. Watson (GI8GK), F. A. Robb (GI6TK), and R. Holden (GI5HU); Hon. Secretary, Mr. C. Taylor (2AQB); Hon. Treasurer, Mr. J. N. Smith (GI5QX).

The society has arranged to issue a badge for its members, and this will take the form of a black diamond with red hand of Ulster in the centre, and letters R.S.N.I. in gilt. The price of the badge is 1s. 6d.

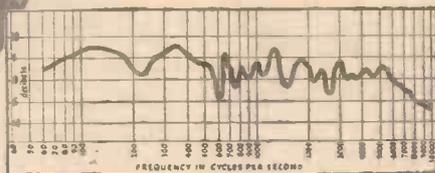
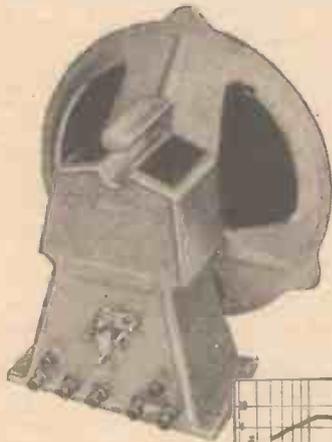
It was also decided to communicate with the I.R.T.S. in Dublin, with a view to having a joint meeting of the two societies at an early date; it is also proposed to pay visits to places of interest during the coming season. Particulars of the society may be had by applying to: The Hon. Secretary, R.S.N.I., C. Taylor (2AQB), 2, York Crescent, Shore Road, Belfast, N.I.

Proposed Club for Edgware

WILL any readers interested in the formation of a short-wave society in the Edgware district, please get in touch with G. Yale, 40, Raeburn Road, Edgware.

(Continued on opposite page)

Satisfied with your reproduction?
WAIT TILL YOU HEAR THIS!



Make no mistake—here is no mere superficial alteration in design.

An observant glance at speech coil, centring device, and cone will show you a few of the differences; and two or three minutes of listening will show you many more! Another 600 cycles of top response—complete absence of 300 cycle peaks—slight gain in average sensitivity—It takes a keen ear to analyse this new smoothness and fidelity, but no ear can fail to detect it!

Prices (at present) remain at the old low level—17/6 to 42/-. Get your new Stentorian speaker now!

ANOTHER NEW



Stentorian

DIFFERENT—& BETTER STILL

WHITELEY ELECTRICAL RADIO CO., LTD. (technical dept.), MANSFIELD, NOTTS.



Read Mr. Gamm's
Opinion

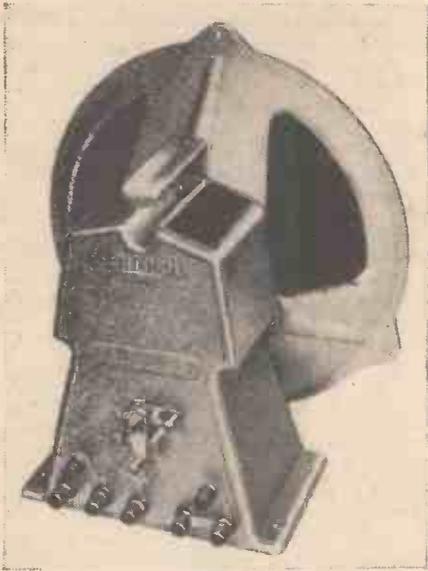
"Good and bad sets will be improved by it. It is an important advance in speaker technique."

J. J. Gamm

The New Stentorian

Senior Loudspeaker

Type 38S



The new 1937-8 Stentorian loudspeaker.

WE have just completed a thorough and extremely interesting test of the new loudspeaker announced by the Whiteley Electrical Radio Co., Ltd., of Mansfield, Notts.

It is very similar in appearance to previous models which have become well known amongst set constructors, and this similarity is emphasised when a visual comparison is made. Except for colour, and a few words on the back of the stand, the appearance of the 1936 Stentorian, the 1937 Stentorian, and this present new model are identical. Knowing, however, that between the performances of the first two models there existed a definite difference, we were interested to hear in what manner the makers have now improved on last year's speaker—which we considered extremely good at the time of its introduction, and of which we still have a very good opinion.

Cone Details

Upon closer examination, we find that although having the same steepness of pitch, and being curved on a similar radius, the cone of the new speaker is apparently of a different texture—feeling extremely flexible to the touch at the periphery, and gradually stiffening as it approaches the centre. The centring is also carried out in a different manner, the device being of a new and rather interesting shape. In passing we would say that the importance of the centring device in a medium-sized or large loudspeaker is frequently overlooked. It can bring about the widest differences in general tone characteristics. We also understand from the makers that the magnetic material this year has a higher permeability, and, therefore, gives increased flux density. We were not able to take the speaker to pieces for the purpose of checking with a fluxmeter, but this claim is borne out by the slightly increased sensitivity mentioned later.

Mounting the 1937 speaker, and the new 1937-8 model side by side, and connecting them by means of a two-way switch to our laboratory model of the "Oracle" Receiver, we set out first to analyse the audible differences in reproduction with a view to checking our impressions later by

electrical measurement. This is a fascinating pastime, and is thoroughly to be recommended to any experimenter who has the necessary equipment available, for it provides a check not only of the apparatus being tested, but also of the accuracy of the experimenter's hearing—a variable quantity which every keen listener should get to understand thoroughly.

Sensitivity

Listening first to an orchestral passage, we received the definite impression that the new Stentorian was slightly better on the score of sensitivity than its predecessor. The difference was more apparent in the middle and higher frequencies, and was particularly notable on a clarinet passage, which not only seemed to come over with more volume, but had a definitely better tone characteristic when reproduced by the later instrument.

A short period of listening to a number



The Stentorian speaker on the 37S chassis.

of items from two alternative stations confirmed this impression, and also made it clear that the new instrument has a "smoother" type of reproduction, even more free from cone colouration than the previous model.

Power-handling Capacity

Testing the speakers next on a large amplifier we found that the power-handling capacities are approximately equal. It was possible to put up to seven watts undistorted through each without audible signs of distress, but an advantage was found in the new speaker in that whilst the heavy volume tended to emphasise cone colouration in the 1937 model, this somewhat unpleasant effect was entirely absent from the new loudspeaker.

Checking these results afterwards with an oscillator and valve voltmeter, we were interested to find that the characteristic curve obtained bore out our aural impres-

sions exactly. Compared with the previous model, the new instrument has a higher sensitivity above 400 cycles, and the small local resonances are much smaller than previously and have become practically negligible. This accounts for the new smoothness we noticed.

Output at 5,000 cycles is exactly level with that at 200 cycles, and between these two levels the curve varies no more than seven or eight d.b. from the datum line throughout. Below 200 cycles the output rises slightly to 100 cycles, thereafter dropping gradually to about 55 cycles, below which it is not audible. Above 6,000 cycles commences a gradual falling away, but it is interesting to notice that even at 10,000 cycles—beyond which very few receivers are capable of reproducing—output is still highly satisfactory.

In summarising, we feel that the new Stentorian represents a definite advance on the 1937 model, and will offer new opportunities for improvement to constructors who are keen on the maximum of realism from their radio receivers. At its price (42s.) it offers surprising value, and we anticipate that many thousands of listeners will be highly pleased with the extra "quality" which results from fitting this new speaker.

RADIO CLUBS AND SOCIETIES

(Continued from previous page.)

Portsmouth and District Wireless and Television Society

THE above society held its first meeting of the winter session on Wednesday, September 8th. Mr. Harold Leigh gave a lecture on small power transmitters, and gave diagrams and details of a circuit which has a range of several thousand miles under suitable conditions. The use of various types of frequency-measuring apparatus was also explained.

Meetings will be held every Wednesday, and the clubroom will be available any time to members, day or evening.—H. Leigh, Chairman, 20, King Street, Southsea.

Deptford Men's Institute Short-wave Radio Club

THE new session of the above short-wave club commences with meetings on Tuesday, September 28th, and Thursday, September 30th, at 8 p.m., to be held at the Deptford Men's Institute, Clyde Street, Deptford, S.E.8.

The Tuesday meeting is intended for those who have had some experience of short-wave work, and will be of a more advanced character, including amateur transmitting topics. The Thursday meeting is for those who are only just starting, or who have had less experience, and will be devoted to elementary principles and topics. The subscription is 1s. 3d. per term of three months, which entitles members to attend both meetings.

All interested prospective members are requested to communicate with Mr. G. Edwards at the above address.

REPLIES IN BRIEF

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

L. C. (Yorks). The lack of reception on the shortest band is probably due to the use of an excessively long aerial or to insufficient voltage on the detector valve anode. The station you listened to was probably G31A, the Daily Express Towers Station in Surrey.

A. F. (N.W.1). It would seem that the lack of stations on the long-wave band is due to the use of an inefficient aerial. If overhaul of the aerial-earth system does not provide a remedy the first coil and first valve should be tested.

P. N. (S.W.6). We suggest that you obtain the issue of PRACTICAL AND AMATEUR WIRELESS, dated January 2nd, 1937, in which constructional details of a low-powered transmitter will be found.

A. H. (Bromley). We suggest that you obtain the issue of PRACTICAL AND AMATEUR WIRELESS, dated February 29th, 1936, in which constructional details of a battery amplifier are given. Two volts should be tapped off your 6-volt accumulator for supplying the filaments of 2-volt valves, or 6-volt valves may be used.

E. W. (Guernsey). The hand capacity is probably due to the use of an ineffective earth connection. If a good earth connection cannot be used, an insulated extension spindle should be fitted to the tuning condenser. Thanks for your suggestions.

J. B. G. (Glasgow). It is probable that the 110 kc/s Telsen I.F. transformers would work satisfactorily in your receiver, but we regret that we cannot supply wiring instructions as we have no details of the terminal numbering of these components.

F. T. P. (Gafford). The trouble you are experiencing may be due to incorrect adjustment of the trimmer condensers or to H.F. oscillation. If the trimming is correct the screening of the H.F. components and wiring should be improved.

L. J. (Holyhead). You should definitely ascertain that the aerial-earth system is in order. The L.F. amplification may be improved by fitting an L.F. transformer in place of the R.C. coupling between the detector and output valves. If a transformer is used a short-wave H.F. choke or a 15,000 ohm resistance should be joined between the valve anode and the P terminal of the transformer.

W. N. (Rotherham). We cannot answer your query in detail in these columns, but an article on the subject to which you refer will appear in a future issue of PRACTICAL AND AMATEUR WIRELESS.

T. R. (Edinburgh). The trouble experienced may be due to a bad connection on the metallised surface of the chassis, and therefore we suggest that you overhaul these connections. You may also try the effect of connecting the M.B. bolt behind the coil unit to the chassis of the gang condenser. If a run down H.T. battery or an eliminator is used we advise you to connect a T.C.C. type 809 condenser across H.T.— and H.T.+ leads.

P. E. H. (Worpleston). We suggest that you use a Polar or J.B. bar type two gang .0005 mfd. condenser.

J. K. (Long Area). We suggest that you obtain "Everyman's Wireless Book" and the "Outline of Wireless" (published by Newnes), but it will be necessary for you to obtain practical experience in addition to theoretical tuition.

J. C. (Dagenham). We cannot supply the blueprint of a two-valve receiver using plug-in coils, but it is probable that the Signet Two, Blueprint PW76 would prove suitable.

J. M. M. (Argyle). A transmitter of the type required may probably be obtained from Stratton and Co., Dromsgrove Street, Birmingham.

H. K. (Newcastle-on-Tyne). Reliable reception cannot be expected beyond approximately 50 miles, but it is probable that more transmitters will be installed within the next few years to cover the whole country. We suggest that you obtain "Television and Short-Wave Handbook," published by Newnes.

R. U. (Leicester). The coils could be used in any short-wave set, but we have no blueprint which shows a set designed to use these particular coils.

THE WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA

By F. J. CAMM 4th Edition 5/- net
(Editor of "Practical and Amateur Wireless")

Wireless Construction, Terms, and Definitions explained and illustrated in concise, clear language.

From all Booksellers, or by post 5/6 from George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Important Broadcasts of the Week

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, Sept. 22nd.—The Swan, a musical play.
Thursday, Sept. 23rd.—Promenade Concert from the Queen's Hall, London.
Friday, Sept. 24th.—Hero and Heroine, a programme of Songs and Duets from famous Operettas.
Saturday, Sept. 25th.—Past, Present and Future, a Variety programme.

REGIONAL (341.1 m.)
Wednesday, Sept. 22nd.—Promenade Concert: Bach, from Queen's Hall, London.
Thursday, Sept. 23rd.—Pollie Tregembo, a Cornish Comedy by Bernard Walke.
Friday, Sept. 24th.—A Gilbert and Sullivan programme.
Saturday, Sept. 25th.—Promenade Concert from Queen's Hall, London.

MIDLAND (296.2 m.)
Wednesday, Sept. 22nd.—An Account of the Enthronement of the Lord Bishop of Lichfield.
Thursday, Sept. 23rd.—Melody and Rhythm, instrumental programme.
Friday, Sept. 24th.—A Gilbert and Sullivan programme.
Saturday, Sept. 25th.—Sport in the Midlands.

NORTHERN (449.1 m.)
Wednesday, Sept. 22nd.—Songs that Father sang (and Mother, too), Choral and Orchestral programme.
Thursday, Sept. 23rd.—Stick-in-the-Mud, a Comedy by T. Thompson.
Friday, Sept. 24th.—Choral Concert.
Saturday, Sept. 25th.—The Fell Dales Show, Eskdale, an eye-witness account by Harry Lamb.

WEST OF ENGLAND (285.7 m.)
Wednesday, Sept. 22nd.—Producing a Play —1, Choosing a Play, by L. A. G. Strong and Frances Treglohan.
Thursday, Sept. 23rd.—Pollie Tregembo, a Cornish Comedy by Bernard Walke.
Friday, Sept. 24th.—A Variety Programme from the Palace Theatre, Bath.
Saturday, Sept. 25th.—Salvation Army Band Concert.

WELSH (373.1 m.)
Wednesday, Sept. 22nd.—Organ Music by Blind British Composers, A Recital from St. Catharine's Church, Pontypridd.
Thursday, Sept. 23rd.—1937 Evening Follies from Catlin's Arcadia, Llandudno.
Friday, Sept. 24th.—Orchestral Concert.
Saturday, Sept. 25th.—Choral Concert from the Gorse Hall, Swansea.

SCOTTISH (391.1 m.)
Wednesday, Sept. 22nd.—Variety from the Theatre Royal, Edinburgh.
Thursday, Sept. 23rd.—Spare the Rod, a Miscellany for Anglers.
Friday, Sept. 24th.—Orchestral Concert.
Saturday, Sept. 24th.—Mar a Fhuair Domhnall Bonn Oir a' Mhoid le Donnchadh MacIain (How Donald Won the Mod Gold Medal, by Duncan Johnston).

NORTHERN IRELAND (307.1 m.)
Wednesday, Sept. 22nd.—Stop Dancing, a programme of very light music.
Thursday, Sept. 23rd.—Orchestral Concert.
Friday, Sept. 24th.—Light Orchestral programme.
Saturday, Sept. 25th.—Choral Concert from the Ulster Hall, Belfast.

Great New Electrical Part-work

THE Grid System has given a wonderful impetus to the Electrical Industry, and the rate of progress in Electrical Engineering is probably more rapid to-day than it has ever been before. As a result there is an ever-growing demand for "key-men" who have a comprehensive knowledge of the industry.

George Newnes, Ltd., are now producing what is, in effect, the key to the key-job—a new work: "COMPLETE ELECTRICAL ENGINEERING." It will be complete in about forty weekly issues. More than fifty experts have been engaged on this publication and what they have written is of considerable value to all in the Electrical Industry, whether connected with Electrical Contracting, Radio Retailing, Electrical Manufacturing, Power Company Work, Theatre and Cinema Engineering. It is of immense value to students of Electrical Engineering.

Especially to-day when the Contractor is often required to have the knowledge of the Consultant, the Radio Retailer to understand Electricity Supply to houses, shops and showgrounds, and the Theatre and Cinema Engineer to understand Television, such a work as "COMPLETE ELECTRICAL ENGINEERING" is a really worth-while publication.

The first number is published on Wednesday, September 29th, and subsequent parts each Friday commencing October 8th, price 1s. per part. The whole work will

comprise over 2,000 diagrams, plans and "action" photographs, and useful data sheets will be included Free throughout the work.

Join Newnes' Practical Group!

PRACTICAL MOTORIST

The owner-driver's journal which tells you how to repair, overhaul and obtain the best performance from your car.

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The only English journal of its type. It deals with every branch of Science, Mechanics, Invention, Model-making, Chemistry, Astronomy, Photography, Television.

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PRACTICAL POINTS FOR THE CONSTRUCTOR

(Continued from page 27)

course, as such formation tends to reduce their field of interference.

Remember that grid leads are super-sensitive to any interference, therefore it is usually advisable to cover such connections with metal braid sleeving, earthing the latter at the nearest earth potential point. Don't use very thin wire; 20 S.W.G. is a satisfactory size and quite easy to work with. By the way, if the wire comes off a reel, unwind a few feet

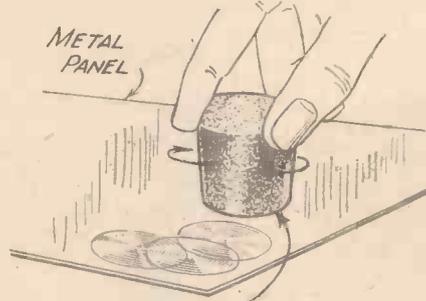


Fig. 7.—How to obtain a pleasing mottled effect on polished aluminium.

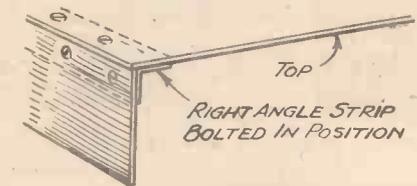


Fig. 8.—Using an angle strip for joining the corners of a metal chassis.

before starting wiring, and slightly stretch it; this will remove all twists and bends and make the wire more rigid.

Chassis

I would not advise the beginner to make his first chassis from metal, unless, of course, he is experienced in handling sheet metal. Good 5-ply wood takes a lot of beating as it is strong, clean, and efficient screening can be obtained—if required—by fixing a flat sheet of aluminium on the top.

There are one or two points to watch, which are as follows: See that all edges are cut and finished perfectly straight and square, and make the structure really rigid; it is always advisable to use the fillets as shown in the sketch (Fig. 4). See that the side members are tall enough to allow ample clearance of all components, and that the size of the base is sufficient to take all components according to plan.

If sheet metal is used, particular care must be taken with the marking out. Use a good metal straight-edge and scribe, only be sure you scribe the lines on the underside, out of sight. For bending, one cannot do better than use two iron strips, say, 1½ins. by ¼in. by 18ins., between which the sheet should be clamped in a good vice (Fig. 5).

Start the bending with gentle but firm pressure all along the line, squaring the edge up by taps with a large-headed hammer on a piece of board which is held along the bend.

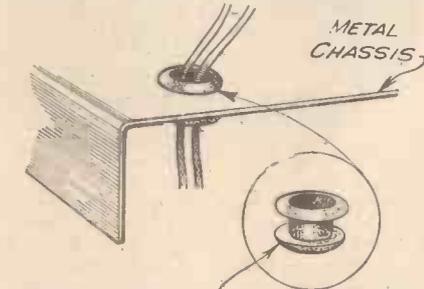
When drilling, see that all burr is removed from the holes by going over them with a couple of turns with a large drill (Fig. 6). If a professional finish is required, the chassis—if of aluminium—can be soaked in a solution of caustic soda; only

be careful with your hands. This process will produce a matt or frosted finish. The circular burr effect can be obtained with a large cork and fine knife powder, the cork being kept moist and given a hard twist when it makes contact with the metal (Fig. 7). In both cases, the metal must be well washed in clean water after the operations. Another method of constructing metal chasses is to cut flat sheet to the dimensions of the top, back, front and side members, and then bolt all pieces together with the aid of brass or aluminium right-angle strip, as shown in Fig. 8.

If a wire has to be taken through the base, use a drill large enough to give reasonable clearance to prevent fraying of the covering, and if several wires have to pass through the same hole use a piece of large-diameter systoflex to insulate the opening or, better still, use a proper rubber grummet (Fig. 9). If, as is usual with metal chassis, the earth is connected to the structure, make sure that all parts above earth potential are insulated from the metal; the same applies to components on a metal panel.

Never use a fine file for smoothing off edges of aluminium as it will soon become choked; strange as it may seem, a "dread-nought" file is best.

If external screens are used, it is essential for them to be securely bolted to the chassis



RUBBER GRUMMET PROTECTS WIRES WHICH PASS THROUGH CHASSIS
Fig. 9.—Showing the use of a rubber grummet.

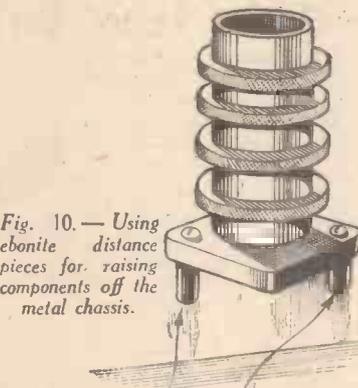


Fig. 10.—Using ebonite distance pieces for raising components off the metal chassis.

EBONITE DISTANCE PIECES KEEP S.W. COMPONENT OFF METAL

thus earthing them properly, and their shape should be such that they effectively screen the section concerned.

With short-wave H.F. chokes, valveholders and aerial series condensers, it is advisable to mount them clear of earthed metal, short distance-pieces being slipped over the holding bolts (Fig. 10).

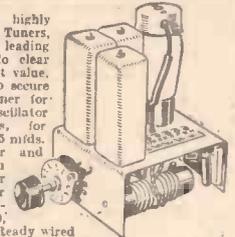
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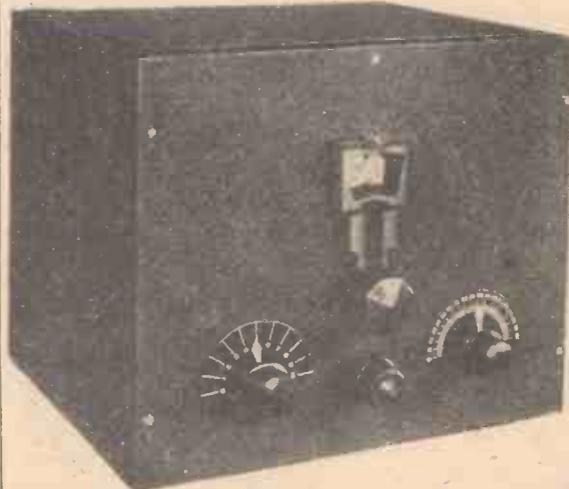
MODEL 360

IN the issue dated September 11th, we mentioned the *Pilot Short-wave Experimenter*, a booklet recently published by Peto-Scott, Ltd. We have now had the pleasure of testing one of the receivers described in this booklet—Model 360. This is a simple straight-three type of short-wave receiver, using a six-pin plug-in coil. One tuned stage is employed, but a refinement not normally found in receivers of this type is a hand-spread tuning condenser. This condenser, operated by a slow motion drive, considerably simplifies tuning. Two L.F. stages are used, the first being resis-

Listeners who are situated within 50 miles of a medium-long-wave transmitter are advised by the manufacturers to obtain Model 364 or 464.

Price

The price of the kit of parts for Model 360, excluding valves and coils, is £2 5s., or £3 2s. 6d. with valves. The coils can be obtained separately for 10s. and the finished instrument, including coils and valves, is obtainable at £5.



Pilot Model 360 Short-wave Receiver marketed by Peto-Scott, Ltd., at £5. This is a straight 3-valve set using 6-pin plug-in coils which provides good reception between approximately 10 and 100 metres.

tance-capacity coupled and the second parallel-fed transformer coupled. A medium impedance triode is used as detector, an L.F. type triode in the first L.F. stage, and a pentode in the output stage. An L.F. volume control is not incorporated, but a resistance is connected across the secondary winding of the L.F. transformer to prevent overloading of the pentode. A refinement which should prove very popular is the incorporation of a 'phone jack. This is connected across the anode resistance of the second valve so that the output valve is not in use when the 'phones are plugged in.

On Test

The receiver gave surprisingly good results for a straight three-valver, the sensitivity being higher than is normally obtained from a set of this type. This high sensitivity is probably accounted for by the use of a pentode in the output stage. The threshold howl commonly experienced on short-wave receivers of the reacting detector type was entirely absent on the model we tested when an H.T. voltage of 120 was used. The receiver is enclosed in a metal cabinet and, therefore, there is no fear of hand-capacity effects being obtained. By using the set of four coils we were able to cover a wave-range of approximately 10 to 100 metres. Medium and long-wave reception can also be obtained by using suitable coils, but the receiver is primarily intended for short-wave reception. For our test an aerial approximately 25ft. long was used and although the manufacturers do not guarantee that medium-long-wave breakthrough will not be experienced when the receiver is used within 50 miles of the local station, we did not experience any trouble in this respect.



Showing the chassis of the above receiver removed from its metal cabinet.

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The wavelengths of these stations are not given, but they will operate in the regions of 160 and 10 metres.



Tommy Farr's family listening with a McMichael (inodel 137) receiver to the relay of the Farr-Louis fight.

impressive record of this College is easier to understand after a visit of inspection. It is a real college, and is housed in an extensive building which is continually being enlarged to cope with the fast-growing number of students.

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PRACTICAL AND AMATEUR WIRELESS, 25/9/37.



Impressions on the Wax

IT is not generally known that Peter Dawson composes under the name of McCall. This month he sings his latest, "Fret Foot," a fine song in march rhythm, and Cadman's vigorous "The Builder," on H.M.V. B 8610. There is also a new record by Nan Maryska, who recently made her first concert appearance in London. She has a remarkably clear soprano voice and sings Zeller's "Nightingale Song"—a tuneful vocal waltz—and "Don't Be Cross," on H.M.V. B 8609.

Vocal Recording

PAUL ROBESON has recorded three songs from his new film, "Big Fella"—"Lazin'" and "You Didn't Ought to Do Such Things," on H.M.V. B 8607, and "Roll up, Sailorman," on H.M.V. B 8591, the other side containing a new song of the ballad type, "I Don't Know What's Wrong." Another coloured singer, Elizabeth Welch, also sings two songs from "Big Fella"—"One Kiss" and "Harlem in My Heart," on H.M.V. B 8608. Derek Oldham is in very good voice in "Will You Remember?" from the film "Maytime," which is one of the biggest song sellers to-day. With it is another film hit, "Our Song," from "For You Alone." The record is H.M.V. B 8605.

Aileen Stanley, the popular American comedienne who is reputed to have made more records "over there" than any other artist, is now making a big music-hall tour in England. Her new record presents her in "I've Got My Love To Keep Me Warm," and "It Looks Like Rain in Cherry Blossom Lane," on H.M.V. BD 444. Dan Donovan makes his first H.M.V. record with "Little Old Lady of Poverty Street" and "The Greatest Mistake of My Life," on H.M.V. BD 438.

Light Orchestral Music

BARNABUS VON GECZY and His Orchestra have two very good numbers, "Destiny Waltz" and "Voices of Spring"—H.M.V. B 8611. Films supply the music for Anton and the Paramount Theatre Orchestra, London, with Al Bollington at the organ. They are "Ready, Willing and Able" and "For You Alone," on H.M.V. BD 445. Vivian Ellis plays an attractive piano medley of hits from "On the Avenue," on H.M.V. BD 437. For her first record, Vera Guilaroff has a piano medley of recent film hits—H.M.V. BD 446. She is Russian, has become very popular on the air in America and as the result of her first broadcast in this country she is now commencing a music-hall tour.

chestra play two tunes from "London Rhapsody," the new production at the London Palladium—"Hometown," coupled with "Smile When You Say Goodbye," from the film "The Show Goes On," on H.M.V. BD 5248, and "Waltz of the Gypsies," coupled with "Ten Pretty Girls"—H.M.V. BD 5250. Roy Fox and His Orchestra have this month recorded "I've Got My Love To Keep Me Warm" and "This Year's Kisses," both tunes being from the film "On the Avenue," on H.M.V. BD 5233, and "Our Song," from the film "For You Alone," coupled with "To-morrow is Another Day," from the film "A Day at the Races"—H.M.V. BD 5238.

Swing Music

FOR swing enthusiasts Benny Goodman has recorded two titles from the film, "On the Avenue." The tunes are "This Year's Kisses" and "He Ain't Got Rhythm"—H.M.V. B 8595. "You're Driving Me Crazy" and "Mystery Pacific" are the numbers chosen by the Quintette of the Hot Club of France, on H.M.V. B 8606, and Tommy Dorsey and his Clam Bake Seven have recorded "Twilight in Turkey" and "The Milkman's Matinée," on H.M.V. B 8596. It should be noted that the ten-inch H.M.V. magenta label records and ten-inch plum label are now 2s. and 3s. respectively.

Impressions on the Wax

GRACIE FIELDS has made an attractive medley record this month on Rex 9101. She sings four popular tunes of the moment—"When My Dream Boat Comes Home," "September in the Rain," "Where is the Sun," and "When the Harvest Moon is Shining." Brian Lawrence, accompanied by Fred Hartley and his Quintet, has recorded two tunes from the film "On the Avenue." They are "This Year's Kisses" and "I've Got my Love to Keep Me Warm"—Rex 9094.

Carson Robinson and his Pioneers have made a medley featuring two hill-billy songs on Rex 9100. The medley includes "Summer Night on the Texas Trail," "Roll Along, Little Doggie," "Billie Boy," and "My True Love Has Gone."

Len Green has made "Melodies of the Month No. R6"—a piano medley—Rex 9112, and Reginald Dixon, the famous Blackpool organist, contributes "Dixon Hits No. 15" on Rex 9099. He introduces such favourites as "When My Dream Boat Comes Home," "Brokenhearted Clown," "Toodle-0o," "Where are You?" "On a Little Dream Ranch," and "The Merry-go-round Broke Down."

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Dancing Time

AMONG the many dance tunes offered this month are two from the new Ivor Novello Drury Lane success, "Crest of the Wave." These are "Why Isn't It You?" (quick-step) and "If You Only Knew" (waltz), played in strict dance time by Henry Jacques and His Correct Dance Tempo Orchestra, on H.M.V. BD 5249. Ronnie Munro and His Or-



QUERIES and ENQUIRIES

Detector Valve

"Recently I bought an A.C. mains valve of the detector type which I wish to incorporate in a new set. My present receiver is an A.C. mains type using VMSG, Det., and Power valves and the one I am building will be almost identical except for the addition of two pentodes in push-pull. When I inserted the new valve in the old set it worked reasonably well, but the volume was reduced by half and there was no reaction above 400 metres on the medium-wave band and above 1,700 metres on the long-wave band. Will this defect be cured when I add push-pull valves? The reaction condenser has a capacity of .0003 mfd., and the old and new valves have impedances of 18,000 and 13,000 ohms respectively, with amplification factors of 72 and 40."—P. B. G. (Dunston on Tyne.)

THE addition of the two pentode valves will increase the volume, but will not correct the reaction trouble. Lower volume is to be expected with the new valve in use owing to its lower amplification factor, and the reaction trouble may be due to the anode resistance having too high a value for the 13,000 ohms valve. If reducing this resistance to approximately 40,000 ohms does not provide a remedy the valve should be tested.

Oracle Trimming

"I have built a few simple wireless sets with success and would like to try a two-gang type. The Oracle seems to be a suitable type, but I would like to have advice concerning the trimming adjustments as there are more trimmers than I have been accustomed to. When adjusting the gang condenser do you adjust trimmer No. 1, or is it only necessary to adjust trimmer No. 2 until maximum volume is obtained? On the wiring diagram three figures (1, 2, and 3) are shown on the coils. Do these indicate trimmers which have to be adjusted in conjunction with the condenser trimmers?"—D. G. (Glasgow).

IT is advisable to keep the trimmers attached to the gang condenser at minimum setting and balance the tuned circuits by means of the coil trimmers (marked 1, 2 and 3 on the diagram). It is only necessary to select a station near the lower end of each waveband and adjust the trimmers in turn for maximum volume, bearing in mind that trimmer No. 1 controls the short-wave band, No. 2 the medium-wave band, and No. 3 the long-wave band.

Adding a Valve

"I have a three-valve receiver supplied from batteries and using an H.F. pentode in the H.F. stage, a triode detector, and a power output valve. I am anxious to increase the volume without spoiling the quality but do not know the best type of valve to add. I have been told that a Class B valve would be suitable, but a friend tells me that this will cause distortion. I should like your advice on this matter."—F. G. H. (Manchester).

A CLASS B valve may be added to your three-valve receiver by connecting the existing speaker sockets to the P and HT terminals of a Class B driver transformer with the secondary terminals of this transformer joined to the grid terminals of a Class B valve. This addition will increase the volume obtainable from the local station but will not materially increase distant station volume. A Class B stage is likely to produce distortion unless the driver transformer, valve, and speaker transformer are correctly matched. You could obtain better quality by using an L.F. type valve in place of the existing output valve, and then adding a push-pull

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.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

stage using your existing power valve in this stage in conjunction with another power valve of the same type. This arrangement would give better all-round results than a Class B stage.

Energised Speaker

"I am thinking of building your A.C. Record Three, but would like to use an energised moving-coil speaker in place of the specified permanent-magnet type. The speaker I have on hand has a field winding resistance of 6,500 ohms and a transformer for matching a pentode valve. If I cannot use this would an energised model having a lower field resistance be suitable?"—P. K. (Hull).

WE do not advise the use of an energised speaker in conjunction with the A.C. Record unless it is separately energised from the mains. To obtain optimum results the smoothing choke should not have a resistance in excess of approximately 700 ohms. If the field winding of your 6,500 ohms speaker were connected in place of the specified choke the anode voltage would be very low and results would be poor. It is probable, however, that reasonably good results would be obtained with a speaker having a 2,000 ohm field winding in use.

Pick-up on Oracle

"I am interested in the Oracle All-world

3, but would like to know if it is adaptable for use as a radio gram."—C. C. (Ilford).

THE Oracle is quite suitable for use in conjunction with a pick-up for gramophone record reproduction. If it is desired to use a radio-gram switch this should be of the three-point change-over type. The lead at present joined to the grid of V2 (from C6), should be disconnected and connected to one of the end terminals of the switch. The centre terminal of the switch should then be joined to the grid of V2 and the other end terminal to one of the pick-up sockets with the other pick-up socket joined by means of a flexible lead to the $-1\frac{1}{2}$ volt socket of the G.B. battery. The grid leak R2 should be left in the position indicated on the diagram, and the leads to the switch should be kept as short as possible. If it is not desired to use a switch the grid terminal of V2 should be connected to one pick-up socket with the other pick-up socket connected to the $-1\frac{1}{2}$ volt socket of the G.B. battery.

L.T. from Charger

"I have a three-valve set which I am using in conjunction with an Ekco eliminator having a trickle charger incorporated. I want to know if it is possible to do away with the accumulator and obtain the L.T. current direct from the trickle charger. The mains voltage is 200-250 volts A.C., and the eliminator is type K18."—H. D. (Cardiff).

WE do not advise the use of the trickle charger for supplying L.T. current to the valve filaments, as the output voltage exceeds two volts. The voltage could, of course, be dropped by means of a resistance, but excessive hum would probably be experienced. If a resistance is tried its value can be calculated from Ohm's Law, the current value used in the calculation being the normal current consumption of the valves with a two-volt accumulator in use.

H.F. and L.F. Controls.

"My set is of an old type having one H.F. stage using an S.G. valve, and two L.F. stages using one resistance capacity coupler and one transformer. Can I improve the performance by fitting an H.F. pentode instead of the S.G. valve, and are there any simple improvements I can make?"—A. H. N. (Wolverhampton).

IF the coils used in your set are effectively screened improved results can be obtained by substituting an H.F. pentode for the S.G. valve. The new valve should be of the variable- μ type and a 50,000 ohms potentiometer should be added to control the volume by varying the grid bias voltage on this valve. A .0005 mfd. condenser should be connected between the grid lead and the valve grid and a .5 meg. resistance should be connected between the valve grid and the centre terminal of the potentiometer, with the end terminal of the potentiometer joined to G.B.—9 and the H.T.—line respectively. As two L.F. stages are used an L.F. volume control may also be added as an additional refinement. This should replace the grid leak in the grid circuit of the first L.F. valve. The coupling condenser should be connected to one end terminal of the control (a 500,000 ohms potentiometer), the G.B.—lead to the other end terminal, and the grid of the L.F. valve to the centre terminal.

The coupon on page 50 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 should be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London. W.C.2.

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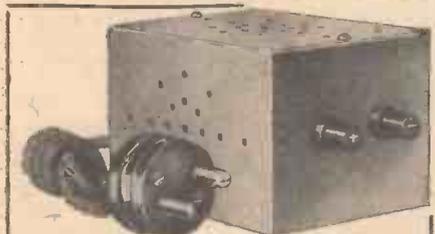
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3-WATT A.C. AMPLIFIER, 2-stage for mike or pick-up. Complete kit of parts with 3 valves, 40/-. Wired and Tested, £2/15/0.

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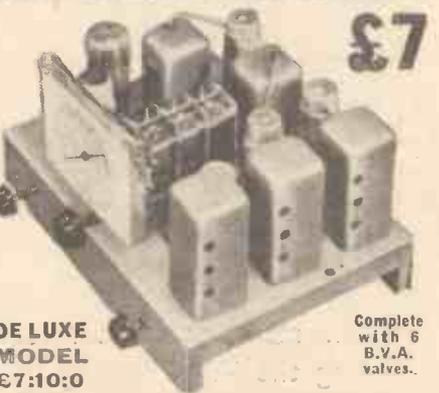


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