

THE "SPARES-BOX" THREE— See Page 515

Practical and Amateur Wireless

3^d
EVERY
WEDNESDAY

Edited by F.J. CAMM

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AND PRACTICAL TELEVISION

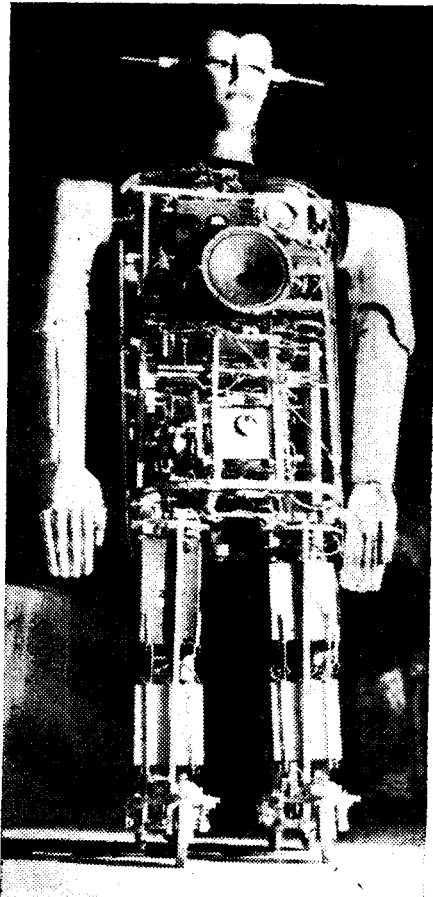
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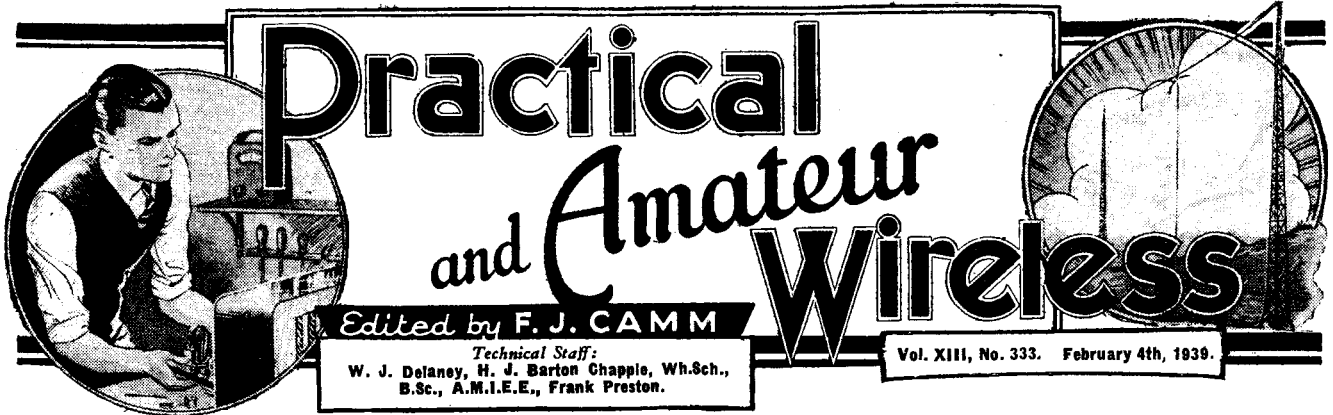
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6^d



MAKING YOUR OWN COMPONENTS — SEE PAGE 519



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. XIII, No. 333. February 4th, 1939.

ROUND *the* WORLD of WIRELESS

Short-wave Converters

ALTHOUGH the superhet type of receiver is very popular amongst experimenters, it is often found that selectivity is capable of improvement and that some difficulty is encountered from the point of view of whistle interference. The inclusion of an H.F. stage in front of the frequency-changer does, however, remove these difficulties, and the best type of receiver will thus be provided with such a stage. This is sometimes referred to as a Signal Amplifier, Pre-H.F. Stage, and various other novel names, but the principle is the same, namely, the inclusion of a further tuned stage plus a certain amount of additional amplification due to the valve which is employed. The superhet converter may be regarded in exactly the same category as the superhet receiver, and thus we may expect the same improvements if this type of additional amplification is provided in the converter. In this issue we give details of a two-stage converter which may be built for either battery or mains operation, and it will be found to provide a higher standard of performance than the usual single-stage converter. It may be used down to 10 metres or so and is capable of use with any standard broadcast receiver employing at least one H.F. stage, or with a superhet receiver.

The Lucerne Plan

THE interests of British listeners will be represented this month by Sir Noel Ashbridge, who is going to Switzerland to attend the Conference of Governments discussing adjustments to the Lucerne Plan. Mr. L. W. Hayes, of the B.B.C. Engineering Intelligence Staff, will hold a watching brief.

Amateur Call-signs

THE Postal Authorities have now exhausted all references under the prefix G3 for amateur transmitters, and the latest call-signs to be issued bear the prefix G4.

Lighthouse Radio

THE importance of transmitting and receiving apparatus in lighthouses has been admitted by the Australian Federal Ministry of Commerce, and in future special transceivers are to be installed in light-

houses on the eastern Australian coast. Owing to the lack of suitable supply sources, it is proposed that special pedal-driven generators be supplied with this equipment so that they may be operated efficiently when desired.

Irish Short-wave Transmitter

THE wavelength of the new Irish short-wave transmitter is 49.75 metres, which coincides with that of the transmitter at the Vatican City. It is hoped, however, that interference may be avoided by careful attention to programme schedules.

the Oriental compère. But before Karachi is reached, the television cameras will take them to the tourist bureau in London. The aeroplane will then be seen leaving Croydon Airport and thence on a whirlwind flight with a burlesque commentary by Douglas Young who, in the manner of certain American travel films, will paint a glamorous picture of the Mediterranean far below and that eighth wonder of the world, the Irak pipeline.

Flashing back to the television studio viewers will see the travellers landing, and no time will be lost in the short trip through Oriental streets to the hotel.

A surprise in these hot latitudes will be the arrival of Bill Pedersen's seal. In the second performance, on February 18th, Galli-Galli, the Eastern conjurer, will make another appearance.

Richard Gooden as Mr. Meek

RICHARD GOOLDEN, who created the radio character "Mr. Penny," is returning to the microphone in a new "Monday at Seven" series which begins on February 13th. Harry S. Pepper, chief producer in the B.B.C. Variety Department, is starring him as Mr. Meek of "Meek's Antiques," in which he will have the type of part that he has made peculiarly his own.

Mr. Meek, thirty-five years old, spectacled, a bachelor who regards himself as past romance, has a little antique shop down Chelsea way, stocked with idols, mummy cases, curios and treasures that clients bring him from many parts.

Listeners may at first think him only a humble, obsequious, inoffensive little fellow. But they will be overlooking the fact that Mr. Meek has a pretty shrewd mind, plus Susan, an attractive young assistant.

"Outward Bound"

SUTTON VANE'S play, first produced at the Everyman Theatre in 1923, was not only a sensational box office success, but a real contribution to contemporary drama. It has been revived on more than one occasion and is at present arousing great interest among critics and public alike in America. The first act of the play has been described as "one of the most splendid surprises of the theatre," and "Outward Bound" as a whole can certainly be described as a superlatively successful essay in the uncanny. It will be heard on February 26th, the producer being Barbara Burnham.

ON OTHER PAGES	
The "Spares-box" Three	515
On Your Wavelength ..	517
Making Your Own Components ..	519
Practical Television ..	521
Readers' Wrinkles ..	523
A Two-valve S.W. Converter ..	524
The Amateur Transmitter Using Discarded Components ..	526
British Long-Distance Listeners' Club ..	532
Practical Letters ..	533
Queries and Enquiries ..	535

It is hoped that the transmitter will be on the air by the end of this month.

"Eastern Cabaret"

VIEWERS will "fly" to India in a few minutes in a unique edition of "Eastern Cabaret." Harry Pringle's television variety show in the afternoon programme on February 14th, to be repeated in the evening on February 18th.

"Eastern Cabaret" will take viewers from the rain and fog of London to the sunshine of Karachi for a gala performance in the European Hotel, with Cyril Fletcher as

ROUND the WORLD of WIRELESS (Continued)

British Railwaymen Broadcast to Germans

ACCORDING to a Paris report, anti-Nazi transmissions are being carried out by British railway workers from a special station of which the location is being kept secret. These broadcasts are destined to give German workers and, in particular, those engaged on the railway system in that country, a summary of news items which they would not get from their local stations in the ordinary way.

THE PRIME MINISTER AT THE MICROPHONE.



The Prime Minister opened the National Defence Campaign for National Service by broadcasting from his study at 10, Downing Street, last week, on the National wavelength. Mr. Chamberlain announced that the organising machinery was nearly ready and appealed for volunteers. Our illustration shows Mr. Chamberlain at the microphone at No. 10, Downing Street.

WLW's Studio at New York World's Fair

WLW, Cincinnati (Ohio), has concluded a contract with the organisers of the 1939 New York World's Fair, with a view to the installation in the Exhibition grounds of a studio for the rebroadcast of special radio programmes through the 500-watt transmitter. It is proposed, among other features, to specialise in interviews with celebrated visitors to the Fair.

I.E.E. Meetings

MEETINGS of the Wireless Section of the Institution of Electrical Engineers have been announced as follows: Section meeting, February 1st at 6 p.m.; a paper on "Electrolytic Condensers" will be read by P. R. Coursey, B.Sc. (Eng.), and S. N. Ray, M.Sc., B.Sc. (Eng.). Ordinary meeting, February 2nd; a paper entitled "The Empire Service Broadcasting Station at Daventry" will be read by L. W. Hayes and B. N. MacLarty, O.B.E.

"Western Magazine"

"WESTERN MAGAZINE" for February 3rd will, it is hoped, provide entertainment, interest and information

INTERESTING and TOPICAL NEWS and NOTES

for West of England listeners. The items will include: "If I had a Million," by James Corbett, the well-known author; T. L. Green in a talk, "Making Life Easy"; "Western Notebook"; "This Week's Recipe"; "Microphone Bows"; "West

Coventry, a syncopating pianist and siffleuse, who has done a good deal of work in concerts and cabaret; Dorothy Summers, the Birmingham comedienne, who toured in Australia and South Africa and has been broadcasting frequently in the past ten years; and Peter Evans, a Coventry singer who spent several years in Australia and first broadcast on his experiences in the Bush.

Orchestral Concert

LESLIE HEWARD will conduct the City of Birmingham Orchestra in a Town Hall concert on February 4th, the first part of which is to be broadcast. The title of the programme is "The Young Idea." May Blyth will sing the aria "L'amero" from Mozart's "Il re Pastore," and Bizet's Symphony in C will also be broadcast.

Northern Pantomime

THE North is continuing to present pantomime fare in generous measure, with excerpts from a good number of the big theatre pantomimes in various cities. On Tuesday night, February 7th, listeners will hear a forty-minute excerpt from another Emile Littler pantomime, "Goody Two Shoes," at the Leeds Grand Theatre. Prunella, The Old Woman who Lived in a Shoe, is played by Henry Lytton; Kitty Reidy is Robin Goodfellow; and among others in this pantomime are Eddie Gray, Jack Stanford, and Betty Jumel.

Coleridge-Taylor Programme

THE B.B.C. Midland Orchestra, with Trefor Jones (tenor) and Norris Stanley (violin), will be conducted by Reginald Burston in a Coleridge-Taylor programme on January 25th.

SOLVE THIS!

PROBLEM No. 333

Bradsmith had a four-valver (H.F., Detector, 2 L.F.) which had given every satisfaction, but he thought that he could improve the general design and bring it up to date. He therefore fitted more modern valves which gave an improvement in signal strength and selectivity. He then decided that a visual tuning indicator would be an interesting refinement and accordingly he purchased a Cossor neon tuning indicator. He included this in the detector anode circuit between the H.F. choke and the transformer primary in order to judge of tuning accuracy, but he found that this failed to give any indication. Why was this? Three books will be awarded for the first three correct solutions opened. Entries should be addressed to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 333 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, February 6th, 1939.

Solution to Problem No. 332

When Atkinson joined the two batteries in series he overlooked the fact that the partially discharged battery would have a high internal resistance and thus would not only fail to obtain a total voltage equivalent to the two batteries, but the effect of the series resistance would be to decrease the H.T. supplied by the new battery. The following three readers successfully solved Problem No. 331, and books have accordingly been forwarded to them: B. G. Jenkins, 11, Upper Woodland Street, Blaenavon, Mon.; J. Merrett, 31, Rowplatt Lane, Felbridge, East Grinstead, Sussex; A. Eccleston, c/o 89, Clarence Road, Handsworth, Birmingham.

Country Visitors' Book," and other topical talks. This weekly programme by and for West Country people is devised and produced by Pat Beech. The compère will be Victor Fawkes.

B.B.C. Music Productions Unit

WE are informed by the B.B.C. that the report which has been published recently to the effect that the B.B.C.'s Music Productions Unit is to cease producing studio opera after March next is without foundation. There is ample evidence that this unit's productions of opera have been well received and the B.B.C.'s policy remains unchanged.

The Music Productions Unit will continue to produce studio opera, though between April and June, 1939, its activities in this field will be temporarily suspended owing to the Corporation's heavy commitments in respect of opera to be broadcast from Covent Garden and Glyndebourne during that period. This is the sole reason for the suspension of operatic productions by the Music Productions Unit.

Studio Variety

THE artists for the Midland Regional programme of studio variety on February 10th will be Dorothy Parsons, of

The "Spares-box" Three

How to Construct an Efficient General Purpose 3-valve Receiver from the Odds and Ends to be Found in Most "Spares" Boxes

THE desire to build a good general purpose receiver is often killed by the concrete fact that circumstances do not allow the necessary components to be purchased or, in other instances, by the failure to obtain a blueprint or diagram which will lend itself to the utilisation of the spare parts on hand. Most constructors have accumulated a varied assortment of odds and ends of radio components, and although they are usually somewhat out of date, bearing in mind the rapid progress which has been made in such matters, it does not alter the fact that they are still quite capable of giving a further period of useful service, provided suitable working instructions can be secured to allow the owner to embody them in a receiver. A further example of the demand for help in this direction comes from those whose unfortunate circumstances have prevented them from obtaining the benefit of a radio receiver to help pass the long hours of unemployment, but who have been given a collection of components to try and help them attain their desire. In such instances they naturally endeavour to get hold of a diagram to assist them with the constructional work and, no doubt, apply to the Query Service, overlooking the fact that, while their requirements are fully appreciated, that very vital factor *time* renders it impossible for diagrams to be drawn by hand to suit individual specifications and innumerable components.

It is hoped, therefore, that the details given in this article will be sufficient to enable those who have "spares" to use to carry on with the good work and enjoy the broadcast programmes.

Construction

For simplicity, cheapness and ease of construction, the old and original system of baseboard assembly has been used. If a spare chassis is to hand, that, of course, can be employed, but if not, then the first suggestion is the better.

The baseboard can be formed from any suitable piece of wood, provided it is cut to the shape shown and its upper surface rendered reasonably smooth. It should not be thinner than, say, $\frac{3}{8}$ in, otherwise fixing of the components and panel will not be too secure.

For the panel, ebonite, wood or metal can be used. The most readily obtainable, and the cheapest, is likely to be a piece of plywood having a thickness of a $\frac{1}{4}$ in. to $\frac{3}{8}$ in. As with the baseboard, it is essential to see that the material is really dry and free from dirt and grease, i.e., soldering flux, etc. Should a metal panel be decided on, careful consideration will have to be given to the components mounted on it, otherwise there will be the possibility of short-circuiting the various parts of the circuit.

If any doubt exists, mount the components on small strips of wood or ebonite, and screw these to the panel, in which holes of a sufficient diameter to clear the operating spindles have been drilled.

If the baseboard is on the thin side, make

two simple brackets from wood or thin metal strip to support the panel in a rigid vertical position.

The best procedure to adopt with the constructional work is to mount all the baseboard components first, and complete as much of their wiring as possible, including battery-supply leads. After this, mark off and drill the panel, taking care to see that the control components will be so placed that they will not foul any of the baseboard items, and after mounting them add such wiring as can be done before the two sections are screwed together.

formers and fixed condensers are more or less identical, irrespective of make.

Coils

These are the only items which are likely to cause a stumbling block, and, unfortunately, it is impossible to give the correct connections for every type of dual-range coil on the market. To try and overcome this difficulty, coils of different make have been purposely used in Fig. 1, for the aerial and H.F. circuits, both of them being makes and types which still appear to be held by many constructors. Those who have other

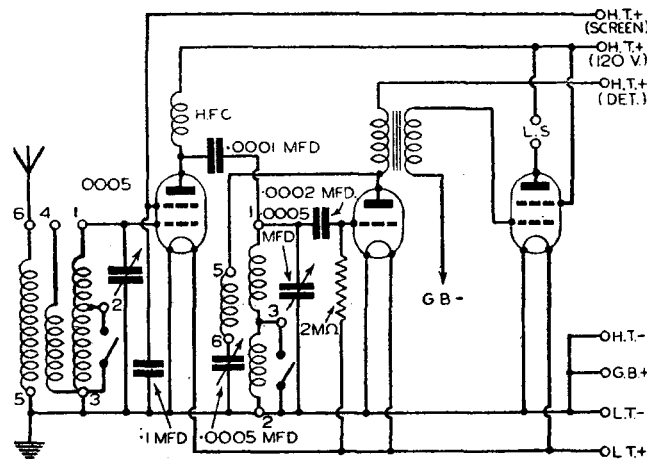


Fig. 1.—Theoretical circuit of the 3-valve receiver which may be made up from old parts as described here.

When the panel and baseboard are fixed, complete all wiring and prepare for initial tests. Where wires cross or where they come close together, always use insulated wire.

Components

The complete list of components for the bare circuit, as shown in Fig. 1, is given, so it is possible to see at a glance the exact parts required.

No makes are specified as practically any make will do, provided that the values shown are followed as closely as possible. It will be found that the connections to such things as variable condensers, trans-

forms should note that the connections for quite a number of the earlier coils are given in detail on page 331 of the issue for June 18th, 1938.

With coils of the dual-range type, it is necessary to provide switching arrangements for changing from the medium to the long waves, unless, of course, such switches are built in the coil construction. Assuming that such is not the case, a three-point or contact switch, will have to be used to control the two coils, but as the simple push-pull "on-off" types are more likely to be available, these have been shown, two of them being required.

Layout of Components

The proportions shown in Fig. 2, which also shows the suggested layout, allow plenty of room for components of widely varying sizes and adequate spacing between the H.F., det., and output stages. Incidentally, this also makes the construction and wiring much easier without affecting the efficiency.

Between the H.F. valve and the H.F. coil, i.e., the one connected to the detector valve, it is advisable to erect a metal screen, as indicated on the diagram. This can be cut out of aluminium, copper or zinc, tinned plate can be used as a last resource, and it must be connected to the earth terminal. Clearance holes must be drilled in it to allow the connections to be made between that section and the other two valves. Its height should be a shade

(Continued on next page)

LIST OF COMPONENTS FOR THE "SPARES-BOX" THREE

- One S.G. valve, 1 triode det., 1 power or pentode.
- Three .0005 mfd. variable condensers (air or solid dielectric).
- Two dual-range coils.
- Two on-off switches.
- Three valveholders.
- One L.F. transformer.
- One H.F. choke.
- One .0001 mfd. fixed condenser.
- One 0.1 mfd. fixed condenser.
- One .0002 mfd. fixed condenser.
- One 2 meg gridleak.
- Baseboard, panel and odd terminals and wire.

(Continued from previous page)

greater than that of the H.F. valve, and it is fixed to the baseboard by turning over, say, $\frac{3}{16}$ in. of its bottom edge at right angles, and screwing it down.

The screen is very essential, especially if unshielded coils and tuning condensers are used, otherwise interaction will take place between the two circuits, and cause uncontrollable oscillation.

Circuit

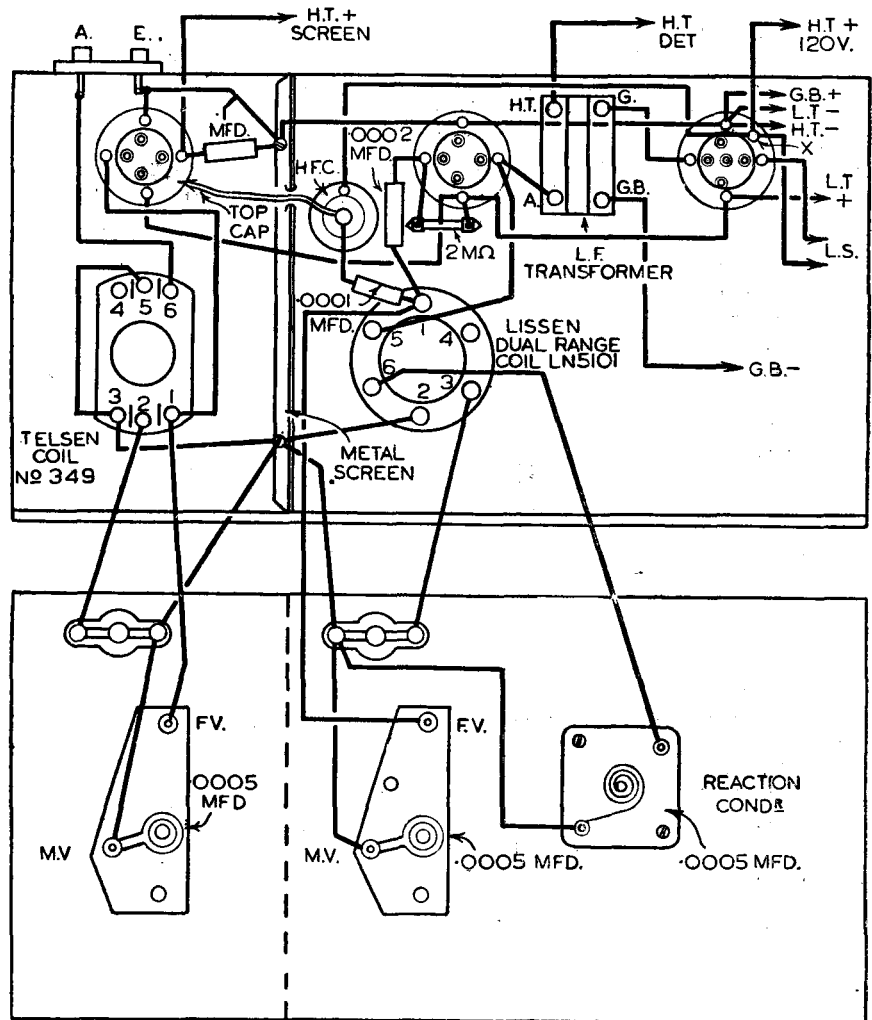
This is not, at this stage, very ambitious, but it is one which is capable of giving very satisfactory results, provided valves and aerial are of normal efficiency. A poor H.F. and/or detector valve will seriously affect the whole circuit, so try to make sure that these are above suspicion.

From Fig. 1 it will be recognised that the standard S.G. H.F. stage is used, which is coupled to the detector by means of a tuned-grid coupling. This method was selected as it is most applicable to the coils with which we are concerned, and because it simplifies wave-change switching.

The detector, using the normal capacity controlled reaction, is coupled to the output valve via a standard L.F. transformer, the ratio of which is not critical. The output stage shown is for a pentode valve, but if it is desired to use a power, then the H.T. connection to the terminal marked X can be ignored. Separate H.T. leads for the H.F. and output anodes, the screening grid and the detector anode are advised as these allow the first two to receive 120 volts, the screen, say, 60 volts, and the supply to the detector to be adjusted to suit the valve. With the last, it should be remembered that the value should be kept as low as possible consistent with good results and smooth reaction, so that the anode current is kept on the low side to remove the possibility of burning out the primary winding of the L.F. transformer.

As mentioned before, the circuit employs only the bare essentials, and as it is possible that many may wish to add certain refinements further details of suitable additions or modifications will be given next week.

WIRING DIAGRAM OF THE "SPARES-BOX" THREE



IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, February 1st.—Symphony Concert from the Queen's Hall, London.

Thursday, February 2nd.—Love is on the Air, dance band programme.

Friday, February 3rd.—Susannah's Secret (Wolf Ferrari)—studio opera.

Saturday, February 4th.—Wales v. Scotland: a running commentary on the International Rugby Union Football Match, from Cardiff Arms Park.

REGIONAL (342.1 m.)

Wednesday, February 1st.—Dance Cabaret from the Grand Hotel, Torquay.

Thursday, February 2nd.—Lillibulero, a diorama of the Great Siege of Londonderry (1688-89) by Denis Johnston.

Friday, February 3rd.—The Trial of Katharine Nairn: reconstruction of scenes of the trial from documents dating back to 1765. (Scottish.)

Saturday, February 4th.—Music from the Sea, a fantasy for broadcasting by Walter de la Mare.

MIDLAND (297.2 m.)

Wednesday, February 1st.—Negro Spirituals, arranged by Granville Bantock.

Thursday, February 2nd.—Mr. Cinders, a musical comedy.

Friday, February 3rd.—Susannah's Secret (Wolf Ferrari)—studio opera.

Saturday, February 4th.—Myself and Life, a talk by the Bishop of Birmingham.

WEST OF ENGLAND (285.7 m.)

Wednesday, February 1st.—Dance Cabaret, from the Grand Hotel, Torquay.

Thursday, February 2nd.—A Choral and Orchestral Concert, from the Colston Hall, Bristol.

Friday, February 3rd.—A visit to the Quarterly Meeting of the Federation of West Country Farmers.

Saturday, February 4th.—Music from the Sea, a fantasy for broadcasting by Walter de la Mare.

WELSH (373.1 m.)

Wednesday, February 1st.—The Small Nation as a Political Unit: a talk in the Small Nations series.

Thursday, February 2nd.—The Death of a Martyr, a play by Gwyn Jones (in English).

Friday, February 3rd.—The Welsh Poetic Tradition, a talk.

Saturday, February 4th.—Concert from the National Museum of Wales.

NORTHERN (449.1 m.)

Wednesday, February 1st.—The Blackleg, a play by Mary Stocks and John Orchard.

Thursday, February 2nd.—Stagshaw Round-Up.

Friday, February 3rd.—Zulu Song recital.

Saturday, February 4th.—Saturday Concert Hall at the Town Hall, Huddersfield.

SCOTTISH (392.2 m.)

Wednesday, February 1st.—Instrumental recital.

Thursday, February 2nd.—The Chanter, a Gaelic play by Donald MacLaren.

Friday, February 3rd.—The Trial of Katharine Nairn: reconstruction of scenes of the trial from documents dating back to 1765.

Saturday, February 4th.—Gaelic Songs.

ON YOUR WAVELENGTH

Lost Opportunities Overseas

I AM credibly informed by one of my friends recently returned from South Africa that last year 4,000 British sets were sold in that country against 50,000 American sets. At a time when British manufacturers are anxious to increase their sales it is a surprising thing that nearly all of them neglect the overseas market. This state of affairs has existed right from the early days of the industry, for with only one or two minor exceptions no British manufacturer has taken the trouble to investigate the possibilities abroad. Some of them are under the impression that they can design sets in this country for overseas markets without having actually visited those countries. If some of the live British manufacturers were to take the trouble to send representatives abroad to investigate the possibilities, and the special features of construction and design which would be necessary to suit tropical conditions, and to study atmospheric and reception conditions as well, they would be able to manufacture over here a set which would be bought in preference to American receivers. Ever since I have been contributing this feature I have received at regular intervals, and from various parts of the world, complaints from my readers that although they wish to buy British, they are unable to do so because the British sets offered are unsuitable. Many of them have asked us to design a special receiver for them. There are many difficulties in the way of doing this because our English readers would object if the sets were unsuitable for this country. We have, however, done our best to oblige these overseas readers by suggesting suitable designs and circuits for their special needs. I therefore will award book prizes to the senders of what I consider to be the best circuits for overseas conditions. Mark letters "Circuit" in the top left-hand corner and address to THERMION, PRACTICAL AND AMATEUR WIRELESS, "Tower House," Southampton Street, Strand, W.C.2, entries to be received not later than March 1st. Please note that this competition is open only to Overseas Readers.

Society of Pioneer Constructors

WE have a Fellowship of Old-time Cyclists, and a Society of Veteran Motorists, and it has occurred



By Thermion

to me that we ought to have a Society of Pioneer Constructors. That, of course, would not be the title, but I have in mind a society for those early pioneer wireless experimenters who have done so much for the science and the hobby. The difficulty will be to decide on a formula for membership, and I suggest that the first rule should be that applicants must have made and built a set at least twenty years ago. Those readers who agree with this project should write me a letter giving full details of their ideas, whilst those who feel that they have the necessary qualifications for membership would also gladden my heart if they drop me a line.

The Television Push

THE manufacturers have decided to make a push to increase the sales of television receivers. This includes the placing of over 200 advertisements in the London evening papers, 63 local papers in the television area and the trade press; one thousand three-colour posters will be displayed on the underground railways, and 4,000 similar posters will be provided for the use of dealers. There will also be a series of lecture demonstrations by the B.B.C. Public Relations Officer for television, and the slogan is "Television is Here—You Can't Shut Your Eyes to It."

This is the first real effort which has been made to push television, which at the moment seems to be held back by some unseen force. In some quarters the programmes are blamed for lack of sales, others think that the public is not yet ready for television, whilst some still foster the illusion that television technique may change, and that the present sets are imperfect. The receivers and the transmitting sets to-day are unlikely to undergo any radical change in the next two years. A

television receiver can therefore be purchased with every confidence. I cannot foresee that prices will be very much lower than they are to-day when you can buy an add-on unit for just over £20. If you are within the service area you should consider television when deciding to buy a new set.

New Models

I SEE that some members of the trade are following the usual practice of announcing new season's models early in January. I cannot help expressing the opinion that this is a mistaken policy, and does more to disturb the market in the middle of the selling season than anything else. The public have ceased to be attracted by new sets produced without technical improvements, but merely in a new design of case. People are more likely to refrain from buying new receivers because of the risk of new models being produced a short time after, thus rendering their own obsolete, than to purchase new sets.

Old Components

I HAVE received a large number of letters from readers naming the old components which they have in stock. I have tabulated these and handed them over to the Editor, and I hope, therefore, that we shall be able to satisfy those readers who wish to experiment with parts they possess without having to disburse a fair amount of money on new components. Some of the requests I have received have been quite unreasonable. One reader wants us to explain in this journal how to make loudspeakers; and another even wanted to make fixed condensers. It is not possible for either of these components satisfactorily to be made at home. Other readers require very special circuits to suit special conditions, and here again it would be unfair to devote space to such matters.

Back Issues

ONE or two of my readers have asked me to publish a notice stating that they will send back issues of this journal providing that applicants will pay carriage. Once again I have to point out that, generous though the offer is, and ungracious

though it may appear, we cannot publish such notices in the readers' own interests. Each reader making such an offer is bound to receive a large number of requests, all enclosing postage, and he is, therefore, put to the considerable expense and trouble of returning the stamps or remittances to unsuccessful applicants. If you have back issues which you wish to dispose of, I suggest that you get into touch with your local radio society, or write to your local paper, when, no doubt, a local enthusiast will call upon you and relieve you of the burden and the bundle.

Coils Wanted

THE Triogen coils which we specified for the Corona Four are no longer available, but one of my readers is particularly anxious to get hold of a pair of these coils. Any reader, therefore, who has a pair for sale should get into touch with Mr. A. H. Walker, Aston Commercial School, Whitehead Road, Aston, Birmingham. The coils should not be sent until this reader has written for them.

Our Small Ads.

THIS brings me to a feature of this paper which some readers are apt to overlook when they need parts or have something which they wish to sell. I refer to the miscellaneous advertisement section, which for a small fee will rapidly put you into touch with those who have the goods you wish to buy or sell. The terms and conditions are printed at the top of the miscellaneous advertisements page. Those parts you have for sale, that blueprint now out of print that you require, those back issues you want to complete a set, all these and more will be accounted for by a small ad. I mention this because so many readers are asking me to convert my column into something pariously approaching a readers' exchange mart. I hope they will take this hint that I cannot publish further requests in this column. A frigid advertisement manager insists that advertising space should be paid for. This is not unreasonable.

"Music Hall's" New Acts

ON the back page of a little red diary for 1938 that John Sharman keeps on a shelf in his St. George's Hall office is a list of twenty-six acts and artists who have either made their first broadcast or have returned to the microphone after a long absence during the past year.

"And yet," Sharman will say with a smile, "it is said that 'Music Hall' bills consist only of 'regulars.'

Notes from the Test Bench

All-wave Tuners

ONE or two readers who have tried to design their own all-wave receiver, have used a standard three-gang condenser in conjunction with a set of coils for all-wave tuning. In many cases this has been found to work quite satisfactorily, but there are two small points which should receive attention in this type of receiver. Firstly, the trimmers on the gang condenser should be removed entirely, as the slight minimum capacity which may be left if they are merely opened to minimum setting may introduce difficulty in tuning on the short-wave ranges. Secondly, it is a good plan to mount the coil and condenser on a small chassis and to inset this into the main receiver chassis, making the auxiliary chassis in the form of a floating unit, by using rubber grummetts and leaving the lock nuts on the holding-down bolts loose.

Push-button Four

IN a receiver of the Push-button Four type some difficulty is often experienced by an amateur in trimming when a signal generator or similar instrument cannot be obtained. The I.F. transformers should be set to the approximate setting, as distinguished by the greatest background noise. The trimmers on the Push-button Four coil unit are as follows: the centre condenser trims the medium-wave band, the right-hand pair of trimmers are for long waves, and the left-hand pair for short waves. In addition to these there are two larger condensers, and of these that on the left is used to "pad" the medium waves and the other one is for long waves. These two condensers govern the "law" of the tuning circuit and are adjusted to bring the pointer into correct line for accurate station identification with the condenser dial which is used in the receiver. These padding condensers should only be adjusted on the waveband for which they are intended, and on no account should they be touched on any other waveband. A slight readjustment of the I.F. transformers may be made when the trimmers and padders have been adjusted to the best advantage.

"Last year 'Music Hall' ran fortnightly, and rested for some weeks in the summer, you must remember, and the twenty-six new turns were included in only twenty-two broadcasts. Those making their first appearance at the studio microphone, included Tommy Trinder, Billy Matcchett, the Six Harmonists, Clifford and Jan, Wheeler and Wilson, 'Lipsky,' Olga Takla, Emil Boreo, Fred Miller and Millie Dean, Allen and Taylor, Billy Reid and his Accordeon Band, Frank Randall, the Hungariau Gipsy Boys Band, Pat and Vera Lennox, the Russian Choir, Clifford Warren, Haig and Escoc, and Vocalli. In addition, a number of artists made their first broadcast as double acts—Dorothy Ward and Shaun Glenville; Dawn Davis and Len Bermon; Rose Perfect and Percy Manchester.

"Besides these, Albert Sandler made his first broadcast in this type of programme, and we were glad to welcome back a number of artists who had been off the air for a considerable time, such as Norah Blaney and Gwen Farrar, Charles Austin, the Mills Brothers, and Ethel Levy; and we had the good fortune to book Eddie Cantor while he was on a short visit to this country."

During the present quarter, with "Music Hall" again the regular Saturday night variety show, John Sharman hopes to introduce many other new acts to his bills. Those already planned include Len Young, comedian; Wilson Hallett (his second broadcast); and Gus Chevalier, who has not been on the air for some months (February 4th); Hal Jones and Jock McKay, working together for the first time; Big Bill Campbell and Company, their first appearance in Music Hall (February 11th); and Lilian Burgess, the singer (February 18th).

Britain's Bomb-proof College.

I WAS particularly interested to note that there is a bomb-and-gas-proof college in Britain. I refer to the Bennett College, of Sheffield, which has been very active in teaching police, firemen, air wardens, decontamination squads, etc., A.R.P. work free of charge. The Bennett College have acquired a large house standing in an acre of grounds which adjoins the college. This house is on a hillside, and, working to architects' special plans, this hillside is now being tunnelled so that a bomb-and-gas-proof chamber nearly fifty feet under ground will be available for the staff of nearly two hundred, together with several hundreds more if necessary.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. C.A.M.M.

From all Booksellers 5/- net, or by post 5/6 direct from the Publishers, George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, London, W.C.2.

Making Your Own Components—5: MAINS TRANSFORMERS

Constructional Details of Transformers for Use in Typical A.C. Receivers, and for Trickle Chargers

By FRANK PRESTON

LAST week I concluded by explaining that most types of mains transformer can be made by using as core six dozen pairs of No. 4 Stalloy stampings, and that with such a core an allowance of eight turns per volt is correct when the component is for 50-cycle mains. This turns-per-volt ratio is not based simply on the number of the stampings, but upon the area of cross section of the so-called winding limb. (See Fig. 1.) As mentioned last week, a core of the type referred to has a cross section of $1\frac{1}{2}$ in. by $\frac{7}{16}$ in.; this gives an area of almost exactly 1 sq. in. From this it will be understood that the number of turns per volt for any other size of former can be found by simple proportion, using the basis of eight turns per volt for 1 sq. in. In other words, if the cross sectional area were $\frac{1}{2}$ sq. in. 16 t.p.v. would be correct, and if it were 2 sq. in. four t.p.v. would be used.

For Rectification

A general-purpose transformer might be described as one giving an output of 250 volts, suitable for use with a full-wave 250-volt, 60 mA rectifying valve, of 4 volts, one amp. for the valve filament,

Secondary Wattage

Suppose, however, that the H.T. winding is to be a double-250 volt winding for 60 mA, it will need 4,000 turns in all, a tapping being taken after 2,000 turns. The wattage taken by this winding would be 250 times 60 (mA) divided by 1,000 (to convert mA to amps.). Thus, the result would be 250 times $\frac{3}{50}$, or 15 watts. The 4-volt, one amp. winding would take four watts, and the 4-volt, 5-amp. winding, 20 watts. The total output is, therefore, nearly 40 watts. There is an inevitable small loss in the core and windings, which means that to find the primary wattage it is necessary to increase the estimated secondary wattage by 25 per cent. It can thus be seen that the primary wattage would be approximately 50 watts.

From this we can find that the primary current would be approximately 50 divided by 240 (amp.), or 50/240 times 1,000 mA, which is rather more than 200 (mA). In Table I, details are given for a few generally used gauges of wire, average current ratings being based on 1,500 amps. per sq. in. This is a fair average for transformers, and should not be greatly exceeded. From the table it can be seen that 30-gauge wire

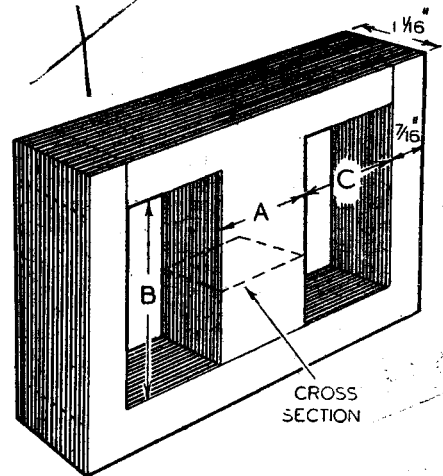


Fig. 1.—A built-up core, showing the principal dimensions. The thickness applies to six dozen pairs of stampings.

core suggested above. Table I shows the number of turns which can be wound per square in. of winding area (see Fig. 2), whilst Table II shows the winding area for a few core sizes. It is generally found best to use enamelled wire for gauges of 26 and finer, and d.c.c. for stouter gauges. We should therefore use enamelled for both high-voltage windings. Our primary winding would occupy about $\frac{1}{2}$ sq. in.; the H.T. secondary would need, rough, $\frac{1}{2}$ sq. in.; the 5-amp. secondary would need about $\frac{1}{2}$ sq. in., and the 1-amp. secondary about $\frac{1}{20}$ sq. in. If we add these together we get a total necessary winding area of just under 1 sq. in. Actually, the figures given for winding turns per sq. in. assume that the wire is wound evenly, so we should expect a slightly greater area to be taken up when winding by hand. But as the available winding area of No. 4 stampings is $1\frac{1}{2}$ sq. in., this would be satisfactory so long as reasonable care is taken in winding, and the spool is not bulky.

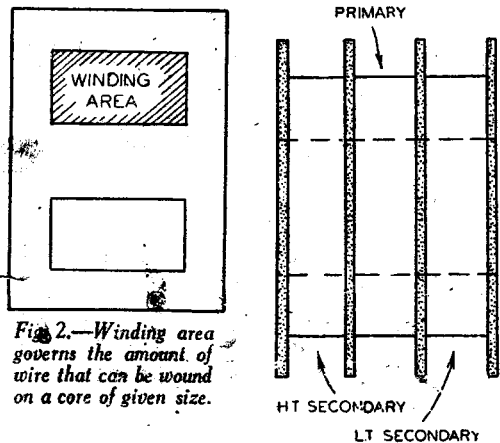


Fig. 2.—Winding area governs the amount of wire that can be wound on a core of given size.

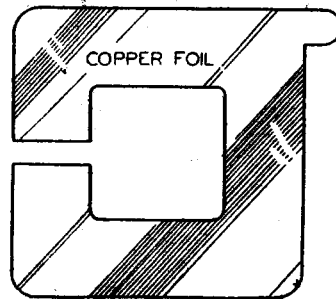


Fig. 4 (above) Details of a screen for fitting on the spool.

Fig. 3. (left) A convenient arrangement of windings on the spool.

and of 4 volts, 5 amp. for the heaters of the receiving valves. The primary must, of course, be appropriate to the mains voltage. This generally means that it is best to wind it for a maximum of, say, 240 volts, and to provide tapings for 230 and 210 volts. From what has been written above, it will be seen that the total number of turns would be 240 times eight, or 1,920 turns. Tappings would be taken after 1,680 and 1,840 turns. The gauge of wire required, which is dependent upon the current to be handled, cannot be determined until it has been found what total output will be taken from the secondaries.

would be suitable, since it carries about 190 mA at 1,500 amp. per sq. in., or 250 mA at 2,000 amp. per sq. in.

For the H.T. secondary we could use 36-gauge wire, which will very easily carry the necessary 60 mA. The 1-amp. L.T. winding could be wound with 22-gauge wire, and the 5-amp. winding with 16-gauge wire. Each of these windings, incidentally, would have 32 turns and would have a centre tapping.

Winding Area

The next point is to make sure that the windings could be accommodated on the

The Spool

The spool would be made as described last week, but an extra cheek would be required and should be placed slightly to one side of the centre of the spool. We should then put the primary in the smaller section, fitting a thin layer of insulation (waxed paper or oiled silk would be best and least bulky) after about every six layers of the winding. In the other spool

(Continued on page 520)

TABLE I—WIRE DATA

S.W.G.	Average Current 1,500 A. per sq. in.	Max. Current 2,000A. per sq. in.	Turns per sq. in.	
			Enamelled	D.C.C.
16	4.9	6.5		173
18	2.7	3.6		297
20	1.5	2.0		472
22	0.95	1.25		592
24	0.57	0.76		977
26	0.38	0.51	2,560	
28	0.27	0.35	3,760	
30	0.19	0.25	5,370	
32	0.135	0.18	6,890	
36	0.075	0.10	13,500	
38	0.045	0.06	20,400	

TABLE II—CORE DATA

Size No.	Dimensions (Fig. 1)			Turns per Volt	Approx Winding Area sq. in.
	A	B	C		
.4	$\frac{1}{16}$	$2\frac{1}{16}$	$\frac{1}{16}$	8	$\frac{1}{4}$
.5	$\frac{1}{8}$	$1\frac{1}{8}$	$\frac{1}{8}$	12	$\frac{1}{2}$
.28	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	6	$\frac{1}{2}$
.35	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	5	$\frac{1}{2}$

46 Ts + 1 + 46 Ts.
4111-11111

Handwritten notes and calculations on the right margin, including numbers like 3500, 700, 4200, 350, 120, 250, 150, 147, 4, 36, 60, 29, 14, 8, 54, 88, 293, 46, 314, 4.

MAKING YOUR OWN COMPONENTS*(Continued from previous page)*

section we should first wind the H.T. secondary, insulating as with the primary. A layer of insulation must be placed over that and the 1-amp., and then the 5-amp. windings wound over it; insulation must, of course, be used between the two L.T. windings, and must be put on very carefully in view of the high voltage existing between these two windings.

The method of starting and finishing the windings should be as described for the chokes last week, and the tapings should be made by soldering on lengths of thin rubber-covered flex.

Metal Rectification

Now let us work out details for a transformer for use with a metal rectifier such as the Westinghouse style H.T.16, which has a maximum output of 300 volts, 60 mA, when fed from a 240-volt, 200 mA winding. The primary would have the same number of turns as before, and could be wound with 28-gauge enamelled wire, although the current passing through it would be on the high side. Only one L.T. secondary would probably be required, and this would be the same as the 5-amp. winding on the transformer previously dealt with.

In this case, the H.T. secondary winding would have to be wound with 30-gauge enamelled wire, and would have 1,920 turns. We could best use a spool with three sections, as shown in Fig. 3, placing the primary in the centre with one secondary on each side. The separating cheeks must be thin so that they do not take up too much of the available winding area. In winding, it would also be necessary to

take care that the spacing cheeks are not displaced. This could best be done by lightly winding two sections with string until the third has been filled with wire. Then one string winding could be removed until the second winding is in place. Finally, the third winding could be wound.

Screening

In some respects it is better to place the L.T. secondary between the other two windings, so that it acts as a screen between the primary and the H.T. secondary. The screen is effective because the centre tap of the winding is earth-connected in the set. Another method is to place a screen on each side of the primary, the screen being made from copper foil, as shown in Fig. 4. Note that the foil does not completely encircle the core, but is gapped, and that a tag is provided for making a soldered earth connection. The foil screens could be glued to the cheeks and given a coat of good insulating varnish or could be painted with melted paraffin-wax.

For a Trickle-charger

The general instructions given above can be applied to any transformer, taking care to calculate the required winding area before deciding on the size of core stampings needed. In making a transformer for a 2, 4, 6-volt, 1-amp. trickle-charger, we could still use No. 4 stampings. In this case, separating cheeks would not be necessary, the secondary being placed directly over the primary, with insulation between the two windings and after every four layers or so of the primary. To feed a Westinghouse style L.T.4 metal rectifier we should require outputs of 7.5, 9 and 11

volts for charging 2-, 4-, and 6-volt accumulators.

For the secondary we should use 88 turns of 20-gauge d.c.c. wire, making tapings after 60 and 72 turns. The maximum wattage requirements of this winding would be only 11, so that we should allow about 14 watts for the primary, which would therefore pass only 14 divided by 240 and multiplied by 1,000 mA. This works out at 58 mA, so we could satisfactorily use 36-gauge enamelled wire. Actually, still finer wire could be used with safety, but as it is far more difficult to handle it would not be advisable, especially since there is ample winding area when using No. 4 stampings.

We could quite well use a core consisting of six dozen pairs of No. 5 stampings. The area of cross section of the core would then be approximately $\frac{2}{3}$ sq. in., so we should allow 12 turns per volt. That means that the primary would need a total of 2,880 turns of 38-gauge wire, whilst we should use 132 turns of 22-gauge wire for the secondary. The required winding area would be less than $\frac{1}{2}$ sq. in., and as the total available (which must also allow for the spool) is $\frac{3}{4}$ sq. in., there is ample space.

Other Transformers

The details given should make it a fairly easy matter for any reader to calculate the core and wire sizes suitable for any transformer. In every case it is wise to choose a core providing a good deal more winding area than that found necessary by calculation, because allowance must be made for the space occupied by the spool, and for the space necessarily wasted by uneven winding. Similarly, it is better to avoid the use of very fine wires, which are rather difficult to handle.

PROGRAMME NOTES**"A La Carte"**

A **N**OTHER mixed menu of light fare will be presented in "A La Carte" in the Western programme on February 10th. The artists will be White and Woodman, "in Original Songs at the Piano"; Peter Valerio, "The Wonder Boy Accordionist"; and the Wessex Players, directed by A. H. Morgan.

Organ Recital

A **P**UBLIC organ recital in the Concert Hall at Broadcasting House (the fifth in the present series) will be given on February 11th (Regional), when Harold Darke will play a programme of organ music by Bach.

Contemporary Concert

O **N** February 10th, Ernest Ansermet will conduct the B.B.C. Orchestra in a Contemporary Music Concert in the Concert Hall at Broadcasting House. The programme, which will be broadcast on the National wavelength, will consist of three modern works: "Ostinato," by Conrad Beck (first performance in England); Symphonic Fragments from "Lulu," by Alban Berg; and the Suite "Nobilissima Visione," by Paul Hindemith. This suite is derived from the ballet of the same name which was produced by the Russian Ballet at Covent Garden last season.

Sir Adrian Boult's Midland Visit

S **I**R ADRIAN BOULT will be the guest conductor of the City of Birmingham Orchestra for their Town Hall concert on February 9th. He was the Conductor of this Orchestra before he went to London as the B.B.C.'s Director of Music. The

symphony for the concert is Schumann's No. 4.

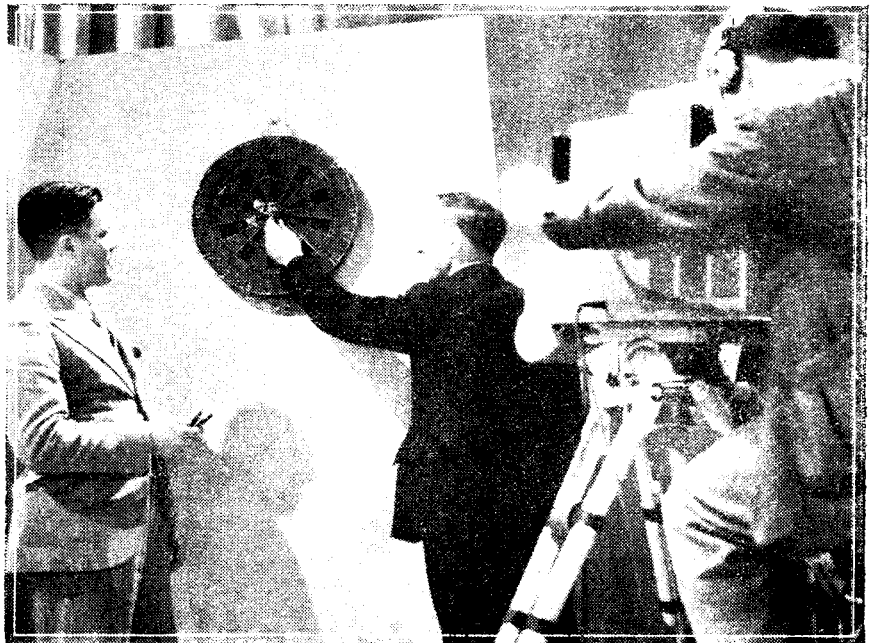
Western "Cabarette"

"C **A**BARETTE" will be presented on February 8th, by the Futurists' Swing Quartet (Ronnie Austin, violin;

Percy Pegg, accordion; Ralph Smith, bass; Jack Colin, guitar) and Compton Evans and Ray Monelle, in original songs at the piano.

Variety from Bath

A **V**ARIETY programme will be broadcast for West of England and Regional listeners from the stage of the Palace Theatre, Bath, on February 7th.



A darts match between two teams of brothers of different families was recently televised at Alexandra Park. The illustration gives a close-up of the television camera and two of the players.

Practical Television

February 4th, 1939. Vol. 3. No. 137.

A Television Demonstration Van.

BRTAIN'S first van devoted solely to television demonstrations and installations has been placed on the road by E. K. Cole, Ltd. It is the first of a fleet of similar vehicles. Specially sprung, and with a smart two-tone green streamlined body, it is a 15 cwt. 24 h.p. Ford. The sides are gold lettered: "EKCO TELEVISION—Installation and Service," and on the roof, mounted like a fire-escape, are a triple-extending ladder, a roof-ladder and two collapsible temporary masts.

Mast Erection by One Man

The ladder extends to 34ft., and the masts to 30ft. The latter is a converted racing-yacht-mast, ferruled and socketed, and can be erected complete with dipole by one man. It is a special light-weight demonstration dipole, made of duralumin, weighing less than a pound complete with reflector.

Inside the van are carried standard Ekco dipoles, vision units and other receivers, complete sets of spare valves and tubes, in special sprung container, drums of co-axial cable and transmission line, chimney and wall-mounting brackets of various types, and a range of test gear which includes a 20,000 ohms per volt voltmeter, an all-wave

handling of tubes, boiler suits and even oilskins for use in wet weather.

The engineers have been especially trained for installation and demonstration work, one of each crew being a highly-skilled technician and the other having wide experience of roof-work. Both are fully insured for roof-work.

Engine Suppression Throughout Fleet

As a matter of interest, it may be pointed out that the van engines are fitted with suppressors to eliminate television interference from this source. Similar action has been taken with all the vans and cars maintained by E. K. Cole, Ltd., thus setting an example the whole industry might adopt as a step, however small, in the right direction.

New Ekco Receivers

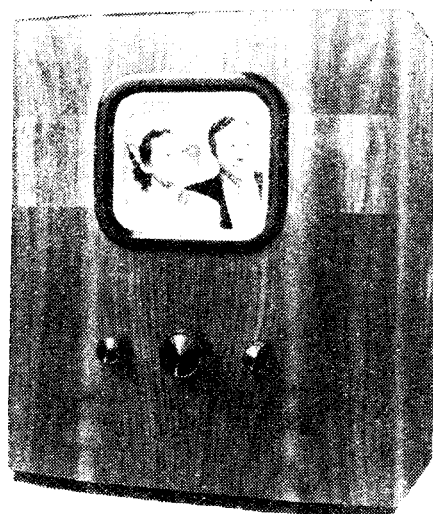
Coincident with the above news comes the announcement of the production of low-priced television receivers from the Ekco works. A special add-on unit, illustrated on this page, may be obtained for 22 guineas and represents a trend of development of

which we have before made mention. This type of unit enables an existing receiver to be used for sound reproduction and thus reduces the initial cost of television equipment. In some of the add-on units which have been so far produced the radio section is in the form of a S.W. converter, which is connected to the aerial terminal of an existing set, and by tuning in the picture it is thus possible to hear sound through the broadcast receiver. In this new Ekco set the sound output is fed to the pick-up sockets, thus utilising only

the L.F. and speaker sections of the broadcast receiver for the television sound.

The picture size in this unit is 6½in. by 5½in., and it incorporates a power pack (3 rectifiers), an 11-valve receiver, a 4-valve time base generator and an all-magnetic tube. There are only three controls—focus, brightness and contrast.

A similar type of television receiver is also announced by Ekco, but with the sound amplifier and speaker included.

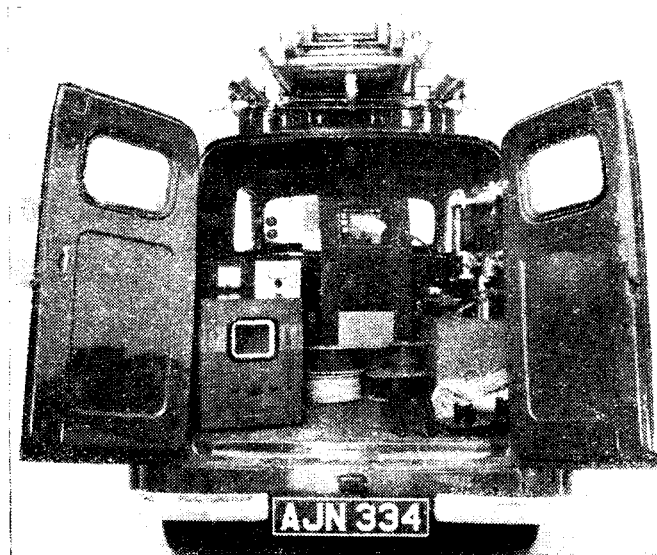


A new add-on television unit by Ekco. Picture size is 6½ins. x 5½ins.

In all other respects it is identical and the cost is raised to 26 guineas.

Television Interference

IT is anticipated that the whole-hearted campaign which has now been inaugurated to bring about the suppression of all forms of interference at their source will achieve quite a fair measure of success. As far as television is concerned, owners of sets near the main traffic roads were loudest in their volume of protests regarding the picture and sound troubles brought about by the ignition systems of motor-cars. Another source which so far has apparently received scant attention, but which is quite likely to be just as effective in causing interference, are the other forms of electrical equipment in cars, such as horns, windscreen wipers, and so on, but no doubt this apparatus will be dealt with in due course. The volume of complaint has been added to by those viewers living in the neighbourhood of hospitals, private doctors, dentists, etc., where electro-medical apparatus of differing types has been used. In the bulk of the first-named cases the normal picture exhibits white splashes across the television screen, while a form of close-mesh pattern bars, due to a frequency beat, are evident in the case of the last named. Then again, television viewers residing within the vicinity of aerodromes are complaining that low-flying machines are upsetting pictures, and this formed the subject of a recent question to the Postmaster-General in the House of Commons. Here, in addition to trouble from the aeroplane's ignition systems, the whole picture scan is distorted, and the strength of the signal varies in a most weird fashion. This has been attributed to the reflection of the ultra-short waves from the metallic bodywork of the machine, the extent of the signal alteration depending upon the angle of the machine when it is banking in mid-air. All these factors combined serve to emphasise the extreme importance of hastening any proposed government legislation which aims at reducing and, if possible, removing sources of interference for both listeners and viewers.



A view of the interior of the new Ekco Television demonstration van.

signal generator and a special 7-metre oscillator.

From Blow-lamps to Oilskins

In addition there is a comprehensive kit of tools ranging from drills, braces, saws, hammers, vices, soldering irons, blow-lamps, files and chisels, to nails, screws, ropes and wires of every dimension likely to be required. The equipment of the van also includes face-masks to be worn during the

WORKSHOP CALCULATIONS, TABLES AND FORMULÆ
3/6, by post 3/10 from
George Newnes, Ltd.,
Tower House, Southampton St., Strand, W.C.2

TELEVIEWS

A New Appointment

THE recent death of Lord Selsdon will necessitate certain changes in the personnel of the Television Advisory Committee, who are responsible to the Postmaster-General for ensuring that the present service of television is conducted in a proper manner. It is not too much to say that Lord Selsdon did more than any other man of recent times to put Britain on the map as far as television is concerned. His first association was when as Postmaster-General he conducted an investigation into the low-definition transmissions which were then being radiated by the Baird Company. Everyone connected with the television industry owes him a debt of gratitude for the work which he sponsored, and it will be difficult to fill his post. In official circles it is being freely stated that Sir Frank Smith, who is retiring from the post of Secretary of the Committee of the Privy Council for Scientific and Industrial Research, may be appointed as chairman of the Television Committee. Sir Frank's keenness for the science of television is well known, and he has acted as vice-chairman for a long time. There is no doubt that other changes will be made, and a full statement of the whole position is expected shortly. From the public point of view it is hoped that at the same time the whole position of television will be reviewed, and so remove some of the unaccountable reticence which has been associated with this committee for some time.

A Definition

ABOUT a year ago, when television formed the subject of many after dinner speeches to the Press, manufacturers, and other interested bodies, Sir Frank Smith dealt with this highly technical science in a simple everyday manner which enabled the whole assembly to appreciate how the scheme works at both the transmitting and receiving ends. It has been left to Mr. Gerald Cock, however, to provide an all embracing definition which he gives to interested inquirers when they ask what television really is. He has a framed definition in his office which furnishes this as an explanation:

"Excited by impulses borne on a carrier wave which vibrates 45 million times a second, a spot of light 1.32nd of an inch in diameter, travelling at the rate of 6,000 miles an hour, and varying in its illumination up to 4 million times a second, traces 25 times a second, in alternate lines, a page of 405 lines on the sensitised end of a cathode-ray tube. The vision and sound signals are synchronised to within one four millionth part of a second."

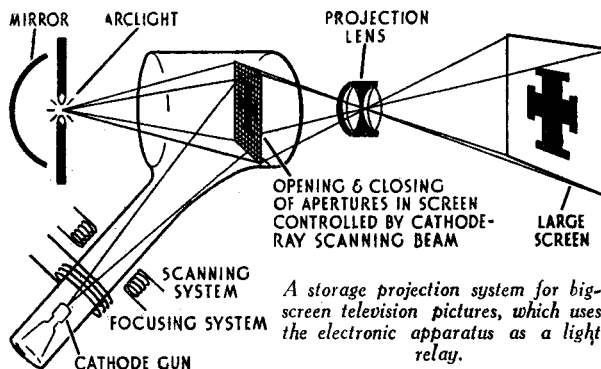
Technicians may join issue with the Director of Television as to the complete accuracy of the statement, particularly in regard to light spot size, but there is no doubt that to the layman this is an awe-inspiring statement, and serves its purpose admirably in answering what is admittedly a difficult question.

A Cinema Industry Survey

AT this period each year the cinema industry is furnished with an annual survey of technical developments which have occurred during the past year, in so far as they affect their own particular section. This year proved no exception to the rule, and it is very interesting to note that the line of progress which is regarded as having the greatest effect on the industry

is big-screen television. The results achieved, and shown during the year on the Baird projection C.R. tube installation at the Tatler Cinema, London, are recapitulated, as well as the single demonstration furnished by Scophony in a well-known Kensington store. The relative advantages and disadvantages of mechanical and electronic methods of scanning are mentioned, and the opinion is expressed that the scheme which seems most likely to achieve commercial success is a cathode-ray operated relay which has the effect of controlling the light from an arc lamp. This scheme is perhaps explained best by referring to the accompanying illustration, which is a diagram used by Mr. West during the course of his presidential address to the British Kinematograph Society. An evacuated glass tube, which is really a large cylindrical vessel having a narrow neck joined to it at a predetermined angle, has a special form of screen mounted inside. This screen is in effect a whole series of properly arranged relays or apertures which are normally closed and so prevent any of the arc light beam from reaching a remote screen. This mosaic of apertures is scanned in the orthodox television fashion by a cathode-ray beam, deflection and focusing being undertaken magnetically, but provided this beam is unmodulated the relays stay closed. When an amplified television signal is applied to the modulation electrode surrounding the beam in the neck end of the tube, each minute relay upon which the beam is incident in turn during its scanning will open to a degree dependent entirely upon the intensity modulation of the beam. This opening and closing of the

lack of definition. Now, while it is in every way admirable to have such high standards of excellence at which to aim, just the same as in every other walk of life, there are practical considerations which must be taken into account. This is particularly so with television, where so many factors in the chain of sequence from original to reproduced picture have to be allowed for. Even a few of these items are sufficient to show that a big jump in picture definition which the theorists demand is almost impracticable with the present knowledge and equipment which is available. First and foremost is the electrical problem arising from the ultra-high frequencies which must be transmitted over quite long distances. Both optical and electrical distortions arise of very considerable magnitudes. In the case of the ultra-short wave radio transmitter it has been shown by television engineers that there is a decrease of power brought about which is related to the highest modulation frequency in the generated picture. It is said that this cannot be avoided by increasing the value of a carrier wave frequency, or by designing the output stage of a transmitter so that it has the characteristics of a band-pass filter. Present knowledge seems to show that the only way of achieving this necessary increase of transmitter output is by the development of a type of valve which has a very high ratio between the saturation current and the anode to cathode capacity. Many other interesting points arise in this intricate problem of increasing the number of picture lines, but what must not be lost sight of is that



shutters at a very high rate will allow a picture pattern to be projected on to the screen in true half-tone elements. It should be noted that this device has storage properties, inasmuch as each relay stays open for the duration of a complete picture scan when the incidence of the beam at that spot once more adjusts the degree of aperture opening. Inadequacy of light does not arise, as this is dependent only on the intensity of the arc lamp beam, and the method, if perfected, will provide an interesting alternative to known schemes for big-screen television pictures.

Picture Definition Investigated

THE total number of lines into which a television picture should be divided in order to give a result which is above criticism has long been the subject of discussion and experiment among expert technicians. It was, of course, known that the present standard which is being used both in this country and abroad—that is, between 400 and 450 lines per complete picture—while giving really good quality results was not equal to that achieved in the cinema. With images including a lot of small detail it is possible to see the

with the present standard used by the B.B.C., the quality of the reproduced images is amply sufficient for a service which is capable of giving real entertainment value. The full use of this has yet to be exploited, and even with up-to-date transmitting and receiving equipment it is felt that the full 405 lines is not achieved. Any feeling that a rapid jump from the present standard is either desirable or contemplated for some time to come should be eradicated and attention turned to making better use of the present transmitted pictures. This will be of greater value to television's development.

A Rare Occurrence

THOSE viewers who were seated comfortably at home watching the television cabaret programme on Saturday, January 21st, saw what is regarded as the first accident to be actually televised. Two roller skaters on a small diameter raised stage were executing quite hair-raising evolutions when the man appeared to lose his grip and, with a scream, both he and his girl partner were veritably catapulted from the stage on to the floor. With great presence of mind the producer faded out the turn and went straight on to the next item, a news reel. Many telephone calls were put through to Alexandra Palace to ascertain if the accident was of a serious nature, and later in the programme Miss Jasmine Bligh assured those looking in that the two performers were not seriously hurt. Television transmissions, however, especially O.B.s, will always make it possible for accidents, even tragedies, to be witnessed.

(Continued on page 531)

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

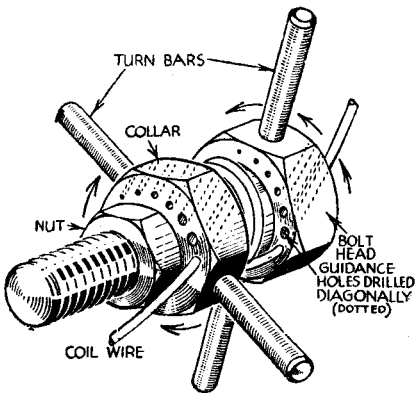
READERS WRINKLES

THE HALF-GUINEA PAGE

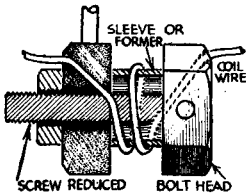
A Winder for U.S.W. Coils

The coil-winding device shown in the accompanying sketches will be found useful for making short and ultra-short-wave coils.

An ordinary nut and bolt were used, the nut having the thread removed, making it a collar. The bolt is reduced in size and a smaller nut fitted; as a series



Pictorial and sectional views of a winder for short and U.S.W. coils.



of holes are drilled diagonally through the collar and bolt head, this nut must leave the holes clear. The coil wire is threaded through one of these holes, and by twisting the fitment (as shown by arrows) a coil of any length is produced. The diameter of the coils can be arranged by inserting a sleeve or former of the desired size. Four brass rods are used for turn bars.—B. HOULT (Edgware).

An Imitation Torpedo Mike.

I RECENTLY came across a rather rusted electric cycle lamp which I had discarded some time ago, and as this lamp was of the torpedo pattern, it occurred to me that it would be possible to clean it up and convert it into an imitation torpedo mike.

After removing the rust and thoroughly rubbing down the lamp case (before assembly) this was given two coats of black Japan. the chromium rim was fortunately in fairly good condition.

From the accompanying sketches it will be seen that I have removed the reflector fitments, and by letting a 4 B.A. bolt through the back of a single headphone, it was a simple matter to clamp the 'phone to the rear of the lamp case. To overcome any tendency to rattle, it was necessary to pad the assembly, and this I did by inserting a couple of pieces of thick rubber, finally screwing the 'phone down after

THAT DODGE OF YOURS!

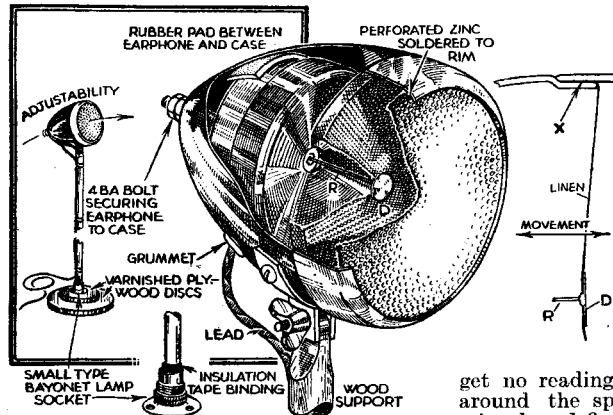
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account 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.

SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

passing the connecting lead through a grummetted hole let into the case, as shown.

When carrying out preliminary tests I tried various forms of secondary diaphragm, eventually deciding upon the use of a piece of thin linen cut into the form of a disc, and provided with a small tin disc



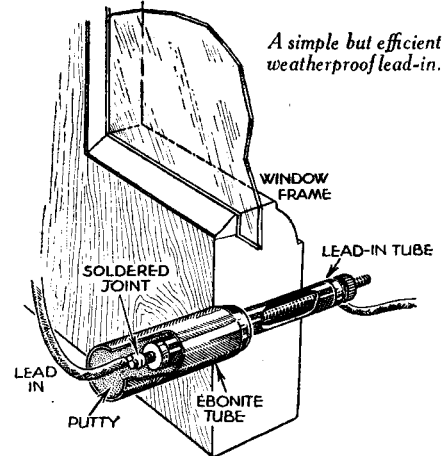
A discarded cycle-lamp casing is used for this home-made torpedo pattern mike.

glued to the exact centre. The purpose of this tin disc "D" is clearly indicated, and before fitting the linen, a thin reed was soldered to the disc, the other end being soldered to the 'phone diaphragm. A perforated zinc front was then soldered to the rim, and after carefully setting the linen and checking the reed centre, the rim was forced into position, the linen being drawn taut, as illustrated in the inset diagram at "X." A wooden stand was made up, and with the final coat of varnish the whole assembly looked and worked well.

A Weatherproof Lead-in

HAVING had considerable trouble with my lead-in tube rusting and making bad contact, I devised the arrangement

shown in the accompanying sketch. The ebonite tubing is part of an old cycle pump which is packed with pitch or putty. An essential point is that spirits of salts should

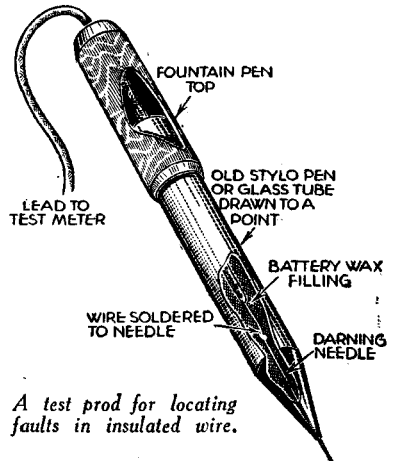


A simple but efficient weatherproof lead-in.

not be used for soldering the joint, which should be well cleaned before applying the flux.—JOHN LUNN (Kilsby).

A Handy Test Prod

HERE is a novel test prod for finding faults in insulated wire without damaging the insulation. The actual body of the prod can be made from an old stylo pen, or a piece of glass tubing can easily be heated and drawn to a point. To test a wire, start at one end with two prods, make sure they pierce the insulation properly, and start moving one of the prods a few inches at a time until you get no reading on the meter, then work around the spot where the reading first missed, and find the actual location of the breakage.—E. A. HEBRON (Manchester).



A test prod for locating faults in insulated wire.

A TWO-VALVE S.W.

Circuit and Constructional Details of a Converter for Use with Standard Receivers -

THE majority of readers know that a standard medium and long-wave broadcast receiver which employs at least one H.F. stage may be used with a separate unit for the reception of short waves. This type of unit is known as a short-wave converter, and we have published several constructional designs of these from time to time. In the majority of cases they consist of an H.F. pentode or a similar valve arranged in such a manner that they function as a superhet frequency-changing stage—the receiver being tuned to a point on the long waves corresponding to the intermediate frequency generated in the converter stage. These units are quite efficient and give very good results, but there is one small point which often gives rise to difficulty. This is the generation of whistles, due to the rather poor selectivity of the single type of frequency-changing stage. It is also found sometimes that the damping of the aerial results in the stage working at low efficiency, and where really long-distance reception of very weak stations on the headphones is desired it is also sometimes found that selectivity is inadequate.

An H.F. Stage

All of the difficulties mentioned may be overcome by adding an H.F. stage in front of the frequency-changer, and there are

similar coil A form of aperiodic coupling is indicated between the H.F. and frequency-changing stages, and the value of the grid leak may be found by experiment. Generally a value of 1 or 2 megohms will answer quite well. Band-spreading may be included in the aerial circuit, and the tuning condensers should, of course, be of the standard .00015 or .00016 mfd. type.

Important Features

In a circuit of this kind there are one or two details which must receive very careful attention if the best results are to be obtained. The first of these is the type and disposition of the two H.F. chokes. Standard short-wave components, designed to cover the wavelengths on which the set is to be used, may be employed, but they must be so placed that no possibility of interaction can arise. Similarly, the two coils must be arranged in the same manner. As the top cap of the H.F. type of valve is the anode, and the anode of the frequency-changer is connected to one of the pins, it is obvious that the best plan is to build a converter of this type on a chassis and then

ment experienced with a frequency-changing stage is often due to the fact that the oscillator fails to oscillate at certain frequencies. These frequencies are often dependent upon the coil characteristics, but the H.T. voltage is just as important, and, therefore, if results are not up to expectation with this type of circuit a milliammeter should be included in the oscillator anode circuit at the point marked X in the diagram, and the valve checked.

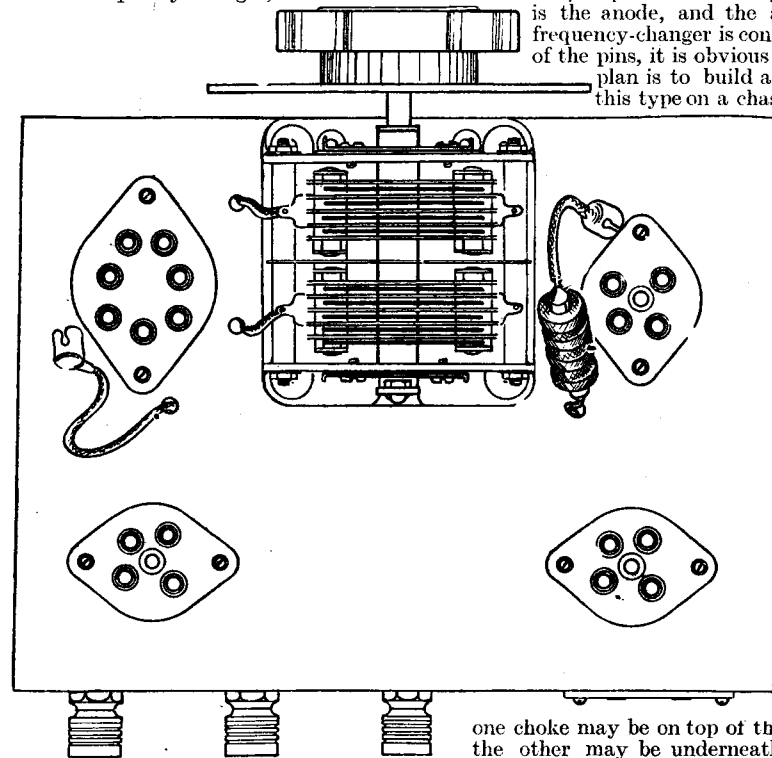


Fig. 2.— This plan view of the converter is drawn exactly half scale. In place of the 2-gang condenser unit shown, two separate condensers may be ganged.

one or two alternative methods of doing this. One of the circuits which has been found to give most satisfactory results consists of an H.F. pentode or S.G. valve followed by a triode-hexode or a pentagrid or similar frequency-changer. In the aerial circuit we may use a choke or resistance giving the aperiodic arrangement which many prefer, or a complete tuned circuit. Where selectivity is the main consideration the tuned circuit is to be preferred, and a very satisfactory arrangement is shown in Fig. 1. The aerial circuit utilises a loose-coupled arrangement for which the standard 4-pin coil will be found ideal, whilst the oscillator grid circuit, and reaction winding, may also be covered by a

one choke may be on top of the chassis and the other may be underneath. Provided that the chassis is effectively earthed, interaction will thus be avoided.

The coils may be placed at opposite ends of the chassis, or a metal screen may be placed vertically between them, but if this is done care should be taken to place the coils sufficiently far away from the screen to avoid losses caused by the screen cutting through the fields of the coils.

Oscillator Voltage

The other important point is the voltage applied to the oscillator anode. The normal reaction winding may be found sufficient on some coils to provide adequate oscillation throughout the range covered by the coils. On the other hand, much of the disappoint-

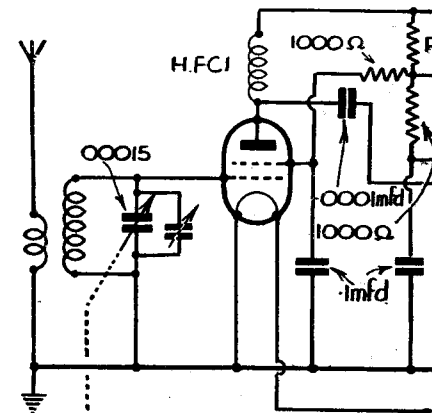


Fig. 1.—Theoretical circuit

LEAVES I

British Bechuanaland Calling

DAILY from G.M.T. 18.00-19.30 broadcasts are made from ZNV, Mafeking, on 50.84 m. (5.903 mc/s). Reports of reception should be addressed to the General Post Office, Mafeking (Cape Province), Union of South Africa.

Vienna's Short-wavers

SINCE the amalgamation of Austria with the German Reich the broadcasts on short waves are made by the new 50-kilowatt Zeesen stations DJZ on 25.42 m. (11.8 mc/s), and DJY, 49.41 m. (6.072 mc/s). The daily schedule is G.M.T. 21.50-03.50.

Sweden's Winter Radio Programmes

SBP, Motala, on 25.63 m. (11.705 mc/s), is now working daily on Monday to Friday inclusive from G.M.T. 06.20-07.00, 11.00-14.00, and from 16.00-21.15; on Saturdays from G.M.T. 06.20-07.00, and from 11.00-21.15; on Sundays from 08.00-21.15. Special broadcasts destined to the U.S.A. are given on Wednesdays and Sundays from G.M.T. 01.00-02.00. SBO, on 49.46 m. (6.065 mc/s), is on the air daily from G.M.T. 21.15-22.00. The Stockholm station SM5SX which hitherto has been in its experimental stage works daily from G.M.T. 16.00-22.00. All reception reports should be addressed to Svenska Rundradio, Aktiebolaget Radiotjänst, Kungsgatan, 8, Stockholm (Sweden).

CONVERTER

An Efficient S.W. Converter
By W. J. DELANEY

This is done by noting the anode current indicated on the meter and then earthing the grid—the simplest way of which is to touch it with a moistened finger. If the valve is oscillating, the current will rise as soon as the grid is earthed in this manner. A variable resistance could be used in this anode circuit if desired to control oscillation, but such a refinement is not generally necessary. A few experiments over the entire range which it is desired to cover will

indicate what value of resistance is required for the particular valve, coils and H.T. voltage which is available.

Suggested Layout

A suggested layout for a converter of the type indicated is shown in Fig. 2, and this should operate quite satisfactorily down to 10 or 12 metres. Where lower wavelengths are required a shorter run of wiring will be called for, and this may lead to some difficulty in disposing the coils and valves. The two tuning condensers may, of course, be ganged, using one of the special couplers sold for the purpose. If the coils are then of the same type the tuning should hold on all ranges, and a good slow-motion dial will ensure ease of tuning. Careful attention to the remaining voltages, types of component, and wiring will

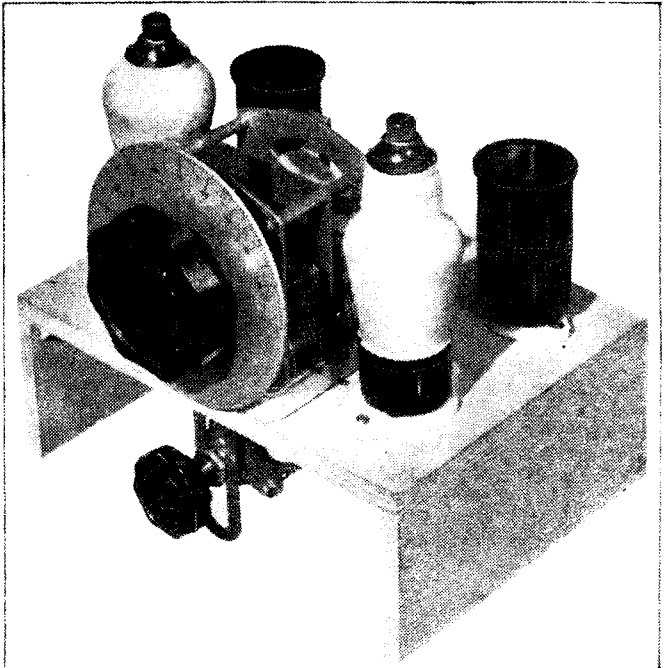


Fig. 3.—View of the completed converter ready for connection to the receiver.

guarantee good results. A list of the main components is attached, and it should be noted that in one or two cases exact values are not quoted. For instance, the screens of the H.F. and frequency-changing valves are fed from a potentiometer across the H.T. supply, together with decoupling components. The two resistances forming the potentiometer are marked R and R1 in Fig. 1, and these must be chosen to apply the voltage recommended by the makers of the valves in use, and they will also vary according to the voltage available at H.T.+2. A certain latitude is also indicated in respect of one or two of the remaining components, and again the makers' instructions should be adhered to. Remember that the receiver with which this type of converter is used must employ one H.F. stage at least, and that it must be tuned to a point somewhere on the long waves where no interference is experienced. A superhet receiver may, of course, be used with the converter although, as this type of receiver already employs a frequency-changer, there is a risk of whistles being generated at certain points due to the coincidence of the beat frequencies set up in the two circuits.

LIST OF COMPONENTS

- One Metaplex chassis, 8in. by 6in. with 2 1/2 in. runners.
- Three Ceramic 4-pin valveholders.
- One Ceramic 7-pin valveholder.
- One two-gang .00016 mfd. condenser, or Two .00016 mfd. condensers with coupler.
- Two S.W. H.F. chokes.
- One .00005 mfd. bandspread condenser.
- One component-mounting bracket.
- Two .1 mfd. fixed condensers.
- Two .0001 mfd. fixed condensers.
- One .0002 mfd. fixed condenser.
- One .0003 mfd. fixed condenser.
- Two 1,000 ohm 1/2-watt resistors.
- One 2 megohm fixed resistor.
- One 1/2 megohm fixed resistor.
- Three 1-watt fixed resistors (see text).
- Three insulated terminals.
- One Aerial-Earth socket strip.
- One H.F. pentode or S.G. valve—metallised.
- One triode-pentode or triode-hexode valve—metallised.
- Connecting wire, flex, screws, etc.

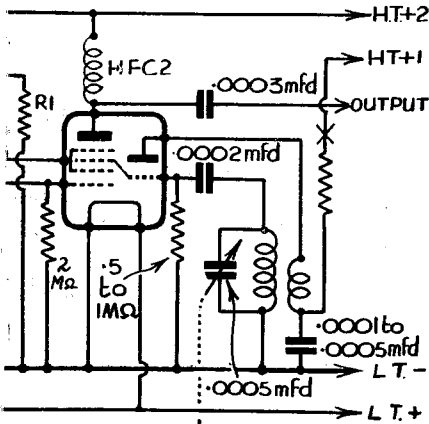


Fig. 2.—Schematic of the 2-valve converter.

FROM A SHORT-WAVE LOG

And Poland

THE Polish Broadcasting Corporation (Polskie Radjo), of Mazowiecka, 5, Warsaw, announces that during the winter months the short-wave stations will operate according to the following time-table: SPD, 26.01 m. (11.535 mc/s) and SPW, 22 m. (13.636 mc/s) daily for North America between G.M.T. 23.00-02.00; SP25, 25.65 m. (11.695 mc/s), and SP19, 19.84 m. (15.12 mc/s), with a programme for South America at the same time. SP48, on 48.86 m. (6.14 mc/s), and SP31, on 31.49 m. (9.52 mc/s), may be found on the ether nightly from G.M.T. 20.00-22.30.

Altered Call-signs

HJ3ABH, Bogota (Republic of Colombia), 61.22 m. (4.9 mc/s), is now HJ3CAH. Slogan is still *La Voz de la Victor*, and broadcasting times have not altered, namely, G.M.T. 16.30-19.00 and 23.00-04.00. Address: Apartado Postal, 565, Bogota. HJ4ABE, Medellin (Colombia), has been allotted the call-sign HJ4ADB; it works daily on 49.2 m. (6.097 mc/s) from G.M.T. 22.30-03.30 and still styles itself: *La Voz de Antioquia*. Address: Señor Jose, M. Acavedo, Hotel Europa, Medellin (Colombia).

Puerto Plata Changes Channel and Location

HHS, Puerto Plata (Dominican Republic), previously on 6.42 mc/s

(46.73 m.), has increased its power, transferred its studios to Santiago de los Caballeros, and is now working on 46.66 m. (6.43 mc/s). Announcements are given out in Spanish, French and English; interval signal: 3 chimes. Operating schedule: G.M.T. 16.30-18.30, and again at 22.40 until 01.40, or even later.

Broadcasts from Finland

A REGULAR series of transmissions is now broadcast daily by the Lahti-Helsinki short-wave stations. OFH (No. 3), on 16.85 m. (17.8 mc/s), may be heard from G.M.T. 09.00-14.00; OFE, on 19.75 m. (15.19 mc/s), from G.M.T. 06.05-09.00, and from 14.00-22.00; OFE, on 25.47 m. (11.78 mc/s), from G.M.T. 06.05-17.05 and OFD, on 31.58 m. (9.5 mc/s), from G.M.T. 17.15-22.00. Address: O/Y Suomen Yleisradio Aktiebolaget Helsinki (Finland).

Addis Ababa on the Air

IUC, Addis Ababa (Abyssinia), on 25.09 m. (11.955 mc/s), may be picked up nightly working telephony with Rome from G.M.T. 23.00.

Broadcasts from New Zealand

TESTS are being carried out almost daily at Wellington (N.Z.) with a new transmitter working on 6.96 mc/s (43.1 m.) between G.M.T. 10.00-midday. Occasional relays of New Zealand radio programmes are carried out through ZLT4, 27.27 m. (11 mc/s).

The Amateur Transmitter

The Importance of Monitoring, with Details of a New American Frequency-monitor which Forms the Basis of an Interesting Design

THE amateur transmitter will have realised as soon as he commences activities, that one of the most important points which concerns his apparatus is the accuracy of the frequency upon which he operates. Under the conditions of the licence it is essential to adhere to a given frequency, and the operator is expected to take all reasonable steps to ensure that the transmitter is kept on the frequency selected. As a result of this, a crystal is invariably used in the oscillator stage, and a certificate must be furnished to the authorities showing that the crystal is accurately cut. (The makers will generally supply this with the crystal.) In spite of this, however, the crystal may vary due to the effects of heat, moisture or mishandling, and it is interesting to note that in America now the Federal Communication Commission has now stated that "every amateur station shall provide for measurement of the transmitter frequency and establish procedure for checking it regularly." They will not recognise the use of a crystal from the transmitter being used as a supposedly-known frequency for checking purposes. Therefore, a special frequency-monitor must be obtained for check purposes.

Various arrangements may be adopted for frequency check systems, and many amateur transmitters in this country have their own apparatus for the purpose. It should be remembered, however, that the B.B.C. and similar stations are crystal controlled and very accurate stabilisation of the crystal frequency is obtained in these modern transmitters, and they may thus be used as standards by means of which, with suitable apparatus, the frequency of an amateur transmitter may be checked from time to time.

An Interesting Circuit

A well-known firm in America has recently produced a frequency-meter, which is available in kit form for construction, designed for amateur use. The circuit is shown on this page, and amateur transmitters will, no doubt, be interested in the arrangement employed and may desire to experiment with similar apparatus for monitoring purposes. The Monitor has a 7½ in. chromium dial calibrated to hair-line accuracy and reading against an anti-parallax indicator for all, except above 5 metre, amateur bands. Calibration covers 324 deg. of a full circle, with low-frequency bands at outside. This gives a maximum effective scale length of 21½ in. for the outer scale, which is devoted to a vernier scale of 500 divisions. Accurately readable to one-half division, each band may be accurately read to 1/1000th part, and even more closely with a little care, by virtue of the long dial scale length.

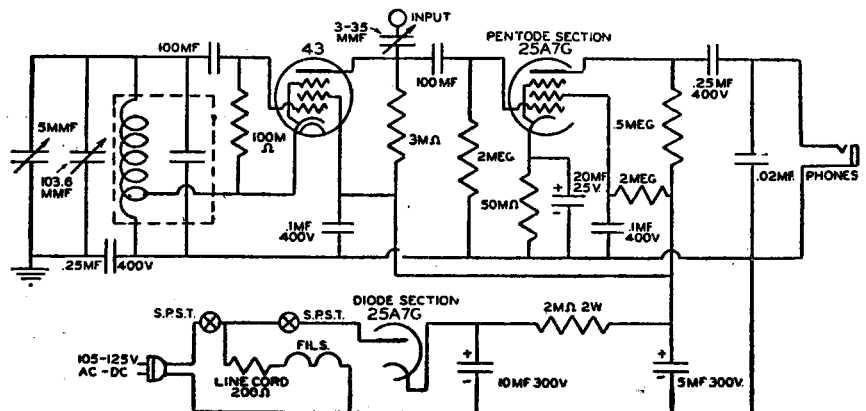
This main dial may be operated by its centre large knob, or for precise setting by the 10 to 1 vernier reduction knob at its lower right. To the lower right is the on-off switch and headphone jack, with input coupling through the small jack at the upper right. The small knob and dial at lower left are the zero-setter, or calibration setter. By first

setting the main dial to any standard frequency station signal and then adjusting the zero-setter knob to zero beat, calibration is automatically made accurate for the entire range. Despite a very high order of stability, no reliance is placed upon such stability, and never should be in precise frequency measurement, over long periods of time. Calibration should be definitely checked and set with the zero-setter before any period of use. Yet the stability is such that the frequency meter will hold zero beat with a standard frequency signal for many hours at a time, and easily for 24 hours and more.

The stability is obtained by an electron-coupled oscillator circuit consisting of a very wide-spaced, Steatite-insulated, ball-bearing tuning condenser, high-Q 15/41 Litz inductance wound on low temperature-coefficient Steatite form, and a padding or "swamping" capacity of low-drift silver-plated-on-mica construction completely ceramic-sealed. All

of the 43 electron coupled oscillator, in itself forming no part of the oscillator circuit, and additionally isolated by a small 3-35 mmfd. adjustable coupling condenser which may be so set that external coupling will not affect oscillator frequency.

To be fully useful for measurement of received signal frequency, a high-gain pentode is used as beat-note detector-amplifier, and is coupled to the isolated oscillator plate circuit; thus may the user measure not only his own transmitter frequency, but the frequency of signals heard upon his receiver. This detector-amplifier is the pentode section of a 25A7G dual valve, its diode being the power supply rectifier. A.C.-D.C. operation is provided not in the interest of cheapness, but in order to obtain the best possible supply voltage regulation. Omitting the usual power transformer, which always introduces some regulation problems, operation is direct from the power line, with only the H.T. supply filter and rectifier tube as



Circuit of the frequency-monitor referred to in this article.

are housed in a tightly closed metal box. This box provides a "dead air" mass around the frequency determining circuit which effectively resists temperature changes. In turn, enclosed inside the outer cabinet 9½ in. high, 10½ in. long and 6 in. deep, the effects of external short-duration temperature changes such as might affect stability are effectively eliminated from the tuned circuit. Stability is further assured by running valve heaters continuously. The heating elements maintain temperature within narrow and stable range well above ambient temperature.

The fundamental range of the oscillator is 850 to 1,030 kc/s, so that it may be checked directly against the signals of broadcast stations tuned in on the receiver—or even directly upon the frequency meter in the case of locals, for it is in itself a receiver. Harmonics of this range cover 1,700 to 2,060 kc/s, thus including both new and old 160-metre amateur bands. Through the use of a 43 power pentode as oscillator, it can both be run in the frequency stable range well below maximum rating, and at the same time put out husky harmonics right down into the 5-metre band. Coupling is to the plate

factors to impair regulation. By isolating the power line from the metal cabinet, the possibility of shock usual to user simultaneously touching a grounded metal object and the chassis is eliminated completely, and the frequency-meter cabinet may be directly earthed.

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Edited by F. J. GAMM

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Notes from the Trade

Service Aid Reductions

MESSRS. HOLLIDAY AND HEMMER-DINGER announce that the price of the scratch remover which was reviewed in these columns some time ago has now been reduced to 2s. 6d. In addition it has been re-named "Elimmo," under which registered name it will henceforth be known. They also announce a reduction in the price of the metal soldering iron holder to 2s. net.

Cossor American Type Valves

MESSRS. A. C. COSSOR, LTD., announce that they now have available a complete range of American-type valves suitable for use as replacements in receivers designed for these. Full details and prices may be obtained on a special leaflet supplied by Messrs. Cossor on application. The address is Cossor House, Highbury Grove, London, N.5.

Wharfedale Replacement Transformer

IT is announced that the Wharfedale Wireless Works are in future discontinuing one of their service replacement transformers, and in future only one model will be available, but this will include four ratios with a centre tap, thus avoiding stock and replacement difficulties. There will be no increase in price, the transformer remaining at 6s.

Change of Address

MESSRS. T. W. THOMPSON AND CO., makers of mains transformers, etc., inform us that, owing to the re-naming of streets in their locality, their address is now 176, Greenwich High Road, S.E.10.

Electron Dipole Aerial

A COMPLETE dipole aerial kit is now available from the New London Electron Works. This includes two horizontal spans of 17 and 43ft. of the special Electron stranded wire, twisted at the junction and the ends then brought down in a covered cable to the receiver end. The total length of the down-lead is 35ft., and there are thus no joins or breaks in the entire length. The wire is supplied without insulators or transformers, and the price of the complete outfit, boxed, is 6s. 6d.

New Bulgin Lines

A NEW edition of the well-known Bulgin 120-page catalogue is now ready and shows price reductions on a large number of components, and a range of about fifteen new lines. These include



New Hivac Managing Director

THE HIGH VACUUM VALVE COMPANY announce that following the death of Mr. Stephen P. de Laszlo, his brother, Mr. Patrick D. de Laszlo, has been appointed as managing director. For a number of years he was joint managing director with his brother.

Radio Manufacturers Association

AT the recent annual general meeting of the R.M.A., Mr. J. H. Thomas was elected chairman, Col. G. D. Ozanne was elected vice-chairman, and Lord Hirst was re-elected to the position of president of the association.

magic-eye holder, television aerial and feeder, Electrolytic condensers, resistances, colour-dolly switches, suppressors, terminals, transformers, valveholders, volume controls, terminal blocks, and connecting plugs. Copies of the catalogue may be obtained from Messrs. Bulgin, price 3d., post free.

SOS BROADCASTS IN 1938

A TOTAL of 836 SOS messages were broadcast during 1938 for relatives of people dangerously ill and 469, or 56.1 per cent. were successful. The B.B.C. is without information as to the success or failure in 67 cases.

The successful results are a tribute to the willing co-operation of listeners in every part of the country. This is an essential factor in the success of SOS broadcasts, which are only permitted when all other means of communication have failed.

In addition to these SOS messages, 412 police messages were radiated, bringing the total number of appeals of the SOS type broadcast from London and all Regions during the year to 1,248, of which 612 (or 49.03 per cent.) were successful.

There were 323 appeals for witnesses of accidents, 119 (or 36.84 per cent.) of which met with response. Nine (or 36 per cent.) of the 25 messages broadcast with the object of assisting police inquiries into crime were successful, and in the "special" police message category, 15 (or 23.44 per cent.) of the 64 appeals were answered.

BARGAIN LISTS FREE!
THE WORLD AT YOUR FINGER-TIPS with this AMAZING N.T.S. MONEY-SAVING NEW 1-VALVER
 List Value 55/-
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 World-beater on all bands. Absolutely complete kit with matched and tested components, valve, 3 coils for 12-94 metres, drawings, and pair of sensitive headphones. Yours for 2/6 down and 10 monthly payments of 3/-. Effective wave-range, 9-200 metres.

BARGAIN POST FREE 5/6 LIST VALUE 35/-
 Secure your set. 3 matched 2-volt battery valves, 2 S.G.'s and Pentode output complete with 3 valve holders, all data and circuit diagrams—all for 5/6 post free. These 3 valve holders are offered to you—brand new in maker's cartons and represent amazing value for set builders, experimenters, servicemen and for set-replacement purposes. 3 sets—15/6 post free. **ORDER NOW.**

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WORLD S.G.4 MODEL Marvellous station-setter with Pie H.F.S.G. Det., S.G. audio and Pentode output. All components supplied extra 1/2-valve version including station-name dial, 4 valves given FREE. Cash or C.O.D., 42/- or 2/6 down and 12 monthly payments of 3/3.

COILS—SPECIAL OFFER. 10 B.T.S. coils for "World" 3 and 4-valve receivers, 9-2,000 metres, 3 short-wave ranges; list value 27/-. Bargain, 17/6. Or add 1/6 to above Kit deposit and payments. **ORDER YOUR "WORLD" KIT NOW!**

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- Station-name dial.
- A.V.C. and tone control.
- 3 Watts output.
- Fully guaranteed.

LIST VALUE £8. 18. 6 BARGAIN £4.17.6
 This 1939 7-stage all-wave superheterodyne provides wonderful selectivity and quality reproduction on radio and gramophone. 3 wavebands 18-2,100 metres. Illuminated station-name dial, as illustrated. A.V.C. Tone Control, 3 watts output. Size 11 1/2" L, 8 1/2" H., 8 1/2" deep. Pick-up sockets. Complete with all valves and knobs. For A.C. mains 200/250 v., 40-100 cycles. Yours for 5/- down and 18 monthly payments of 6/3. Or with matched moving-coil speaker, 26/5/0 cash or C.O.D. or 5/- down and 18 monthly payments of 7/1.

A.C./D.C. MODEL All waves, 16-2,000 metres. Latest circular full-vision station-name dial. P.U. sockets. Efficient 6-valve superb circuit. Over 3 watts output. Brand new, ready for fixing in your own cabinet. Size 11in. wide; 7 1/4in. deep; 8 1/4in. high. Complete with 8in. cone Celestion speaker and valves. List value 29/19/6. **BARGAIN 26/6/0**, or yours for 5/- down and 18 monthly payments of 7/1.

BARGAIN PARCELS
 No Constructor, Experimenter or Serviceman must miss this opportunity. 1 each 2 and 3 gang variable condensers, 1 1 and 2 gang variable condensers, 1 transformer, 3 valve holders, 6 standard value resistances, 6 standard value fixed condensers, 1 doz. various control knobs and 1 brand-new ready-drilled cadmium-plated steel chassis. List value 45/-. Bargain 5/8, plus 9d. for special packing and postage. **ORDER EARLY.**

MORE CHASSIS BARGAINS
 Order from descriptions with every confidence. Complete specifications available on request.

S.G. BATTERY 3 CHASSIS. Famous set maker's surplus. Wave-range 200-2,100 metres. Engraved dial. Steel chassis. Screened coils. Wonderful choice of British and Continental stations. Fully tested. List value 59/6. **BARGAIN 19/6.** Matched British S.G. Det. and Pentode Valves 13/9 extra. Cash or C.O.D. only. Order type 7021.

STRAIGHT BATTERY 3 CHASSIS. Amazing offer. Employs screened coil, steel chassis and engraved scale 200-2,100 metres, fully tested. Well worth 55/-. **BARGAIN 12/6**, cash or C.O.D. Order type 7019. 3 matched S.G. valves. 10/6 extra.

A.C. S.G.4 BANDPASS CHASSIS. Only a few left now. Wave-range 200-2,100 metres. Engraved scale. Wonderful selectivity and sensitivity. Output 3 watts, P.U. sockets. Steel chassis and screened coils. Complete with 4 British Matched valves. Ideal replacement chassis for A.C. mains. Fully tested. List value 45/-. **BARGAIN 55/-. Yours for 5/- down and 12 monthly payments of 5/-. Order type 7053.**

SPECIAL OFFER CLASS "B" 4-valve CHASSIS. Powerful new model, giving volume equal to a mains set. Amazing range and sensitivity. Full-vision scale calibrated 200-2,000 metres. Steel chassis and screened coils. Complete with all valves. Fully tested. List value 6 gns. **BARGAIN 59/6**, or 5/- down and 12 monthly payments of 6/3. Order type 60410.

8 ONLY 4-VALVE SUPERBET CHASSIS. Excellent replacement model. Powerful and selective. A.V.C. and manual control. Wave-range 200-2,100 metres. Station-calibrated scale. Steel chassis. Screened coils and I.F.'s. Complete with all valves. Brand new, fully tested. List value 6 gns. **BARGAIN**, to clear, 27/6, or 5/- down and 14 monthly payments of 5/3. Order type 7093. For A.O. Mains only.

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BEHIND THE SCENES

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be doing - ONE
YEAR FROM TODAY*



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Don't do it, man—don't do it! There's no greater tragedy than that of the man who stays sunk in a rut all his life, when with just a little effort he could get out of it and advance.

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Avoiding Casualties in a Battery Works

THE serious results of some industrial accidents are often due to the nature of the product handled by the worker, and whether or not the injury—often a minor one—is prone to develop into a much more serious condition through neglect depends largely on the precautions taken against sepsis.

At the Exide Battery Works the dangers that might arise from minor injuries to workers among lead and lead oxides are fully appreciated, and adequate steps have for a long time been taken to encourage casualties to report to the ambulance room for immediate treatment for abrasions and cuts.

Although the battery industry is not one where a high accident rate is to be expected, a certain number of accidents is inevitable. Much, however, can be done to reduce them. It is now known, for instance, that accidents are not entirely accidental, and are not determined by pure chance, but that certain individuals are much more liable to them than others. Some 75 per cent. of industrial accidents are usually found to be incurred by 25 per cent. of those exposed. It is possible, therefore, by studying accident records, to single out those people who are particularly prone to accidents, and to ensure that they are not exposed to a high-accident risk. A great deal can also be done to reduce accidents by suitable propaganda, and suggestions for improved safety measures are always welcome, particularly when these apply to the actual process on which a man is engaged.

At the Exide Works all accidents involving lost time are reported to the Works Committee, which thoroughly investigates the cause and makes recommendations with a view to preventing a recurrence. This committee consists of fifteen members, four of whom are appointed by the company and eleven elected by the employees, and one important aspect of its work is the consideration of safety-first measures in the factory.

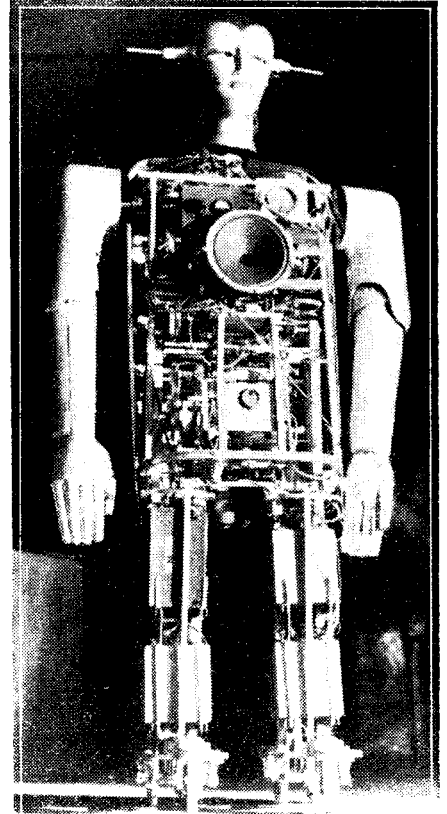
Minor accidents are dealt with by the Resident Medical Officer's staff. Where early treatment is carried out in a scientific way, it results in a great deal of lost time being prevented. A scratch or cut which is neglected can cause much lost time, a lost limb, or even death. For this reason great stress is laid on the early treatment of accidents, and on the employment of strictly aseptic methods.

The ambulance room at the Exide Works is under the care of a qualified sister who has had wide experience in casualty work, and it is gratifying to learn that since her appointment the first attendances for injuries of all types have doubled, whereas the "lost-time" accidents have been halved. In other words, twice as many men are reporting their minor accidents (approximately 5,000), while the number sufficiently severe to involve loss of time has been reduced from 60 to 30 per annum.

Rehabilitation is another important aspect of industrial medical service. In more serious cases there usually comes a time when the patient may need the support of the industrial environment if he is to avoid psychological complications of his accident. This can usually be arranged, and light or alternative work is found, which, though often uneconomical for a few weeks, is probably not so in the long run, in that it has the effect of fitting the man for his own work weeks, and sometimes even

months, earlier than would be the case were he left to his own devices.

Full benefits from a medical service such as is in operation at the Exide Works can only be obtained if there is close co-operation between the medical department, the management and the employees. This co-operation has been wholehearted, and large sums of money have been spent on putting into effect the various recommendations of the medical department; while employees have never once refused their help in any investigations, often at some personal inconvenience.



In our issue dated December 31st last we showed an "outside" view of a new radio robot. The above illustration shows some of the complicated mechanism which is built into the body of the robot. It will be noted that the legs are built round the batteries which are used to control the 20 motors which animate the model.

Brush Acquires a New Engineer

THE Brush Development Company is proud to announce an important addition to its staff—a distinguished leader in electrical and radio engineering. To those in close touch with the field, the name of S. J. Begun tells a story.

Dr. Begun received his Master's degree in Electrical Engineering at the Institute of Technology in Berlin, Germany, in 1929. In 1933 he was honoured with the Degree of Doctor of Engineering from the same institution. During this period Dr. Begun did much practical work, broadening his background. In 1928 and 1929 he was associated with Automatische Telefon, A. G., Berlin. His work here was concerned with the designing of circuits for automatic long-distance telephone systems. The following year, while with Ferdinand

(Continued at foot of opposite page.)



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. E. P. (Bitterne). The two dots are merely contact points on the switch, but these points are not used in the receiver in question.

W. S. C. (Milford Haven). We regret that we are unable to publish details of the tester in question.

D. B. A. (Boscombe). An anti-interference aerial should be quite satisfactory, and we suggest you get into touch with the Belling Lee Company. The Post Office does not sell the apparatus.

J. McL. (Paisley). The coil is Bulgis type C6, and the valves are Hivac types HP215 and Y220.

H. W. (Bristol, 3). The makers are British General Manufacturing Co., Ltd., Brockley Works, London, S.E.4.

C. T. L. (Bognor Regis). We are unable to identify the set which you have sketched and are unable to supply a blueprint for wiring this.

B. W. R. (Birmingham). The tapping point is at a point about 25 per cent. from the lower or earthed end of the coil.

H. W. A. H. (Waltham Cross). We think your difficulty would be overcome by obtaining the special records recently mentioned in the Transmitting series.

J. L. (Fulham, W.6). We suggest you get into touch with the L.S. Repair Service, 5, Balham Grove, London, S.W.12.

F. C. (Lincoln). Your idea is quite in order and the S.G. valve could be used as detector by connecting the screen to H.T. in the usual way. The best voltage will have to be found by experiment. When wiring the heaters make the detector the last in the chain, that is, with one side joined direct to the earth line.

F. R. (Longdon). The rheostat idea is not suitable for modern valves. They should be run with 2 volts on the filaments and volume should be controlled by grid bias. We doubt if the condenser would be suitable for a modern dial as these do not follow the straight-line wavelength law.

A. G. S. (Edinburgh). We have no details of the material mentioned. Celotex does, we believe, have similar properties. A special meter rectifier should be used with the D.C. meter and the makers will be able to advise you concerning the best method of making the addition.

G. C. (Cambarley). We are unable to trace any book which gives programmes on the lines mentioned. We have no details of the society mentioned by you.

G. B. (Nuneaton). The coils were specially designed for a paper no longer on the market, and we have no details of them.

A. J. H. (Homerton). We are unable to identify the type numbers of the coils you mention and suggest you write direct to the makers, Formo, Ltd., 153, Mason's Hill, Bronley, Kent.

R. P. (Bristol, 4). We doubt whether the acquisition of a set would be of much help. It would be preferable to obtain one or two of our books and read up the subject first and then build one or more of the sets described in our pages. The Service Manual would then be valuable in indicating the lines to adopt in repairing or tracing faults.

C. R. H. (S.W.12). We are unable to recommend a blueprint from which you could build a set with the parts mentioned in your letter. We only guarantee our sets when built with parts which we have tried and specify, and it is therefore preferable to build one of our designs rather than to try to build up a set from odd parts.

T. W. S. (Northampton). If you connect the set as shown modified on the sketch which you sent you will certainly obtain nothing, as the aerial is earthed. The other side of the condenser should be joined to the "top" of the grid coil and probably this is your trouble.

W. A. W. (Oldham). We regret that we have no details of the particular coils illustrated and thus are unable to supply a wiring diagram or connecting details. We suggest you write to the makers, Colven, Ltd., Mawneys Road, Romford, Essex.

F. C. T. (Bristol). Your set may be in need of adjustment as it is essential for all circuits to be properly in trim if you are to obtain maximum selectivity from it. A better speaker would not make any difference in the direction you require.

G. A. (Co. Antrim). The address of the firm you mention is Mawneys Road, Romford, Essex, but we regret that we do not know the price of the coils, and we believe that they are, in fact, no longer on the market. Spaghetti resistances are now superseded by composition types, a 1 watt resistance being suitable for your purpose.

H. C. (Stornoway). The suppressor grid should be joined to earth, and the screen connected to H.T. positive at the voltage recommended by the makers of the valve. We do not know of a six-pin coil which will cover the wavelength mentioned, but the Eddy-stone coil type 6G will tune from 260 to 510 metres with a .00016 mid. condenser.

R. E. and Son (Llandyssul). We cannot supply a blueprint for making a pick-up, but we can supply prints for amplifiers for use with them and perhaps this is what you require. The blueprints are 1s. each, and the designs are for battery or mains use.

BEHIND THE SCENES

(Continued from opposite page)

Schuchhardt, A.G., of Berlin, he developed and supervised the production of the first commercial magnetic dictating and broadcasting machines for the British Broadcasting Company. He also designed disc and film sound-recording equipment, and took part in the development of production check and production test instruments.

From 1930 to 1932 Dr. Begun was affiliated with the Echophon Maschinen, A.G., when they acquired the business of Schuchhardt in the field of recording machines. Here he was in charge of the laboratory, and developed and placed in production new accessory equipment for recording machines. Then Dr. Begun showed his versatility by establishing sales representatives for selling dictating machines in Great Britain, Sweden, Norway, Denmark, Italy, Czechoslovakia, Hungary, and Austria. At the same time he was active in sales work.

In 1932 Dr. Begun became associated with C. Lorenz, A.G., one of the two principal telephone manufacturers in Germany.

In 1935 Dr. Begun went to the United States, to be connected with the United Radio Company, at 420, Lexington Avenue, in New York City.

Dr. S. J. Begun joined the staff of Acoustic Consultants, Inc., located at 1270, Sixth Avenue, New York City.

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Adapting Discarded Components

Some Useful and Interesting Applications of Disused Parts

WHEN one side of the moulding of a two-way plug adapter became fractured, the writer decided that instead of discarding the unit entirely, various parts could, with a little adaptation, be used for other purposes, and the following ideas proved to be quite serviceable in practice.

Firstly the remaining bakelite side, which had in no way sustained any damage, was utilised for a 2-amp junction box to supply

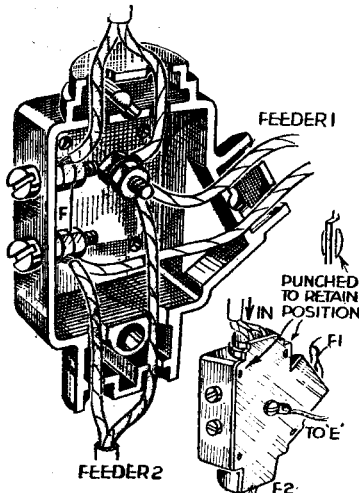


Fig. 1.—A 2-amp junction box utilising the bakelite casing of an old plug-adaptor.

two feeders from the mains, and as the bakelite proved to be non-inflammable, it was realised that the incorporation of a single fuse would be quite safe.

A single 2BA bolt sufficed for the distribution of one side of the mains, this being let into one side and, of course, countersunk so that the whole unit could be finally screwed flush to the shed wall.

For the fuse terminals 2BA bolts were also used, but with three nuts to permit ease of replacement when necessary; these points are illustrated clearly in Fig. 1.

An aluminium cover plate was then

fashioned and drilled in the centre for one screw fixing through the whole unit and into the shed wall, this requiring a clearance hole in the "back" of the moulding as shown.

As this cover plate was of metal, it became necessary for this to be earthed, so a tag connector was included under the head of the fixing screw, a bare tinned copper wire return being made to the nearby water pipe.

The finished junction box looks very neat, the feeder wire cables being brought right up to the point of insertion, and it will be seen how the original spring-pin holes serve admirably for recessing the wires.

A Three-point Switch

The next consideration was a three-point switch which could be used for many

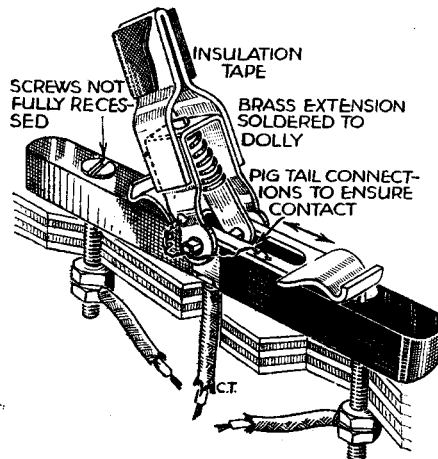


Fig. 2.—A neat snap-action three-point switch.

purposes, and, fortunately, as the operating push-bar of the original switch happened to be of the square type, it was seen that by letting into this bar a couple of 2BA bolts suitably positioned to contact with the sliding bar at its extremes of movement, not only would two very good contacts be

obtained, owing to the pressure which the sliding bar exerts under the dolly spring, but a neat and simple method of clamping the switch would result.

It will be seen, on referring to Fig. 2, that it was only necessary to bend a short length of brass, solder this to the existing dolly, and finally bind with insulating tape to complete the conversion. It was essential that the centre contact should be wired with a litz pigtail to the moving bar, otherwise the pivot action would result in bad contact.

Resistor Holder

A neat resistor holder which allowed the fitting of varying sizes of resistor constituted the next idea, a diagram of the principle being given in the inset, Fig. 3. For this assembly, two 18 S.W.G. aluminium end plates had to be shaped, these being screwed, after recessing, to the underside of a piece of plywood.

Two holes were drilled and countersunk in the base for fitting to any apparatus, and finally the spring pins were fitted to the end plates as depicted.

Countersinking the pins provided a very satisfactory cleating for the conical metal-ended resistors, and the assembly was found in use to be strong and efficient from the contact point of view.

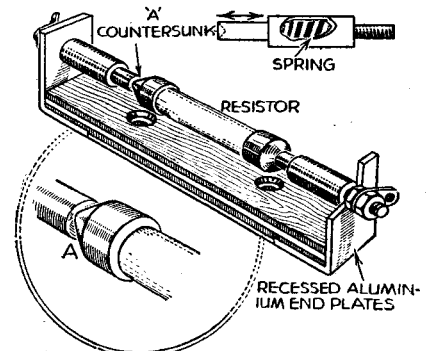


Fig. 3.—A simple resistor holder which accommodates resistors of varying sizes.

Newfoundland Radio-telephone Service

THE island of Newfoundland has an area of about 42,000 square miles and a population of nearly 300,000. The chief industries are fishing, and wood pulp and paper making. The telephone system of Newfoundland is centred principally in the south-eastern portion of the island, and especially in the capital, St. John's, which has 6,000 stations.

Newfoundland has hitherto had no external telephone communications, but a radio-telephone service was opened with Canada on January 10th. The station in Newfoundland as well as that in Canada is owned and operated by the Canadian Marconi Company, in which Cable and Wireless, Ltd., has a controlling interest.

Service between Newfoundland and Great Britain will be afforded by the interconnection of the new Newfoundland-Montreal and the existing Montreal-London radio-telephone links. The charge is £5 14s. for a three-minute call during the day time (10 a.m.

ITEMS OF INTEREST

to 10 p.m.) and £4 10s. at night, and on Sundays. The service is available between the hours of 12.30 p.m. and 11.30 p.m. G.M.T. It will be limited initially to the south-eastern portion of the island.

Telephone services available to subscribers in Great Britain already enable them to speak to about 95 per cent. of the telephone subscribers in the world, and the addition of Newfoundland to the overseas services reduces still further the comparatively small number of subscribers with whom service is not yet obtainable.

Northern Broadcasting "With the Lid Off"

A PROGRAMME of a kind which has certainly never been done in the North Region before is to be put on the air

on Thursday night, February 9th—"Broadcasting with the Lid Off," arranged by Olive Shapley. This feature will be nothing less than a peep-behind-the-scenes at Broadcasting House, Manchester, with a number of realistic glimpses of how broadcasting is carried on not only in Manchester, Leeds and Newcastle, but in other and more remote parts of the Region. For 35 minutes listeners will hear, in a light-hearted manner, something of how radio material is devised, discussed, planned and put on the air. The whole programme will be made up of recordings taken inside Broadcasting House, Manchester, and at various other places in the North. Among other things, the programme will illustrate the ways in which listeners' letters are followed up and answered; and the listener is likely to hear what happens in the last few minutes before, say, "Spot Page" is put on the air, why programmes are faded out, what happens behind the scenes at auditions, and how programmes are constructively criticised among the B.B.C. staff.

RADIO CLUBS & 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 CROYDON RADIO SOCIETY.

Headquarters: St. Peter's Hall, Ledbury Road, Croydon.

Meetings: Tuesdays at 8 p.m.
Hon. Pub. Sec.: Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

Mr. F. G. G. DAVEY visited the Croydon Radio Society on Tuesday, January 17th, in St. Peter's Hall, S. Croydon, and the evening was devoted to a lecture and demonstration on his new Communication Receiver. Mr. P. G. Clarke presided. Mr. Davey soon made it clear how such features as sensitivity, selectivity, stability, signal-mush and signal interference ratios, as well as legibility, all meant a compromise in the receiver's design. For example, in selectivity alone, the 'phone user wanted a three kilocycle wide band; the broadcast listener a ten kilocycle, and the Morse listener one as narrow as he could get. As a result he had used variable selectivity, and particularly interesting was his account of the circuit for it. When dealing with legibility, Mr. Davey warned his audience of undue narrowing of the band, which robbed the Morse note of its distinctive character, and he explained how with double crystal control, undue narrowing did not materialise.

In the demonstration he found that the Society's headquarters were such an ideal reception point that little interference was available. However, Mr. H. G. Salter, a vice-president, obliged by starting up the engine of his motor-car, whereupon on short-waves a hearty crackle was heard. This, it was shown, was considerably suppressed by insertion of the noise-limiter valve. Next Tuesday, February 7th, Mr. H. Bevan-Swift will lecture on: "Radio Reminiscences." Readers of PRACTICAL AND AMATEUR WIRELESS will be welcome.

RADIO, PHYSICAL AND TELEVISION SOCIETY.

Headquarters: 72a, North End Road, West Kensington, W.14.

Meetings: Friday evenings at 8.15 p.m.
Hon. Sec.: C. W. Edmans, 13, Cambridge Road, North Harrow, Middx.

On Friday, January 20th, Mr. Walters, of Messrs. Belling and Lee, Ltd., delivered a lecture entitled, "The Suppression of Electrical Interference with Broadcast Reception."

TELEVISIONS

(Continued from page 522)

Television and the Police.

IT has been known for some time now that the police departments of the various countries have been investigating the possibility of the use of television to assist them in their relentless war against crime and the wrongdoer. One scheme which has been suggested for London is for Scotland Yard to install its own transmitter, with an aerial on the top of the building. By using this equipment it will be possible to radiate pictures of wanted criminals, stolen articles or printed notices, so that television receivers in the police stations within the service area can have the information well in advance of any other method which involves the actual delivery of pictures. Furthermore, if records are required, then photographs of the received picture can be taken at the police station and suitably enlarged to meet any requirements. It has also been proposed that the B.B.C. may be asked to collaborate in police investigations which are now afoot. Police messages are broadcast with great regularity, so why not televise the photographs of wanted persons in the hope that one or more viewers who are looking in at that time can furnish vital information? It is also learned that both on the Continent and in the United States the military authorities are carrying out research to find out whether aeroplanes can transmit visual information to land stations.

After describing the main causes of man-made static the lecturer proceeded to explain the most usual methods employed for their suppression. Details of the well-known Belling and Lee Sky-rod were given, and a model of it demonstrated. After demonstrating various interference suppressors the lecturer concluded with particulars of some of the proposed legislation which, whilst not putting the user of electrical apparatus to any excessive cost will, at the same time, provide more or less interference-free reception for thousands of listeners.

Forthcoming events of the Society include a lecture by a representative of The Automatic Coil Winder and Electrical Equipment Co., Ltd., on Friday, February 3rd, and a visit to the printing works of The Sunday Graphic in the evening of Saturday, March 11th.

Further particulars may be obtained from the Hon. Secretary, at the above address.

SLOUGH AND DISTRICT SHORT-WAVE CLUB

Headquarters: 35, High Street, Slough, Bucks.

Meetings: Alternate Thursdays at 7.30 p.m.
Hon. Sec.: Mr. R. J. Sly, 16, Buckland Avenue, Slough.

THE annual general meeting was held on January 3rd, when a new committee was elected, and the chairman (G6PR) gave an interesting lecture on Aerials. A television receiver was demonstrated on January 19th, the first meeting at the new headquarters. The next meeting is on February 2nd, when 2FAU will talk on Oscillators. The agenda will also include the usual Morse practice, and the sale of transmitting apparatus by 2DDG.

SOUTH LONDON AND DISTRICT RADIO TRANSMITTERS' SOCIETY

Meeting Place: West Norwood Brotherhood Hall.

Meetings: First Wednesday every month.
Secretary: H. D. Cullen, 164, West Hill, Putney, S.W.15.

At the January meeting Mr. Cullen (G5KH) gave a demonstration and technical explanation of the Halliater diversity receiver.

The February meeting will be devoted to a talk on "Home-constructed Short-wave Superhet Receivers," by Mr. Stone (G2ZL). Visitors are always welcome.

BOOK RECEIVED

CIVIL AVIATION AS A CAREER. By T. Stanhope Sprigg. Published by George Newnes, Ltd. 138 pages, 5s. net.

THIS is a revised edition of the work formerly published in 1934 under the title of "Air Licences." The author's object has been to provide, in a single work of reference, complete and detailed information of the various licences and certificates available to those who wish to embark upon a career in civil aviation. Each of the twenty-one licences and certificates is dealt with separately, and the information given includes a survey of training facilities, details of official requirements, examinations, and fees charged. Some of the information given has not hitherto been available in printed form.

The book is divided into eleven chapters dealing respectively with Pilot's "A" Licence; Pilot's "B" Licence; Master Pilot's Certificate; Instructor's Certificate; Navigator's Licences; Ground Engineer's Licences; Balloon Pilot's Licences; Airship Pilot's Licences; Wireless Operator's Licences; Exhibition Parachutist's Licence; and Gliding Certificates. The appendices deal with such subjects as Technical Examinations, Books for Study, Training Centres and Medical Re-examination Centres. The practical advice and useful data given in this comprehensive book should prove invaluable to those seeking a career in civil aviation, and to others requiring information on this all-important subject.

PATENTS AND TRADE MARKS.

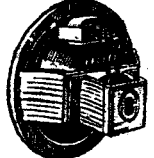
Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Rayner & Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, Chancery Lane, London, W.C.2, who will give free advice to readers mentioning this paper.

ELECTRADIX CHARGERS.

For cell charging from A.C. mains. Complete, ready for use. NEWTON CRYPTON TEN-GUINEA SERVICE III. For A.C. Three circuits, 6 amps. total. Volt switch, 15 v. to 30 v., 3 meters and rheos. 10 to 70 cells. steel case. 55/6. PHILLIPS Model 1081. D.C. Output 24 volt. 10 amps. 85/-. 47/10. DAVENSET DCG. 2-circuit, 80 cells, 1 to 3 amps., meters and plated wheel-controls, 55/10. DAVENSET S.P.C.L. For A.C. mains. Single circuit for 100 H.T. secure charge at 250 ma. for 250 volts, steel case, nickel finish, new, 45/10.

E.T.H. TUNGAR. Another fine A.C. charger with meter and volt controls. 70 v. 6 amps., 100 to 150 cells, 57/17/6. E.T.H. TUNGAR. Larger ditto for 75 volts 10 amps. two 5-amp. circuits with meters and volt controls 412/15/-. The A.C. RETHDAY will keep your battery fit without attention. Model W/AG, 100/250 volts A.C. and D.C. 6/8 volts 1 amp., 15/-. Model N/BA, 100/250 volts to D.C. 6/8 volts 1 amp., 25/-. Model N/CG, 100/250 volts to D.C. 6/8 volts 2 amps., 35/-. Model N/DL2, 100/250 volts to 12 volts 1 amp., 32/-. Ditto, 12 volts 2 amps., with 6-volt tap, 55/-. 5 amps., 44/10/-.

MOVING COIL SPEAKER Bargains. Mains Magnavox 6" cone, 10/6. and A. 6" cone, 7/6. Bola 6" cone, 6/8. Battery M.C. Speakers, K.B., 6-volt, 7" cone, 7/8. Hegra 6-volt, 9" cone, 10/-. Brown 11" cone, 12/6. Odd M.C. Speakers with damaged cones, 4/6. Add postage. 15-watt Big Horn P.A. Speakers. Emerson 24" P.M. speaker, 46/8. Tannoy 12" M. Short Horn, 15 watt. Ribbon Riffell, 25/-. P.A. Giant Van Top 30" Cinema P.M. 30/40 watts, 29.



LOW COST SOUND RECORDING. Blanks now 3/3 per dozen. Electric FEIGH set has ball-bearing centre gear box and geared traverse rod. Set with Tracking Gear, Pick-up and Tone-arm fitted diamond, 37/6. Tracker gear only, less Pick-up and Tone-arm, is 21/6. Diamond Cutter Needles fit all pick-ups, 7/6. 6in. Blank Discs, 3/3 dozen. Complete Acoustic Sets de Luxe, 18/-; No. 2, 10/6; Junior Type, 9/6 each, complete. 3 1/2 MILLIAMMETERS.—New. Where the job calls for something simple without fabrication for tuning or gaitro for testing. Back of panel type, as illus., 8 m.a. full scale. Plain scale and 1 in. needle with mica panel, back lamp and bracket. Neat and compact. Can be used as voltmeter with extra resistance. Great bargain at 3/3 post free.

ONE-OMETER. The One-Ometer with only 6 terminals, but 50 ranges, is a valuable instrument for laboratory work. It is of portable size to go in the pocket, but big enough to cover the whole range of D.C. electrical measurements, 50 microamps, to 20 amps, and 20 millivolts to 2,000 volts. 55/- ONLY. Multipliers from 6 to 60 each.

DIX-MIDANTA VEST POCKET TESTER. A wonderfully versatile moving-iron multi-range meter for service on A.C. or D.C. jobs. No protecting terminals. THREE ranges of volts: 0-7.5, 0-150, 0-300. Used for MILLIAMPS, reads: 121 m.a. and 75 m.a. In black bakelite case. Measures only 2 1/2 in. In black bakelite case. Measures only 2 1/2 in. Leaflet "N" gives full information. 19/6.

SHORT WAVE Lead-in Insulators. Frequentite brass stem, 8d. Stand-off Insulators, porcelain with base, 6d. each, 5/- doz. Screened Flex, single 4d. yd. Screened Sleeving, 3d. yd. Tubular Condensers, various cap., .01, .02 and .1mfd., etc., 6d. each. Electrolytic and H.T. Condensers to 10,000 volts, cheap. Mains Transformers to 3, 5, and 8 volts, 2/6. Dials Vernier Drum, 6d. .0005 varia. Condensers, 1/-.

ARMCHAIR CONTROL. Modula high res-compression, Volume Control, 12in. twin flex and valve adaptor, 2/6. CRYSTAL SETS for crystal-pure reception. Desk type, full B.B.C. range, 7/6. Headphones, 2/6 and 4/6.

X-RAY TUBES. As illus. previous issues. Brand new W.O. Hospital Tubes, 7in. dia. bulb, big electrodes. Full emission. Cost 25/- Save 12/6. Carriage forward.

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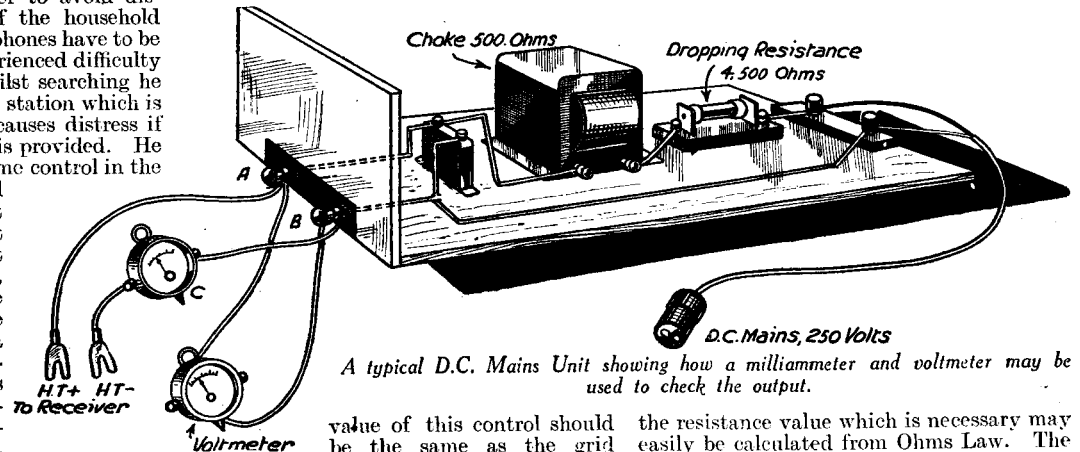
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B.L.D.L. The British Long-Distance Listeners' Club

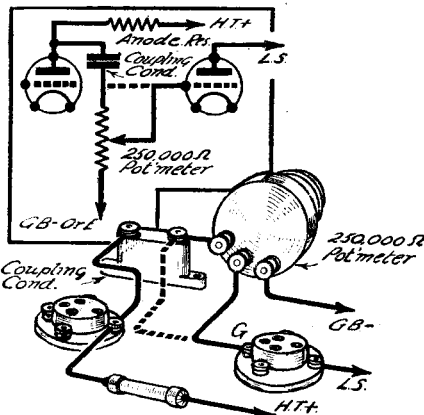
Volume Control

THE majority of long-distance short-wave listening is generally carried out late at night, and in order to avoid disturbing other members of the household this generally means that 'phones have to be used. A member has experienced difficulty owing to the fact that whilst searching he occasionally comes across a station which is extremely loud, and this causes distress if no form of volume control is provided. He asks how he can include some control in the receiver which will not spoil quality, which will not affect the existing circuit which he has found best for his particular purposes, and which will cost the minimum to install. The circuit he is using is a detector-two L.F. combination, and the L.F. stages are coupled by a transformer and by a resistance-capacity unit. Obviously, therefore, the best plan in such a case is to fit a standard L.F. volume control, replacing

of the leak, as shown by the dotted line. This connection must be removed and the grid connected to the arm (centre terminal) of the volume control. The



A typical D.C. Mains Unit showing how a milliammeter and voltmeter may be used to check the output.



How to replace a fixed grid leak by a variable component.

the grid leak in the circuit by a variable component. The accompanying illustration shows the theoretical and practical interpretations of this arrangement, the grid being originally connected to the "top"

value of this control should be the same as the grid leak now in use. One side of the control is then joined to the coupling condenser and the other side to grid-bias, and the circuit is then exactly the same as before, but the volume applied to the following valve may be varied by tapping off the signal voltage across the leak. The only point to be watched in this case is that the control is of reliable make, as otherwise it may prove noisy in operation.

D.C. Mains Unit

ANOTHER member has built up a D.C. mains unit to replace the H.T. battery for his receiver, and he is in some doubt as to the output of the unit and its suitability for his receiver. The standard unit which is generally employed in such a case consists merely of a smoothing choke and associated condensers, but some form of series resistance must be included in the positive lead in order to reduce the available H.T. to the maximum for which the valves in use are designed. With most battery valves this is 150 volts, and this means that from 50 to 100 volts must be disposed of in the mains unit. The average choke will not account for all of this, in spite of the current which is flowing

through it, and therefore a resistance must be employed. In the accompanying diagram we show a suitable layout and wiring for a unit of this type, and have also indicated how the output may be properly checked so that the appropriate resistance may be included. A good milliammeter is included in the H.T. negative lead, and at the same time a good voltmeter is joined across the positive and negative terminals. This enables the H.T. output to be seen, and also the current which is being taken by the receiver. In the event of the wrong voltage being obtained the adjustment of

the resistance value which is necessary may easily be calculated from Ohms Law. The excess voltage indicated on the meter should be divided by the current shown on the milliammeter and the answer multiplied by 1,000. This will give the value of additional resistance required. If the resistance is too high, and the voltage obtained is thus too low, the amount of resistance to be taken away may be similarly calculated. The wattage rating of the resistance is very important and it should be of a type which will easily pass the total current without heating. The wattage may be calculated by squaring the current and multiplying this by the resistance value.

Northwich Members—Please Note!
MEMBER W. HOUSEMAN, of 99, Runcorn Road, Barnton, Northwich, Cheshire, would like to get into touch with any other member or reader in his locality. He is especially interested in short- and ultra-short reception.

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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).

Mains Operated S.W. Two!

SIR,—We readers, of the splendid PRACTICAL AND AMATEUR WIRELESS, confirm Mr. Reuven Sokolovsky's (Tel-Aviv) letter which was published in the "Letters from Readers" section of the issue for December 17th, 1938.

Hoping you will give the subject your attention for the benefit of we overseas readers.—E. M. RAFFOUL and J. SHAUKEIR (Haifa, Palestine).

The Hall-Mark Four

SIR,—I have been wondering why you have not published a design for a receiver of the following type: 1 H.F. stage—detector—L.F.—push-pull output (PX4's if possible), and for A.C. mains. I know there are other readers of your journal who want this type of receiver, as I have read letters in your columns asking for it. Instead of this type of set you have given us a superhet, or an all-wave ordinary battery set.—J. MACKEN (Dundee).

[We have not side-stepped the issue, but, if you will examine our Blueprint list you will find a receiver of the type you mention. This is the Hall-Mark Four, and it was designed in three different versions so that every listener could make use of it—battery operated, A.C. mains operated and a Universal—A.C./D.C.—operated model. The push-pull output stage in these receivers employs pentode valves.—Ed.]

Using Up Old Components

SIR,—I was very pleased to see the article on using up old components in a recent issue. I've seen it stated several times recently that the Lewcos B.P.F./R. will not tune down below 235 metres. The leaflet supplied with this filter gives it as 210-550 metres. It is the B.P.F./G. for superhets that does not go below 235 metres. I have had the variable-mu set, built from your book "Wireless Sets and How to Make Them," a few years ago, in daily use ever since, and have regularly received Radio-Normandie, Radio-Lyons and below this. I fitted this set into a large radiogram cabinet with B.T.H. gram, pick-up, etc., full vision scale, with station names (home made) and W.B. speaker. It is still a fine set. I converted it to all-mains 18 months ago, and it is used in preference to a well-known maker's A.C. set we have. Anybody using the Lewcos filter even under present-day conditions will be satisfied. If the A.T.G. coil cannot be easily obtained, a good canned coil, such as the Colvern K.L.G., or similar, incorporating a rotatory switch in base, can be ganged with filter switch. A separate tuning condenser, of course, must be used for the canned coil. My filter has rotatory switching. There must be a large number of experimenters, like myself, who have a lot of good components, some of which can give good results to-day. Most of the fun

we get would be lost if we had plenty of money to buy ready-made sets. If readers would like to correspond with me, or call and see me, re wireless, I should be very pleased to meet them.—A. G. CARTER (129, Goodrich Road, E. Dulwich).

Correspondents Wanted

SIR,—I'm 15 years of age, and would be pleased if some of your readers would correspond with me. I am interested mainly in short-wave work, and experimenting.—F. D. DREW (11, Sandover Road, Camberwell, London, S.E.5).

SIR,—May I ask you to publish this invitation to correspondents in this area interested in amateur transmission? I will endeavour to reply to all letters received.—D. W. J. DARE (Spencer Cott, Greenway, Budleigh Salterton, Devon).

SIR,—I would be very glad if some of the younger readers of PRACTICAL AND AMATEUR WIRELESS would correspond with me on the subject of amateur logging on 20 and 40 mc/s. I am not interested in the technical side of radio.—DERRICK WALKER (79, Novar Drive, Hyndland, Glasgow, W.2).

S.W.L.'s Please Note!

SIR,—Miss Dorothy Hall (W2IXY), wishes me to pass on the following message to all S.W.L.'s who send her reports on her 14 m/c 'phone transmissions.

"All S.W.L.'s requiring a verification card must enclose postage; if no postage is enclosed then no card will be sent."—E. P. WILLS (Dolton, N. Devon).

A Five-valve Battery S.W. Superhet!

SIR,—I note with interest the request of C. Heyne, from Briton Ferry, Glam., in the issue of PRACTICAL AND AMATEUR WIRELESS, dated January 21st, asking for a five or six-valve S.W. superhet. There must be many, who, like myself, have only batteries as a source of power and to whom such a receiver would be welcome. Personally I have little use for A.V.C. on short-waves, unless it be in a mains receiver. Otherwise I think the circuit suggested would be very satisfactory and I, for one, would welcome a design on those lines.—B. A. PILE (Folkingham).

A Reader's Thanks

SIR,—With reference to my letter published in PRACTICAL AND AMATEUR WIRELESS dated December 24th, 1938, I want to say how grateful I am to your invaluable paper for the tremendous response I received in reply to my request. And may I take this opportunity to thank you, and also fellow-readers who replied to my letter. I now have the back numbers I required. I would also like to say how much I enjoy this fine paper and I wish it every success in the New Year.—H. BARNETT (Evesham, Worcs).

Back Number Wanted

SIR,—I shall be glad to get in touch with a reader who has a back number of *Amateur Wireless* dated June 17th, 1933, with details of the "Full Volume 2," the blueprint of which I already have.—H. BENNETT (53, Mackenzie Road, Beckenham, Kent).

The Trio-Pen S.W.2: Correspondents Wanted

SIR,—I have just constructed and tested the Trio-Pen S.W.2, which was described in PRACTICAL AND AMATEUR WIRELESS dated November 12th, 1938.

This set gives surprising results here, and I consider it ideal for this country. I recommend it to other listeners, both at home and abroad.

I hope to send a report of stations logged with this set at a later date.

I would like to hear from any S.W. fans in England or India.—Fus. E. ROSENDALE (1st Bn. Royal Fusiliers, Jhansi, U.P., India).

"Wireless Transmission for Amateurs"

SIR,—I wish to thank you for the book, "Wireless Transmission for Amateurs," awarded me for solving a recent problem. It is a very interesting book indeed, and I am sure that if every short-wave fan, who at some future date intends going in for the transmitting side of radio, purchased this book, he would be well prepared when he applied for his A.A. or full licence as the case may be. I would also like to add that I have had my A.A. licence since last April, and practically all my information was gained from the transmitting articles appearing in PRACTICAL AND AMATEUR WIRELESS from time to time.—C. WRIGHT (2DTX) (Coal Aston, nr. Sheffield).

CUT THIS OUT EACH WEEK.

Do you know

—THAT the unrectified output from a mains transformer winding may be used for testing various components.

—THAT it is quite safe to connect headphones to an A.C. or other mains-operated receiver, provided that a transformer is used for coupling purposes.

—THAT it is possible to use a single valve stage to act as a mixer for pick-up and microphone work.

—THAT push-button tuning may be incorporated in a remote-control unit for addition to existing receivers.

—THAT tuning may be carried out in a superhet by adjusting the oscillator circuit.

—THAT a special commercial component for the above purpose has been placed on the American market.

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 Neveles, 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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LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes, price 2s. each.

OPTICAL SYSTEMS; LUMINESCENT SCREENS.—Radio-Akt.-Ges. D. S. Loewe, No. 494298.

The luminous screen of a cathode-ray tube for television is formed on the surface of a lens placed within the tube and separate from the wall thereof and forming the first member of a projection system. Fig. 1 shows a receiving device comprising such a lens consisting of a plane piece 5b between two plano-convex lenses 5a, 5c, the fluorescent screen being formed

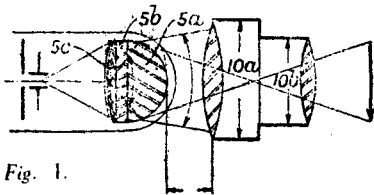
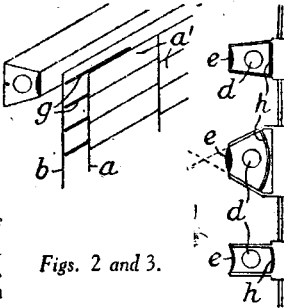


Fig. 1.

on the convex face of the lens 5c. The projection system is completed by two lenses 10a, 10b outside the tube. An arrangement for transmission is also described comprising two lens systems outside the tube, that further from the tube being of shorter focal length than the nearer.

ADJUSTING WIRELESS APPARATUS.—Electric and Musical Industries, Ltd. No. 493297.

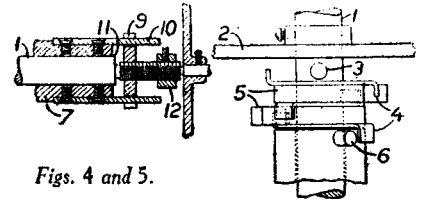
Each station name is illuminated separately and successively by an optical projection system, the source of light being movable with the tuning mechanism and focusing in slits symmetric with the station positions and arranged in a mask located between the source of light and reading scale. The station names are spaced vertically and laterally in areas a^1 on a scale plate a , the mask b being provided with slits g for focusing the light rays and illuminating each name area separately. Fig. 3 shows different forms of optical units comprising a light source d , reflector h and lens e , the particular unit employed being mechanically connected for movement with the tuning drive.



Figs. 2 and 3.

ADJUSTING WIRELESS APPARATUS; SHAFT COUPLINGS.—Standard Telephones and Cables, Ltd. No. 493256.

A two-speed gear mechanism for tunable electric apparatus comprises driving and driven members connected through reduction gear, one or more members being interposed between the driving and driven members and being successively entrained by the driving member through more than one complete revolution. In Fig. 5, the driving member 1 includes a flywheel 2 and has a pin 3 which engages a lug on the



Figs. 4 and 5.

first of a series of discs 4, the discs in turn engaging radial projections on sleeves 5 until the last disc abuts against a pin 6 on the driven member 7. In Fig. 4, the rotation through more than one complete revolution is effected by a sliding nut 9, the driving and driven members 1, 7 being concentric, and guides 10 preventing rotation of the nut relative to the member 7. Stops 11, 12 limit the number of revolutions before a direct drive occurs.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications.

- 873.—Astley, A.—Crates, etc., for carrying wireless valves, etc. January 11.
- 646.—Baird Television, Ltd., and Graham, G. E. G.—Electron multipliers. January 9.
- 783.—Baird Television, Ltd., and Tingley, G. R.—Electric oscillation generators. January 10.
- 668.—Briggs, G. P.—Radio receiving circuits. January 9.
- 454.—Cope, J. E., and Pyc, Ltd.—Interstage coupling for radio, etc., systems. January 5.
- 715.—Edwards, B. J., and Pyc, Ltd.—Television systems, etc. January 9.
- 716.—Edwards, B. J., and Pyc, Ltd.—Apparatus for remote control of radio receivers, etc. January 9.
- 369.—General Electric Co., Ltd., Clark, F.; Rose, W. R.; and Forbes, A. D.—Tuning devices for radio receiving sets, etc. January 5.
- 370.—General Electric Co., Ltd., Clark, F.; Rose, W. R.; and Forbes, A. D.—Coil-changing devices. January 5.
- 674.—Martin, F. H.—Television. January 9.
- 942.—Radio Gramophone Development Co., Ltd., and Parkinson, W. R.—

Control of radio receivers. January 11.

- 517.—Standard Telephones and Cables, Ltd., and Gibson, W. T.—Thermionic valves. January 6.
- 796.—Yardeny, M.—Devices for tuning radio receivers. January 10.

Specifications Published.

- 498130.—Midgley, A. H., and Midgley, A. M.—Electrical musical instruments.
- 498134.—Freeman, G. S. P.—Mosaic electrode structures for use in cathode-ray apparatus for television and similar purposes.
- 498470.—Telefunken Ges. Fur Drahtlose Telegraphie.—Electrodynamic loudspeakers.
- 498475.—Cossor (Holdings), Ltd., A. C., Bedford, L. H., and Pollock, R.—Transmission of electric signals at radio frequencies.
- 498417.—Standard Telephones and Cables, Ltd., and Wagstaffe, C. F. A.—Wireless direction-finding systems.
- 498331.—Marconi's Wireless Telegraph Co., Ltd.—Radio and like apparatus.
- 498154.—Cole, Ltd., E. K., and Rowe, jun., H. C.—Tuning of radio receivers.
- 498344.—Berry, R. J. (Lorenz Akt.-Ges., C.)—Wireless short-wave directional systems.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

DIFFERING OPINIONS ON TELEVISION

AT a recent address given by Sir Noel Ashbridge on broadcasting problems before members of the Institution of Electrical Engineers, he quite naturally dealt with the extension of the television service beyond its present area. That the extension will occur at some date in the future was not the point at issue, but "how and when." As readers know, the latter cannot be stated with any degree of certainty, but it is felt that the first station may materialise sooner than most people imagine. Where opinions differ very widely is the method which will be used finally, in order to relay the television signals from London to proposed stations in the Midlands and the North. Sir Noel said quite clearly that he was in favour of the use of cables instead of wireless links, because they were more reliable, not so clumsy, but, most important of all, occupied no space in the ether. As against this there are the proposals to use directional micro-wave links of the order of one metre, because they are likely to be more economical both to install and maintain at full efficiency.

Lack of Information

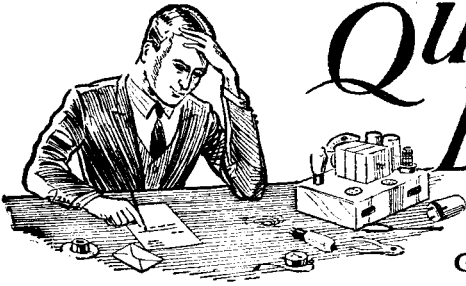
No information can be obtained as to the success or otherwise of the experiments now being conducted by the Post Office on these problems, but possibly the solution will be forthcoming in a compromise. Where high hills may interfere with the wireless links, cable may be employed, leaving all the wide stretches of open country to be linked by relay stations which can work either automatically or semi-automatically. In any case, as has been mentioned before in these columns, the public are entitled to know what progress has been made, and should be advised more definitely by those in authority when work on the service extension is likely to start.

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QUERIES and ENQUIRIES

and you could short-circuit it to see if this will restore signals.

G.B. Battery Potential

"I recently bought a new G.B. battery for my set and am puzzled by the behaviour of it now. When I plugged in, using the same sockets as before, I could get no signals. I checked all connections and whilst trying different ideas I found that when I changed round the two G.B. leads everything was working properly. The only explanation I can see is that the battery is wrongly marked, but I wonder if there is any other fault which may have arisen in the set which could make it necessary to use positive bias on the L.F. valve."—T. E. (Hornchurch).

WE have had reports on several occasions of G.B. batteries being marked from the positive end, and it is possible that this is the case with the battery you

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.

have obtained. You can check this point by using an ordinary moving iron voltmeter, as it will only give a reading when connected to the battery with the correct polarity. There is no fault which could arise in the set to enable the valve to work with a positive bias on the grid, and we therefore suggest that you check the battery as above mentioned.

Speaker Matching

"I have a small public-address amplifier which has a 10-ohm output circuit. I used a 10-ohm speaker and have now been fortunate enough to acquire three more similar speakers and am uncertain regarding the best way of connecting up all four to obtain more or less correct matching. Perhaps you could assist me, as I should like to use all four for a job which I am shortly doing."—T. F. (York).

AS all four speakers are of the same impedance and each is of the correct load for the amplifier, obviously the best method of connecting them is in series parallel, placing one pair in series across the output terminals and the other pair in series across them. This gives the effect of two circuits of 20 ohms in parallel, which is, of course, 10 ohms, and your matching will thus be correct.

Using Headphones

"I have a mains 7-valver, and although this is giving all normal output requirements with an extension speaker, I am now anxious to fit up headphones so that listening may be carried out in a spare room by someone who is hard of hearing. What is the best and safest way of making this addition to the set?"—Y. P. O. (Gloucester).

THE only effective plan will be to obtain a step-down transformer (assuming that the output circuit is of the high-impedance type). The primary should be wired to the output sockets of the receiver, and the secondary then connected to thick wire extension leads to the desired point. Headphones may then be joined to the ends of the extension leads and no risk of shocks will occur. By carefully choosing the ratio of the transformer, or by obtaining a multi-ratio output transformer, you will be able to get the desired volume at the headphones.

Volume Expansion

"I have come across the term 'volume expansion,' and I cannot find any reference to this in any of the numbers which I have by me. Have you dealt with the subject, and if not, could you give me any idea what it is?"—J. B. (Perth).

WE have dealt on one or two occasions with the principle and have given circuits. Briefly, the arrangement consists of splitting the input to a valve and taking part through an amplifier, rectifying it and applying it to the output. In this way it operates in the reverse manner to an automatic volume control circuit, reducing in intensity quiet passages and increasing the volume of loud passages. Generally, it must be designed for special use, such as radio or gramophone record reproduction, and for some types of programme it must be disconnected.

Television Transmission

"I am anxious to get permission to build a low-definition television transmitter operating on about 1,000 metres or so. I only want to radiate vision, as I am interested in the development of colour television, etc. Can I get a licence for this?"—A. W. (Cranford).

YOU would be unlikely to obtain a licence for use on the wavelength mentioned, and in the event of obtaining a licence for the work you would undoubtedly have to use short waves. However, we would remind you that it is not necessary to radiate signals to carry out experiments of the nature indicated, and probably all of the experimental work could be carried out on closed circuits or by wire-connected apparatus. If you applied for a licence you would have to give details of the wired experiments which had been carried out and prove that it was impossible to continue your experiments further without radiating the signals.

Wireless Masts

"I should be glad if you would inform me of the names of firms supplying suitable masts for aerials."—J. E. E. (Bishop Auckland).

WE suggest you communicate with Messrs. Laker (John and James) Co., Ltd., of Kent House Lane, Beckenham, who specialise in this department.

Push-pull Working

"I am a beginner in radio and do not understand the use of valves in push-pull. Would you explain the wiring and operation to me, please?"—C. E. P. (Rhonda).

A COMPLETE description would take two or three pages, but briefly the following is the feature of this particular type of circuit. A special L.F. transformer is employed and this has a tapping in the centre of the secondary winding. As the signal is transferred from the primary to the secondary winding of the transformer there will be a signal voltage right across the secondary. The centre tap is joined to earth or G.B. and therefore each end of the secondary will have an equal difference of potential but they will be of opposite polarity. As the two ends are joined to the grids of two valves one of these grids will be so many volts positive when the other is the same number of volts negative. In this way the anode currents of the two valves will fluctuate and these are connected to another transformer also with a centre tap, this time in the primary winding. H.T. positive is applied to the centre tap and thus a voltage corresponding to the signal appears across the transformer primary. Each of the push-pull valves thus takes only half of the signal input and accordingly a larger output may be obtained free from distortion.

Wearite Type "B" Coils

"I have constructed the Bandsread S.W.3 described in Blueprint P.W.68, but find that I am unable to obtain the coil, a Wearite Type "B." Could you tell me where I can get it or, failing that, give me particulars to wind it myself?"—H. C. (N.W.11).

THE coil incorporates a primary, secondary and reaction windings. It is of the four-pin type with a top terminal, the latter being joined to the high potential end of the primary winding. The low-potential ends of primary and secondary are joined together and taken to one terminal. Therefore, you may substitute for this coil a standard 6-pin short-wave coil, adopting the standard connections for this. The Type "B" coil is designed to cover from 24.6 to 51.0 metres with a .00016 mfd. tuning condenser.

Transformer Primary Burn-out

"I have a three-valve set which has been crackling for a long time. I have now found signals are very much weaker, and last night they stopped altogether. Would it be possible to tell me what is wrong when I say that I have put a meter on the detector anode and cannot get a flicker of the needle?"—H. D. (N.W.5).

THE most likely cause of the trouble is a burnt-out primary winding in the L.F. transformer. If the winding has been damaged it could cause the crackling noises, and weakening signals followed by complete cessation of signals would bear out this suggestion. Alternatively, if there is a resistance in series with the transformer primary, this may be broken

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

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS		No. of	SUPERHETS.	
CRYSTAL SETS.		Date of Issu.	Blueprints, 1s. each.	
Blueprints, 6d. each.				
1937 Crystal Receiver	—	—	£5 Superhet (Three-valve)	5.6.37 PW40
The "Junior" Crystal Set	27.8.38	PW94	F. J. Camm's 2-valve Superhet	13.7.35 PW52
STRAIGHT SETS. Battery Operated.				
One-Valve : Blueprints, 1s. each.				
All-wave Unipen (Pentode)	—	PW31A	F. J. Camm's £4 Superhet	— PW58
Beginner's One-valver	19.2.38	PW85	F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37 PW75
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93	Mains Sets : Blueprints, 1s. each.	
Two-valve : Blueprints, 1s. each.				
Four-range Super Mag Two (D, Pen)	—	PW30B	A.C. £5 Superhet (Three-valve)	— PW43
The Signet Two (D & LF)	24.9.38	PW76	D.C. £5 Superhet (Three-valve)	1.12.34 PW42
Three-valve : Blueprints, 1s. each.				
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2	Universal £5 Superhet (Three-valve)	— PW44
Selectone Battery Three (D, 2 LF (Trans))	—	PW10	F. J. Camm's A.C. £4 Superhet 4	31.7.37 PW50
Sixty Shilling Three (D, 2 LF (RC & Trans))	—	PW34A	F. J. Camm's Universal £4 Superhet 4	— PW60
Leader Three (SG, D, Pow)	22.5.37	PW35	"Qualitone" Universal Four	16.1.37 PW73
Summit Three (HF Pen, D, Pen)	—	PW37	Four-valve : Double-sided Blueprint, 1s. 6d.	
All Pentode Three (HF Pen, D (Pen), Pen)	29.5.37	PW39	Push-Button 4, Battery Model	22.10.38 PW95
Hall-mark Three (SG, D, Pow)	12.6.37	PW41	Push-Button 4, A.C. Mains Model	
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	SHORT-WAVE SETS.	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35	PW49	One-valve : Blueprint, 1s.	
Genet Midget (D, 2 LF (Trans))	June '35	PM1	Simple S.W. One-valver	9.4.38 PW88
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51	Two-valve : Blueprints, 1s. each.	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53	Midget Short-wave Two (D, Pen)	— PW38A
Battery All-Wave Three (D, 2 LF (RC))	—	PW55	The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38 PW91
The Monitor (HF Pen, D, Pen)	—	PW61	Three-valve : Blueprints, 1s. each.	
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62	Experimenter's Short-wave Three (SG, D, Pow)	30.7.33 PW30A
The Centaur Three (SG, D, P)	14.8.37	PW64	The Perfect 3 (D, 2 LF (RC and Trans))	7.8.37 PW63
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69	The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38 PW68
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	PW72	PORTABLES.	
The "Rapid" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82	Three-valve : Blueprints, 1s. each.	
F. J. Camm's Oracle All-Wave Three (HF, Det, Pen)	28.8.37	PW78	E. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	— PW65
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84	Parvo Flyweight Midget Portable (SG, D, Pen)	19.6.37 PW77
F. J. Camm's "Sprite" Three (HF Pen, D, Det)	26.9.38	PW87	Four-valve : Blueprint, 1s.	
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89	"Imp" Portable 4 (D, LF, LF, Pen)	19.3.33 PW86
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Det)	3.9.33	PW92	MISCELLANEOUS.	
Four-valve : Blueprints, 1s. each.				
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	S.W. Converter-Adapter (1 valve)	— PW48A
Fury Four (2 SG, D, Pen)	8.5.37	PW11	AMATEUR WIRELESS AND WIRELESS MAGAZINE	
Beta Universal Four (SG, D, LF, C, B)	—	PW17	CRYSTAL SETS.	
Nucleon Class B Four (SG, D, (SG), LF, Cl, B)	6.1.34	PW34B	Blueprints, 6d. each.	
Fury Four Super (SG, SG, D, Pen)	—	PW34C	Four-station Crystal Set	23.7.33 AW427
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW43	1934 Crystal Set	— AW444
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67	150-mile Crystal Set	— AW450
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79	STRAIGHT SETS. Battery Operated.	
"Aeneas" All-Wave 4 (HF Pen, D (Pen), LF, Cl, B)	12.2.38	PW83	One-valve : Blueprints, 1s. each.	
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.38	PW90	B.B.C. Special One-Valver	— AW387
Mains Operated.				
Two-valve : Blueprints, 1s. each.				
A.C. Twin (D (Pen), Pen)	—	PW18	Twenty-station Loudspeaker One-valver (Class B)	— AW449
A.C.-D.C. Two (SG, Pow)	—	PW31	Two-valve : Blueprints, 1s. each.	
Selectone A.C. Radiogram Two (D, Pow)	—	PW19	Melody Ranger Two (D, Trans)	— AW388
Three-valve : Blueprints, 1s. each.				
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—	PW23	Full-volume Two (SG det, Pen)	— AW392
D.C. Ace (SG, D, Pen)	—	PW20	Lucerne Minor (D, Pen)	— AW426
A.C. Three (SG, D, Pen)	—	PW35C	A Modern Two-valver	— WM409
A.C. Leader (HF Pen, D, Pow)	—	PW35D	Three-valve : Blueprints, 1s. each.	
D.C. Premier (HF Pen, D, Pow)	31.3.34	PW35B	Class B Three (D, Trans, Class B)	— AW386
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A	New Britain's Favourite Three (D, Trans, Class B)	15.7.33 AW394
Armada Mains Three (HF Pen, D, Pen)	—	PW38	Fan and Family Three (D, Trans, Class B)	25.11.33 AW410
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50	£5 5s. S.G. 3 (SG, D, Trans)	2.12.33 AW412
"All-Wave" A.C. Three (D, 2 LF (RC))	—	PW54	Lucerne Ranger (SG, D, Trans)	— AW422
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56	£5 5s. Three : De Luxe Version (SG, D, Trans)	19.5.34 AW435
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70	Lucerne Straight Three (D, RC, Trans)	— AW437
All-World Ace (HF Pen, D, Pen)	28.3.37	PW80	Transportable Three (SG, D, Pen)	— WM271
Four-valve : Blueprints, 1s. each.				
A.C. Fury Four (SG, SG, D, Pen)	—	PW20	Simple-Tune Three (SG, D, Pen)	June '33 WM327
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D	Economy-Pentode Three (SG, D, Pen)	— Oct. '33 WM337
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45	"W.M." 1934 Standard Three (SG, D, Pen)	— WM351
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47	£3 3s. Three (SG, D, Trans)	— Mar. '34 WM354
A.C. All-Wave Corona Four	6.11.37	PW51	1935 £6 6s. Battery Three (SG, D, Pen)	— WM371

£5 Superhet (Three-valve)	5.6.37	PW40	Issues of Practical Wireless 4d. Post Paid.	
F. J. Camm's 2-valve Superhet	13.7.35	PW52	Amateur Wireless 4d. " "	
F. J. Camm's £4 Superhet	—	PW58	Practical Mechanics 7d. " "	
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	PW75	Wireless Magazine 1s. " "	
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—	—	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	—	
Mantovani A.C. Three (HF Pen, D, Pen)	—	WM374	—	
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	—	Jan. '36 WM401	—	
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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	—	
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Heptode Super Three A.C.	—	May '34 WM359	—	
"W.M." Radiogram Super A.C.	—	WM366	—	
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)	—	—	AW393	
Family Portable (HF, D, RC, Trans)	—	—	AW447	
Two H.F. Portable (2 SG, D, QP21)	—	—	WM363	
Tyers Portable (SG, D, 2 Trans)	—	—	WM367	
SHORT-WAVE SETS—Battery Operated.				
One-valve : Blueprint, 1s. each.				
S.W. One-valver for America	15.10.28	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-waver (SG, D, Pen)	—	Jan. 19, '35 AW463	—	
The Carrier Short-waver (SG, D, P)	—	July '35 WM390	—	
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A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)	—	—	AW436	
Empire Short-waver (SG, D, RC, Trans)	—	—	WM319	
Standard Four-valver Short-waver (SG, D, LF, P)	—	Mar. '35 WM383	—	
Superhet : Blueprint, 1s. 6d.	—	—	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.				
S.W. One-valve converter (Price 6d.)	—	AW329	—	
Enthusiast's Power Amplifier (1/6)	—	WM387	—	
Listener's 5-watt A.C. Amplifier (1/6)	—	—	WM392	
Radio Unit (2v.) for WM392	—	—	Nov. '35 WM398	
Harris Electrogram (battery amplifier) (1/-)	—	—	WM399	
De-Luxe Concert A.C. Electrogram	—	—	Mar. '36 WM403	
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B.L.D.L.C. Short-wave Converter (1/-)	—	—	—	
Wilson Tone Master (1/-)	—	—	May '36 WM465	
The W.M. A.C. Short-wave Converter (1/-)	—	—	June '36 WM406	
—	—	—	—	
—	—	—	—	
—	—	—	—	

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 Amateur Wireless 4d. " "
 Practical Mechanics 7d. " "
 Wireless Magazine 1s. " "

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Economy A.C. Two (D, Trans) A.C.	—	WM286	—	
Unicorn A.C.-D.C. Two (D, Pen)	—	WM394	—	
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Four-valve : Blueprints, 1s. 6d. each.				
All Metal Four (2 SG, D, Pen)	—	July '33 WM326	—	
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"W.M." Radiogram Super A.C.	—	WM366	—	
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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)	—	—	AW393	
Family Portable (HF, D, RC, Trans)	—	—	AW447	
Two H.F. Portable (2 SG, D, QP21)	—	—	WM363	
Tyers Portable (SG, D, 2 Trans)	—	—	WM367	
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Home-made Coil Two (D, Pen)	—	—	AW440	
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World-ranger Short-wave 3 (D, RC, Trans)	—	—	AW355	
Experimenter's 5-metre Set (D, Trans, Super-regen)	—	30.6.34 AW438	—	
Experimenter's Short-waver (SG, D, Pen)	—	Jan. 19, '35 AW463	—	
The Carrier Short-waver (SG, D, P)	—	July '35 WM390	—	
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A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)	—	—	AW436	
Empire Short-waver (SG, D, RC, Trans)	—	—	WM319	
Standard Four-valver Short-waver (SG, D, LF, P)	—	Mar. '35 WM383	—	
Superhet : Blueprint, 1s. 6d.	—	—	Nov. '35 WM397	
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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	
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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.				
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Harris Electrogram (battery amplifier) (1/-)	—	—	WM399	
De-Luxe Concert A.C. Electrogram	—	—	Mar. '36 WM403	
New Style Short-wave Adapter (1/-)	—	—	—	
Trickle Charger (6d.)	—	—	Jan. 5, '36 WM388	
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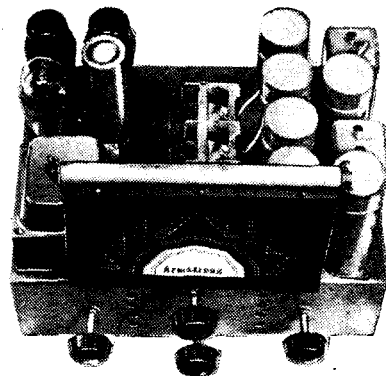
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