

Greatly Enlarged Christmas Number

Practical and Amateur Wireless

AND PRACTICAL TELEVISION

4^p
EVERY
WEDNESDAY

Edited by
F. J. CAMM

Vol. 13. No. 324.
December 3rd, 1938.

A GEORGE NEWNES Publication



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EASILY-MADE AMPLIFIERS—

See
Page 297

Practical and Amateur Wireless

'Round

Greetings!

ONCE again the time has arrived for us to convey to all our readers the compliments of the season, and our best wishes for a really enjoyable Christmas. It is the custom in the printing trade to produce Christmas numbers in advance of Christmas week, and in the case of the hobby followed by readers of this paper, it is just as well. We are able to give details in this issue which will enable every reader to make use of his radio for adding to the enjoyment of the parties which are held at Christmas-time, and there is plenty of time left in which to make modifications and obtain the additional parts needed so that the various ideas which are given may be put into effect. All tastes are catered for in the feast of articles included in this issue. Suggestions are given for Christmas presents—either to be given or received—and it should not be forgotten that books are a most lasting gift and we publish a large selection from which to choose. To all those readers who have been with us from No. 1, as well as to all new readers, we again repeat, a Merry Christmas.

World Broadcasting

THE Bureau of the International Union of Telecommunications announces that broadcasting stations throughout the world numbered 1,550 at the end of 1937.

Continental Exhibitions

DATES have already been fixed on the Continent for next year's shows. The Berlin Radio Exhibition will be held in the Exhibition Halls from July 28th to August 6th. The Paris International Trade Fair will be held from May 13th to 29th. All dates are inclusive.

Radio Cinemas

A CHAIN of cinemas is to be built in France in which radio and the film will be combined for entertainment purposes. The first of these theatres was opened on November 2nd in Place Clichy, and is known as Ciné Paris-Soir-Radio 37.

Amateur Football Critics

THE B.B.C. announces that "bob" spectators, the mainstay of most football clubs, are to be given a chance to say what they think of matches in which their clubs are playing on December 24th, the day on which the Christmas holiday programme begins. Four of them will be chosen at random from matches in Scotland, Wales, the North of England, and London, and they will be asked to broad-

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Wireless

recording studio. Production will be by Ronald Waldman.

Variety from the Embassy, Peterborough

THEATRE variety will be broadcast for Midland and Regional listeners from the Embassy Theatre, Peterborough, on November 30th. The Embassy was opened in November last year, and is one of the most up-to-date theatres in the provinces.

International Amateur Boxing

INTERNATIONAL amateur boxing, Ireland versus England, will be described in a running commentary by Raymond Glendenning, from King's Hall, Balmoral, Belfast, on December 5th.

One-woman Band

A REVUE containing eight important characters will be broadcast from Aberdeen, yet there will be only one woman at the microphone. Addie Ross, well known both as a radio actress and as Miss Mouse of the Aberdeen Animals, is performing several parts in "Femme Seule," a one-woman revue. Among parts she will portray are an old woman, with counterparts from Buchan, Glasgow, and Lancashire, a small boy, a small girl, a singer, and a young woman. This is not all. The programme announcement concludes demurely, "Other parts played by Addie Ross." Alan Melville will be in charge of the production.

A Newcomer in 25-metre Band

LISTENERS report hearing a new call from South America in this portion of the short waveband; it would appear to emanate from ZP14, Villarica (Paraguay), which, hitherto working on 48.78 m. (6.15 mc/s), has now started transmitting on 25.59 m. (11.725 mc/s) with a power of 300 watts. The call heard is *Estaciones ZP14 y ZP15, La Voz del Corazon de Sud America*, or alternately simply *Radio Cultura*, without giving the call-letters.

New Stations in Peru

OAX2A, *Radio Rancho Grande*, is the call of a 250-watt short-waver at Trujillo (Peru); the channel adopted is 25.44 m. (11.796 mc/s). So far, no further details regarding its broadcasts have been received. In addition to its transmitter OAX5A, on 25.42 m. (11.8 mc/s), 100 watts, *Radio Universal*, at Ica (Peru), has brought into operation OAX5C, 31.28 m. (9.59 mc/s), 150 watts, which was previously working on 50 m. (6 mc/s). Address: *Radio Universal*, Apartado Postal. 112, Ica, Peru (South America).

the World of

cast their impressions of the games during the Fourth News bulletin, at 10 o'clock that night.

Indian Licence Fee Reduction

IN order to try to increase the popularity of radio in India, the Government have reduced the annual licence fee from Rs. 10 to Rs. 8. This is the equivalent of a reduction from 15s. to 12s.

American Radio Amateurs

AT a recent meeting, the Chairman of the U.S. Federal Communications Commission, the Hon. Frank R. McNinch, stated that of the world's amateur transmitting stations, America possessed 80 per cent.

Strange Story of a Dance Record

SPIKE HUGHES has specially composed his own music for the "What Happened at 8.20?" variety-mystery that he has written for broadcasting on December 2nd, in the National programme. It was almost essential to do so, because the curious story of a dance record upon which the show is based has an original twist to which the music—one piece in particular—contributes. The scene of the affair is in a London

The Editor
and Staff Join
in Wishing
Every Reader
an Enjoyable
Xmas

ROUND the WORLD of WIRELESS (Continued)

Walking-stick Radio Sets

A RADIO receiving set concealed in the head of a walking-stick has been designed by a Russian inventor. The iron tip of the stick serves as an earth connection. These tiny receivers are to be mass produced for military purposes.

"After Dinner" Comes Back

"AFTER Dinner," the radio cabaret show with which the North did well last year, is back in the programme again and is to be held on Regional during Tuesday evening, December 6th. David Porter will again be the producer, and the artists include the Three Semis, Violet Carson, and Don Bamford and his band.

Concert from

Bradford

LISTENERS in the Bradford district of Yorkshire will have a special interest in one of the North Regional programmes on Wednesday evening, December 7th: the first part of Handel's "Samson." The broadcast will be of a concert of the Bradford Festival Choral Society from the Eastbrook Hall in that city. With the Northern Philharmonic Orchestra, led by Edward Maude, and the Bradford Festival Chorus, will be four well-known soloists—Florence Austral (soprano), Edith Coates (contralto), Walter Widdop (tenor), and Norman Walker (bass). Dr. Malcolm Sargent will be the conductor.

Radio Tripoli

ITALY'S new 50-kilowatt transmitter erected at Zanzur (North Africa) will shortly be inaugurated. It will work on 271.7 m. (1,104 kilocycles). Another Italian station of a power of 3 kilowatts will also be working within a week or two at Catania (Italy). It will share the Palermo (Sicily) channel, namely, 531 m. (565 kc/s).

Broadcasting Programmes By Telephone

THE Leningrad department of the Soviet Institute of Research in Communications has constructed a new apparatus which will make it possible to receive up to ten relayed broadcasting programmes on the systems of the automatic telephone exchanges. A dynamo with an amplifier will be connected to the ordinary automatic telephone receiver. A subscriber will be able to choose any of the relayed programmes he desires. In the event of his being rung up during the course of the programme, the relay is automatically inter-

INTERESTING and TOPICAL NEWS and NOTES

rupted, and automatically reconnected at the conclusion of the conversation. A similar system of relay at the automatic telephone exchanges is extensively used in Switzerland. The Soviet device is of original design.



Members of the Eton O.T.C. during recent manoeuvres on Willey Common. The boys make their own radio at the school, and the illustration shows a portable set in use.

Normandy Will Change Wavelength

THE Radio Normandie station at Louvetôt started up on 274 m. (1,095 kc/s) on October 28th last, and has since that date been testing daily between G.M.T. 11.00-14.30, and from 18.00-21.00. Other programmes have been maintained on 212.6 m. (1,411 kc/s). It is understood that when the high-power transmitter is in perfect order all Radio Normandy programmes will be made on the higher channel; the daily transmissions will be continuous from G.M.T. 06.30-01.00.

Extra Sunday News Bulletin

WE are informed that as from Sunday, January 1st, 1939, the B.B.C. have decided to include an extra News Bulletin in the Sunday programmes. This will be broadcast at 6 p.m. on the Regional wavelength, and the existing bulletin, at 8.50 p.m., will be confined to the National programme.

In response to listeners' requests, the

weather and shipping forecasts, which were formerly given in the Regional programme at 10.30 a.m. each day, will be reinstated as from Monday, December 12.

"Music Hall"

COMEDY, melody and harmony are represented by some of the best-known variety names in the "Music Hall" bill which B.B.C. Variety producer John Sharman will present on the National wavelength on December 3rd.

Mamic Soutter, "The Modern Bunch of Mirth," will open the show, and she will be followed by Albert Sandler, the celebrated violinist, who will be accompanied by Arthur Spinak and Joseph Pacey (cello); George Robey, "The Prime Minister of Mirth"; the Duncan Sisters; and Tommy Trinder, whose particular brand of humour has won him enormous popularity. Charles Shadwell will conduct the B.B.C. Variety Orchestra.

Opera

ACTS 1 and 2 of "Madame Butterfly" will be broadcast from Sadler's Wells in the National programme on December 3rd, and Acts 3 and 4 of Verdi's "Don Carlos" will be broadcast from the same theatre on December 6th (National).

Sweet Serenade

IN "Sweet Serenade," a potpourri of romantic tunes will be played by the Seven Serenaders, and sung by Eileen Vaughan (soprano) and the Three Nomads on November 30th. The programme will again be presented by Leslie Bridgmont.

Concert from Bristol

THOSE taking part in a Choral and Orchestral Concert to be broadcast from the Colston Hall, Bristol, on December 1st will be: Frank A. Tayler (organ), the Whitecroft and District Male Voice Choir, and the Clifton String Orchestra, led by Joan Allen and conducted by Reginald Redman.

SOLVE THIS!

PROBLEM No. 324

Smith had a battery three-valve set consisting of detector and two L.F. stages, and to enable him to carry out some home broadcasting at Christmas-time he purchased a pick-up. He knew this had to be joined across the grid circuit of the detector valve, and to avoid tampering with the receiver he decided that the easiest method of connecting the pick-up was to join it to the aerial and earth sockets. He did this, but failed to obtain results. Why was this? Three books will be awarded for the first three correct solutions opened. Address your envelopes to The Editor, PRACTICAL AND AMATEUR WIRELESS, Tower House, Southampton Street, Strand, London, W.C.2. Envelopes should be marked Problem No. 324 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, December 5th, 1938.

Solution to Problem No. 323

When Johnson calculated the total anode current he overlooked the fact that his H.F. valve screen was fed from a potentiometer across the H.T. supply and this added a further drain on the battery. He should, of course, have used a larger battery.

The following three readers successfully solved Problem No. 322 and books have accordingly been forwarded to them: J. M. Atlee, 54, Lyndoch Street, N. 1; J. G. Picot, 18, Castle Road, Luton, Chatham; F. Gresty, 214, Park Road, Timperley, Cheshire.

With Microphone and Pick-up

How to Carry Out "Home Broadcasting," and Suggestions for Mixing and Fading Microphone and Pick-up Outputs

THE majority of standard broadcast receivers may be used for gramophone record reproduction, and there is very little difference between the connections needed for this and those required for the use of a microphone. At Christmas time particularly, it is very useful to be able to use these components, as by their aid you can produce your own programmes, giving musical items for dancing or for games, and interspersing remarks to add to the enjoyment of the party. In

and a ratio up to 100 to 1 must be used. A volume control may be incorporated if desired. A pick-up will not need the transformer, but it also may be provided with a volume control. The circuits accompanying this article show various combinations of the two instruments which will enable full programmes to be given through your

used. The connections will be as shown in pictorial and theoretical form in Fig. 1. With this arrangement the speech or music may be gradually faded out to inaudibility and then the other items

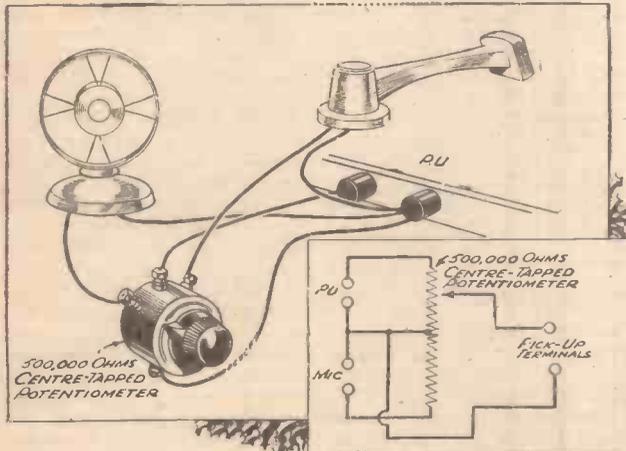


Fig. 1.—Controlling pick-up and mike with a single "fader" control.

general it may be stated that the pick-up or microphone has to be connected to the grid of one of the L.F. valves, although with suitable modification the detector valve may be used—provided there is not too much L.F. amplification following, which may give rise to troubles due to overloading. One side of the pick-up or mike is, therefore, joined to the grid and the circuit is completed by connecting the other side of the component to the grid-bias battery. Where a mains valve is in use, the other side of the component is joined to the earth line, and the bias for the valve is obtained by connecting a resistance in the cathode lead in the usual way. If the detector valve is being used as the input valve, then the grid leak in the case of the mains valve is joined direct to the cathode and the bias is thereby automatically obtained when the pick-up or mike is in use.

Combined Circuits

These are the main details, but there are one or two points which have to be borne in mind. Firstly, if a carbon or similar microphone is used, a transformer will have to be joined between it and the valve,

of a simple mike and pick-up and for these a centre-tapped potentiometer, or fader as it is usually called, may then be

gradually introduced. They cannot be "mixed" by this type of control. However, it is ideal for a play, for instance, where a preliminary announcement has to be made, and then music faded in, after which the music may be faded out and the words of the play introduced. If a background of music is required whilst an announcement is made, or if you desire to give sound effects as a background to speech during a play, for instance, then two separate controls will have to be used, and these should be arranged as shown in Fig. 2.

The two controls may be operated independently, and will enable any desired degree of mixing to be obtained.

Single Controls

Where simplification is desired a single control may be used to control both the pick-up and the microphone, by wiring this

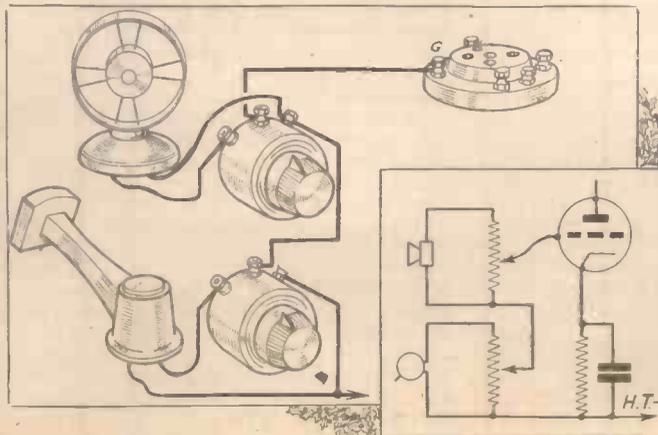


Fig. 2.—How to connect a "mixer" circuit made up with two separate volume controls.

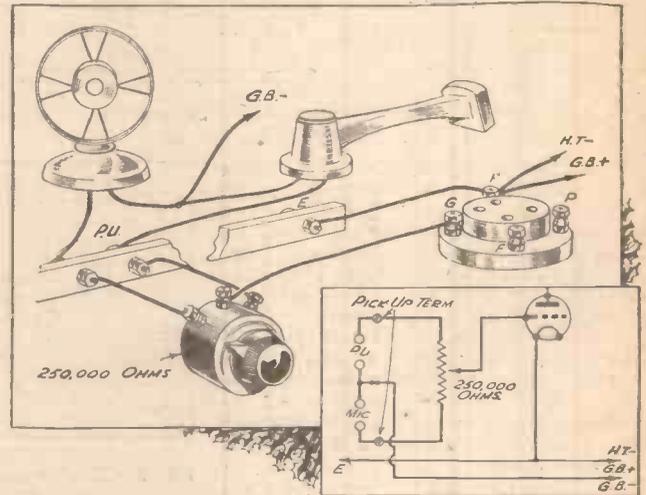
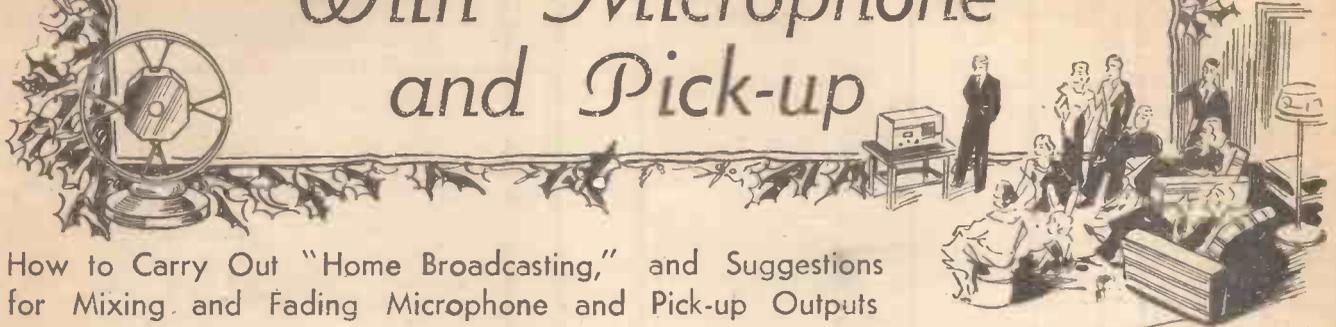


Fig. 3.—Controlling both input components with a single control.



as shown in Fig. 3. Both components will be in circuit all the time, but the total output is controllable. To enable varying degree of volume from each to be obtained (after the same style as with the two mixer controls), each component may be provided with its own volume control, and then by careful operation of the three controls any desired mixing may be obtained. Fig. 4 shows the same arrangement when used

similarly, the microphone will only give results when it picks up sounds. Accordingly, it is not strictly essential that a fader or mixer be employed, as by placing the pick-up on a record only when music or sound effects are required, and by masking the mike so that it is "dead" until speech is desired, the two components may be permanently connected. Fig. 6 shows this arrangement, and if the pick-

up is being enacted so that a background of the desired level is obtained. It will thus be seen from the above notes that with a microphone and pick-up you can produce any desired play through your loudspeaker, and some of the most elaborate effects are possible. Records of bells, orchestral instruments, sound effects, and similar items are obtainable and may be blended with a play. Where suitable sounds

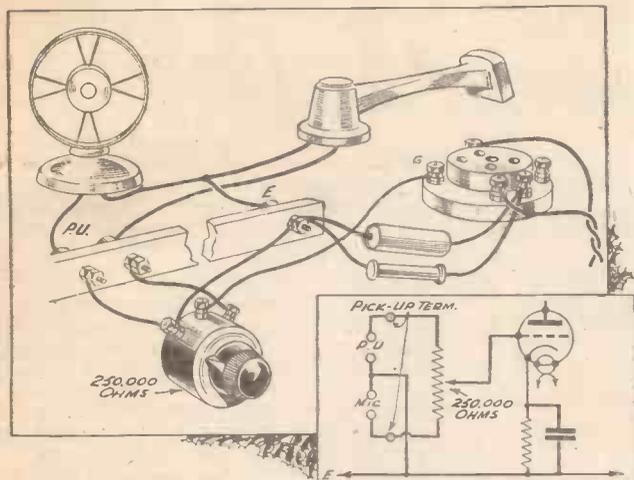


Fig. 4.—Circuit similar to Fig. 3, but for mains valves.

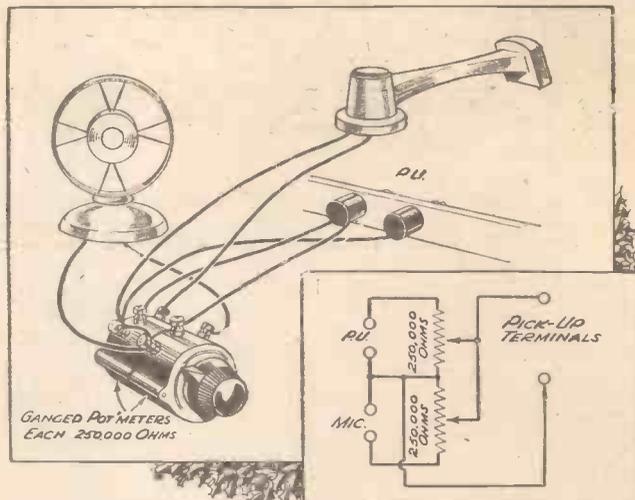


Fig. 5.—Two separate controls in "ganged" formation may be used as shown here.

with a mains valve, and these two circuits will show clearly how the components are joined to any receiver—the method of obtaining bias being clearly indicated. In both of these illustrations the normal pick-up terminals are indicated, and may, of course, be used with a single component such as a pick-up or microphone.

There are on the market certain combined controls, consisting of two volume controls as one unit, with a single control knob. These may be used for controlling a pick-up and mike as shown in Fig. 5, the arrangement being then very similar to the Fig. 3 and 4 circuits.

Without a Fader

It should be remembered that the pick-up will only deliver sounds through the receiver when it is placed on a record, and

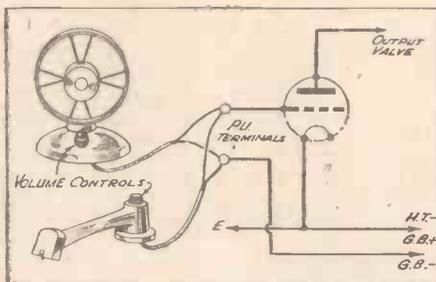


Fig. 6.—How to connect a mike and pick-up without an input control.

up has a volume control built in, the pick-up may be placed upon a record and the volume reduced to the desired level when

are not obtainable on records, you may replace the pick-up by another microphone and make your own sounds in front of this instrument whilst the other is used by the players. It will, of course, be necessary to place the two mikes apart so that the sounds are separately controlled. For best results, the receiver should be placed close to the microphones and pick-up, with the audience in another room into which an extension loudspeaker is placed. It may be masked or placed behind a small stage cut-out, or even behind a cinema screen so that you can make your own sound effects or dialogue for a home-cinema film. There are endless possibilities with these components, and it should be a simple matter from the details which have been given for everyone to give some sort of a home-broadcast this Christmas.

Decca and Rex

A NOVELTY record is introduced by the Decca company this month. C. L. Hermann's ballroom novelty "The Chestnut Tree" ('Neath the Spreading Chestnut Tree) played by Ivor Kirchin and his Orchestra on Rex 9434. On the reverse side of the record Adele England tells you how to dance the Chestnut Tree.

Charlie Kunz, the popular pianist, revives some old tunes in "Kunz Revivals No. 6" on Decca F 6864. The hit tune of the moment, "Music, Maestro, Please," has been recorded by "The Street Singer" on Decca F 6863. The coupling is another popular tune "Red Maple Leaves." Billy Cotton and his Band play a "Ragtime Medley" on Rex 9405 and "The Mountains of Mourne" and "Christopher Robin is Saying his Prayers" on Rex 9406.

H.M.V. Catalogue

THE appearance of the new H.M.V. record catalogue, just issued, seems to prove the correctness of the report that people are buying more records.

Impressions on the Wax

(Xmas Records, see also page 307).

It is only when turning its pages, there are 480 of them, that one realises the immense wealth of fine music that has been recorded. The full repertoire in the catalogue runs to some 7,000 records, and it would take several months to play them all. The choice runs from traditional folk music to works by Bliss and Vaughan Williams; from the film song to the classic song in its highest form.

In addition to this mass of skilfully-indexed material, covering the General, Connoisseur and Historic collections, as well as a résumé of the company and limited editions from their commencement, there are such useful adjuncts as a pronunciation guide, glossary of musical terms, suggestions for record collections, and illustrated biographies of famous H.M.V. artists.

A charge of sixpence is made, which it is

obvious covers only a proportion of the cost, and everyone who likes to choose the music he wants to hear should obtain a copy of this new edition.

Parlophone

Reginald Foort's popular radio combination "The Organ, the Dance Band and Me" have recorded "In a Little Toy Sailboat" and "There Goes My Affection" on Parlophone F 1247, whilst another famous organist, H. Robinson Cleaver, playing on the new Studio Organ, features "Bolero" and "Jealousy" on Parlophone F 1248.

Attractive piano solos are supplied by Patricia Rossborough with "A Bouquet to Irving Berlin," a medley of some of this composer's early song hits, on Parlophone F 1249, and Billy Thorburn has made a medley on Parlophone F 1242.

A new band is featured for the first time this month—Victor Silver's Harmony Music, who have recorded "Liebestraum" and "The Teddy Bears' Picnic" on Parlophone F 1241.

LOUDSPEAKERS IN EVERY ROOM

How Extension Speakers may be Connected to a Receiver, and Methods of Silencing Individual Models



MOST listeners now require at least one extension loudspeaker so that they may listen to a programme in another room. The majority of commercial receivers now produced are provided with a pair of "Extension" sockets, sometimes marked "E.S.," and sometimes "Extl." The first point of importance here is that these sockets will have been designed for a speaker of a definite impedance, and this may be high or low. The ordinary type of loudspeaker as sold is provided with an input-matching transformer, and is of the type known as High Impedance. In some cases there are several terminals on the speaker, and these are marked Power,

will be to fit a fixed condenser to the output anode terminal and join the other side of this condenser to one of a pair of terminals or sockets mounted in a convenient position. The other socket should be joined to the earth line. These connections are shown in Fig. 1. Care must be taken to trace out the correct position for the fixed condenser, but usually this will not be found difficult. If it is desired to avoid the expense of the condenser, or if a condenser is not available and a rapid addition is required, the speaker may be joined in parallel with the existing speaker, as shown in Fig. 2, but this is not a recommended arrangement except for emergency use. To avoid the losses occasioned when the two speakers are connected in parallel in this manner, a change-over switch may be joined to the anode, as shown in Fig. 3, but it is essential to remember that when this is done the H.T. must be switched off before the switch is operated, to avoid breaking the H.T. circuit. A special plug and socket device is obtainable from Messrs. Clix, known as the "Clix L.S. Control Panel," and this may be used to carry out the idea shown in Fig. 3. The wiring for this device is shown in Fig. 4.

H.T. negative line, which is also earthed, one wire between the rooms may be saved by connecting the speaker direct to the nearest earthed point in the room. In this case single bell-wire may be used from point to point.

Silencing the Built-in Speaker

When an extension speaker is in use it is often found desirable to silence the speaker which is used with the receiver, and the arrangement in Fig. 3, of course, enables this to be done, although with this arrangement both speakers cannot be used together. When the extension speaker is in circuit the only way of silencing the built-in

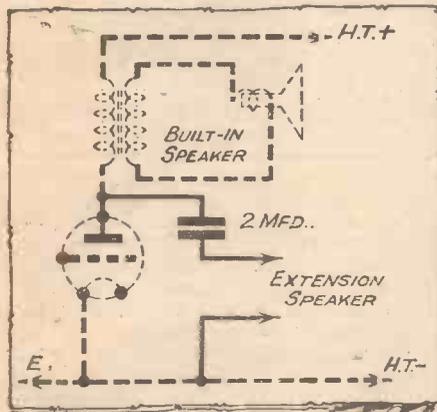


Fig. 1.—Standard output arrangement for a single extension speaker.

Pentode, Super-power or Push-pull. These are all high impedance points and can only be used with high-impedance output sockets. The speech coil on the modern speaker is of low impedance, and, therefore, if a low-impedance output circuit is provided it will be necessary to disconnect the speech-coil from the transformer secondary and connect the ends of the coil to the low-impedance sockets. Alternatively, a step-up transformer will have to be joined between the set and the speaker, but the introduction of additional iron in the output circuit is not desirable. Matching is of importance, and if a low-impedance output is provided this will generally be suitable for a value from about 5 to 10 ohms, and, therefore, the length and gauge of wire used for the extension leads must be considered as this may easily be more than the resistance of the speech coil, and this will mar the results.

Connections for Speakers

Where no such sockets are fitted arrangements will have to be made to use an external speaker, and in the majority of cases all that will be necessary

Connecting Leads

To run between the various rooms where listening is desired ordinary bell-wire is quite suitable, and it is worth while fitting special plugs and sockets to these points so that risk of connecting a speaker to a mains socket is avoided. Messrs. Belling-Lee supply some special plugs and sockets of either the flush or wall-mounting type which may be recommended, whilst Messrs. Bulgin also supply suitable sockets and inter-connecting wire. The wire may be taken beneath floor-boards or run round the picture rail or top of the skirting-board. It is important also to remember that as one side of the external speaker (when connected as shown in Fig. 1) is joined to the

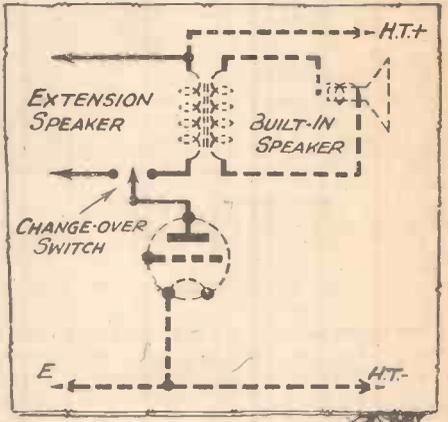


Fig. 3.—A change-over switch may be wired as shown here, to change from built-in to extension speaker.

speaker is to open the secondary circuit, as the transformer primary is then acting as a choke for coupling purposes (See Fig. 1). To open the secondary circuit an ordinary toggle switch may be used, connected in one lead, and this means that the lead from the cone to the speaker-transformer secondary will have to be cut or unsoldered, as shown in Fig. 5. The switch may be mounted on the speaker chassis, or at a convenient point on the cabinet. If it is desired not to interfere with the speaker, the only alternative, where the straightforward coupling of Fig. 1 is employed, is to replace the speaker transformer by an iron-cored choke, and this will mean that a double-pole change-over switch will have to be used to change from choke to transformer. This is additional and unnecessary expense, and provided that care is taken when disconnecting the speech-coil lead no damage should occur. The switch used for silencing may, of course, be of the simple push-pull type if desired, and this could be operated from the panel or front of the cabinet by attaching a length

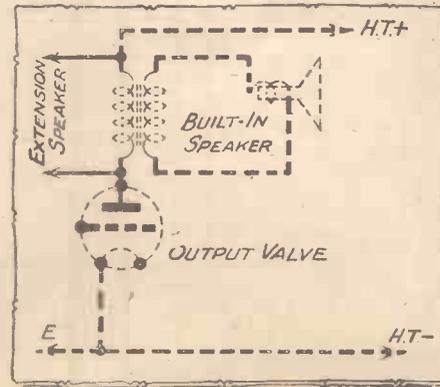


Fig. 2.—An alternative connection to that shown in Fig. 1.

(Continued overleaf)

LOUDSPEAKERS IN EVERY ROOM

(Continued from previous page)

of rodding tapped to screw on the shaft of the switch.

Volume Control

The question of controlling the volume is a rather difficult one, especially where more than one extension speaker is being used. The simplest and usual system is to connect a control across the speech coil of the speaker, and thus a low-resistance control is called for. Generally something between 5 and 20 ohms will be found suitable and will not affect the working of the speaker. The control should, of course, be mounted on the extension speaker cabinet. Where something more reliable than this is desired the W.B. Long-Arm device may be called

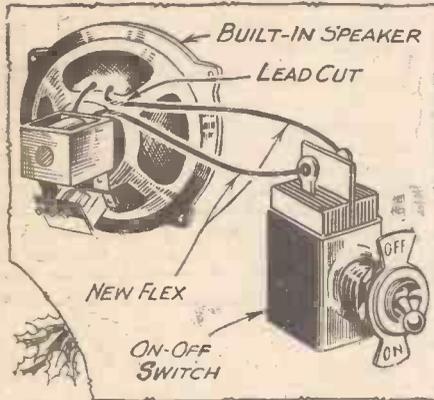


Fig. 5.—How to silence a built-in speaker.

TO INTERNAL SPEAKER

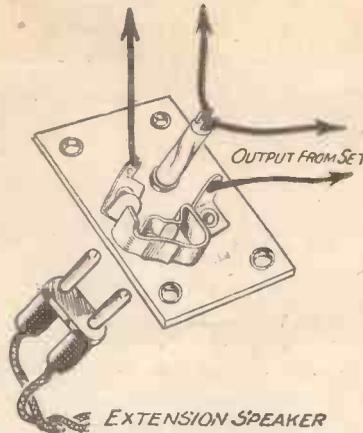


Fig. 4.—The Clix loudspeaker control panel.

into use. This is a complete long-distance relay which enables the receiver to be switched on and off from the extension listening point, and a special form of volume control is provided so that maximum results may be obtained. A push-switch enables the set to be operated through a special relay.

Special Notes

In connection with the question of extension loudspeakers it should be remembered that the use of two speakers widely separated may be used to give added realism to reproduction. For instance, if a speaker is placed in each of two rooms, and the doors are left open, it will be possible to sit in either room, and by adjusting the level of the

volume in the room in which you are sitting, it will be possible to arrive at a point where it is impossible to tell where the music is coming from and due to the natural time delay in the sound from the distant speaker arriving at your ear, a "solidity" is given to the music and a depth which is most realistic, especially where the set or amplifier feeding the speakers is of the "high quality" type. A somewhat similar, though not so enhanced, effect is obtainable if the two speakers are placed wide apart in one room, but the farther apart they are the greater the time factor and the greater the realism.

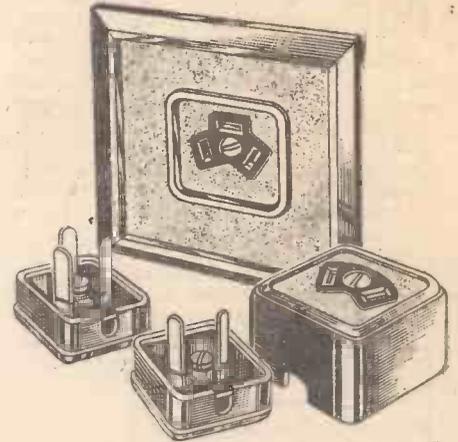


Fig. 6.—Here are two of the Belling Lec wall-plugs and sockets.

INEXPENSIVE P.A. EQUIPMENT

Details of the Peto-Scott Mikes and Amplifiers

THE accompanying illustrations show the amplifier and two of the microphones which are now obtainable from Messrs. Peto-Scott for public-address

work. The mikes are of the transverse-current type and the small moulded base which is provided will house the matching transformer and/or a suitable biasing battery. The Professional floor model costs 42s., and the table model is 25s. The switch on the table model enables the battery to be disconnected and output terminals are provided so that it may be connected to the line cord, amplifier, or even to the pick-up terminals of a standard radio receiver. The mikes are supported by shock-proof mounts and give very good quality even on loud items such as dance bands. They are not unduly directional.

The amplifier is of the A.C. type, completely self-contained, and utilising a push-pull output circuit, for which a speaker with a push-pull transformer must be employed. Full-wave rectification is adopted, and the input circuit incorporates a volume control. A 4-pin socket is fitted for the connection of the loud-speaker, which must be of the energised type, and this also is supplied by Messrs. Peto-Scott. The rated output is between 6 and 7 watts and several speakers may be fed satisfactorily. The

price of the amplifier is £3 10s., and this, as well as the remaining parts of the equipment, may all be obtained on the hire-purchase system

if desired. Details of these, as well as of other interesting Peto-Scott equipment, such as complete Replacement chassis of battery and mains-operated all-wave super-hets, may be obtained from Messrs. Peto-Scott. Leaflets describing them will be sent free on request to 77, City Road, London, E.C.1.



The neat and compact design of the amplifier.



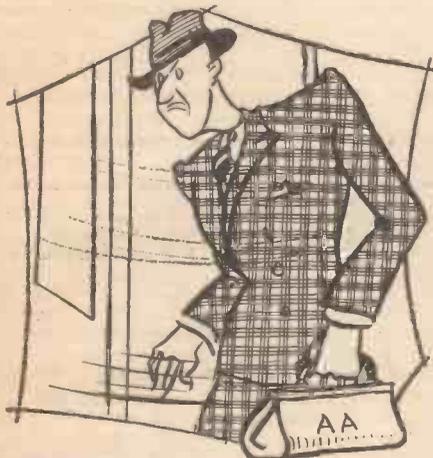
The table and stand microphone.



Lunacy's Greatest Addict is
At It Again
By ARTHUR ASHDOWN

THE Christmas festivities were approaching with verve, pep and vim when I received the fateful telegram. "Come with all haste," it read, "staggering Christmas sensations for the Great British Public, Battisin Belfry."

To those members of the Great British Public who have not met Battisin, this sort of telegram may have come as a welcome surprise and one simply loaded with



SUCKED INTO THE ENTRANCE

promise. The majority of the G.P.B. who have been introduced to Battisin's "staggering Christmas sensations" for the past few years will appreciate the terrific depths of despair into which I was plunged on the receipt of the veiled command.

Battisin Belfry, let me hasten to add, is an extremely nice bloke—a good scout—one who has the well-being of the public at heart. Whilst, however, he is able to live up to the above—he is also very capable of living up to his name—for no bat in any

belfry could contrive to outclass this inventive master of lunacy. One has only to recall his "Santa Trap" and "Crooner Choke" in order to appreciate the mental hairpin bends of which his mind is capable.

The telegram had been received and the die was cast. "Why not," you may ask, "send a telegram stating that your grandmother was extremely ill and ask to be excused?" My more polite reply to such a query would be, "Meet Battisin and see," whilst a less polite, tactful (but perhaps more human) rejoinder would be, "Don't be a gump!" Battisin's slightest wish is a command, and his telegram is a threat full of malevolent portent. And so I departed for Battisin's (private) home with all haste, as requested.

His country seat at Colney Hatch has now been transferred to the wilder parts of Dartmoor (Gossip writers, please copy), and it was thither that I found myself hurtling on that early November morn. The fog swirled with lustful grace about the trap which had been sent to fetch me from the station, and it was with a sense of impending doom that I alighted at the portals to the "home." The knocker echoed with reverberative persistence into the silent house, and eventually the revolving door gyrated on its pivots, and before I could say "Jack Robinson," "Adolph Hitler" or "Old Mother Riley," I found myself sucked into the entrance hall.

"You wish to see who?" a loudspeaker queried at my elbow, and before I could state my business into a convenient microphone, the floor slid from under my feet and transported me (via seven escalators) to a door marked "Strictly public, No Hawkers, No Circulars, No Good Coming in here—Please Knock." Screwing up my courage to the highest common denominator I rang the bell and entered.

It would be useless for me to describe the welcome which Battisin can afford. On this particular occasion the welcome afforded was stupendous and left me an easy victim to his powers of narration. Far into the night he talked of his new Christmas inventions whilst I made rapid notes on whatever happened to be handy. The variety of subjects on which he talked left me somewhat jaded, and I have decided to adopt the "Beeton" method of formulæ which was used to describe his inventions last year. So here goes!

Recipe No. 1

Radio Nutcrackers

Ingredients.—One portable radio set, 12in. by 12in. by 8in. One mahogany table. One pulley block, with screw. One length of rope.

The Mixture.—Screw the pulley-block firmly into the ceiling and place the table directly under it. The portable radio set is now attached to the rope which, in turn, is threaded through the pulley. The nut (or nuts) is now placed in the dead centre of the table after the radio set has been raised to ceiling height. By releasing the rope suddenly the set crashes down on the nut (or nuts).

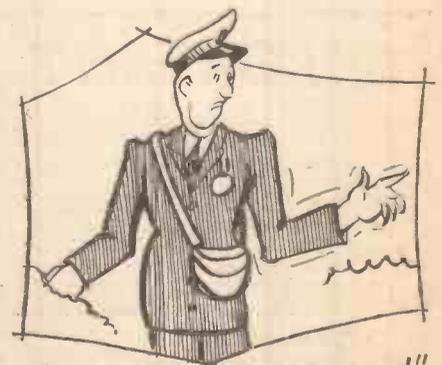
Result.—The nut (or nuts) is (or are) cracked; in fact, they are usually found to be in smithereens.

Recipe No. 2

Programme Eliminator

Ingredients.—One radio set in working order. One aerial lead. One bus conductor named George.

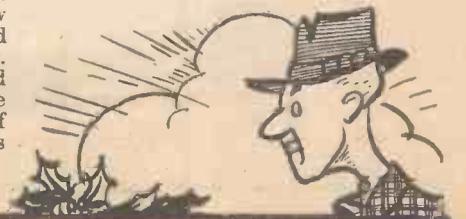
The Mixture.—The radio set is duly installed in any convenient position with the aerial lead in close proximity. The



"O.K. GEORGE - LET HER GO!"

bus conductor (named George) is now induced to clutch the aerial lead with one hand and the aerial terminal on the set with the other. The set is switched on, the programme is transmitted via the loudspeaker. When the programme becomes too dull for endurance, one just shouts, "O.K."

(Continued overleaf)



(Continued from previous page)

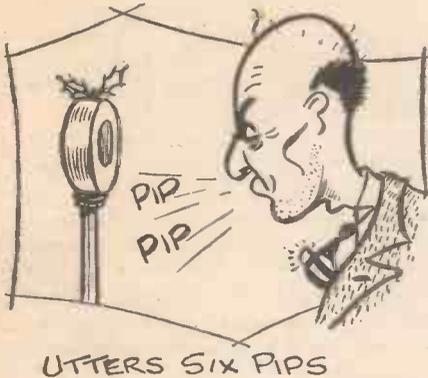
George—let her go!" and George drops the aerial lead.

Result.—The programme is immediately eliminated.

Recipe No. 3

A Radio Raisin Pimper

Ingredients.—One box of tin-tacks. One magnet. One gill of glue. One radio receiver.



The Mixture.—Heat the glue and spread it thinly (but firmly) on a table. Sprinkle the raisins on top of the glue before it sets. The magnet should now be tied to the diaphragm of the loudspeaker and the latter connected to the radio set. We now come to the delicate portion of the operation. Grasping a tin-tack, firmly, but delicately, between the thumb and forefinger, we pierce the raisin and drive the point of the tack into the pip. This procedure is adopted for each raisin and the table-top eventually bristles with tacks. The radio set is now switched on and tuned in to a

station which incorporates a brass band in its programme. The loudspeaker is held over the tin tacks and the magnet makes contact with them. The brass-band vibrated diaphragm dithers in and out with tremendous gusto and thus the tacks are withdrawn. To the end of these we find the raisin pips adhering with sullen tenacity.

Result.—Raisins are de-pipped painlessly and permanently.

Note.—The raisins should be washed in a solution of caustic soda in order to obviate gluey taste in puddings, etc.

Recipe No. 4

Misleading Time-signal

Ingredients.—One microphone. One amplifier. One despondent gentleman. One screen.

The Mixture.—This particular recipe has been especially designed for bringing into use when one wishes to rid oneself of unwanted guests. The microphone is hidden behind the screen and connected to the amplifier, whilst the despondent gentleman is induced to take up his position in front of the microphone. When the guests have overstayed their welcome the despondent gentleman is given a kick on the shin. His despondent state has caused him to have the pip and thus the unprovoked assault causes him to utter six pips. The host immediately says, "By jove! Eleven o'clock—so sorry you have to go."

Result.—The unwanted guests tear off for the last bus many hours too soon.

Recipe No. 5

Balloon Inflator

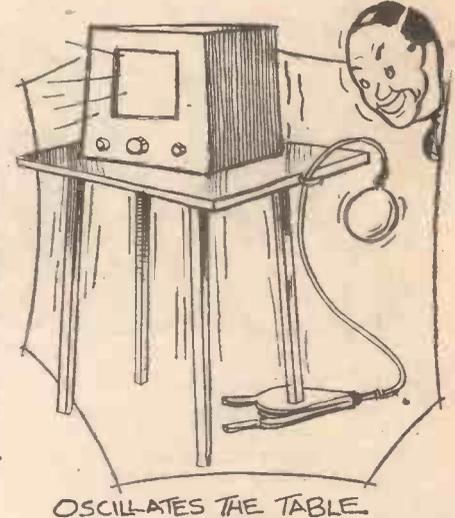
Ingredients.—One powerful radio receiver. One unstable table, with one leg shorter than the others. One pair of bellows. One length of rubber tubing.

The Mixture.—The powerful radio set is perched on the table whilst the body of

the bellows is placed under the short leg. One end of the rubber tubing is connected to the nozzle of the bellows, whilst the balloon is tied to the other end. The radio set is now turned on to maximum volume and this oscillates the table, which in turn works the bellows up and down.

Result.—The balloons are inflated ever so nicely.

The above are but a few of the staggering radio sensations which Master Belfry has in store: Those readers who wish to tempt



Providence may get in touch with him direct, marking their postcards "Bats" in the top inside corner. The Editor has asked me to state that, whilst he is overwhelmed by the subtlety of the inventions, he can hold himself in no way responsible for the mental condition of any poor gump who experiments on them.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, November 30th.—Scotland, 1938, a programme for St. Andrew's Day.

Thursday, December 1st.—Kentucky Minstrels programme.

Friday, December 2nd.—National Dances of Europe: Band programme.

Saturday, December 3rd.—Madame Butterfly, acts 1 and 2, from Sadler's Wells.

REGIONAL (342.1 m.)

Wednesday, November 30th.—Variety from the Embassy Theatre, Peterborough.

Thursday, December 1st.—British Heavy-weight Boxing Championship: Harvey v. Phillips, from Harringay.

Friday, December 2nd.—Variety from the Palace Theatre, Burnley.

Saturday, December 3rd.—Death of an Artist, by Norman Edwards; and Arrested Development, by Anthony Gittins: Two short comedies.

MIDLAND (297.2 m.)

Wednesday, November 30th.—Variety from the Embassy Theatre, Peterborough.

Thursday, December 1st.—English Folk Music: a programme of music by Gerrard Williams.

Friday, December 2nd.—Orchestral concert.

Saturday, December 3rd.—All Down for the Finale, musical comedy feature.

WEST OF ENGLAND (285.7 m.)

Wednesday, November 30th.—The Use of the Land—8, The Nationalisation Policy, a discussion.

Thursday, December 1st.—Choral and Orchestral Concert, from the Coston Hall, Bristol.

Friday, December 2nd.—Mid Somerset Musical Festival Children's Concert, from the Pavilion, Bath.

Saturday, December 3rd.—Soldiers Tales—2, true stories of Army life.

WELSH (373.1 m.)

Wednesday, November 30th.—Choral programme from Grove Park (Wrexham) School.

Thursday, December 1st.—Where We Came From, more recollections of the trek to South Wales—5, Men of Llanelly.

Friday, December 2nd.—Wrexham Football Club Feature.

Saturday, December 3rd.—Chamber music.

NORTHERN (449.1 m.)

Wednesday, November 30th.—Music in Ripon Cathedral.

Thursday, December 1st.—Halle Concert from the Free Trade Hall, Manchester.

Friday, December 2nd.—The Spot Page, a variety magazine.

Saturday, December 3rd.—String Orchestral programme, from the Milton Hall, Manchester.

SCOTTISH (391.1 m.)

Wednesday, November 30th.—Scotland, 1938, a programme for St. Andrew's Day.

Thursday, December 1st.—Nor' East Sidelights, a magazine of "sound" entertainment.

Friday, December 2nd.—Scottish Dance music.

Saturday, December 3rd.—Choral and orchestral Union of Glasgow Concert, from St. Andrew's Hall, Glasgow.

NORTHERN IRELAND (307.1 m.)

Wednesday, November 30th.—Organ recital from Armagh Cathedral.

Thursday, December 1st.—Orchestral programme.

Friday, December 2nd.—Inter-School Spelling Bee: Portora v. Inst.

Saturday, December 3rd.—Equity follows the Law, an Ulster play in a prologue and two acts by Louis J. Walsh.

ON YOUR WAVELENGTH



FOR the sixth year I avail myself of the special privilege (and I do so regard it) of greeting my readers on the advent of the festive season—good will to all men, a Merry Christmas and a Bright New Year. There is no means of conveying in print the sincerity behind those wishes, which run the risk by frequent repetition of becoming hackneyed and expressionless, like “Good Morning” or “Good Night.” But I want to assure you that I do express that feeling with more than ordinary fervour, especially at a time when the world seems drenched in crises, threats of war, jazz and crooning. I have enjoyed writing this feature from its first issue, and although I cross swords with readers and draw their fire it is in the spirit of burlesque that I mostly write.

I suppose that my post from readers is larger than that of most feature writers, and I enjoy a correspondence which reaches me from practically every country in the world. Some of the letters are mildly chiding, some of them submit me to verbose flagellation, some are flatteringly approving, some mildly critical. I reply facetiously only to those who write in that strain.

Once again, therefore, seasonal Good Wishes to my readers in all parts of the world.

A Curious Clubman

I RECEIVED a letter the other day from the secretary of a club who, in sending in his report of his club's activities for the week, asked me if I would publish it on this page instead of on the usual Club Page, because he thought my page was read and the club feature was not. This is indeed a curious viewpoint, and quite naturally I declined the request. We have extended the courtesy of free insertion of club notices in every issue of this journal to all club secretaries from the first issue, and it is a bit of a shock to find that a club secretary is dissatisfied with this generous treatment. The suggestion that I should use part of my space to give publicity to what is, after all, a piece of purely local news only of interest to readers in that particular district strikes me as being distinctly quaint.

No one can accuse this journal of

By *Thermion*

neglecting the club movement. It is the only one which has regularly kept such a feature running, and I have on more than one occasion done my best to encourage the formation of new clubs. The first Directory of Wireless Clubs was compiled by me and published in this journal.

Many periodicals make a charge for inserting such notices, and I am sorry that I am unable to use my space for club notices. If I made an exception in one case all of the clubs would expect me to do the same, with the inevitable result that this feature would be converted into a club news feature.

Overseas Problems

THE difficulty of designing a set which will please all readers is shown by the following letter from an overseas reader living in Bengal:

“I had been looking forward with great interest to the waverange coverage of your latest receiver, ‘Push-Button 4,’ but I was somewhat disappointed to learn from PRACTICAL AND AMATEUR WIRELESS of October 22nd that the waverange is practically identical with many of the previous all-wave receivers described in this journal. You will realise our position here in India, as all the short-wave stations use the 61-metre band and as such, these receivers, admitting that they will bring in the whole world, will fail with the Indian short-wave transmitters. Again, we are not much interested with the long-wave band, as there is no such station nearby. India will enthusiastically welcome a set designed by a master designer covering two short-wave bands extending up to 90-100 metres, and the medium-wave band of 180 to 500 metres. As a matter of fact, almost all the commercial sets marketed here cover such waveranges, with no long-wave band. May we in India expect such a set to

be described in PRACTICAL AND AMATEUR WIRELESS?”

“Both battery and A.C. mains versions should be given, and the price of the components should be kept as low as possible, consistent with the quality for which your sets have made a name. I write this from my personal experience after building four sets from your designs—one battery, two A.C. and one A.C.-D.C., and the results in all cases have been quite remarkable, although I had to use substitutes here and there, as all of the specified parts could not be obtained from the local markets.

“Wishing your very useful paper every success.”

I merely ask, how many Indian readers would build such a set? And would it interest English readers?

Our Transmitting Articles

WE have been publishing articles on transmitting for a long time, but one of my readers has encountered a snag on which you may care to debate. Here is his letter:

“I feel compelled to let you know that I sincerely appreciate your articles that have and are dealing with TX topics; to me they have been of great assistance. For four months, inspired by your articles, I studied keenly the subject of short waves and amateur radio, and eventually applied for the A.A. licence; after a period of three months of correspondence with the G.P.O. Engineer-in-Chief's Department, I was informed that a licence could not be granted. I was bitterly disappointed, as I had furnished them with all the matter they required, and each reply built up my hopes until the last request, which was followed shortly afterwards by the letter of rejection. I furnished them with my original birth certificate and several good references which were definitely genuine; also, I am emphatically a British subject; also my parents and ancestors ages back.

“Soon after the G.P.O. rejection I left the town with my parents, and here in a strange place of several months' duration I am without a pal or friend, or even acquaintance, who is interested in amateur radio.

“Through the courtesy of a local radio store's manager I respectfully

begged the privilege of paying a visit to a local TX amateur, and here is his reply: 'I have my friends and do not care for any visitors.' I was disgusted and said to the manager, after his reply to my inquiry: 'What friendly spirit! And amateur radio is supposed to be akin to Freemasonry.'

"I inquired of more local amateurs, and made another visit, the third, but during my short stay I just sat and was like a component on his shelf. He had his pal there, and all they did was to talk of what they had done and were going to do. Twenty minutes went by and I took my leave, begging pardon for my call.

"In view of my experience I have come to the conclusion that too much superiority complex exists in the amateur radio sphere, and unless one is lucky enough to get into these cliques one had better plod along on his own.

"Another point is, having been rejected by the G.P.O., should I relinquish my one and only interest (apart from an occasional visit to cinema)? I am of the opinion, definitely no! For what reason should I? I was honest enough to apply for the licence, and feel confident of my humble capabilities of keeping within the law regarding such a licence.

"In respect of amateur radio, I am equipped with the knowledge of the various codes, and can read morse and write same without difficulty. I should add that I read radio morse signals without difficulty, and know the amateur international language pretty well.

"Lately, thanks to the great assistance of your articles, I have been very successful with my A.A. experiments, carried out strictly within the law of the licence.

"It is not for me to say whether the rules of such a licence should be made easier, or, in view of the so-called 'pirates,' made more difficult, but I do say that the G.P.O. should provide other means of testing applicants other than just the forms. Many cannot put into writing their knowledge of those things they can expertly do in a practical manner.

"What with amateur radio snobbishness and the unfairness of the G.P.O., the learner has a lot to put up with.

"Very best wishes, sir, and more strength to your pen."

Death of a Zealous Listener

MR. HERBERT GRANVILLE DYSON, of Timperley, Cheshire, whose death occurred on November 15th, might justly be described as the North Region's

Notes from the Test Bench

Condenser Connections

A NUMBER of readers have tried to use old-pattern tuning condensers in short-wave receivers, and these possess both advantages and disadvantages. Many of these old components have wide spacing, which has certain merits, whilst the method of assembly also enables them to be dismantled so that they may be modified from the capacity point of view. The main disadvantage is that the moving spindle is generally provided with a friction contact to the appropriate terminal, the latter generally being mounted on the metal end-plate and a ball or other friction device making contact between spindle and end-plate. This may give rise to noises on short waves, and this may be overcome by soldering a short length of insulated flex to the spindle or bottom spacing washer and joining this to the terminal. Just sufficient wire to enable the condenser to move over the required range should be used, and a large amount of wire coiled into a spiral should not be employed as this will prove troublesome.

Plug-in Short-wave Coils

THE standard six-pin short-wave coil has three windings, grid, primary and reaction. It should not be overlooked that in certain circuits it may prove worth while changing round the primary and reaction windings. The positions of these as well as the size of the windings often provide alternative results which in some circuits may prove well worth while. Added to this, the inclusion of a small condenser in the aerial lead provides yet a further range of tuning or adaptability which will prove of value to the experimenter.

Finishing Flex Ends

WHEN making battery connections or other wiring in which standard flex is employed it is generally found that the ends of the silk covering frays and presents an untidy appearance. There are several methods of avoiding this, the simplest of which is to slip a short length of ordinary cycle valve-rubber over the end. The frayed ends may be singed away with a match, and this alone often gives the desired clean appearance, but it should not be forgotten that special sticky thread is now on the market by means of which the end may be very neatly whipped. Where much movement is to be given to the end it is desirable to take steps to prevent the wire from being fractured, and a short length of insulated sleeving should therefore be slipped over the end to give the desired rigidity.

"No. 1 listener." For years he had, day by day, and quite voluntarily, performed, a much appreciated service by not only listening to almost all transmissions, but reporting on them to the B.B.C.

Early in 1923 Mr. Dyson became keenly interested in broadcasting and took pains to give careful and systematic reports of the daily programmes. Through this interesting work he became closely associated with the programme and engineering staffs at Broadcasting House, Manchester, and he was esteemed not only for the help he gave, but for the friendship which he extended.

He often spoke of how, in the early pioneering days, he noticed some fault in the transmissions and reported it to the B.B.C. An engineer would go out to his house, confirm the report, and telephone the transmitter, asking for certain adjustments to be made. From those early days until the middle of last week Mr. Dyson made a call at the B.B.C. offices every morning with a typewritten report on the previous evening's programmes. He made these reports with such regularity that if for any reason he was unable to listen for a day or longer, he would warn the B.B.C. in advance.

"The Best Set I Ever Built"

I HAVE received very many interesting entries in this competition, and hope to publish the results next week. In the meantime I offer another six books for the six best entries in my new Essay Competition. Write an essay not more than 250 words in length entitled "My Favourite Circuit." Send entries in an envelope marked "Circuit" in the top left-hand corner not later than December 17th.

One Year of Radio Variety

IT is interesting to note that for a period equivalent to more than two whole months of seven-day weeks, and twenty-four-hour days, nothing but variety programmes were being broadcast by the B.B.C. during the past year, from London alone. That is one of the remarkable facts revealed by analysis of a statistical review, just completed, of the output of the Variety Department. The twelve months covered by the report were from October, 1937, to September, 1938.

Some 1,756 "live" shows were staged in that time by 24 producers—a figure that is, perhaps, more surprising when it is realised that a very large number of the broadcasts were at once "first nights" and final performances. To that total may be added 714 gramophone record variety shows.

N.T.S. BARGAIN BEST SELLERS

POST ORDERS
ALL ORDER SENT BY RETURN CARRIAGE AND C.O.D. CHARGES PAID OVER 10/- PLEASE REGISTER CURRENCY AND CROSS P.O.s.

AMAZING XMAS OFFERS!! HURRY POST YOUR ORDER - SAVE £££'s

CALLERS
ALL ADVERTISED LINES AVAILABLE FROM OUR LONDON ADDRESS. CALL IN FOR LISTS.

FREE VALVES GIVEN FREE WITH ALL N.T.S. KITS

SECURE YOUR PENTA-KIT NOW BUILD 5 SETS for the PRICE OF ONE

5 BANDS 9-2,000 METRES



- Short-Wave Adaptor
- Short-Wave Converter
- 1-Valve All-Wave
- 2-Valve All-Wave
- 3-Valve All-Wave

For efficient short-wave or all-wave work, 3 Short-wave ranges. Employs famous B.T.S. self-tuning 6-pin inductors with wave range of 9-2,000 metres. Kit comprises slow-motion

tuning and reaction condenser, L.F. transformer, all-wave and short-wave chokes, fixed condensers, ready drilled steel chassis with all holders fitted, engraved slow-motion dial, coils and all instructions. 3 matched British battery valves comprising highly efficient Detector and L.F. and Pentode output given FREE. List value £4/10/0.

BARGAIN 42/-

or 2/6 down and 12 monthly payments of 3/9.

2/6 DOWN

BANDSPREAD SHORT-WAVE KITS

VALVES FREE.—The number of N.T.S. Bandspread Short-Wave Kits now in use throughout the world has almost reached the hundred thousand mark. No kits have ever before experienced such amazing popularity. N.T.S. Bandspread Short-Wave Sets for loudspeaker and headphone work give full highly efficient results on 18-94 metres and at only slightly extra cost additional low-loss coils are available for the complete coverage of 9-200 metres. With every Kit we present you with matched and tested valves, absolutely free.

1939 S.G. 4-VALVE MODEL.—Complete matched and tested Kit with 3 coils and 4 FREE Valves, comprising S.G., Det., L.F. and Pentode output. List value £4/19/6. Bargain, 49/6, or 3/6 down and 12 monthly payments of 4/3.

1939 3-VALVE PENTODE OUTPUT MODEL.—Complete matched and tested Kit, with coils for 12-94 metres and FREE VALVES, comprising Det., L.F. and Pentode. List value £4/7/6. Bargain, 42/-, or 2/6 down and 12 monthly payments of 3/9.

1-VALVE.—SPECIAL OFFER.—Complete kit of parts for World-wide reception on 12-94 metres, including coils. FREE high efficiency valve and pair of light-weight headphones. List value, 55/- Bargain, 27/6, or 2/6 down and 11 monthly payments of 2/6.

—NEW "WORLD" S.G.3—

LIST VALUE £4/15/0 CASH BARGAIN C.O.D. 29/6

9 to 2,000 metres.



MATCHED VALVES FREE!

A triumph in receiver design. Two S.G. and Pentode Output stages. For the enthusiast who requires maximum efficiency and those extra stations on the Short, Medium and Long Waves, 3 Short-Wave ranges. Employs famous B.T.S. One-shot inductors or N.T.S. 6-pin coils. Slow-motion Tuning. Complete Kit for

STATION-NAME DIAL

Battery use with Steel Chassis Twin-gang Condenser. Slow-motion Tuning, Station-name dial, Transformer, Resistances, etc., and assembling instructions, less coils, 29/6 cash or C.O.D., or 2/6 down and 12 monthly payments of 2/10.

COMPLETE KIT. Comprising above kit with set of 6 Coil^s Cash or C.O.D. 41/6 or 3/- down and 12 monthly payments of 4/- VALVES GIVEN FREE.

WORLD S.G.4, a more ambitious model with Pre H.F.S.G., Det. S.G. audio and Pentode output. All components supplied extra to 3-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 3/9. Required coils special offer, 10 B.T.S. coils list value 27/- Bargain 17/6. Or add 1/6 to deposit and payments.

COSMOCORD PICK-UP BARGAIN



LIST VALUE 15/-

6/6 POST FREE

Limited stocks now, you must hurry. Brand new COSMOCORD highly sensitive Pick-ups, complete with Arm Rest and Screened Lead. Only an exceptional purchase allows us to offer at less than half price. An excellent opportunity for you to fit an improved pick-up for electrically reproducing your gramophone records. A real bargain at 6/6, cash or C.O.D.

BRAND NEW CHASSIS BARGAINS FULLY TESTED

5-VALVE A.C. S/HET. ALL-WAVE CHASSIS



- 7-stage s/het. circuit.
- All waves 18-2,000 metres.
- Station-name dial.
- A.V.C. and tone control.
- 3 Watts output.
- Fully guaranteed.

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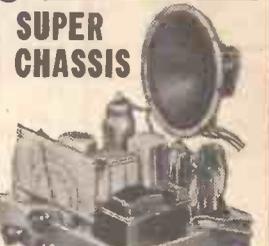
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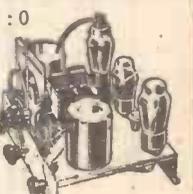
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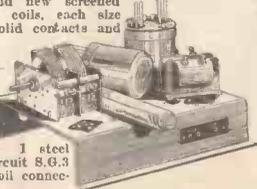
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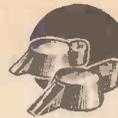


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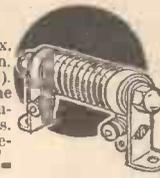
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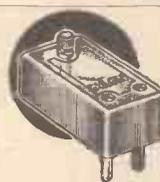
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Party Television Tricks

How to Arrange Make-believe Television Demonstrations for the Christmas Party

THE party spirit which prevails at this time of the year gives an excuse for many things, and considerable amusement and interest may be aroused if at your party this year you announce that you are going to give a television demonstration. Television is now becoming very popular, but there are many who cannot afford a receiver or who are unable at the moment to obtain one, and therefore added interest will be given when you proudly announce that you will give such a demonstration. Most amateurs are familiar with the "stunt" whereby a mike is connected to a broadcast receiver and during a broadcast programme the music is faded out and an SOS or similar message is heard for a member of the party—this message, of course, being given by somebody in another room. If you do not know how to do this, read the article on page 283. Well, "cod" television broadcasts may be given in a very similar manner and there are several ideas which may be adapted for the purposes—depending upon the facilities available and the ability of the reader.

One of the best ideas forms the subject matter of our cover illustration this week, but it is, unfortunately, only applicable to those houses where communication between two rooms is effected by means of a folding door. These are fairly common in houses of a certain age, although some modern houses are being made with a similar idea carried out in glass. In some modern houses a serving-hatch is fitted in the wall, and could be used on similar lines.

Illumination and Screens

As may be gathered from the illustration, the guests sit in one room, which is darkened, and the "performer" is situated in the other room, the entire doorway being masked by means of heavy light-proof curtains. An opening of any desired size is left between the curtains, across which is stretched a sheet of Cellophane, glass or semi-transparent material. If now the performer is brightly illuminated, he will be seen "on the screen" and may give any desired performance. For best results the performer should be provided with a dark backcloth, the guests should be in total darkness, and illumination for the performer should be provided by bulbs placed on each side of the screen. If the latter is of glass this gives a most realistic appearance. Alternative ideas will suggest themselves regarding the material from which the screen is made, the disposition of the guests and performer and lighting. A remarkably realistic "fade-in" device may be obtained if lamps are placed on both sides of the screen, and those on the performer's side are switched off. The front lamps should, of course, be masked so that they do not dazzle the guests, and if a good dimmer is connected in circuit it will be possible to switch out gradually, or fade out, the lamps on the guest side at the same time as those on the performer's side are faded in, and the variation in

double-sided illumination gives a very realistic fade-in of the image.

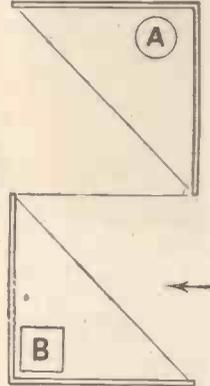
To complete the "picture" sound is, of course, necessary, and a mike and loud-speaker may be placed in a convenient position so that the guests may hear words

clearly. A mike may be used and speech may be synchronised, or if a travel picture or other similar type is projected ordinary broadcast music or gramophone records may be played as a background and will "fit in."

Further, it is possible to obtain rectangular reducing glasses which lend themselves very readily to "fake" television. One of these may be mounted in the front of a cabinet placed against the aforementioned open doors, the remaining opening being screened by light-proof curtains. If now the rear room is fully illuminated, and the "lookers" are in the dark or subdued lighting, it will be possible to see practically the whole of the lighted room in the reducing glass, on a small scale just the same as a television image in the end of a cathode-ray tube. A suitable size for the glass is 6in. square, and the slight curvature of the surface resembles very realistically the front of the standard C.R. tube. These glasses are obtainable from any good opticians or scientific appliance stores. A 6in. square glass of the type mentioned may be obtained for 5s.

Finally, it may be possible to adopt the idea known as "Pepper's Ghost." In principle this is arranged as shown in Fig. 1. A double box has two sheets of plain glass arranged as shown, and in normal use the object at B is illuminated whilst the object A is in darkness. A backcloth of dark material is used in both sections. If, however, the lights at B

Fig. 1.—A suggestion for using a "mirror" device to produce a faded-in "Television" image.



and music. A mixing circuit with pick-up for a musical background and the microphone through which the performer may sing will add realism. The method of connecting these items will be found on other pages.

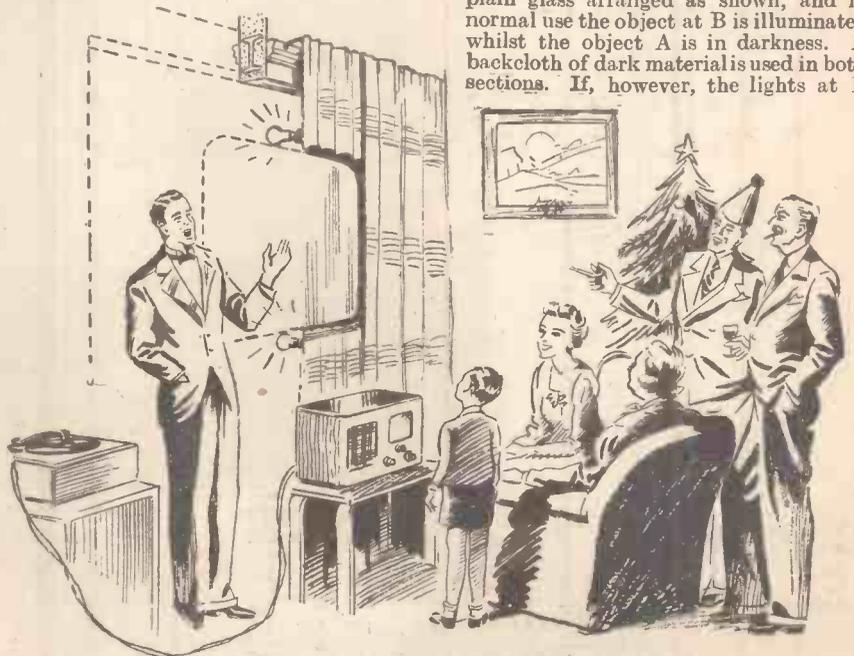


Fig. 2.—How to arrange for a fake Television demonstration.

Other Ideas

There are several other schemes which may be adopted for fake television, many of which will no doubt occur to the reader. The home-cinema may be brought into use, and a cabinet may be built, or an existing radio cabinet modified so that a small rectangular opening is provided across which ordinary frosted glass or grease-proof paper may be placed, and a projector mounted in the cabinet and focused

are switched off the dark background will give to the glass a mirror effect, and then if A is illuminated it will be seen when looking in the direction of the arrow as in a mirror. Thus two objects may be made to change places. By projecting a picture on to the glass or backcloth at A it may be seen from the front and no doubt modifications will occur to the reader on the basic idea.

Our New Aerial

Details of the New Array Which has been Erected over our Laboratories

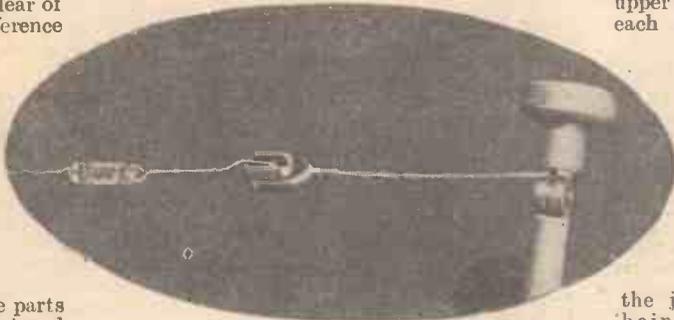
FOR some time the ideal situation offered by the tower at the top of our new building has suggested that we could take advantage of an improved aerial system, so that maximum results could be obtained clear of the interference which is normally experienced in a busy area such as this. Accordingly, a twin-mast system was planned, and all the parts were designed and made in our own workshops.

The accompanying illustrations show the two masts and give some idea of the situation. An indication of the relative height of the aerial may also be judged from the illustrations, in one of which Nelson's Column may be seen, and which is considerably lower than the aerial. The Clock on the Shell-Mex building, a familiar landmark, may also be seen, and is also below the aerial level. The masts were made from galvanised heavy-gauge conduit, and special pulleys were made up and mounted at the top, as shown in the upper illustration. By this means an internal halyard may be used, and there is no risk of it slipping over the

pulley—a trouble which is often experienced with the standard type of pulley. The steel halyard was sweated into phosphor-bronze stirrups which were riveted into stout insulators, and the top of the

upper section of each mast was capped. Two separate lengths of tubing were employed for each mast and were of different sections, the junction being effected by reducing sockets turned

from steel and pinned to prevent rotation of the upper section. To these reducing pieces horizontal lengths of tubing were welded, the ends being slotted to carry



The pulley and method of attaching aerial to halyard.

and standard television aerials. We are thus able to test all receivers, either designed in our laboratories or sent in for servicing by readers, on various aerial systems, and are thereby able to judge of the performance under all the conditions which may be met by the user.

All initial tests with new receivers are, of course, carried out on a small aerial arranged to resemble as closely as possible an "average" aerial, and for special results or tests the remaining aerials are brought into use.



This view shows the upper mast and on the left may be seen Nelson's Column.



This view gives a good idea of the height of the aerial above the surrounding buildings.

supporting guys, as shown. The upper mast, on top of the tower, projects 15ft. above the roof, and the supporting halyard for the lower mast, which is attached to the wall outside the laboratory, is carried down inside the mast and is provided at the bottom with a heavy weight so that the aerial is "floating." To reduce the interference experienced on our other aerials, an anti-interference aerial system has been erected on these masts and is giving very good results.

For experimental and test purposes we now have a most comprehensive aerial array, including short-wave aerials of various types



This shows the lower mast attached to the wall of the laboratory.



The upper mast being fixed in position on the tower.

THE "AIR-HAWK" 9

How to Make the Chassis and Screens, and Main Constructional Details of this New Receiver

By W. J. DELANEY

ALL the main essentials of this amateur receiver were given last week, and all that remains now is to describe the constructional work. For the chassis, 14 gauge S.W.G. aluminium

which obviously must register. The dimensions given in the illustrations of these screens are taken from 16 gauge aluminium, but any variation in thickness will necessitate a readjustment of the

score along the lines for bending, making the score on the opposite side to the direction of the bend. I used a wood-carver's "V" engraving tool and hammered the metal in the same direction so that the "V" was closed on the inside, but this does not appear to be the simplest way of doing the work, provided that the score is not made too deep. The result with the "V" cut inside is certainly the neatest, but if you can obtain two lengths of stout angle-iron and clamp the metal in a vice between these quite a neat edge may be made with the ordinary score cut with, say, a blunt penknife blade.

To ensure accurate registration of the fixing holes it is preferable to cut the three top partitions upon which the band-spread condensers are mounted, and to drill all holes in these. Next cut out the two narrow pieces which join these together on the outside, and mark off the holes in these from the previous pieces. Now cut out the three under-side partitions, and place these in position under the chassis and make certain that the fixing holes for the top screens, the holes in the chassis and your markings on the under partitions agree. A good plan is to mark the holes on the under pieces through the holes in the chassis. Next cut the two long partitions for the top, and again mark off the side holes in the left-hand partition from the holes on the ends of the three partitions already made. It is, in fact, a good plan to bolt in position each partition as it is made, and proceed to build up the chassis in this manner, although it will have to be taken to pieces before the set is made. It is worth while taking great care with all this metal work, as the finished result must be neat and rigid and there is nothing more disappointing to find, when attempting to assemble the various parts that

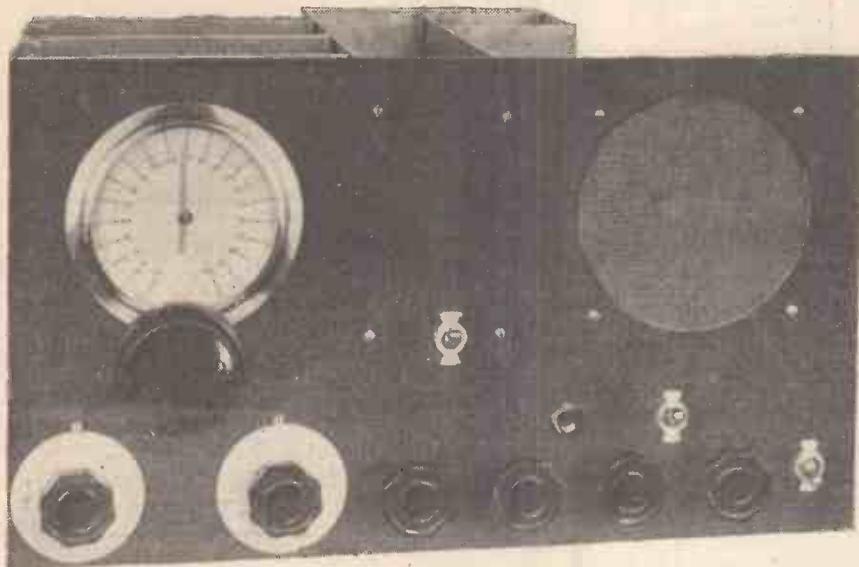


Fig. 1.—Here is the completed Receiver showing the panel layout.

sheet should be cut to the shape and dimensions shown in Fig 2. If desired, $\frac{1}{8}$ in. may be left at the sides so that they may be turned and bolted, or alternatively short lengths of brass angle may be cut and bolted to give greater rigidity. Alternatively, of course, the chassis may be purchased from Messrs. Peto-Scott ready made up. If you construct it yourself, carry out all the drilling shown in Fig. 2 before bending down the sides, as by this means cleaner holes may be cut. For the large holes an ordinary carpenter's centre-bit is best, the tracing point being permitted to cut partly through from one side, and the chassis is then turned over and the cut completed. In this way the cutting edge of the bit will not be damaged, and it may still be used for ordinary woodwork. It should be noted that only the main holes have been shown in Fig. 2, in order to prevent complication. There are several more holes required, but these are, with two exceptions, only $\frac{1}{8}$ in. in diameter, and are for inter-connecting leads. The two remaining holes are $\frac{1}{4}$ in. in diameter. Their exact positions will be found from the wiring diagram which will be given next week, and they may be left until then.

measurements. All of the turns are $\frac{3}{4}$ in., and the drawings have been made to show the direction of the bends and turns. Care is necessary here, as should a bend be made in the wrong direction the piece will undoubtedly be wasted, as the bend cannot be turned right back without breaking the metal, or at least seriously weakening it. Cut the pieces to the full size, being careful to add on the $\frac{3}{4}$ in. bends and then mark off the holes. Next with a steel straight-edge

The Screens

The next part of the work to be undertaken is the cutting and bending of the screening partitions. This is a rather tricky piece of work, as not only must they all be cut accurately to enable them to be bolted up neatly, but the various fixing holes must be accurately aligned, as in some cases top and bottom screens are bolted through the same holes, and in others the screens are held together by bolts

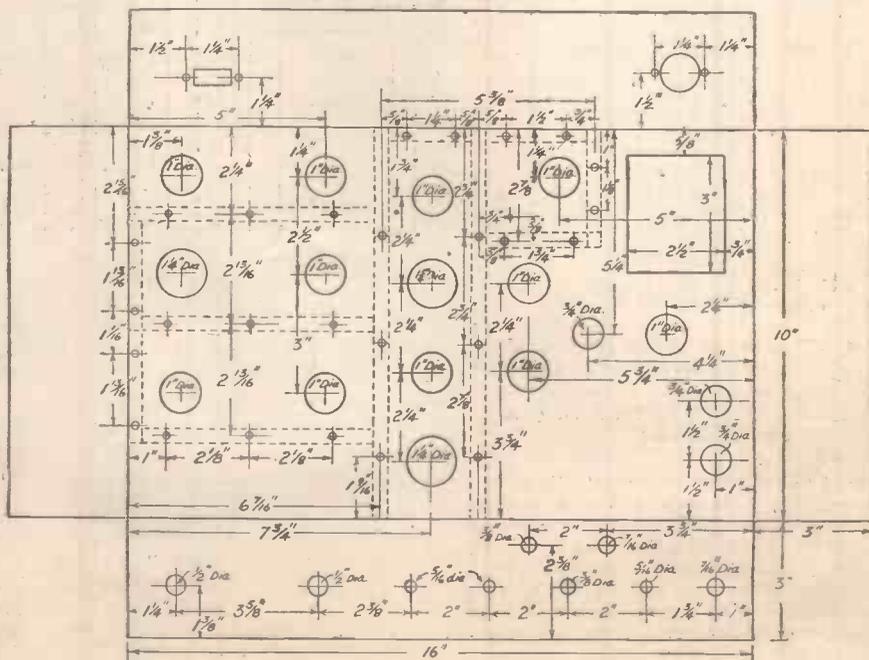


Fig. 2.—Drilling and cutting dimensions for the chassis of the Air-Hawk 9.

they will not fit and fresh holes may have to be drilled in such a position that the drill will run into previous holes and make it almost impossible to obtain a rigid job.

Assembly

The large hole for the mains transformer is best cut out with a metal fret-saw blade, or alternatively by drilling a series of holes, knocking out the piece and filing up the edges. When the partitions are finished, place them on one side, and then place the various valveholders and coilholders in position and drill through the fixing holes, attaching these components by bolts with shakeproof washers on the under-side. An important point here is that the coilholders in the front section and the rear section must be raised up from the chassis, so that the sockets will eventually clear the condensers underneath. A nut between

when these screens and associated parts have been found to fit perfectly, the band-setting condensers should be removed so that wiring may be carried out. This method is recommended to avoid the difficulty of having to take down the screens due to failure of the spindles to line up on either side.

Extension Controls

The two extension controls used for the band-setters must be cut down as follows: Remove the grub screw and then the brass ring at one end of the paxolin tube on each of these, and cut down the tube in one case to 1 1/2 in., and in the other case to 3 in. The brass rod which fits into the extension control must then be cut in one case to 1 1/2 in. and in the other case to 2 in. Now if the brass ring is placed over the cut end of the paxolin and the hole placed in line with the remaining grub screw, a hole may

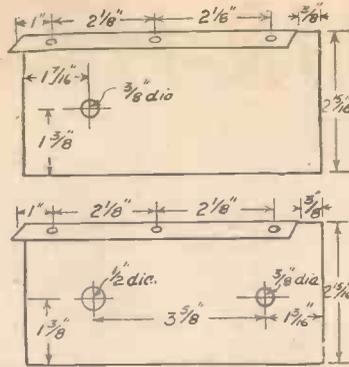


Fig. 3.—The above are two of the under-side partitions separating the band-setters. The third partition is shown in Fig. 10. The upper unit is placed nearest the rear of chassis, and the lower is mounted next to it.

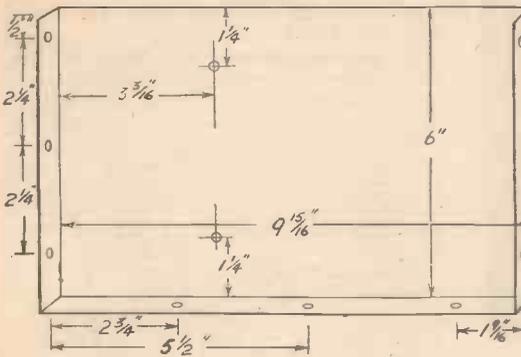
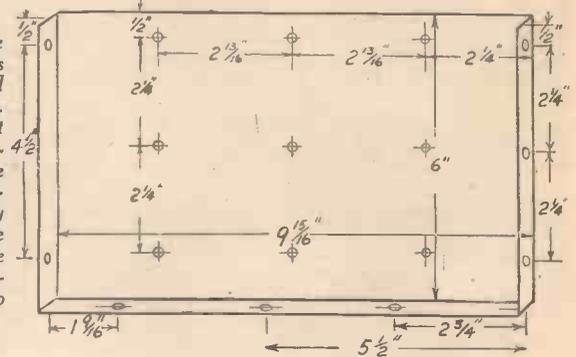


Fig. 4.—These are the two long partitions enclosing the I.F. and second detector stages. The unit on the right is bolted to the partitions separating the band-spread condensers. Note carefully the direction of the turned-up edges. The two-hole turn is attached subsequently to the panel.



chassis and holder should suffice. Now comes the difficult part. On each of the top condenser partitions mount one of the band-spread condensers, making quite certain that the lock-nut is tight and that all condensers are exactly in the same position; that is, with the fixed plates towards the bottom. Do the same with the band-setters, noting their position from the illustrations given last week, and then

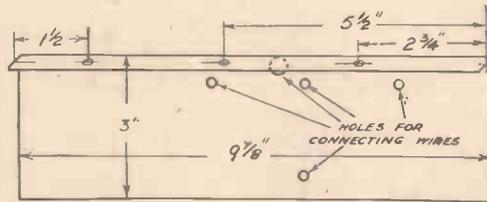


Fig. 5.—This partition is for the underside of chassis and separates the band-setting condenser from the remainder of the wiring.

be pierced in the paxolin, the inner edge scraped with a penknife to remove the "burr," and the grub screw placed in position. The shortened length of rod may now be placed right down the tube whilst the other end of the control is attached to the condenser spindle in each case, after which, with a thin-nosed pair of pliers the rods

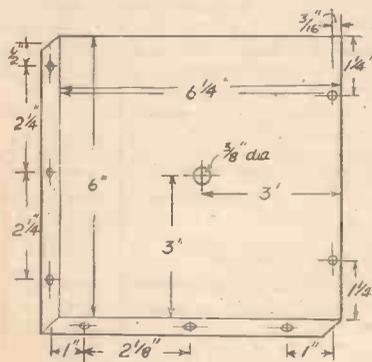


Fig. 6.—These are the supports for the band-spread condensers. Three of these have to be made, and all are identical. The central hole must be exact to enable the condensers to be mounted in line.

proceed to erect the screens, starting from the panel and locking top and bottom units together with shakeproof washers to avoid any risk of subsequent loosening. As one screen is placed into position, a coupler must be attached to the spindle of the condenser on the upper side, and the extension rods and couplers on the under-side. It is difficult to explain every point here, but with the parts in hand the method of procedure will become apparent, and

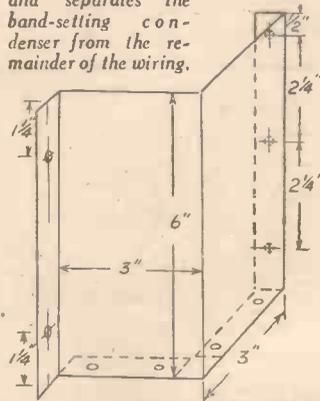


Fig. 7.—This is part of the B.F.O. screen. It is attached to the right-hand screen in Fig. 4 and at the rear to Fig. 8.

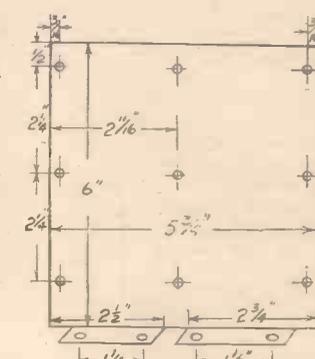


Fig. 8.—This section encloses the rear of the I.F. screens (Fig. 4) and is also attached to Fig. 7.

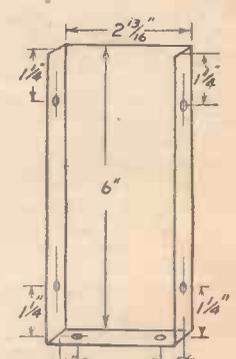


Fig. 9.—Two units as above are required and are used to bond together the three screens shown in Fig. 6.

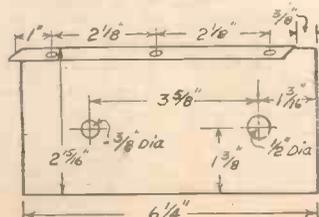


Fig. 10.—This is the remaining under-chassis screen and is placed nearest the panel.

may be withdrawn and pushed into the slow-motion drive in one case and into the flexible coupler in the other case. The appropriate grub screws are then tightened. The long top partition is then placed in position and bolted up with the under unit corresponding to it; the I.F. transformers are then placed in their respective places, and the right-hand top partition bolted up with its rear plate. The B.F.O. screens are then placed in position and locked, after which the wiring may be commenced.

Easily-made Amplifiers

Essential Details of a Few Simple Types of Amplifier for Battery and Mains Use. The Units Described are Intended only for Temporary Use and are not "Quality" Amplifiers

By THE EXPERIMENTERS

THERE are innumerable uses for a simple amplifier, especially at Christmas time when microphones, pick-ups and similar devices are being employed. For many of the various forms of radio amusements described elsewhere in this issue it is convenient to have a small amplifier unit additional to the broadcast receiver, because both amplifier and receiver will often be needed together.

At the same time, it will seldom be considered worth while to go to the expense of building a "pukka" amplifier unit for occasional use in this way. Also, it is by no means essential that the temporary amplifier should come within the description of "high fidelity." Clearly, the simplest type

of a small wooden box or old attaché case. It would probably be found convenient to allow room in the container for a microphone and its transformer and energising battery.

Greater Amplification

If the input device were known to be somewhat insensitive, it would be better to use a couple of valves—a triode and an output pentode or tetrode—in a circuit similar to that given in Fig. 3. The maximum permissible output would be the same as that from the simpler unit, but that output could be obtained when the input was appreciably less. A circuit of this type is often more satisfactory than a

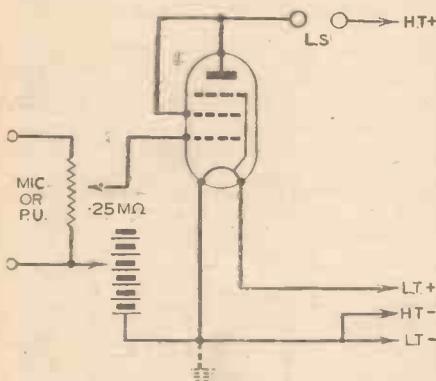


Fig. 2 shows the few connections in pictorial form. In this illustration the dry battery is of the type for both H.T. and G.B., and it should have a total voltage of 120 if a moderate output is required. A small accumulator is used for low-tension current, but a three-volt dry battery with a 5-ohm resistor in series could be used if desired. The available output for the speaker will, naturally, be small, but will be adequate for many requirements. At any rate, if the pick-up or microphone is of a sensitive pattern the amplifier will give an output

Fig. 1 (Left).—One of the simplest single-valve battery amplifier circuits.

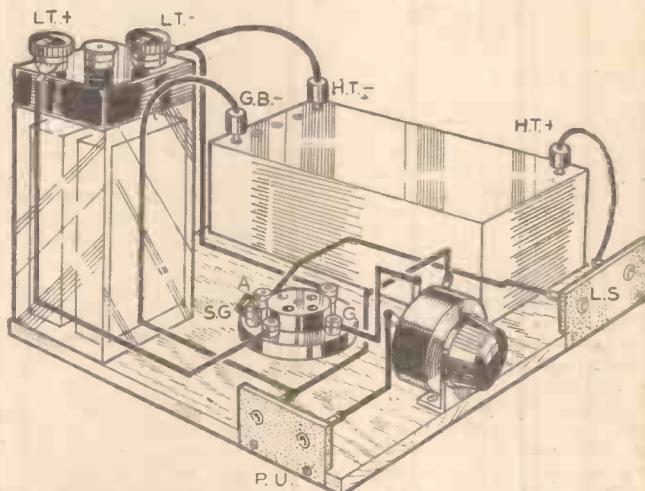


Fig. 2 (Right).—A practical arrangement of the circuit shown in Fig. 1. Layout is optional, but the component positions shown are as good as any.

of unit that could be made is one with a single battery-operated valve. It can be built on a very small baseboard or in a compact wooden box, and can be carried about very easily. Small batteries can be housed within the container, so that the only external connections required are those to the microphone or pick-up and those to the loudspeaker.

Single-Pentode Unit

A circuit for a unit of this type is given in Fig. 1, where it will be seen that the valve is a pentode, and that the connections are very few in number. The only component additional to the valveholder is a .25 megohm volume-control potentiometer.

falling not far short of that given by the average battery set.

The most suitable type of valve is one such as the Cossor 220PT or Hivac Z220 (this is a tetrode, of course). These have a rated maximum undistorted output of 1,000 milliwatts, and will handle a fairly heavy input from the pick-up or microphone.

We do not show the set built into a carrying case, but such an arrangement could easily be provided by mounting a couple of terminal-socket strips on the side

single-valve one even when the microphone is of a very sensitive type, because it allows the microphone to be "throttled down" so that there is less chance of instability and back-coupling between the microphone and speaker. It is frequently the case that the most pleasing reproduction is obtained when the microphone volume control is turned well down or when the energising voltage applied to the microphone is reduced to 1.3-3 volts, instead of the more usual 4.5-6 volts.

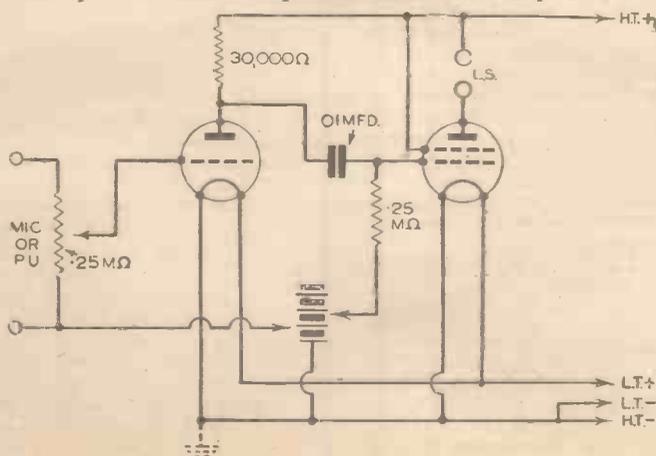
Earthing

It will be seen that in both circuits dealt with the earth connection is suggested by broken lines. Very often it will not be required, but on the other hand there are many instances in which it will be found to improve results. When the microphone speaker lead is screened, the screening braid should in any case be connected to the earth terminal, whether an earth lead is also joined to it or not.

Two Triodes

A slightly more elaborate two-valve battery circuit is shown in Fig. 4. In this case, two triodes are used, the first being an L.F. or general-purpose type and the second a power-valve of the Cossor 230XP, Hivac PX230, Osram P.2 or Mullard PM202 pattern; the bias voltage must, of

Fig. 3.—This two-valve battery-amplifier circuit is efficient and inexpensive to build. At the same time it will give a satisfactory output when fed from a microphone or pick-up of fairly low sensitivity.



(Continued overleaf)

EASILY-MADE AMPLIFIERS

(Continued from previous page)

course, be regulated to suit the valve chosen. The battery must be of 16 volts maximum rating when using a 120-volt H.T. battery unless a battery with suitable H.T. and G.B. tappings is employed. When using a couple of valves, especially if the second takes .3 amp. L.T., an accumulator is essential for L.T. supply. To ensure that the output valve can be fully loaded a

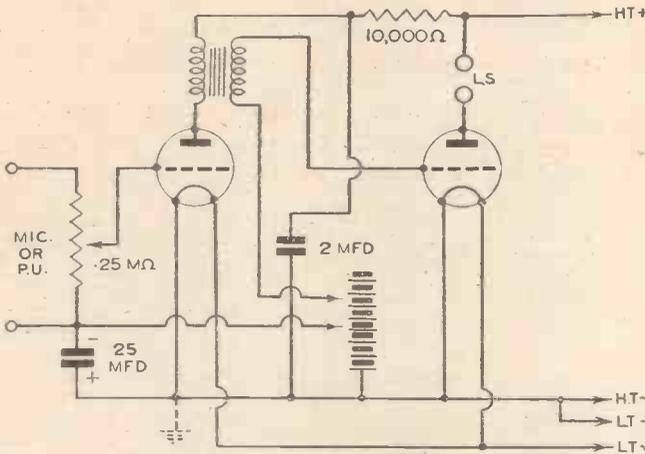
the mains voltage of about 230 to the 40 volts required by the valve heater, a 40-watt lamp bulb is wired in series; this could be mounted on top of the container and used as a "silence" signal to warn the "broadcaster" that the amplifier is alive.

The smoothing choke need not be an expensive one, provided that it will carry up to about 50 mA and that it has an inductance of not less than 10 henries at

It would be an easy matter to modify this simple basic circuit to include a second (input) valve of the ordinary L.F. type, since the rectifier would provide an ample amount of current. Coupling between the two could well be as shown in either Fig. 3 or Fig. 4.

Of course, the output of any valve used in this circuit would be less than the maximum rated output due to the fact that applied H.T. voltage would not be more than about 170, and because the heater current would be rather less than the rated current of .2 amp. unless the lamp used as a resistor were replaced by a barretter or by a wire-wound resistor. Another point that should not be overlooked is that if two valves were employed a different resistance lamp would have to be used. Thus, if the mains voltage were 240, one 220-volt, 40-watt lamp would be suitable with a single valve, but if two valves were used—the first taking .2 amp. at 13 volts, and the second .2 amp. at 40 volts—it would be correct to use a 200-volt, 40-watt lamp. In both cases, the heaters would be slightly, but only slightly, underrun. Of course, a .2 amp barretter rated at 120-200 volts would be equally suitable whether there were one, two or three valves in the circuit.

Fig. 4.—This battery amplifier employs a pair of triodes coupled together by means of an L.F. transformer, which may be a fairly small and inexpensive component. The anode circuit of the first valve is decoupled.



transformer is used to couple the two valves, and this should have a step-up ratio of about one to 3.5. Decoupling is also shown in the anode circuit of the first valve, although this might not be essential; it is desirable, however, when using transformer coupling. Another minor refinement is an electrolytic condenser between the lower end of the input volume control potentiometer and the "earth line." This can often be omitted without affecting results in the slightest. Nevertheless, it is sometimes useful in improving stability and helping the quality side. It need have a working voltage of no more than 12 if used.

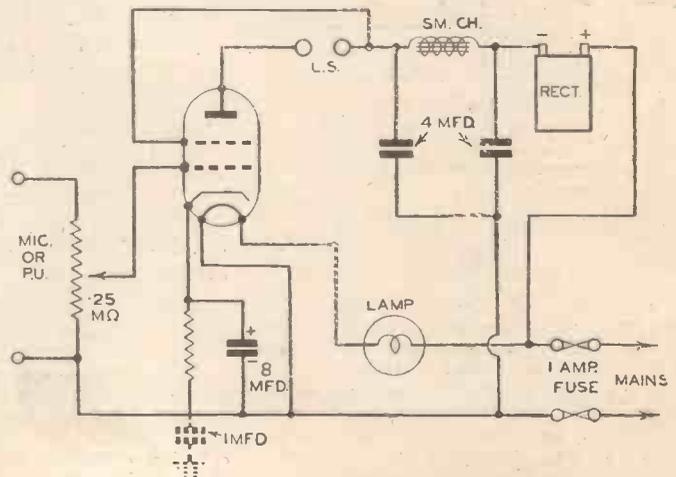
A.C. Amplifiers

Those who always use a mains-operated receiver will probably favour a mains-type amplifier. This is capable of giving a greater output, of course, and is better in many respects—generally too good for present requirements. It will cost a good deal more to build, whilst it is less likely that the requisite parts can be obtained from the junk box. But for those who prefer a set of this type we give a circuit in Fig. 5. It will be seen that the usual A.C. mains transformer is omitted for simplicity, a half-wave rectifier being included in the H.T. positive feed line.

Many will point out that this arrangement is not in accordance with I.E.E. regulations, but it is that which is used in many universal receivers and has been proved to be satisfactory. A single 40-volt, .2 amp. tetrode is used, the circuit being similar in all important respects to the battery version shown in Fig. 1. To drop

that current. Additional smoothing is provided by a pair of 4 mfd. electrolytic condensers, although the capacity of these can be increased to 8 mfd. if the larger condensers are more readily available.

Fig. 5.—This simple mains amplifier can be operated from either A.C. or D.C., and can be built cheaply using standard components, many of which the constructor will already have on hand.



With regard to the rectifier this could well be a Westinghouse style H.T.10, which has a maximum D.C. output of 200 volts at 100 mA. This rectifier also has a low resistance, so that the maximum output can be obtained with an input of 250 volts. Assuming that a Cossor 4020 tetrode valve were used the bias resistor would require to have a value of 150 ohms and could be rated at 1 watt.

should be kept apart and, where possible it is better to have a separate earth connection to the screening braid of the microphone lead if this is more than about 25ft. in total length. With a mains-operated amplifier it is essential that the containing case, when used, should be perforated to permit of ample air circulation round the valves and rectifier so that over-heating is avoided.

It has frequently been suggested that television in one form or another can undoubtedly prove an aid to the police for detecting crime, and apprehending criminals more speedily than by standard methods. It is known that officials of the Police Force are interested in the science, and one or two tests have already been undertaken, although not on any ambitious scale. During an experimental transmission in one of the London streets last year a fake theft was

TELEVISION and CRIME

staged, and one viewer who was looking in at the time phoned Alexandra Palace and clearly stated all he had seen. With the many outdoor television broadcasts now being undertaken, a separate camera panning on the crowds with a good tele-

photo lens could be used so that the pictures transmitted were watched only by the police on their own receiving sets. Pick-pockets or any sign of disorder would be readily revealed and steps taken at once to apprehend the wrongdoer. It has been left to Germany, however, actually to employ television in order to assist the police in a real murder mystery. Unfortunately for them there are no commercial sets in the hands of the public.

A PAGE OF PRACTICAL HINTS

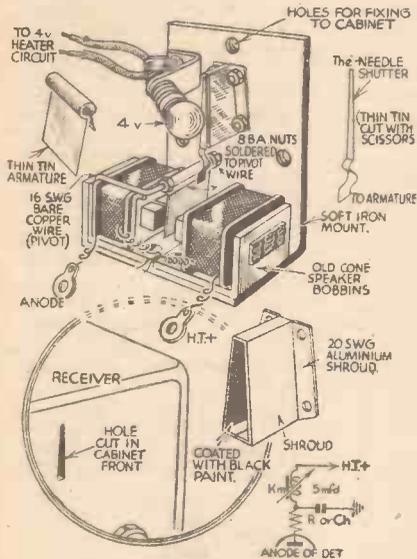
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Sensitive Signal Kick Meter

FOR some time now I have wanted a sufficiently sensitive "kick" meter for use on the short-wave bands, and it occurred to me that with a couple of old cone (moving-iron type) speaker bobbins, a good needle fluctuation could be obtained



A novel sensitive signal kick-meter.

with about 2 milliamps flowing in the anode of the detector valve. The assembly I have adopted is clearly shown in the accompanying illustration, and the mode of operation is as follows.

The needle shutter, which is constructed from thin tin, serves effectively to block out the light from a 4v. bulb centralised behind the needle and shroud. Any movement of the tin armature will allow the penetration of the light either side of the needle, the intensity and duration being governed by the strength of the current flowing in the bobbins. No grease or lubricant of any sort should be applied to the pivot assembly, and it is necessary to ensure absolute alignment of the needle with the shroud aperture in the normal unoperated position.

To prevent any possible instability of the detector stage which may arise in the fitment of this type of unit, the resistance or choke impedance should not be broken at the anode end, but at that of the H.T., with a suitable by-pass condenser of about .5 mfd., this value depending on the value of the resistance, when such is used. I have kept the unit independent of the chassis proper so that apart from being able to use same in different "hook-ups," the vibration of the speaker, which constitutes part of the chassis, cannot upset my observations on very weak signals. This piece of apparatus can be used for numerous other circuit functions, such as wavemeters, B. F. oscillators, and signal generators of modest design.—C. J. WELSBROOK (Shrewsbury).

THAT DODGE OF YOURS!

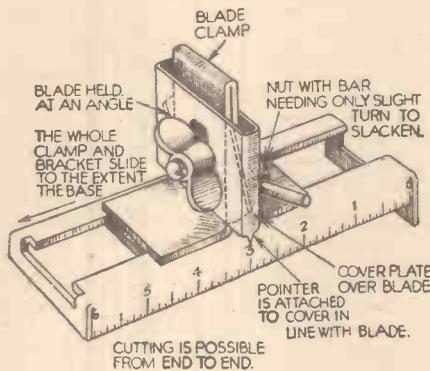
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account 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 307.

A Scoring and Cutting Tool

THIS handy scoring and cutting tool is very useful for chassis construction. By careful adjustment the depth of the cut, as well as the width from the edge, can be accurately gauged. The illustration



A scoring and cutting tool, and details of the baseplate.

shows how this adjustment is made. The end of the base plate is left slightly longer, so that by placing this part of the tool on the edge of the work a regular and straight cut is made.

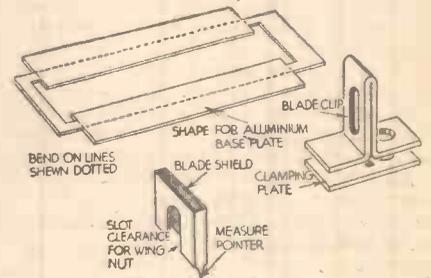
The base of the tool is made of aluminium sheet of about 18 gauge, and if number punches are not available a 6in. rule can be screwed to the side of the base, and scraps of sheet aluminium can be used for the clamp and the razor-blade cover, which carries a pointer on the bottom edge, in the dead centre, for indicating the measurement required. As this pointer is in direct line with the blade, accurate marking is obtained. When assembled, the clamp, with the blade and cover, will slide right through the channel in the base plate. A nut with a short bar tightens the clamp and

clamping plate sufficiently, without the necessity of dismantling the tool for adjustment.—JOHN DENBY (Erdington).

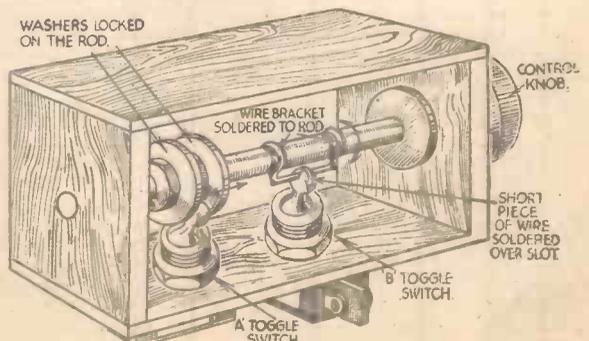
A Dual-purpose Switch

HAVING built a mains amplifier for a set with battery radio-frequency stages, I needed a switch which could perform the following operations: 1. Switch set and amplifier off; 2. Switch set and amplifier on; 3. Switch amplifier on only (for gramophone).

The switch shown in the sketch is designed to do this job, using two ordinary Q.M.B. toggle switches. Constructional details are clearly shown. On pushing or pulling the knob, switch A is actuated only, since the arm operating B just slides in the groove in the switch dolly. On turning the knob, switch B is actuated by the arm soldered to the spindle, resting in a groove as mentioned. (The switches had already had this groove cut in them, but any switch "dolly" can easily be adapted.) By means of this arrangement any combination of the two switches is available simply by pushing or rotating the knob. In order to restrict the turning motion, a piece of wire is soldered over the groove in the arm of switch B, after the wire bracket operating the switch has been put in position. The assembly can be claimed to be universal, in so far as various



combinations of switching arrangements can be obtained. Toggle type switches are made in many forms from the simple "on-off" to more elaborate multi-contact patterns, thus allowing a very wide choice of components and, incidentally, unlimited applications of the main idea.—F. GIRLING (Slough).



An easily-contrived dual-purpose switch.



The Open Mike

A Comedy-Thriller Specially Adapted for Home Broadcasting from the Play "On the Amateur Band"

By L. ORMOND SPARKS

(For Home Performance Only. All other Rights Reserved).

Production commences with a record playing "Fingal's Cave." Fifteen seconds later, fade down music to form soft background to the following announcement.

ANNOUNCER: "Ladies and Gentlemen, we are presenting this evening "The Open Mike," a comedy-thriller based on the experiences of two amateur transmitters. The chief characters are: Jack Wainwright and his wife, Ann; Sir John Budleigh and his son, Douglas (an amateur transmitter); Victor Jones, a draughtsman in Sir John's firm of aircraft manufacturers and designers; Nip Ranigan, a crook; Bill Hayman, another amateur transmitter. Other players taking part are the landlord of the "Three Stones" a small inn on the borders of Dorset, Gaffer and yokels, policemen and Bill's father.

Ladies and Gentlemen . . . "The Open Mike." (Fade up music and superimpose morse buzzer, sending dah dit dah dit, dah dah dit dah. Repeat four times, then fade out music and morse. Fade in sound of burr of a motor-car. After five seconds, fade down soft background.)

JACK: My heck! Just look at those clouds. Not a trace of the moon. There's an A.A. sign, see if you can pick out its wording, Ann. (Sound of car easing up.) Got it?

ANN: Yes, it says Hilbury one mile, so we are all O.K. (Bring up car speed.)

JACK: How's the time? Are we keeping up our average?

ANN: Twenty minutes past nine. You are three miles up on the last hour and still have five minutes to go, so what about that spot of food?

JACK: Ah! good idea. I vote we drop anchor at Hilbury, and raid the local pub and see what we can scrounge in the way of good old Dorset vit'als. It's time poor "Old Faithful" had a breather. She has done darn well so far . . . Er . . . touch wood.

ANN (enthusiastically): She's a marvel. Folks can say what they like about her looks, but she certainly gets us places and back again. I should hate to part with her. Wouldn't you?

JACK: Of course I would, but (thoughtfully) if we did win the Pool, I suppose we should fall for a modern sports model, and then (wistfully), well, poor "Old Faithful" would become just a happy memory.

ANN (emphatically): Oh no she wouldn't. I would hate to part with her. I would have her all poshed up and pension her off. (Sound of car changing to lower gear.)

JACK (laughs): No, but seriously, what would you choose if you had the chance?

ANN: What would I choose? Why one of those sporty little "Humbos." (Sound of dog barking in distance.) You know, Jack, the dinky two-seater model. Who . . . a' what was that?

JACK: (Sound of changing to top gear.) Great Scott, did you see it? It was a fox or something bunking into the hedge. We should be in Hilbury in a couple of ticks. (Sound of rising wind.) By the look of things, we are in for a fine old storm, and the sooner we find an inn the better. (Sound of wind increasing.)

ANN: There is something down there on the left. Can you see it? It has got a light over the porch and . . . yes, it is an inn, I can see a sign swinging about.

JACK: You're right. I've spotted it. (Sound of engine slowing down.) My heck, hardly a Ritz is it? Still, any port in a storm. (Sound of car slowing down to a standstill and engine stopping.) Shall we chance it?

ANN (emphatically): Of course.

I'm starving and half frozen, and judging by the glow coming from those quaint little windows, it looks a mighty sight warmer in there than out here. (With determination.) Come on big boy, we are going to sample mine host's hospitality and . . . shush, listen (Fade in sounds of country folks singing a chorus), and have a spot of cabaret as well. (Click of car door opening, crunch of feet on road and the slamming of the car door.)

ANN: (Sound of wind howling.) Oh . . . it's a bit breezy isn't it? I'm as stiff as a poker. Hi . . . wait a tick . . .

JACK: Come on, you are all right. Here comes the rain. (Sound of patter of feet as they dash to the inn porch, and then swirl of wind and rain.)

ANN: Phew! . . . What a corker. Here, let's get inside. (Sound of yokels' chorus ending.) The show's over, so in we go.

JACK: (Click of latch; as door opens fade up noise of yokels in bar parlour.) After you, madam. (Side whisper.) Crumbs! Bit foggy isn't it. (Aloud.) Mind the step.

LANDLORD: (Fade down noise.) Good evening lady. Good evening zur. Getting a bit gusty like ain't it. (Sound of heavy gust of wind and rain.)

JACK: Er . . . Yes, there is a nice breeze. But, tell me landlord, what's it like when it blows down here if that . . . (Sound of another gust.) is only gusty?

LANDLORD: Ah . . . I see you bain't used to it. We down yere don't take no notice on't. Leastways, not at this time of yur. Why last yur now . . .

LANDLADY: Garge . . . Garge, why don'ty see to the lady. Let'en her stand thur all cold and wet like when thurs a lovely roaring fire o'er thur. Wur be your manners, man?

ANN: That's all right thank you. I was just admiring your room. It's like stepping back into the past. The low ceiling, the quaint old beams and that wonderful log fire. It's so lovely and cosy in here after the stor . . . the slight breeze outside.

LANDLORD: I'm downright zorry, lady. You see I wern't expecting visitors to-night. (In loud voice.) Now then Ben Bobbin, Charles Weatherell and you Gaffer.

make way by the fire thur and let the lady and gent warm theirselves a bit.

VOICES: All right, Garge. Yer you be lady. Come over and sit'e down. (Sound of shuffling feet, etc.)

LANDLORD: "Now, zur. What can I be offering to'e."

JACK: Well, we are not expecting a meal at this time of night, but could you fix us up with a bite of food, one of those pewter pots of your best ale and a very nice glass of wine.



LANDLORD : Zurtn'ly zur. I expect as'ow we've got summat in the larder that'll tempt'e. Martha! . . . Martha! run and see what'e can do while I see to the drinks.

JACK : Good evening all. Quite a merry party.

VOICES : Good evening, zur.

JACK : Didn't we hear you enjoying yourselves as we pulled up?

GAFFER : Eh! zur, Ben was giving us a bit of a song. Sort of getting ready for Christmas y'know.

JACK : Good idea. Don't let us upset the proceedings. We enjoy a song as much as anyone. Won't someone else take the floor and oblige?

VOICES : Come on Ben, let's yur another'un.

Go on man, do'e stuff, the lady wants'e to sing.

What about you, Gaffer? You ain't done nuthin' s'evening.

GAFFER : Not so fast thur, not so fast. I'd sing to the lady and gent, but I ain't so young as I were and my throat gets all dry and tickly like. (*Yokels, Jack and Ann laugh.*) What be'e all laughin at . . . ?

ANN : (*Sidewhisps to Jack.*) "Your cue big boy. Fill up their pots.

JACK : Well, gentlemen, as Gaffer says, no one can sing with a dry throat, so all have a drink with us. Landlord, hi! . . . Landlord, fill them all up and have one yourself.

VOICES : Murmurs of approval and thanks. (*Rattle of glasses and tankards.*)

GAFFER : Well, well, thank'e kindly, zur. Yurs to the very good 'ealth of yur both, and may'e have a very 'appy Christmas.

VOICES : Yur . . . yur, etc.

Come on then, Gaffer, that thur throat of yourn bain't be dry and tickly now. Get on wi't."

GAFFER : Not so fast. Let I get up first. Where's that darn stick of mine. Ah! . . . (*Grunts and puffs.*) That's better.

VOICE : What's it going to be Gaffer? (*Gaffer sings suitable country songs and all join in chorus. Insert items to suit own requirements.*)

JACK : (*After songs, etc.*) Well, gentle-

men, as much as we enjoy your company we must be getting on. What do you say, Ann?

ANN : (*Sighing.*) "Um . . . m! I suppose we must, but it's rather hard to leave this lovely fire for those bleak roads. (*Shudderingly.*) Bu . . . rr.

(*Sound of shuffling feet as Jack and Ann prepare to leave.*)

JACK : Well, landlord, what's the damage? We must be on our way.

LANDLORD : Let I zec now, there was . . . (*They move away from the mike.*)

GAFFER : Which way be'e going lady?

ANN : Devonshire way. 'Er. . . Mr. Gaffer.

GAFFER : Oh. . . Then you'll have to go up Chain Hill and pass Bill Hayman's place on the edge of the moor at top of the 'ill. You'll find it powerful bleak and windy up thar to-night.

ANN : Do you think the storm is going to last.

GAFFER : I don't suppose it'll blow 'erself out afore dawn. But you'll be all right unless it turns to snow, then I doubt if you'd get through. A car tried last year, on just such a night as this (*Sound of wind still blowing*), and she run off the road and got all smashed up. Still, don't 'e worry. . . .

JACK : Are you all O.K. Ann. Fasten up your coat collar. Well, good night folks and thank you for the pleasant time.

ANN : Good night everyone, thank you so much and . . . a happy Christmas to you all.

VOICES : Good night, lady. Good night, zur. 'Appy Christmas. (*Sound of shuffling feet and click of the latch. Fade down noise of yokels, etc., and fade UP noise of storm and rain as door is opened.*)

LANDLORD : Come back, Rover. Come back, will'e? (*Sound of Rover barking.*) You bain't going out in this. Come back, zur.

JACK : Make a dash for the car, Ann. Go on . . . I'm coming. Good night, landlord. (*Sound of dashing feet.*)

LANDLORD (*faintly, as if drowned by the noise of wind and rain*): Good night, zur. Safe journey.

(*Sound of inn door being slammed and then the two doors of the car in turn.*)

ANN : Bu-r-r. Oh! do you want all the car, Jack? Wait a tick, let me get the rug round me. Poor "Old Faithful," I hope she isn't going to jib.

JACK : Sit tight and hold your breath. Will she (*sound of self-starter turning engine*), won't she, will sh—(*sound of engine starting*) Yes, she will. Good old girl. (*Sound of engine revving up. Splutters once or twice, but picks up.*)

ANN : Home, John. And, by the way, accord-
ing to our cheer-
ful Mr. Gaffer, keep a sharp look-out
for avalanches, icebergs, one or two
landslides and a few hurricanes.
Otherwise. . . . Shush . . . Listen,
they are at it again.

(*Sound of engine revving, gear being engaged and the car slowly moving off.*)

(*Fade in faint sound of yokels singing Christmas carol and then fade down again as the car moves away and the wind comes up.*)

(*Fade in music. After ten seconds superimpose morse code. Keep both going for a further ten seconds, then slowly fade out.*)

(*In Bill Haymans' transmitting den.*)

BILL HAYMAN : Hullo! G9XY, GP2S here. I got your report O.K. Many thanks for tip about the P.A. stage. I'll try that out as soon as I can. My leg is going on all right, but I still have to use a stick and hobble around like an old man. I've put up the gain on the modulator, so I'll come back to you for your remarks. GP2S to G9XY and standing by for you, old man. Over to you.

DOUGLAS BUDLEIGH (*heard through the loudspeaker of Bill's receiver*): All O.K., GP2S, G9XY here. Your speech is R7. Regarding my new shack. You remember my gov'nor was having a change round with his study. Well, I managed to take over his old room for my den, so now I have a posh place instead of the old shack. You know where his place used to be. It was built out from the west wing. He has shifted round to another room leading into the conservatory. I have left all the Tx gear down in the shack and rigged up remote control. How are you standing the storm? It's pretty bad here. The phone lines are down. How are your masts sticking it? I'll come back to you now, let me know if you have heard from the rest of the boys. G9XY going over to GP2S and standing by. Over.

BILL : GP2S here, Doug. Don't talk to me about the storm. It's enough to blow the insulators off the aerial. You're a lucky blighter, aren't you? The poor old masts are sticking it so far, but I'm sweating on the top line about the guys. Hang on, I can see them from the window. Lordy, one is jerking about with every biff of the storm. Let's hope she weathers it. I say, Doug. I just caught sight of a car's headlights cutting the blackness. Phew. . . . Poor blighters being out in this. They are just starting the climb up the old hill. Well, G9XY, I think I'll be calling it a day, so I'll just come back to you for your final remarks before closing down. This is GP2S going back to G9XY for final report before closing down and signing off. Over to you, Doug.

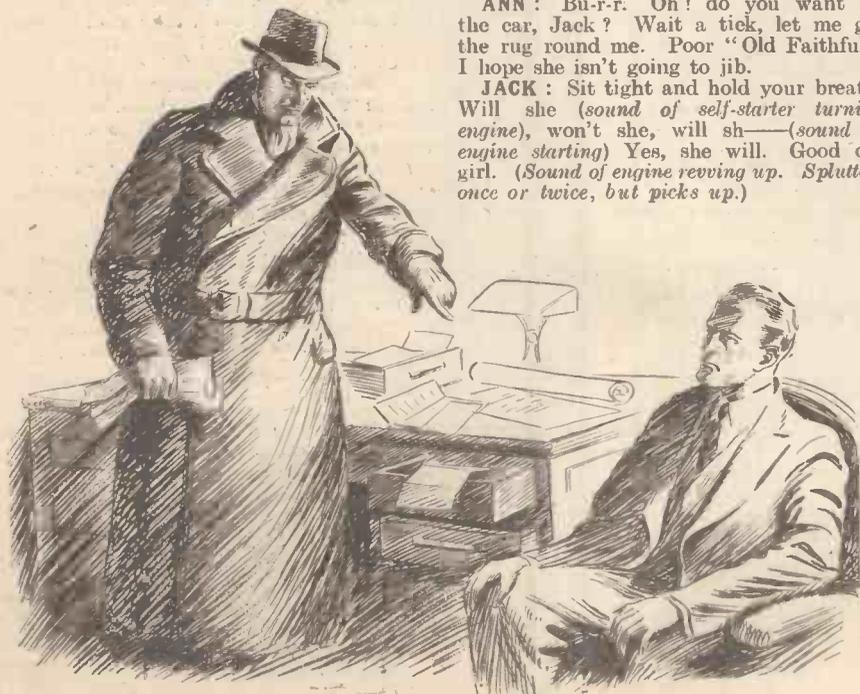
DOUG : G9XY here, Bill. I may have a punt around up on the twenties later on. I don't envy the folks in the car you mentioned. I am quite content indoors to-night. Nice and warm and all secure. I— (*Excitedly.*) Hi! What's the game?

RANIGAN : Stick 'em up, boy! Come on. This isn't no Christmas play acting. Stick 'em up, damn you, and keep your mouth shut. Turn round. Got the gag, mate? Frisk him and then lash up that mouth of his. Come on, make it snappy.

DOUG : What in the hell is your game?

RANIGAN : Stow it, or I'll—

JONES : Just a minute. Perhaps



"So you are getting reasonable at last, eh! Sir John?"



he can save us a bit of trouble by telling us where Sir John is.

RANIGAN: Huh... Yea... Well, just keep it quiet and don't get yelling your answers.

DOUG.: You can go to hell as far as I am concerned. Do you think I am going to STAND BY and see a couple of crooks swipe up all they want? Rats.

RANIGAN: Aw, quit your blasé talk and get down to business. Now, youngster, where is the old man and where would he keep those plans. Spill it and cut out all the boloney.

DOUG.: You swines. Do you think my father tells me of everything he brings home and where he puts it? In any case, my father is out. He has gone over to Bill Hayman's place to GET HELP for—
(*Sound of struggle.*)

RANIGAN: You poor sap. (*Sound of fist striking face.*) Then take that.

DOUG.: Ow... ur'r. (*Sound of thud as Doug. falls to floor.*)

JONES: My heck. You brute, Ranigan. You've knocked the kid right out.

RANIGAN: Now cut it, what do you expect me to do, kiss the kid? Come on, get that gag on and tie his wrists and ankles. I know what I'm doing. That sock won't hurt him. He'll be round in a few ticks. (*Grunts and sound of Douglas being tied up.*) *Slight pause. Fade in wind.*

BILL HAYMAN: Good God. (*Sound of feet rushing to door.*) Dad! Dad, here, quickly. (*Sound of footsteps as Bill's father comes into the room.*)

FATHER: What in the world be up, lad?

BILL: I was listening to Douglas Budleigh up at Moorside Towers, giving me a final report, when I heard him held up by burglars. They are after Sir John and some plans or something. Douglas managed to give me the tip to stand by and get help. What in the devil can we do on a night like this? I can't go with this damned leg of mine?

FATHER: Lawks a massey. Burglars at the Towers, the scoundrels. 'Ere, I'll go down to the village and get help.

BILL: No, dad, it would take agos to reach the village to-night. Besides... (*Excitedly.*) Here... there was a car starting to climb the hill just now. He can't have passed yet, go out and hold them up.

FATHER: Right, son, give me that torch. I'll stop 'em if they bain't gone by already. (*Sound of footsteps and the click of the door latch. Bring up storm sound as Bill's father goes out into the night, and then slamming of the door.*)

BILL: The blackguards. I only wish I could go over. 'Phone lines down. I daren't put out a call as I feel certain Doug. meant me to stand by. If that car isn't—
(*Break in sound of grunts coming through Bill's speaker in the form of morse code.*) (*Excitedly.*) It's Doug. G9XY calling GP2S. (*Softly.*) Hullo, G9XY. Bill here; take it easy and give me details. I heard the hold-up. Trying to get help. Over. (*Grunting morse starts again. Hold it for five seconds and then fade over to Jack and his wife in car plugging up Chav'n Hill. Sound of storm gets worse as they reach the top.*)

JACK: Come on, "Old Faithful," keep it going. I say, Ann, what a blinking hill; it's like trying to climb a corkscrew, what with the gradient and the bends. Are you all right?

ANN: Yes, I'm all right; you carry on.
JACK: I can make out the top of the hill.

ANN: Go on, old girl, only another lap... (*Excitedly.*) There it is, Jack!

I can see the lights over there. That must be the house Gaffer spoke about. Hurrah, we've made it. Good "Old Faithful."

JACK: Thank heavens for that. Great Scott! What in the devil is that? There's somebody waving a light about like mad.

ANN: Oh, lordy. I hope it's all right. Perhaps he wants help though, Jack.

JACK: Ah, that's better. He is in the beam of the headlights now and is holding up his arms for us to stop. (*Sound of car coming to a standstill, but engine keeps running slowly.*)

JACK (*heard faintly above the wind*): What do you want?

BILL'S FATHER: It's all right, zur. Zorry to trouble you, but can you come into my house and see my son? There's been burglars at Sir John's. Will 'e come in and see if you can do owt?

JACK: Well, my hat. Who said the days of adventure were past. Come on, Ann, we must at least see what's wrong. (*Sound of car doors opening and closing, steps on road, and engine being switched off.*) Right, lead the way then, old man, only make it snappy. (*Sound of opening house door, barking of dog and then fade down storm.*)

BILL'S FATHER: Bill, Bill, here's the folks. Quiet, Prince, back, boy. (*Cut out dog barking.*) (*Sound of morse coming through Bill's speaker.*)

JACK: Shush... (*Quietly.*) He is taking down a message.

BILL: (*Morse stops.*) O.K., Doug. Message received. Stand by, old man. (*To Jack.*) Thank heavens for the hill, and that we have been able to stop you. There's trouble over at Sir John's place. Two scoundrels are after plans of the new aeroplane. Can you help us out?

JACK: Phew...! What is it, fifteen miles away. Um-m. Two of 'em, you say. Have you got anything in the way of a gun? They are bound to be armed.

BILL: Yes, a good idea. Dad, get our two shot-guns and a few cartridges. You've got some pluck, sir, but what about the lady...? Will she wait here?

ANN: Certainly not. If you are going, Jack, then so am I.

BILL'S FATHER: Here you are, zur. Two of the finest double-barrelled shot-guns ever made.

JACK: Right, now give me details.
BILL: Sir John's room is at the rear of the house which can be entered through a conservatory. Keep straight along the road you are on; you can't mistake Sir John's place, as the entrance to the drive is flanked with two large stone pillars.

JACK: Right, come on, Ann, we have got to move if we are going to see any of the fun. Try and make contact with the police.

BILL'S FATHER: Take care, won't 'ee, zur. Let 'em have both barrels and then ask afterwards. (*Sound of storm as Jack and Ann go out. Rushing feet and then the slam of the car doors. Sound of self-starter and engine picking up. The car moves off. Introduce gear changing from bottom to top.*)

JACK: Come to glorious Devon for a nice quiet holiday. I didn't bargain for any shooting. Still, variety is the spice of life.

ANN: No, be serious for a moment; let's get this thing framed up properly—I mean to say, we can't just go dashing in there.

JACK: You are a blighter for convention, Ann, you needn't worry. I shall knock at the door and ask if I... Ow!

ANN: Rats. I mean to say, we must make a plan of attack.

JACK: I've got it. Stone pillars flank the drive. It's ten to one the crooks came down by car and will have their bus near

the house. If there are any gates to the drive we will shut them, but if not, we must place poor "Old Faithful" across the entrance. I'll go up to the house and try and scare them out, and, hopeful little lad, get the drop on them with this double-barrelled cannon. You, Ann, had better find some shelter near the drive entrance, then if the crooks should get into their car and make a dash for it, they will be baulked by "Old Faithful."

ANN: Ye... e, that sounds all right... but... Jack, don't be too rash will you... You know I couldn't... (*Fade out and fade in soft music to form a background to.*)

VOICE: GP2S calling GQ3T calling GQ3T GQ3T (*Repeat this several times.*) (*Fade down into music only and after five seconds bring in.*)

VOICE: GQ3T replying to GP2S GQ3T replying to GP2S GQ3T is standing by, so come in GP2S (*Fade up music again for a few seconds and then bring in.*)

VOICE: Hullo. GQ3T, this is GP2S calling. There are burglars at Moorside Towers, Sir John Budleigh's place, contact the police and get help. Very urgent. All 'phone lines down in this area. GP2S going over to GQ3T and standing by.

(*Fade up music for five seconds and then bring in.*)

VOICE: GQ3T replying to GP2S: Your message all O.K. Will contact police at once. Good work, old man.

(*Fade up music and hold it for fifteen seconds.*)

Sir John's Study.

RANIGAN: So you are getting reasonable at last, eh, Sir John? Well, it was either the plans or your daughter. I thought we could break your cursed determination if we turned to your gal...

SIR JOHN: You fiends. Don't think you will get away with this. You damned traitors.

RANIGAN: Aw' cut the cackle and just open up that wall safe... No, don't trouble to open the door. My mate can do that. I ain't green. You might have a gun in there. Stand back again. Now then, buddy, see if they are in there. Ah!... is that them? Good, now we are all O.K. (*Shuffling of feet as they move towards door.*) Unlock the door and put the key in the other side. Well, Sir John, we've got a date to keep, so we must toddle along.

(*Fade in quickly the sound of the french window being kicked open, the breaking of glass and shriek of Sir J's daughter.*)

JACK: Drop that gun, you rat.

RANIGAN: Like hell I will. (*Two cracks of automatic pistol.*) The LIGHTS... quick. (*Crash of shot gun. Click of switch going off. Shuffle of feet, door slams, click of key, and then rush of feet and slam of hall door.*)

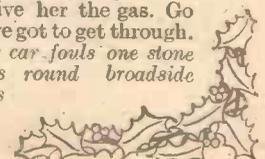
JACK (*faintly through door*): Switch on the light, Sir John, and follow me to the drive through the conservatory. They've locked that door.

(*Sound of car door slamming, self-starter, whirr of car engine, and then shriek of tyres as the car rushes down drive.*)

JONES (*Excitedly*): Hell, there's a car across the gateway. Look up!

RANIGAN: Give her the gas. Go for the gap. We've got to get through. (*Terrific crash as car fouls one stone pillar and skids round broadside into Jack's car.*)

(*Continued on page 316*)



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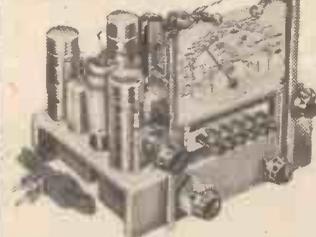
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Practical Television

December 3rd, 1938. Vol. 3. No. 128.

Improved Big Screen Television

THE televising of the Lord Mayor's Show and the Armistice Service at the Cenotaph served to feature the improved Baird big screen television equipment which has been installed in the Tatler News Theatre, London. The cinema was closed to the public for four days to allow the apparatus to be installed and tested, and the large audiences of several hundreds paid tribute to the big improvements in the results obtained. Unfortunately, the sky was very overcast for the Lord Mayor's Show, with the result that the pictures had a somewhat foggy appearance at the sides, but this was due entirely to the transmitted signal. This was proved very clearly by the remarkable results seen on Armistice Day, when the better weather conditions enabled the B.B.C. to radiate really excellent pictures that did credit to their service in every way. For the latter occasion three of the improved electron cameras were in use and their greater sensitivity made the work easier except when directed on the face of Big Ben, where the sun got into the lens, and made the clock face almost indecipherable. A new form of projection cathode-ray tube is employed and this is mounted on a projector unit accommodated in the centre of the front row stalls but set farther back from the screen than the original equipment. A much larger diameter lens is employed and the resultant brightness of the picture as seen on an 8ft. by 6ft. screen represents a great improvement on what has hitherto been achieved. If this rate of progress in the improvement of big screen television is maintained, and there seems no technical reason why such should not be the case, it will not be long before the television pictures will equal in brightness those seen in any West End cinema. For full cinema screen size, however, the line definition standard of 405 needs to be increased if complete justice is to be done to the televised picture, and there is no doubt that as the art progresses, this will take place.

The Public and Big Screens

UP to the present there has been a definite ban on the showing of the B.B.C.'s outside broadcast television pictures in places of public entertainment. On the occasion of the Armistice service, however, permission was granted for cinemas to be open to the public so that the broadcast could be seen. Difficulty in obtaining any sanction for big screen television demonstrations has so far centred on the question of copyright. The ruling of the B.B.C. on this occasion, however, was that as the Armistice ceremony at the Cenotaph was a national event, copyright questions were not involved. It would be an advantage if a general ruling was made that all similar national events that occur during the course of the year—State Opening of Parliament,

Trooping of the Colour, Lord Mayor's Show, and so on, should be made available at cinemas via big screen television. Following on this it is possible that satisfactory negotiations could be initiated to meet such cases as the Boat Race, notable football matches, boxing events, etc., where copyright difficulties could be surmounted by the payment of a fee to those holding the copyright. That events such as these would be an additional box office attraction, especially in the case of News Theatres, is a foregone conclusion. After all, commercial interests are involved in so far as the equipment is concerned at both the transmitting and receiving ends, and it is only right that they should be given an opportunity to reimburse themselves for the expenditure of such large sums in developing the equipment to such an advanced stage. That there

inner and outer faces of this glass window, as well as on the C.R. tube face, and the result is a partially dimmed and somewhat blurred picture. Cleaning the glass thoroughly but carefully with a chamois leather will make a remarkable difference to picture clarity and should be carried out wherever this is possible. The same thing happens with indirect viewing except that there is now an additional surface for collecting dust provided by the mirror reflector. If not surface silvered this can be cleaned in the normal manner, but when a surface silvered reflector has been provided it will be ruined if cleaned with an ordinary polishing rag. As a rule the manufacturer furnishes careful instructions for this work, and they should be strictly followed, otherwise the reflector can be ruined.

Looking Ahead

BEFORE the Tatler Theatre big-screen demonstration on the occasion of the televising of the Lord Mayor's Show, Mr. Baird made a few remarks which reflect the pioneer's ideas concerning big-screen work generally. He felt that the time was not far distant when the television screen would be taking its place as a permanent adjunct to the cinema screen. Its initial use would be for portraying topical events, but as development takes place the tele-



Leslie Banks as "Cyrano de Bergerac" noses into one of the television cameras at the dress rehearsal of the play which was broadcast recently from the Alexandra Palace Studios.

is public entertainment in big-screen pictures has been proved quite conclusively on many occasions, and there would be an added incentive to stimulate further progress if questions of this nature were amicably settled.

'Ware Dust

IT is not always realised by the average viewer that the presence of dust can mar what would otherwise be a very satisfactory television picture. In many cases when a picture is viewed directly on the cathode-ray tube screen, the tube face is protected by a sheet of glass so that it will not receive accidental knocks and cause the tube to crack. Dust will collect on both the

vision screen would slowly but surely supplant the present form of cinema screens. Eventually stage plays, topical events and cinema films would be broadcast from selected studios throughout the country to television projectors in every place of entertainment. This would effect large cinema savings in the cost of circulating films in addition, of course, to the great step which will have been taken in enabling audiences to see events at the instant they occur.

PATENTS AND TRADE MARKS

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

THERE is a very wide range of components and accessories from which the keen hobbyist may choose a suitable item for either a gift to another fan or which he may wish to receive himself from someone who is anxious to make a gift in this form. Such items range from the smaller components, costing only a few pence, up to complete units costing pounds. It would obviously be impossible to deal with everything which is available, but a

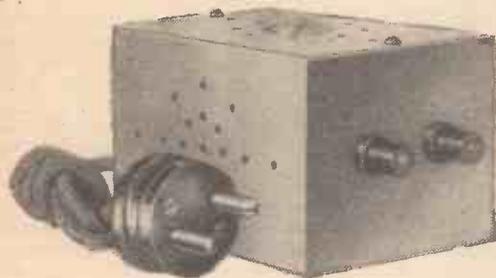
XMAS PRESENTS

the user to keep his battery in good condition. Similarly, a mains unit may be obtained in various forms and will enable the H.T. battery to be dispensed with.

There are also still many listeners using their radio receivers only for broadcast reception, and in nearly every case a pick-up may be used. Therefore, a good pick-up will make an ideal present and add to the range of entertainment which the radio set provides. A pick-up may be obtained as a simple unit for as low as 5s., or as a complete self-contained unit, with carrier-arm and volume control in various forms.

Among other useful items for presents are loudspeakers—either chassis models or complete cabinet models—microphones, batteries, valves and sundry accessories. Many an old receiver may be improved by re-valving, and a set of valves to-day is not an expensive proposition. It is also possible to make very satisfactory replacements of

components, such as coils and tuning condensers, which will improve many an old receiver. Cabinets, of which such a wide range at very reasonable prices are now available form a particularly useful gift as they not only provide means of making an attractive



Here is a typical trickle-charger—a Heayberd—costing 12/6.

guide will no doubt prove of great value in view of the very wide range which is available. For instance, a keen experimenter would no doubt find a meter of some kind very useful, whilst an amateur who is interested in short-wave work would undoubtedly find very acceptable a pair of good sensitive headphones. There are many listeners who are using battery receivers but who have mains facilities available, and to these a good battery charger will make a very useful present, enabling



NOTE SNAP CONNECTOR TERMINALS

A good pair of head-phones may be obtained at a reasonable figure and will please many amateurs.

installation out of a receiver and/or gramophone, but they also form, in the majority of cases, a useful piece of furniture. A modern "rack" assembly is always acceptable to the owner of an A.A. or full transmitting licence, while a quartz crystal, complete in holder, will always be appreciated by those interested in this side of radio. These suggestions are naturally rather brief, but a perusal of our advertisements, and perhaps of the catalogues of several of the well-known firms will enable one to select suitable items for Christmas presents.



A pick-up is an ideal present. Models are available from 5/- upward. The above is a Cosmocord piezo-electric model costing 30/-.



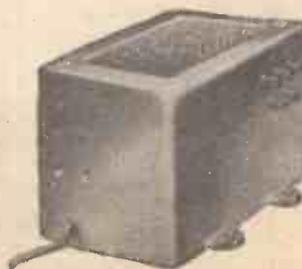
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BROADCASTING HOUSE, GLASGOW

A Brief Description of the New Scottish Broadcasting Headquarters at Kelvinside

THE new Broadcasting House, Glasgow, which has been in partial operation since May, 1938, was officially opened by Mr. Walter Elliot, M.P., Minister of Health, on Friday, November 18th.

The premises acquired by the B.B.C. for conversion into the new Glasgow studio centre were formerly occupied by Queen Margaret College, a training centre for women students which was part of the University of Glasgow. The site is on the banks of the Kelvin, adjacent to the Botanic Gardens, Kelvinside. The original College buildings have been considerably modified internally to suit the varied needs of broadcasting, and two new blocks have been built in a style which harmonises with them. The total ground area occupied by the buildings is now actually greater than that covered by Broadcasting House, London.

The Building

The original B.B.C. premises in Bath Street, Glasgow, contained one studio only, which was brought into use in 1923. In 1924 these were superseded by new premises in West George Street and the number of studios was increased to four. There are ten studios in the new Broadcasting House, of which No. 1, the large orchestral studio, has a volume nearly fifteen times that of the largest of the old studios. The new premises are fitted with the most up-to-date technical equipment, which has been developed by the B.B.C. as the result of the experience gained over more than fifteen years of broadcasting.

The Studios

The acoustic treatment of the studios is designed to give the best conditions for the type of programme for which they are to be used. To achieve this result the walls, floor and ceiling of a studio are covered with materials which have certain sound-absorbing properties.

Above the dados are blankets of rock wool one inch thick, arranged either in panels or in horizontal strips, alternating with plaster surfaces. Panels of acoustic felt are fixed to the ceiling. The wood panelling absorbs energy at the lower frequencies, due to resonance, while the rock wool and acoustic felt absorb mainly the higher audible frequencies. The required reverberation time at the different frequencies is secured by correctly proportioning the areas covered by the different materials. The floor coverings of these studios are of narrow oak strips laid on battens which are in turn fixed to the concrete floors.

The walls of the Talks and Gramophone Recitals studios and of the Narrators' studio used in conjunction with Studio 1 are panelled in wood up to within two feet of the ceiling, leaving a frieze which is filled with rock wool and building board. The floors of these studios are carpeted and the ceilings are of ordinary lath and plaster.

Of the two Drama studios, one is acoustically almost completely "dead," the walls and ceilings being covered with rock wool and the floor completely carpeted. The other has a reverberation period of 0.3 seconds brought about by the introduction of a dado of lath and plaster four feet high and a normal lath and plaster ceiling.

The Dramatic Control Room

Associated with these studios is a Dramatic Control Room containing a twelve-channel Dramatic Control panel. The fade controls on this panel to which the studios are connected, operate relays when they are faded up, which break the loudspeaker circuit of the studio concerned and prevent a "howl-back." Provision is made for the addition of artificial "echo" to the output of any studio by means of "echo" rooms situated in the basement. An echo room is simply a bare room containing a microphone and loudspeaker. A portion of the studio output is fed to the loudspeaker and, after being picked up by the microphone complete with "echo," is added to the studio output in the required proportion. The operation of connecting a studio or "echo" room to the panel is performed in the Dramatic Control room itself, thereby enabling changes to be made without involving the Control room. Signalling keys on the panel operate green cue lights in the studios and return lights are fitted so that the studio can indicate that all is

phones in the studio, a loudspeaker and headphones on which the studio programme can be heard and a visual volume indicator in the form of a "programme meter."

Control Room

In the Control Room, programmes originating in the studios or incoming by line are passed from a distribution desk to control desks where the monitoring and amplitude control is carried out. The (controlled) signals are then fed to another switching desk equipped for sending programmes to outgoing lines to the transmitters or other studio centres. Immediately behind the row of desks is a large amplifier rack containing high-gain microphone amplifiers, control amplifiers to compensate for the attenuation caused by the mixing and control channels, and incoming and outgoing line amplifiers. These latter adjust the volume level for sending to line or alternatively compensate for the drop in volume of the signals coming in from Outside Broadcasts or other studio centres.



The Control Room of the new Broadcasting House, Glasgow.

ready. A "talk-back" circuit enables the producer in the Dramatic Control room to speak into a microphone connected to the studio loudspeaker for giving instructions during rehearsals. On transmission, the programme cannot be interrupted and the talk-back microphone is then connected to headphones only in the studio.

Adjoining the various studios are listening rooms wherein the control of the volume range of programmes originating in the studios may be carried out. The acoustic treatment is identical to that of the talks studios, and a glass window is provided between each studio and its listening room to permit a view of the studio from the control position. The equipment includes a fading and mixing unit for selecting or combining the outputs of the various micro-

The actual switching is done by punching keys operating 24-volt relays. Each studio is tied to a microphone amplifier, and it is the output of these amplifiers which is connected to the input-switching relays of the control amplifiers. The gain of the control amplifiers can be adjusted by potentiometers on the desks in the control room, in the studio listening rooms, or in special control cubicles provided for the purpose. The control potentiometers on the control room desks and in the studio listening rooms are connected in series. Whichever one is not in use for controlling must, therefore, be faded right up. Some indication is desirable and this is given by lamps which glow brightly until the control is fully faded up and are then dimmed by the action of a relay circuit.

Xmas Records

WITH the approach of Christmas one thinks of parties and entertaining friends, and one of the best forms of entertainment is undoubtedly the gramophone. Although the various companies have not yet released their Christmas records, there is a wide selection of interesting items in the latest releases.

For the music-lover the Parlophone Company have issued an ideal Christmas gift consisting of a complete recording of the opera "Turandot." It is recorded on sixteen 12in. double-sided records, complete in two handsome art albums, with libretto (in Italian) for £4 16s. The cast taking part are Gina Cigna (Turandot), Franco Merli (The Unknown Prince), Magda Olivero (Liù), L. Neroni (Timur), A. Poli (Ping), A. Zagonara (Pang) and G. Del Signore (Pong). The numbers of the records are Parlophone R 20410 to R 20425; single records 6s. each.

Richard Tauber has chosen two well-known songs "Sylvia" and "Trees" for his latest disc, Parlophone RO 20426. He sings both songs in English, and it is definitely an outstanding record.

A 14-year-old Singer

ONE of the most interesting records this month features a fourteen-year-old girl soprano, who records for the first time. She is Millicent Phillips, and was discovered and trained by Mavis Bennett, the distinguished singer. She has been advised to go to a London college of music to complete her training, but her father cannot afford the fee, so Millicent's career is therefore in jeopardy.

If her records sell she will have a chance to complete her musical education—if not, England may lose a brilliant little singer. Her recorded titles are "Il Bacio" and "Voices of Spring," sung to the accompaniment of a full orchestra. I hope readers will make a point of hearing this record—Parlophone R 2589.

Miss Phillips has not appeared in public, but was given a broadcast in "Band Waggon" on November 2nd, and received an ovation.

Variety

LESLIE HUTCHINSON (Hutch) has two records this month, "Cinderella Sweetheart" and "A Garden in Granada"—Parlophone F 1268 and "Change Partners" coupled with "I Used to be Colour Blind" from the film "Carefree" on Parlophone F 1269.

Medley records should prove popular at Christmas parties, as everybody can join in the choruses. Ivor Morton and Dave Kaye on two pianos with string bass and drums have made "Tin Pan Alley Medley No. 12" on Parlophone F 1270, and they introduce several of the latest hit tunes.

Ideal dance records in strict dance tempo are supplied by Victor Silvester and his Ballroom Orchestra. They are "Change Partners" and "The Night is Filled with Music" on Parlophone F 1263, and "Cinderella Sweetheart" coupled with "Is That the Way to Treat a Sweetheart?" on Parlophone F 1264.

A humorous recording is supplied by Douglas Byng, the popular comedian, with "I'm a Bird" and "The Mayoress of Mould-on-the-Puddle" on Parlophone F 1277.

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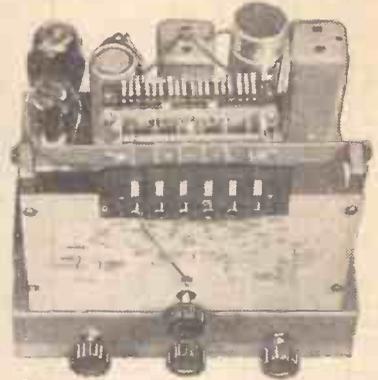
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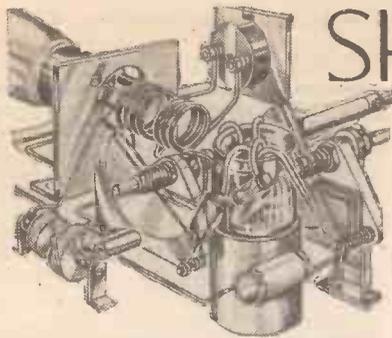
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SHORT-WAVE SECTION

THE CHOICE OF L.F. COUPLING

Points to be Considered in the Choice of Suitable L.F. Coupling in S.W. Receiver Design are Discussed in this Article.

Of the many problems which face the constructor in the course of designing a new receiver, that concerning the choice of L.F. coupling requires considering both as an individual function and again in conjunction with the H.F. section of the circuit.

The simplest form of coupling, and one which is favoured particularly for circuits working on the higher frequencies, is the resistance-capacity method, and although this undoubtedly provides the better quality, whilst being the cheaper way, the alternative systems of transformer and choke coupling, including such as filter feed, have their merits in other directions.

this brings one to the question of reactance.

By fitting a large-capacity condenser at the junction "X," whilst splitting the anode resistance, as shown by the dotted lines, the signals arriving at this junction have the option of two paths to earth, the shorter of these being governed by the reactance of the condenser at the actual frequency of these signals. To make this clearer one should consider the meaning and method of determining this value; and below is given the formula for this in respect of condensers.

$$\text{Reactance (in ohms)} = \frac{1,000,000}{6.28 \times f \times C}$$

Where f equals the frequency (calculated usually between 50-100 cycles), and C equals the capacity in mfd.

Example:

$$\frac{1,000,000}{6.28 \times 50 \times 1} = 3,184 \Omega$$

From this formula it will be apparent that the value of the resistance on the H.T. side of the condenser should be made so that for the frequency response, the reactance of the condenser will always be less, thus offering a shorter path to earth.

Voltage Drop

The next point which arises concerns the voltage drop which will result in the use of resistances

in the anode circuit, thereby necessitating the employment of a larger H.T. battery than would be deemed essential for the satisfactory operation of the particular valve used in the detector stage.

To meet this condition, an alternative method would be achieved by using a directly-coupled transformer (see Fig. 2), this arrangement permitting the by-pass condenser return to be made more direct whilst the voltage drop through the resist-

tance of the transformer primary is very much lower than that in Fig. 1, at the same time the signal voltage at the injection grid of V2 has been boosted by the step-up characteristic of the transformer secondary, unless, of course, a ratio of 1:1 is being used.

This may seem a comparatively sound solution to the problems, but whereas in a fairly simple detector L.F. broadcast circuit instability through H.F. feed-back might not be apparent to such an extent that reproduction is marred by "motor boating," this arrangement when used indiscriminately for short or ultra-short-wave work can cause endless trouble in the nature

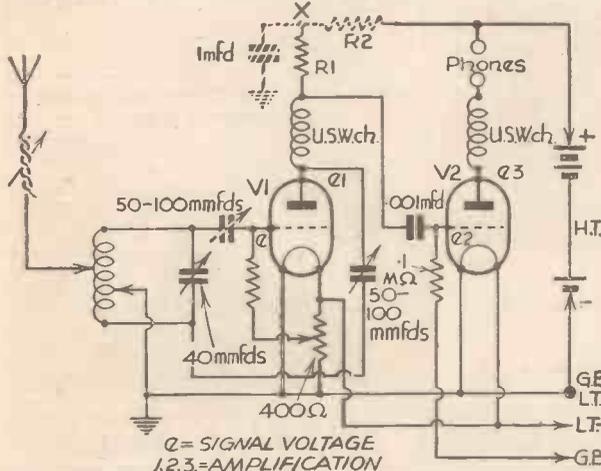


Fig. 1.—A typical ultra-short-wave circuit showing voltage variation from stage to stage.

The points which arise with short-wave receiver design concern primarily the effects of decoupling and H.F. feed-back, or "break through," and the ultimate possibilities regarding instability in badly-arranged transformer coupling.

For a practical example reference can be made to Fig. 1 which shows in theoretical form a commonly used ultra-short-wave circuit. Now in the first place the received signal voltage "e" at the grid of the detector is increased by the amplification of this valve, and becomes "e1" at the anode, but in view of the alternating character of this signal and the lack of decoupling in the way of a by-pass condenser to earth, some of the H.F. signal will most certainly find its way back to earth through the H.T. battery, as this constitutes the shortest path of resistance. This condition of feed back causes L.F. instability through difference in the phase relationship of "e" and "e3" with ultimate loss in amplification.

Counteracting Feed-back

To combat this deficiency, it is necessary to introduce a shorter path to earth for the H.F. signals "e1" and

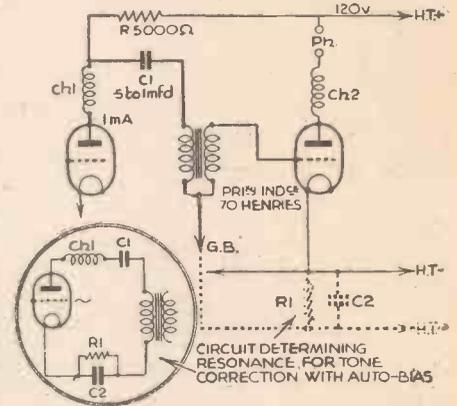


Fig. 3.—Circuit diagram of a filter-fed transformer system.

of loss of amplification and hand-capacity effects through the output stage.

Filter for Transformer Coupling

One must now look to the method which will still permit the retention of the major benefits obtained in transformer coupling; thus we get the well-known filter-fed transformer system.

In Fig. 3 is depicted a method which, whilst requiring the use of a resistance of, say, 5,000 ohms for the detector H.T. decoupling, will cause only a negligible drop of about 5 volts, assuming the anode dissipation to be in the neighbourhood of 1 milliamp.

The by-pass condenser now serves to return some of the H.F. signals to earth through the grid-bias battery, or if automatic bias is being used, as shown by the dotted portion, through a low bias resistance and another by-pass condenser C2.

In this circuit another condition arises which must be taken into consideration, namely the resulting resonance of the inductance/capacity circuit, and this will naturally mean that any variation to either inductance or capacity will result in tonal

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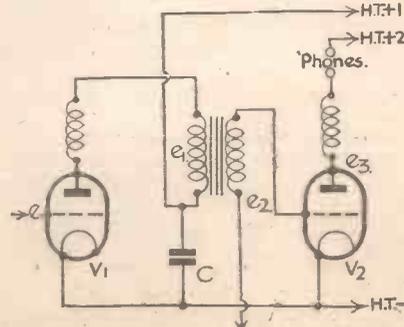


Fig. 2.—Circuit diagram incorporating a directly coupled transformer.

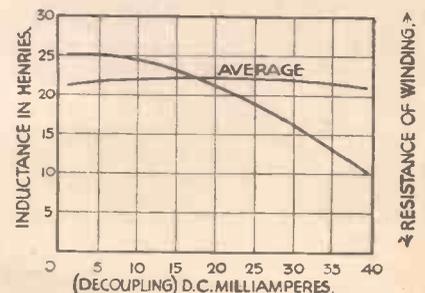
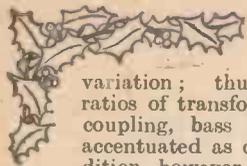


Fig. 4.—Illustrating the drop in inductance resulting in a badly designed choke using thin high-resistance windings.



(Continued from opposite page)

variation; thus with different ratios of transformer and capacity coupling, bass and treble can be accentuated as desired. This condition, however, is not so vitally important when dealing with small short-wave circuits where only one or perhaps two stages of L.F. amplification are in evidence, but proves an asset in powerful receiver design.

One of the advantages in using filter-fed transformer coupling, so far as short-wave circuit design is concerned, lies in the smallness of such transformers specially designed for this coupling. It will be apparent that the primary winding of these transformers is not called upon to carry any appreciable current, therefore the use of finer wire is permitted, but without detriment to the response to the frequencies it is to handle.

Due to the high permeability of the metal used in the construction of such transformers, it is possible when the anode current of the preceding valve does not exceed the manufacturer's limits, for direct transformer feed to be employed, and with excellent results, and from the point of view of short-wave design, the overall dimensions of the average filter-fed transformer are such that a very small field is offered; this means that H.F. influence externally is reduced to a minimum, whilst compact component lay-out is permitted. Screening between the H.F. and L.F. portions, whilst helping to cure instability, can if badly arranged, cause damping; and should the earth connections to the screen be in any way deficient, it is quite possible for some of the H.F. currents to be "deflected," thus influencing any adjacent component, particularly of an inductive nature, and giving rise to either parasitic oscillation or instability.

In the case of a tuning inductance or, say, an H.F. choke, the reactance of this component can be effected with consequent loss at certain frequencies, and again in the instance of a detector anode choke, resulting in the complete cessation of either reaction or regeneration.

Permeability

The permeability of a choke or transformer is important when considering reactance in direct-fed amplifying stages, inasmuch as the decoupling is concerned, and a typical example of a choke which depreciates in inductance value with the increase in anode current can be graphically illustrated, as in Fig. 4.

The reason for this falling off at the end of the curve can invariably be traced to the

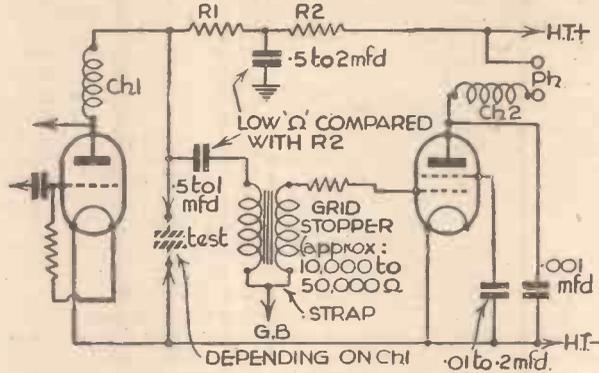


Fig. 5.—Suitable values for the various components are given in this illustration.

inferiority of the winding, this being usually due to the employment of a much thinner gauge of wire. The formation of the laminations of the choke or transformer constitute another cause for depreciation, although this will not have anything to do with curve given. The "curve" should be very nearly "straight" to represent the desired response in a good choke.

Considering the foregoing notes, it will be clear that for preference, the resistance capacity method of decoupling should be used in short-wave work, and it is generally well worth while sacrificing a little H.T. in the interests of the points mentioned.

The merits of transformer and filter-feed coupling should be applied after at least one stage of R.C., and it is bad policy to try to boost up signals by resorting to more than one stage of direct transformer coupling, even if the system is to be such that the

first stage of amplification is carried out by filter feed, and followed by direct transformer coupling.

Space will not permit further notes on the prevention of parasitic oscillation, but there are a few final remedies which can be found in grid and anode stopper resistances or H.F. chokes, not forgetting the free use of anode by-pass condensers under extreme conditions. These condensers can be so arranged that the by-pass capacities for each individual stage of amplification are of different value, thus filtering more effectively the stray H.F. signals at each point of amplification. The reactance of these condensers at these different frequencies varies the path of resistance to earth irrespective of the actual component resistance. Figs. 5 and 6 outline in a self-explanatory way the considerations just made, and should the reader try out the effects of different capacities from anode to earth, the leads of any condenser pack, or test box, should be unscreened, and as short as possible; the

best method, of course, is actually to solder the condenser into the receiver in each case, noting the response.

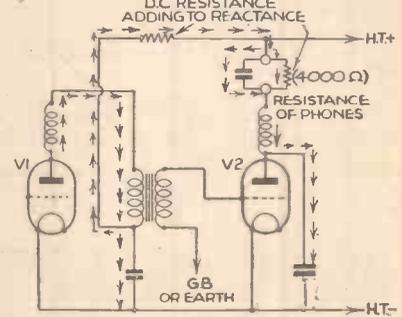


Fig. 6.—This diagram shows the main direction of current flow as explained in the text.

Short-wave Broadcasts from Switzerland

PENDING the bringing into operation of special transmitters, the Swiss Broadcasting authorities are transmitting radio programmes at regular intervals through the Prangins (League of Nations) stations. Every Monday at G.M.T. 23.45 HBL, on 32.1 m. (9.34 mc/s), and HBP, on 38.48 m. (7.79 mc/s), broadcast to North and South America respectively. In addition a series of transmissions are made on the first Saturday in each month through HBO, on 26.31 m. (11.4 mc/s), at G.M.T. 07.45 for Southern Asia, Australia and New Zealand, and through HBJ, on 20.64 m. (14.53 mc/s), at G.M.T. 12.45 for the Far East, with a further transmission at G.M.T. 16.45 destined to African listeners.

Another Broadcaster in Cuba

COCA, Havana, habitually used for the relay of radio programmes to the United States, may now be picked up on 32.97 m. (9.1 mc/s). Address: Avenida de Italia, 102, Havana (Cuba).

Short-wave Programmes from Iraq

PENDING the opening of the proposed short-wave Baghdad-Chiftlig transmitters a small experimental station is now

Leaves from a Short-wave Log

relaying programmes from the local medium-wave studio. The channel is 41.67 m. (7.2 mc/s). Times: G.M.T. 13.30-20.00 daily.

Radio in French Cameroons

FOR the relay of the news bulletins from Radio-Mondial (Paris), and also for the broadcast of local news and announcements, the French Colonial P.T.T. have placed a short-wave transmitter at the disposal of the authorities. Most broadcasts are made on 26.62 m. (11.27 mc/s), on a power of 800 watts through station FIA6 at Douala.

For Ultra-short-wave Listeners

HERE are a few calls of the U.S.A. Police Headquarter transmitters working on the 8 and 9 metre bands: WQJD, Reading (Mass.), 7.916 m. (37.9 mc/s); WQIJ, Hackensack (N.J.), 8 m.

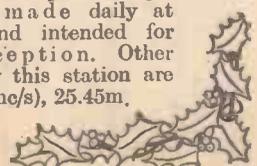
(37.5 mc/s); WQJG, Wellesley (Mass.), 8.357 m. (35.9 mc/s); WQIP, Boston (Mass.), 8.451 m. (35.5 mc/s); WQIK, Eaglewood (N.J.), 8.955 m. (33.5 mc/s); WQIY, Atlantic City (N.J.), 9.063 m. (33.1 mc/s); WPPA, City of Newtown (Mass.), 9.44 m. (31.78 mc/s); WQJF, Chicago (Ill.), 9.646 m. (31.1 mc/s); WQIE, Newark (N.J.), 9.772 m. (30.7 mc/s).

Music-hall of the Air

UNDER this somewhat misleading title—at least, to British ears—W3XL, Boundbrook (N.J.), on 16.87 m. (17.78 mc/s), 35 kilowatts, now re-broadcasts from WJZ, New York (U.S.A.), abbreviated performances of Grand Opera every Sunday from G.M.T. 17.00.

Boston's Test Transmissions

WIXAL, Boston (Mass.), U.S.A., is trying out the new 10-kilowatt transmitter on 13.98 m. (21.46 mc/s). During October a special experimental broadcast was made daily at G.M.T. 15.00, and intended for European reception. Other channels used by this station are 19.67 m. (15.25 mc/s), 25.45 m. (11.79 mc/s), and 49.67 m. (6.04 mc/s).



TelevIEWS

A Successful Experiment

"I HAVE always held strongly to the view that it is folly to oppose the march of progress," were the words spoken by Basil Dean, the theatrical producer, at the conclusion of a very successful television experiment recently. It was the occasion when J. B. Priestley's Yorkshire farce "When we are Married" was televised direct from St. Martin's Theatre, and received on home screens with a clarity which rivalled many Alexandra Palace studio programmes. It was a lead which Britain gave to the television world, and a rough estimate states that more than 25,000 people saw and heard the play; the biggest audience ever known for a stage play. Mr. Dean is to be admired for his courage and foresight, and in emphasising that the new medium of entertainment furnished by television should be encouraged, pointed out that the theatre has no reason to be afraid, for the legitimate stage will never die. No doubt others will take the cue from this producer, and co-operate in a manner hitherto thought dangerous to their own interests. For the purpose of the experiment there was a general deepening of the make-up used by the actors, while more intensive lighting was provided round the stage and in the boxes. Three cameras, one at each end of the stalls and another in the circle, enabled the whole action of the play to be followed clearly, while the atmosphere of the theatre

was provided by the large audience in the seats, the rise and fall of the curtain, and the usual ten-minute interval. It would appear that the cast of the play seemed encouraged, rather than upset, by the unusual conditions operating and they acted with great vivacity, entering into the spirit of television adventure in a manner which called for praise. Anyone desirous of making a comparison with viewing the play from the auditorium and the pictures provided on the television screen could adjourn to an upstairs lounge where a television set enabled the rich humour of the play to be enjoyed. Signals were fed through to the cable ring which runs through the heart of London, and seemed to lose nothing in their quality when judged in comparison with direct studio material. It is hoped that this experiment will presage the inauguration of other play transmissions of a similar nature.

Television and the Planets

IN some quarters it was wondered why the B.B.C. did not make any attempt recently to televise the eclipse of the moon. The reason given was that the light of the moon was insufficient for television, but that as soon as the anticipated sun spots appear the B.B.C. may try to reproduce them on home television screens. The question of using electronic methods in relation to the study of the planets in the heavens has quite often been raised and, strictly speaking, there should be no prime difficulty in this connection. First of all, it is known that large electron microscopes have been built, these being capable of giving magnifications of several thousand diameters; in any case, considerably in

excess of any standard optical means. Is it not possible, therefore, for an image of any one planet to be focused on to the screen of an electron telescope in spite of the very low light value of the object? This could then be scanned, and the signal reproduced electrically after amplification by established methods. The resultant picture should then possess sufficient brightness and contrast to be focused on to an electron camera for subsequent reproduction as a television image. The results would be more certain if any intermediary scanning could be avoided as this may complicate the arrangements and necessitate elaborate synchronising arrangements. It is certain, however, that very soon the principles of television, or better still electronic engineering, will be harnessed to the needs of astronomy, and when this occurs it is equally certain that remarkable additions to our knowledge of the stars will materialise.

WIRELESS TRANSMISSION FOR AMATEURS

Edited by F. J. CANN

Explaining how to Learn the Morse Code: Applying for a Licence: Building and Operating the Set. Illustrated by Many Practical Diagrams.

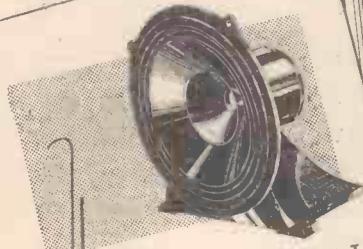
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above can be almost entirely eliminated. It is fairly obvious that if we start with a strip which, in all subsequent condition, is already curved, pressure applied laterally in one end will only tend to increase and decrease the amount of curvature. For the centre of curvature of comparatively small radius is necessary, whereas a large radius of curvature is used in the main design, where subjective harmonics are not likely to be troublesome, due to the fact that the main design is only used to reproduce the lower frequencies.

Another very desirable feature of the curved design is that it allows of an increased radial thickness of the material, which is a desirable feature in itself.



THE ATTAINMENT OF AN IDEAL

GOODMANS LOUSPEAKERS

5. Elimination of Bass modulation of the upper frequencies.

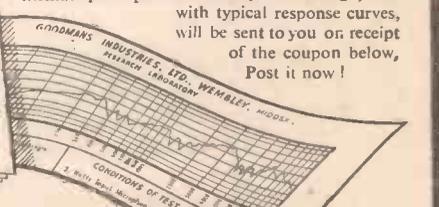
Bass modulation of the upper frequencies is the cause of a very unpleasant form of distortion which is heard as a rapid succession of high notes, giving the effect of a "rattle" or "chatter". This is caused by the voice coil vibrating at a low frequency (where the movement of the cone is in the same direction as the gap) and with the coil at rest the whole of the cone is acted upon by the magnetic field but immediately the coil starts to move, some of the cone will pass outside the field, or at least into a field of very much lower density. Since the driving force exerted by the coil on the cone is in the direction of the field, the cone will move towards the field, and a reduction in the force and current, and hence in the field, means a reduction in the force and current. Thus, for example, a 50 c.p.s. note with a 100 v.p.s. note superimposed. During one half cycle of the 50 c.p.s. note the cone will move towards the field, and the result will be a 100 v.p.s. note. In the next half cycle of the 50 c.p.s. note the cone will move away from the field, and the result will be a 100 v.p.s. note, gradually decreasing to a minimum then increasing in intensity from the previous cycle, so that instead of reproducing a steady note at 100 c.p.s., we have a note which is steadily varying at the rate of 100 c.p.s. This may be remedied either by arranging that the coil is very much longer than the gap, or that the gap is very much longer than the cone. In the first case a similar number of turns of wire is used in the gap, whilst in the second case the coil is arranged to be of constant strength since the coil does not travel beyond the end of the gap. Both these methods cause a diminution in sensitivity, but owing to the greater axial length of gap required for the second method, a much larger magnetic system is required for the second method, a much larger magnetic system is required for the second method, a much larger magnetic system is required for the second method.

6. Freedom from Hum.

In designing these High Fidelity Loudspeakers it was decided to use Permanent Magnets provided flux densities at least equal to

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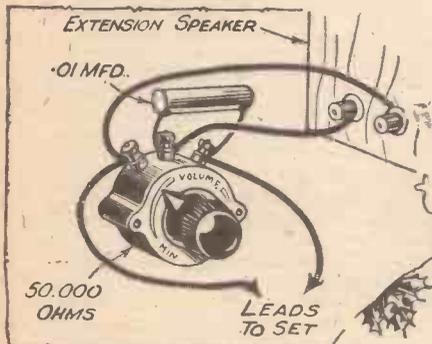
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RADIO REVELS

How to Use Your Radio to Add to the Party Spirit

WHEN the party spirit is beginning to flag and you have exhausted all the usual indoor games, it should not be forgotten that the radio receiver may be turned to good account and will provide considerable entertainment, apart from its normal function of providing speech or music for listening purposes. If you have a microphone or pick-up you can add still further to the many ideas which may be employed in making your set take its part in the festivities. There are many versions of Musical Chairs, such as Musical Arms, where the players link arms instead of sitting down when the music stops, or where a paper hat is passed from one head to another whilst the players stand in a ring, the players upon whose head the hat rests going out when the music stops. Other ideas may be used, and by making use of a radio-gram, the record may provide the music and the pick-up may be lifted to stop the music or a switch may be included in the circuit to produce the necessary silencing effect. If you want to make the game more interesting the pick-up may be in another room, and the reproduction carried out through an extension speaker. The latter may be silenced or controlled by means of a standard volume control across it as shown below, and the record may thus be left in place through the entire record.



An extension speaker volume control.

Guessing games may be introduced by playing short extracts from records, placing the needle at the beginning and switching in at odd places for just a bar or two. Alternatively, by making another hole in the record, separated about $\frac{1}{4}$ in. from the original hole, the record may be played eccentrically and this will make it very difficult to identify a tune or voice.

Playing Records Backwards

Another interesting idea is to play a record backwards, driving it by pressing it against the edge of the turntable, round which a length of adhesive tape has been affixed. Care must be taken to place the pick-up in the correct position so that the needle does not dig into the record. Special records are also supplied by the well-known record companies in which race games or medleys are provided.

By interrupting the output circuit you can also introduce some good competitions. The two leads normally taken to the extension loudspeaker should be disconnected, and the single lead from the output filter condenser should be attached to some metallic body which is in contact with the speaker, whilst a large number of leads should be bunched together and

attached to some non-metallic object. Included amongst these leads should be one which is joined to the nearest earth point (or to the remaining extension lead). If now any of the bunched leads are touched to the remaining speaker terminal nothing will happen, but if the earthed lead is placed there the signals will be restored. Versions of Hunt the Slipper, Blind Man's Buff and other party games may be introduced, by giving each player a lead or letting them select one, and the player who finds the "live" lead is the winner.

Various "gambling" games may be made up with these loose ends, attaching

them to a board of plywood and arranging for various metallic objects to be moved over it. Drawing-pins may be used as contact points, and coins could be thrown on the board, the arrangement of the points being so made that certain combinations which can be bridged by a coin will complete the circuit. Alternatively, a map of Europe may be used and various towns connected to the points, and the players have to identify the towns when called out and thereby complete the circuit. Journeys from one place to another may be made in this manner, the pair completing their journey first being declared the winners.

The ideas given above should give everyone some indication of the various uses to which the receiver may be put, and no doubt many interesting versions will suggest themselves when once the main ideas have been grasped.

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Anyone who smokes is sure to like Capstan. The following sizes are supplied in these attractive Christmas cartons: Flat 50 box (as shown), at 2/5 — Flat 50 tin, at 2/6 — Box of 100, at 4/8 — Tin of 100, at 4/10 — and Box of 25, at 1/3.

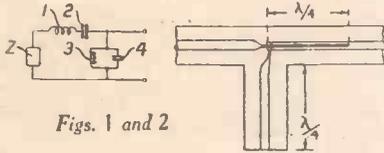
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LATEST PATENT NEWS

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WIRELESS SIGNALLING.—Cork, E. C., and Pawsey, J. L. No. 490449.

An aerial or other load impedance, the effective resistance of which varies with frequency in a parabolic manner over the range of frequencies to be handled and the reactance of which varies linearly is associated with shunt and series reactances



Figs. 1 and 2

which render the resistance and the series reactance substantially constant over said frequency range. In one embodiment, when the resistance of an impedance Z, Fig. 1, decreases with variation from a fixed frequency in the range, a series resonant circuit comprising inductance l and capacity 2 compensates for said decrease and a parallel resonant circuit 3, 4 connected across the combination 1, 2, Z compensates for the variation in susceptance. The

parallel circuit may be tapped to form an auto-transformer. The lumped reactances may be replaced by quarter wavelength transmission line sections. A similar arrangement is described for the compensation of a resistance characteristic which rises on each side of a fixed frequency in the range to be used. Reference is made to Specifications Nos. 451494 and 469245.

WIRELESS SIGNALLING.—Lorenz Akt.-Ges., C. No. 490485.

To enable a superheterodyne receiver to receive signals simultaneously on two wavelengths, the intermediate frequency is arranged to be the same frequency as that of the wanted transmission and a single aerial is coupled to both the heterodyning part of the receiver and the i.f. amplifier. As shown the heterodyning part 1 of the receiver is coupled to aerial

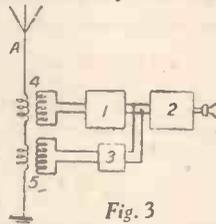


Fig. 3

A by coupling 4, the i.f. signals being fed to the i.f. amplifier 2. The aerial is also coupled to the i.f. amplifier directly by coupling 5 through rejector device 3 which is provided to prevent back-coupling. The apparatus is intended to be used for the receipt of distress signals, the intermediate frequency being equal to that on which distress signals are broadcast.

AERIALS.—Cork, E. C., Manifold, M. Bowman, and Pawsey, J. L. No. 490414.

A capacity-loaded aerial is formed by severing two twisted lengths of wire 1, 2 alternately as indicated at 3 and 4 respectively. The wires are mutually insulated by enamel or cotton covering 5, and a rubber sheath 8 and a suitable core 7, which may be reinforced to assist suspension of the aerial, are provided. Fig. 4.



Fig. 4

PRACTICAL WIRELESS SERVICE MANUAL
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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 Patents from 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

- 32445.—Antenne and Kabel Akt.-Ges.—Frame antenna arrangement for non-directional reception. November 8.
- 32096.—British Thomson-Houston Co., Ltd., and Kinman, T. H.—Radio interference suppression devices. November 5.
- 32581.—Edwards, B. J., Jackson, D., and Pye, Ltd.—Scanning, etc., devices for cathode-ray tubes. November 9.
- 32040.—Garrard Engineering and Manufacturing Co., Ltd., and Offen, F. J.—Pick-up control mechanism for automatic gramophones. November 4.
- 32025.—Hazelkline Corporation.—Television scanning systems. November 4.
- 32197.—Ideal Werke Akt.-Ges. fur Drahtlose Telephonie.—Motor control for the tuning means of broadcast receivers. November 7.

- 32031.—Kolster-Brandes, Ltd., and Smyth, C. N.—Sound-reproducing apparatus. November 4.
- 32393.—Lorenz Akt.-Ges., C.—Television transmitters. November 8.
- 32362.—Scruby, B., and Roberts, A. J.—Method for receiving inaudible sound vibrations. November 8.
- 32388.—Standard Telephones and Cables Ltd.—Systems of exploration for picture transmission. November 8.

Specifications Published

- 494857.—Pinsch Akt.-Ges., J.—Electromagnetic resonators for use in radio or like apparatus.
- 494967.—Fernseh Akt.-Ges.—Television and like apparatus.
- 495035.—British Thomson-Houston Co., Ltd., and Eade, S. R.—Illuminating systems for optical-projection apparatus.
- 495066.—Metcalf, C.—Radio and like receiving apparatus.
- 494979.—Strafford, F. R. W., and Belling and Lee, Ltd.—Radio-frequency receiving systems.
- 494939.—Aga-Baltic Radio Aktiebolag.—Arrangements for automatically controlling the volume in radio receivers.

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.

BOROUGH POLYTECHNIC'S NEW LECTURER IN RADIO ENGINEERING

A NEW appointment of Lecturer in Radio Engineering has recently been made by the Governors of the Borough Polytechnic. This is a full-time appointment necessitated by the developments which have recently taken place in the Department, including courses for the new

National Certificates in Radio Engineering, and those in Radio Service Work, and additional Day Courses in Radio Communication.

Mr. S. N. Ray, M.Sc., A.M.I.E.E., A.Inst.P., has been appointed to fill the post. In addition to holding a first-class honours degree in Physics of Calcutta University, Mr. Ray obtained an Honours Degree in Electrical Engineering at London University.

TELEVISION AT CHRISTMAS

SOME good fare is promised for the festive season when an interesting programme opens with Gordon Daviot's historical drama, "Richard of Bordeaux," in the evening of December 18th, with Gwen Ffrangcon-Davies in her original part as the Queen. The play will be produced by Michael Barry. On the following afternoon, Stephen Thomas will present "The Knight of the Burning Pestle," by Beaumont and Fletcher, an Elizabethan comedy which stages a play within a play, with interruptions from the audience. A high-flown drama of thwarted love is thus reduced to something which has been described as "period panto."

In the evening of December 19th, Reginald Smith will present "Review of Revues," featuring Phyllis Monkman, Edward Cooper, Queenie Leonard and other stars of the "Re-view" shows, which have now reached their seventh edition.

Edgar Wallace's exciting detective play, "The Ringer," will be televised in the afternoon of December 21st, and evening of December 27th. In the evening of December 21st, Spike Hughes's burlesque pantomime, "Cinderella," will be presented by Dallas Bower. This was originally broadcast last Christmas.

In the evening of Christmas Day, Noel Coward's comedy, "Hay Fever," will be presented by Reginald Smith, with Kitty de Legh, playing Marie Tempest's original part of Judith Bliss.

In the afternoon of Boxing Day, "Once in a Lifetime," the brilliant comedy of Hollywood life by Moss Hart and George Kaufmann, will be presented by Eric Crozier, with Joan Miller and Charles Farrell in the leading parts. This is the first television play to run into five performances.

Denis Johnston will present his own play, "The Moon in the Yellow River," in the afternoon of December 28th.

Books for Christmas

BOOKS are, of course, the most acceptable of gifts at any time, and for the wireless amateur there is a wide range of technical books available from this office. We show below a reproduction of five of these, and from the complete list it will be possible to select a volume which will appeal to every type of listener. For the beginner, for instance, there is the *Wireless Constructor's Encyclopædia*, now in its sixth edition. This costs 5s. (5s. 6d. by post) and deals with the subject of radio on the lines of an illustrated dictionary. If, for instance, you come across some term in an article in these pages which is not clear to you, turn it up in the *Encyclopædia*, and you will find not only a description but, in many cases, practical illustrations or applications of the device or circuit referred to. There are 394 pages and nearly 500 illustrations.

Another very good book for the beginner is *Everyman's Wireless Book*. This is so

receivers described, full-size blueprints are available at 1s. each. This book costs 2s. 6d. (by post 2s. 10d.).

Wireless Coils, Chokes and Transformers gives detailed instructions for making short-wave and broadcast coils, L.F. and mains transformers and various types of choke. Wire tables and all relative matter is included in the 172 pages, and the cost is 2s. 6d. (post 2s. 10d.).

The *Service Manual* tells you in simple language how to service a modern receiver, and in addition to a description of the various faults commonly met with, there is some valuable data on the construction and use of various types of testing equipment. There are 288 pages, and the cost is 5s. (5s. 6d. by post).

Transmission

For the amateur who is interested in radio transmission, there is an interesting volume dealing with the subject from the

Sixty Receiver Designs ranging from Crystal to Superhet Receivers, Battery and Mains operated.

An Ideal Gift for the Experimenter. How to Build all Kinds of Coils, Chokes and Transformers.

A Valuable Guide to Modern Radio. Arranged in Alphabetical Order, with 500 illustrations.

A Complete Guide for the Beginner, Covering Design, Construction and Operation.

Modern Television Practice and Design, with Short-wave Technique and Receiver Design fully illustrated.



arranged that even a schoolboy will be able to follow the subject, and it forms a very good guide to modern radio, dealing with various items of equipment, making testing apparatus, and so on. It shows how to build a receiver and how to trace and check faults which might arise. Details are given on selecting loudspeakers, and so on. This costs 3s. 6d., or 3s. 10d. by post.

For the Advanced Amateur

The keen experimenter or advanced amateur is catered for by several text books such as the *Service Manual, Transmission for Amateurs, Workshop Calculations*, and others. For practical work there is *Sixty Tested Wireless Circuits and Wireless Coils, Chokes and Transformers*. The former, as its name implies, gives sixty circuits, ranging from simple crystal sets to multi-valve superhets, and lists of parts and layouts are given. In the case of some of the

theoretical and practical point of view. In addition to a description of the various pieces of apparatus needed at a transmitting station there are descriptions of transmitters and how to use them. The price is 2s. 6d. (post 2s. 10d.).

Workshop Calculations

Finally, for the keen handyman *Workshop Calculations, Tables and Formulae* will be found of the utmost value, giving such details as workshop mathematics (square root, cube root, progressions, weights and measures, etc.) with valuable tables. This is 3s. 6d. Uniform with this is *Practical Mechanics Handbook*, 400 pages, covering mechanical drawing, tool-making, lathe equipment, soldering and brazing, blueprints, mechanical drawing, polishing and finishing metals, casting, battery charging, etc. This costs 6s., or 6s. 6d. by post.

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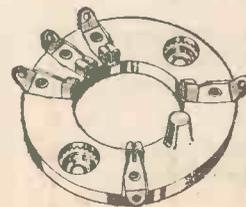
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CLIX OCTAL Type. 10d. each.

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Radiogram Chassis, with Radio Frequency Pre-amplifier, 3 stages of A.V.C., and 8 Watts Resistance-Capacity Coupled TRIODE Push-pull Output. Model A.W.93 P.P.



This chassis is built for **QUALITY** incorporating an efficient short-wave band, 16-50 metres, but essentially designed for high quality reproduction. Circuit incorporates highly efficient radio frequency pre-amplifier, 3 stages of A.V.C., resistance-capacity coupled, push-pull output of 8 watts.

The finest British made materials are used throughout, and a heavy pressed steel chassis, cellulosed grey, is used for construction. The size of chassis, 12" x 9" x 10½". **Price 10 Guineas.**

Packing and Carriage Free. 7 Days Trial. Carriage Paid. **Armstrong 12 months guarantee.**

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PRACTICAL MECHANICS

The Magazine of Modern Marvels

Contents of the December PRACTICAL MECHANICS include:—

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HOW TO PLAY THE PIANO
By Maurice Reeve, famous broadcasting pianist.

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6^D DEC.



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).

Correspondents Wanted

SIR,—I have been a reader of your invaluable paper for about three months. It was the Short-wave Section that caused me to become interested. I would like to correspond with an overseas reader about my own age (17½ years) who is also interested in short-wave listening.—**N. G. REYNOLDS, 71, Checkett Road, Belgrave, Leicester.**

SIR,—I should be very pleased to correspond with one or two readers, either in England or abroad, who are interested in short-wave listening. I am only a raw beginner, but find your splendid journal very interesting.—**F. SWINDEN, 112, Westborough, Scarborough, Yorks.**

Another Prizewinner's Thanks

SIR,—May I express my appreciation of the W.B. Stenonian Junior Speaker which I was fortunate enough to win in your recent Radiolympia Competition. I have it in use as an extension speaker for a 4-v. A.C. superhet, and it is certainly "doing its stuff"; in tone and sensitivity it is truly amazing.

May I also thank yourself and staff for the fine journal "P. & A. W." has become.—**P. W. DUFFY, Reading.**

A Push-button Set in 1923!

SIR,—I first became interested in wireless in 1917 when doing guard on a wireless station in Peshawar, N. India, and then I transferred to the Signals to get a proper training. My present job is that of a chauffeur-mechanic, and I believe I have one of the first car radios, and also a "push-button" set in 1923. The car set is an H.F. D. and L.F.(2) with car batteries tapped at 6-volts for L.T. and two high-capacity H.T. batteries for H.T. The plug interference I overcame by "Eureka" wire resistance wound on 3in. ebonite rod, and placed between plug terminal and lead, and a fixed condenser in the earth return. The "push-button" unit was made up with "Formodensors" and small knife switches, and I made it for a gentleman friend of my employers who had the misfortune to be blind.—**T. BROMLEY (Sheffield).**

A DX Log from Cheshire

SIR,—I append my log of the best DX stations received here from the 31st of October to the 5th of November, inclusive, on 10-metre 'phone and CW. The time of reception is G.M.T. I have omitted all W districts except the 6th and 7th. All are 'phone except where otherwise stated.

W6MLS (18.15) W6ONQ (18.00), W5AH (16.40), W6MYS (CW, 16.45), W6GOS

(17.05), W7GGG (CW, 16.15), W7AFS (CW, 16.25), W7GG (14.30), HH2J (13.55), VP6YT (18.10) ZE1JA (14.35), VQ4CRE (CW, 13.35), VU2AN (CW, 13.40), VK2TI (CW, 13.55), VK5IT (CW, 10.30) In addition there were scores of the other W districts. The Rx is det., L.F., push-pull, operated off an eliminator. The antenna is a 20-metre dipole with the feeders connected together and taken through a pre-set to a four-pin coil. All reception was on headphones, although most of the stations were R7-9—**K. KILBURN (Wirral, Cheshire).**

Back Number Wanted

SIR,—I shall be glad if you could put me in touch with a reader who has a back number of P. and A. W. dated September 26th, 1936, to spare.—**T. A. ROBERTS, 148, Stokesay, Craven Arms, Salop.**

CUT THIS OUT EACH WEEK.

Do you know

—THAT a small rigid cone cemented in the centre of an existing large-cone speaker will improve top-note response.

—THAT matching of screened coils may be effected by moving the end turn or two on one or more of the coils.

—THAT a panel-mounted trimmer is often of great use in a ganged receiver when tuning-in distant stations.

—THAT the performance of multi-waveband receivers is often improved by using a multiple aerial array.

—THAT in severe cases of picked-up interference, after aerial and earth are removed, the bottom of a chassis may be closed in with a sheet of metal.

—THAT care is necessary to ascertain the current which is passed through the small L.F. transformers, where good reproduction is required.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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A Mammoth Stage Organ

Details of the New Instrument Which is Being Introduced by
Reginald Foort

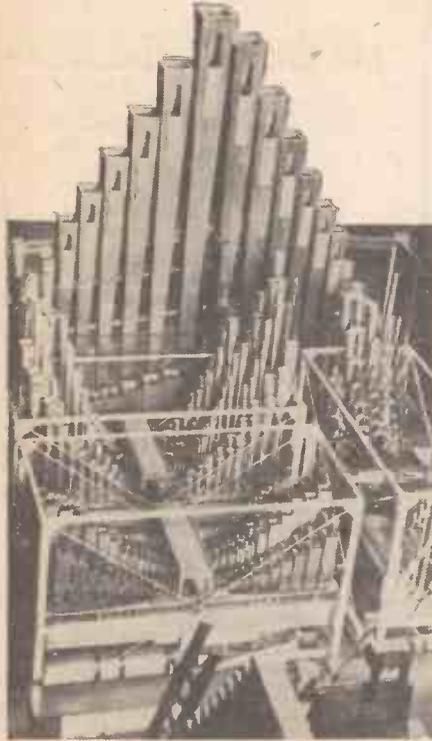
EVERY listener knows that Reginald Foort left the B.B.C., where he had been the official organist, in order to adopt a stage career, and for this he has had a mammoth organ built in America. It would be impossible to give all of the technical details in the space available in these pages, but the accompanying

conditioning plant. It is about 2ft. in diameter. The organ was built in America by Moller, and shipped to this country in special oak packing cases which alone cost over £200. A staff of organ engineers is travelling with Mr. Foort, and it is estimated that it will take about 10 hours to assemble the organ, although when experience has been gained this may be reduced to about eight hours. To dismantle it will occupy about four to six hours. The total weight is in the neighbourhood of 20 tons, and there are

hundreds of miles of wire used in the electrical system.

The pipes of the organ range in size from one large enough for three men to stand inside, end to end, to the smallest which is smaller than a lead pencil. All of these pipes are controlled by 259 stop tablets on the console. There are 125 combinations controlled by pistons from the console, and the tonal design permits an inexhaustible range of tone combinations, estimated to be over 5,000. To operate the electrical section of the organ a special relay had to be built and there are over 200 ounces of sterling silver used for the various contacts. Two D.C. generators are employed to operate the electric action.

The organ may be heard this week at the Empire Theatre, Stratford; and next week at the Hippodrome, Portsmouth.



Here is a section of Mr. Foort's new stage organ, taken during manufacture.

illustration shows one section of this wonderful instrument. We were privileged to inspect this at its inauguration, and it outclasses anything which has previously been attempted on the stage. It incorporates in a single instrument a full theatre organ as well as a cathedral organ. The swell-box occupies the rear of the stage and is in four sections, the illustration showing one of these. The total height is 18ft. and the length 42ft. In addition to this there is a complete percussion unit giving all the usual devices such as drums, cymbals, tympani, xylophone, etc. The console is very similar to that seen in the normal cinema, and is of the four manual type. This, as well as all the remaining sections, takes down into separate units, and all are packed for travelling purposes in four large vans which will no doubt soon be a feature of our roads as the organ travels from one town to another. Extensive advertising is carried on the vans as well as Mr. Foort's name.

Driving Power

To operate the organ a 30 horse-power blower is used, and this is housed at the side of the stage and connected to the organ through a pipe resembling that used in a modern building provided with air-

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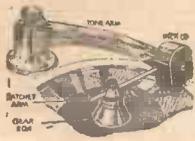
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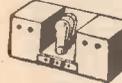


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THE OPEN MIKE

Continued from page 302

RANIGAN (Hoarsely): Oh! . . . My God. Come on, get out, and make for the road. My door's jammed.

JONES (Gasping): The wheel's . . . caught me . . . help me out.

RANIGAN: Move, for heaven's sake. They're coming down the drive.

ANN (Firmly): Stand where you are, hold your hands high. I couldn't miss a haystack at this distance.

JONES: Well, I'm damned. *(Sound of running feet as Jack and others come down drive.)*

JACK: Thank heavens you are safe, Ann. I've got 'em covered. Hi, don't point that darned thing at me. Your finger might be shaking a wee bit too much.

SIR J.: Let's take them up to the house. We can hold them there until the police arrive. I've got the plans. By Gad, sir, you've got a damned plucky lady for a wife.

ANN: Oh, Jack . . . just look at poor "Old Faithful." She looks as though her days are over at last.

(Fade into Sir John's room. Knock at door; butler enters.)

BUTLER: Two police officers to see you, sir.

POLICEMAN: What's all the trouble sir? We had the information from an amateur transmitter that something was wrong.

SIR J.: Well, officers, we have certainly had a spot of trouble, but thanks to our friends we managed to get the better of our visitors. You'll find them in the stable under a pretty strong guard.

POLICEMAN: Right, sir, we'll see to 'em.

SIR J.: Now, Mr. . . .

JACK: Wainwright's the name, sir.

SIR J.: Now, Mr. and Mrs. Wainwright, I can't thank you enough for what you have both done. You have rendered not only me but the country a very great service.

JACK: Well, to be quite frank, we've enjoyed the little adventure. Poor "Old Faithful" had the run of her life. If you could let your chauffeur run us over to our friends, we will see about clearing the wreckage later.

SIR J.: But, surely, you don't intend leaving us to-night. You can't possibly carry on through this storm.

JACK: It's awfully good of you, sir, but we shall only be causing a whole heap of worry if we don't arrive at our destination. You know what folks are, sir!

SIR J.: Well, well. You young folks are very determined, I must say. But about your car. You must let. . . . What's that, Douglas? Ah . . . a wonderful idea, my boy. Mr. and Mrs. Wainwright, will you come with me through to the garages?

ANN (Aside to Jack): What's the big idea? Isn't he a charming old boy?

SIR J.: Ah! . . . Here we are. You have the key, Douglas. There, step inside, Mrs. Wainwright. After you, sir.

ANN: Oh! . . . Jack, it's one of our dream cars. A sporty little "Humbo." Oh, what a beauty. You are surely not sending her out in this weather, just for us, are you?

SIR J.: Well. . . . I'm not, but you say you must continue your journey, and I am sure poor "Old Faithful" wouldn't have her successor jib at a little rain.

(Fade in music—superimpose morse code—then slowly fade out.)

THE END.

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

THE Croydon Radio Society had a Questions Night on Tuesday, November 15th, in St. Peter's Hall, Ledbury Road, S. Croydon, with Mr. P. G. Clarke in the chair. He said this was an occasion whereat the society's knowledge was pooled, and so everyone could benefit from the lucky dip. He himself started the ball rolling with a discussion on phase reversal methods in push-pull amplifiers, pointing out how recent quality demonstrators to the society had used different systems for phase reversal. This topic lead to tone compensation, and inevitably to testing for high quality, or to be more exact, natural reproduction. The tester must have a tester's ear, as each instrument in an orchestra must be separately identified. For example, there were the violas, cellos and violins, while instruments such as the bass drum, piccolo and horn could not be mistaken. Perhaps the superheterodyne was unduly blamed, for the majority of commercial sets used this principle and the manufacturer was forced to give the public what it wanted, namely a nice "mellow," booming thump! Thus it must be realised that much remained to be done in educating the public as to what was and what was not good reproduction.

THE EXETER AND DISTRICT WIRELESS SOCIETY
Headquarters: Y.W.C.A., 3, Dix's Field, Southernhay, Exeter.
Meetings: Mondays at 8 p.m.
Hon. Sec.: Mr. W. J. Cling, 9, Sivell Place, Heavitree, Exeter.

At the meeting of this society held on Monday, November 14th, Mr. D. R. Barber, B.Sc., F.R.A.S., of the Norman Lockyer Observatory, gave an illustrated lecture entitled, "Radio and the Moon." Mr. Barber entertained his large audience with a lucid and clear discussion of conditions, so far as we know them to be, on the moon itself, and in the course of his talk demonstrated that the moon has no atmosphere, and that its gravity is of the ratio 1 to 6 compared with the earth. There are great variations of temperature on the moon's surface, the tempera-

ture falling as low as 80 degrees Centigrade in the middle of the lunar night. Numerous slides of the moon's surface were shown and an illustration given of how the moon affects tides and even the atmosphere of the earth itself.

Graphs were also shown, compiled from lunar eclipse data sent to Mr. Barber by local members of the Radio Society of Great Britain, but it is still not safe to say that radio reception is affected by the moon. Numerous questions were asked the lecturer and a hearty vote of thanks was proposed to Mr. Barber for his kindness in giving up his time, and in taking so much trouble.

BRADFORD SHORT-WAVE CLUB
Headquarters: Bradford Moor Council School, Leeds Road, Thornbury, Bradford.
Hon. Sec.: G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

ON November 13th the second of the Sunday meetings was held. The club's transmitter was on the air from 10.30 to 15.30, and quite a number of interesting QSO's were obtained on the 160-metre band.

The Morse class is steadily progressing under the personal supervision of Mr. Myers, who has kindly offered his services to the club as Morse instructor. A very interesting lecture on Aerials was given to the club on Friday, November 11th, by Mr. F. W. Garnett (G6XL). A good deal of information was derived by members from this talk, and it is hoped that two or three of the licensed amateurs who heard this address will be busy with the erection of a new antenna system at their stations. Quite a considerable interest was aroused by the W8JK beam aerial.

Friday, December 9th, is the date reserved for the annual social and pie supper, and the following Friday a talk will be given by Mr. Mallinson, of Truechorde Radio; the subject will be "Mains Transformers."

The secretary will be pleased to receive reports on the club's transmissions, and all reports will be acknowledged with the usual QSL card. The call is G3NN. Any further information can be obtained from the secretary at the above address.

RADIO, PHYSICAL AND TELEVISION SOCIETY
Headquarters: 72A, North End Road, West Kensington, W.14.

Meetings: Friday evenings.
Hon. Sec.: C. W. Edmans, 15, Cambridge Road, North Harrow, Middx.

At a meeting of this society held on Friday, November 18th, Mr. Hamlett lectured on "Radio Activity in Medicine." Modern methods of aiding the treatment of cancer were described, particular attention being paid to a new treatment which may possibly supersede the present method of using radium needles. The treatment consists mainly of injecting into the blood stream radio-active potassium, and has the advantage that there are no needles to be extracted at the conclusion of the treatment. Moreover, the path of the radio-active potassium through the body may be traced by the use of photographic plates. As a matter of general interest it may be also mentioned that the same principle can be applied in the vegetable as well as the animal kingdom.

T. R. T. (Aberdeen). We see no reason for the particular type of coil mentioned. Why must this be used? Can you supply further details.

H. J. T. (Plymouth). There is no set on the market of the type mentioned, but you could mount any good set in a horizontal plane to bring the controls and dials on the top board. Alternatively, you could fit the set in the usual way and use remote control, or flexible drives.

M. R. (Winchester). Our "Wireless Constructor's Encyclopaedia" would be most suitable for your purpose, read in conjunction with the various articles published in these pages.

R. H. G. (Manchester). Grid condenser should be .0001 mfd. and band setter is of the same capacity. Band-spreader is 15 mmfd. or modified .0001 mfd. stripped down to the desired capacity. H.F. choke should, of course, be in anode circuit.

N. McC. (Co. Donegal). All parts are obtainable from Messrs. Peto-Scott.

J. W. (Greenford). We cannot supply circuits to individual requirements, and we have nothing in our lists which would be suitable for you.

P. C. M. M. (Achnashellach). You could use the Centaur circuit with your coil—the only difference being that the primary is centre-tapped in the Unigen model. We have no details of the other type of coil mentioned.

D. P. (Dorchester). The valves are special components, and upon receipt of a stamped and addressed envelope we will send you the maker's characteristics and connecting details.

W. H. T. (S.W.12). The Television and Short-wave Handbook gives circuits and details which will be useful to you.

L. J. (Enfield). The transformer may be faulty, or your ribbon may not be properly disposed in the gap. We cannot advise definitely from the details given.

G. H. (Taunton). We published an article on the subject in our issue dated March 20th, 1937.

J. W. (Elmham). The voltage on your mains does not affect the pick-up in any way. It will affect the design of an amplifier for use with it, but a good battery amplifier would give fair results on 100 volts. Alternatively, you may be able to convert the output to high-voltage so as to use mains equipment.

G. H. G. (S.E.15) and others. The point had already been noted and a correction appears in our issue dated November 26th.

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Replies in Brief

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

R. C. S. (Bristol). You may be receiving signals radiated from a local aerial used in an oscillating condition. Your dealer may be able to help you if you tell him how the set is behaving.

J. J. M. (West Grinstead). The Pyramid One-Valver should be quite suitable for your requirements.

W. F. L. (Chertsey). As the set is a commercial model we suggest that you have it examined by the makers or their nearest local service agent.

P. J. R. (Portrush). We regret that there is no receiver in our range which would meet your special requirements.

R. R. S. (Sunderland). We have no details of conditions in the country mentioned and therefore cannot advise definitely. We think, however, a good short-wave set tuning from 13 metres up to 150 or so, would be most suitable. There is nothing in our blueprint list which we could recommend in this case.

J. M. (Rowley). We cannot send C.O.D., but if you will let us have a remittance in respect of the blueprints or copies you require, they will be sent by return.

C. O. B. (S.E.13). We would suggest the "Imp" or the Two H.F. Portable in your special case.

F. H. (King's Heath). We have not used the combination mentioned and therefore cannot recommend a particular set.

L. J. (E.1). We have published designs of several test instruments, but cannot recommend one without full details of your requirements.

T. J. L. (Chelmsford). We cannot supply blueprints of commercial receivers. We are unable to insert your request as we should be inundated with similar requests from other readers, and we can only suggest that you insert a small advertisement.



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Beginner's One-valver ..	10.2.38	PW85	D.C. £5 Superhet (Three-valve) .. 1.12.34 PW42	
The "Pyramid" One-valver (HF Pen) ..	27.8.38	PW93	Universal £5 Superhet (Three-valve) .. — PW44	
Two-valve : Blueprints, 1s. each.			F. J. Camm's A.C. £4 Superhet 4 .. 31.7.37 PW50	
Four-range Super Mag Two (D, Pen) The Signet Two (D & LF) ..	—	PW36B	F. J. Camm's Universal £4 Superhot 4 .. — PW60	
Three-valve : Blueprints, 1s. each.	24.0.38	PW76	"Qualitone" Universal Four .. 10.1.37 PW73	
The Long-range Express Three (SG, D, Pen) ..	24.4.37	PW2	Four-valve : Double-sided Blueprint, 1s. 6d. Push-Button 4, Battery Model } 22.10.38 PW95	
Selectone Battery Three (D, 2 LF (Trans)) ..	—	PW13	Push-Button 4, A.C. Mains Model } .. —	
Sixty Shilling Three (D, 2 LF (RC & Trans)) ..	—	PW34A	One-valve : Blueprint, 1s.	
Leader Three (SG, D, Pow) ..	22.5.37	PW35	Simple S.W. One-valver .. 0.4.38 PW89	
Summit Three (HF Pen, D, Pen) All Pentode Three (HF Pen, D (Pen) Pen) ..	—	PW37	Two-valve : Blueprints, 1s. each.	
Hall-mark Three (SG, D, Pow) ..	20.5.37	PW39	Midget Short-wave Two (D, Pen) The "Fleet" Short-wave Two (D (HF Pen), Pen) .. 27.8.38 PW91	
Hall-Mark Cadet (D, LF, Pen (RC)) F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three) ..	12.3.37 10.3.35	PW41 PW48	Three-valve : Blueprints, 1s. each.	
Genet Midget (D, 2 LF (Trans)) ..	13.4.35	PW49	Experimenter's Short-wave Three (SG, D, Pow) .. 30.7.38 PW30A	
Cameo Midget Three (D, 2 LF (Trans)) ..	June '35	PM1	The Prefect 3 (D, 2 LF (RC and Trans)) .. 7.8.37 PW63	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) Battery All-Wave Three (D, 2 LF (RC)) ..	8.6.35	PW51	The Band-Spread S.W. Three (HF Pen, D (Pen), Pen) .. 1.10.38 PW68	
The Monitor (HF Pen, D, Pen) ..	—	PW53	Three-valve : Blueprints, 1s. each.	
The Tutor Three (HF Pen, D, Pen) The Centaur Three (SG, D, P) ..	21.3.30 14.8.37	PW55 PW61	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) .. — PW65	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) ..	31.10.36	PW60	Parvo Flyweight Midget Portable (SG, D, Pen) .. 10.0.37 PW77	
The "Colt" All-Wave Three (D, 2 LF (RC & Trans)) ..	5.12.30	PW72	Four-valve : Blueprint, 1s.	
The "Rapid" Straight 3 (D, 2 LF (RC & Trans)) ..	4.12.37	PW32	"Imp" Portable 4 (D, LF, LF, Pen) .. 19.3.33 PW80	
F. J. Camm's Oracle All-Wave Three (HF, Det, Pen) ..	28.8.37	PW78	MISCELLANEOUS	
1938 "Triband" All-Wave Three (HF Pen, D, Pen) ..	22.1.38	PW84	S.W. Converter-Adapter (1 valve) .. — PW48A	
F. J. Camm's "Sprite" Three (HF Pen, D, Tet) ..	20.3.38	PW87	AMATEUR WIRELESS AND WIRELESS MAGAZINE	
The "Hurricane" All-Wave Three (SG, D (Pen), Pen) ..	30.4.38	PW89	CRYSTAL SETS	
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet) ..	8.9.38	PW92	Blueprints, 6d. each.	
Four-valve : Blueprints, 1s. each.			Four-station Crystal Set .. 23.7.38 AW427	
Sonotone Four (SG, D, LF, P) ..	1.5.37	PW4	1934 Crystal Set .. — AW444	
Fury Four (2 SG, D, Pen) ..	8.5.37	PW11	150-mile Crystal Set .. — AW450	
Beta Universal Four (SG, D, LF, Cl, B) ..	—	PW17	STRAIGHT SETS. Battery Operated.	
Nucleon Class B Four (SG, D, (SG), LF, Cl, B) ..	6.1.34	PW34B	One-valve : Blueprints, 1s. each.	
Fury Four Super (SG, SG, D, Pen) Battery Hall-Mark 4 (HF Pen, D, Push-Pull) ..	—	PW43	B.C. Special One-Valver .. — AW387	
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) ..	20.9.36	PW67	Twenty-station Loudspeaker One-valver (Class 1) .. — AW449	
All-Wave "Corona" 4 (HF Pen, D, LF, Pow) ..	9.10.37	PW79	Two-valve : Blueprints, 1s. each.	
"Aeolus" All-Wave 4 (HF Pen, D (Pen), LF, Cl, B) ..	12.2.38	PW83	Melody Ranger Two (D, Trans) .. — AW388	
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) ..	3.9.38	PW33	Full-wave Two (SG det, Pen) .. — AW392	
Mains Operated.			Lucerne Minor (D, Pen) .. — AW426	
A.C. Twin (D (Pen), Pen) ..	—	PW18	A Modern Two-valver .. — WM409	
A.C.-D.C. Two (SG, Pow) ..	—	PW31	Three-valve : Blueprints, 1s. each.	
Selectone A.C. Radiogram Two (D, Pow) ..	—	PW19	Class B Three (D, Trans, Class B) New Britain's Favourite Three (D, Trans, Class B) .. 15.7.38 AW386	
Three-valve : Blueprints, 1s. each.			Fan and Family Three (D, Trans, Class B) .. 25.11.33 AW410	
Double-Diode-Triode Three (HF Pen, DDT, Pen) ..	—	PW23	£5 5s. S.G.3 (SG, D, Trans) .. 2.12.33 AW412	
D.C. Ace (SG, D, Pen) ..	—	PW25	Lucerne Ranger (SG, D, Trans) .. — AW422	
A.C. Three (SG, D, Pen) ..	—	PW29	£5 5s. Three : De Luxe Version (SG, D, Trans) .. 10.5.34 AW435	
A.C. Leader (HF Pen, D, Pow) ..	—	PW35C	Lucerne Straight Three (D, RC, Trans) .. — AW437	
D.C. Premier (HF Pen, D, Pen) ..	81.3.34	PW35B	Transportable Three (SG, D, Pen) Simple-tune Three (SG D, Pen) .. June '33 WM327	
Ubique (HF Pen, D (Pen), Pen) ..	28.7.34	PW36A	Economy-Pentode Three (SG, D, Pen) .. Oct. '33 WM337	
Armada Mains Three (HF Pen, D, Pen) ..	—	PW38	"W.M." 1934 Standard Three (SG, D, Pen) .. — WM351	
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) "All-Wave" A.C. Three (D, 2 LF (RC)) ..	11.5.33	PW54	£3 3s. Three (SG, D, Trans) .. Mar. '34 WM354	
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) ..	—	PW50	1935 £6 6s. Battery Three (SG, D, Pen) .. — WM371	
Mains Record All-Wave 3 (HF Pen, D, Pen) ..	5.12.30	PW70	PTP Three (Pen, D, Pen) .. — WM339	
All-World Ace (HF Pen, D, Pen) ..	28.8.37	PW80	Certainty Three (SG, D, Pen) Minitube Three (SG, D, Trans) All-Wave Winning Three (SG, D, Pen) .. — WM393	
Four-valve : Blueprints, 1s. each.			Self-contained Four (SG, D, LF, Class B) .. Aug. '33 WM331	
A.C. Fury Four (SG, SG, D, Pen) ..	—	PW29	Lucerne Straight Four (SG, D, LF, Trans) .. — WM350	
A.C. Fury Four Super (SG, SG, D, Pen) ..	—	PW34D	£5 5s. Battery Four (HF, D, 2LF) The H.K. Four (SG, SG, D, Pen) The Auto Straight Four (HF Pen, HF Pen, DDT, Pen) .. Apr. '30 WM340	
A.C. Hall-Mark (HF Pen, D, Push-Pull) ..	24.7.37	PW45	Five-valve : Blueprints, 1s. 6d. each.	
Universal Hall-Mark (HF Pen, D, Push-Pull) ..	0.2.35	PW47	Super-quality Five (2 HF, D, RC, Trans) .. — WM320	
A.C. All-Wave Corona Four ..	6.11.37	PW51	Class B Quadradyné (2 SG, D, LF, Class B) .. — WM344	
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Amateur Wireless .. 4d. " "
Practical Mechanics .. 7d. " "
Wireless Magazine .. 1s. " "

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

Mains Operated.		Two-valve : Blueprints, 1s. each.	
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Unicorn A.C.-D.C. Two (D, Pen) ..	—	Unicorn A.C.-D.C. Two (D, Pen) ..	— WM280
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Mantovani A.C. Three (HF Pen, D, Pen) ..	—	£15 15s. 1936 A.C. Radiogram (HF, D, Pen) ..	— WM374
Four-valve : Blueprints, 1s. 6d. each.		All Metal Four (2 SG, D, Pen) ..	— Jan. '36 WM401
Harris' Jubilee Radiogram (HF Pen, D, LF, P) ..	—	May, '35	— WM386

SUPERHETS.		Battery Sets : Blueprints, 1s. 6d. each.	
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The Request All-Waver ..	—	1035 Super Five Battery (Superhet) ..	— June '36 WM407
Mains Sets : Blueprints, 1s. 6d. each.		Heptode Super Three A.C. ..	— May '34 WM359
"W.M." Radiogram Super A.C. ..	—		— WM366

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Midget Class B Portable (SG, D, LF, Class B) ..	20.5.33	Holiday Portable (SG, D, LF, Class B) ..	— AW389
Family Portable (HF, D, RC, Trans) ..	22.0.34	Two H.F. Portable (2 SG, D, QP21) ..	— AW393
Tyers Portable (SG, D, 2 Trans) ..	—		— WM363

SHORT-WAVE SETS - Battery Operated.		One-valve : Blueprints, 1s. each.	
S.W. One-valver for America ..	15.10.38	Home Short-waver ..	— AW429
Ultra-short Battery Two (SG det., Pen) ..	—	Home-made Coil Two (D, Pen) ..	— AW452
Three-valve : Blueprints, 1s. each.		Ultra-short Battery Two (SG det., Pen) ..	— Feb. '30 WM402
World-ranger Short-wave 3 (D, RC, Trans) ..	—	Home-made Coil Two (D, Pen) ..	— AW440
Experimenter's 5-metre Set (D, Trans, Super-regen) ..	£0.6.34	Three-valve : Blueprints, 1s. each.	
Experimenter's Short-waver (SG, D, Pen) ..	—	World-ranger Short-wave 3 (D, RC, Trans) ..	— AW355
The Carrier Short-waver (SG, D, P) ..	—	Experimenter's 5-metre Set (D, Trans, Super-regen) ..	— £0.6.34 AW438
Four-valve : Blueprints, 1s. 6d. each.		Experimenter's Short-waver (SG, D, Pen) ..	— Jan. 19, '35 AW463
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans) ..	—	The Carrier Short-waver (SG, D, P) ..	— July '35 WM390
Empire Short-waver (SG, D, RC, Trans) ..	—	Three-valve : Blueprints, 1s. 6d. each.	
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Superhet : Blueprint, 1s. 6d.	—	Empire Short-waver (SG, D, RC, Trans) ..	— WM313
Simplified Short-waver Super ..	— Nov. '35 WM397	Standard Four-valver Short-waver (SG, D, LF, P) ..	— Mar. '35 WM383

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New Style Short-wave Adapter (1/-) ..	—	Trickle Charger (6d.) ..	— Jan. 5, '35 AW462
Short-wave Adapter (1/-) ..	—	Superhet Converter (1/-) ..	— AW466
B.L.D.L.C. Short-wave Converter (1/-) ..	—	Wilson Tone Master (1/-) ..	— May '30 WM465
The W.M. A.C. Short-wave Converter (1/-) ..	—	June '38	— WM466

QUERIES and ENQUIRIES



Tungram Valves

"Please could you give me the address of the Tungram valve company and also the price of the Tungram valve VP4B (mains)?"
—P. W (Hill, nr. Rugby).

THE address is Tungram Electric Lamp Works (Gt. Britain), Ltd., 82, Theobald's Road, London, W.C.1. The valve in question costs 10s. 6d.

Substitute Components

"I wish to build a set in which a Graham Farish S.W.2 valve and a Max Transformer are specified, but as they do not make these I should like to know what I could use in place of them. Also where could I get two short-wave condensers? Please could you also tell me the address of the Eddystone firm?"—E. T. (Bristol 6).

IN place of the valve mentioned you can use the Hivac type D.210.S.W., but there is no equivalent for the special transformer mentioned. You can, however, use any standard L.F. transformer in a parallel-fed circuit, and a standard ratio of 4 to 1 is quite suitable. The short-wave condensers may be obtained from such firms as Raymart, Premier or Webb's Radio and their addresses will be found in the advertising columns of this paper. Eddystone components are manufactured by Messrs. Stratton and Co., Bromsgrove Street, Birmingham 5.

A "Straight" Three

"Is it possible to supply me with a blueprint of a circuit described in 'Sixty Tested Circuits'? The circuit is on page 62, Fig. 53."—C. E. L. (Chiswick).

WE cannot supply a blueprint of the exact arrangement shown in this particular circuit, but we have a similar one in the Rapide Three, Blueprint No. P.W.82. This is a detector and two L.F. stages, but in place of the two transformers in the circuit you refer to, the Rapide has one Resistance-capacity stage and one transformer stage.

Greenwich Mean Time

"As a beginner in wireless I am writing for information regarding G.M.T. All short-wave programmes are given by such method and I should like to know if there is any object in it. I have been working this time on a 24 hour consecutive dial. When one obtains such a mark as 00.00 is this 12 p.m. (midnight)? There is also G.S.I., G.S.O., G.S.F., etc. What are these?"—T. McG. (Co. Antrim).

THE letters G.M.T. stand for Greenwich Mean Time, which is a standard of time used all over the world. In America,

for instance, there is Eastern, Central, Mountain and Pacific Standard Time, varying from 5 to 8 hours behind G.M.T. There are also other time factors which, if given in lists of short-wave stations would be confusing to English listeners, and therefore all times of broadcasting given in this country are reduced to our standard, G.M.T. The 24-hour 'clock system is used, 1 p.m. being 13.00 hours and 24.00 is not given, as after 23.59 the figures 00.00 are used to indicate our 12 p.m. The other letters, G.S.F., etc., are the call letters of our

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.

B.B.C. short-wave Empire transmitters and different letters are used for the different zones, that is, those transmissions used for various colonies—these having to be transmitted at various times of the day to coincide with evening periods in the colonies.

Unmatched Speakers

"I recently bought a loudspeaker for use with my commercial set and on fitting this to the extension sockets I find that

it is much quieter than the built-in speaker, and also that the total volume seems less when this one is added. Can you help me to overcome this trouble or explain to what it is due?"—L. E. (Perth).

THE output sockets are intended for a definite impedance and you are probably using the wrong type of speaker. When two speakers are in circuit the maximum current will naturally flow through the lowest resistance and this could account for the variation in volume. The fact that total volume is reduced would tend to indicate that a high-resistance speaker should have been used, but you are using a low-impedance model. You should, therefore, inquire from the makers of your set what impedance is needed and obtain an appropriate speaker or transformer to match it.

Dial Lights

"I recently fitted a clip on my tuning dial and mounted a bulb on it to illuminate the dial as in commercial sets. I find, however, that my accumulator now needs charging much more often and wonder if I have wired it wrong. I took two leads from the bulb holder down to the filament terminals on the valveholder (output). I am sure there are no short-circuits as covered wire is used and the connections are efficiently made at each end."—M. T. (Cardiff).

THE connections were quite in order, but you have probably used a high-consumption pocket-lamp bulb. Special low-consumption bulbs are generally employed for dial-lights in battery receivers, but as the light is only needed when tuning to a station it is recommended that an on/off switch be connected in the lamp wiring so that as soon as a station is tuned in the switch may be operated and the light turned off. This will avoid unnecessary drain on the accumulator.

Television Projection

"I noticed an illustration in your paper a little while ago of a television set with a very large screen attached to the lid. Could you tell me how the big pictures are obtained, as I thought that the cathode-ray tube was now used for television."—O. S. (Gloucester).

IN the majority of modern "big-screen" domestic television receivers the screen is generally of a semi-translucent type, and arranged in such a manner that the screen rises into a vertical position on lifting the receiver lid. With the tube and lens mounted vertically, the actual picture traced out in miniature on the tube face is focused on to an inclined mirror, which in turn reflects it back on to the rear of the main viewing screen. Another idea which is finding favour in some quarters is to make the C.R. tube in such a way that its screen is not at right angles to the scanning beam. Normally, this would produce a keystone distortion, but by applying a correction to the line scan deflection this is rectified.

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PUSHBACK Wire, 6 yds., 6d., heavy, 9d. Resin-cored Solder, 6ft., 6d.; Screened Flex, single, 6d., yd.; twin, 9d. yd. Assorted Solder Tins, 6d. packet. Humdimmers, 9d. each.

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UTILITY 7/6 Famous Micro Dials, 3/9; Radiophone, 0.00116 Short-wave Condensers, 9/8. Short-wave H.F. Chokes, 5-100 mfd. 9d. Centralab Pots, all sizes, 1/6; switched, 2/-; 20,000 ohm Pots, 1/-; Tubular Glass Puses, 2d. Milliammeters, 25 m.a. upwards, 5/8; super, 6/9.

SPECIAL OFFERS.—Class B Kit, worth 30/-, comprising Driver, Transformer, Valve and Holder, 5/-. Dozen wire-ended assorted resistors, 1/8. Order 5/-, post free.

W. 8in. Permanent Magnet Speakers at one-third Cost. Extension Type (no Transformer), 7/6; Standard Type (with Transformer), 12/6.

ALL interested in the "AIR-HAWK" 9-valve communication type receiver should send at once for THE NEW RAYMART CATALOGUE of Short-Wave Components. It is yours for 14d., post free.

A splendid range of short-wave components is always ready for immediate despatch. The right goods at the right prices.

RADIOMART

44, HOLLOWAY HEAD, BIRMINGHAM, 1

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50/- SUNBEAM 4-valve A.C./D.C. superhet. table receivers. Last few at fraction of cost. Brand new in sealed cartons. 2 watts output. Full size speaker and cabinet. Wonderful performance. A full size set bargain. Not a midget.

22/6 5-BAND Pentode Battery Kits. Southern's 1939 all-wave kits with metal chassis and panels. 10-2,000 metres. World-wide reception guaranteed. Works speaker or phones. Band-spread, new super-regeneration circuit, etc. The season's best value. Illustrated leaflet on receipt of stamp. Price with valves, 34/6.

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3/11 A.R.P. Crystal Receivers in attractive bakelite cases. 4/11 High-grade headphones. 2/11 cheaper pattern.

5/- SOUTHERN'S famous bargain parcels of useful components. Bigger value than ever. Value over 20/-, 6/-, American valves, all types.

2/- LOW-LOSS Short-wave Condensers, .0001, .00015 and 5-50 m.mfd.

1/8 SOUTHERN'S special new high-performance miniature plug-in coils, 4-pin. 10-21, 20-35, 31-75, 70-150 metres, 250-500, 1,200-2,000 metres, 2/-, 10d. miniature short-wave chokes. 1/- ditto Long-wave.

3/6 TELSEN Midget Iron-core coils, W349; dual-range coils, 2/6; with aerial series condenser W70, 3/3; triple-gang superhet W476, 14/6; triple band-pass W477, 14/6; twin-gang W478, 9/-.

8/6 TELSEN A.C./D.C. Multimeters, 5 range. Garrard Radiogram Units, brand new, 42/-.

2d. STAMP brings complete lists by return post. Remember Southern Radio for the biggest and soundest bargains.

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COSMOCORD GRAMO UNIT, comprising Electric Motor, Pick-up and Vol. Control, Auto-Stop and Start; 100-250v. A.C., 35/9. Universal Model for A.C. or D.C., 49/6.
COSMOCORD PICK-HEADS, 4/6 each.

SPECIFIED FOR THE "AIR HAWK 9"
3 Premier Tritolite Condensers, .00016 mfd., at 2/6 each. 3 Premier Tritolite Condensers, .00015 mfd., at 1/6 each. 2 Premier Epicyclic Drives at 2/3 each. 1 Premier A.C.9 Mains Transformer, 14/6.
Get our quotation for the complete Kit.

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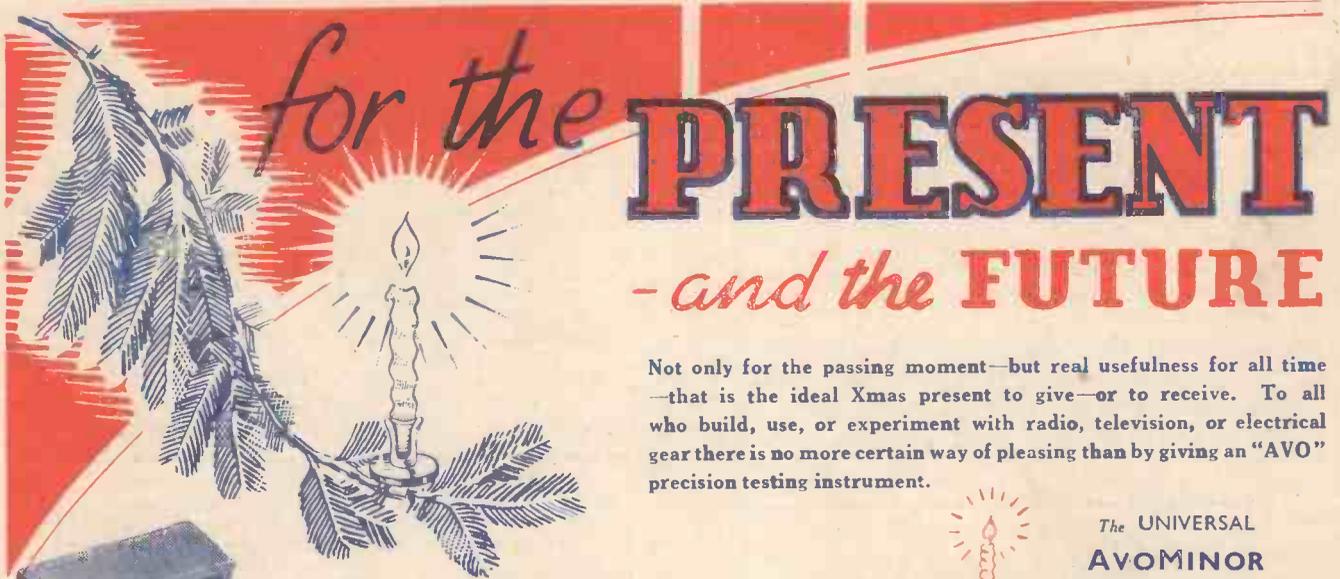
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RADIO RECEIVERS FOR CYCLES— See page 324

Practical and Amateur Wireless

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WEDNESDAY

Edited by F.J. CAMM

a GEORGE
NEWNES
Publication

Vol. 13. No. 325.
December 10th, 1938.

AND PRACTICAL TELEVISION

Further Details about "The AIR-HAWK"

THE IDEAL CHRISTMAS GIFT

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM

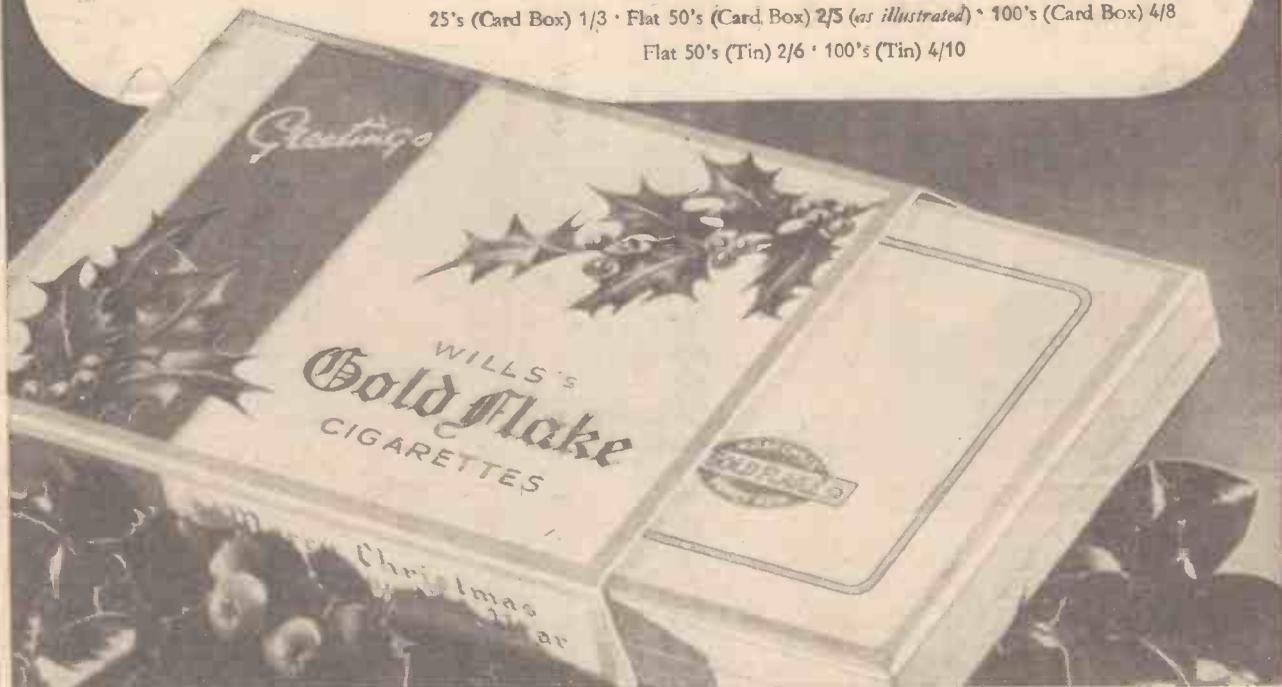
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FROM BASEBOARD TO CHASSIS— SEE PAGE 323

Practical and Amateur Wireless

Round

Amateur Television

There is evidence of increasing activity by amateurs in the direction of television experiment. The introduction of small cathode-ray tubes gives added interest to this section of radio as one of the main costs is thereby reduced. It should be remembered that these small tubes, although having a diameter of only 1in. or 2in., give really good pictures when properly operated, and although it is possible for several people to obtain entertainment from these small images, there are still available on the market large diameter magnifying lenses as used in the early low-definition television receivers which may be put to use in increasing the apparent size of the pictures. In America a group of Y.M.C.A. amateurs have recently installed their own television transmitter and receiver, the pictures being sent out on 5 metres. They claim that they are the first amateur radio club to carry out television tests of this nature.

New Rumanian Station

A NEW 50-kW short-wave station is announced from Bucharest. In addition to this, a high-powered medium-wave broadcast station is also shortly to be inaugurated at Baneasa.

Royal Visit to Canada

In connection with the proposed visit of the King and Queen to Canada next summer, the Canadian Broadcasting Corporation is planning a Dominion-wide series of broadcasts.

Headphones for Conductors

The difficulty experienced in hearing vocalists and other items in an orchestral programme is being met by the conductors wearing headphones in many present B.B.C. broadcasts. This ensures that the conductor can give the orchestra the necessary instructions and lead without "blotting out" the vocalist or soloist and, furthermore, enables him to hear the broadcast as it is going out "over the air."

Borough Polytechnic

Owing to the extension of business in the Electrical Engineering Department of the Polytechnic, Mr. S. N. Ray, M.Sc., A.M.I.E.E., A.Inst.P., has been appointed to the full-time post of lecturer in Radio Engineering. He takes over at the beginning of the New Year.

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. 325. December 10th, 1938.

the World of

A Novel Competition!

DEALERS who are on the look-out for ideas for use in conjunction with local sales drives can find many points of novelty in relation to local music-hall artists, etc. At a recent radio exhibition held by Francis W. Birkett and Sons, Ltd., at the Cleckheaton Liberal Club, a map of the district carried a large number of pins, each pin representing a recent

GIVE BOOKS THIS CHRISTMAS!

The following Standard Works make ideal Christmas presents. They are all suitable for beginner and expert, lavishly illustrated, and well bound.

By	Price.	Post.
Practical Wireless Service Manual	5/-	5/6
Wireless Transmissions for Amateurs	2/6	2/10
Sixty Tested Wireless Circuits	2/6	2/10
Wireless Coils, Chokes and Transformers and How to Make Them	2/6	2/10
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Television and Short-Wave Handbook	3/6	3/10
Workshop Calculations, Tables and Formulae	3/6	3/10
Practical Mechanic's Handbook	6/-	6/6

radio sale. Visitors had to guess the number of pins, and this proved a most novel attraction.

Television Expenditure

In the House of Commons recently the Postmaster-General announced that the capital expenditure measured on the Television service up to September 30th last (less depreciation written off) was approximately £126,000. The revenue expenditure up to that date, including depreciation and programmes, engineering and staff costs, was approximately £660,000. He also stated that the question

Wireless

of a special television licence was reviewed from time to time by the Television Advisory Committee, but that they do not consider such a course would be necessary at the present stage of development of the service.

October Licences

WIRELESS licences have again maintained unusually high levels. The figures for October, just announced, are 8,828,200, representing an increase of 71,241—the best monthly increase since January, 1937, and the best October increase for six years. Of the total, 51,200 licences were issued free to the blind. The individual totals are: England and Wales, 7,910,000 paid and 44,750 free; Scotland, 750,000 paid and 5,500 free; and Northern Ireland, 117,000 paid and 950 free.

"Hail, Pantomime!"

RADIO is to give listeners a preview of some famous pantomime figures this year.

Gale Pedrick, author of the earlier successful series of "Hail, Variety" shows, is writing three "Hail, Pantomime" scripts for productions to be broadcast on December 14th, 21st, and 30th. Each programme will bring to the microphone a number of artists whose names will be sparkling in lights outside the big "panto" houses this Christmas.

For the first time on any kind of stage a remarkable family of Widows Twankey will work together in the first programme, among them Dan Lono Junior, who is also a well-known writer of pantomime "books" and is acting as adviser to B.B.C. producer Roy Speer; Shaun Glenville, who has been a "Dame" of the more unctuous type for something like twenty-five years; George Lacey, who is regarded by many as to-day's greatest "Dame"; G. S. Melvin, who is in the Drury Lane pantomime this Christmas; Clarkson Rose, booked for the big Lyceum show; Nelson Keys, who is this year joining the esteemed company of Dames for the first time, via the Covent Garden show; and Fred Miller, who is scheduled to appear in a Sheffield pantomime.

Albert Sammons

WHEN the Rodewald Society's Concert is broadcast on the Northern wave-length on December 12th, listeners will hear a sonata recital by Albert Sammons, the well-known violinist, and Gerald Moore, pianoforte soloist.

ROUND the WORLD of WIRELESS (Continued)

France's National Transmitter

THE high-power station which the French authorities are erecting at Allouis will be ready for operation by the spring of 1939, and its inauguration will be made the occasion of an imposing series of special programmes.

Telephoning to Polar Circle

THE Danish explorer Eigel Knuth recently communicated successfully by radiotelephony with a journalist at Copenhagen. The communication was made by a wireless transmission from his camp situated on the extreme north-west coast of Greenland and was relayed by the Danish Blaavand station. By this means a two-way conversation was easily realised.

Germany's Additional Wireless Listeners

ON October 1st, the number of the current radio licences in Germany was 10,398,066, to which was added 643,389

INTERESTING and TOPICAL NEWS and NOTES

taken over the channel of 259.1 m. (1,158 kc/s) so far used by Kosice, and has already started its tests. The adoption of this wavelength is to prevent Hungary, which has now acquired the Kosice transmitter, from broadcasting on the same frequency.

What's in a Name?

THE former Czech Moravska-Ostrava station which, when it passed into German hands was named "Schoenbrunn," has now been officially called: *Troppau*; it relays the Breslau radio programme on 249.2 m. (1,204 kc/s).

"Cavalleria Rusticana"

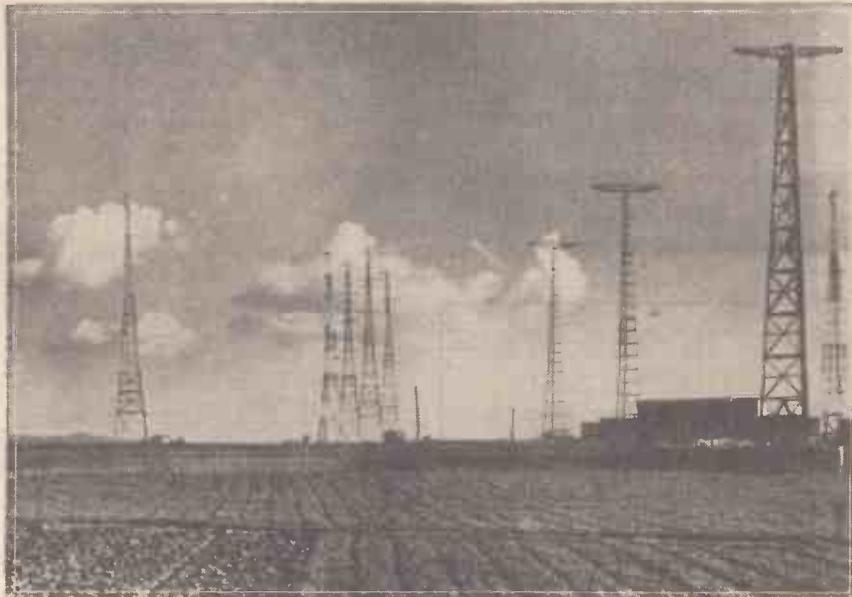
PART of Mascagni's opera, "Cavalleria Rusticana," performed by the Royal Carl Rosa Opera Company, will be broad-

evenings, starting in January, the history and present organisation of the Press in this country will be surveyed, in the National programme, by well-known speakers.

In addition to factual descriptive accounts of the various processes of newspaper production and distribution, experts will discuss some of the problems connected with the Press.



Miss Dorothy Holbrook, the well-known "Ladies Band" leader, is an enthusiastic reader of "Practical and Amateur Wireless" in her spare time.



A view of the aeriels of Italy's new short-wave broadcasting station at Prato Smeraldo, which was recently opened by Signor Mussolini.

from former Austria, or a grand total of 11,041,455. Since that date a further increase has been attained by the inclusion of listeners residing in the recently acquired Czech territory taken over by the Reich.

Sweden's Second High-power Station

WORK has been started at Borlange (Sweden), roughly 180 miles north of Motala, on the construction of another 100-kilowatt transmitter.

Development of the Czech Radio Network

THE Prague authorities have decided to install a 100-kilowatt transmitter on the Perdina mountain in the neighbourhood of Prostejov to replace the Moravska-Ostrava station which they were compelled to hand over to the Germans. Every effort is to be made to have it ready by the end of 1939. The wavelength to be used is 325.4 m. (922 kc/s), the channel hitherto used by Brno. The old Prague-Strasnice (5-kilowatt) station has

cast from the Pavilion Theatre, Boufne-mouth, on December 8th.

A Famous Saxophonist

IN the Birmingham Philharmonic String Orchestra's concert, in the Midland Regional programme, on December 9th, Sigurd Rascher, the well-known Scandinavian saxophonist, will be the soloist for a concerto by Glazounov. Johan Hoek will be the conductor.

Theatre Variety

ON December 15th, theatre variety will be broadcast from the New Theatre, Northampton. There have been a number of broadcasts from this theatre, which is owned locally and serves a large area. The turns for the bill to be broadcast are not yet finally selected.

Talks About the Press

WE are informed that the B.B.C., which has already dealt in its talks programme with other industries, intend to broadcast a series of talks and discussions about the newspaper Press. On Friday

SOLVE THIS!

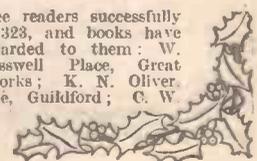
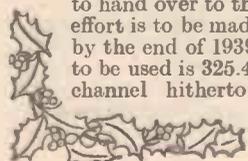
PROBLEM No. 325

Adkins had a mains three-valver feeding an extension speaker, and whilst listening one night, signals suddenly ceased. No sound could be heard from the speaker—not even a faint mains hum. The receiver was accordingly examined, but all valves were glowing, and although a meter could not be obtained for tests a faint shock was experienced when the S.G. terminal was touched, apparently indicating that the H.T. was getting to the circuit from the mains unit. What was the most likely cause of the trouble? 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. 325 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, December 12th, 1938.

Solution to Problem No. 324

Smith overlooked the fact that when joined across the aerial-earth sockets the aerial coil was in parallel with the pick-up. The low resistance of this coil short-circuited the pick-up and this failed to give the desired results.

The following three readers successfully solved Problem No. 323, and books have accordingly been forwarded to them: W. Barraclough, 4, Cresswell Place, Great Horton, Bradford, Yorks; K. N. Oliver, 5, Emsmore Avenue, Guildford; C. W. Cragg, 28, Ashdown Avenue, off Hepley Road, Leicester.



From Baseboard to Chassis

Practical Pointers in Connection with All-metal or Metallised-wood Chassis Design are Discussed in this Article

FOLLOWING the preliminary experiments in the baseboard stage of a newcomer's activities, the next step is usually towards metal or metallised-wood chassis design.

From experiments along the lines recently given in these columns, it may have been noticed in particular that the

layout will be for use up to frequencies in the neighbourhood of at least 10 metres, such conditions have to be borne in mind, even if the possibility of a similar fault is very remote.

In Fig. 1 is depicted an assembly arranged so that the first L.F. is wired, checked, and finally tested in conjunction with the H.F.

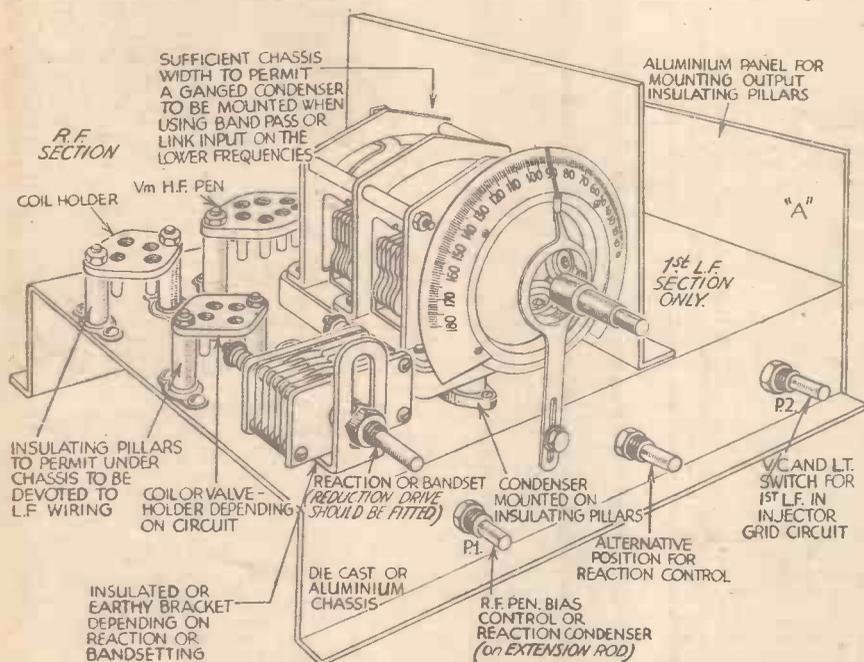


Fig. 1.—The suggested component layout for a combined R.F. and first L.F. chassis.

first L.F. stage can have a very definite influence on the function of the detector stage, and it is therefore advisable, where possible, to arrange so that the first L.F. stage may be wired up in absolute harmony with the detector before attempting final amplification.

To attain the desired amplification in this stage without detriment to the performance of the H.F. portion, it is necessary to check the response over the whole frequency range it is proposed to cover, since it will be remembered that where one circuit fault may be noticeable at, say, 30 metres, another will make itself evident only on about 12 metres, due to the particular constants employed for that waveband.

Detector Damping

A rather startling example concerning detector damping arises with regard to the relationship of the first L.F. anode, which was of generous proportion, to the tuning (grid) coil on a 56 mc/s rig. Without wiring up the L.F. valveholder, the proximity of the electrode proved sufficient to cause cessation of regeneration, and as it is intended that the illustrated chassis

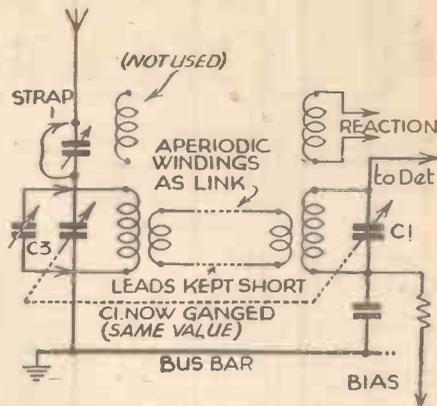


Fig. 3.—Illustrating modification to input stage for selectivity on lower frequencies.

section; thus it will be possible to attain a maximum degree of efficiency prior to boosting with further stages of L.F. amplification.

It is now possible to obtain plug-in coils covering from 9 to 2,000 metres whilst tuning with the same capacity over the whole range, this capacity being in the neighbourhood of 160 mmfds. By this consideration it is therefore possible to make this class of chassis and circuit design respond very well without extensive modifications to the original layout, when band-pass or further stages of aperiodic coupling to the input section is required on lower frequencies.

Using Insulating Pillars

The method of mounting the principal components on insulating pillars has been adopted to reduce drilling and to facilitate short, direct wiring. The valve and coilholders are shown fairly close to the tuning, reaction and bandset condensers, this meeting the majority of average circuit conditions.

Any alteration to the input circuit when carrying out comparative tests in selectivity at different frequencies will, by this layout, prove a simple matter, and although four-socket coilholders are illustrated, it will be realised that six-pin coils will be necessary for link coupling and maximum selectivity, and those depicted serve to show the position and approximate relationship only.

To prevent any H.F. influence in the first

L.F. section, a thick screen is advisable, apart from careful attention to the position of the wiring and coupling components. This screen can be either of copper or aluminium, the latter proving cheaper and more easy to "work." With the type of condenser illustrated, the screen may be actually fixed to the framework, as well as the chassis, by suitable small brass brackets, using shakeproof washers for each bolt, to prevent inefficient earthing with resultant "noises" on the higher frequencies.

(Continued overleaf)

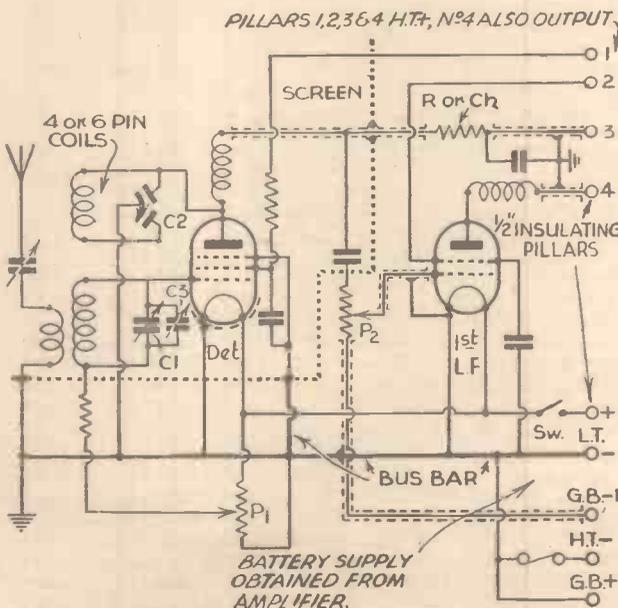


Fig. 2.—A suitable circuit basis upon which to commence experiments. Part of the screening shown is derived from the chassis itself.

RADIO for CYCLES

An Interesting Field for Experiment with Portable Receiving Apparatus

CAR radio is now a recognised branch of "portable" radio, and many listeners have turned their attention to the design of radio apparatus which may be used on a cycle. It is obvious that portability is one of the main features, and although a standard portable could be attached to the carrier of a modern cycle, and reproduction obtained from a small loudspeaker bolted to the frame, this is not the ideal way of solving the problem. Certain commercial apparatus has been designed on these lines, however, for

apparatus, designed to enable a policeman to make announcements without dismounting from his machine. In certain parts of the country police radio receivers have also been designed for use with cycles so that constables in remote districts may be informed of any special new item from headquarters.

For entertainment purposes whilst riding for pleasure, however, an ordinary broadcast receiver has to be employed, and one of the difficulties met with in such apparatus is that it has to be designed for medium and/or long-wave reception. Weight cannot, therefore, be kept down as in the case of a specialised short-wave receiver, although there are available special lightweight midget components and valves which will do a lot to assist in the design of suitable equipment.

Readers' Examples

The accompanying illustrations show two amateur attempts to solve this problem, the upper receiver being of an entirely self-contained type, whilst the lower one includes a small aerial, slung across two telescopic masts supported on the machine. These masts are actually the legs from a dismantled camera tripod. The receiver is built into a cigar box measuring 5½ in. by 6½ in. by 2 in., and feeds a miniature loudspeaker mounted on the handlebars. The other receiver is, as may be seen, designed for use with a headset. Subsequent experiments by the owner of the outfit seen in the lower station have enabled the aerial to be dispensed with, and a coil of wire enclosed in a cycle pump is now employed. The framework of the machine will undoubtedly make a fairly efficient earth, but the aerial is one of the problems which will offer field for experiment. A telescopic device which may be raised when required is one way out, but this is not all that can be desired. The question of winding a frame aerial inside the



A self-contained two-valve headphone receiver, built by Mr. C. R. Pritchard.

frame of the cycle may occur to readers, and perhaps some reader has tried this. The machine is, of course, insulated from earth by the rubber tyres, and it is quite possible that the frame could be used as an aerial—in the same manner as many listeners have employed the spring or frame of a bedstead for an aerial. Both of the receivers illustrated are of the two-valve type and it would therefore appear that there is no need to make a larger receiver than a two-valver, and this is economical and enables quite small batteries to be utilised. They may be built into the container, or carried separately in the touring or tool-bag, with flexible connections to the receiver proper. We shall be glad to have details of any other cycle-radio equipment which has been designed and tested by readers.



Mr. Hitchen, a 16-year old reader of Birmingham, with his first experimental 2-valve cycle radio equipment. Note the suspended aerial.

specialised use, and a typical example is the Tannoy equipment which in this case is more of the public-address type of

FROM BASEBOARD TO CHASSIS

(Continued from previous page)

L.F. Couplings

For resistance-capacity coupling to the L.F. valve—which is preferable—it will be apparent that the only component on the top of the chassis in this section will be the valve itself, and this will be all to the good, but in the case of direct or filtered transformer or direct transformer coupling, the transformer can either be positioned above or below the chassis, this depending entirely on whether it is proposed to use the receiver in any way connected with the mains, since as the ultra-high frequencies are to be handled, even with the most careful screening and bus-bar returns, hum or instability may occur through back-coupling, should the decoupling or wiring prove susceptible to either immediate internal influence or simply from external effects.

By providing a generous depth of chassis runner, the potentiometers, reaction condensers, bias, and volume controls can be conveniently positioned, whilst any larger component, such as the L.F. transformer,

may be fitted without fear of either damping from the under-chassis surface or mechanical restrictions.

Sub-chassis Layout

Although the chassis is of moderate proportions, it will be noticed that the size need not affect the length of each inter-connection, and, in fact, the under-chassis components can, when necessary, be brought right under the associated component by the use of extension rods.

The theoretical aspect of this chassis arrangement can be followed with regard to its purpose in circuit modifications by reference to Figs. 2 and 3, which illustrate the conversion of a straight detector input to that of link coupling or band-pass tuning.

When preparing a chassis along the lines of the one illustrated, the reader would be well advised to make a few rough pencil diagrams so that the exact relationship and amount of alteration necessary will be more easily understood and noted, whilst further circuit adjustments may have definite advantages over original intentions,

in which case some rather interesting notes can be compiled.

There are just one or two other minor details which need mentioning, the first of these concerning the output terminal panel "A."

Output Leads

A useful method of terminating the output leads will be found, as has been mentioned in a previous article, in the employment of ½ in. insulating pillars; these pillars prove not only a cheap and serviceable proposition, but are more efficient from the point of view of leakage. The connecting leads from this chassis to any successive amplifier should be fully screened, with earthy connections being made to both ends of the screening braid.

With regard to the front panel of this chassis, either one of the metal-faced plywood type or just a sheet of 15 to 18 S.W.G. aluminium can be used, but for the purpose of clarity this is not shown in the illustration. These small insulating pillars are also used for the aerial and earth terminals which are let into the rear runner of the chassis in the H.F. section.

An All-Electric Push-button Switch

Constructional Details of a Novel Switch Unit are Given in this Article

MANY readers will find a practical use for this novel switch which can be built at home from the proverbial "scrap-box" parts. A glance at Fig. 1 will convey the general idea of the device,

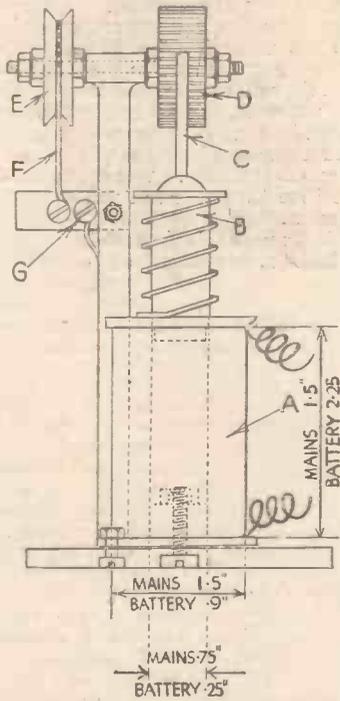


Fig. 1.—Side view of the completed electrically operated push-button switch.

although the imaginative constructor will see many alternative designs to suit the particular job the switch is required for, which may be anything from "push-button" tuning (see Fig. 5), to a bedroom-controlled mains isolating switch. It will be seen from Fig. 1 that the vertical movement of the piston in the solenoid is converted by the hooked arm "C," and the ratchet wheel "D," into rotary movement, the extent of which can be regulated by the length of the piston stroke, which takes place each time the current is turned on by simply pressing an ordinary bell push. The rotary movement is transmitted by a threaded shaft to the contact wheel "E."

The Solenoid

Actually, the solenoid is not very important, as it is never in use for more than a few seconds at a time. The main thing to aim at when selecting this is the strength of pull, which must be sufficient to overcome the return spring, and strong enough to give positive action on the ratchet wheel "D."

For the mains model the field winding off an old moving-coil speaker will serve admirably. Alternatively, many wireless enthusiasts will have one of the L.F. transformers with separate windings in

their "junk" box; if the case and laminations are removed, the secondary winding will do equally well provided that a suitable "slide-in" fit piston is found. Should the constructor wish to make the mains-type solenoid, the insulated core former dimensions are given in Fig. 1, and this should be filled up to the outside diameter with No. 26 S.W.G. enamelled copper wire; this again is not important as deviations will be necessary for different voltages. A 6-volt car trafficator, or starter-switch solenoid, will meet the requirements of the low-voltage model, and these are particularly suitable as they are fitted with pistons. The current may be supplied by a mains transformer with fairly heavy secondary winding, or from storage batteries. In Fig. 1 the fundamental dimensions are given for a small dry battery type, which will also operate from the heater tappings in a receiver; about eight layers of 60 turns of No. 20 S.W.G. enamelled copper will be required. Whatever type of solenoid it is decided to use, the performance will be improved by inserting a short core of soft

Fig. 3. (right) —Detail of the ratchet wheel, "D."

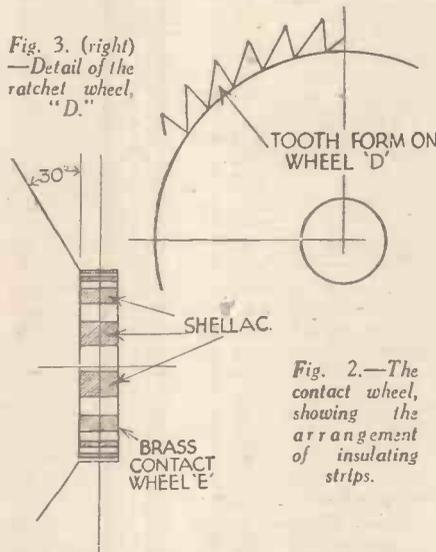


Fig. 2.—The contact wheel, showing the arrangement of insulating strips.

iron in the lower end and this may also be used to anchor the whole to a base, as in Fig. 1.

The Plunger

The plunger, or piston, must be of soft iron, and a sliding fit into the core of the winding. The upper end must have some type of collar to retain the return spring. To facilitate the assembly of the arm "C," the top of the piston should be drilled and tapped, or, alternatively, threaded to take three nuts; an improvised collar may then be made by inserting a large washer between the lower two nuts leaving a third to secure the operating arm "C."

This must be of light flexible steel, of flat section, with a hook on the upper end which engages the ratchet wheel on the down stroke of the plunger. It will be

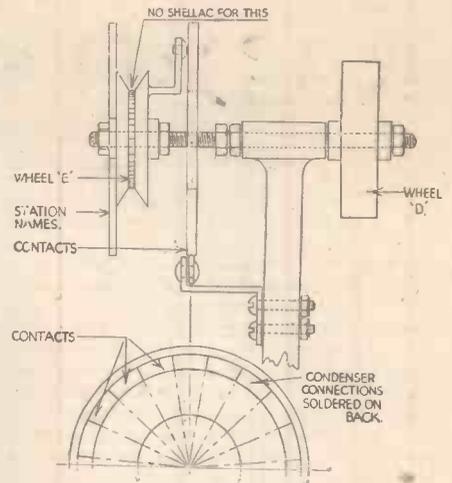


Fig. 5.—Illustrating a method of using the switch for push-button tuning.

necessary to soften the tip to form the hook, but this can be accomplished by heating to a dull red. To prevent the arm, on the return stroke, from rotating the wheel in the opposite direction, a ratchet stop may be fitted to engage the wheel "D." The constructor may find that by bringing a slight pressure to bear on the contact wheel "E" by the contact "F," this stop will not be needed.

The Ratchet Wheel "D"

The object of this wheel will now be obvious, and in Fig. 3 the tooth form is shown in detail. It is unlikely that such a wheel is available, but it can easily be made from a small fibre gear, a file being used for shaping the teeth. An ebonite disc, when suitably shaped, will also serve the purpose. The number of teeth is not important; it will be best to use a little "trial and error" here, as the number is directly controlled by the amount of movement on the piston. It is advised that 16 is used as a minimum on a wheel of .5in. radius.

When the apparatus is to be used as a remote control "on" and "off" switch, a brass pulley (as shown in detail Fig. 2) makes an excellent contact wheel. After cleaning up the "root" of the wheel a number (half the number of teeth on wheel "D") of equally spaced strips of shellac must be painted across the wheel to form the "dead" or "off" positions of the switch. A length of fairly stout copper wire, "F," running in the pulley will make contact with the unpainted strips.

A helpful article on the internal modifications for the "set" was given in PRACTICAL AND AMATEUR WIRELESS of October 1st.

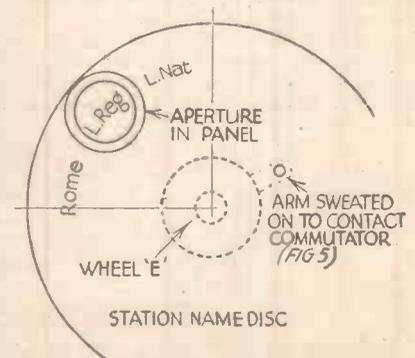


Fig. 4.—A suggestion for marking out a station-name disc.

The Amateur Transmitter

Link Coupling the P.A. and the Theory and Application of Neutralisation are Discussed in this Article by L. O. SPARKS

THE P.A. stage described in the issue of November 26th was intended to provide the most simple means of carrying out tests with the amplification of the oscillations produced by the crystal-controlled oscillator.

Capacity coupling was shown between the two stages; if a reasonable amount of time has been given to the operation and adjustment of the suggested circuits, and experiments carried out to determine the characteristics of such a stage, then some provision can be made to take the matter a step further.

The pros and cons of capacity coupling have already been discussed; the defects

placing the P.A. stage out of harm's way with respect to the oscillator tank, and by suitably locating the anode and grid coils of the P.A. The link-coupling coils can be constructed and supported in the same manner as that given for the original one used on the C.O. anode tank coil. The connecting leads are best formed from a suitable length of ordinary twisted twin flex.

Such procedure will attend to the coils, but will not eliminate all sources of feedback. For example, it is possible for the valve to have sufficient capacity present between its electrodes to allow energy to be transferred from the anode to the grid

provided in such a manner that it kills the first.

A typical circuit is shown in Fig. 2. A triode valve is arranged as a P.A. and the inter-electrode capacity of the valve is represented by the dotted condenser "E.C." In the anode circuit a centre-tapped tank-coil is connected, together with its associated tuning condenser, the H.T. being fed to the valve via the centre tap.

Considering the circuit from the point of view of radio-frequency currents, that is, what the valve is amplifying, the centre tap on the coil is at zero potential. Each end of the coil, however, will be at maximum R.F. potential, but at any given instant they will be out of phase with each other, or, in other words, they will be opposite as regards polarity. When the free end is positive the anode end will be negative, and so on.

It is through this that neutralisation can be obtained, as it now only becomes necessary to connect a small condenser between the free end of the coil and the grid to provide the out-of-phase energy to cancel out that passed back by the inter-electrode capacity of the valve. The small condenser used for this purpose is called a neutralising condenser, and it is shown in Fig. 2 by the component "N.C."

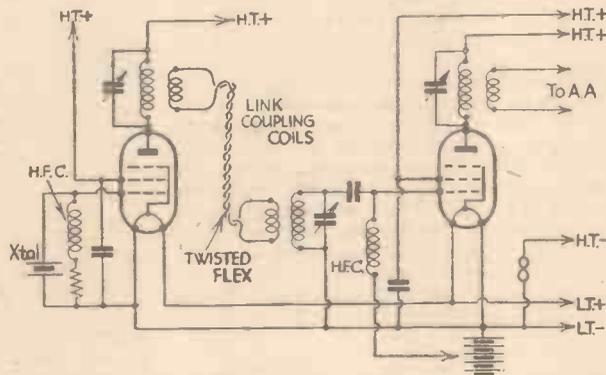
Particular care is needed when carrying out these adjustments, otherwise complete neutralisation will not be obtained, and the stage will be prone to self-oscillation, together with marked loss in efficiency and other very disturbing results.

Adjustments

To neutralise the P.A., adjust the C.O. stage in the normal manner but break the H.T. supply to the anode of the P.A. valve.

With the lamp-loop in position round the P.A. anode tank circuit, apply the drive

Fig. 1.—The crystal-controlled oscillator coupled to the P.A. stage by means of "link" coupling.



will have been revealed more clearly with the additional valve; therefore, bearing in mind the claims put forward for link coupling, it is advisable to modify the P.A. stage to allow that method to be used. The trouble which will arise in many cases is that sufficient room will not be found on the original chassis to house the components now required. Whether a fresh chassis is made or whether a form of extension chassis is constructed depends on individual conditions.

On examining the theoretical circuit, Fig. 1, it would not seem that a great deal of extra space is required for the additional variable condenser and coil which now take the place of the H.F. choke shown in the previous diagram. One has to consider not only the physical space required but the effective fields of the coils in the three tuned circuits now being used.

Reference to the fundamental oscillators given in previous articles will reveal the fact that the P.A. stage is now practically identical to that of the T.P.T.G. oscillator. In other words, if adequate precautions are not taken to prevent the slightest form of feed-back between the grid and anode circuits, the valve will commence generating oscillations, an item which is to be avoided at all costs.

Link Coupling

This, then, is one reason why the coils must be spaced so that there is no possibility of inductive coupling taking place between them. From previous experiments we know that with link coupling the distance between the two circuits to be coupled is not a limiting factor; therefore, all fear of inter-coil coupling can be eliminated by

without any external coupling, thus creating a state of instability.

This possibility is most likely with triode or unscreened valves having a comparatively high inter-electrode capacity. Pentodes, because of their construction and operation, have a lower capacity and are, therefore, more suited to the work in question.

Neutralisation

To avoid any misunderstanding regarding inter-electrode feed-back and neutralisation, the following exaggerated explanation is given.

Consider a normal valve employing capacity controlled reaction; the operation of the circuit depends on energy being fed back from the anode to the grid circuit via the reaction coil and condenser, the latter, being variable, controlling the degree of effect obtained. Supposing, then, that the variable condenser is replaced with one having a fixed value so that constant reaction is secured, and that the resultant effect is used to represent the feed-back produced by the electrodes in a P.A. stage.

To take the matter a step further, let us assume that it is possible to connect some arrangement between the anode and grid circuits in such a manner that further feed-back or reaction is provided, but its action at any given instant is exactly opposite to that of the original circuit. If this condition is produced, it is obvious that the total result, so far as feed-back is concerned, will be nil, as the two reaction circuits, being opposite in phase, or out of phase, will cancel out, and thus eliminate the possibility of instability.

That is actually what happens when neutralisation is applied; no attempt is made to remove the original source of feed-back, but an additional source is

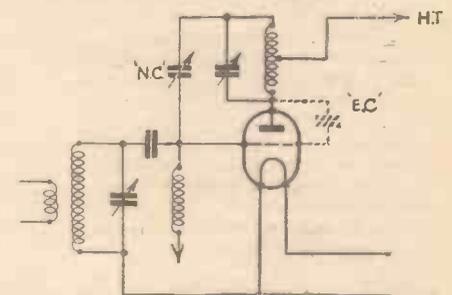


Fig. 2.—A P.A. stage showing how neutralisation is applied. Note the centre-tapped anode coil.

from the C.O. and tune the P.A. tank until the maximum brightness is obtained from the lamp. This procedure will no doubt upset the tuning of the C.O. or drive, therefore, that circuit must be readjusted until the maximum output is obtained and the P.A. tank retuned as before. These details must be repeated until the P.A. tank tuning condenser can be rotated through its complete travel without any light being produced in the loop-lamp; when this condition is reached, the stage is neutralised.

ON YOUR WAVELENGTH



Am I Worried?

ONE of my readers who is interested in spiritualism is annoyed that I should have a tilt at something in which I do not believe, namely, spiritualism and black magic. If this letter, which was from F. B., of Heaton, is a fair sample of the intelligence of the followers of spiritualism, I can well understand why it has such a small following, for this letter is a perfect example of muddled abuse, thick thinking, lack of intelligence, and irrational reading.

I find this concatenation of the imponderables in a cutting, apparently from some spiritualist paper, which a reader sent me. The paragraphist asks "Who gave Thermion permission to utter this gratuitous sneer about a large body of opinion? . . . He is liable to find quite a lot of people rushing off to start a form of protest against him."

The answer to this fatuous question is, of course, that I do not have to ask permission, not even of the spiritualists, who, I would add, do not represent "a large body of opinion." I write what I think, and am prepared to support my remarks. Also, I do not go in any fear of a "lot of people rushing off to start a storm of protest." I am well able to handle that sort of nonsense. It is significant that I have only received these two letters against, but several dozens for my point of view.

Poem

WHILST I am dealing with correspondence, here comes that way K. T. H., of Birkenhead, waving a piece of inky paper; better see what it is all about. Ah! I thought so, another poem.

"If Thermion's chortling, let him chort,
It proves that he's a decent sort
And has a sense of humour,
And now he knows, that I am not
Inventors' champion, and for Scot,
My love is but a rumour.

"Will I forgive him? Sure I will.
I bear our Thermion no ill-will,
But 'doggerel' was not kind.
I beg, in future, that he'll use
A nicer word to name my muse,
Politer title find.

"Continue, then, with Thermion's page,
Against inventors let him rage,
His tirades make us chuckle;
And as the Scotsman's natural foe
From strength to strength may Thermion
go,
Hoch aye, forbye o'er muckle!"

Wireless Club for Headingley

MR. P. McBRETNEY, of 23, St. Chads View, Headingley, Leeds, 6, wishes to form a club in that district and asks that local readers will get into touch with him, which brings me to a point, all too often overlooked. When a club is formed in this way the officers should be elected by vote. There is always the tendency for the person calling such a meeting to be regarded as the proprietor of the club. Many clubs have

By Thermion

faded out because they have become a one-man concern.

Birthday Cake

AN ominous-looking package arrived for me the other morning and I gingerly opened it suspecting a bomb from a crooner, a jazz fiend—or even a spiritualist. But no! It was from the secretary of the Blythe and District Radio Club, who had sent me a cutting from their birthday cake to celebrate their first year's existence. They sent it to me as a token of appreciation and goodwill for the good work this journal is doing for the benefit of radio.

Radiovision

SOME advance particulars have reached me concerning a system of transmitting and receiving sound with vision in natural colours, over a single wavelength, invented by Mr. L. V. Charlton.

Only a single transmitter using one wavelength is required for transmitting both sound and vision together—as distinct from television, which requires two wavelengths, one for sound and one for vision. The transmission and reception of vision will be in natural colours, being done with a mauve ray and a photo-electric vapour. No mechanical system is used, such as spinning discs, drums, etc. By the use of a special vision modulator (camera), scanning the picture becomes unnecessary; this means that the chief difficulties due to scanning will be non-existent.

Radiovision will utilise the medium and long wavelengths. As there will be no scanning, the use of short waves for high definition, as with television, will be unnecessary. On the medium waves, say, 300 metres, 1,000,000 complete pictures per second will be transmitted. The transmitting range is expected to be actually greater than that of the present broadcasting stations, thereby making the existing number of stations ample to provide sound with vision for everyone.

The price of Radiovision receivers will be within the reach of nearly everyone—being a single receiver, and not two receivers in one as in television. The picture will be projected on to a screen. At least, that is what Mr. Charlton thinks.

Television-phone Experiment

I AM informed that Mr. Gerald Cock, B.B.C. Director of Television, will try an interesting new experiment on the evening of December 23rd, when he faces the television camera to speak to individual viewers on the telephone. Going into "the

witness box" he will invite queries concerning the television service from viewers who have telephones in the same room as their television sets. Inquirers will see him pick up the 'phone, and be able to look directly at him as he speaks to them.

The telephone calls will be limited to six, and each viewer will be allowed one question. When an inquirer has been switched through to the Director of Television he will be asked to give his name and address, which will be announced, unless it is preferred that only the locality should be mentioned.

Mr. Cock will be on guard against practical jokers. "In self defence," he said in an interview, "I shall reserve the right to disallow any irrelevant question because practical jokers might see an opportunity in this to make life unbearable for me."

The idea, which has never been tried before, arose following the increasing volume of viewers' correspondence, half of which is in the form of questions regarding programmes and the service. Most of the questions can be answered under eight or nine heads, and thus it is felt that in this conversational interlude the Director of Television may be able to clear up many small problems. Many viewers have written to say that television has an intimate quality which fosters the feeling that they are members of a big family, and it is hoped that this spirit will be perpetuated by this new type of television programme which occurs, appropriately enough, on the eve of Christmas.

Christmas Outside Broadcasting House

AS expected, the Christmas season brings with it a deluge of work for the Outside Broadcasts Department of the B.B.C. Not only in London, but in the Regions, an attempt is made to capture the spirit of Christmas by sending microphones and commentators to festive centres. In addition, there are the ordinary routine outside broadcasts.

"Round the London Organs" is a series of visits to famous organs in London's great churches. On the first day of Christmas week (December 19th), the visit is to Westminster Abbey, where Dr. Ernest Bullock, the Abbey organist, will describe the Abbey's famous instrument for listeners and give illustrations of its wonderful tone and flexibility.

On Christmas Eve (December 24th) King's College Chapel, Cambridge, with its superb choir, gives its annual carol service. On the same day the B.B.C. Chorus and the B.B.C. Military Band, conducted by Leslie Woodgate, go to St. Mary's, Whitechapel, at the annual invitation of the Reverend John A. Mayo, to broadcast their now firmly-established carol programme.

In the afternoon of December 24th a broadcast of a very different nature, but sponsored by the Outside Broadcasts Department, is coming from the Cricket Ground, Johannesburg, where the M.C.C. will be playing South Africa in the first Test Match. A broadcast will take place on each of the four days of the match.

I.B.U. Conferences

THE conference held in Brussels under the auspices of the International Broadcasting Union (I.B.U.), which includes among its members almost every broadcasting organisation in Europe and numbers of the principal organisations overseas, has just ended, under the chairmanship of Monsieur A. Dubois, of Holland.

Technical matters were discussed at meetings attended by about 125 delegates representing thirty countries.

The technical commission met under the chairmanship of Monsieur R. Braillard, director of the Centre de Controle Technique of the I.B.U., to prepare a draft plan of wavelength distribution among the broadcasting organisations in the European region.

The various resolutions taken by the assembly, as well as the draft wave plan drawn up by the committee of experts, after submission to the Council of the I.B.U. will be passed to the Governments of the European region through the intermediary of the International Bureau of Telecommunications at Berne. The final wave plan will be discussed and adopted during the European Broadcasting Conference to be held in Switzerland next spring.

A conference of experts on foreign relays was held at the same time as the meetings of the Technical Commission. At this meeting more than twenty-five delegates, representing fourteen countries and the Secretariat of the League of Nations, met for the first time in the new Belgian Broadcasting House. The principal networks

of the United States of America were also represented. This meeting, which was unofficial, was under the chairmanship of Monsieur Dymling, Sweden, President of the programme committee of the International Broadcasting Union.

During the meeting, which lasted two days, the delegates offered their most interesting Winter Season programmes for relay. They established the bases for exchanges of concerts and other programmes likely to interest their listeners. In view of the success of this meeting, the International Broadcasting Union Council has endorsed the wish expressed by those taking part to the effect that the Union should in future organise two meetings of this kind each year.

In addition, a study group met at Brussels under the chairmanship of Dr. Sourek, Czechoslovakia, President of the Juridical Commission of the Union, to examine various legal problems, and in particular those created by the development of television.

Finally, the Budgetary Commission examined various financial problems. Monsieur A. W. Glogg, Director-General of the Société Suisse de Radiodiffusion, was appointed President in place of the late Monsieur Roman Starzynski, Poland.

During the Union meetings the inauguration of the new buildings of the Union's technical checking centre at Uccle took place. The new building was opened officially by Monsieur H. Marek, Minister of Transport, P.T.T. and the I.N.R.

The next meetings of the International Broadcasting Union will be held in Switzerland shortly before the official Conference of European Administrations, probably towards the end of February, 1939.

Notes from the Test Bench

Station-name Scales

MODERN receivers are fitted with scales carrying the names of the main stations, and many amateurs have apparently attempted to fit such scales to their apparatus after purchasing them from surplus stores. It should be remembered, however, that these scales will only hold good when used with a coil having a certain inductance value and a condenser covering a certain "law." As some commercial receivers utilise special components it is quite possible that it will be found impracticable to attempt to use the scales. Modern home-constructor coils and condensers are now made to definite standards, and therefore home-constructor dials will be interchangeable with various coil and condenser combinations, provided that they are built to these standards.

Junior Crystal Set

A NUMBER of readers who have made up this crystal receiver have complained of the results obtained, and upon inspection it has been found that the crystals have been practically ruined. The combination incorporates a piece of tellurium, which is very soft, and the plunger, which carries a harder crystal, should not be turned round whilst the crystals are in contact. This merely grinds away the softer crystal and destroys it. When changing a spot, or when searching for a sensitive spot for reception, the knob of the crystal should be held lightly, and the plunger withdrawn and then slowly lowered until the crystals are felt to be in contact. If that spot is not sufficiently sensitive, withdraw the plunger again, turn it slightly and again lower it gently.

Selectivity and Sensitivity

ANOTHER point which is met with in this receiver is the question of selectivity and sensitivity. The coil is provided with a primary winding and this gives a certain degree of selectivity. With all coils of this type, the sensitivity is naturally lower than that obtainable when the primary is cut out. Consequently, if you are in a district where selectivity is not of paramount importance, it is quite in order to transfer the aerial to the top of the secondary winding (that is, to the fixed vanes of the tuning condenser) and this will give an increase in power or sensitivity, with a reduction in selectivity. These remarks apply, of course, to any receiver which has an aerial coil provided with a separate aerial or primary winding.

Christmas Variety Broadcasts

LISTENERS will be interested to know that the light entertainment programmes to be broadcast on Christmas Day will include a revival of John Watt's radio adaptation of Walt Disney's full-length sound cartoon, "Snow White and the Seven Dwarfs"; a typical twenty-minute story by A. J. Alan; a broadcast at the Theatre Organ by Reginald Foot; and an appropriate light musical programme, "Christmas Cheer," by Walford Hyden and his Orchestra.

The B.B.C. will also provide some good fare on Christmas Eve (Saturday, December 24th), when the second of two performances of the adaptation of "Shall We Dance?", the big Astaire-Rogers film success, will be broadcast, and so will special Christmas editions of "In Town To-night" and the Saturday-night "Sing Song" variety performance. A cabaret show will be contributed by the West of England Region. Afternoon dance music will be played by Harry Roy and his Band and the late night dance music period will be divided between Billy Cotton and his Band from the studios and Billy Bissett and his Canadians from the Café de Paris.

Boxing Day Features

Shows scheduled for Boxing Day include "Monday at Seven," with an all-child cast; an hour's dance band entertainment by Jack Hylton; a "Musical Games" programme, to be contributed by the Midland Region; and a half-hour edition of the gramophone request programme, "You've Asked for It." Late night dance music will be played by Joe Loss and his Band from the Astoria Dance Salon.

On Bank Holiday (Tuesday, December 27th), programmes will include a 45-minute dance band entertainment, arranged and presented by Jack Payne; "For You, Madame"; and the "Légionnaires"; while on Wednesday, Felix Mendelssohn will present the second "Crooners' Corner" show, and there will be the weekly "Bard Waggon" production and a cabaret performance from the West of England.

The "Kentucky Minstrels" will put over a typical and topical show on Thursday, and "Big Bill" Campbell is arranging one of his popular hillbilly programmes.

Pantomime Broadcasts

On Friday, listeners will hear the third and last of a new series of "Hail, Pantomime" broadcasts and a relay from Paris by Ray Ventura and his Collégiens. Late night dance music will be provided by Jack Jackson from the Dorchester Hotel and afterwards by Jack Harris and his Band from the Chelsea Arts Ball at the Royal Albert Hall.

On Saturday, December 31st—New Year's Eve—variety programmes will include "Music Hall"; an outside broadcast from the Coventry Hippodrome of the "Robinson Crusoe" pantomime; "In Town To-night"; a new show by Gale Pedrick and Vernon Harris, in which "veteran" variety broadcasters of 1938 will come to the microphone as they might in the year 1968; and a broadcast by Hugo Rignold and his Band. During the late night dance music period, Jack Hylton will broadcast with his Band from a studio.

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Practical Television

December 10th, 1938. Vol. 3. No. 129.

Reckoning the Cost

AS a result of a recent Parliamentary question the total cost of the television service up to the end of September of this year was given as nearly £800,000. Of this the capital expenditure accounted for about £126,000; the balance being due to depreciation, programmes, engineering and staff costs. This covers a period of over two years, and when offset against the progress made in the service, which is now the finest in the world, is not really untoward. It was stated at the same time that the question of introducing a special licence was not considered a wise course to follow at the present stage of development. The exact number of television sets sold is known to members of the Television Advisory Committee, and although these figures are confidential, if the ambitious programmes of the B.B.C. are any criterion there must be several thousand to justify the work which is now contemplated. The success which has undoubtedly attended the recent outside television broadcasts presages the time when almost every event of real importance which takes place in London and the home counties, whether outdoors or indoors, will be seen by viewers on their home screens. Whether the cinemas will be able to participate in these ambitious programme efforts is still a matter for conjecture. It has been stated in authoritative quarters, however, that a special demonstration of the existing big-screen installations in cinemas is to be given to the television committee, and the results accruing from this will no doubt influence very materially the final decisions on this very important side of television's development. Regular cinema shows can in no way upset home-receiver sales, rather the contrary, now that big-screen working has advanced so rapidly.

A Happy Thought

IT was certainly a happy thought on the part of the B.B.C. to inaugurate a series of talks on television from the London Regional station. In the survey which Mr. Howard Marshall is giving, he is maintaining a strictly impartial attitude, and is basing his remarks on a personal investigation. Like all others, the Marshall family did not display any apparent enthusiasm when the receiver installation was undertaken, but after a few days the apathy changed to marked interest, and an appreciation of the undoubted home entertainment value provided by this medium. Most of the casualness which television has to combat comes from those who deliberately, or through no fault of their own, have not had an opportunity of witnessing programmes in the comfort of the home for, say, a week. Any carping criticism brought about by lack of contact with this service is then invariably changed to enthusiasm, which does not wane with time, although obviously the items of the B.B.C. programmes week by week must vary in their quality and the range of their appeal to different persons. There is no

doubt that Mr. Marshall's talks will have undoubted good propaganda value, and serve to furnish further evidence of the determination of the B.B.C. to make the public television conscious, and so justify their faith and monetary expenditure in the television service. Some critics of these talks state that Mr. Marshall should base his judgment on reception in areas notorious for interference, but this is a very narrow outlook. No service should be castigated because reception is not perfect everywhere, and Mr. Marshall's happy knack

duced officially, and it is hoped that by that date receivers will be on the market for home use. In the public viewing rooms of Berlin the sets employed are of an expensive and elaborate character, but in addition to ordinary complete commercial sets, manufacturers hope to have available the add-on or adaptor units which can be used with standard broadcast receivers to give combined sound and vision. No prices are yet known, although a figure of £20 to £30 has been mentioned as likely for the add-on units. Reception in this country of the German signals as at present radiated is not likely because of the long distance away, but if very high powers are employed next year freak results would not be wholly unexpected when the American and South African stories of receiving Alexandra Palace are borne in mind.

Television and Education

THE popularity of the schools broadcasts on the normal broadcast channels shows that there is now a definite function to be fulfilled by radio as an aid to education. It is therefore time that the authorities



Schoolboys following a television programme of an educational nature.

of making all things interesting has proved useful to viewers, as well as to those who do not yet possess a television set.

Berlin at Work

THE German high-definition television service has now started working to a regular schedule on a 441-line definition standard. The service has not been opened officially, and an auxiliary aerial is in use until the proper one has been completed. A carrier frequency of 47.8 megacycles is used for radiating the picture and synchronising pulses, while the accompanying sound is sent out on 45 megacycles. Two hours per day, from 8 p.m. to 10 p.m., constitute the transmission periods, and the items chosen embody both direct vision from the studio together with a fair balance of film material. Due to the temporary transmitting aerial arrangements, the signals seen so far are below the strength of those experienced during the very lengthy 180-line régime. In the New Year it is anticipated by the authorities that the regular service will be intro-

considered the inauguration of special schools television broadcasts at either morning or afternoon sessions, where many of the existing broadcasts could be augmented by picture relays. Broadcasts to schools could then include many features which at present are outside the normal range, and it does not need much imagination to see that some very valuable knowledge could be given to scholars which would otherwise probably be unobtainable. The Zoo broadcasts are extremely popular, not only with children but with adults. Such features as the televising of valuable *objets d'art*, collections of pictures, and visits to places of historic interest not generally open to the public would greatly increase the educational value of television, and we hope that before very long the authorities will take steps to initiate a regular schools television programme.

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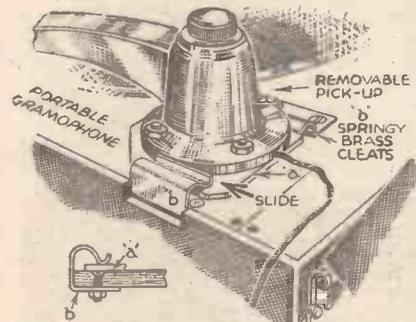
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READERS WRINKLES

THE HALF-GUINEA PAGE

A Handy Pick-up Fitment

I HAVE to resort to a portable gramophone into which I have fitted an electric motor, but owing to the rather large overall dimensions of the pick-up, it became



Method of fitting a removable pick-up to a portable gramophone.

necessary for me to adapt this to the gramophone in such a way that after use it could be removed easily, so that the gramophone could be closed up. The attached drawing shows how I fitted a sliding attachment to the pick-up base by means of cleats "b" attached to the motor board.

For the sliding base I used a piece of 16 S.W.G. aluminium, allowing narrow flanges for engaging with the springy brass cleats. The assembly is very stable, and does not "shift" during the handling of the records, etc.

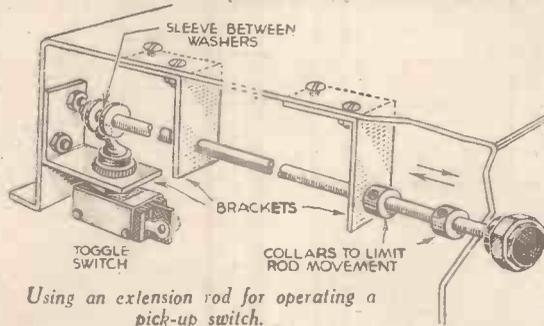
To fit the near cleat so that the lid of the gramophone did not foul this when closed, I had to cut a small piece out of the side of the case, as shown in the sketch, to permit the necessary recessing.

There is one point concerning the fitment of the pick-up which can be mentioned for those thinking of adopting a similar method, and this concerns the positioning of the pick-up in relation to the cleats and turntable; the full traverse of the P.U. should be taken into consideration before drilling out the base plate.—T. J. Johnson (Leigh, Essex).

A Pick-up Switch Improvement

WHEN building a radiogram recently, I was confronted with the problem of fitting a pick-up switch very close to a valveholder at the back of the chassis, to be operated from the front panel. How I got over the problem is made clear in the accompanying sketch.

The switch and operating rod are mounted on small brass brackets fixed to the chassis, as shown, and the end of the brass operating rod is tapped to a slightly smaller diameter, leaving a shoulder, upon which is threaded two washers with a sleeve between, and secured by a nut at the end.



Using an extension rod for operating a pick-up switch.

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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.

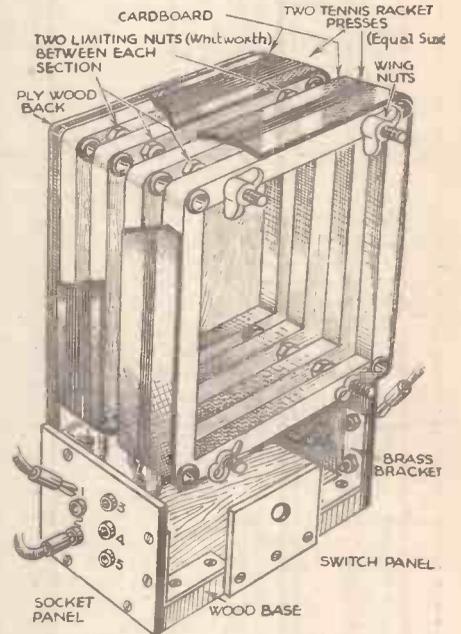
SPECIAL NOTICE
All wrinkles in future must be accompanied by the coupon cut from page 338.

Two collars are also fitted on the rod, to limit the movement to that of the dolly on the switch. Hum due to long switch leads is effectively eliminated by adopting this arrangement.—R. A. Coates (Whitby).

An Experimental Frame Aerial
WITH the aid of the jig illustrated, I have been able to carry out some interesting experiments in different types of windings for various wavelengths, and the adjustment afforded by the method of assembly has proved very useful for ascertaining the correct spacing for effective sensitivity and smooth reaction under various conditions. It will be seen that I have simply modified two disused tennis racket presses by removing the existing tightening bolts and redrilling four holes in new positions to take four long Whitworth bolts.

Between each section two nuts are used for rigid adjustment, after ascertaining the required spacing, the wing-nuts finally

include suitable socket panels and a switch panel, these being made of ebonite, and the whole assembly is mounted on a "back plate" of 5-ply wood, as shown. The base piece and ebonite panels are bracketed to this back plate with 14-gauge brass angle brackets, thus the jig is very robust and capable of standing constant usage without distorting or weakening. The base is of 3/4 in. American white wood, so that wood screws could be used to fix



A pair of old tennis racket presses are used for this experimental frame aerial.

The panels as depicted.—F. G. WELLS (Writtle).

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WHEN the constructional work detailed last week has been completed the wiring may be commenced, following the plan given on page 334. Note that in several cases soldering tags have been attached to holding-down bolts in order to facilitate earth return leads. The two supports for the H.T. positive lead are mounted in the following manner. Remove the screw which holds the base to the support and drill out the hole in the base with a $\frac{1}{8}$ in. drill. The support may now be screwed over the bolts holding the valveholders in position (at the points shown in the wiring diagram), the bolts cutting their own thread. Do this carefully, turning the support in the opposite direction after every two or three turns to clear the thread. Solder a length of bare 22 or 20 S.W.G. tinned copper wire across these two supports to which the various components and leads for H.T. are attached. Note the use of screened sleeving where indicated. One clip on the 500-ohm Spirohm resistance should be slid along for a distance of about $\frac{1}{2}$ in.—the exact position being found later with the aid of a meter when H.T. voltages are checked. No difficulty should be experienced in the wiring provided that care is taken to proceed stage by stage. In the wiring plan certain of the resistors are shown as of the $\frac{1}{2}$ -watt type. Furthermore, some of the condensers may not appear to resemble those specified. This is on account of the fact that the drawing and the photographs were made from the original experimental model, in which components ready to hand were employed. Those now specified are adopted for various reasons and should be adhered to.

Mounting the Controls

The mains transformer should be left

until the end, and then bolted into position. The colour-coded leads should be carefully picked out to avoid trouble from wrong connections. The primary is tapped for various mains voltages, and those applying to your particular mains should be connected to the mains-input socket and the remainder made safe by slipping over them a length of insulated sleeving, after doubling them up to reduce their length and to avoid risk of short-circuits.

The panel may now be drilled from the diagram on this page and it should register accurately with the holes in the front runner of the chassis and also with the holes in the front of the two long screens. When this is found satisfactory, bolt down the slow-motion drive and remove the pointer. In the case of the original model the short spindle provided for this was cut down slightly to enable a neat appearance to be presented in the finished dial. Now remove the lock-nuts on the volume controls, jack and switches on the front runner, and attach the single-pole change-over switch to the upper hole in the centre of the panel. Connect the two contacts together as shown, and push the leads from the I.F. transformer up through the hole drilled to receive them. Solder a short length of wire to a tag and attach this to the nearest bolt on the lower edge of the right-hand screen and attach the other end of the wire to the switch. The flexible leads from the I.F. transformer are then also attached to the switch, after which the panel may be placed into position.

The B.F.O. Unit

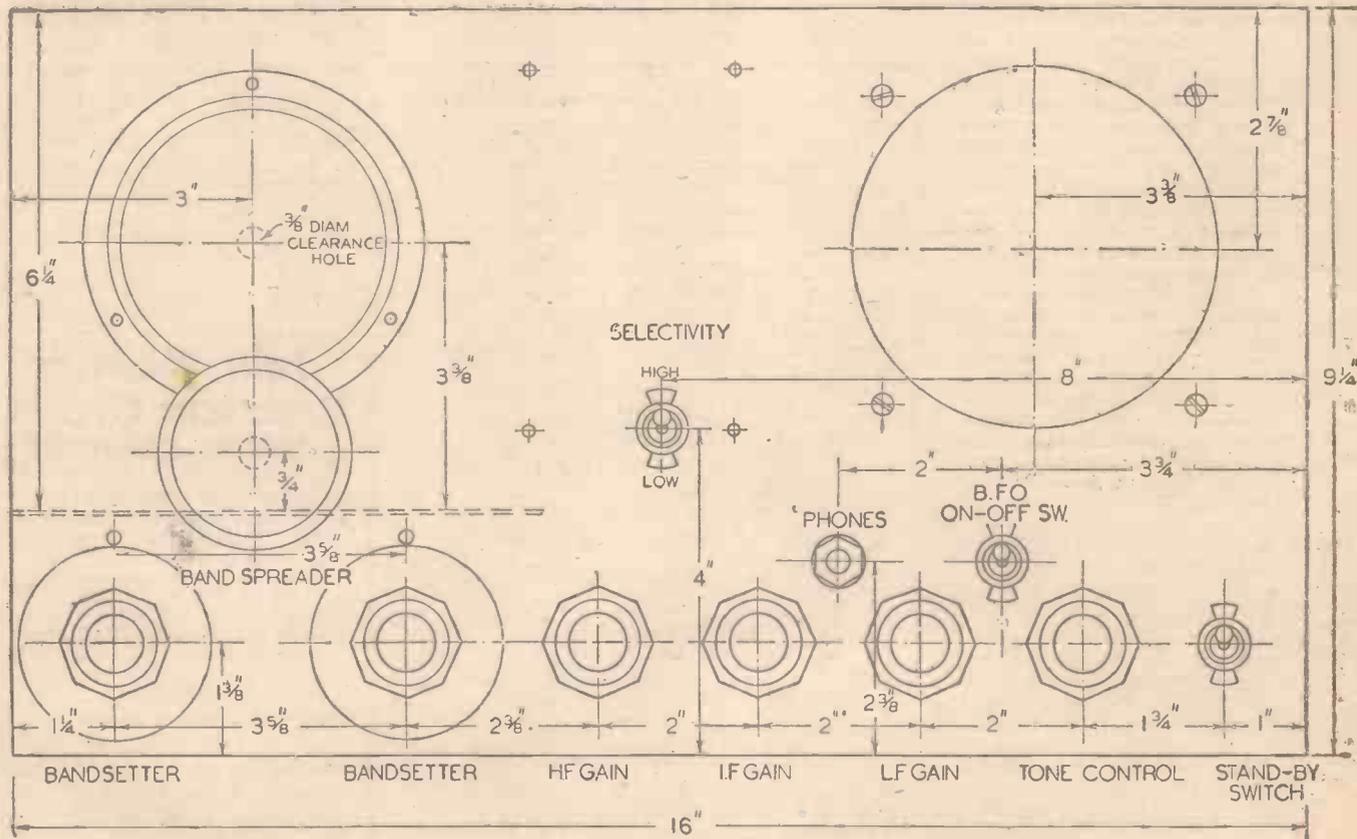
Lock up the nuts for the volume controls, jack and switches, and the panel should then be rigidly held, after which the bolts may be placed through the screens to com-

FURTHER D THE "AIR-

Completing the Wiring, Bu Preliminary Operating Deta

plete the assembly. The loudspeaker may now be placed into position, although, if you prefer it, it may be placed on to the panel before locking this up. There may be a risk of damage if the speaker is handled too early, and it is preferable to leave this until last, as it is still perfectly accessible.

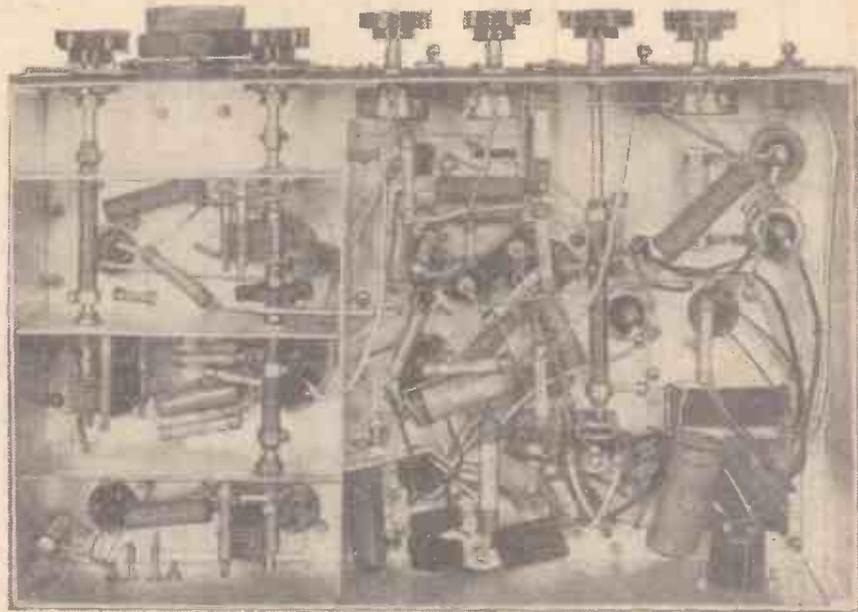
The B.F.O. unit is made up as shown in the inset in the wiring diagram (in the position occupied by the mains transformer). The two long tags on the coil are bent carefully upwards so that they enclose the .0001 mfd fixed condenser and the two pairs of contacts are soldered together, after which the pre-set condenser is also soldered to the contacts—the two condensers thus being in parallel. To the remaining tag—which is the cathode tap—a length of wire is attached and passed down through a hole in the chassis for connection to the cathode of V6. A wire should now be soldered to a tag and attached to one of the bolts inside the B.F.O. screen, as shown in the wiring diagram, and the coil is then dropped into position and a bolt passed up from below the chassis through the tapped hole in the holding-down strip inside the coil.



Dimensioned diagram for drilling the panel. The various controls are identified in this diagram

DETAILS OF "HAWK" 9

...ing the B.F.O. Unit, and
- - By W. J. DELANEY



This under-chassis view shows the positions of the various items, and should be studied in conjunction with the wiring diagram on the following page.

The earth wire from the tag is attached to one side of the coil unit, whilst to the other side a further .0001 mfd fixed condenser, with grid leak in parallel, is attached. A lead is then joined to the other side of these two components for subsequent attachment to the top cap of the valve. When this has been done the rear screening piece (Fig. 8 in last week's issue) may be locked into position to enclose the I.F. and B.F.O. screens.

Slow-motion Drives

The two drives for the band-setters may now be constructed. Remove the small screws holding the paxolin pointers in place on the drives and carefully remove the control knobs from the Eddystone dials. This may be done by filing across the underside of the dials and carefully prising the knob away after removing the retaining pin. Clean up the underside of the knob, and it may be used for the operation of the control. Place the drive in position behind the front runner of the chassis and locate it with the extension control spindles. A hole should now be drilled through the panel and runner to accommodate the locating bolts which are provided on the drives. When this has been done saw off 1/4 in. from the spindles of the drive (that is, remove the slotted portion) and then lock the drives in position. Slip over the dial, and the screws originally removed will now be found to locate accurately in the hole in the dial and in the drive, and they may then be locked in position. The knobs should now fit over the spindles and lie almost flush with the dials. Place the band-spreaders with vanes all in (maximum capacity) and set the pointer on the large drive to read zero. Remember that this drive gives from 0 to 100, an increase in reading to agree with an increase in frequency—which is a reduction in capacity. This will be found of great use in short-wave work and is to be preferred to the type of dial which indicates with an increase in reading an increase in capacity, which is a decrease in frequency.

Preliminary Adjustments

A set of coils will have to be made up and full winding data for these will be given next week. In the meantime, the following operating notes will no doubt be helpful in understanding the working of the receiver. With the B.F.O. switch in the "off" position the receiver should be switched on and the right-hand switch depressed. As the receiver warms up a faint hum should be heard in the speaker. All controls should be set to minimum. Connect a pair of headphones to a jack, and plug this into the socket to facilitate the preliminary adjustments. Turn the tone control to a mid-way setting and the L.F. control to maximum. Now if the band-setters are both adjusted together it will be

found that when they are "matched" a faint rushing will be heard in the 'phones. The degree of noise will depend upon the setting of the H.F. and I.F. volume controls. In the majority of cases the I.F. control should be about half-way on and the H.F. control set back to zero. Now turn the selectivity switch and note the degree of "spread" obtained on the band-spread dial. It will be found that in one position there is a single peak—used when high selectivity is required—and in the other position there is a double peak.

This is only needed when quality results are required on a broadcast station, or when searching and "flatter" tuning is required.

When the two band-setters are matched the background noise or "mush" will be at maximum and this forms a ready indication of their correctness. The main tuning dial may then be turned through its full compass and stations located. When a complete rotation of this control has been made the two band-setters are advanced a

(Continued on page 339.)

LIST OF COMPONENTS FOR THE "AIR-HAWK" 9

- | | |
|--|--|
| One aluminium chassis, 16 S.W.G., 16in. x 10in. x 3in. (Peto-Scott.) | Two I.F. transformers, BP.123 and BP.124. (Varley.) 16s. 3d. |
| One aluminium panel, 14 S.W.G., 16in. x 9in. (Peto-Scott.) | Four Lab-type volume controls, 10,000 ohms, 20,000 ohms, 50,000 ohms and .5 megohm. (Eric.) 12s. 0d. |
| One full-vision dual-speed drive, type 1070. (Eddystone.) 8s. 9d. | Twenty-eight fixed resistors: |
| Three couplers, type No. 1009. (Eddystone.) 4s. 6d. | One 100 ohms 1-watt type |
| Three extension controls, No. 1008. (Eddystone.) 3s. 9d. | Two 300 ohms do. |
| One 6-pin coil holder, type 964. (Eddystone.) 1s. 3d. | One 500 ohms do. |
| One ceramic preset (30 mmfd.) type No. 1023. (Eddystone.) 1s. 0d. | One 600 ohms do. |
| Two miniature dials, No. 1099. (Eddystone.) 4s. 0d. | One 2,000 ohms do. |
| Two stand-off insulators, No. 1028. (Eddystone.) 1s. 0d. | One 5,000 ohms do. |
| Set of coil formers, 4 and 6-pin. (Eddystone.) | Three 10,000 ohms do. |
| Three switches (types S.80.T, S.80.T and S.81.T). (Bulgin.) 4s. 9d. | One 15,000 ohms do. |
| One mains connector, type P.20. (Bulgin.) 2s. 0d. | Two 20,000 ohms do. |
| One midget H.F. choke, type H.F.8. (Bulgin.) 2s. 9d. | One 25,000 ohms do. |
| Four top-cap shielded connectors, type P.103. (Bulgin.) 2s. 0d. | Two 30,000 ohms do. |
| Three top-cap connectors, type P.96. (Bulgin.) 2d. | Five 50,000 ohms do. |
| One shaft coupler, No. 2005. (Bulgin.) 3d. | Five 100,000 ohms do. |
| One B.F.O. type P. coil. (Wright and Weaire.) 1s. 6d. | One 200,000 ohms do. |
| Two 4-pin ceramic valveholders. (B.T.S.) 1s. 6d. | One 500,000 ohms do. |
| One component-mounting bracket. (B.T.S.) 4d. | One 500-ohm "Spiroh" resistance. (Dubilier.) 3s. 0d. |
| Nine octal valveholders. (Clix.) 7s. 6d. | Twenty-eight fixed condensers (Dubilier): |
| One A.E. socket strip. (Clix.) 6d. | Six .0001 mfd., type 690W 4s. 0d. |
| Three .00016 mfd. trolitul condensers, type Tro. 160. (Premier.) 6s. 9d. | Eight .1 mfd., type 4603/S 10s. 8d. |
| Three .000015 mfd. trolitul condensers, type Tro.15. (Premier.) 4s. 6d. | Three 1 mfd., type 4609/S 7s. 6d. |
| Two epicyclic drives. (Premier.) 4s. 6d. | One .04 mfd., type 4601/S 1s. 0d. |
| One mains transformer, type AC.9 (Premier.) 14s. 6d. | Three .05 mfd., type 4602/S 3s. 9d. |
| | Two .01 mfd., type 4601/S and 691W 3s. 0d. |
| | Two 25 mfd., type 3016 3s. 0d. |
| | Three 8 mfd., type 0281 13s. 6d. |
| | Nine valves: |
| | One X.64 |
| | Three W.63 |
| | Two Z.63 |
| | One H. 63 |
| | One KT.63 |
| | One U.50 |
| | One special energised loudspeaker, 1,600 ohm field, type A.C.9. (W.B.) |
| | One plug and jack. |
| | Connecting wire, nuts, bolts, shakeproof washers, flex and screening sleeving (Peto-Scott.) |
| | Supply of 16 S.W.G. aluminium sheet for screens. |

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SPECIFICATION :
Powerful 3-valve 3-stage circuit with variable- μ H.F. pentode, high efficiency, Detector and Harries distortionless output pentode. Clear, colour-coded, station-named dial. Wave-ranges, 18-52, 200-550 and 900-2,100 metres. Duplex Epicyclic tuning with slow-motion ratios of 9-1 and 80-1. Balanced and screened air-cored wave-wound broadcast coils; screened s.h. or f-wave coil. Alternative aerial mounting.

Rotary wave-change switch, with silver-plated contacts. Volume control. Chassis size 11 $\frac{1}{2}$ " wide, 9 $\frac{1}{2}$ " deep, 9 $\frac{1}{2}$ " high. Supplied complete with 3 British valves and all knobs. **NORMAL LIST VALUE, 5 gns.**

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OUR PRICE, Cash or C.O.D. 72/6 or 5/- down and 12 monthly payments of 8/2. See speaker offer below.

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A Complete Outfit for the Darts enthusiast. The 18 in. Tournament-size Board is made in one piece of specially treated wood covered with material and printed Red and Black. No soaking required. Wired both sides and fitted removable numbers. The Wall Cabinet is made of 1/2 in. ply finished in attractive Walnut colour. Interior sprayed Green. Fitted, framed and hinged folding doors painted Black. Two brackets are provided for fixing to wall; Size open approximately 4'4" x 2'2". Complete with two Sets of specially selected cane darts. Carriage Free. Normal list value for this superior outfit, 35/-.

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- Automatic Volume and Tone Controls.
- Pick-up Sockets, 3 and 20 Watts Output.

Here is unbeatable value in modern chassis. This 5-valve 7-stage superhet, as illustrated, covers the short, medium, and long waves. Sensitivity and selectivity rivaling an expensive multivalver. Supplied to you complete with all knobs and valves and matched energised moving-coil speaker. Chassis size 11 $\frac{1}{2}$ in. wide, 9 $\frac{1}{2}$ in. high, 8 $\frac{1}{2}$ in. deep. **Normal Value, £9/9/0.**

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- Beat Frequency Oscillator with separate pitch control.
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TROPHY 8. Rear chassis view.

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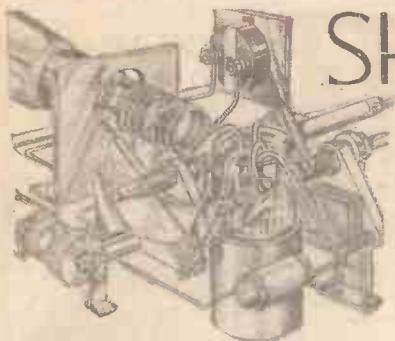
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SHORT-WAVE SECTION

SHORT-WAVE RECEIVER DESIGN

An Explanation of the Principles Underlying the Design of a Simple Short-wave Receiver

MANY listeners are anxious to commence listening on the short waves but are deterred on account of the many different circuit designs which they see recommended from time to time. The superhet has gained tremendous popularity, and is undoubtedly an ideal arrangement where maximum efficiency is desired, but a simple one-valve battery-operated receiver can give a remarkable account of itself when properly designed and handled. For the beginner, a two-valve battery receiver will be found a very good arrangement, giving not only ample scope for experimental work, but rewarding the user with some very good logs when conditions are suitable and when the knack of handling a short-wave set has been acquired.

As an example we attach a circuit of a receiver of this type, and this will serve to explain many of the points which trouble the beginner. Dealing first with the coil—this may be of the 4-pin, 6-pin or other type. The two first mentioned are available commercially and thus will enable a listener to get started right away, without the need for worrying about the design of the coil. Furthermore, home-made coils could subsequently be made up and used in the coil-holder for experimental purposes. To avoid the complications of a loose-coupled aerial, a 4-pin coil may be used, and to enable the effects of damping (due to the aerial-earth system) to be removed a small condenser, C1, is included in the aerial lead.

Component Values

This condenser may be fixed, variable, or semi-variable. A variable component, although providing a further control, is definitely advisable as it enables the circuit to be "trimmed" on each band and the maximum coupling obtained. A maximum value of .0002 mfd. to .0005 mfd. may be used, and the component should preferably be of the short-wave type. The aerial and reaction coils should be coupled, although shown at right-angles in the circuit, and here again is room for experiment. The position of the reaction coil in relation to the grid coil and the number of turns is quite critical, and a position will be found on each coil where smooth reaction is obtained throughout the band covered by the coil in use. The main tuning condenser, C3, should not be greater in value than .0002 mfd., and a .0001 or .00016 mfd. condenser is most suitable. To this may be added a very small condenser in parallel to provide band-spread tuning if so desired. The grid condenser, C2, and grid leak are two further components which will be found very critical, and although a value of .0001 mfd. may be stipulated for the grid condenser, the leak may have any value from 1 to 5 megohms. In many cases the higher value will be found more efficient, although by providing clips for this component and using clip-in leaks the varying effects of different values on different wavebands may be ascertained.

Suitable Valves

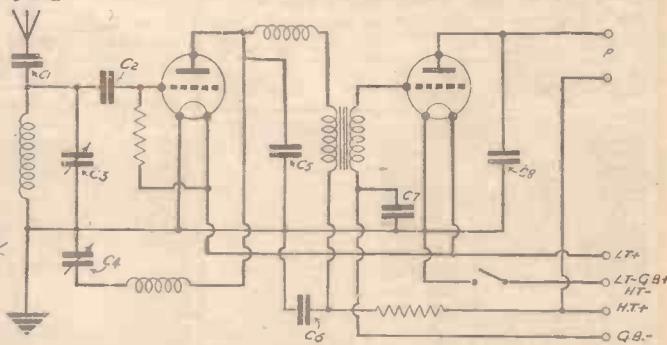
The anode by-pass condenser, C5, plays a very important part in obtaining smooth reaction and good quality, and its omission will generally result in decreased efficiency. A value of .0002 mfd. is generally suitable, although again this may be the source of experiment. The H.F. choke should be of the special short-wave type, and if the receiver is intended to tune from about 15 to 100 metres, this may be home-made and consist of 100 turns of, say, 26 D.C.C. wire on a good quality former about $\frac{1}{2}$ in. in diameter. The L.F. stage is coupled by a transformer, and decoupling is introduced in

the interests of stability. The decoupling condenser, C6, should be either 1 mfd. or 2 mfd., and the resistance in the H.T. positive line will have to be chosen to enable a suitable H.T. voltage to be applied to the valve. This will obviously depend upon the H.T. which is available and the type of valve in use. For the detector it is generally recommended that a valve of the General Purpose type be used. This is sold under various type numbers, generally known as HL210, 2HL or some similar title. The L.F. valve is, of course, a standard L.F. or small power type. The transformer may have a ratio between 3 and 5 to 1

and is not critical. Grid bias decoupling is provided by the condenser (C7, the value of which should be 2 mfd., whilst any H.F. present in the output stage should be passed to earth through the condenser C8 to avoid hand-capacity effects when headphones are being worn. This condenser should be of .001 mfd., although various values from .0005 to .01 mfd. may be tried.

Modifications

The details which have been given are for the receiver in its simplest form, and it may be relied upon, if well made up, to give very good results. Modifications which can be introduced to improve the ease of handling, or perhaps to improve the results obtained, will suggest themselves to the operator. A metal panel should be adopted to avoid troubles due to hand-capacity effects, whilst earth leads should be of heavy gauge wire well soldered or at least well locked up where terminal connections are employed. Low-loss coils, self-supporting without formers, are well worth trying, and the best quality short-wave components justify the additional expense which they entail. For the aerial, a vertical wire will be found very good, if supported at least 18 ins. from the wall, and tied at each end to a chain of small



A good two-valve circuit for the beginner on short waves.

insulators. In many cases this proves more efficient than a horizontal wire, although if this type of aerial is employed it should not exceed 30ft. in length and should also be very well insulated and supported so that it does not sway in the wind.

Leaves from a Short-wave Log

Panama City versus Cape Town

HP5J, Panama City, Republic of Panama (Central America), formerly on 31.28 m. (9.59 mc/s), has reduced its wavelength, and is now operating on the same channel as ZRK, Cape Town, on 31.23 m. (9.607 mc/s). ZRK is on the air from G.M.T. 04.45-16.45, whereas HP5J usually broadcasts from G.M.T. 22.00-03.30.

More Zeesen 50-kilowatt

The following are to be added shortly to the German short-wave network: DXE, 13.81 m. (21.72 mc/s); DXF, 13.83 m. (21.69 mc/s); DXD, 13.85 m. (21.66 mc/s); DXC, 16.83 m. (17.825 mc/s); DXB, 31.22 m. (9.61 mc/s); DXG, 48.47 m. (6.19 mc/s), and DXA, 48.7 m. (6.16 mc/s).

Official Stations of Argentine Republic

THE Posts and Telegraphs Department of the Argentine Government at Buenos Aires now operates four 10-kilowatt short-wave transmitters: LRA, on 25.58 m. (11.73 mc/s); 30.96 m. (9.6 mc/s) and

48.54 m. (6.18 mc/s); also a newcomer, LRA5, on 16.83 m. (17.83 mc/s).

The call is *Radio del Estado, Buenos Aires*. Broadcasts are now carried out on weekdays from G.M.T. 15.30-18.00, and from 23.00-02.00 or later; on Sundays the first session closes down at G.M.T. 17.00, and the second transmission is made from midnight (G.M.T.) to 02.00.

Radio-Ruben Darío

WITH this call, and styling itself a National station, YNLG, Managua (Nicaragua), now increased in power to 1 kilowatt, broadcasts twice daily, namely from G.M.T. 18.00-19.30 and from 00.30-03.00. The wavelength is 45.39 m. (6.61 mc/s). For those readers who wish to ascertain the site of the transmitter the geographical position is 86° 14' W. by 12° 10' N., the distance from London being roughly 5,500 miles. Address for reports: Radiodifusora Nacional, YNLG, 5a, Calle No. 207, Managua (Nicaragua), Central America.

(Continued on opposite page)

(Continued from facing page.)

New Time Schedule of Buenos Aires

THE radio programmes of the *Radio del Estado* stations are now broadcast at the following times: LRA1, on 30.96 m. (9.69 mc/s), and 25.58 m. (11.73 mc/s), and LRA5, 16.83 m. (17.83 mc/s): G.M.T. 00.00-02.00 (Sunday and Monday); G.M.T. 23.00-02.00 (Tuesday and Thursday) and 21.00-22.00 and 23.00-02.00 (Friday).

Good Signals from Mexico

ON the high-frequency side of VP3BG, Georgetown (British Guiana), namely 6.133 mc/s (48.92 m.) clear reception is now being obtained of the radio programmes broadcast by XEXA, Mexico City. The established schedule is: G.M.T. 13.30-15.30; 19.30-21.30 and 00.00-05.00 (week-days), and on Sundays from G.M.T. 00.00-05.00 only. The station relays the medium-wave studio XEDP. Address: Radiodifusora XEXA, Secretaria de Educacion Publica, Departamento Autonomo de Prensa, Publicidad y Propaganda, Mexico City, Republic of Mexico (Central America). The transmitter is also entitled to use 25.25 m. (11.88 mc/s).

New Japanese Transmitters

THE following 10-kilowatt stations have been added to the Tokio short-wave network: JWV, 41.34 m. (7.5275 mc/s); JWV2, 31.03 m. (9.675 mc/s); JWV3, 25.59 m. (11.725 mc/s), and 16.83 m. (17.825 mc/s). The Japanese Broadcasting Corporation will also shortly bring into operation a 50-kilowatt transmitter, JZM, 13.94 m. (21.52 mc/s).

Heredia Again

ALTHOUGH TI4NRH, Heredia (Costa Rica), is advertised on 31.02 m. (9.67 mc/s), it has been recently logged very slightly above FZF6, Fort-de-France (Martinique), or practically on the channel used by ZHP, Singapore, 30.96 m. (9.96 mc/s). The call in Spanish, coupled with the slogan *La Voz del Comercio*, is also given frequently in English and French. The studio opens with a bugle call and usually closes down with the playing of the *March of the Toy Soldiers*. References are made to the Island as a holiday resort with an announcement that the broadcast emanates from "the City of Flowers and the Land of Coffee Trees (?)." An English programme is given every Wednesday, Friday and Sunday between G.M.T. 02.00-03.00, the daily transmissions being carried out from G.M.T. 00.00-03.00 and from 04.30-05.00 or even later. Address: Apartado Postal, 40, Heredia (Costa Rica).

And Barquisimeto (Venezuela)

YV3RD, Barquisimeto, a 250-watt working on 46.4 m. (6.465 kc/s), is now on the ether daily from G.M.T. 23.00-04.00. The new address is Radio Barquisimeto, Emisora YV3RD, Avenida Bella Vista, Barquisimeto (Republic of Venezuela, South America).

Radio Eireann

THE new short-wave transmitter, which the Eire Government authorities are installing at Moydrum, near Athlone (Co. Westmeath), near the site of the high-power medium-wave station, is authorised to operate on the following frequencies: 17.84 mc/s (16.82 m.); 11.74 mc/s (25.55 m.); 9.595 mc/s (31.27 m.); and 6.19 mc/s (48.47 m.).

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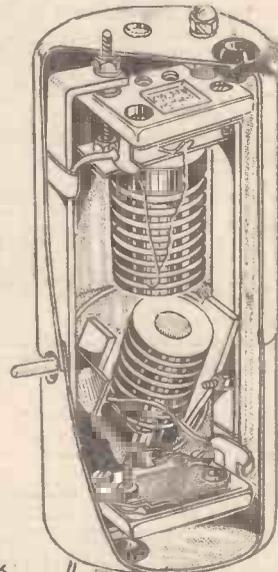
Variable Selectivity

WHEN a long-distance receiver is in use there are two factors which are of great importance in obtaining maximum results. The first of these is sensitivity, which is essential if real long-distance reception of weak stations is required. This requirement is best answered by the superhet receiver or by a multi-valver employing two good H.F. stages. The second is not so simple of solution. Selectivity depends upon many things, the use of a number of tuned circuits being the easiest way out. Unfortunately, every additional circuit added results in a loss of sensitivity, and therefore it is impracticable to use more than a certain

ings, and quite a number of components are built with these two windings on separate formers. In some cases these are supported on a single rod of wood or ebonite, with a fixed coupling between them, whilst in others the two components are mounted on end plates. In the former case it is a simple matter to cut through the supporting rod and then to mount one of the windings on a spindle so that it may be turned through a few degrees and thus vary the coupling. To obtain the best results, of course, the coupling in the maximum position should be greater than was normally provided. The accompanying illustration gives an idea of the finished design, although each component must be considered on its merits. Where the component is home made, of course, the modification will be rendered simpler.

Multiple Aerials

A MEMBER has been trying out a multiple aerial scheme in which he used four separate aerials taken to a switchboard near the set. When listening on one band he selected the appropriate aerial and shorted the others to earth. He says the results were not good. The reason was probably that the earthed (unused) aerials were acting as screens or at least were preventing the used aerial from picking up sufficient energy to make the idea worth while. When adopting a scheme of this nature the unused aerials need not be earthed, and, in fact, are better left connected to the set, in which case the aerial which resonates to the waveband in use will give high efficiency whilst the others will not affect results to any marked degree. Better results are, of course, obtained when a proper matching transformer is joined to the aerials and to the receiver, and there is a good field for experiment in the design of a transformer which will give maximum efficiency on all bands, using, say, three aerials—one for long waves, one for medium and one for the short waves. If the separate aerial lengths are carefully chosen, so that they are harmonically related, it may even be possible to obtain improved results, but some care is then necessary in the arrangement of the separate sections so that absorption does not take place on the wanted wavelength.



BLACK H.T. FOR PRIMARY, BLUE GRID, BROWN A.V.C., RED ANODE.

A variable-selectivity I.F. transformer.

number of circuits. A band-pass input to either type of receiver is a very good plan and gives two circuits, whilst the coupling between them can govern the sensitivity. In a superhet the I.F. stages provide further tuned circuits and give added selectivity without undue loss of sensitivity. but it is often found that the requirements for listening at any given time will vary. Thus, one night or even at one part of a listening period, additional sensitivity may be called for, without it being necessary to retain maximum selectivity. It is here that the receiver with variable selectivity scores over the set not so fitted. Special components are available for variable selectivity purposes, but members who already have a superhet into which they wish to incorporate the variable feature have two courses open to them. They can either obtain new I.F. transformers designed for the purpose or can modify the existing ones.

Modifications to I.F. Transformers

THE main requirement in this type of component is a variable coupling between the primary and secondary wind-

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TelevIEWS

Two Systems

A CONSIDERABLE amount of Press comment has been made recently concerning the extension of the London television service to the provinces. This seems to recur at regular intervals and serves to furnish ample evidence, if such should be needed, that the efforts of the B.B.C., Post Office and Television Advisory Committee are being watched with the greatest interest. It has now become quite plain that the densely populated provincial areas are becoming very impatient at the continual delay and the absence of any official statement which will give an inkling of the time when the building of the provincial stations will start. Surely both the public and the television industry are justified in thinking that they ought to be taken into the confidence of the authorities. To give, say, a minimum time limit, would remove immediately all this uncertainty, and enable production plans to be made with greater surety of market limits. As far as is known there are two systems of signal distribution which are the subject of investigation. One uses a cable or combination of cables which presumably takes into its orbit the coaxial cable, about which so much has been written. In the other the proposal is to employ a series of directional wireless links between relay stations using a wavelength much shorter than that now functioning for the Alexandra Palace transmissions, and which will lend itself to directional ministrations. It is felt that the latter suggestion is likely to work out more reasonable in cost, but on the other hand, it is conceivable that a combination of both ideas may ultimately give the most efficient results. Apparent lack of interest in taking advantage of the London service was frequently put forward in Parliament as the reason for not going ahead with any provincial scheme. Not only does this seem a short-sighted policy but there is now definite evidence that the sales of television receiving sets are going ahead rapidly; in fact, manufacturers are, in many cases, very much behind in the execution of orders. A bold policy of development commenced now would justify set makers in extending very considerably their production plans, and marked stability in prices and performance would follow automatically.

Big Screen Illumination

IT is known that a few days ago the B.B.C. advisory committee saw the latest big screen television installation carried out by the Baird Company at the Tatler Theatre. Whether this will bring about a change of policy in the attitude of the authorities towards the showing of television pictures to cinema audiences is, of course, still a matter for conjecture, but there is no doubt that contrary to general belief the brightness of the cathode-ray tube projected picture on to an 8ft. by 6ft. screen has improved enormously. This is certainly a matter for congratulation to the research engineers who are engaged on this admittedly difficult task, and no one will deny their enthusiasm for the job. There is still a school of thought who incline towards what has commonly been called the Divisor method as providing at least an alternative solution to the problem of big screen illumination. With a standard

projection tube the picture built up on the fluorescent screen is so intrinsically brilliant that it is projected by means of a lens on to a remote screen. In the other scheme, however, the tube screen is normally opaque, so that a beam of light from an arc lamp or other luminous source focused on to this fails to penetrate and reach a separate screen. The beam of electrons, modulated in intensity by the incoming television signal, is then given the task of rendering the otherwise opaque tube transparent, each elemental area having a degree of transparency which depends entirely on the strength of the incoming signal. In this way, therefore, the separate light beam can pass through the tube screen to produce the various tonal values to give the replica of the actual televised picture. This method is often referred to as the storage tube relay arrangement, and one American has suggested using a screen on which are mounted thousands of hairs; these being made to open and shut like the leaves of an electroscope according to the charge imparted by the electron beam. In any case, no matter what improvement will be effected with big screen working subsequently, the standard of performance now is surely high enough to justify public viewing, at least in the case of a number of selected events of wide appeal.

CHRISTMAS TELEVISION VARIETY FEATURES

NONI, the musical clown who appeared in the first Christmas television programmes and again last year, has been booked for Harry Pringle's Christmas Cabaret on the afternoon of December 20th and the evening of December 22nd. In this programme Jasper Maskelyne will appear in some vanishing tricks without trap doors, there being none in the Alexandra Palace studio. Afrique, the impressionist, will take part, and two surprise items are promised.

Charlie Coborn, the eighty-five-year-old veteran of the halls, heads the bill in the Old Timers' Christmas Eve party in the television programme in the evening of December 24th. He will sing "The Man Who Broke the Bank at Monte Carlo." Other guests at the Christmas table will include Harry Champion, singing "Any Old Iron"; Marie Kendall will be heard in "Just Like the Ivy"; Daisy Dormer singing her old favourite "I Wouldn't Leave My Little Wooden Hut"; Tom Leamore (Percy from Pimlico); and Sable Fern singing "What's the Use of Loving a Girl."

Viewers will not only see the artists, but catch glimpses of the studio audience, which will consist of between forty and fifty people. Harry Pringle, who is again producing the Old Timers' party, is searching for a genuine old-time music-hall chairman who has actually wielded the mallet and quaffed his beer before London music-hall audiences. As the custom died out early this century the chairman must be a real veteran. The Old Timers' party will be repeated in the afternoon programme on December 29th.

PATENTS AND TRADE MARKS

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

PLAYER'S FOR CHRISTMAS

YOU remember no doubt the delight expressed by your friends last year on receiving really big Christmassy boxes of "Player's." This year many of Player's brands are again being supplied in gay seasonable postal cartons.

The famous "Medium" Navy Cut Cigarettes are available in tins of 150 for 7/3, 100 for 4/10, 50 for 2/6, and in card boxes of 100 for 4/8, 50 for 2/5 and 25 for 1/3. For smokers who prefer the ordinary 20's packet there are postal cartons containing five packets of 20 for 4/9d. The "Mild" Navy Cut Cigarettes so popular to-day are supplied in card boxes 50 for 2/5, also in the Xmas cartons.

Player's "Weights" Cigarettes in Christmas cartons of 60 for 2/- (four card boxes of 15), or 50 in card box 1/8, are an inexpensive yet always welcome gift and are now supplied cork-tipped or plain. Player's "Gold Leaf" Navy Cut Cigarettes in decorated tins of 50 for 2/11 are just right where a higher grade cigarette is required.

Specially blended for sensitive throats, Player's Cork Tipped "Bachelor" Cigarettes, in flat tins of 50 for 2/6, always make an acceptable gift. Then there are those generous size Player's No. 3 Virginias in flat pocket tins of 50 for 3/4, for smokers who appreciate a cigarette of extra quality. Both brands are supplied in Christmas outers.

Player's "Whiffs"—those delightful little cigars with the real Havana flavour—are available in tins of 12 for 2/-.

With the pipe smoker, Player's "Medium" Navy Cut Tobacco in 1/2-lb. tins at 4/4 is always a favourite at Christmas time. Equally popular are "Airmen" Mixture in 1/2-lb. tins 3/4, "No Name" in 1/2-lb. tins 5/-, and the "Digger" range of all Empire Tobaccos at 2/8 per 1/2-lb. tin.

The new "Double Ring" Mixture and Flake—10/4d. per 1-oz. airtight tin—has also become a favourite with many.

THE "AIR-HAWK" 9

(Continued from page 333.)

few degrees and the searching again carried out on the main dial. With a receiver of this type a logging chart should obviously be drawn up for each of the coils in use so that rapid location of a desired station may be carried out.

Selectivity Adjustments

When a station has been located a final setting of the H.F. and I.F. controls may be carried out. To sharpen tuning and to remove interference, the H.F. gain control is advanced and the I.F. control retarded. If the H.F. control is turned too far the receiver will burst into oscillation, and the same remarks apply to the I.F. control. This could have been avoided by using different voltages on the valves, but this feature was retained as it enables the operator to know that the receiver is in its most sensitive condition. As soon as oscillation takes place the control is turned back slightly. If no oscillation is obtained there is always the feeling that if only there was a little more gain better results might be obtained, and most experimenters will appreciate this point. The B.F. oscillator is only switched on when C.W. signals are being received, and the trimmer should be adjusted with a long screwdriver to obtain a suitable note. The degree of twist in the wires forming the B.F.O. coupling condenser will govern the strength of the B.F.O. circuit.

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.

RECEIVERS.—Hausdorf, E. No. 489540.

A telephone receiver, which is to be used as an instrument auxiliary to a main receiver, is constructed so that the coil winding and the volume of the iron core of the coil are so proportioned in relation to one another that the impedance is at least doubled as compared with that of the standard type of receiver over a range of frequencies from 800 to 3,000 cycles per sec. The cores *a*, *a* which are smaller than in the normal receiver have a volume not greater than 15 per cent. of that of the coils *b*, *b* and have a thickness not greater than one fifth of their width. The cores *a*, *a* are attached to plates *e* secured between the magnet *c* and the casing *d*, Fig. 1, and the coils are elongated and rectangular in cross-section. Dimensions of the cores and coils are given in the Specification.

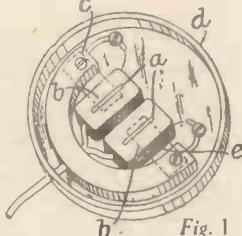


Fig. 1

LOUDSPEAKERS.—Telefunken Ges. fur Drahtlose Telegraphic. No. 486038.

In a public address system for radiating or directing sounds covering substantially the speech or music frequency range, and including sets of loudspeakers mounted vertically apart from each other, the loudspeaker units of the sets are provided with one or more deflecting members which serve to deflect downwardly the sounds of higher frequency. As shown, inclined deflecting members 23 are associated with openings in a member 22 in which the loudspeakers are mounted. The member 22 is such that the axes of the loudspeakers are inclined downwardly, Fig. 2, and the members 23 may be adjustable. In a modification (not shown), a single frustoconical deflecting member is provided for a set of loudspeakers and isolating baffles are disposed between the individual loudspeakers of the set. Specification 486,095 is referred to.

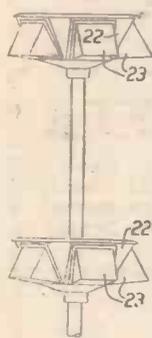


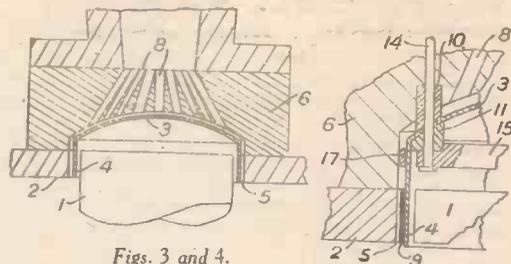
Fig. 2.

LOUDSPEAKERS.—Wheeler, G. C., Houlgate, H. J., and Fountain, Ltd., G. R. No. 489548.

In a sound-reproducing device comprising a dome-shaped diaphragm and a co-operating throat member having its inner surface substantially identical in shape with and disposed close to that of the domed diaphragm, the throat member has a plurality of channels each of uniform cross-section connecting the space formed between the diaphragm and the throat member with the end of a horn, the channels being formed as closed surfaces about independent and non-coaxial longitudinal axes for the purpose of providing acoustic matching between the diaphragm and the horn. The domed diaphragm 3 has an integral flange 4 carrying a coil 9 in

the gap 5 between a centre pole-piece 1 and pole-plate 2. The throat member 6 mounted on the plate 2 is formed with a number of conically disposed tubular bores 8 of uniform cross-section. The diaphragm 3 is mounted between rubber rings 10, 11 mounted respectively in the throat member 6 and on a plate 15 secured to the throat member by bolts 14, one of which is shown. An additional centring support is provided by a rubber

ring 17 located between the inner-wall of the throat member 6 and the cylindrical flange of the diaphragm, Fig. 3. The rubber is preferably of a porous or aerated type, and the ring 10 serves to limit the air space between the surface of the diaphragm and the throat member. (Fig. 4.)



Figs. 3 and 4.

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 Application

- 33155.—Baird Television, Ltd. (Weiss).—Electron multipliers. November 15th.
- 33125.—Cole, Ltd., E. K., and Robertson, N. C.—Method of making electric connections in radio receivers, etc. November 15th.
- 32775. 33021.—Cole, Ltd., E. K., and Shackell, A.—Tuning of radio receivers. November 11th.
- 32633.—Cole, Ltd., E. K., Martin, A. W., and White, J. K.—Cabinet and sound-broadcast receiver. November 10th.
- 32603.—Ferranti, Ltd., and Edwards, A. W.—Tuning arrangements for radio receivers. November 10th.
- 32713.—Gunyon, V. H. M.—Pocket wireless sets. November 10th.

- 32670. 32671.—Hazaltine Corporation.—Television scanning systems. November 10th.

Specifications Published.

- 495185.—Radioakt.-Ges. D. S. Loewe.—Television cathode-ray tubes.
- 495313.—Marconi's Wireless Telegraph Co., Ltd., Rust, N. M., and Keall, O. E.—Automatic frequency-control systems for radio receivers and the like.
- 495315.—Metcalf, C.—Station-indicators for radio and like receivers.
- 495330.—Fernseh Akt.-Ges.—Electron-discharge devices for use in television or like systems.
- 495438.—Farnsworth Television, Inc.—Electron multipliers.
- 495338.—McGee, J. D.—Electron-discharge devices, for use in television, for example.

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.

TELEVISION AND FOG

THE degree of sensitivity associated with the B.B.C. television cameras has always been the subject of comment. Every increase in this must of necessity improve performance, for it allows one of two things to happen. Either the degree of lighting necessary to secure a satisfactory signal can be reduced, and the ordinary lens retained, or the lens can be stopped down and a longer focus used for crowd scenes without spoiling the picture. The B.B.C. is devoting a lot of time to this problem, and although the "super" forms of camera are still regarded as experimental it is hoped before long to introduce them into regular service with every degree of reliability. The other day, however, another advantage of the electron camera was emphasised somewhat unexpectedly. On the occasion of the television broadcast of the arrival of King Carol of Rumania at Victoria Station a thick fog persisted, and it was felt at first that the transmission would be ruined.

The mosaic of the camera is far more sensitive at the red and infra-red end of the spectrum, and since the red and infra-red rays penetrate fog far better than the violet and blue, this factor enabled the pictures seen to be better than those observed by the human eye on the spot where this event was occurring. Apart from a suggestion of haze every detail of the meeting of the two Kings and the subsequent introduction to the assembly of diplomats was clearly visible on the screens of the cathode-ray tubes in home receivers. The B.B.C. admitted that they had not realised how useful this colour response property could be in such a case, and in future there will be little fear of the results when fog happens to be about. At the recent Ice Hockey match television broadcast on a foggy night the same success did not attend the transmission, and this can only be attributed to the use of a different form of photo-electric mosaic in the cameras employed.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. GAMM

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Meetings: Tuesdays at 8 p.m.

Hon. Sec.: Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

"**AMPHION**," music critic of *The Croydon Advertiser*, was the speaker at the Croydon Radio Society's weekly meeting in St. Peter's Hall, Ledbury Road, S. Croydon, on Tuesday, November 22nd. Dr. K. A. Bailey, vice-chairman, presided and Mr. P. G. Clarke operated the special reproducer for amplification of illustrative records. The topic discussed was the history and technique of conducting. The lecturer opened by asking what, if anything, one missed in listening to music by wireless, given good reproduction, of which his audience was a sufficiently good judge. Music, after all, was made to be heard, but not necessarily to be seen. One member of the orchestra was there who was never heard, yet seen, namely, the conductor, and "Amphion" traced the origin of conducting from the sheer necessity of keeping performers together to the development of music into greater complexity. He then demonstrated the elementary technique of time beating, and he had several things to say about style of conducting. Berlioz was quoted on the point of making the artist do the work, and added that eminent authority's scathing description of the exaggerated antics of those who ignore this radical matter. The interpretative side of conducting was also examined carefully. Here, independence of the left hand was vital if the conductor was to convey his intentions clearly to his team. In conclusion, "Amphion" suggested that what one should look for was not the power to astonish, but the power to make his audience feel that the composer's intentions were being realised. Next week, Tuesday, December 13th, the vice-president, Mr. H. G. Salter, makes a welcome return with another musical programme on gramophone records.

RADIO, PHYSICAL AND TELEVISION SOCIETY

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

Meetings: Friday evenings.
Hon. Sec.: C. W. Edmunds, 15, Cambridge Road, North Harrow, Middx.

INSTEAD of the usual weekly meeting on Friday, November 26th, by special permission of Messrs. Cables and Wireless, Ltd., members of the society paid a visit to the Telegraph Office at Electric House, Moorgate, where they spent a most enjoyable and instructive evening.

After being split into a number of small parties of four or five persons each, members were conducted over the whole of the building, the visit occupying a little over two hours. The parties were first shown the cable operating rooms where, among other interesting things, they saw telegraphists in direct communication with Singapore and the Far East. Next they were conducted over the relay rooms and saw the apparatus used for synchronising the high-speed automatic telegraph instruments. After this members of the society were shown over the wireless section and saw apparatus capable of transmitting and receiving messages at the phenomenal speed of 600 words a minute. After visiting the phone room, members were taken to see the main switchboard with its special fire-extinguishing device. Another section of Electric House of particular interest was the department for the transmission and reception of pictures by wireless. Few people realise the enormous cost of this type of apparatus, and when a member inquired as to the cost our guide smilingly explained that the lead-screw of the most up-to-date instrument alone cost over £400.

Although the number of persons for this particular visit was strictly limited, there are occasionally vacancies for non-members to accompany us on some of our visits. Further particulars may be obtained from the hon. secretary at the society's headquarters.

SOUTH LONDON AND DISTRICT RADIO TRANSMITTERS SOCIETY

Headquarters: West Norwood Brotherhood Hall (opposite W. Norwood bus garage).

Hon. Sec.: H. D. Cullen (G5KH), 164, West Hill, London, S.W.15.

Meetings: First Wednesday every month.

AT the November meeting an interesting lecture was given by ex Z8IAH on "Radio Conditions in South Africa."

On Wednesday, December 7th, Mr. Stuart Davis, of the Davis Theatre, Croydon, will give a lecture and demonstration on high-quality reproduction. Visitors are cordially invited.

CLAYSMORE RADIO CLUB

Hon. Sec.: I. H. Gordon, Claymore School, Iwerne, Minster, Dorset.

THE winter session opened with the enlarging of our present clubrooms to accommodate new

members. Two meetings have been held, the first on October 14th, and the second on November 2nd, and Morse classes are now being held every Wednesday evening at 6.30.

It was decided that talks on the theory of wireless should be given, as members seemed to be neglecting this side of radio.

More books have been presented to the club library, and it now possesses many useful books.

A new feature is "Listening Night," which is held every Saturday from 7.30-9. Visitors are invited.

A. W. G. Wilson is applying for an A.A. Hence, and soon, we hope, he will be starting on a 6L6 crystal-controlled transmitter. There will be no club expedition this term.

ASHTON AND DISTRICT AMATEUR RADIO SOCIETY

Secretary: K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

TWENTY members were present at a meeting held on November 23rd, when it was decided to hire a larger room for the headquarters owing to the increase in membership, which now totals 35.

It was also resolved to have round-table discussion at future meetings if a lecture was not on the programme. Several members have attended the Morse classes, and G3FF has been appointed official Morse instructor. 3FF is obtaining full information as to the capabilities (or otherwise!) so that the various candidates can be graded accordingly. There is now no need for members to bring phones as 2CDY (who has applied for his full ticket) has kindly provided a loud-speaker mains auto-oscillator.

It was unanimously resolved to have a "hamfeast" early in the New Year, and to invite the Oldham and Rochdale "hams," who very generously entertained us on October 30th.

The secretary was instructed to purchase more handbooks for the library, and interested members are requested to see the librarian, Mr. W. P. Green. Mr. Green is to give a lecture on "Electrolytic Condensers" on December 14th, and Messrs. Ferranti, Ltd., have promised to provide us with a lecturer on "Electrical Measuring Instruments" early in the New Year.

NOW READY!

WORKSHOP CALCULATIONS, TABLES AND FORMULÆ

By F. J. GAMM

3/6, by post 3/10, from George Neurnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, December 7th.—Symphony concert from the Queen's Hall, London: Sir Henry Wood Jubilee Year Concert.

Thursday, December 8th.—Dance Band programme.

Friday, December 9th.—Band programme.

Saturday, December 10th.—Saturday Night Sing Song.

REGIONAL (342.1 m.)

Wednesday, December 7th.—Concert Party programme from the Grand Theatre, Leeds.

Thursday, December 8th.—Scrapbook for 1903.

Friday, December 9th.—Famous Music Halls: No. 5, The Palace Theatre, Plymouth.

Saturday, December 10th.—Broughton Castle, the story of a house, arranged for broadcasting by Igor Vinogradoff.

MIDLAND (297.2 m.)

Wednesday, December 7th.—Paul Temple and the Front Page Men—Episode 6, Murder on the Six-Ten.

Thursday, December 8th.—Industry Entertains: A variety programme—No. 1, The Motor Industry.

Friday, December 9th.—String Orchestral Concert.

Saturday, December 10th.—Broughton Castle: The Story of a House, arranged for broadcasting by Igor Vinogradoff.

WEST OF ENGLAND (285.7 m.)

Wednesday, December 7th.—The Use of the Land—9, A central policy for agriculture, a discussion.

Thursday, December 8th.—Cavalleria Rusticana (Mascagni), performed by the Royal Carl Rosa Opera Co. from the Pavilion Theatre, Bournemouth.

Friday, December 9th.—Famous Music-Halls: 5, The Palace Theatre, Plymouth.

Saturday, December 10th.—Sports Special, a feature for fans—No. 16.

WELSH (373.1 m.)

Wednesday, December 7th.—Choral programme.

Thursday, December 8th.—Orchestral music by Welsh composers.

Friday, December 9th.—Badminton: A commentary on the match between England and Wales, from the Craigsidde Hydro, Llandudno.

Saturday, December 10th.—Beth petasai'r Bardd Cocos yn fyw heddiw? What if the Bard Cocos were alive to-day? A talk in Welsh.

NORTHERN (449.1 m.)

Wednesday, December 7th.—Bradford Festival Choral Society: Handel's "Samson," part 1, from the Eastbrook Hall, Bradford.

Thursday, December 8th.—December out of Doors, a talk.

Friday, December 9th.—Alice in Wonderland, a new light opera by the Carlisle Choral Society and the Carlisle Operatic Society from the Lonsdale Theatre, Carlisle (Act 2).

Saturday, December 10th.—Saturday Concert Hall and introductory talk.

SCOTTISH (391.1 m.)

Wednesday, December 7th.—Libel on John Calvin? Signs and Portents.

Thursday, December 8th.—Variety from the Palace Theatre, Dundee.

Friday, December 9th.—Opening of Broadcasting House, Aberdeen.

Saturday, December 10th.—Addie Ross in Femme Seule—a one-woman revue.

NORTHERN IRELAND (307.1 m.)

Wednesday, December 7th.—Instrumental programme.

Thursday, December 8th.—Sing-Song from Portora Enniskillen.

Friday, December 9th.—The Abbey Theatre Company in Hyacinth Halvey, an Irish comedy in one act by Lady Gregory, also Riders to the Sea, a play in one act by J. M. Synge.

Saturday, December 10th.—Association Football: Larne v. Celtic, a commentary on the second half of the match from Legion Park, Larne.



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).

Teaching the Morse Code

SIR—Radio amateurs in the Southend district are extremely fortunate in having in their midst Mr. W. Bradbury, who has so kindly offered to give free morse code instruction.

For months I have endeavoured without success to find a competent instructor in the London area who would be prepared to teach code for a small fee.

On inquiry, it was found that the L.C.C. education centres and radio colleges, etc., teach code only as part of a complete course in radio theory and practice.

Every good wish to your work in the interest of amateur radio.—**J. HEDGE** (London, E.C.).

"Broadcasting" a Play

SIR—Perhaps there are many readers who have thought about "broadcasting" a play, but have been doubtful as to how it would "go over." I can assure them that it would be appreciated with delight, because such a thing is rather fascinating and novel.

It is something out-of-the-ordinary as an entertainment for a party, and I think that there is no better time than Christmas for trying one's hand at it.

Last Christmas I persuaded a few friends to perform, and they rehearsed the play "Nightlight Robbery," published in last year's Christmas issue of PRACTICAL AND AMATEUR WIRELESS. The technical arrangements were left to me, and, as it was only a few days before Christmas, there was no time for elaborate installations. I purchased two mikes of the button type, and connected them up to the domestic receiver. I had no pick-up, but music was produced by holding one of the mikes in front of an acoustic gramophone (an awful racket!)

Nevertheless, even with such simple equipment the play was put over and it was greeted with such enthusiasm that we had to give a repeat performance the same night.

Here are a few tips to those readers who intend "broadcasting" plays, etc.: Don't do it too often, or it will cease to be a novelty, i.e., don't "broadcast" every time a few friends visit you. This will be forcing it on them. Instead, keep it for special occasions, such as a Christmas party, or a birthday party.

When putting over the play, don't switch on and say, "Are you folks in there ready? We're starting the play now," or something like that. Instead, pretend it is a real broadcast from a real station. Make the announcement formal, such as "This is Radio Baloney (the name is left to you) calling. Ladies and gentlemen, we present —," and so on. After the play announce, "You have just been listening to —. Those taking part were —," and give the real names of the performers, as well as the characters they represented. It would

be helpful to listen in to a B.B.C. radio play and note the way they put it over, and try to imitate this.

After last Christmas's performance I made up my mind to build and purchase equipment in readiness for this Christmas. I have ready, therefore, a powerful amplifier (Class B, battery operated), a transverse-current microphone, a pick-up, and a few volume controls which only need to be wired up to make a control panel. With these technical improvements, results should be infinitely better.—**R. WITHEY** (Llanely).

[We hope you will be as successful in putting over "The Open Mike" as you were with last year's play.—**ED.**]

A Scottish Reader's Appreciation

SIR—I have been a reader of your valuable paper PRACTICAL AND AMATEUR WIRELESS since the first number, and have read many others prior to its first issue. Please allow me to congratulate you on your efforts on behalf of home constructors, and the good fare provided weekly for beginners and old stagers alike, in a manner which leaves no doubt in the

CUT THIS OUT EACH WEEK.

Do you know

—THAT fixed condensers in the mains leads on A.C. supplies prevent simple forms of interference.

—THAT the above arrangement cannot be employed on D.C. mains, and H.F. chokes have to be utilised.

—THAT when screening coils, chokes or similar inductive components, the screen should be at least half-an-inch from the winding.

—THAT the waveband from 10 to 25 metres is the most useful band for evening listening at this time of the year.

—THAT a good substitute for paxolin or ebonite in experimental apparatus is dry wood, thoroughly impregnated with paraffin wax.

—THAT fading may be overcome by using two receivers connected to two separate aeriols.

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 Newman, 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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reader's mind as to what is meant.—**C. HARENAPE** (Neilston).

Correspondent Wanted

SIR—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for three years, and during that time I have learned a good deal about radio, and in the future I hope to take up transmitting. I would like to co-operate with any other enthusiast in or near my district.—**L. E. BETTIS**, 40, St. Johns Road, Epping, Essex.

A Good 28 mc/s Log

SIR—I append a log of 28 mc/s stations heard during the past three weeks. 'Phone stations include CO2WM, HI7G, TI2RC, 3AV, K4EZI, 5AS, VE4BB, 4BF, 4WJ, W5FCR, 5TW, 6AM, 6BUY, 6GCX, 6IFC, 6MPS, 6MSM, 6NAP, 6NLS, 6NOG, 6OI, 6OZC, 6PVV, 6QSP, 7BJS (Wyoming), 7EMP, 7GBL, 7GLX and ZE1JR. C.W. stations: CX1FB, K4ESH, KA1ER, NY1AD, PY1HP, 2AC, VE5HR, VK2HF, 5GR, 5KO, 5RT, W5AJG, 6AJD, 6BAM, 6BVX, 6FRN (Utah), 6FZA, 6G6B, 6GRX, 6KKG (Utah), 6MCQ, 6NLI, 6PFD, 6QAP (Arizona), 7AFS, 7DIZ, 7FCC, 7GK, 7MC and YS2LR. In my receiver I use an HL2K and a PT2 valve. The antenna in use is a 7 mc/s half-wave 48ft. high. I would like to correspond with a reader from the West Indies or from K6, and you may be interested to know that as a result of a request of mine which you kindly published last year in your journal, I gained a correspondent from Penang, Malaya.—**F. E. ROSE** (2FHV), 14, Parkway, Raynes Park, London, S.W.20.

Reception in Egypt

SIR—I have often thought of writing to you about a problem which faced me in 1936. Here it is:

Nearly everybody in the country complains about the Midland station. While I was in Egypt I found that during the winter months the reception of this station was better than the short-wave transmissions from England. I, with others, heard the same programme from the Midland station, and we were in Cairo, 2,000 miles away. Probably you know that earthing conditions are hopeless there because of the dry nature of the soil.

I was at the Empire Exhibition during August, and in the Gas Show Rooms there I asked to see a wireless set run by gas; the demonstrator told me he had heard nothing about them, so I replied that PRACTICAL AND AMATEUR WIRELESS had announced this over a year ago. Was I right?—**C. J. GIBBONS** (Southampton).

[You were quite right. So far as we can now trace, however, complete gas-operated receivers are not now on the market, although gas-operated mains units and chargers may be obtained.—**ED.**]

PRACTICAL MECHANICS

6^d. EVERY MONTH.

The only Magazine of its type—
Deals with Hobbies, Science,
Progress and Inventions.



QUERIES and ENQUIRIES

Motor-boating

"I have put together a battery 'straight three' (circuit enclosed). With a dry battery the set works A1, but when coupled to eliminator it commences to motor-boat. I think the fault lies in the first valve stage, as on dry battery I plug in to 36 volts but on eliminator the lowest is 50. Can you suggest anything to stop motor-boating?"
—W. R. (Blackburn).

Microphone and D.C. Set

"I am the owner of an all-wave A.C. D.C. set and am working it on D.C. mains. I have just purchased a microphone which needs a small battery to be inserted in the base and then has to be plugged into the pick-up sockets. I have now discovered that my set is not fitted with sockets for pick-up. Would you please inform me as to where I can affix leads to enable me to put in sockets for working the microphone?"
—T. D., Jr. (Belfast).

AS the receiver you are using is a Universal model, it is possible that special precautions will have to be taken, as the earth line in the receiver is generally in contact with one side of the mains (on D.C.) and thus, as one side of the mike or pick-up circuit is taken to earth there is a danger of a shock when you touch the mike or pick-up. It is for this reason that the pick-up sockets are not fitted. It is possible in some cases to fit a condenser in each pick-up lead to isolate it, but as yours is a commercial receiver we advise you to write to the makers and ascertain whether this is possible in your particular case.

Converting Condensers

"As I want to turn two .0005 mfd. variable condensers into two .00016 mfd. short-wave condensers, I am not sure how many plates to take off. How many plates are wanted for a .00016 mfd. condenser and can you tell me how to arrive at the number of required plates in my case?"
—L. W. (Isleworth).

FIRSTLY, it is not possible to say how many plates are needed as this depends upon the shape of the plates, the area of overlap and the space separating them. As you have .0005 mfd. condensers, by reducing the total number of plates by one half you should arrive at a maximum capacity of .00025 mfd. By taking off another plate from fixed and moving sections you would obtain something between .00016 mfd. and .0002 mfd. It may be possible to use the same number of plates as at present fitted but to increase the spacing between them, thus reducing the capacity, but this will depend upon the length of spindle which is available and the general design of the condensers.

Colour Codes

"I would be greatly obliged if you would let me have the colour code of resistances fitted in all-mains sets and also condensers. Or probably you could advise me if there is a booklet or data book which I could obtain."
—A. B. (Edmonton).

THE same code is employed for resistors and condensers, and we would refer you to our issue dated June 11th last, wherein will be found not only the colour codes for these components, but also the codes for other components, such as transformers, etc. The same code is adopted for components irrespective of whether they are used in all-mains or battery apparatus.

RULES

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

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

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

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

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

THE circuit enclosed was quite in order, but it is often necessary to introduce decoupling into a circuit of this type in order to prevent the trouble. In this case we suggest you decouple the detector stage by including a resistance of 20,000 ohms between the detector anode load and the H.T. positive line, at the same time including a 2 mfd. condenser between earth and the H.T. terminal on the transformer. If this does not prove fully effective you might try the effect of reversing the connections to the secondary winding of one of the transformers.

Recording Broadcasts

"Is it possible to make gramophone records of broadcasts, etc., without any special apparatus? I have a 3-valve battery set working on an H.T. eliminator. There is a good output and good tone with the set. I have a super-power valve and output transformer. Can records be made by connecting the pick-up in place of the speaker? Is it possible to buy blank records already grooved—if so, can you give me the name and address of a firm that stock same?"
—A. D. S. (Llanely).

TO produce satisfactory records an output of at least three watts is required. A cutting head can be provided by using a pick-up in place of the loudspeaker of the amplifier or set, providing an output transformer or choke filter is used. Suitable record blanks can be obtained from Electradix Radios or the V.G. Manufacturing Co., Ltd.

Push-pull

"I have been looking through some circuits and I find that in push-pull it is possible to use resistances as well as transformers on the input side, but there is always a transformer in the output side. Is it not

possible to dispense with the output transformer, as I wish to use my speaker, which is not provided with an output transformer of the push-pull type."—H. E. F. (Wittering).

THE input arrangements may certainly be used with resistances in place of transformers, but in the output circuit you must use either a transformer or a centre-tapped choke. The latter may be used in your case, the ends of the choke being joined to the anodes of the output valves, and the centre-tap to the H.T. positive line. To each anode of the output stage a 2 or 4 mfd. fixed condenser should be connected, the other sides of these condensers being joined to the appropriate pair of terminals on your transformer—these being selected to obtain the correct matching load for the push-pull stage. In this connection it should be remembered that valves in push-pull are actually in series, that is, their impedances are added together when calculating the load required.

Dead Spots

"I have tried out a short-wave receiver but find that at certain places on the dial with different coils there is no reaction and the set seems dead. Is this what is known as 'dead spots' and if so, how can I cure it?"
—J. E. (Cambridge).

THE trouble is fairly common and is aptly named. The defect is usually found to be due to the characteristics of the aerial-earth system and generally the inclusion of a small variable or semi-variable condenser in the aerial lead enables the damping effect of the aerial to be modified so that the dead spots are removed. It is also necessary in some cases to try changing the H.F. choke, the value of the by-pass condenser, and in some cases the grid leak in order to obtain smooth reaction throughout the entire scale.



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.

K. R. R. (Weymouth). In place of the wire mentioned you can use 22 or 20 S.W.G. double-cotton-covered wire. The same number of turns will be needed and the formers are standard size.

F. W. (Wallington). You should first find out whether your set is suitable for use with the unit. We do not advise the dismantling of a commercial set in order to build a unit.

E. E. B. R. (Wantagefield). The Hall Mark 4 would undoubtedly answer your requirements. We can supply a blueprint and the parts may be obtained from Messrs. Peto-Scott.

H. R. P. (Alfreton). The coil is for medium waves only. Primary is interwound at the lower end of the secondary and consists of 30 turns of 30 D.C.C. tapped at every 5 turns. Secondary is 45 turns of 22 D.C.C. and reaction is 35 turns of 30 D.C.C., wound in the same direction as the secondary.

V. E. (Doncaster). So far as we can trace there is no club in your immediate district.

C. S. J. (Limerick). We cannot identify the unit, and there is a possibility that it is not an adaptor but a converter. In that case it would not work as connected by you, but should be joined to the aerial terminal.

J. B. (Openshaw). One figure is the rating of the transmitter and the other is the power in the aerial.

K. C. (Wye). It would not be a simple matter to combine the two sets mentioned. It would be better to build a simple two-valve or single-valve to add to the amplifier. The valve in question is a special combined driver and Class B valve with a 7-pin base.

G. B. (E.11). The set is obviously unstable and this is undoubtedly due to interaction between the H.F. and detector stages. Screening or a re-arrangement of the connection leads is indicated. We cannot reply to the transmitting query unless you quote the call sign.

The coupon on page 338 must be attached to every query.

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS
CRYSTAL SETS.

Blueprints, 6d. each.
 1937 Crystal Receiver .. 0.1.37 PW71
 The "Junior" Crystal Set .. 27.8.33 PW94

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 One-valve: Blueprints, 1s. each.
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 Beginner's One-valver .. 19.2.33 PW85
 The "Pyramid" One-valver (HF Pen) .. 27.8.33 PW93

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 Four-range Super Mag Two (D, Pen) .. — PW36B
 The Signet Two (D & LF) .. 24.9.33 PW76

Three-valve: Blueprints, 1s. each.
 The Long-range Express Three (SG, D, Pen) .. 24.4.37 PW2

Selectone Battery Three (D, 2 LF (Trans)) .. — PW10
 Sixty Shilling Three (D, 2 LF (RC & Trans)) .. — PW34A

Leader Three (SG, D, Pow) .. 22.5.37 PW35
 Summit Three (HF Pen, D, Pen) .. — PW37
 All Pentode Three (HF Pen, D (Pen) Pen) .. 29.5.37 PW39

Hall-mark Three (SG, D, Pow) .. 12.6.37 PW41
 Hall-Mark Cadet (D, LF, Pen (RC)) .. 16.3.35 PW48
 F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three) .. 13.4.35 PW49

Geuet Midget (D, 2LF (Trans)) .. June '35 PM1
 Cameo Midget Three (D, 2 LF (Trans)) .. 8.6.35 PW51

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) .. — PW53
 Battery All-Wave Three (D, 2 LF (RC)) .. — PW55

The Monitor (HF Pen, D, Pen) .. — PW61
 The Tutor Three (HF Pen, D, Pen) .. 21.3.36 PW62
 The Centaur Three (SG, D, P) .. 14.8.37 PW64

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) .. 31.10.36 PW60
 The "Colt" All-Wave Three (D 2 LF (RC & Trans)) .. 5.12.36 PW72

The "Rapido" Straight 3 (D, 2 LF (RC & Trans)) .. 4.12.37 PW82
 F. J. Camm's Oracle All-Wave Three (HF, Det, Pen) .. 28.8.37 PW78

1938 "Triband" All-Wave Three (HF Pen, D, Pen) .. 22.1.38 PW84
 F. J. Camm's "Sprite" Three (HF Pen, D, Tet) .. 26.3.33 PW87

The "Hurricane" All-Wave Three (SG, D (Pen), Pen) .. 30.4.38 PW80
 F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet) .. 3.9.33 PW92

Four-valve: Blueprints, 1s. each.
 Sonotone Four (SG, D, LF, P) .. 1.5.37 PW4
 Fury Four (2 SG, D, Pen) .. 8.5.37 PW11

Beta Universal Four (SG, D, LF, Cl. B) .. — PW17
 Nucleon Class B Four (SG, D, (SG), LF, Cl. B) .. 6.1.34 PW34B
 Fury Four Super (SG, SG, D, Pen) .. — PW34C

Battery Hall-Mark 4 (HF Pen, D, Push-Pull) .. — PW46
 F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) .. 26.9.36 PW67

All-wave "Corona" 4 (HF Pen, D, LF, Pow) .. 0.10.37 PW79
 "Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B) .. 12.2.33 PW83

The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC)) .. 3.9.33 PW90

Mains Operated.
 A.C. Twin (D (Pen), Pen) .. — PW18
 A.C.-D.C. Two (SG, Pow) .. — PW31
 Selectone A.C. Radiogram Two (D, Pow) .. — PW19

Three-valve: Blueprints, 1s. each.
 Double-Diode-Triode Three (HF Pen, DDT, Pen) .. — PW23
 D.C. Ace (SG, D, Pen) .. — PW25
 A.C. Three (SG, D, Pen) .. — PW29

A.C. Leader (HF Pen, D, Pow) .. — PW35C
 D.C. Premier (HF Pen, D, Pen) .. 31.3.34 PW35B
 Ubiq (HF Pen, D (Pen), Pen) .. 27.7.34 PW36A

Armada Mains Three (HF Pen, D, Pen) .. — PW38
 F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) .. 11.5.35 PW50

"All-Wave" A.C. Three (D, 2 LF (RC)) .. — PW34
 A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) .. — PW36
 Mains Record All-Wave 3 (HF Pen, D, Pen) .. 5.12.36 PW70

All-World Ace (HF Pen, D, Pen) .. 28.8.37 PW80
 Four-valve: Blueprints, 1s. each.
 A.C. Fury Four (SG, SG, D, Pen) .. — PW20
 A.C. Fury Four Super (SG, SG, D, Pen) .. — PW34D

A.C. Hall-Mark (HF Pen, D, Push-Pull) .. 24.7.37 PW45
 Universal Hall-Mark (HF Pen, D, Push-Pull) .. 9.2.35 PW47
 A.C. All-Wave Corona Four .. 6.11.37 PW81

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 Battery Sets: Blueprints, 1s. each.
 45 Superhet (Three-valve) .. 5.6.37 PW40
 F. J. Camm's 2-valve Superhet .. 13.7.35 PW52
 F. J. Camm's £4 Superhet .. — PW58
 F. J. Camm's "Vitesse" All-Waver (5 valver) .. 27.2.37 PW75

Mains Sets: Blueprints, 1s. each.
 A.C. £5 Superhet (Three-valve) .. — PW43
 D.C. £5 Superhet (Three-valve) .. 1.12.34 PW42
 Universal £5 Superhet (Three-valve) .. — PW44
 F. J. Camm's A.C. £4 Superhet 4 .. 31.7.37 PW59
 F. J. Camm's Universal £4 Superhet 4 .. — PW60

"Qualitone" Universal Four .. 16.1.37 PW73
 Four-valve: Double-sided Blueprint, 1s. 6d.
 Push-Button 4, Battery Model .. 22.10.38 PW95
 Push-Button 4, A.C. Mains Model .. —

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 Two-valve: Blueprints, 1s. each.
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 Four-valve: Blueprint, 1s.
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 Economy-Pentode Three (SG, D, Pen) .. Oct. '33 WM337

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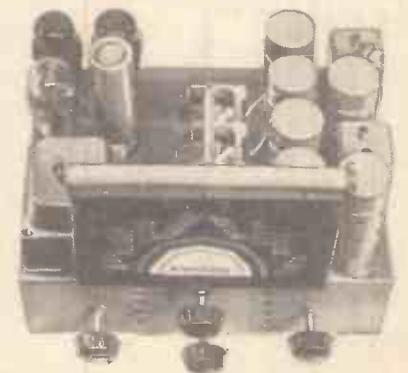
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Edited by F.J. CAMM

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The former article explained the effects of gradual characteristic changes in the Frequency Changer of a superheterodyne. The following deals with the stage in which High Frequency or Intermediate Frequency amplification takes place.

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when the receiver is operated at high sensitivity. The falling off in mutual conductance and gradual increase of background noises which are liable to occur make it advisable that replacement of the H.F. and I.F. valves is made at regular intervals.

Osram
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W31 H.F. PENTODE VARI-MU	...	12/6
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Above are suitable for servicing receivers which have been on the market for the past three or four years.

KTW63 H.F. TETRODE VARI-MU	...	10/6
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For servicing sets with International Range valves.

WRITE FOR FREE VALVE GUIDE TO:

OSRAM VALVE TECHNICAL DEPT. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

* Intermediate Frequency, as applied to "Superhet" sets.

Meter Ranges versus Accuracy.—See page 351

Practical and Amateur Wireless

'Round

Amateur Experiments

WHEN attempting some experiments in new designs there are many different ways of setting about the work. Some constructors merely set up the parts on an old kitchen table or work bench, and by hit-or-miss methods arrive eventually at the desired results. Quite a lot of valuable work may be done without instruments, but when really high-class results are required then a systematic method of working must be adopted and good instruments are essential. As an instance of the lengths to which one can go in designing or building up apparatus, we give in this issue an article from a contributor showing how he tackled the problem of fitting up a small Public Address equipment for private use. This is interesting as it shows how various problems were approached and solved, and every constructor should attempt to plan his work on similar lines so that reliable results may be obtained and the work tabulated and carefully kept notes preserved for subsequent use.

Late Television

A NEW television transmission will be given on New Year's Eve, when cameras will be installed in the Great Room at Grosvenor House in order to give viewers an opportunity of visiting one of London's best ballrooms. It is anticipated that nearly 2,000 visitors will be at the gala, and the television transmission will be carried on until well past midnight. This is yet a further milestone in the progress which is being made by the O.B. section of the Television branch of the B.B.C.

London Tour

THE normal O.B. section of the B.B.C. will also make a gigantic step forward on December 30th, when a broadcast entitled "Entertainment Tour" will be given. This will take listeners from one London entertainment to another, and a vast army of commentators will be dotted about London and will be introduced one by one to listeners. It is thought that this will be one of the most ambitious broadcasts yet attempted in any country.

Interference

AT the World's Fair next spring the G.E.C. of America are staging a gigantic discharge as a feature. Ten million volts will be employed and two metal spheres several feet apart will be used. In order to prevent the radiation of interference which will be caused by this discharge, the building in which the demonstration is to take place is

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. 326. December 17th, 1938.

Wireless

the World of

being elaborately screened and the cost of this screening is said to be about £16,000.

World History

THIS broadcast in the National, December 14th, will be devoted to a figure, half legendary and half historical, who has never ceased to fire the imagination of children and grown-ups alike. About A.D. 800 a Welshman wrote a history of the Britons, and in this he mentioned a great British Chief called Arthur who lost his life in an attempt to repel the Saxon invaders. Since then a host of stories have grown up round his name, and in this last World History lesson of the present term schools will hear one of these legends.

Piano Recitals

EGON PETRI will broadcast Beethoven's Sonata Op. 106 in B flat, generally known as the "Hammerklavier," on December 18th (National), and Cyril Smith is to play the same composer's Sonata in F minor, Op. 57 (the "Appassionata") on December 24th (Regional).

The Dudley Hippodrome

DUDLEY HIPPODROME is a new theatre built to replace the Dudley Opera House which was destroyed by fire in 1936, and the week beginning December 18th will be its opening week. Some account of the new theatre and the old will be given in the Midland programme on December 23rd as an introduction to an excerpt from the programme, in which Jack Hylton and his Band will be featured. The Opera House was opened in 1899; it was bought in 1920 by Benjamin Kennedy, who is the proprietor of the Hippodrome which succeeds it. Mr. Kennedy has had fifty years in the entertainment world. He was responsible for the direction of the first Coliseum in London, afterwards the Dalston Theatre; and with Mr. Moore he originated Kennedy's Comics. He built theatres in Smethwick and Bearwood, and bought the Gaiety Theatre, Birmingham, in 1912, in which he still maintains an interest. He controls the Theatre Royal, West Bromwich, a cinema in that town and one in Dudley, as well as the Dudley Hippodrome. The new theatre is designed and equipped on modern lines, with the latest type of air-conditioning and special stage lighting, controlled by a four-colour mixer panel which enables any colour in the spectrum to be pre-set. The theatre seats rather more than 1,750 people in the stalls and circle.

Christmas Carols

CHRISTMAS CAROLS will be sung by the Choir of the Tabernacle Calvinistic Methodist Church, Bangor, on December 18th. The programme will include a thirteenth-century carol entitled "Poland," and an old French carol, "Picardy." Many of the carols to be sung are chosen from the "Caniedydd," the Welsh hymn-book of the Calvinistic Methodists, and they are without exception very old Welsh Carols, harmonised by the late Dr. Caradog Roberts. Among them is "Yr Hen 137" (The Old 137th), a very old melody, set originally to the 137th Psalm, harmonised by Dr. David de Lloyd. "Groeswen" is one of J. Ambrose Lloyd's most popular tunes. The singing at this church does not consist of a mere handful of choristers—almost the whole congregation takes part in it. The conductor, W. P. Phillips, came to Bangor from Dowlais (famed for its choirs) two years ago. Singing rehearsals are held every Sunday evening after the service, and also after the Thursday night meeting. The programme will be repeated for the Empire on December 21st and 22nd.

GIVE BOOKS THIS CHRISTMAS!

The following Standard Works make ideal Christmas presents. They are all suitable for beginner and expert, lavishly illustrated, and well bound. By Price. Post.

Practical Wireless Service Manual	5/-	5/6
Wireless Transmissions for Amateurs	2/6	2/10
Sixty Tested Wireless Circuits	2/6	2/10
Wireless Coils, Chokes and Transformers and How to Make Them	2/6	2/10
Wireless Constructor's Encyclopaedia	5/-	5/6
Everyman's Wireless Book	3/6	3/10
Television and Short-Wave Handbook	3/6	3/10
Workshop Calculations, Tables and Formulae	3/6	3/10
Practical Mechanics Handbook	6/-	6/6

ROUND the WORLD of WIRELESS (Continued)

Prague International Programmes

THE Prague (11), 100-kilowatt transmitter installed at Melnik (Czechoslovakia) again working on 269.5 m. (1,113 kc/s) broadcasts nightly a series of news bulletins in various European languages. They are timed as under: G.M.T. 19.15 (Serbo-Croatian); 19.30 (Rumanian), 20.00 (German), 21.00 (French), 21.15 (Italian), and 21.30 (English). At G.M.T. 21.40, each evening, a special talk is given in one of these languages.

Maxim Memorial S.W. Station.

TO commemorate the memory of Hiram P. Maxim, first President of the American Radio Relay League, a station has been opened at Newington (Conn.) which comprises five separate short-wave transmitters. The station is to be used as the official mouthpiece of the A.R.R.L. for communications with all members of this association.

Radio for Fishing Fleet

DURING the past year a number of small transmitter-receivers have been installed in fishing craft in Norway, and now fifty-five vessels of the fleet attached to Aalesund, have been fitted with radio-equipment. The Norwegian Government have also allocated 150,000 kroner for reconditioning the commercial radio-telephony transmitter at this northern town.

Radio for Irish Blind

WIRELESS sets have been supplied to 460 blind people during the past four years through the Wireless Committee of the National Council for the Blind of Ireland.

An Interesting Debate

WE understand that "The Freedom of Our Press" will be the subject of a debate at 9.25 p.m. on Wednesday, December 14th, in the National programme. The speakers will be Mr. Dingle Foot, M.P., Mr. Nicholas Macaskie, K.C., and Sir Stanley Reed, M.P. Lord Meston, K.C.S.I., will preside.

Sport in the Midlands

IN the weekly survey of Midland sport on December 24th there will be eyewitness accounts of three Christmas Eve matches. E. A. Eden, secretary of the Birmingham County F.A., will describe the match between Wolverhampton Wanderers and Derby County; Jim Mason, Stoke City Councillor and well-known referee,

INTERESTING and TOPICAL NEWS and NOTES

that between Stoke City and Leicester City; and C. E. Lines, another famous referee, the match between Walsall and Brighton and Hove Albion.



Television entered the theatre for the first time to "broadcast" Mr. J. B. Priestley's Yorkshire comedy, "When We Are Married," at St. Martin's Theatre in London recently. The illustration, which is one of the first to be published, shows the mass of instruments inside the B.B.C. mobile television van.

"Pantomime Preview"

"PANTOMIME PREVIEW," to be broadcast in the Western programme on December 22nd, will give a peep behind the scenes at final rehearsals of "Jack and the Beanstalk" at the Prince's Theatre, Bristol; "Aladdin" at the Pavilion, Bournemouth; and "Cinderella" at the Palace Theatre, Plymouth.

Cabaret from Newquay

DANCE CABARET will be broadcast from the Headland Hotel, Newquay, on December 24th for West of England and Regional listeners. The artists will include Shirley Waldron and his Dance Band, who have broadcast in a number of programmes from the hotel.

Christmas Music

DR. W. K. Stanton, Midland Regional Music Director, will conduct the B.B.C. Midland Orchestra and Singers in a programme of Christmas music on December 21st. The Orchestra will play M. R. de la Lande's "Symphonie des Noels," and Singers and Orchestra will give "Fantasia on Christmas Carols," by Dr. Vaughan

Williams, for which George Gibbs, the Wolverhampton baritone, will be the soloist. Dr. W. K. Stanton's "Come to the Manger" and Norman Fraser's "Christmas Day" will be two of the other carols to be included in the programme.

Radio News Reel

"RADIO MAGAZINE" has changed its name to "Radio News Reel." This month's programme will be broadcast on December 23rd, when an attempt will be made to present to listeners a sound-picture of life in Wales during the month and to give them the "News Behind the News."

Variety from Bristol

IN the feature entitled "Theatres of Variety," a programme will be broadcast from the Hippodrome, Bristol, in the West of England and Regional programmes on December 16th. The Hippodrome first opened as a variety theatre in December, 1912, but in October, 1932, it was closed for variety and opened for films. In August this year it went back to variety again.

Stockport Theatre on the Air

LISTENERS all over the country will be able to hear the variety broadcast from the Theatre Royal at Stockport, Cheshire, on December 14th. This broadcast will be in the "Northern Music Hall" series and it will be included in the Regional as well as the Northern programmes.

How a Locomotive is Made

"ENGINE X" will be in the Northern programmes once more on December 21st, when the fourth and final episode in the series of short cameos, dealing with the construction of a railway locomotive, will be broadcast.

SOLVE THIS!

PROBLEM No. 326

Jackson had a three-valve set in which a pentode was employed for the output valve. This valve developed a fault and in order to hear a special programme he replaced the faulty valve by a triode taken from his spares. This valve had not been used and was in perfect condition. He found, however, that although it should handle more than the pentode and therefore could not be overloaded, the results were disappointing, signals being distorted and volume being weak. He modified the grid bias without advantage. What was wrong? 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. 326 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, December 19th, 1938.

Solution to Problem No. 325

In view of the absence of hum or other noise from the speaker, coupled with the fact that the valves were hot and a shock could be felt on the H.T. line, it is obvious that the fault must lie in the speaker. In the actual example quoted, one section of the speaker transformer primary had broken and signals were restored when alternative tapings on the speaker transformer were employed.

The following three readers successfully solved Problem No. 324, and books have accordingly been forwarded to them: S. E. Bradshaw, 'Misleira', Bonsey Lane, Westfield, Woking. G. E. Anderson, 104, Telford Street, Hull. G. Stephenson, 16, St. Marks Road, Mitcham, Surrey.

More Circuits to Try

Details of a Five-valve "Straight" with Negative Feed-back, an "All-countries" Short-wave Two, and an Excellent Test Panel

YOU will remember that some time ago we discussed at some length the relative advantages and disadvantages of "straight" and superhet circuits. No doubt you also remember that we declared ourselves in favour of the superhet for general use. Many readers wrote to say that they disagreed with our "verdict" on this subject, or asked us to prove that the superhet really was easier to build and operate successfully than a "straight," of similar sensitivity and power. After we had done that we were glad to find that the majority of those who were good enough to drop us a line had been won-over to our point of view.

In fact, we find that several made up sets to the "scratch" circuits that we gave, including a number of standard and inexpensive components. The main trouble now is that some of these sets are operating so well that their owners refuse to scrap them in order to build a more up-to-date receiver that will give vastly superior results. To these people we say that they do not even yet know how excellent a completely modern superhet can be, and we ask them to invest in a pair of coils for 465 kc/s, a couple of I.F. transformers and a 465 kc/s superhet gang condenser.

Good All-rounder

In the meantime we want to give a hearing to "the other side." Quite a long time ago we received a five-valve "straight" circuit of rather unusual and advanced design from Mr. Shuttleworth, of Dudley, Staffs. Our only reason for not giving you this circuit before is that we have not had reason to touch on this subject for the last month or two. Anyhow, the circuit is now reproduced on this page; see Fig. 1. Our correspondent points out that the receiver is giving extraordinarily good results, being satisfactory from the points of view not only of selectivity and sensitivity, but also of quality. And it is never easy to combine all these three, especially with a "straight."

You will soon see that it is of a rather elaborate nature, and not the type that a beginner would take in hand. We should make it perfectly clear that this circuit can be used successfully only by experimenters who have had a fairly good experience of construction and final adjustment. It is not the kind of circuit that you can "lash up" on any old piece of wood that can be pressed into service as a base-board; even if it is built carefully and intelligently it might not be entirely satisfactory until a few preliminary tests and modifications have been made. Apart from that the circuit is one that we can recommend to those who want something rather different, and who do not wish to follow a complete design.

Preliminary Experiment

As will be seen, it is a five-valver designed for operation from a 350-volt H.T. unit. The rectifier portion is not shown, but Mr. Shuttleworth uses

a 350-0-350 valve rectifier and suitable transformer. The first two valves are variable-mu H.F. pentodes, having a common 5,000-ohm variable bias potentiometer. They are followed by another

by The Experimenters

H.F. pentode used as an anode demodulator (or detector, if you prefer that less-accurate term), a triode first L.F. stage and an output pentode. Actually, the first L.F. valve is a double-diode triode, but the diode anodes are not used, so a simple triode will serve equally well.

A Varley B.P.57, tuning unit is used and negative feed-back is applied to the cathode circuit of the first L.F. stage. Just to show that the set is not without interest to the keen experimenter it should be mentioned that its sponsor spent six months on experimental work before bringing the receiver to its present state of efficiency. The valves he uses, and those for which the values shown are correct, are: VMP4G for first two stages, MSP4 anode-bend detector, DH42 for first L.F., and Tung-ram APP4C for the output stage.

coil is earthed, the other being used to provide negative feed-back to the cathode of the intermediate L.F. valve through a .1 megohm resistor. It is important that these two connections from the speech coil should be right way round, and they must be found by trial. When they are out of phase the L.F. amplifier will oscillate continuously, whilst this trouble is immediately rectified by reversing the leads.

Careful With Layout

Do not overlook the fact that extreme care is necessary in planning the layout. The best method is to use a metal chassis measuring about 18in. by 13in., mounting the coil assembly on the underside toward the left with the three-gang condenser immediately over it. The mains transformer and two smoothing chokes can then be mounted on top of the chassis on the extreme right. A five-pin valveholder should be provided for making connections to the energised speaker, which has a 2,500-ohm field. It is, obviously, necessary to keep all coil leads as short as possible, while it will be found desirable to screen the grid leads. Just one more point that might not be apparent at first—there is a Droitwich wave-trap in the aerial circuit, this being wired in series with the lead-in.

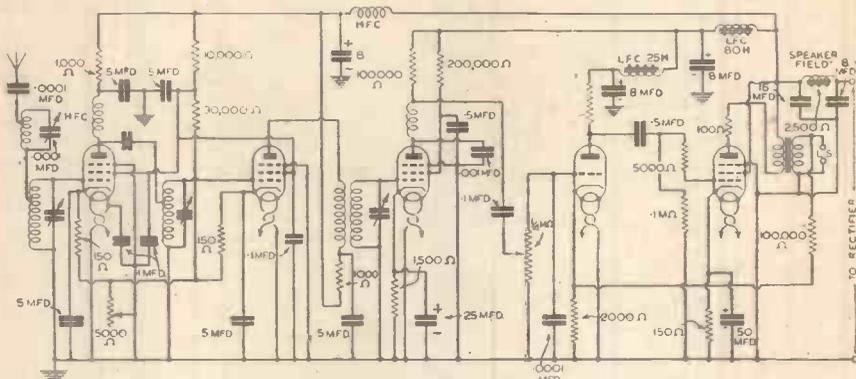


Fig. 1.—This 5-valve "straight" circuit has many interesting features which provide ample scope for individual experiment.

Snags Overcome

In the first place he used the diode anodes of the DH42 to provide A.V.C., but found that this made the set unselective, whilst there was a tremendous amount of background "mush" and the set would work without the detector valve. We think that he was quite wrong in trying to obtain A.V.C. from the L.F. stage; the fact that the set worked without the MSP4, suggests that the L.F. valve was acting as demodulator—although not operating efficiently. If any of you want to try the circuit with different valves it will probably be necessary slightly to modify the principal values of resistors and condensers.

It was also found that stability could be ensured only by earthing alternate heater pins of the first four valves. Until this was done there was terrific hum.

It will be seen that one end of the speech

This will not normally be required unless the set is used very close to the long-wave National.

Well, that circuit will give tired experimenters something to think about. If we had more time we should give it a trial ourselves; perhaps any of you who make use of the circuit will let us know how you succeed.

Twin-Pentode S.W. Two

And here are details of another reader's circuit, this time a two-valve short-waver from Edinburgh. Mr. A. C. Stirling kindly sent it, as shown in Fig. 2. He also sent us a few snaps which prove that it was extremely well made; unfortunately these are not quite clear enough for reproduction. The set was built on a home-made

(Continued overleaf)

MORE CIRCUITS TO TRY

(Continued from previous page)

wooden chassis (and a very neatly made one, too). It is mains-fed, but the mains portion is not shown, because Mr. Stirling agrees with us that the experimenter can most conveniently have a "standard" power unit from which the supply for any set can be taken. He uses a five-pin valve-plug for connecting the power supply to the receiver. Incidentally, this correspondent endorses our opinion that anyone who has mains available should make full use of them as far as radio is concerned.

Surprisingly enough, the only critical component is the .0003-mfd. fixed condenser between the anode and cathode of the detector. Just shows how theory and practice do not always agree, for most people would say that such a value is too high for short-wave work. But as Mr. Stirling has carried out a large amount of experimental work with this circuit he should know what he's talking about. It was found best to erect a screen between the two stages and to operate the set from a doublet aerial. The result is obviously very satisfactory, for nearly all countries were logged within a couple of months.

Electrical bandspread was tried at first, but it was found that reception at the higher frequencies was better when using ordinary mechanical bandspread. To ensure freedom from hum the 1-mfd. condenser across the H.T. supply was essential. It should be mounted as near

as possible to the components fed from the H.T. + line. Of course, it would probably not be required if the power unit were made a part of the complete receiver. Well, you S.W. hams, that's another circuit that you might like to try. You know that it will "deliver the goods" when carefully made and skilfully handled. Actually, it should not present many awkward problems to anybody who has had a little experience of short-wave-set construction.

Test Everything

And now we have another kind of circuit—a test panel—from Mr. F. Lawson in far-away Las Palmas. We have received a number of very interesting letters from

seen for a long time. No wonder its builder now finds that he spends a considerable amount of time testing everything appertaining to his hobby—who wouldn't with a piece of gear like this? He also sent a snap of the wiring diagram, which bears the stamp of a clever draughtsman. All we say is that a considerable amount of patience would be required to follow it through. We are not going to reproduce it, because a half-tone block would not do justice to it. Mr. Lawson tells us that there is just one mistake in the diagram—although this does not occur in the finished instrument. We should have to spend a considerable amount of time tracing out the vast network of wires before we found it!

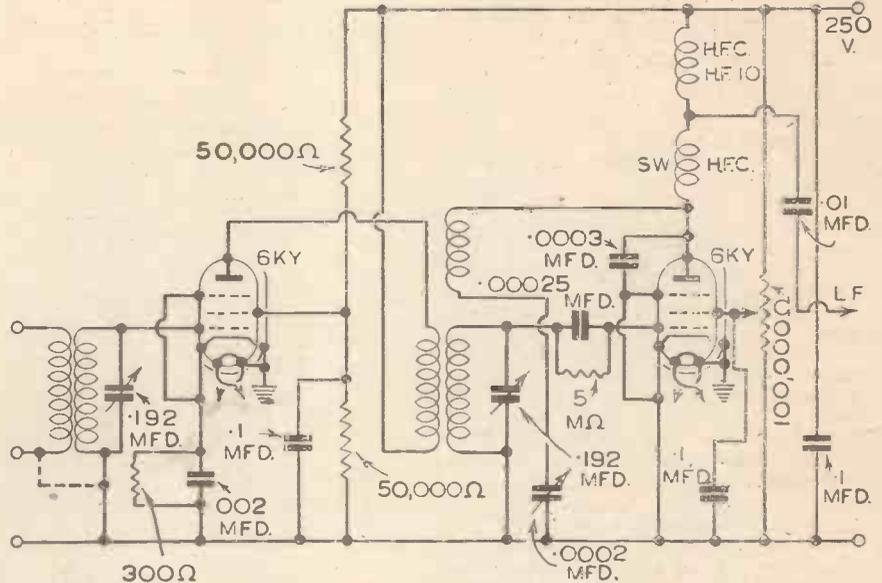


Fig. 2.—This twin-pentode two-valve circuit has provided reception of nearly all countries.

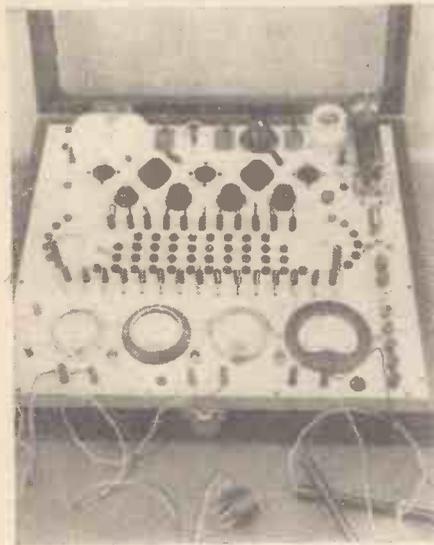


Fig. 3.—This business-like "test everything" panel was built by a Las Palmas experimenter.

this correspondent during the past year, and have made reference to them in these columns more than once. Mr. Lawson finds that PRACTICAL AND AMATEUR WIRELESS and (spare our blushes) The Experimenters enable him to keep in very close touch with radio in Britain. But he is far too modest: in one breath he describes himself as a humble experimenter, and in almost the next refers to some snapshots he encloses of a thorough-going test panel that he has just made. We reproduce one of these in Fig. 3, so you can judge whether or not our Las Palmas friend is "humble" in the realms of wireless. We must say that this job is the most beautiful piece of work we have

Further Details

If any of our readers would like to have further details of this "test-everything" panel we should be glad to forward letters. But remember that it is an expensive job, and that it would be unfair to ask for these details, which could not be given in few words, unless you seriously anticipate undertaking a long, patient, but extremely interesting task. By the way, Mr. Lawson mentions that he is working on his own, a very long way from fellow enthusiasts, and finds our notes from other readers "decidedly stimulating." So if you would like to exchange notes or pass along anything of interest to Las Palmas, we will undertake to forward your letters.

The Making of Xmas Games

By DAVID WHITELAW

SOMEONE once wrote: "Of the Making of Books there is no End." I can reply by saying: "In the Making of Games there is no End—of Fun!" And after all, the two have a great deal in common. In the former it is first the germ of the idea, then the characters and then the surmounting of the innumerable "snags." In games it is again the germ of the idea, then the medium, then the "snags."

But while one can wrestle with the intricacies of a fiction plot, seated quietly at one's desk, the overcoming of snags in

game-inventing suggests a man well on the road to the asylum. Seraps of coloured paper, dice, cards, intricate figurings of "odds"—it only needs straw in the hair to complete the picture!

The germ of the idea for "Soccer," one of the Christmas games this year, came from the knowledge that some ten million people enter the various football pools each week. Therefore, I felt, a game that had a football flavour, and also a "pool" interest, should prove popular. My first snag was how to overcome the possibilities of people saying: "Oh, but I

don't understand football!" In "Soccer" you do not have to!

I am asked continually whether my family circle assist me in the compiling of games. Definitely, no. It's a one-man business. Before putting "Soccer" on the market I played hundreds of imaginary games. "Soccer" will, I feel, be found on many a present tray this Christmas. Apart from its pool-winning element, it contains a large slice of humour—an essential in a family game.

Finally, I never play my own games once they are on the market, and so Bertie the Half-Back and Freddy the Forward must do without me this Christmas. But they'll be giving pleasure in thousands of homes all over the country—and that's all that matters, isn't it?



More Christmas Fun WITH YOUR RADIO

Further Suggestions for Making Use of the Radio Receiver in Party Games

In our Christmas Number we gave the script of a radio play, and no doubt other plays will be used by readers who have a microphone and wish to give their own broadcast as part of the Christmas festivities. A few notes on the production of sound effects would no doubt be welcome in this connection. It should be remembered that with the ordinary broadcast receiver and facilities available in the home, realism will not be called for. Thus, a pistol shot, for instance, whilst sounding much more realistic over the normal broadcast programme when a real pistol is used, would undoubtedly be very poor if performed on the home-broadcast circuit. This is because the voltages and circuits in use would not enable the sound to be broadcast well enough to give the sharp crack which is needed, and a much more realistic sound may be produced by slapping two pieces of wood together, or even by clapping the hands. A sound of this nature, however, must be rehearsed many times, until the distance from the microphone has been found, and the volume at which the noise must be produced.

You may be introducing into your broadcast an air crash, and a most realistic effect may be produced by squashing a matchbox in the hand as shown in Fig. 1. If a match is held in the other hand and broken after the box has been crushed, or even at the same time, added realism will be given—



Fig. 1.—Crushing a matchbox gives an ideal imitation of a crashing aeroplane.

the match giving a very realistic reproduction of the smashing of stout struts. Silver paper crumpled slowly, beans or peas rattled gently in boxes or tins, sheet metal of thin texture slowly bent in opposite directions or a steady stream of air blown into a wide diameter tube all give most realistic sounds which may be included in a storm or hurricane broadcast. No doubt many other ideas will occur

when rehearsals start, but remember that you may find most realistic effects by using objects entirely distinct from those from which the sound is supposed to emanate.

Tricks and Games

Wireless is still much of a mystery to many, and you can obtain quite a lot of fun by adding to the apparent mysteries of radio. As an example, everyone now knows that the programmes travel through the air from the station to your receiver

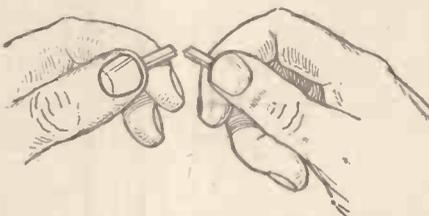


Fig. 2.—Breaking a match to simulate the sound of a spar or branch breaking.

without any interconnecting wire, and you can continue this by removing the aerial lead from your receiver and letting one of your guests hold the lead-in in one hand and touch the aerial terminal with the other. Signals will be restored, although in some cases it may be necessary to retune. By re-tuning you can also obtain signals by cutting the lead-in and separating the two ends (the latter acting, of course, as a series aerial condenser).

Another apparent mystery to the uninitiated is the reproduction of the signals without the use of headphones or loudspeaker. To do this, two people each hold one of the speaker terminals on the receiver, and then a sheet of dry brown paper is placed between their heads, which are placed close together so that their ears are adjacent. If the insulation is good the signals will be heard by the electrostatic effect between the bodies—the brown paper acting as the dielectric or insulator. No doubt other methods of reproducing the programme will occur, based on this idea,

Extension Speakers

If your receiver is not provided with extension speaker sockets, you will need an iron-core choke and a 2 or 4 mfd. fixed condenser, and these should be joined to the loudspeaker terminals or sockets on your receiver as shown in Fig. 3. Extension speaker sockets may then be fixed in as many rooms as you like, adopting the wiring shown in this illustration. Speakers may be hidden in the rooms or masked in various ways and then with a microphone connected to the receiver you

can create considerable interest by making odd noises, such as the scratching of a mouse or by placing a watch close to the mike so that a tick is heard faintly in the room. At the proper volume level, and with the speaker well hidden, much amusement may be obtained whilst your guests search for the mouse or "bomb."

If you change round the extension speaker and mike connections, that is, join the extension speaker lines to the pick-up or input sockets, this will act as a microphone. For this arrangement a pair of leads must be taken to the extension speaker, not just one with an earth return. A transformer may be needed to match the circuit, but this depends upon the type of speaker. With a pair of headphones joined to the loudspeaker terminals of your set or amplifier, and a double-pole change-over switch, you could then eavesdrop in the room in which the speaker is placed, and by changing over the switch could surprise your guests by making some remark relative to their conversation. A moving-

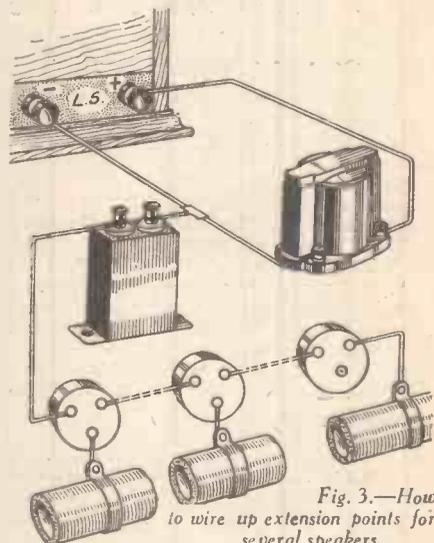


Fig. 3.—How to wire up extension points for several speakers.

coil speaker of the midget type will act best as a microphone and will be found extremely sensitive.

A Warning

In all cases where the receiver is being used for any of the games mentioned, remember that if it is a mains-operated receiver some care should be taken to ensure that a shock will not be received due to the high voltage available, or the fact that the mains leads may be in contact with some part of the apparatus.

The Amateur Transmitter

Your Problems : P.A. Effect on C.O. Stage : A.A. Trouble : Licence Questions and the Selection of a Monitor are Discussed in this Article. By L. O. SPARKS

MANY letters and queries received relate to items which are of a general interest, therefore this page will be devoted once a month to representative problems, thus allowing such matters to be dealt with for the benefit of all.

Another reason for this procedure is, it is possible for readers to want information about one particular section of transmitting which, through covering the subject in a logical sequence, might have been dealt with, or might not come into print for some while. It is hoped, then, that this monthly idea will enable all to keep pace with the progress made by the usual weekly articles, and remove those stumbling blocks which so often get in the way of smooth progression. For example, W. G. J. is experiencing trouble with his C.O. and P.A. stage. He finds that when H.T. is applied to the P.A. the C.O. anode current falls. He wants to know if this is correct and/or why.

Unfortunately, no idea is given of the source of H.T. supply. If it is obtained from a mains unit it is possible for the effect to be produced by the sudden current demand of the P.A. causing an appreciable voltage drop across the smoothing choke or any other form of resistance in the H.T. supply lead feeding those circuits. If, on the other hand, this is not the case, or assuming that a battery source of H.T. is being used, then the drop in anode current will no doubt be due to the C.O. stage being thrown off tune, but it is an easy matter to check that by re-adjusting the tuning of the oscillator tank.

Artificial Aerial

The same reader also has trouble with his artificial aerial. He is using the fundamental circuit including inductance, capacity and resistance, but he also includes a lamp for indication purposes. With the resistance in circuit, the lamp will not glow; cut out the resistance and the lamp lights in the normal manner.

No indication is given of the input to the A.A. The lamp is of the 6-watt type. I would suggest that the lamp is removed from the circuit and placed in a separate circuit inductively coupled to the A.A. in the manner suggested in previous articles. If a standard S.W. tuning coil is used, the reaction winding is quite suitable for the lamp coupling, and it will be found that much sharper tuning can be obtained. If the input to the A.A. is small compared with the 6-watt bulb, it is possible that the total resistance of the circuit is too high to allow satisfactory operation.

Licences

This is not a practical or technical subject, but, as it crops up so regularly, it is being included with the hope of saving other readers writing in to ask the same question. C. S., and others, appear to experience some difficulty in completing the necessary form for an A.A. licence application. The questions numbers 4, 5, 6, 7 and 8 are the ones causing the trouble. They relate to (4) nature and object of experiments; (5) details of apparatus to

be used; (6) power; (7) frequencies and character of waves to be used for transmission; and (8) type of aerial.

As much as these articles are intended to help amateurs progress with their study and experiments of transmitting, they cannot undertake to provide the necessary answers to the above questions. Looking at it from the practical angle, one must realise that if the questions cannot be answered by the applicant, then he does not know sufficient about the subject to warrant the granting of a licence. However, assuming that it is more in the nature of not knowing what the P.M.G. wants to know by the questions, perhaps a little help might be of some assistance.



While static is regarded by radio fans everywhere as the last word in annoyances, Dr. G. W. Kendrick, of the Puerto Rico University, is shown here tuning in, and hoping to catch some on this unusual aerial. The static Dr. Kendrick is fishing for, however, is that which accompanies hurricanes while it is still 100 miles away, and to chart its subsequent path.

Number 4 has got to be answered, and the applicant can only state what experiments he has in mind, and why a licence is essential to allow such work to proceed. I mean by this, that the nature of the experiments must, obviously be connected with transmitting, and in the form of serious work. The P.M.G. will never grant a licence solely to allow one to operate a transmitter so that he can talk to his friends about nothing in particular.

The next question—number 5—should be simple if the applicant knows anything about his subject. It is just a matter of giving particulars, and a theoretical diagram, of the transmitter to be used. The

same applies to number 6. It should not be difficult to say what power you wish to use, i.e., five, 10, 50 or a hundred watts. A beginner is not allowed to start off with more than 10 watts.

Knowledge of simple oscillators will enable the next question (No. 7) to be answered. If you can't, then it is obvious that you must sweat up the subject, and get more familiar with such things before thinking of sending in your application.

The type of aerial, dealt with in number 8, need cause no worry; it is assumed that an A.A. licence is being requested, in which case simple details of an A.A. aerial are all that are required.

To sum up the licence question, it is not the slightest use making application to the P.M.G. even for an A.A. unless you can answer all the questions with satisfaction and confidence. If you know your subject and can put up a strong case, you will receive every consideration, so don't lose heart if you don't succeed at first.

Monitors

Which is the best type of monitor to use, is another frequent query. With monitoring one is concerned with hearing, as faithful as possible, the signal being radiated by the transmitter, therefore as it is essential for the apparatus being used to be, in itself, free from errors and distortion, it is advisable to keep it simple, reliable and self-contained.

An elementary tuned circuit embodying a Westector for rectification forms a very satisfactory monitor possessing the advantages of being faithful, as regards reproduction, and most compact. If an 0/1 mA. meter is available, of good make, and is included in the circuit, a simple form of modulation meter can also be obtained.

A simple one-valver will serve the purpose, but with this type of apparatus there is always the danger of a certain amount of reaction being present, and the last item required is any form of instability.

Of the valve arrangements, one cannot do better than use a diode detector, making use of a proper diode valve or else a triode with its grid and anode strapped together, operated off batteries.

PATENTS AND TRADE MARKS

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

METER RANGES VERSUS ACCURACY

The Selection of Instruments having Proper Scales Increases Dependability of Measurements

THE choice of a voltmeter, milliammeter, or ohmmeter having the proper ranges or scales may often be more important than the rated accuracy of the instrument. Or to say it another way, an instrument designed with ranges unsuitable for radio servicing may give inaccurate results when used for set testing.

The logic behind this statement is apparent when one considers how instruments operate and are rated for accuracy.

While meters are usually rated as 2 per cent. (or 5 per cent.), the complete statement of accuracy usually reads as follows: "the meters are accurate within 2 per cent. of the full-scale reading." This means that the maximum allowable meter error may be plus or minus 2 per cent. of the full-scale reading.

Per Cent. v. Absolute Error

Taking a specific example, such as a 100-volt copper-oxide A.C. meter, the usual rating is 5 per cent. The error at any point on the scale may be as great as 5 per cent. of 100, or 5 volts (often it is less). The numerical value of the maximum absolute error, 5 volts, remains constant over the entire scale. Since the numerical value of the error is a constant factor, the percentage of the error increases for less than full-scale deflection of the meter. A 5-volt variation at 50 volts represents 10 per cent.

with a 5 per cent. rating may actually be 50 per cent. in error.

In Fig. 1 a typical meter scale is shown for the purpose of illustrating how the meter accuracy may vary with the deflection. The shaded areas at 10, 25, 50, 75, and 100 volts show what the maximum variation might be at those points. For a 5 per cent. meter, the variation is 5 volts. The percentages of the maximum allowable error for each point are given. (Note that we say maximum, not average.)

Looking at the error from another viewpoint, one sees that the maximum error for a meter with a uniform scale is inversely proportional to deflection of the meter. A reading at $\frac{1}{2}$ of full scale may have a percentage error of five times that of full scale. Likewise the error at $\frac{1}{4}$ may be three times as great as shown in Fig. 1. The maximum allowable absolute error of a meter is constant over the entire scale.

Overlapping Ranges

Fortunately, radio service instruments are designed with more than one range. Many meters have five or more ranges. If the overlap of two ranges of a meter is 4 to 1, such as 25 and 100 volts, the maximum percentage error that one gets on the 100-volt range in the vicinity of 25 to 30 volts is about four times the full-scale value. The reason for this is that, when the voltage is 25 or less, one uses the

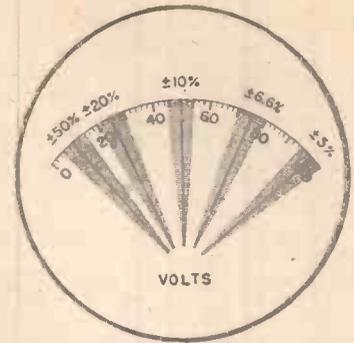


Fig. 1.—The shadow of doubt in a meter reading remains constant in width, but increases in percentage for decreasing needle deflections.

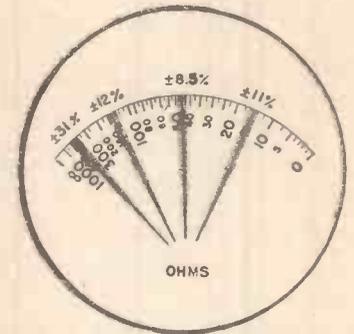


Fig. 4.—For an ohmmeter the possible errors are greater than those of the meter movement itself because of the non-linear scale.

errors oppose each other, the difference in the readings on the two scales will be the sum of the two errors. Likewise may be true if two separate meters are compared.

Comparing Meter Readings

Also when comparing meter readings, additional apparent errors may be introduced by loading effects of the instruments upon the circuits. Circuit changes can and do influence the readings of instruments as every serviceman knows but often overlooks.

If the overlap of the meter ranges is 2 to 1, then the maximum possible error occurs just at half scale, since deflections of less than half-scale would be measured on the lower range. At 50 volts on a 100-volt range, the percentage error may be twice that of full scale.

From this discussion of overlapping ranges, it becomes apparent that the maximum percentage errors in measurements are directly proportional to the rate of the ranges. This relationship is illustrated in Figs. 2 and 3.

As a concrete example of how important it is to have a small ratio in the overlap of instrument ranges, the following example is offered. A multi-range meter may have scales of 10 and 100 which are rated at 2 per cent. Another meter may be rated at 5 per cent. and have ranges of 5, 10, 25, 50, 100. At 25 volts the 2 per cent. meter may be in error by 8 per cent., while the 5 per cent. meter on the 25-volt scale has an error no greater than 5 per cent. At 15 volts the error of the 2 per cent. meter may be about 14 per cent., while that of the 5 per cent. meter may be about 8 per cent. This relation is shown graphically in Fig. 3.

The serviceman, however, should not get the idea that it is advisable to buy less accurate meters with greater overlap of the ranges. The more accurate meters are usually held closer to tolerances than in-

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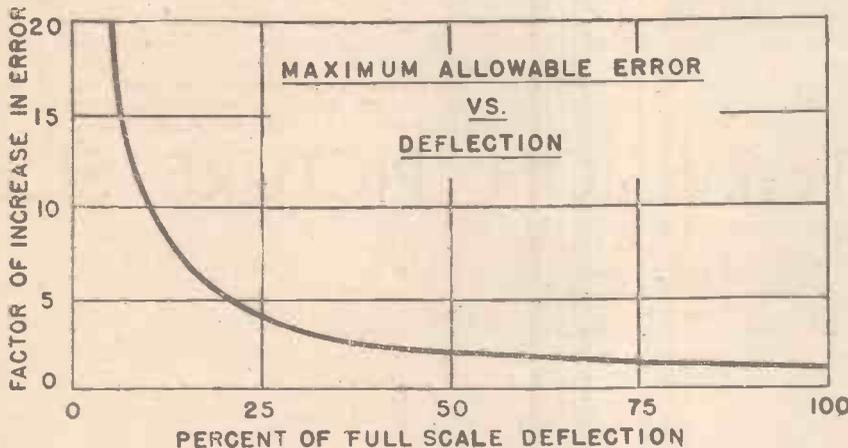


Fig. 2.—The maximum allowable meter error increases very rapidly for deflections less than one-third of full scale. To find the per cent. error, multiply the factor of increase in error by the per cent. rating of the meter.

Likewise at 10 volts, a 5-volt variation is 50 per cent. (For a 2 per cent. meter at 10 volts the variation permissible would be 2 volts or 20 per cent.)

However, the meter is still within the rating of the manufacturer's accuracy. This type of rating applies to instruments of all manufacturers. Fortunately, meters are usually more accurate than the rating, since the rating is given for the purpose of taking into account many sources of errors that might occur, but generally do not.

However, there always is the possibility that a 10-volt reading on a 100-volt meter

25-volt range rather than the 100-volt range. If the voltage is just above 25 volts it is necessary to use the 100-volt range—and this higher range at $\frac{1}{4}$ of full scale may have a percentage error as great as four times the rated error. As the deflection increases, the error reduces, until at full scale the maximum allowable error is equal to that of the manufacturer's rating.

When comparing a reading on one range with that shown on a second range, the serviceman should remember that the error on one range may be plus, while that on another range may be minus. Thus if the

METER RANGES VERSUS ACCURACY

(Continued from previous page)

indicated by their ratings—that is, they are more conservatively rated. The comparisons have been made in terms of maximum possible errors rather than those most commonly encountered.

Choice of Ranges

In addition to meters having closely overlapped ranges it is desirable that the ranges be chosen in so far as is practical, so that the voltages to be measured fall somewhere near full scale. If the majority of voltages to be measured lie between 250 and 300 volts, a full-scale range of 300 is preferable to 500; for on a 500-volt range, most of the readings would be 50 to 60 per cent. of full scale. Thus the percentage error would be about twice that of the meter rating. On the 300-volt range, the maximum error would be only 1.2 times that of the meter rating. Just by choice of suitable ranges, the error is reduced to 60 per cent. of what it might have been.

For this reason the serviceman should take into account what ranges he uses on his meters. Likewise using the same argument, a meter that was adequately designed for measurement on 1928 sets is not so suitable for 1938 sets, because the voltage ranges found in present-day sets are quite different from those of ten years ago.

When the type 71 was in its heyday, 180 volts was about maximum. To-day 300 is very common, and 250 usual. The 200-volt range that was ideal in 1928 is of much less value in 1938.

Even though the same old meters may be perfect as far as their accuracy is concerned, many of them are unsuitable because the ranges are not what are needed for present-day servicing.

Summing up the discussion, one can state that the ranges of the meters employed for radio servicing should be of such values that most commonly measured voltages are on the upper third of the scale, and the ratio of the overlapping ranges should be rather low.

It follows, therefore, that a serviceman handling battery receivers almost exclusively, such as in a rural area, needs different meter ranges from the serviceman who exclusively services power line receivers.

Non-uniform Scales

So far, only uniform ranges or scales have been mentioned. Ohmmeters have scales that are not uniform. At high end of the scale $\frac{1}{16}$ in. may represent one ohm while at the lower end $\frac{1}{16}$ in. may represent 1,000 ohms. To express the accuracy of such a non-uniform scale is more difficult than for a uniform scale. However, basically the rating is the same. Rather than try to use ohms as a measure of the accuracy, it is easier to use degrees of deflection or per cent. of the scale length in inches. Most D.C. meter movements are rated at 2 per cent. Therefore, for such a meter the error will not exceed 2 per cent. of the full scale. If the scale length is 4 in., then 2 per cent. is $.08$ or $\frac{1}{12.5}$ in.

Therefore, anywhere along the scale of the meter, the error may be as great as plus or minus $\frac{1}{12.5}$ in. At half scale on a meter having a mid-scale reading of 45 ohms, the error may be $3\frac{3}{4}$ ohms. On a percentage basis it is equal to $8\frac{1}{2}$ per cent. error. For one-fourth scale deflection, the error in inches is still $\frac{1}{12.5}$ in., but is equal to 15.7 ohms, or 11.6 per cent. of 135. These relationships are shown in Fig. 4. At 450 ohms on the scale the error is 30.7 per cent.

Since the error gets rather high at low

values of deflection it is necessary to have a rather small overlap factor. A factor of 10 is satisfactory. This means each range is ten times greater than the preceding one.

It is interesting to note that as far as accurate readings are concerned, the lower fourth of the scale is of little value. One must take the centre-scale value rather than the extremity as an indication of the range. The centre-scale point is approximately one-tenth of the usable range of an ohmmeter scale. If the divisions at the high-resistance end of the scale are made small enough, it is possible to have a top resistance range of almost any desired value. As a result, ohmmeters made by two manufacturers having the same centre-scale reading may have entirely different top ranges, depending merely on how small a deflection is calibrated on the scale near the infinity point.

Before concluding, it might be well to

accurate. Likewise, meters are sometimes described as having resistors of 1 per cent. (or other value). This does not necessarily mean that the movement is that accurate.

Need for Accurate Meters

Another thing that the serviceman must consider is that his instruments should have a rated accuracy better than the required accuracy of his measurements. Often servicemen wonder why their instruments should be so accurate, when the tolerance in radio sets is usually 10 to 20 per cent. for resistors and condensers and about 10 per cent. for voltages. The reason for the greater accuracy in the instruments is for the reasons discussed previously; namely that the allowable error of the meter increases as the deflections become smaller.

Instead of looking at meters in terms of the highest ranges, the serviceman should

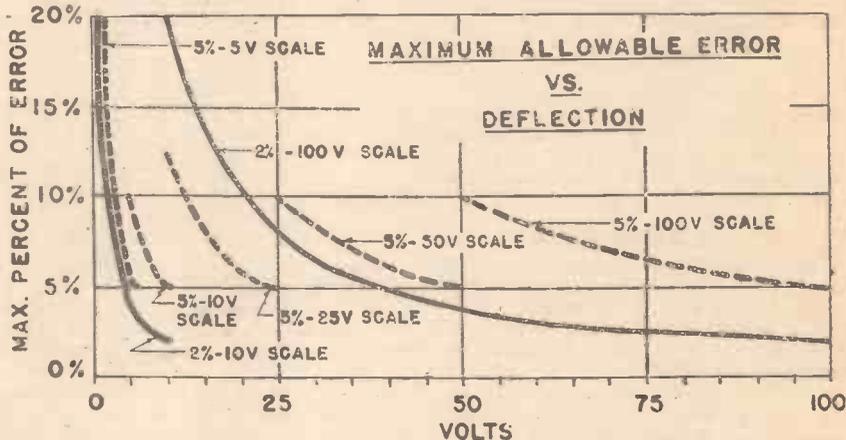


Fig. 3.—By using closely overlapped ranges, the error due to the necessity of taking readings for small deflections is eliminated. Note that the 5 per cent. meter represented by the dotted lines, in some cases has a lower allowable error than the 2 per cent. meter (solid lines).

call attention to the fact that some instruments are rated as having meters with 2 per cent. (or 5 per cent.) accurate movements. This notation applies only to the meter itself, and the resistors may be less

consider instruments in terms of overlapping ranges and the choice of ranges that are most suitable for measuring the voltages, currents, and resistances used in his everyday work.—*Radio To-day.*

TELEVISION PICTURE SIZE

SIR NOEL ASHBRIDGE, in his recent address on television to the Institution of Mechanical Engineers, dealt with many important facts, but one of the most illuminating from the public point of view was his remarks on the size of the television picture for ordinary domestic viewing purposes. Sir Noel reiterated his oft-remarked contention that much larger television pictures than those now seen generally were not essential to viewing in comfort. Taking as the basis of his remarks the popular 10in. by 8in., he pointed out that with every increase in size the minimum viewing distance in the room had to be extended. There is in most cases a limit to this with the normal domestic household. When looking at photographs in an illustrated journal the average individual does not keep wishing that they were much larger—other factors have to be taken into consideration, and with television this is the degree of definition. Closer viewing with any given size picture could be undertaken if there were no lines present, but even so the viewing angle would be wrong proportionately, and a measure of discomfort experienced. Scientifically it was a wrong argument to say that television would not be satisfactory until a large

home picture was available. It would be more logical to put forward a view that the present standard of definition was not enough to convey sufficient information. No doubt, in time to come, the present degree of picture dissection will be re-examined in the light of all the experience gained. The more ambitious the programmes where long shots have to be taken of outside or inside events, the greater will become the need for a higher picture definition, but there is no doubt that the present standard will hold good for quite a long period to come. If changes ultimately have to be effected, then it is hoped in every quarter that a measure of agreement will be arrived at between nations with regard to the technical standards, for both picture dissection and reconstitution, as well as the type of ultra-short-wave transmitter modulation, and the injection of the synchronising signal.

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ON YOUR WAVELENGTH



By Thermion

ON the eve of 1939 I want to assure readers that there will be no change in the price of PRACTICAL AND AMATEUR WIRELESS, which will remain at 3d.—a price which has held from its first issue. I also assure readers that we shall not make a charge for technical queries, and shall continue the policy of answering technical questions to regular readers free of charge. We shall also continue our Free Advice Guarantee, and Service for PRACTICAL AND AMATEUR WIRELESS receivers.

The satisfactory and pre-eminent position which this journal has attained has been achieved by sheer merit, and the loyalty and appreciation of our readers is very tangibly expressed, and in an unanswerable way, by our net sales figures. As all readers know we have always considered it a duty to our readers, and a duty which we cheerfully undertake, to help them out of their difficulties promptly, and free of charge. We have always considered that a reader who is invited to spend money making one of our sets is entitled to free advice, and if necessary to free service, should he be unable to obtain the results which we claim.

Since the foundation of this journal, approaching seven years ago, some tens of thousands of sets have been built from our designs. Our test report book indicates that in that time we have serviced less than 700 receivers—less than approximately 100 per year, or two per week. Such a policy was bound to succeed, and, if I can give a hint to the trade, it is that in spite of the fact that some firms are deserting the home constructor market, there are still over 100,000 enthusiasts in this country, who between them must spend nearly £1,500,000 per year in components. They are shrewder now than they were, and the old method which some of the firms adopted (not PRACTICAL AND AMATEUR WIRELESS advertisers, for your shrew-like Editor is as insistent upon the quality and the probity of his advertisers, as he is over the quality of his editorial matter) of selling anything which resembles a component at a fabulous price without test and without inspection, of fobbing off the resulting complaints on the score of the ignorance of the customer, of taking weeks to deliver advertised goods, and excusing themselves on the score of "unprecedented demand," will not work to-day.

This journal has done a great deal to clean up that unsatisfactory state of affairs, and it has justly earned its reward in the form of its net sales, which are the largest of any technical journal of similar nature.

Rising costs of printing, of paper, and of distribution affect us in the same way that they do other publishers, which means that the reader is getting better value for money than ever before.

Our 1939 policy will be as vigorous, as interesting, and as authoritative as formerly, and at the close of the year I want to say how much I personally appreciate the many letters I have received expressing thanks and good will from all parts of the world.

mitting circuits. A little assistance in the tyro stage keeps one from making such mistakes."

The Power of Thought

I HAVE been reading a little book produced by Mr. R. W. Jepson, who is the Headmaster of Mercers School. It is entitled "Teach Yourself to Think," and I am certain that if some of the critics have read this little book they would not need to adopt that old adage "put on your thinking cap." We may argue that we put on spectacles in order to see better, but the real reason is that we wear them because our sight is defective, and if it is necessary to put on a thinking cap, by that same argument we admit that our reasoning is defective. Mr. Jepson gives some fine examples of confused thinking, or what I prefer to call inverted reasoning, and he draws attention to what Mr. A. P. Herbert has termed "witch" words, but which Americans term propaganda or slogans. He says that adjectival phrases are slipped into speech, and writing, as if they were truisms, and did not permit of argument.

A famous politician the other day in dealing with the ten millions we are going to give to a certain continental country answered his critics by saying, "He who gives quickly gives twice." As a reasonably intelligent individual, that answer does not satisfy me. I want to know first whether it is necessary to give at all, and then why. The answer given merely stated when.

I mention these matters because some of my critics string together a few clichés, and think that they have effectively answered some comment of mine. You have probably noticed that your own arguments are described by yourself, either as unanswerable, forceful or energetic. Whereas those same arguments when used by other people are considered aggressive and violent. Our arguments are challenging, the other persons are provocative. Members of clubs who disagree with their committee consider it a clique . . . and so on.

Now, in the course of my comments I touch on a wide variety of subjects, and necessarily so because radio itself deals with so many subjects. I have noticed, however, that most of my critics are those who are red-hot enthusiasts for a particular thesis, and they are really propagandists. You have all heard the definition of propaganda. Firstly, it must deal with a few simple points, driven home by endless repetition so that people accept them without question; secondly, the appeal must be made to the mass, and not to individuals; thirdly, rational argument must never be used; fourthly, the other side must be depicted as utterly wicked, and fifthly, all criticism must be suppressed.

This is, of course, the doctrine of bigotry. I am entitled to my views, and you to yours. Correspondence sent to me in a reasoned vein finds its outlet in these columns. I find, however, that spiritualists, crooners, jazz fiends, and others have one-way brains which do not admit that there can be another point of view. I would recommend them to read Mr. Jepson's book.

A Quaint Idea

I WAS reading a paper which is intended to appeal to children the other day, and it made the suggestion that the Government should provide bicycles free of charge to the unemployed. The writer of the article stated that bicycles were cheap, and that the Labour Ministry could buy 100,000 of them for £350,000. This idea should be carried a step farther. I suggest that the unemployed should be provided with free wireless sets to relieve the tedium of their unemployment, that they should have free tickets for all the cinemas, theatres and sports meetings, that their newspapers and periodicals should be provided free of charge, and that their food and clothing should be similarly supplied.

If my valuable suggestion is adopted the unemployment problem will be automatically solved, for the very need for finding employment would be taken away from the unemployed, and they would promptly sign off the dole.

The A.A. Licence

E. D., of Aldershot, contributes the following letter to the discussion on this subject:

"I was much interested in the letter from a correspondent in the issue of PRACTICAL AND AMATEUR WIRELESS for December 3rd, regarding the position of the newcomer to the TX. side.

"My own application for an A.A. licence is still with the P.O. Engineer, so I have yet to suffer one of the disappointments of your correspondent. It has, however, been returned once for fuller details of the experiments to be undertaken, and written permission from my commanding officer for the installation of transmitting apparatus. I can understand the first requirement, but what the C.O.'s permission has to do with the Post Office beats me—certainly no mention is made of it in the application form. [Official Secrets Act?—Ed.]

"As regards the alleged stand-offishness of the fully-fledged, I have a suspicion that your correspondent is right. By dint of personality(?) I managed to force my way into the shack of a local 'G' man on two occasions, but it was quite clear that a third visit would hardly be advisable.

"Thus, I find myself in much the same position as the other enthusiast—having to plod along in the dark. This is very damping to one's enthusiasm as, apart from other considerations, one is liable to spend good cash on components which might later prove to be the wrong type for use in trans-

COIL FORMERS

A Practical Article for Amateurs who Like Making their Own Coils, with Special Reference to Celluloid as a Suitable Material

THE absence of proper coil formers often retards constructional work or necessitates the constructor making do with temporary substitutes or devising formers of doubtful efficiency.

In such cases it is not sufficiently appreciated that a substance which, while coming within the definition of an insulator, is not necessarily ideal for use as a former, especially when short waves are under consideration.

On the higher frequencies, and, for that matter, on the broadcast bands as well, serious losses can be set up in a coil if a former having low insulation resistance is used. Many ingenious substitutes have been put forward from time to time by amateurs for home coil construction, but with the introduction of the small-diameter coil, a material which was quite widely used several years ago, namely celluloid, appears to have been overlooked.

This substance is not only cheap, but it also possesses the advantages of being easy and clean to work with, light and yet strong and, finally, it is a good insulator even on the higher frequencies. It has only one possible drawback, and that is that its surface is susceptible to damp atmospheres, but as this applies to many other materials it is not an item worthy of serious consideration as it can be quite easily eliminated.

Formers of Celluloid

A sheet of celluloid 54 by 24in. can be purchased from most motor-car accessories dealers for about 3s. 6d., and it will be found that this will provide sufficient for quite a number of coils. The only other requirements are a tube of Durofix or a small bottle of amyl acetate, a pair of scissors and a sharp bradawl.

The exact design of the former will depend on the circuit and the space available, and whether wave changing is carried out by switching arrangements or plug-in coils. With the first of these the

board tube, allowing, say, $\frac{1}{8}$ of an inch to form an overlap for joining purposes. The celluloid is held in position, after applying the adhesive, by rubber bands or cord. It

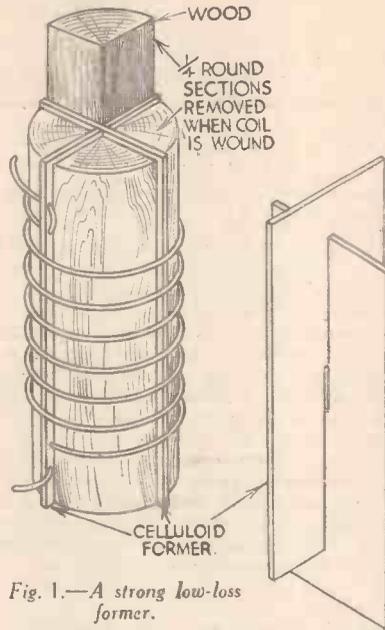


Fig. 1.—A strong low-loss former.

is advisable to carry out the winding of the coil while the tube is still in position as this allows easier handling of the celluloid

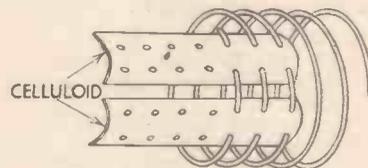


Fig. 3.—Suitable for larger coils.

former. Once the winding has been completed and the ends made fast through small holes made with the bradawl, they should be covered with a very thin film of adhesive, or amyl acetate, which will cement the turns firmly in position and protect the wire against any possibility of leakage through dampness. A completed coil of this type can be mounted in various ways, either horizontally or vertically.

Plug-in Coils

For coils of the plug-in type, where greater rigidity and strength is required, it is advisable to keep the overall diameter down to 1½in. and construct them on the lines shown in Figs. 1 and 2. For mounting, good use can be made of bases taken from scrapped valves, as indicated in Fig. 1, where it will also be seen that the celluloid is cut to provide projecting tongues at the top of the former which, when cemented together, simplifies coil-changing by providing the means of getting hold of the coil without damage.

A much stronger type is shown in Fig. 2, which is formed from two strips of celluloid cut as shown so that a half-lap joint is

made. If so desired, saw edges can be obtained by cutting the strips slightly wider and drilling a series of small holes along the vertical lines representing the correct size. The scissors are then taken through the holes, thus leaving neat and even serrations on the strips.

When winding a former of this type, short lengths of quarter-round beading should be located as indicated; these will strengthen the former during this operation and they can be removed afterwards if a little care is exercised.

For coils of the air-spaced type, when a slightly heavier gauge wire is used, quite rigid construction can be obtained by using two celluloid spacing strips of the type shown in Fig. 3. These should be approximately $\frac{1}{8}$ of an inch in width and their length cut to suit the number of turns required. As regards diameter of coil, it will be found that with this method of construction it is not too easy to get the strips in position on coils under, say, 2in. in diameter. After the strips have been cut and the holes made, the wire must be wound on a temporary former of the correct diameter to make it take up the necessary spiral formation. Once this has been done the strips can be threaded on quite easily if the coil is rotated so that the leading end engages the holes in their sequence. Two strips are usually ample to maintain rigidity, assuming that the coils are not to be changed too frequently.

Cardboard Formers

If celluloid is not available, and one is tempted to use ordinary cardboard tubing,

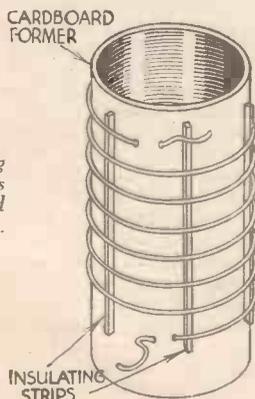


Fig. 4.—Showing how the windings can be supported to eliminate H.F. losses.

coil is invariably fixed in position, therefore it need not be as strong as those of the plug-in type.

Simple Solenoid Formers

For these, one only requires a simple cylindrical tube, and this can be formed by wrapping a piece of celluloid, cut to the correct size, round a suitable tin or card-

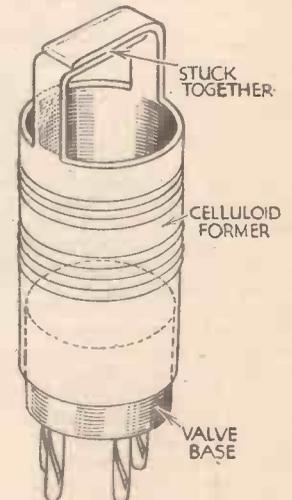


Fig. 2.—A useful plug-in type.

particular care should be taken to see that the material is quite dry.

It is always advisable to bake it in a mild heat, and when it is perfectly free from any trace of moisture give it a thorough coating of shellac varnish. For this, the pure shellac, obtainable from most oil stores, should be used, a solution being made by dissolving it in methylated spirits.

A much higher degree of efficiency can be obtained by supporting the windings as shown in Fig. 4.

A HOME-MADE P.A. INSTALLATION

An Interesting Account of Some of the Problems which were Met and How They Were Overcome

DURING the installation of a small public address amplifier for the use of some local amateur theatricals, the writer compiled some interesting notes on the preliminary experiments and final tests carried out. These are summarised here in such a way as to provide practical assistance for those contemplating an installation along similar lines, either at home or for public engagements.

A three-stage A.C. mains-operated amplifier of home construction was used, the circuit being briefly as follows.

The input was fed to a triode MHL4, this valve being R.C. coupled to an ML4, which in turn was transformer fed to two PX4's in push-pull; it will be appreciated therefore that there resulted a fair power output which, when considering the methods of input and the fact that only one reproducer was used, could be expected to give quite a good response.

P.A. Speaker

The P.A. speaker, or reproducer, was kindly loaned for the occasion by a local engineer, and constituted one of the horn range of Tannoy reproducers.

This model had a permanent-magnet unit, and a speech-coil resistance of 15 ohms, and considering that the output transformer of the amplifier called for a 16 ohm impedance, the error was not appreciable and results came up to expectations.

All preliminary tests had to be carried out at the writer's home, so such conditions as damping through carpets and furniture, apart from the restricted area of operations, had to be taken into consideration when weighing up the various tonal responses during different positioning and "effects."

At first a crystal microphone, which, by the way, was of the hand type, was considered necessary, and here again the one used was on loan, so the question of choice could not arise. However, when this was tried, the amount of "top" and the lack of

bass, apart from the obviously small grid swing which resulted in a weak output, put this form of injection out of the question, and the conclusion arrived at was that this particular model had been intentionally damped for Tx work.

It was therefore decided to overlook conventional practice by trying out different types of moving-coil and moving-iron speakers as substitutes for a proper mike.

Strangely enough the merits of certain arrangements, giving due consideration to positioning, etc., outweighed the technical objections, and a really good "pick-up" and tonal response were ultimately obtained.

Amplifier

Referring now to Fig. 1, this shows in diagrammatical form the general layout of the amplifier, and the first attempts with a moving-iron and moving-coil speaker, connected in parallel, the moving-coil speaker transformer being used in the normal way.

It will be seen from this diagram, that a straightforward layout was adopted in the amplifier design, whilst both tone and volume controls were included. The output transformer is not apparent here, this having been mounted on the underside of a metallised

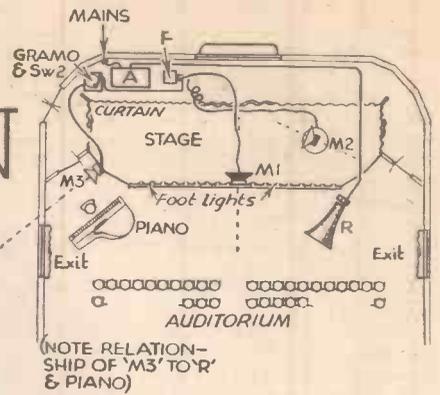


Fig. 3.—Showing the layout of stage and auditorium, and the relationship of the mikes to the reproducer.

panel as for the rest of the components, the whole assembly being neatly fitted into a wooden box, as shown.

Although a volume control was incorporated in the amplifier, it was necessary to construct a simple fader and mixer unit as three mikes and a gramophone pick-up were required for various "effects" on the stage.

Mixer Unit

In Fig. 2 will be seen the "hook-up" mixer unit and separate switching circuit finally adopted, the SW2 being fitted to the gramophone unit, whilst the potentiometer switch SW1 was to be used for isolating mikes M1 and M2.

The value of each potentiometer was 50,000Ω, this proving both a happy medium and most convenient so far as the "junk-box" was concerned.

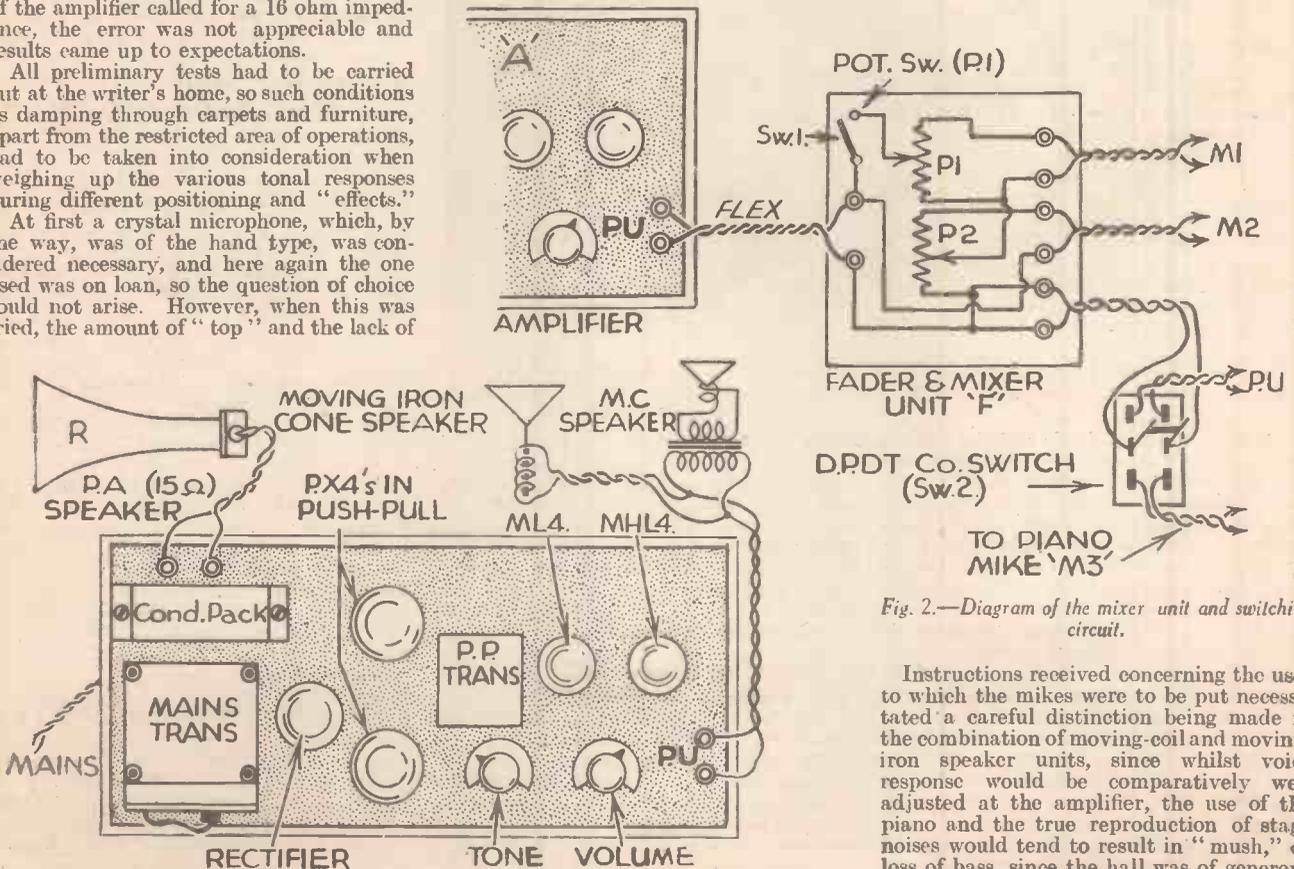


Fig. 1.—General layout of the amplifier.

Fig. 2.—Diagram of the mixer unit and switching circuit.

Instructions received concerning the uses to which the mikes were to be put necessitated a careful distinction being made in the combination of moving-coil and moving-iron speaker units, since whilst voice response would be comparatively well adjusted at the amplifier, the use of the piano and the true reproduction of stage noises would tend to result in "mush," or loss of bass, since the hall was of generous

(Continued on page 364)

Taking His Cue

MANY people will wonder whether Gerald Cock took his cue for the proposed television-telephone transmission from the happenings at the postal congress held recently in Vienna. He proposes to answer telephonic queries from viewers via the home viewing screen, so that anyone looking-in at the time will both see and hear the Director of Television give his reply to whatever question is put to him by those successful enough to be connected through. In the case of the congress, arrangements were made for many of the visitors to carry on visio-telephony conversations with their friends. The transmissions actually took place between the head post office and a neighbouring building, and the equipment employed resembled very closely that used by the Germans for their public service which links Berlin, Munich, Leipzig and Hamburg. The visual conversations were carried on seated, the degree of definition being one of 180 lines with sequential scanning using a picture repetition frequency of 25. Whether the Germans who now occupy that territory propose introducing a public service in the district is not yet known. In any case, while it is recognised that television has now developed on the Continent to a service

TELEVIEWS

the television industry of such a nature that its future would be assured:

Shortsighted

IT is always a matter for congratulation to find this country ahead of any other in the development of a scientific invention to a satisfactory service stage. This is the case with television, and the quality of the B.B.C. pictures, coupled with the nature of the interesting programmes, has been held up as a standard by other countries as something really concrete to aim at. In view of this the authorities responsible for its development ought to lose no opportunity in boosting this achievement whenever one arises. It has just been revealed that the B.B.C. were invited to stage a television, exhibit at the 1939 World's Fair in New York, but turned down the offer on the score of expense. One can sympathise with the B.B.C., for shortage of money has been apparent with the Corporation for some time, but in this case British prestige is at stake. The B.B.C. may be right in adopting the view that it would not be fair to use listeners'

necessity for any form of scanning. In the case of a service which has to provide pictures on widely separated receivers this has so far proved impossible and at the moment there seems little hope of solution, at least where a radio link is required. For advertising purposes, however, or where a picture has to be transmitted from a studio to, say, a large screen in a single theatre, certain proposals have been advanced in the hope of simplifying the problem. The most promising at the moment seems to be centred in the use of a transmitting screen made up from an enormous number of elemental photo-electric cells. These are connected to a receiving screen having a corresponding number of lamps so that each is brought into circuit in turn by a commutator and brush gear which sweeps across the commutator segments (one segment for each P.E. cell) and conveys the photo-electric signals corresponding to the light and shade in the picture in the proper sequence. Whether the idea will become commercially practicable is not yet known, but if the apparatus is not too expensive to make, then for certain limited applications there is a possibility that the scheme will be used.



The B.B.C. transmitting van outside St. Martin's Theatre in London recently, in preparation for the television broadcast of Mr. J. B. Priestley's comedy "When We Are Married."

stage, the absence of funds and the remote possibility of public support because money is scarce may hinder its progress for a time until more stable conditions return. It is possible, however, that a speedier development of international television may materialise as a result of the London conference which met to discuss international telephony circuits. An inter-European relay has been suggested between Britain, Germany, Sweden, France, Italy, Holland and Rumania, and the method to be adopted will be a combination of cable and radio links. An enormous amount of research has already been undertaken on the transmission of television signals over long distances, and if the proposals materialise it is certain that countries will be able to transmit and exchange television programmes for the nominal cost of hire of the cable and radio links. The materialising of such a scheme would give an impetus to

money for this purpose, but surely here is a concrete case for Government assistance. A British Pavilion is being built at the Fair with the express idea of showing to the world those things of which this country can feel justifiably proud. Television is one of them and it ought not to be omitted, and it is hoped that pressure will be brought to bear in the right quarters and so bring about a reconsideration of the whole matter.

Is Screening Necessary?

TO transmit, and ultimately reproduce on a receiving screen at some distant point, any object or scene has up to the present always necessitated the use of a scanning device so that the elements of the picture can be treated in sequence. With the ordinary camera or the human eye scanning is not necessary, and many inventors have endeavoured to devise television systems which would avoid the

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THE PROBLEM OF THE PRESENT

THE Problem of the Present may be a difficult one, but every year readers are helped to a decision in their choice by the inspiration afforded them in the attractive range of cigarette and cigar packings introduced by Messrs. W. D. & H. O. Wills for the Christmas season. Such gifts are certain to give pleasure, and there is something to appeal to every personal taste. All their well-known brands of cigarettes—"Gold Flake," "Capstan," "Embassy," "Three Castles," "Passing Clouds," "Woodbine" and "Star"—are put up in handsome and distinctive Christmas cartons at no extra charge, and there are prices ranging from 1/3 to 7/3.

The beautiful oak cabinets which are so superbly made, containing "Gold Flake" Special or "Capstan" Special cigarettes, proved so popular last Christmas that they are again being offered this year. They are available in three sizes containing 50 cigarettes for 4/2, 100 cigarettes for 7/-, and 150 cigarettes for 10/- The 100s oak cabinets can also be obtained containing "Three Castles" cigarettes at the price of 8/6.

Then in Cigars Messrs. Wills offer a very wide selection. In addition to the well-known brands, such as "Embassy," "Eclipse," "Legation," "Rajah," "Ivanhoe," and "Wills's Whiffs," there is a range of fancy packings at popular prices introduced specially for Christmas. It is easy to go wrong when buying cigars, but not with Wills's

A PAGE OF PRACTICAL HINTS

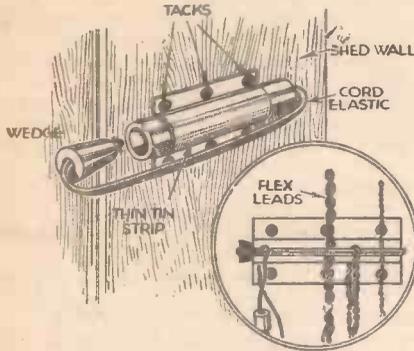
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Retaining Orderly Leads

WHEN tidying up my shed, in which I do all my radio work, I hit upon the idea of using some hair curlers (purchased from a member of the family) to keep



A novel method of keeping leads together.

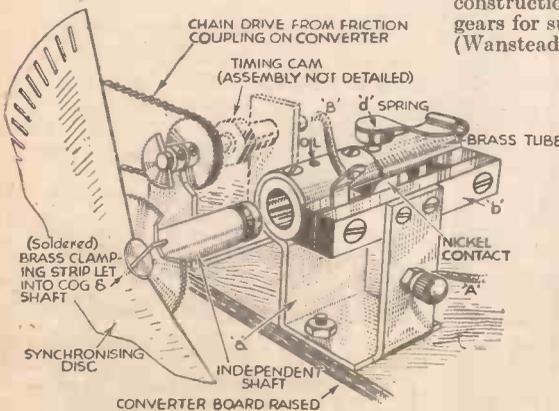
certain test leads in order, whilst ensuring a minimum of trouble when these should be required.

The accompanying sketch shows the method adopted, and all that was necessary for mounting was a strip of thin tin and a few tacks. The strip was obtained by cutting up a cocoa tin. Whenever I require a test lead it is only necessary to remove the wedge, and after extracting the particular lead or leads, replacing this wedge to keep the rest of the leads in position, and out of the way of other gear. —F. S. WRIGHT (Hendon).

An Independent Shaft and Trigger Switch

BY providing a slip clutch of the friction type to my small rotary converter and adjusting this so that overload cannot cause any damage, I have now been able to make this converter do more than its intended job.

From my appended sketch it will be seen that a simple independent bearing can be made up from some brass tubing and some odd pieces of heavy gauge



General arrangement of an independent shaft and trigger switch.

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.

aluminium "a"; 14 S.W.G. is, I think, the size in my case. With this arrangement different types of movements and ratios can be effected simply and quickly for experimental work, running from the chain-driven gear assembly as illustrated.

The fitment, shown disengaged, is a 50-cycle synchronous disc with which I have been experimenting in a photo-electric lighting unit. The trigger switch in the independent bearing is for a relay circuit which operates as follows.

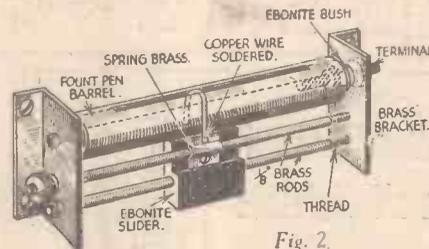


Fig. 2.

Two types of variable grid-leak using a mixture of glycerine and Indian ink.

Should the movement be left unattended and the tension of "d" spring fail to hold the shaft by the groove (this tension is rather light), then the resultant slipping out of mesh of the shaft will break the circuit for the relay (leads A and B), this restoring to normal, and operating an alarm. The contact is carefully positioned in the slot provided in the brass shaft tube, and effectively insulated from the fixing screw by ebonite bushing in the ebonite mounting strip "b." A well-known constructional toy will provide suitable gears for such an assembly. —F. R. GRATES (Wanstead).

A Variable Grid-leak

I HAVE been using this variable grid-leak for some time in my set. I have tried various types of commercial grid-leaks, but cannot get the same results as I can from my adjustable one, the success of which is due to the mixture, which is of glycerine and is a non-conductor. Indian ink is added a drop at a time until the right value is obtained. As shown in Fig. 1, the grid-leak is made up from a fountain-pen barrel, which is half filled with glycerine, and the Indian ink

gradually added. The solution will keep mixed after stirring with the adjusting rod. A more elaborate variable grid-leak, operating on the same principle, is shown in Fig. 2, which is self-explanatory. —L. G. CROAK (Camberley).

Safety Switching

IN order to ensure that H.T. and L.T. will be switched on and off in the correct sequence I have made up a small two-unit push-pull device, as shown in the accompanying sketch. Two blocks of wood are cut as shown, and two strips of brass or other metal are hinged at opposite ends. When both plungers are at rest H.T. cannot be switched on as strip B1 rests in slot S1. When the L.T. plunger is pulled out strip B1 is forced up hill H1, and thus moves B1 out of slot S1. When H.T. is pulled out strip B2 drops down hill 2 and falls into slot S2, thereby locking L.T. With H.T. pushed in the strip B2 is forced up hill 2, releasing slot 2 and operates the H.T. switch in the off position. With the L.T. plunger pushed in the strip B1 rides

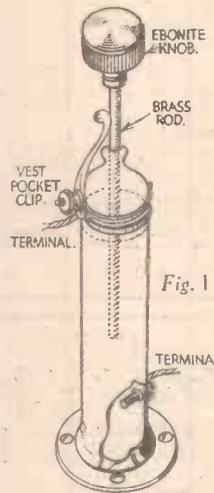
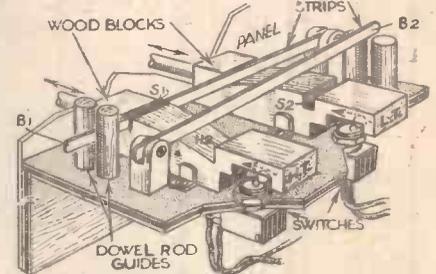


Fig. 1.

down hill H1, and thus locks H.T. in slot S1. —A. L. BANKS (Sanderstead).



A safety switching device for H.T. and L.T.

PRACTICAL MECHANICS

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IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
 Wednesday, December 14th.—Sandy Powell Show, light entertainment.
 Thursday, December 15th.—The Mediterranean, a talk: summary.
 Friday, December 16th.—Increased Facilities: a programme in celebration of the jubilee of the Pneumatic Tyre.
 Saturday, December 17th.—Under the Red Duster: Life in the Mercantile Marine, a dramatised sound-picture.

REGIONAL (342.1 m.)
 Wednesday, December 14th.—Variety from the Theatre Royal, Stockport.
 Thursday, December 15th.—Ups and Downs, a radio plaything written by W. Farquharson Small based upon Frank Stockton's short story, A Tale of Negative Gravity.
 Friday, December 16th.—A Variety programme from the Hippodrome, Southampton.
 Saturday, December 17th.—Good News programme.

MIDLAND (297.2 m.)
 Wednesday, December 14th.—Paul Temple and the Front Page Men, a serial thriller by Francis Durbridge: episode 7, Herr Von Zetton.
 Thursday, December 15th.—Variety from the New Theatre, Northampton.
 Friday, December 16th.—The Music of the Midland Regiments.
 Saturday, December 17th.—Orchestral programme.

NORTHERN (449.1 m.)
 Wednesday, December 14th.—Children's Concert from the Royal Technical College, Salford.
 Thursday, December 15th.—Darlington Night: programme of Variety by Darlington artists.
 Friday, December 16th.—One Day this Week, topical talk.
 Saturday, December 17th.—Spotlight on Sport, discussion on boxing.

WELSH (373.1 m.)
 Wednesday, December 14th.—Getting and Spending the Rates: last in this series for Discussion Groups.
 Thursday, December 15th.—Orpheus or

The Power of Music, a poem written by William Wordsworth, set to music by George Rathbone.
 Friday, December 16th.—The Radio Eisteddfod.
 Saturday, December 17th.—Seamen's Christmas Party, from the Swansea Seamen's Mission, New Cut, Swansea.

SCOTTISH (391.1 m.)
 Wednesday, December 14th.—Pantomime Rehearsal of Babes in the Wood, from the King's Theatre, Edinburgh.
 Thursday, December 15th.—Excerpt from Wee Willie Winkie, from the New Metropole Theatre, Glasgow.
 Friday, December 16th.—The Country Mouse Goes to Town; the story of the Buchan Mouse and the Kelvinside Mouse, an old fable in a modern setting.
 Saturday, December 17th.—Choral and Orchestral Union of Glasgow: Orchestral concerts.

NORTHERN IRELAND (307.1 m.)
 Wednesday, December 14th.—Sea Shanties from Donaghadee.
 Thursday, December 15th.—Barnum was Right! a radio comedy by Joseph Tomelty.
 Friday, December 16th.—The Belfast Philharmonic Society's Concert: Part 1 (Christmas Portion) of Handel's oratorio Messiah, from the Ulster Hall, Belfast.
 Saturday, December 17th.—The Wooden Leg, a radio play adapted from Lynn Doyle's story by N. C. Hunter.

ENTIRE HALLÉ "MESSIAH" TO BE BROADCAST

EACH year now the North broadcasts at least one performance of "The Messiah," and these programmes have come to be regarded as an indispensable part of the Christmas radio season—just as performances of and attendances at "The Messiah" are to thousands of people in the North "dates" without which the Christmas season would hardly be recognisable. This year's should be a star performance, for the whole of the rendering of Handel's famous oratorio at the Hallé concert in Manchester is to be broadcast on the Northern and main Regional wavelengths on December 22nd.

The 'present' forecast — 'Medium' & 'Mild' in all districts

... and a very cheery forecast for all concerned because the fragrance of Player's is as much a part of Christmas as crackers and pies. So give "Player's"—the Cigarettes you can be sure a smoker would choose himself... And you can please individual tastes by sending "Medium" or "Mild"; both are Cork-Tipped or Plain.

IN CHRISTMAS CARTONS



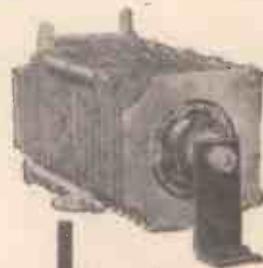
Player's

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 IN CARD BOXES . 25 for 1/3 50 for 2/5 100 for 4/8
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Impressions on the Wax

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

THE entertainment value of the records released for December is extremely high and there is something to suit everybody, however individual their tastes.

A novel recording has been made by Elisabeth Schumann who sings a duet with herself. The "Barcarolle" from the Tales of Hoffmann is admirable for the purpose. The process is to record the single voice with the accompaniment, and then re-record this performance with the artist simultaneously singing the "second" part. While singing for the recording of her second voice, the artiste wore headphones, through which she listened to the original record of her own voice—*H.M.V. DB 3641*.

The successful electrical re-creation of acoustic recordings with a full orchestra accompaniment is a very difficult business. Caruso's voice was best suited, owing to his perfect breath control. Even then only a few records from his enormous repertoire have survived this searching test, and his latest re-creation of two tuneful songs has the added attraction that they are sung in English. They are "Trusting Eyes" and "Your Eyes Have Told Me What I Did Not Know" on *H.M.V. DA 1656*.

Paul Robeson has given Spirituals a rest, and is now recording well-known songs. He sings "Trees" and "Songs My Mother Taught Me" on *H.M.V. B 8830* and "Loch Lomond" with "Drink To Me Only With Thine Eyes" on *H.M.V. B 8831*.

Peter Dawson sings two Christmasy songs—"The Holy City" and "The Lost Chord"—on *H.M.V. C 3038*. He is well backed up by a fine organ accompaniment by Herbert Dawson.

With Doris Arnold's arrangements the B.B.C. Kentucky Minstrels have set a new standard of male voice part singing. "Ora Pro Nobis" had its first performance at a recent Kentucky Minstrels' broadcast, and this record will be a big favourite over the Christmas season. The soloist is John Duncan and the conductor Leslie Woodgate—*H.M.V. BD 626*.

Orchestral Records

TOSCANINI conducts the B.B.C. Symphony Orchestra in Weber's "Invitation to the Waltz" on *H.M.V. BD 3542*.

The Viennese Waltz Orchestra plays a Medley of Waltzes by Archibald Joyce and Charles Ancliffe on *H.M.V. C 3054*. Jack Hylton and his Orchestra desert ballroom dances for the Country, Pastoral and Merry-makers' dances from the "Nell Gwynn" suite and the Morris dance from Edward German's immortal "Henry VIII Dances" on *H.M.V. BD 604* and *BD 606* (two records). They are also very successful in "Colonel Bogey" march and "The Whistler and His Dog" on *H.M.V. BD 620*. The Orchestra of Barnabas Von Gecky is reputed to be the most popular in Central Europe. They specialise in music which one usually hears when out dining, and they have recorded "Song of Songs" and

"Vieni, Vieni" on *H.M.V. B 8820*; also two waltzes, "The Count of Luxembourg" and "Unrequited Love" on *H.M.V. B 8821*.

Louis Levy and his Orchestra have an attractive selection from the new Ginger Rogers film "Carefree" on *H.M.V. BD 613*, and there are new and very charming arrangements of two favourites, "In the Shadows" and "Jolly Brothers" waltz by the New Mayfair Novelty Orchestra on *H.M.V. BD 601*. Geraldo and orchestra put up a rather amazing performance by playing 64 dance hits on one record in Geraldo's "Lightning Hit Switch." You will have to be very quick to spot each tune, but a leaflet is included with each record, giving them all in the order in which they are played.—*H.M.V. C 3057*.

Popular Selections and Humour

TWO sets of three records each which catch the eye are both novelties and make ideal Christmas presents, since, with the portfolio to contain the records, the price is only 6s. 9d.

The first is "Max Miller at the Holborn Empire." This is a complete turn actually recorded at the London music hall, and the records give some 20 minutes of riotous fun with the "Cheeky Chappie" at the top of his form.—*H.M.V. BD 615-6-7*.

Uncle Mac (Derek McCulloch of the B.B.C.) is responsible for the other which is a new idea in records for children. In "Uncle Mac's Nursery Rhymes," the old favourites are introduced by him in his inimitable Children's Hour manner. The soloists are Stuart Robinson and Dorothy Helinrich with a perfectly natural chorus of children.—*H.M.V. BD 622/3/4*.

Elsie Carlisle sings two very good songs in the style that has made her one of the most popular cabaret and radio stars. They are "Change Partners" from the Rogers-Astaire film "Carefree" and a comedy number, "Joseph! Joseph!" in which a reluctant lover is plaintively urged to name the day—*H.M.V. BD 621*.

Dorothy Clarke, Webster Booth, and Foster Richardson have made a second selection of "Songs that have Sold a Million," in which they are supported by orchestra and organ on *H.M.V. C 3050*. Tommy Handley and His Pals have made a real rouser for Christmas parties in a second edition of "Let's all join in the Chorus," starting off with "Hear we are Again" and finishing with "The Old Bull and Bush." *H.M.V. C 3034*.

There are some good band records. Realistic effects make "In a Clock Store" very enjoyable. This, with that one-time favourite "A Frangesa" are played by the Coldstream Guards Band on *H.M.V. B 8806*. Some extremely fine brass band tone and clever playing can be heard in two records by the famous Black Dyke Mills Band. They are "Abide With Me" and "Deep Harmony"—*H.M.V. BD 598* and Turkish Patrol coupled with "Parade of the Tin Soldiers" on *H.M.V. BD 599*.

PETO-SCOTT

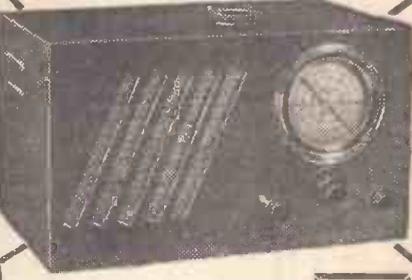
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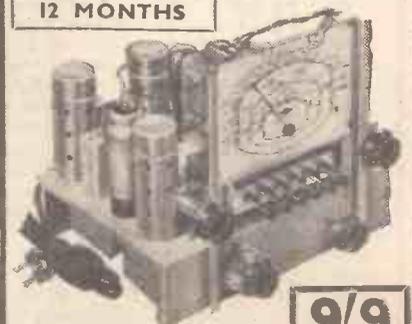
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"The Best Set I Ever Built"

The following are the Six Prize-winning Entries in Thermion's Recent Competition. Will the Writers please Select a Wireless Book from our List and Send a Postcard Naming Their Selection?

A Crystal Set

THE best set I ever built would surely be the one which produced results beyond my expectations, and which gave me the greatest pleasure.

This takes me right back to the beginning when, as a schoolboy, I made my first attempt. It was a crystal set, and great, indeed, was the excitement when I went to town to purchase the parts. How carefully I wound the coils and laid out the panel, and to what trouble I went to make a really fine tuning device! The secret of success, however, probably lay in the aerial. I obtained a larch pole which when peeled, painted, and erected gave me a height of some 45ft., and brought some very suspicious glances from the local landowner who happened to be felling larches at that time!

The results were truly remarkable. It worked four pairs of headphones on 2LO, whereas now on my superhet the London station is definitely not one of the best. We used to sit four in the room with the set on the window-seat and a four-way terminal block on the floor in front of us, at which we all stared for hours on end. Living in a village, evenings listening to my crystal set were in great demand.

These results may have been due to the fact that the aerial was high on the Cotswolds; I certainly seem to have had nothing like them since.—R. C. M. (Brockworth, Glos).

Short-Wave Sets

THE set which gave me the greatest thrill, and, after all, that is the true description of one's best set, was my first short-wave set. What a contraction it was! A two-valve set on a baseboard. The three coils were simply hank wound and mounted on a home-made swinging coil holder, with wooden handles about a foot long. The tuning condenser also had an extension handle of the same length.

Wasn't I excited when one evening in—was it 1925? I can't remember, but it was a long time ago—I heard about 11 o'clock the magic words "KDKA at Schenectady, New York. . . ." There was I, with one hand on the reaction coil handle and the other on the tuning control, not daring to breathe, let alone move, lest the signal should be lost!

This same set gave me an even greater thrill when I discovered how to turn it into a converter to stick in front of my three-valve broadcast set. I finished the alteration one Christmas Eve, and wasn't there some excitement in the house when about 2 o'clock in the morning stentorian (sic!) tones could be heard from the speaker—"KDKA at Schenectady. . . ."

I was still troubled by body capacity, but I became artful. I used to tune past the station and after a lot of adjusting I found the spot where I could walk away and the alteration in capacity would tune in KDKA!

I didn't go to bed that Christmas Eve!—W. W. L. (S.W.11).

Another Short-Waver

THANKS to the Technical Staff of PRACTICAL AND AMATEUR WIRELESS, my first attempt at building a set proved successful. Constructional features of "The Simplest Short-waver" were given in the issue dated December 12th, 1936, and to express my reason for giving it the title of this letter, I could not do better than quote a sentence from the article in the above issue: "This particular receiver appears to have given *phenomenal results*, and we have repeatedly received requests for details of construction." The words in italics aptly describe the performance of the set, and no other words of praise should be needed to justify the claims of this receiver.

Other advantages are:—

1. To the beginner, simple to build.
2. Valuable experience gained by making the coil and H.F. choke.
3. Further stages can be added if required, circuit modifications can be obtained from PRACTICAL AND AMATEUR WIRELESS.

To the constructor results speak louder than words, but regarding the subject of "logs," I refer readers to the numerous letters of praise from constructors of this set which have appeared in the "Letters From Readers" section of your paper.

What I wish to make clear is that for the small sum of threepence, cost of December 12th issue, I built a set that is worth its weight in gold.—A. V. (Ossett).

Superhets

THE best set I ever built was the Premier Super. I had been waiting for a long time for an easy-to-build superhet; all the "sets" I had made were of the S.G.D. and pentode type, and I was rather shy of the superhet. Anyway, I had made up my mind to have a shot at it, and do not regret the time I have spent on it, for I did not rush it. I bought a large radiogram cabinet, a Garrard double spring motor, a B.T.H. Minor pick-up and a Stentorian speaker. I added Class B and a short-wave converter, all made from PRACTICAL WIRELESS circuits, and I had my "ideal," which I had so longed for. The advantage of building your own set is that you know what goes in, and not a lot of fancy gadgets, that are in manufactured sets—gadgets that you cannot replace when anything goes wrong.

Considering the Premier Super is a 1933 receiver I was getting 1938 results up to a few weeks ago. I parted with it to a chum of mine who was always asking me to "save it for him." I am now on the mains, and I purchased an all-wave superhet (manufactured), and when my mother heard it she said it was not a patch on the home-made one (the Premier Super).—F. W. L. (Manchester.)

NEARLY seven years ago I decided to explore the possibility of a superhet, after using a straight three-valver for a number of years.

Living in a congested area, I had experienced much annoyance from a nearby "knob twister," and after perusing a *Wireless Magazine* blueprint I set to work on the kitchen table constructing the famous Super 60. Working carefully, and doubly checking each connection, the great day arrived for exploration of the waves.

To my astonishment, the set was alive at the first venture, and never shall I forget the chimies from Paris booming out. That has been my greatest thrill since I became a hook-up fan.

Although spaghetti resistances caused trouble in the early stages, this set is still giving magnificent service, and I have never heard clearer reproduction. The speaker is a "Baker" and the set is a battery model. A frame aerial displaces an outside one! The set has been, and still is, my aged mother's companion, and she tunes in like an expert.

Can you wonder why I am proud of a faithful friend?—B. O. S. (Bristol 5.)

A Hybrid

FIRSTLY, the title is incorrect, and it depends on "P. and A" whether it ever will be finished or not! Commenced 1933 as S.G. Det. and "Class B," then "Ferrocart" coils for band-pass, then extra intermediate L.F. stage, then triodes in push-pull minus inter-L.F. stage, then double pentode Q.P.P., then a return to extra inter-L.F. stage. So much for that. Then S.W. adapter (Ferranti heptode). Then change over to Milnes Unit H.T. Now I can run over hundreds of stations if necessary, consumption over all 10mA at 150v., working two L.F. Roping Americans at 6 mA 100v. through six valves—due in great portion to "P. and A." hints and close study of "The Experimenters" ideas. To plagiarise—"1933-38 and still going strong." Now I want to add automatic bias—and then what? "P. and A." holds the key. Anyway, I consider it my best set because it *isn't finished*. Good tone, low running costs, excellent selectivity, "getatability," and the world at fingertips—so far, so good. Just that tendency to "spill over" on the short waves. Thermion, *that's* the heel of Achilles!—W. H. S. (Nr. Kingsbridge, Devon.)

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By F. J. CAMM

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Strand, London, W.C.2.

Notes from the Test Bench

S.W. Components

WHEN making short-wave apparatus many constructors employ sheet aluminium or copper and mount various parts on stand-off insulators made from all kinds of material. We have lately seen a receiver in which the chassis and panel had been dipped in strong caustic soda and the surface etched away, whilst components were mounted on moulded bakelite (?) shaving-stick holders and similar devices. It should be remembered that on the ultra-high frequencies the H.F. currents travel on the surface and therefore it is highly desirable that all such surfaces should be as smooth as possible. Not only does this shorten the path, but it prevents the settling of dust and dirt which can increase H.F. resistance. Therefore, only highly polished surfaces should be employed for S.W. apparatus.

L.F. Transformer Performance

MANY constructors are still using low-price old pattern L.F. transformers, and it is not often realised that the output from these can be considerably modified by various means. One of the simplest is to connect a fixed resistance across either primary or secondary, the results being modified according to its position and its value. Fixed condensers may also be placed across the primary and will have an effect, although not so noticeable.

Push-button Four

IN the battery version of this receiver a series of Cossor valves was specified. For the I.F. stage a 210 VPT valve was recommended, but this valve is not now obtainable with a top grid cap, and the design calls for a valve of the latter type. The lead from the I.F. transformer may be taken down through the baseboard to the grid terminal on the valveholder, and the lead to the valveholder may be taken through the chassis to the top cap, or alternatively a top-grid valve may be substituted. In the latter case we recommend the use of the Tungram SP2D valve, and this will enable the receiver to be used without alteration to the wiring. If the wiring is modified, both leads should be screened and the screening earthed.

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By F. J. CAMM

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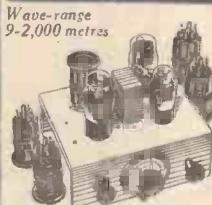


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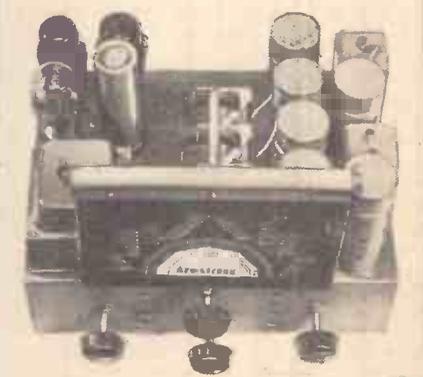
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Practical Television

December 17th, 1938. Vol. 3. No. 130.

TELEVISION TRANSMITTING AERIAL DESIGN

Details of the Aerial System which is Used by the B.B.C. at the Alexandra Palace

IN a paper read at the Institution of Electrical Engineers, on December 7th, some very interesting data relative to the design and equipment of the television aerials was given by Mr. E. C. Cork, B.Sc.(Eng.), and J. L. Pawset, Ph.D. The matching of the feeder lines is, apparently, a very difficult task, and during the course of experiments it was found that the presence of insulators in the line will considerably affect its impedance. The same remarks are, of course, applicable to the lines used in television receivers, and readers who have television receivers can try for themselves the effect of bending the feeder, modifying

frequencies, and at the transmitter a $\frac{1}{4}$ -wavelength transformer is used to transform the characteristic impedance to 50Ω , which is more suitable for loading the transmitter.

The Feeder

The main vision feeder runs from the vision aerial platform vertically down to the base of the steel mast, to which it is bonded throughout its length. It passes to the outside of the supporting tower, vertically down to the colonnade, and then about 100ft. horizontally to a change-over box in the wall of the sound transmitter room. From this box two equal branches lead to the two vision transmitters originally installed in Alexandra Palace. The sound feeder runs beside the vision feeder. Both feeders are laid with as few bends as possible, and those which do occur are right-angle bends in the form of angle boxes.

The feeders consist of concentric copper pipes of 5in. and 1 $\frac{1}{2}$ in. diameter, respectively. The characteristic impedance of such a feeder if air-spaced would be 78Ω and the attenuation 1 neper in 4.8 miles. The inner conductor is located by means of steatite low-capacitance insulators in the form of rods passing through the inner and having sleeves slipped over the ends of the rods of such a length as to centralise the inner (see Fig. 3). The rods are $\frac{3}{16}$ in. diameter and the sleeves 1 $\frac{1}{2}$ in. long. The insulators were spaced at equal intervals of $\frac{1}{4}$ wavelength at 45 Mc./sec., alternately at right angles, and ferrules were sweated into the holes in the inner to act as guides for the rods and to increase the bearing surfaces. The capacitance introduced by one insulator was $0.4\mu\mu\text{F}$, and the reduction of characteristic impedance given by our equation was 0.35Ω . The loss was extremely small and was not measured.

A source of trouble with feeders of this type is the condensation of water on the insulators, which can cause losses and introduce impedance irregularities in the feeder. This was encountered in one of the

feeders laid at Hayes, but was absent in subsequently laid feeders. Provision was made at Alexandra Palace for drying the feeder, should it prove necessary, by passing a large 50-cycle current through it.

The type of angle box used is shown in Fig. 3. It consists of an approximately cubic brass box containing a large conical insulator and a variable condenser in the form of a disc on the end of a threaded spindle. The same figure shows an inner expansion joint located at the box.

The feeder was laid from the transmitter end, and at the conclusion of suitable sections, usually at an angle box, the feeder was terminated and the variation of input resistance with frequency measured. Adjustments were made, as in the case of the Hayes vision feeder, to reduce the variation. The final curve of resistance against

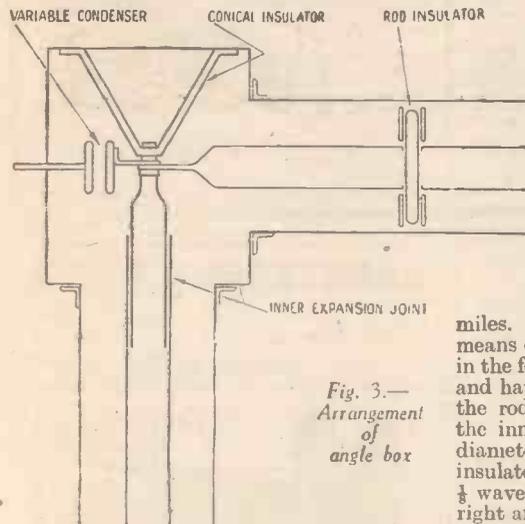
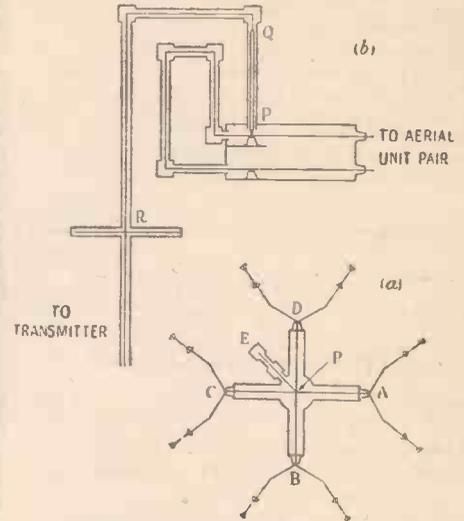


Fig. 3.—Arrangement of angle box

its length and otherwise departing from the maker's specification. The presence of standing waves on the feeder gives rise to various forms of distortion and freak effects in the resultant picture. The aerial now used at the Alexandra Palace consists of two rings of full-wave dipoles with the mast in the centre as illustrated at Fig. 1 (which is diagrammatic). This is a plan view, and at Fig. 2 is a false section along the line APE. It will be seen that the main feeder is brought to a central point P from which radiate lines to the various aerial units.

The change from the unbalanced feeder to the balanced aerial system is accomplished by means of a half-wave phase-reversing loop. From the point P (Fig. 1), the point of connection of the feeder to the aerial, a transforming section of approximately $\frac{1}{4}$ wavelength is used to transform the complex aerial impedance to the characteristic impedance of the feeder at the carrier frequency. Beyond this point the main feeder with normal inner conductor runs 450 ft. to the transmitter. A correcting circuit is inserted in parallel with the feeder at approximately 60 ft. from P to reduce the mismatch at the side-band



Figs. 1 and 2.—Arrangement of aerial and feeder connections.

frequency for the 300ft. up to the point of insertion of the tuned circuit is shown in Fig. 4. It will be seen that the variation between 43 and 47 mc/s. was not greater than ± 0.5 ohms.

At the transmitter end the arrangement transforming the characteristic impedance to 50 ohms consisted of a condenser formed by a short length of open-circuited feeder, branching from the main feeder about $\frac{1}{8}$ wavelength from the transmitter.

NOW READY!

WORKSHOP CALCULATIONS, TABLES AND FORMULÆ

By F. J. CAMM

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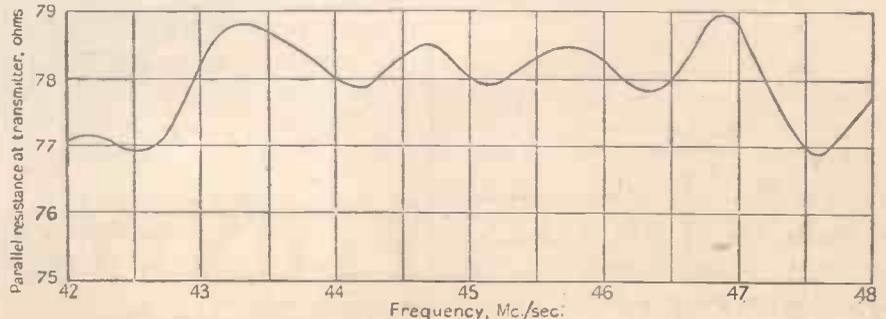


Fig. 4.—Impedance/frequency characteristic of the Alexandra Palace vision feeder, terminated with Z_0 4ft. below R.

THE "AIR-HAWK" 9

Coil Winding Details, and Practical Service Data

THIS receiver is intended to cover the band from 9 to 160 metres, and as three coils are needed for each separate range 15 coils will be required in all. Standard 4- and 6-pin Eddystone coil formers are used, and if desired the ready-made Eddystone coils may be purchased and modified where necessary. The standard 4-pin coil may be used unaltered for the aerial coil, but for the remaining two coils cathode taps have to be introduced. As the second coil is of the 6-pin type the original coil (if purchased ones are obtained) will have to be modified by removing the reaction winding. Similarly, the remaining coil will be modified by removing the primary. Fig. 2 shows the coil connections for each coil, L1 being the aerial coil, L2 the transformer coupling the H.F. valve to the frequency-changer, and L3 being the separate oscillator coil.

The coils for the shorter wavelengths are wound with spaced windings, for which purpose the threaded Eddystone coil formers should be employed. The spacing provided is 14 turns to the inch. The primary. You may also care to experiment with interwound primaries for the other coils, and the results obtained experimentally in this connection are quite interesting. The position of the cathode

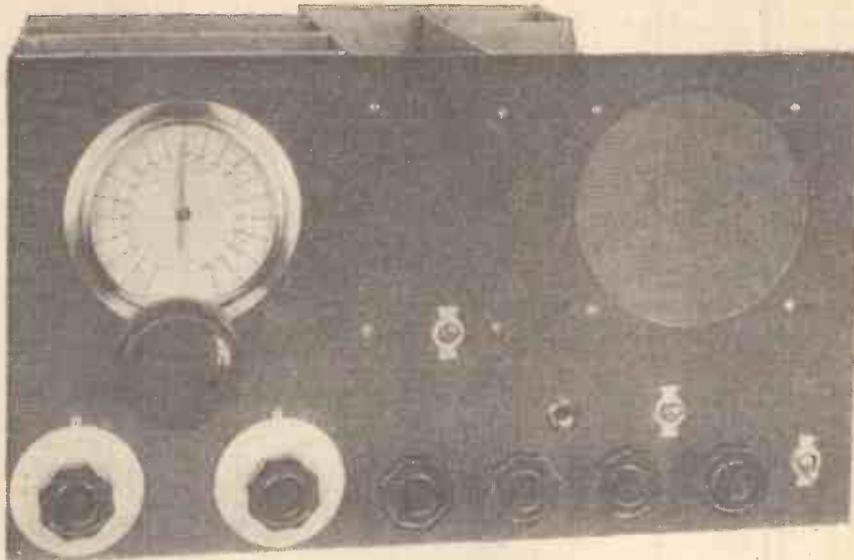


Fig. 1.—Here is the completed receiver showing the panel layout.

COIL L1				
Range	Primary	Grid	Cathode Tap	Wire Gauge
9-14	3	2 $\frac{1}{2}$	—	20 Enam.
12-26	2	3 $\frac{1}{2}$	—	20 Enam.
22-47	4 $\frac{1}{2}$	8 $\frac{1}{2}$	—	26 Enam.
41-94	9 $\frac{1}{2}$	23 $\frac{1}{2}$	—	28 Enam.
76-165	15	35	—	30 Enam.

COIL L2				
Range	Primary	Grid	Cathode Tap	Wire Gauge
9-14	2	2 $\frac{1}{2}$	$\frac{1}{2}$	20 Enam.
12-26	2 $\frac{1}{2}$	3 $\frac{1}{2}$	$\frac{1}{2}$	20 Enam.
22-47	4 $\frac{1}{2}$	8 $\frac{1}{2}$	$\frac{1}{2}$	26 Enam.
41-94	9 $\frac{1}{2}$	23 $\frac{1}{2}$	1 $\frac{1}{2}$	28 Enam.
76-165	10	35	1 $\frac{1}{2}$	30 Enam.

COIL L3				
Range	Primary	Grid	Cathode Tap	Wire Gauge
9-14	—	2 $\frac{1}{2}$	1	20 Enam.
12-26	—	3 $\frac{1}{2}$	1 $\frac{1}{2}$	20 Enam.
22-47	—	8 $\frac{1}{2}$	2 $\frac{1}{2}$	26 Enam.
41-94	—	23 $\frac{1}{2}$	9	28 Enam.
76-165	—	35	10	30 Enam.

largest two coils (41 to 165 metres) are wound with turns touching. If desired, the primary windings may be interwound on these two coils and there does not appear to be much difference in performance with this type of winding or with the separate

tap is also important on both the coils which are tapped, and experiment here is well worth while so that maximum results may be obtained with the particular valves and voltages in use.

Working Voltages

To assist in setting up the receiver satisfactorily the following table gives the various voltages obtained in each stage and in the H.T. section, and this will enable the receiver to be checked. The readings given were obtained in the experimental model with a standard Avometer, set to the 1,200-volt range. The total current reading was obtained with the meter set to the 120 mA range. It should be remembered, however, that valves vary slightly in their characteristics, and the slight variation in resistance values may modify some of the readings slightly. Provided, however, that your readings are somewhere near those given, you will know that the receiver is properly set up.

Valve	Anode	Screen
V1	246	120
V2	246	Varies with setting of [control]
V3	230	100
V4	246	120
V5	80	120
V6	150	90
V7	180	—
V8	250	250

H.T. Positive line : 266 volts.

Voltage across rectifier : 410 volts.

Total current, measured in H.T.—line : 80 mA. With B.F.O. switched off, total current is 78 mA.

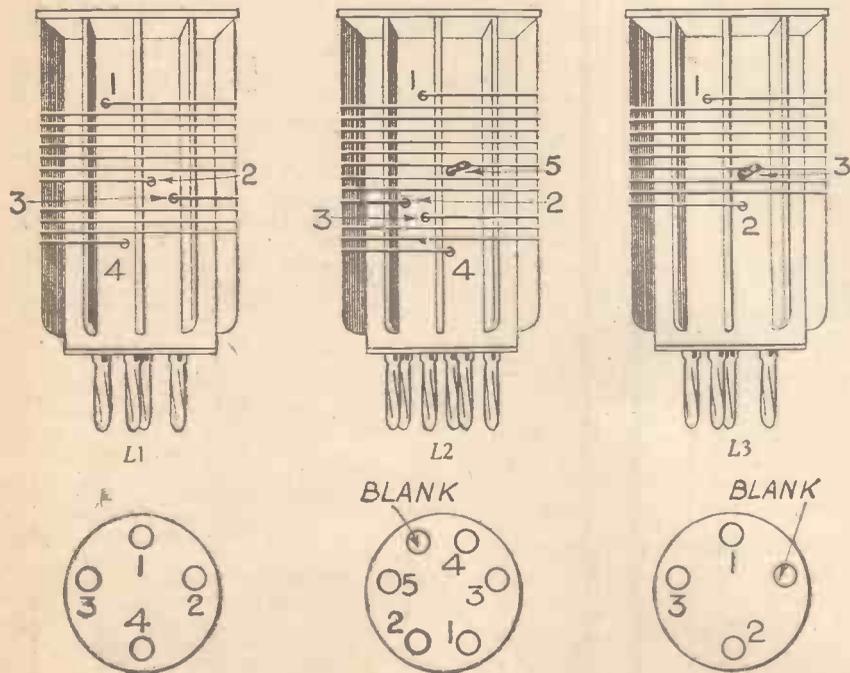


Fig. 2.—The above illustrations show the three coils needed for each waveband, with the connections to the pins. The lower illustrations show the pins, viewed from below the coils—that is, the under-chassis view of the coilholders. For the three smallest coils threaded formers should be used, and for the remainder plain formers are required. Note that all windings are in the same direction.

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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.

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Meetings: Tuesdays at 8 p.m.

Hon. Pub. Sec.: Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

IN St. Peter's Hall, Ledbury Road, S. Croydon, on Tuesday, November 29th, the Croydon Radio Society welcomed the return of a former chairman, Mr. W. J. Bird. He lectured on "Sound in the Cinema," with Mr. P. G. Clarke in the chair. Mr. Bird began by explaining the layout of apparatus in a cinema, and perhaps the most important and intricate part was the sound head. Here a beam of light and a photo cell enabled the sound to be converted from its photographic state on the film to that of electrical impulses. He then described how and what type of loudspeaker effected sound distribution in the hall. Indeed, to make his points clear, Mr. Bird had with him a complete sound head. Thus he was enabled to show exactly how the film was threaded through, and the general mechanism. Particularly interesting was the method of driving through a flywheel damped in oil, to "iron out" all traces of vibration. Finally, specimen lengths of film were examined by members, and features of the sound tracks explained.

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Meetings: Friday evenings.

Hon. Sec.: C. W. Edmunds, 15, Cambridge Road, North Harrow, Middx.

ON Friday, December 2nd, Mr. Roys (G3QR), delivered a lecture on "Crystal Controlled Oscillators" in which he gave some extremely interesting particulars of various frequency stabilizing devices. Details were also given of the so-called "Rubber Crystal Control" which, in the opinion of the lecturer, would soon find popularity among the amateur transmitters.

On the previous Friday a party of members visited the main London Telegraph Office of Messrs. Cable and Wireless, Ltd. Further particulars of the society may be obtained from the hon. secretary, at the above address. Alternatively, new members may call at headquarters any Friday evening except Friday, December 16th, when members propose to visit an

exhibition at the Borough Polytechnic, on Friday, December 23rd, when there is to be no meeting.

BRADFORD SHORT-WAVE CLUB

Headquarters: Bradford Moor Council School, Leeds Road, Thornbury, Bradford.

Hon. Sec.: G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

THE winter session is now in full swing, and the climax was reached on Friday last, when the annual social and pie supper was held, a very enjoyable evening being spent.

On Friday, December 16th, Mr. A. C. Mallinson, of the Truechorde Radio Co., Brighouse, will give a talk on "Mains Transformers," covering fully the construction and re-winding process.

The club's transmitter was active on Sunday, November 27th, and Friday, December 2nd. Will anyone who heard these transmissions on the 160-metre band send their reports to the secretary, who will confirm same with a QSL card?

Anyone interested in the club's activities can obtain further particulars from the hon. sec.

THE EXETER AND DISTRICT WIRELESS SOCIETY

Headquarters: Y.W.C.A., 3, Dix's Field, Southernhay, Exeter.

Meetings: Mondays at 8 p.m.

Hon. Sec.: Mr. W. J. Ching, 9, Sivel Place, Heavitree, Exeter.

AT the meeting of this society held on Monday, November 28th, members were guests of the Exeter Gaslight and Coke Company. A lecture was given in their showrooms.

The manager, Mr. Brown, and his staff showed the audience everything that is available in cookers, grills, water heaters, refrigerators, fires and lighting.

Mr. Bell read an excellent paper to members on the gas industry in general, and he dealt very fully with the utilisation of gas for industrial public service and even mentioned the fact that gas is used for the production of H.T. wireless units, i.e., Milnes units. Three films were shown in the private theatre, and coffee and refreshments were served at the close of the evening. All interested readers are invited to get in touch with the secretary at the above address.

INTERNATIONAL SHORT-WAVE CLUB (LONDON)

Headquarters: R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8.

European and Colonial Representative: Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

ON and after Friday, December 16th, the London Chapter of this organisation will meet at a new and better location. The address is R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8 (near Vauxhall and Stockwell stations). A special programme of features has been arranged for the winter session, during which there will be lectures with demonstrations dealing with every aspect of radio. Experiments will also be carried out with the club's experimental transmitter. Readers are especially invited to attend the meetings, which commence at 8.30 p.m.

We will also be glad to send any readers copies of our publications if they will send their names and addresses to us on a postcard.

A HOME-MADE P.A. INSTALLATION

(Continued from page 355)

size, and there would be a possible over-accenuation of "top."

Three rooms were commissioned at the writer's home, one being allotted to the amplifier equipment, one for the reproducer only, and the third for the three microphone-speakers—or perhaps these can be better termed "speaker-mikes."

The normal lengths of leads were used, and due regard was given to the isolation of the mains leads in relation to the mike leads, thus reducing mains hum even under these restricted conditions.

With regard to the various combinations of speaker-mike, whilst the use of a small W.B. of the midget chassis P.M. type, parallel connected to a large Rola P.M., responded very satisfactorily on speech and for normal effects, the higher frequencies introduced by the piano were not so well reproduced, and the striking effect of the piano notes seemed difficult to obviate.

The MHL4 was obviously getting a very appreciable grid swing, but there remained the possibility that with a combined moving-coil and moving-iron action, with the advantage of a larger cone, this trouble would be overcome, so the Rola speaker was retained and the midget m.c. replaced by a cone.

This resulted in the same percentage of "pick-up" due to the larger m.c., and the "beat" of the piano at the higher frequencies was considerably reduced, although retaining, if not slightly improving, the original quality.

Finally, the W.B. speaker and the cone were tried together, but whilst the "beat" was removed, the pick-up was not so good, consequently it was decided to allot the W.B. to the piano, whilst using the Rola and the moving-iron cone for the general stage requirements.

Gramo. Output

The powerful and good quality output obtained from the gramophone was of course anticipated, so it appeared that a really good combination of mike and pick-up was at last obtainable, the percentage of reproducer "boom" being such that with the allowances being made for the hall and the amount of absorption caused by a mass of people in the auditorium, the margin permitted could be finally adjusted at the amplifier.

The play was held on a Saturday evening, consequently that afternoon saw a great deal of hustle and bustle at the hall; however, after positioning the mikes and suspending the reproducer 12ft. above and sloping down to the audience, some quick tests were carried out, these meeting with the approval of all concerned. Fig. 3 depicts the layout adopted, and particular attention is drawn to the relationship of each mike to the reproducer, whilst it can be mentioned that the W.B. mike (M3) was positioned 6ft. from the piano, and not in direct line with it.

Microphony was absent, as the sound waves from the reproducer approached the mikes (including the travelling mike M2, which was temporarily mounted on a wooden stand) from the rear. The mikes M1 and M3 were padded with cloth against floor effects, and all leads were arranged to obviate any possible interaction or superimposed mains hum.

The play went off very well and the moving-iron cone speaker attracted considerable interest when discovered to constitute the travelling mike M2, since a good camouflage was had by draping with crêpe paper.

Leaves from a Short-wave Log

Special Short-wave Programmes

ACCORDING to the International DX-ERS' Alliance, special transmissions will be carried out by HJ7ABD, Bucaramanga (Republic of Colombia), on December 4th between G.M.T. 08.00-09.00; the wavelength is 31.17 m. (9.621 mc/s); also on December 9th and 10th, between G.M.T. 07.00-09.00, TI2XD, San José (Costa Rica), will be on the air on 25.17 m. (11.92 mc/s). The address of the former station is: Calle 2a No. 1205, Bucaramanga, and of the latter Apartado Postal 1729 (San José).

Rome's Powerful Voice

WITH the announcement that "the station is the highest powered short-wave broadcaster which has yet been installed," the Italian Government now transmits special news bulletins in English through the new 100-kilowatt stations 12R03, 31.14 m. (9.635 mc/s), and 12R04, 25.4 m. (11.81 mc/s).

Short-wave Broadcasts from Tonking

THE French transmitter at Hanoi (2) working on 25.21 m. (11.9 mc/s) has been heard irregularly broadcasting a news bulletin and native music from G.M.T. 14.30. Other channels used are: 31.55 m. (9.51 mc/s), and 49.8 m. (6.022 mc/s).

Good Signals from Kenya Colony

BROADCASTS from VQ7LO, Nairobi, are being well received at this period of the year. The station operates on 49.32 m. (6.083 mc/s) with a power of 500 watts. Time table: Week-days: G.M.T. 10.30-11.00, and 16.15-19.15, with an extra transmission on Tuesdays and Thursdays from G.M.T. 13.15-14.15. Address: East African Broadcasting Company, P.O. Box 777, Nairobi, Kenya Colony (British East Africa).

Radio Programmes from Albania

IN connection with the recent official opening by King Zog of Albania of a small broadcasting station in the city of Tirane, it is interesting to note that transmissions will also shortly be made on short waves, namely 30.04 m. (9.987 mc/s). Alternative channels are 29.71 m. (10.097 mc/s); 40.07 m. (7.487 mc/s); 41.02 m. (7.313 mc/s), and 41.61 m. (7.21 mc/s), but some of these frequencies may be monopolised for commercial telegraphy.

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).

From a Palestine Reader

SIR,—I am a regular reader to your splendid magazine which I am getting every week from my newsagent. I have never tried my pen and paper to drop you a line regarding how do we, overseas readers, enjoy this magazine.

From my observations I have noticed that the description of Short and Ultra-Short Wave receivers, are all described to work for Battery operation, whereas the tubes, they are also of British made and are very hard to get here, and whereas the price, it is extremely high and I think that there are many readers who can not get these tubes for such a high price. In your last two copies viz 11th and 19th of November, you are describing a 2 valves Short-Wave receiver, and I do think that this receiver is really a very good one, but here once again, it is built for Battery operation and using British Tubes.

I would like to see a version of this "Trio-Pen S.W.2" intended for A.C. Mains, 230 volts and using American tubes, for these tubes are available on this market and they are much cheaper to buy them, and do hope that many of your overseas readers would like to see this version of a set.

Hoping that this letter is of interest to you and your readers and thanking you in advance for putting your attention on it.—REUVEN SOKOLOVSKY (Tel-Aviv, Palestine).

[The above letter is reproduced as received and unedited.—Ed.]

An Amateur Replies

SIR,—I note with regret your reader's unwarranted attack on "hams" and "ham spirit." If he considers that the examples of the amateurs he has met represents the usual hospitality extended I am afraid I disagree. My experience has been the very reverse. Naturally it is unfortunate regarding his licence, but I am sure that if he had fulfilled the conditions laid down by the G.P.O. it would have been granted in the normal manner. My advice to him is to join a society such as the R.S.G.B. By doing this he will keep in touch with amateur affairs, thus gaining the knowledge which evidently he so urgently requires.—T. N. LLOYD (G3SL), (Ashford, Kent).

Name and Address Wanted

SIR,—As a result of the advertisement placed in your journal, we have received an inquiry from one of your readers in Pwllheli, Caernarvonshire, but he has omitted to state his name and address.

Possibly this reader may write to you direct complaining of our lack of attention, and we would be grateful, therefore, if you will point-out the necessity of enclosing

addresses when replying to advertisements.—GOODMANS INDUSTRIES, LIMITED (Wembley).

Noisy Interval Bells!

SIR,—What tinpot wireless receiver has our budding "Schoolboy Director-General" G. H. Mahood, been listening to, to complain of the clanging, tolling, noisy interval bells? I personally believe there is nothing better than a bell to test the quality of a receiver.

It would do G. H. M. a whole lot of good to spend a few months here in Malta, where he would learn to appreciate the mellow sound of a perfectly tuned peal of bells.

He goes so far as to suggest a dead silence during the intervals; what on earth does he imagine an interval signal is for, anyway? Even the arrangement of programmes giving "highbrow" alternating with "lowbrow" doesn't satisfy him, he wants them both at once

And as for jumping for joy, he should jump into the "Lagen."—E. J. YALDEN (Malta).

CUT THIS OUT EACH WEEK.

Do you know

- THAT an earth lead should not be added to an A.C./D.C. set without taking special precautions.
- THAT the reason for the above is that in most of these sets one side of the mains is joined to the chassis and thus there is a possibility of shorting the mains.
- THAT low value resistances in the anode circuit of the output valve reduce the tendency to self-oscillation.
- THAT rectifiers may be connected in parallel or combined half-wave units to increase the output from a mains section.
- THAT in a mains short-wave set a fixed condenser from one side of the mains to earth often proves of value in reducing hum.
- THAT care should be taken when selecting smoothing condensers for mains units as the rectifier may be damaged by an unsuitable value.

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 Nevenes, 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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Blanks now 3/3 per dozen. Electric FEIGH set has ball-bearing centre gear-box. Set, Pick-up and Tone-arm fitted diamond, 37/6. Tracker gear only, 21/6. Diamond Cutter Needles fit all pick-ups, 7/6. Gfa. Blank Discs, 3/3 dozen. Complete Acoustic Sets de Luxe-18/-; No. 2, 10/6; Junior-Type, 5/6.

A.C. CAR CHARGERS. The NITNDAY will keep your battery fit without attention. Model N/A8 100/250 volt mains to D.C. 6/8 volts 1 amp, 15/-. Model N/B6 100/250 volts to D.C. 6/8 volts 1 amp, 25/-. Model N/C6 100/250 volts to D.C. 6/8 volts 2 amps, 35/-. Model N/D12, 100/250 volts to 12 volts 1 amp. Ditto 12 volts 2 amps, with 6 volt tap, 55/-. 5 amps, 54/10/-.



3/3 MILLIAMMETERS.—Ncv. Where the job calls for something simple without calibration for tuning or galvo for testing. Back of panel type, as illus, 8 ma. full scale. Great bargain at 3/3 post free.

MILLIAMMETERS.—Moving coil. 5, 10, 25, 50, 200 and 500 m/a. in various sizes from 2 1/2 in. to 8 in. dia. Switchboard Meters for all purposes.

PANEL MOV. COIL MICRO-MILLIAMMETERS.—Distortion in receivers may be caused by a few micro-amps of grid current detected by Leadiac sensitive moving coil Micro-meters reading 2 m. m.a. to 50, 1,000 ohm coils, bakelite case, flush panel, 2 1/2 in. dial, 40/-. Relay for M.C. for 50 Micro-amps, 60/-. THE DIX-MIPANTA VEST POCKET TESTER. A compact versatile moving-iron multi-range meter for A.C. or D.C. circuits. No projecting terminals. THREE ranges of volts: 0.75, 0.150, 0.300. MILLIAMPS: 0.12 m/a and 0.75 m/a. In black bakelite case. 2 1/2 in. by 2 1/2 in. with pair of test leads and plugs, 19/6.

MOTOR BARGAINS in midsize H.P. motors for A.C. or D.C. 200/230 volts 1/110th H.P. D.O.T. type totally enclosed K.B. Cover 2,000 revs at a price never before offered; 7/6 only. Next larger G.M. No. 2 type high speed 1/60th H.P., 4,000 revs., 9/6. Larger still 1/45th H.P. Model G.E. No. 1, 12/6.

MICROPHONES. New models high efficiency, low prices. The famous W.E. Button type Microphone, 1/-, No. 1.1 Hand or sling mike, solid bakelite body, 5/-. Super midsize Table stand Bakelite mike with self-contained transformer in base semi-transverse not bottom, worth a guinea, 10/- only. The well-known W.V.11 table mike with square bakelite case, fitted switch and transformer; detachable bronze table stand, 12/6 only.

MOVING COIL MIRES. Torpedo P.M. moving coil mike, model T.M. needs no battery, directional correct frequency response, ideal for P.A. and recording, 55/-. Table stand, 7/6. Transm., 7/6. Epoch type ditto, a very robust and handsome P.M. 31C-mike, 35/-. with table stand, 42/6. Transformer, 2/6.



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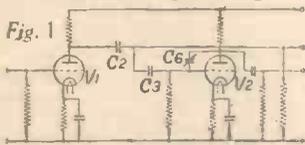
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LATEST PATENT NEWS

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.

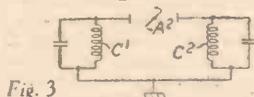
VALVE AMPLIFYING CIRCUITS.—Hirshman, C. L., and Metropolitan-Vickers Electrical Co., Ltd. No. 491468.

A paraphase amplifier comprises two valves arranged to give a push-pull output, the second valve V2 being coupled to the valve V1 by a capacity potentiometer of which one leg comprises condenser C2, C3 and the other consists of the input capacity of the valve V2 due to Miller effect. Condenser C3 may be adjustable so that the outputs of the valves V1, V2 may be balanced or alternatively an additional condenser C6 may be provided for this purpose. If the input capacity of valve V2 due to Miller effect is made large compared with capacity C2 + C3, then the capacity potentiometer automatically compensates for variations in gain of the valve V2. (Fig. 1.)



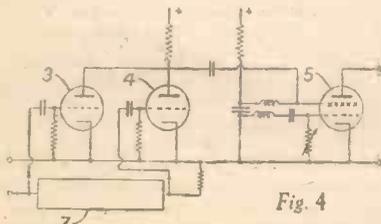
WIRELESS RECEIVING APPARATUS.—Kolster-Brandes, Ltd., and Smith, K. G. No. 491532.

The coupling between the coupled I.F. circuits of a superheterodyne receiver, is varied to vary selectivity, by means of a magnetic core A, Fig. 2, pivotally mounted between the ends of the iron-core I.F. inductances C¹, C²; alternatively a metallic disc, pivoted about a diameter may be employed. In Fig. 3 an insulated wire A² is rotatably mounted between two small condenser plates mounted on the inductance C¹, C²: this constitutes a variable top-capacity coupling for the filter.



TELEVISION; TYPE-PRINTING TELEGRAPHY.—White, E. L. C. No. 491728.

Pulses of long duration (e.g., frame synchronising signals) are isolated from a mixture of pulses of long and short duration, by applying the mixture to two parallel paths, one of which comprises a delay network, so that on combining the outputs, the delayed and undelayed long pulses overlap to produce a signal distinguished by



amplitude which is isolated by an amplitude filter. In Fig. 4, the two paths comprise valve 3, and delay network 7 and valve 4; the outputs are combined and the oscillator 5, operating as disclosed in Specification 402629, is biased to be controlled only by the derived pulses of greater amplitude.

The delayed and undelayed pulses may be applied to the anodes of a double diode, or to the grids of a double triode, or may be applied to the two control grids of a hexode

valve biased to pass current only when both grids are energised; in this case, the mixed signals may also be developed in the output by a triode portion of the hexode energised with the undelayed pulses. The invention is applied to television, the multiplex signalling system described in Specification 470495, and type-printing telegraphy. Specifications 420391 and 455375 also are referred to.

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

- 33404.—Baird Television, Ltd., and King, E. B.—Metal-to-glass seals. November 17.
- 33744.—Briggs, G. A.—Speaker volume control in wireless. November 21.
- 33770.—Keith, J. R.—Radio receivers. November 21.
- 33947.—Kolster-Brandes, Ltd., and Arnold, J.—Remote control systems for radio receivers. November 22.
- 33948.—Kolster-Brandes, Ltd., and Beatty, W. A.—Antenna systems, etc. November 22.
- 33949.—Kolster-Brandes, Ltd., and Smyth, C. N.—Television systems, etc. November 22.
- 33585.—Lorenz Akt.-Ges., C.—Radio receivers. November 18.
- 33835.—Maguire, I. L.—Radio amplifiers, etc. November 21.
- 33836.—Maguire, I. L.—Television systems. November 21.

33951.—Standard Telephones & Cables, Ltd., Terry, R. St. G., and Beard, J. R.—Changer-over switching arrangements for radio equipments. November 22.

Specifications Published

- 495822.—Baird Television, Ltd., and Merdler, L. R.—Television distributing systems.
- 495757.—Radioakt.-Ges. D. S. Loewe.—Cathode-ray tubes.
- 495646.—Marconi's Wireless Telegraph Co., Ltd., and Myers, L. M.—Television reproducer apparatus. (Cognate Application, 23299/37.)
- 495724.—Blumlein, A. D.—Television receiving systems.
- 495596.—General Electric Co., Ltd., and Bloch, A.—Tuning-indicators in radio receiving apparatus.
- 495613.—Berry, R. J. (Lorenz Akt.-Ges. C.)—Methods of indicating distance by wireless.
- 495624.—Lorenz Akt.-Ges., C.—Antenna arrangements, especially for radio beacons.
- 495554.—Berry, R. J. (Lorenz Akt.-Ges., C.)—Receiving arrangements for radio direction-finder 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.

AMERICAN TELEVISION

ALTHOUGH between two to three years behind this country it would appear that America is at last determined to make an effort to establish its own television service, and by common consent "zero hour" is to coincide with the opening of the New York World's Fair at the end of April, 1939. The R.C.A., in association with the National Broadcasting Company, are actively engaged in building their equipment in the Empire State building. David Sarnoff has at last admitted that the only satisfactory way in which to solve the problems associated with the art of television is to use the experience gained by serving the public in their own homes with high-definition television pictures. This, of course, was the conclusion arrived at in this country a long time ago, and the proof of the argument is amply evident in the strides which have been made here since the B.B.C. service started. Various American executives have for a long time paid extended visits to this country to study our technique, and it is certain that the work done in the States will be moulded on the experience gained here. It is generally conceded that the television service will be run on much the same advertising basis as the existing American radio network, and in this respect it will be illuminating to compare the nature of the programmes with those in London, where all advertising is barred. Competition with the N.B.C. in

New York will be provided by the Columbia Broadcasting System, for this last named company is now actively engaged in installing the apparatus in the Chrysler building which rises to a height of over 900 feet. So as to give a uniform ultra-short-wave radiation in all directions, the vision and sound aerials are to be arranged at the four points of the compass. These dipoles will have a horizontal orientation, for the standards laid down by the Federal Communications Commission embody horizontal polarisation of the radiated waves, whereas in this country vertical polarisation is the method adopted. Another marked difference is that the sound signals are to be broadcast on a higher carrier frequency than the vision, although here vision signals employ the higher carrier frequency. Sound will be radiated on 55.75 megacycles, while vision will lie between 51 and 52.5 megacycles, but the power to be employed is considerably less than that used here. In any case, the weekly programme time to start with has been given as two hours, as against the twenty or so hours which has now become a common schedule with the B.B.C. If we include Germany and France this will make the fourth great power to take up a television service seriously, with Russia a possible fifth. It is certain that many of the smaller nations will follow suit, but questions of finance seem to provide the inevitable stumbling block.



QUERIES and ENQUIRIES

Car Ignition Interference

"I recently installed a television receiver, but find that I get a lot of interference from passing car traffic. Is there any way in which this may be overcome?"—H. R. (N.W.9).

THE interference will be found to cover a fairly wide area, and the only satisfactory plan is to place the aerial clear of the interference and connect it to the receiver through a special feeder. If the aerial cannot be placed at the bottom of a garden or sufficiently far from the roadway, it should be placed on a pole erected on the roof of the house and a special feeder line used.

Reducing Eliminator Output

"I have recently purchased an eliminator for use in my battery set, but it only possesses two tappings, H.T. — and H.T. + 120. The battery set in use requires also H.T. 60, so I propose taking a tapping from H.T. 120 and cutting it down to make 60. Can you inform me the correct procedure, please?"—J. G. C. (Bristol, 5).

THE only satisfactory way of finding the resistance value is to connect the set to an H.T. battery and then place a milliammeter in the 60-volt lead. Note the current flowing. This current, expressed in milliamps, should then be divided into 60 (the difference between the required voltage and that available) and the answer multiplied by 1,000. This is the value of the resistance needed and it may be joined to the H.T. positive speaker terminal inside the set so that only the two leads need be joined to your set from the mains unit. Between earth and the junction of the resistance and the original H.T. 60-volt lead a 2 mfd. fixed condenser should be connected.

Transmitting Details

"Please could you let me know the address to which I must apply for an amateur broadcasting licence? I have fitted up a morse-sending station which works within a radius of 5 to 10 miles. I have purchased a really good microphone, intending to transmit speech, etc., on the short wavelengths, but on inquiry I was informed that first I must have an amateur licence. I would be glad of the address to which I must apply for this."—J. I. J. (nr. Wells).

IT is illegal to carry out experiments in transmission until a licence has been first obtained, and you should not, therefore, continue with your present tests until you have obtained a licence. In any case, you would be unable to obtain a "radiating" licence, and all preliminary experiments must be carried out with an artificial or non-radiating aerial. Write to the Engineer-in-Chief, Radio Section, G.P.O., Armour House, London, E.C.

Scrambled Speech

"Is it correct that the so-called 'scrambled' ship to shore transmissions on short waves are halved and transmitted

on two separate wavelengths? If this is so, can they be received on a home-built set comprising two detector stages each fed by a separate aerial wired in parallel, both being amplified by an L.F. stage followed by a power stage?"—F. S. (Darwen).

SO far as we are aware ordinary ship to shore transmissions are merely carried out in code. The Radio-telephone system adopts various devices to render conversation secret, and this may consist of scrambled speech or inverted speech. In the first case the signals are divided and sent out on different wavelengths, and in the second the signals are inverted—that is, increases are radiated as decreases, and vice versa. Although it may be possible to build circuits at home which will render such signals intelligible, we would remind you that under the conditions of your licence your apparatus is to be employed for the reception of the broadcast pro-

covering both medium and long waves. This was subsequently improved by tapping the primary, and thus, with a three-point switch the two windings may be adjusted for medium or long-wave reception, better results being obtainable on both bands due to the more effective primary coupling. The tap on the primary winding is taken to terminal No. 8. The coil design was subsequently modified, but the connections retained, and the new coil was known as the Unigen, but from a connection point of view the Unigen and the Type A coil are interchangeable. The former gives a better performance, however, and is the more modern component.

Hot Rectifying Valve

"I have a mains receiver which now fails to give any signals. Whilst looking round to try and find the trouble, although I know very little about wireless, I found that the rectifying valve was extremely hot and the inside seemed to be red-hot. I am told that this should not be so and I wonder if you can tell me what fault has developed and how to overcome it."—I. H. P. (W. Bromwich).

THE usual indication when a rectifier glows in this manner, or has a strong blue glow, is that it is being seriously overloaded, and this is generally found to be due to the fact that a short-circuit has developed on the receiver side of the mains section. The commonest cause of this trouble is an electrolytic condenser developing a partial or complete internal short-circuit, and this will probably be found to be the reservoir condenser joined from the choke to earth. If you disconnect the condensers used in this section, one at a time, you will probably find that when one is disconnected, signals will return, plus a little hum, and the rectifier, if not already seriously damaged, will cool off and give some sort of results. You will probably find that the condenser has been over-run.

Diversity Reception

"I recently read an account of a new type of receiver which it is claimed gives diversity reception. I have not seen any mention of this in your paper and wonder if you could explain to me what it is in non-technical terms. I have only taken your paper for about six months, but have learnt many things which were previously mysteries to me and am now very keen on radio experimenting."—H. E. (Winchester).

ON the short waves signals are subject to fading which varies according to the time of the year, time of the day, and the wavelength in use. It has been found, however, that signals fade in varying degrees at different points, and when two aerials are erected at some distance apart which bears a direct relation to the wavelength, the signals on one aerial will fade away, whilst those on the other aerial build up. Therefore, if two receivers are joined to two aerials, and the output from each fed to a common amplifier, a constant signal output free from fading should be obtained. There are, however, many difficulties in the way of successful functioning, such as the signal to noise ratio, etc. A compensated A.V.C. circuit helps to overcome this, but so far the arrangement is not in general use in this country.

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, 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.

grammes only, and you are not allowed to make use of commercial signals. Should these be received by accident it is illegal to make use of any information received therefrom.

Wearite Coils

"With reference to your Pyramid one-valve set, I have a Wearite Type A Universal Coil. Can I use this in place of the Unigen? The makers say the connections are the same, and that the latter can replace the former."—H. E. P. (Bitterne).

THE original Wearite coil was the Universal. This had a tapped secondary winding, but a double primary

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Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS

CRYSTAL SETS.

Blueprints, 6d. each.	Date of Issue.	No. of Blueprint
1937 Crystal Receiver	9.1.37	PW71
The "Junior" Crystal Set	27.8.33	PW94

STRAIGHT SETS. Battery Operated.

One-valve: Blueprints, 1s. each.		
All-wave Unipen (Pentode)		PW31A
Beginner's One-valver	19.2.33	PW85
The "Pyramid" One-valver (HF Pen)	27.8.33	PW93

Two-valve: Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)		PW30B
The Signet Two (D & LF)	24.9.33	PW76

Three-valve: Blueprints, 1s. each.		
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2

Selectone Battery Three (D, 2 LF (Trans))		PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))		PW34A

Leader Three (SG, D, Pow)	22.5.37	PW35
Summit Three (HF Pen, D, Pen)		PW37

All Pentode Three (HF Pen, D (Pen) Pen)	20.5.37	PW30
Hall-mark Three (SG, D, Pow)	12.6.37	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW18

F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	19.4.35	PW40
Genet Midget (D, 2LF (Trans))	June '35	PM1
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)		PW53
Battery All-Wave Three (D, 2 LF (RC))		PW55

The Monitor (HF Pen, D, Pen)		PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	14.8.37	PW64

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.30	PW69
The "Colt" All-Wave Three (D 2 LF (RC & Trans))	5.12.36	PW72

The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82
F. J. Camm's Oracle All-Wave Three (HF, Det, Pen)	28.8.37	PW73

1938 "Tribune" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84
F. J. Camm's "Sprite" Three (HF Pen, D, Det)	26.3.38	PW87

The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89
F. J. Camm's Push-Button Three (HF Pen, D (Pen), Det)	3.9.38	PW92

Four-valve: Blueprints, 1s. each.		
Sonotone Four (SG, D, LF, P)	1.5.37	PW4
Fury Four (2 SG, D, Pen)	8.5.37	PW11

Beta Universal Four (SG, D, LF, Cl. B)		PW17
Nucleon Class B Four (SG, D, (SG), LF, Cl. B)	6.1.34	PW34B

Fury Four Super (SG, SG, D, Pen)		PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)		PW46

F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	20.9.36	PW67
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79

"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.38	PW83
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.38	PW97

Mains Operated.

Two-valve: Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)		PW18
A.C.-D.C. Two (SG, Pow)		PW31

Selectone A.C. Radiogram Two (D, Pow)		PW19
Three-valve: Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)		PW23

D.G. Ace (SG, D, Pen)		PW25
A.C. Three (SG, D, Pen)		PW29
A.C. Leader (HF Pen, D, Pow)		PW35C

D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A

Armada Mains Three (HF Pen, D, Pen)		PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW59

"All-Wave" A.C. Three (D, 2 LF (RC))		PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW56

Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
All-World Ace (HF Pen, D, Pen)	28.3.37	PW90

Four-valve: Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)		PW20
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D

A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47
A.C. All-Wave Corona Four	6.11.37	PW81

SUPERHETS.

Battery Sets: Blueprints, 1s. each		
£5 Superhet (Three-valve)	5.6.37	PW40
F. J. Camm's 2-valve Superhet	13.7.35	PW52
F. J. Camm's £4 Superhet		PW58

F. J. Camm's "Vitesse" All-Waver (5 valver)	27.2.37	PW75
Mains Sets: Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)		PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42

Universal £5 Superhet (Three-valve)		PW44
F. J. Camm's A.C. £4 Superhet 4	31.7.37	PW59
F. J. Camm's Universal £4 Superhet 4		PW60

"Qualitone" Universal Four	16.1.37	PW73
Four-valve: Double-sided Blueprint, 1s. 6d.		
Push-Button 4, Battery Model	22.10.38	PW95

Push-Button 4 A.C. Mains Model		
SHORT-WAVE SETS.		

One-valve: Blueprint, 1s.		
Simple S.W. One-valver	9.4.38	PW89
Two-valve: Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)		PW88A

The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38	PW91
Three-valve: Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Pow)	30.7.33	PW30A

The Perfect 3 (D, 2 LF (RC and Trans))	7.8.37	PW63
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38	PW68

PORTABLES.		
Three-valve: Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)		PW65

Parvo Flyweight Midget Portable (SG, D, Pen)	19.6.37	PW77
Four-valve: Blueprint, 1s.		
"Imp" Portable 4 (D, LF, LF, Pen)	19.3.38	PW86

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

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Blueprints, 6d. each.		
Four-station Crystal Set	23.7.38	AW427
1934 Crystal Set		AW444
150-mile Crystal Set		AW450

STRAIGHT SETS. Battery Operated.

One-valve: Blueprints, 1s. each.		
B.C. Special One-Valver		AW387
Twenty-station Loudspeaker One-valver (Class B)		AW449

Two-valve: Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)		AW388
Full-volume Two (SG det, Pen)		AW392
Lucerne Minor (D, Pen)		AW426
A Modern Two-valver		WM409

Three-valve: Blueprints, 1s. each.		
Class B Three (D, Trans, Class B)		AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394

Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
Lucerne Ranger (SG, D, Trans)		AW422

£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)		AW427
Transportable Three (SG, D, Pen)		WM271

Simple-tune Three (SG, D, Pen)	June '33	WM327
Economy-Pentode Three (SG, D, Pen)	Oct. '33	WM337

"W.M." 1934 Standard Three (SG, D, Pen)		WM351
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354
1935 £6 6s. Battery Three (SG, D, Pen)		WM371

PTP Three (Pen, D, Pen)		WM389
Certainty Three (SG, D, Pen)		WM393
Miniature Three (SG, D, Trans)	Oct. '35	WM396

All-Wave Winning Three (SG, D, Pen)		WM400
Four-valve: Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)		AW370

"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2HF Four (2 SG, D, Pen)		AW421
Self-contained Four (SG, D, LF, Class B)	Aug. '33	WM331

Lucerne Straight Four (SG, D, LF, Trans)		WM350
£5 5s. Battery Four (HF, D, 2 LF)	Feb. '35	WM381
The H.K. Four (SG, SG, D, Pen)	Mar. '35	WM384

The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	Apr. '36	WM404
Five-valve: Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans)		WM320

Class B Quadradyné (2 SG, D, LF, Class B)		WM344
New Class B Five (2 SG, D, LF, Class B)		WM340

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Amateur Wireless	4d. "
Practical Mechanics	7d. "
Wireless Magazine	1/3 "

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

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Two-valve: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.		AW403
Economy A.C. Two (D, Trans) A.C.		WM286
Unicorn A.C.-D.C. Two (D, Pen)		WM394

Three-valve: Blueprints, 1s. each.		
Home Lover's New All-electric Three (SG, D, Trans) A.C.		AW383
Mantovani A.C. Three (HF Pen, D, Pen)		WM371

£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401
Four-valve: Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	July '33	WM626

Harris' Jubilee Radiogram (HF Pen, D, LF, P)	May, '35	WM386
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SUPERHETS.

Battery Sets: Blueprints, 1s. 6d. each.		
Modern Super Senior		WM375
'Varsity Four	Oct. '35	WM395
The Request All-Waver	June '36	WM407

1935 Super Five Battery (Superhet)		WM379
Mains Sets: Blueprints, 1s. 6d. each.		
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)	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP2)		WM363
Tyers Portable (SG, D, 2 Trans)		WM367

SHORT-WAVE SETS—Battery Operated.

One-valve: Blueprints, 1s. each.		
S.W. One-valver for America	15.10.38	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	AW403
The Carrier Short-waver (SG, D, P)	July '35	WM390

Four-valve: Blueprints, 1s. 6d. each.		
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)		AW436
Empire Short-waver (SG, D, RC, Trans)		WM313

Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35	WM383
Superhet: Blueprint, 1s. 6d.		
Simplified Short-waver Super	Nov. '35	WM397

Mains Operated.

Two-valve: Blueprints, 1s. each.		
Two-valve Mains Short waver (D, Pen) A.C.		AW451
"W.M." Band-spread Short waver (D, Pen) A.C.-D.C.		WM368
"W.M." Long-wave Converter		WM390

Three-valve: Blueprint, 1s.

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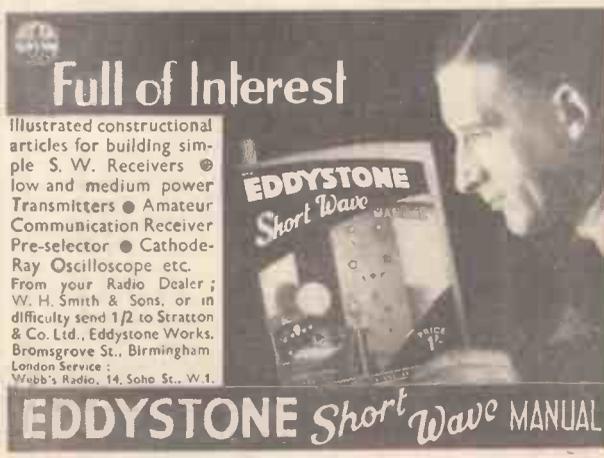
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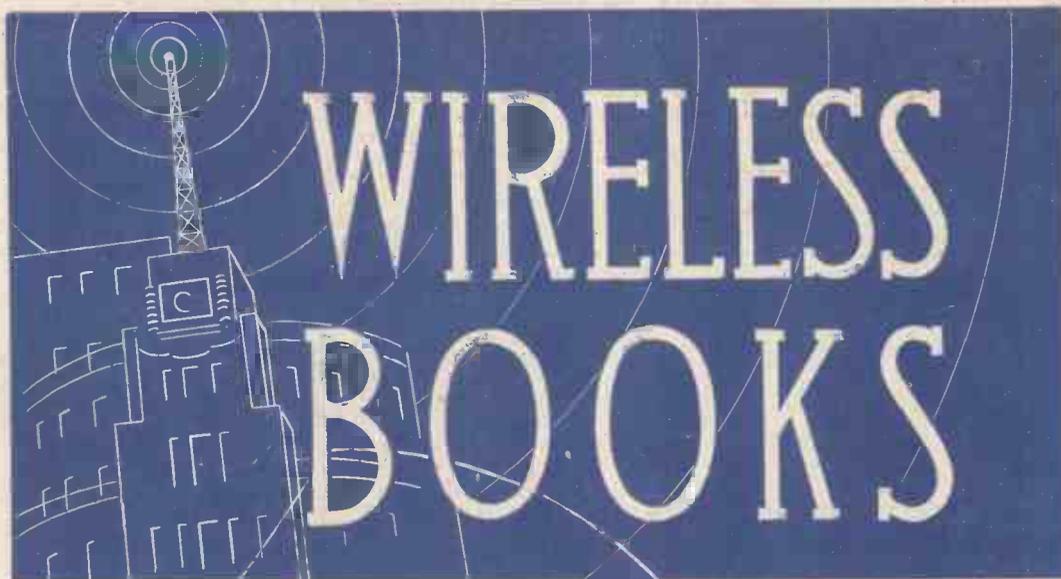
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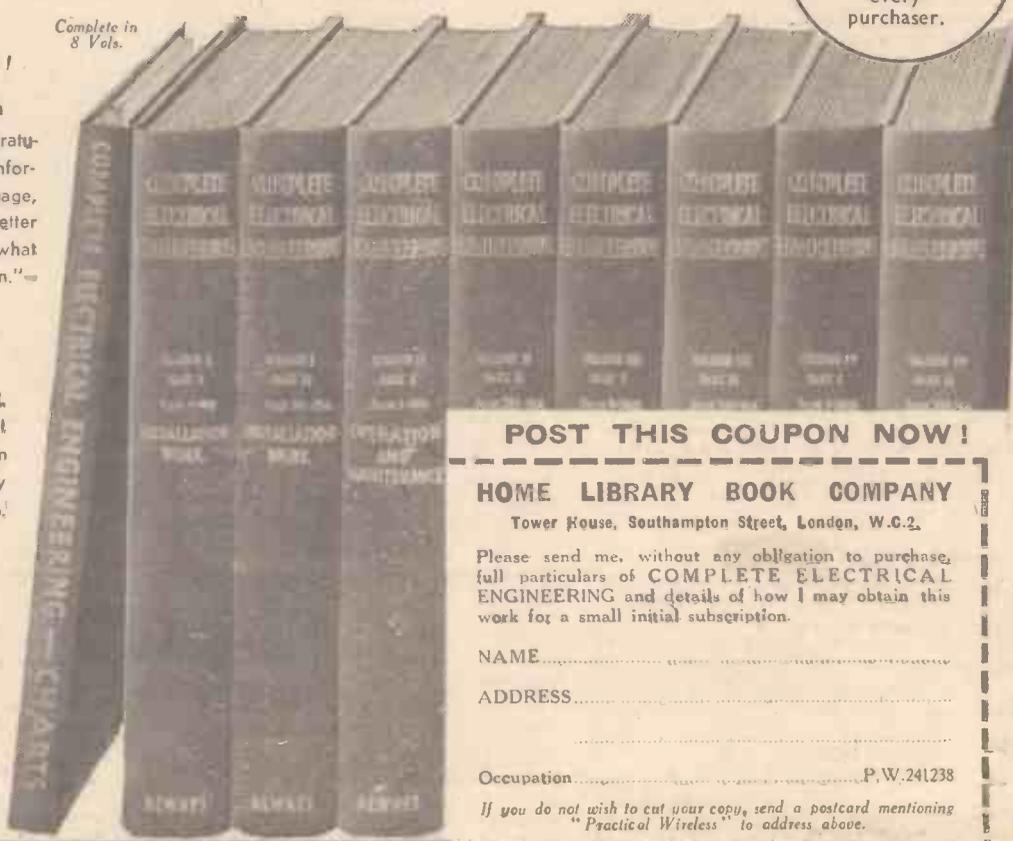
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If you do not wish to cut your copy, send a postcard mentioning "Practical Wireless" to address above.

NOTES ON CHASSIS CONSTRUCTION— See page 373

Practical and Amateur Wireless

Round

Measuring Signal Strength

THE amateur often finds it difficult to judge the strength of a received signal, and one frequently hears a signal described as R8 or R9 which might perhaps be given a lower reference by another listener. The ideal arrangement would be to include a properly calibrated watt-meter or signal meter in the receiver and take a pre-arranged reading for various signals, so that some type of standardisation could be arrived at. The keen experimenter will be interested in an arrangement of this nature, and although some types of signal meter are very complicated, it is possible to make up quite a simple instrument which will give the desired indication of signal strength. In this issue we describe such a device, and when this has been in use for a short while it will be found of great value in assisting the experimenter to ascertain the advantages of circuit changes, as well as being a valuable guide in compiling logs of reception conditions from night to night. A device of this nature, in conjunction with a simple oscillator, will remove one of the greatest difficulties which the set-builder meets, namely, the accurate lining up of tuning circuits.

Radio Curfew

LOCAL by-laws in many places call for a restriction in the use of outdoor radio or control the use of apparatus to prevent annoyance. We now understand that Godstone Rural District Council has decreed that wireless receivers should not be worked after 11 p.m. or before 8 a.m. in any of its houses without written permission.

Visio-Telephone

THE Burgos Government has received from the German Government a gift of a complete two-way television telephone equipment similar to that which is now in use between Berlin-Leipzig, and Nuremberg-Munich.

Television on Christmas Day?

A VISIT to a hospital by the O.B. Television Department on Christmas Day will enable viewers to take part in a Children's party. Frederick Grisewood and Margaretta Scott will be entertaining the children with stories as the television cameras come into action to show everyone waiting for the arrival of Father Christmas, and viewers will see the gaily-lighted Christmas trees as the camera gives a "long shot" of the ward.

Edited by
F. J. CAMM.

Technical Staff:
W. J. Deane, H. J. Barton Chapple, Wh.Sch.,
B.Sc., A.M.I.E.E., Frank Preston.
Vol. XIII, No. 327. December 24th, 1938

Wireless

the World of

Father Christmas will be followed by Leonard Henry and other visitors.

New B.B.C. Mast

A NEW type of mast has been tested by the B.B.C. and is being employed at the Start Point Transmitter now in course of construction. In this mast a cut is made two-thirds of the distance from ground level and an inductance coil inserted in this gap.

Davis would be shortly commenting on the forthcoming match in which he, Willie Smith, would be taking part, listeners must expect retaliation.

Joe Davis will have his opportunity on January 3rd, having promised to give a running commentary on the Willie Smith v. Horace Lindrum match.

Reginald Foort's Return

WHEN Reginald Foort returns to St. George's Hall on Christmas Day to broadcast a recital at the B.B.C. Theatre Organ, he will initiate a series of programmes that will, for some time, bring him back to the B.B.C. every other Sunday.

A Masque for New Year's Eve

IN place of the usual review of the year on December 31st, a completely novel type of programme has been devised by Francis Dillon. It is cast in the classic form of a masque and opens with Fear and Discord claiming the Old Year for their own. Carrying on the ante-masque, the Twelve Months appeal to Goodfellow for a trial, hoping that the Old Year may survive it with a good reputation. The ante-masque dissolves and the trial takes place with Goodfellow as the Judge, Fantasy as Clerk of the Court and the Listeners as the Jury. The defence is conducted by the Months and such allegorical figures as Fashion, Virtue and Weather are subpoenaed to give evidence.

"A Farmer's Visit to Ireland"

A SHORT time ago James Best, who himself farms 200 acres in Dorset, gave a talk on his visit to a German farm: on December 28th, in a talk entitled "A Farmer's Visit to Ireland," listeners will hear his personal observations on a recent visit. Mr. Best is on the Committee of the Bath and West Show, and contributes articles to the Press on agriculture and natural history.

Christmas Dinner for 5,000

CHRISTMAS DAY programmes from the North will include a short broadcast from a huge Christmas dinner providing turkey and plum pudding for 5,000. At the time when more fortunate folk will be sitting down to the great meal, the Northern microphone will invite the listener to join, for a few minutes, a happy gathering of poor children awaiting their Christmas dinner provided by the citizens of Hull.

GIVE BOOKS THIS CHRISTMAS!

The following Standard Works make ideal Christmas presents. They are all suitable for beginner and expert, lavishly illustrated, and well bound. By

	By	Price.	Post.
Practical Wireless Service Manual	..	5/-	5/6
Wireless Transmissions for Amateurs	..	2/6	2/10
Sixty Tested Wireless Circuits	..	2/6	2/10
Wireless Coils, Chokes and Transformers and How to Make Them	..	2/6	2/10
Wireless Constructor's Encyclopaedia	..	5/-	5/6
Everyman's Wireless Book	..	3/6	3/10
Television and Short-Wave Handbook	..	3/6	3/10
Workshop Calculations, Tables and Formulae	..	3/6	3/10
Practical Mechanics Handbook	..	6/-	6/6

The resultant efficiency is greater than with the normal top-capacity aerial now in use. One mast has been completed at this station and the other is nearing completion.

Snooker

WILLIE SMITH, in his several recent snooker commentaries for the B.B.C. has, in a sly and droll manner, indulged in mild humour at the expense of the competitors. Many listeners no doubt heard one of his pertinent remarks during Joe Davis's recent match. He then said that as Joe

ROUND the WORLD of WIRELESS (Continued)

New German Stations

ON December 1st the *Reichsfunk* formally opened a 5-kilowatt relay transmitter at Stolp (Pomerania), with the object of improving the reception of German broadcasts in the Polish "corridor" district. The wavelength is 225.6 m. (1,330 kc/s), common to the stations of the Hamburg group, such as Hanover, Bremen, and so on. For the Sudeten areas the authorities have decided to install a special independent high-power transmitter of which the programmes are to be suited to the district. Pending the construction of this station a small transmitter is being used in the vicinity of Karlsbad.

A Floating Marconi Museum

S.Y. *Elettra*, the yacht on which the late Marchese Marconi carried out his experimental radio work, was recently purchased by order of Signor Mussolini. It is to be anchored at Ostia, near Rome, where it will serve as a museum in which will be exhibited a collection of apparatus used by the great inventor.

An Addition to Italy's Network

THE E.I.A.R. has now officially inaugurated the 3-kilowatt transmitter at Catania and it relays nightly the programmes broadcast by Rome 1. The station shares the channel used by Palermo



Diana Miller, the popular vocalist of stage, screen and broadcasting fame, who is often heard over the air with Jack Harris and his Band.

(Italy) and Athloné (Eire), namely, 531 m. (565 kc/s).

French News in English

DAILY from G.M.T. 17.30-17.45 the P.T.T., Lille and Rennes stations, on 247.3 m. (1,213 kc/s), and 288.5 m. (1,040 kc/s), respectively broadcast a Paris news bulletin in the English language.

The "Old Colonel"

RADIO lost what might have been one of its fine singing voices when the Old Colonel, star of the

INTERESTING and TOPICAL NEWS and NOTES

"Checkerboard Time" programme heard over WLW (Cincinnati) Mondays, Wednesdays and Fridays at 7.30 a.m. E.S.T., decided to cast his lot as an actor and announcer. The Old Colonel, in fact, made

"MR. WALKER WANTS TO KNOW"



Syd Walker, whose problems under the heading of "Mr. Walker wants to know" are very popular with listeners of the B.B.C. "Band Waggon," recently made a record of some of his problems at the Kingsway Hall. In the illustration he seems puzzled by his own problem, as he listens to a test record.

his first radio appearance a good many years ago as guest soloist on WWJ, Detroit, and later appeared over WELL, Battle Creek, as a singer and later as an announcer. For years the Old Colonel handled devotional programmes, and through them brought inspiration and hope to thousands of radio listeners.

Obituary

WE regret to record the death of Sir Thomas O. Callender, of the E.I.B.A., on Friday, December 2nd.

Sir "Tom" Callender was a Senior Warden of the Association, a Member of the Council, and a Past President, having held that office in 1921. He was a very liberal benefactor and only within a fortnight of his death had made arrangements for a further gift of £500 to its funds, in addition to which he took a deep personal interest in the affairs of the Electrical Industries Benevolent Association.

Studio Variety

MIDLAND and Regional listeners will hear, on December 31st, a short variety programme. The artists will be Dick Spencer and Ethel Williams ("Two Voices and a Piano"); Jim Collier ("the Singing Lumberjack"), who had a long run of broadcasts when he was out West; Warwiek Vaughan, son of Alice Vaughan the singer, in impersonations; and Jack Hill, Birmingham pianist and composer, in syncopation at the piano.

Torquay Municipal Orchestra

THE Torquay Municipal Orchestra, led by Harold F. Petts and conducted by Ernest W. Goss, will broadcast from the Pavilion, Torquay, on December 25th.

Variety from Bristol

VARIETY from the Colston Hall, Bristol, on December 31st, will include Harry Roy and his Band, Batic and Foster, and the Lowe Brothers.

SOLVE THIS!

PROBLEM No. 327

Trimble had a three-valve battery set, using detector, L.F. and pentode output valves. The last stage was R.C. coupled. There was a background whistle accompanying signals, and Trimble decided this was L.F. instability. He therefore obtained a 100,000 ohm resistance and joined this between the coupling condenser and the junction of the grid leak and grid of the output valve. When he switched on, signals were very much weaker than previously. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must 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. 327 in the top left-hand corner, and must be posted to reach this office not later than the first post on Wednesday, December 28th, 1938.

Solution to Problem No. 326

Although the valve Jackson used was in good condition and all voltages were correct, he overlooked the fact that the speaker would not be correctly matched, and the difference in the load needed for a small triode and a pentode would result in serious loss of volume.

The following three readers successfully solved Problem No. 325, and books have accordingly been forwarded to them: B. M. Hayman, 87, Tachbrook Road, Leamington Spa. W. Barraclough, 6, Cresswell Place, Great Horton, Bradford, Yorks. R. L. Savage, 20, Millmark Grove, New Cross, S.E.14.

PROSPECT and RETROSPECT

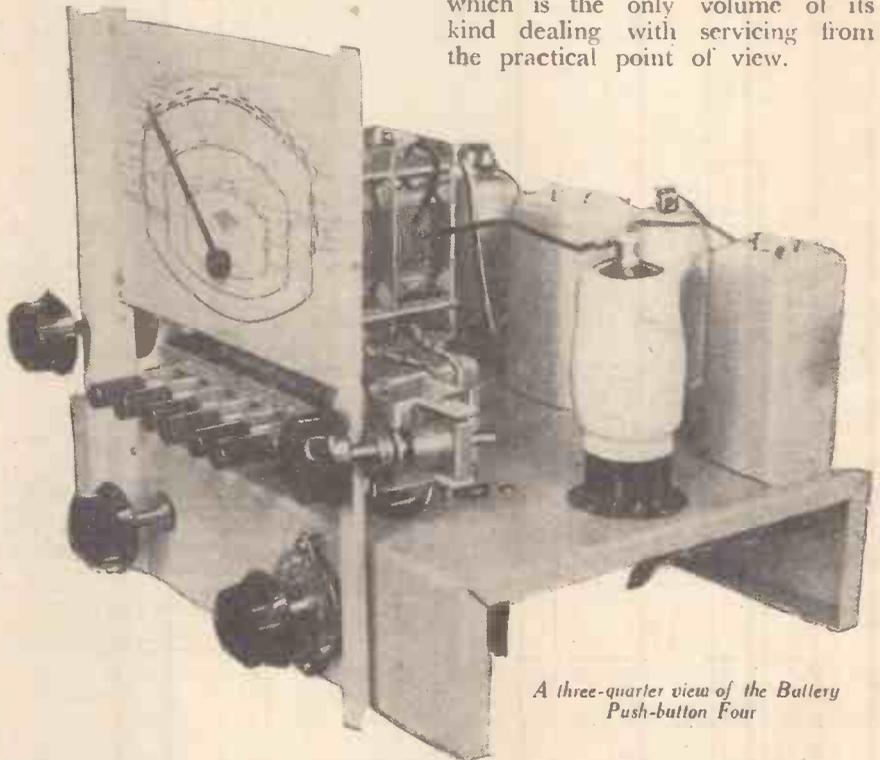
IN looking along the avenues of 1938 which now recede into the background, overshadowed by the rising sun of 1939, nothing emerges from the shadow of the former upon which we can base any forecast for 1939. The year of grace 1938 does not cast the shadow of a coming event. It has been a tranquil year so far as radio design has been concerned, with the possible exception of push-button radio. Television has not made the strides we thought it would, and whilst a fair number of programme hours have been maintained there is no immediate prospect of an increase in the daily transmissions. Technical problems concerned with television still have to be solved, and in my view the chief problem is that of extending the service area, at present limited by the use of ultra-short wavelengths. Television has passed long ago from the experimental stage, but the shackles which hold it at present to the county of London do not seem within sight of being broken. I cannot believe that the real solution to national television is the erection of a number of stations all over the country, each serving a radius of only twenty miles. The failure of the coaxial cable between London and the Midlands seems to strike a death blow at the prospect of a multiplicity of television transmitters. Somewhere there is a missing link in television which needs to be discovered, although I cannot discern that 1939 will bring it.

Sound Broadcast Receivers

As far as sound broadcast receivers are concerned, I am also of the opinion that the most that can be expected in the way of innovations for 1939 will be concerned with detail refinements. I cannot foresee that new valves will be produced, nor that any new radio improvement will be disclosed. As 1938 goes out it sees PRACTICAL AND AMATEUR WIRELESS in the healthy position of having the largest net sales of any technical journal dealing with amateur radio, and it is now the only 3d. weekly. It is pleasing to be able to report that its net sales at the end of 1938 are above what they were in December, 1937. I stress this point because a few of the firms catering for home constructors have tended to believe that the market is closing. I can assure them that it is not so. The sales of our blueprints during the past year have been steadily main-

tained, and even increased, and those firms who have pinned their faith to the home constructor will find their confidence justified. The resignation of Sir John Reith, Director-General of the B.B.C., has not had the calamitous effect on broadcasting which many supposed. Nor has the appointment of Mr. Ogilvie as his successor been accompanied by whirl-

There has been a notable increase of interest in amateur transmission, and the series of articles we have published on this subject has been very popular; as also our new handbook entitled "Wireless Transmission for Amateurs." During 1938 we also produced in the interests of constructors and service men "The Practical Wireless Service Manual," which is the only volume of its kind dealing with servicing from the practical point of view.



A three-quarter view of the Battery Push-button Four

wind changes and reorganisation of programmes and personnel, which many thought would naturally ensue. A large piece of entertaining machinery like the B.B.C. must suffer from the defects of its own inertia—it is difficult to set it in motion—but once in motion it is difficult to change its direction of motion. I cannot forecast that there will be any great difference in programme material during 1939.

Criticism of B.B.C. programmes—a healthy sign which the B.B.C. encourages—has continued unabated, as it will next year. There has been a notable decline in the popularity of jazz bands, crooners, and gyrating, jibbering conductors who draw large salaries without understanding one note of music. It is indeed a welcome sign, and it is hoped by the majority of listeners that in 1939 jazz and dance music will be cut down to not more than two items of ten minutes each per week. I am confident that this will be a popular move.

"P. and A. W." Receivers

The series of receivers described in the journal this year has been most successful, judging from the many thousands of them which have been built. Our programme for 1939 will be based on suggestions which we have received this year from many readers. We shall do our best to produce receivers to suit all of our readers. The sets will, of course, be backed by our free advice guarantee as in the past.

Rising costs of production, including paper, printing, and distribution, which have affected all publishers and all journals, have provided a problem which has been solved in some cases by increased charges. We have, however, effected arrangements which render it unnecessary for us to pass along to our readers any increased cost. To the trade may I say that in spite of our increase in circulation we do not propose to increase the advertising rates.

Making a Simple Output Meter

Constructional Details are Here Given of a Useful Instrument for the Experimenter

By A. W. MANN

WHILST many experimenters include a multi-range test meter amongst their equipment, few are the possessors of a calibrated output meter. Under average circumstances, laboratory standards of accuracy are not required, and the limited use to which the instrument will be put do not justify the initial outlay.

A simple output meter will meet the requirements of those who do not consider the expensive type of instrument worth while.

of the meter and four sockets designated AA and BB respectively, which conform to those shown in the theoretical diagram, Fig. 1.

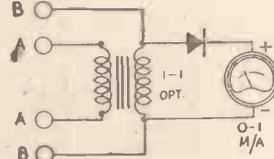


Fig. 1.—Theoretical circuit of the Output Meter.

The necessary dimensions are also given, relative to panel and centres.

Fig. 3 shows the general arrangement of components behind the panel, the top left-hand socket being underneath the crystal detector. The general layout allows sufficient space to carry out modifications and additions, in order to widen the scope of the instrument at some future date should it be desired.

Details of Casing

The first consideration is the construction of a suitable case for the instrument, which should be robust yet neat, and capable of protecting it from dust and damage. The case is simply a wooden box, but as a meter is a sensitive device, it is worth while making a good job of it.

Fig. 4 shows a dimensioned sketch of the case in detail. Reverting to Fig. 2, it will be noted that the case sides are trenched $\frac{1}{8}$ in., and that the ends are made $6\frac{1}{8}$ in. long in order to provide an inside width of 6 in. The arrow G in Fig. 2 will make this clear.

Referring again to Fig. 4, the box and lid can be made in the form of a complete and enclosed unit. Thus the depth from

E to F would be $2\frac{3}{8}$ in. plus $1\frac{1}{2}$ in., plus $\frac{1}{8}$ in., totalling in all $3\frac{3}{8}$ in. as against $2\frac{3}{8}$ in. Glue and sprig the whole together.

This is followed by finishing off the outside and then gauging a line along the sides, and ends, $2\frac{3}{8}$ in. from the bottom, followed by another at $2\frac{1}{2}$ in. By sawing between these parallel lines we assure a well-fitting lid.

Two strips of wood $\frac{3}{8}$ in. square should

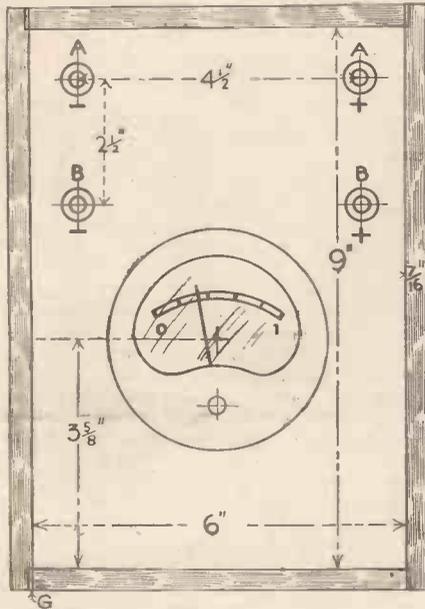


Fig. 2.—Panel layout and drilling dimensions.

Fig. 1 shows the theoretical circuit, in which is incorporated a one-to-one ratio output transformer with a carborundum crystal detector, and an 0-1 milliammeter coupled in series with the secondary winding. It will be noted that two sets of input sockets are shown. The output transformer is incorporated for isolation purposes, but if the receiver to be adjusted does not incorporate an output transformer, the meter sockets AA are coupled to the receiver output sockets. If otherwise, coupling is made to sockets BB.

Crystal Detector

With reference to the carborundum crystal detector, this, of course, carries out rectification. It is not suggested that its efficiency equals that of the metal rectifier type, but where ganging, matching, and interchangeability tests are to be carried out, and pick-up tests, etc., in conjunction with a simple oscillator, and in cases where comparison, rather than precision measurements are to be made, it will be found satisfactory.

The design centres around a Premier 0-1 milliammeter Type 14 of 100 ohms resistance, and which requires a hole $2\frac{3}{8}$ in. diameter for flush mounting on the panel.

Fig. 2 shows the panel layout, consisting

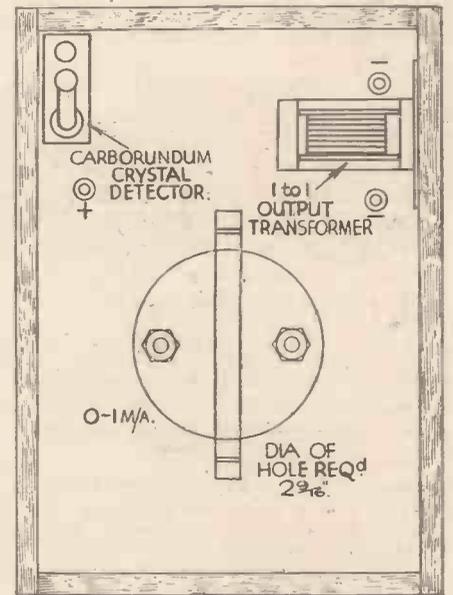


Fig. 3.—Component layout of the Output Meter.

next be screwed across the ends $\frac{1}{8}$ in. below the joint. Thus the $\frac{1}{8}$ in. panel will stand



Fig. 4.—The meter may be housed in a simple wooden case, and a suitable design may be made up as shown here.

NOW READY!

**WORKSHOP CALCULATIONS,
TABLES AND FORMULÆ**

By F. J. CAMM

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Ltd., Tower House, Southampton Street,
Strand, W.C.2.

$\frac{1}{8}$ in. above the joint, and act as a rabbet over which the lid is fitted.

The case should be completed with the panel drilled and fitted before component mounting and wiring is taken in hand.

A simple output meter of this type will prove to be well worth the modest outlay, and the method of case construction is applicable to a variety of radio cabinet and instrument cases.

Notes on Chassis Construction

In this Article, Specially Written for Beginners, the Uses of Tools and Constructional Details are Discussed

WITH many home constructors a great deal of the fascination in designing a new receiver lies in the preliminary chassis work, and although ideas are carefully planned on paper, some find difficulty in arriving at satisfactory designs. This in many instances may be due to lack of guidance, hurried measurements, or makeshift tools may have upset these good intentions; therefore, in the present article it is pro-

or snipping, but the constructor would be well advised to obtain a pair of separate wire cutters.

For marking out the metal work a suitable scribing tool and a pair of dividers will be necessary, and an exception can be made here in the use of the dividers for both purposes, but if funds permit, a neat combined scribing tool and screwdriver shank can be obtained for a very reasonable price.

A good quality steel rule is one of the most essential parts of the constructor's kit, and to prevent rust, it is advisable to keep this rule in a damp-proof place.

For bending purposes a mallet should be used, protecting the surface of the metal with a piece of thick cloth.

Another necessary tool is a try square, a suitable size having a blade 6ins. in length.

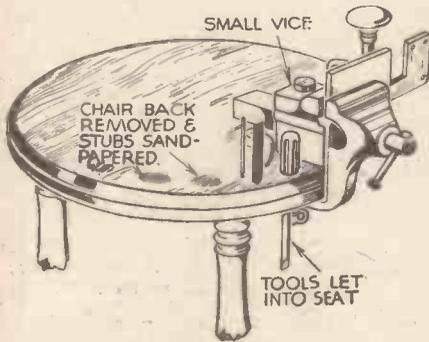


Fig. 1.—A disused chair converted for use as a small bench.

posed to deal with the essential details and a few of the constructional points which should be watched when shaping aluminium and brass.

These two metals are most favoured for average chassis work from the home constructor's point of view, chiefly due to the pliability; although, of course, the electrical value of these two metals becomes an important factor in more serious design.

Before dealing with the constructional side it is necessary to summarise the different tools which should be to hand, and these can be outlined as follows.

Tools Required

Commencing with the subject of filing, a small selection of different grades of file will be necessary, including rat-tail, round and needle types, having both fine and coarse cross cuts. The coarse files will be necessary for the removal of any considerable amount of metal during, for example, the preparation of a large hole or slot, the finer files being required for neat finishing.

Flat-type files fall into three categories—the straight, tapered, and the half-round flat or tapered. Each of these will be found essential in the shaping of slots and home-made jigs of unusual pattern, apart from normal uses. To have the correct file to hand will mean a considerable saving in time.

Only two types of saw need be added to the kit to begin with—a hack-saw, and a keyhole saw.

For both constructional and final test purposes it is advisable to have a pair of heavy-duty insulated pliers and two pairs of snipe-nosed pliers. With some pliers provision is made for wire cutting

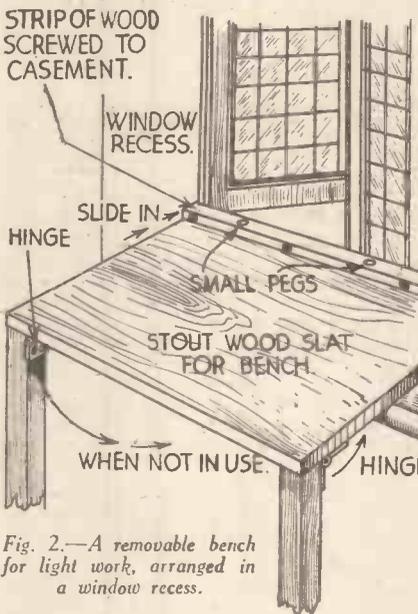


Fig. 2.—A removable bench for light work, arranged in a window recess.

The steel rule can serve as an accurate means of extending the blade.

The question of a suitable vice will have to be left to the discretion of the user, but one with jaws about 3ins. wide is a useful size. Next in order come the hand-drill, taps, brace and bits, the latter including countersinks.

Work Bench

Lack of room in which to work proves in many instances the greatest problem, but although a bench, or even a table, may not be commissioned for any length of time, a novel alternative can be improvised by converting an old chair, as shown in Fig. 1. If a window ledge of the recessed type is available, say, in the "spare" room, then a neat, removable bench for light work can be arranged in the manner depicted in Fig. 2.

With regard to actual construction, those who are used to drawing will find little difficulty in preparing their lay-out designs

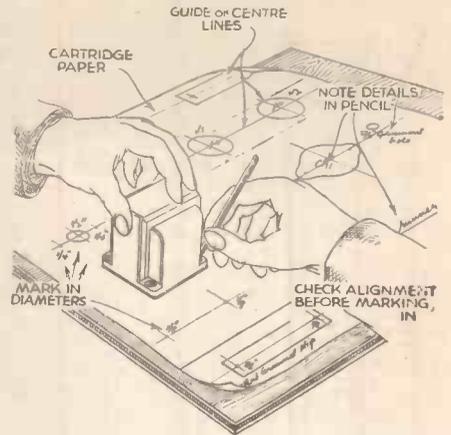


Fig. 3.—Marking out the position of components with the aid of a paper diagram.

for a proposed chassis, but it is assumed that drawing is out of the question, and trial and error methods are to be used.

The theoretical circuit conditions will be known, and the first consideration will be the relationship of the components when mounted. As trial-and-error methods are to be used, a sheet of cartridge paper will be required on to which can be positioned the various components, by drawing round them with a pencil. By turning the paper over, the under-chassis relationship and drillings can be noted exactly.

The amount of room which will be required for the incidental fixed resistances, small condensers, etc., will readily be ascertained, but there may be required a marginal allowance (see Fig. 3).

Having marked out the positions for the components, and carefully checked drilling points to see that the above and below chassis positions are not liable to foul, attention can be given to the question of screening, and any unusual forms of lugs or bracketing which will constitute part of the chassis modelling.

There will not be any appreciable saving in drawing brackets from the chassis itself, but at times when very rigid and compact designs are involved, this often proves a more satisfactory way of mounting certain components, so such a condition is included in a sample chassis for this reason (Fig. 4).

(Continued overleaf)

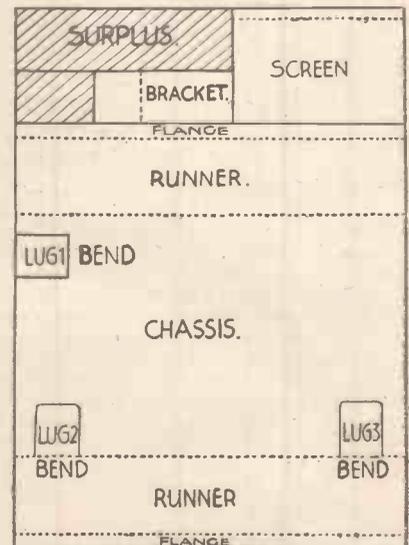


Fig. 4.—Marking out the chassis, etc., on the aluminium sheet.

NOTES ON CHASSIS CONSTRUCTION

(Continued from previous page)

Component Layout

Referring to the component layout drawn on the paper, and taking note of the overall dimensions of each piece of apparatus which is to be mounted underneath the chassis, the depth of the chassis runners can be ascertained with suitable allowances being made for the incidental resistances and wiring.

One of the many important considerations which will arise concerns the amount

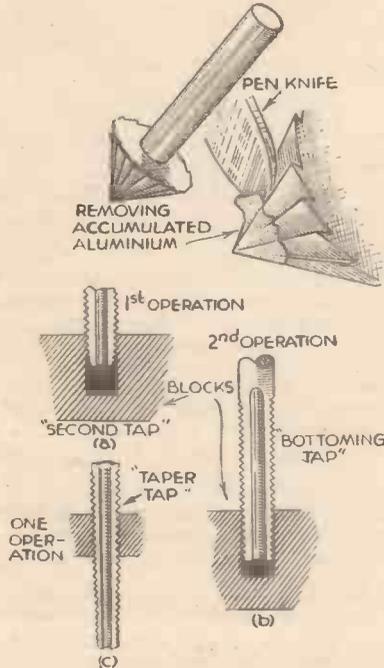


Fig. 5.—(Top) Removing aluminium deposit from a clogged countersink bit. Fig. 6.—Details of tapping.

of room which will be necessary for arranging such components as H.F. chokes, grid leaks, and any wire which will be at a high-frequency potential, and it may be found necessary to exceed the preliminary measurements made, this resulting possibly in the use of deeper runners.

There is also the question of ultimately housing the chassis in some form of cabinet, and provision will have to be made for runner flanges, or lugs, for clamping down in the cabinet. A final check should, therefore, be made before attempting the construction.

By the aid of the paper layout, it should be a comparatively simple matter to ascertain the amount of metal which will be required.

No. 16 or 18 S.W.G. aluminium will be suitable for most conditions, 18 S.W.G. proving a little easier for bending, and this is therefore advised for those unused to this class of construction. Fig 4 illustrates the manner in which a chassis can be planned to get a minimum of waste, but it will be noticed that the front panel is not included in these measurements, since when purchasing the aluminium, the measurements of this can be quoted, and the panel thus obtained already squared up.

Cutting Aluminium Sheet

To cut up the aluminium, the simplest method is by deeply scoring both edges along lines already scribed on both sides of the sheet, then in bending along these scorings it will be found that the metal

splits very easily, leaving only a slight serration along the edges of the metal which can be removed by drawing a fine cut file along the edges. Having obtained the incidental brackets, screens and chassis proper, it is preferable to bend, or perhaps one should say mould, the chassis prior to carrying out the drillings, since unless one is used to tolerances, an error is liable to occur owing to the nature of the bends. With the use of aluminium there is no reason why all drillings should not be carried out speedily and accurately, but before commencing it is essential, particularly in the case of the beginner, to use the centre punch, and, when drilling, it is necessary to drill slowly but with a steadily exerted pressure; hasty drilling will tend to cause a distorted hole, and if drill slip occurs, the surface will be spoiled.

Bad drilling can be caused either by relaxing pressure on the drill, thus causing "slip," or by the use of a bent bit, which results in the periphery of the hole becoming distorted. Occasionally, one may have a bit snap during the drilling, but these broken bits can prove useful at times when a thin bit which is rather long will tend to bend in inexperienced hands, thus causing trouble.

Making Large Holes

For making large holes in aluminium or brass sheet one method is to scribe a circumference to the required diameter, and drill a number of small holes just inside the scribed diameter, then with a metal-piercing saw, or small cold chisel, the surplus metal can be cut away.

Concerning the countersinking, in Fig. 5 it will be seen that aluminium will tend to clog the cutting edges so that unless this is removed, as indicated, one is bound to get a burred-over countersinking effect, which will prevent the screw head sitting flush with the surface of the aluminium. Should this occur, do not attempt to remove the burr by filing down, as in all probability the end of the file will scratch the surface badly. Re-countersinking after the bit has been cleaned will solve this problem.

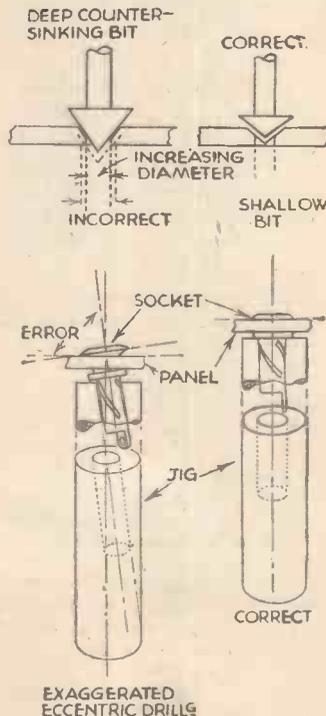


Fig. 7.—Methods of countersinking, and details of a socket jig.

Tapping

Tapping is quite a simple matter if due care is exercised in the choice of the drill bit used. There are three types of taps which need mentioning here: the taper,

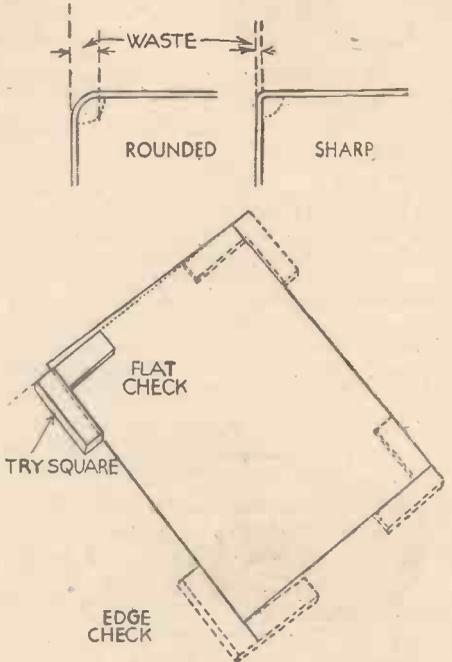


Fig. 8.—Details of bends in metal chassis; method of squaring up the edges.

second, and bottoming tap, and reference to Fig. 6 will make the difference clear.

The shaded portions represent either blocks of metal or ebonite, and it will be seen that for (a) and (b) where "blind" holes are to be tapped, two operations are necessary, the first being the use of the "second" tap for commencing the threading, this being followed by the "bottoming" tap, which allows the threading to be carried right to the end.

In the case of (c), where the drilling is carried right through the metal or ebonite, the taper tap is used in one operation, since this commences and finishes with an even thread by the time the tap is about half or three-quarters of the way through.

TABLE OF B.A. THREADS				
Gauge.	Diameter in ins.	Drill No.	Core Diameter in ins.	Taps.
0	.236	12	.189	
1	.209	19	.166	
2	.185	26	.147	
3	.161	31	.127	
4	.142	34	.111	
5	.126	40	.098	
6	.110	44	.085	
7	.098	48	.076	
8	.087	51	.066	
9	.075	53	.057	
10	.067	56	.050	

Before the tapping can be carried out, there is the question of the right side of drill to use, and referring now to the accompanying table of B.A. gauges, the exact diameter and number of the drill can be ascertained, but it is essential that one should become familiar with the comparative diameters.

After the threading operation do not remove the tap hastily, as this can very easily cause a burred or damaged thread.

In Fig. 7 is illustrated a simple valve socket jig made with brass rod, this serving as an example of the accuracy necessary in critical drillings of this nature. Drilling too fast will cause "whip" resulting in the type of error depicted.

ON YOUR WAVELENGTH



Radiolympia—Is There An Alternative?

EXHIBITIONS are always regarded by some firms as a nuisance, for many firms are so narrow-minded that unless they can measure the immediate result of publicity in terms of £ s. d., they presume that they have lost the money spent on it. I have been associated with several industries, such as motoring, cycling, aircraft and engineering, each of which runs its exhibitions. Ever since I can remember members of these industries have argued at their annual exhibition that it was not worth while; they did not propose to exhibit next year; one exhibition in three years is adequate; exhibitions merely waste our money, etc., etc., and etc.

Those firms, however, always appear at the following exhibition, because they feel that whilst their competitors are there they must be too.

Encouraging Trade

It is impossible to assess the value of an exhibition, but we can consider first of all the objects of an exhibition. In the first place, it is intended as a spectacle, and the trade organisations responsible for staging the exhibitions expect to make money from the attendance and from the exhibitors, in return for which they give considerable publicity to the industry. By attracting members of the public to the exhibition they are encouraging trade. An exhibition enables an individual to survey practically the whole industry under one roof in an afternoon or evening. The complaint, however, is that Northerners cannot afford the time nor the money to come to London, and therefore that all exhibitions should be held in the provinces as well; as far as the radio trade is concerned this has been tried, and it has failed financially, from which we must conclude that the Scots and the Northerners are a noisy minority who criticise out of pique, and some exaggerated idea of the importance of their country (more hoots, hoochs, and aches from binnie Scitland). If provincial people want exhibitions they should support them when they get them. It is a fact that exhibitions

By *Thermion*

only pay when they are held in London. Now, the trade should not expect to go to Radiolympia merely for the purpose of taking orders, and equally it should not presume that if it does not go to Olympia it will still get orders. It will not, and the full effect of an exhibition is not felt until months after it is closed. Many members of the public take that amount of time to make up their minds and to study the catalogue. I mention these things because I see a suggestion in a trade contemporary that Radiolympia is merely a local show, and that the trade should embark on some other form of combined effort. This individual thinks that the money spent on Radiolympia can be far better invested, and with perhaps greater experience of exhibitions than the writer of this particular article, I can say at once that there is not a satisfactory alternative to Radiolympia, which, whilst in the public eye representing a combined effort on the part of the trade, yet permits the manufacturers to operate at the Exhibition independently. There have been attempts to drop exhibitions, and to indulge in co-operative advertising schemes before, but none of them have yet succeeded. I have no doubt that if the radio trade embarks on such a scheme it would merely duplicate the experiences of other industries.

Keep Fit Campaign

For example, the cycle trade has recently embarked on a co-operative advertising scheme linking up with the National Keep Fit Campaign to popularise cycling. The Manufacturers' Union spent a large sum of money—£25,000—on advertising the Keep Fit Family, but, of course, not

naming particular makes of bicycle. Individual members of the trade naturally thought that this would result in immediate sales, and so they spent less on advertising their own individual makes. The result has been far from satisfactory. It is all very well to point to such national slogans as "Beer is Best," "Drink More Milk," "Eat More Fruit," and so on, but radio is in a totally different category. Fruit is fruit, and milk is milk, but all radio sets are not alike, and thus individual advertising is more necessary. The writer of the article to which I have referred doubts whether more than 75,000 buyers visit the Show. I do not accept that figure, but presuming it to be correct, let us suppose that each spends an average of £10. That represents a turnover of £750,000, and in getting this the manufacturers jointly spend £50,000, or less than 6 per cent. of the turnover, a very low figure.

For the Small Man

Another point is that an exhibition provides the little man with a small capital with the same opportunities of exhibiting his goods to the public. Apart from the number of visitors to the exhibition we must also remember the limelight of publicity which newspapers all over the country give to Radiolympia. The value of the editorial space alone, assessed at advertising rates, must be worth nearly £500,000. For the £50,000 which, is said the manufacturers spend on Radiolympia, you could merely purchase about fifty pages of advertisements in one of the London newspapers. It is absurd to suggest that this would have the same effect. The writer thinks that this would appeal to millions of people. I cannot see his point here, for quite obviously the press publicity of Radiolympia is read equally by millions, and it costs the industry nothing. Also, whatever form of national advertising was embarked on it could not really tell the story of the industry. Editorial support is worth pages of advertisements. The writer of the article thinks that dealers would contribute towards the scheme. I can assure him they would not. Radiolympia will be held next year as usual!

Simple Valve Tests

Methods of Testing and an Explanation of the Most-commonly-used Valve Terms such as Impedance, Amplification Factor and Mutual Conductance

IT appears that many of our readers are in doubt as to the simplest methods of testing their valves. It was customary a number of years ago to make sure that the filament circuit was intact, and from that to draw a definite conclusion as to whether or not the valve was in good condition. Such methods were always of doubtful value, but nowadays they are entirely useless; every experimenter knows that the filament or heater rarely burns out with a modern valve. Instead, the emission of the filament or cathode becomes less as the valve "wears out."

Cathode Emission

From that it should be clear that any test of a valve must depend upon checking the emission in certain standard conditions. Thus, a fair test can be made by the simple process of measuring the anode current—by means of a milliammeter included in the anode circuit—when particular grid and anode voltages are applied to the valve. A test of this kind can be made even when the valve is in the receiver by disconnecting one lead to the anode-load component (transformer, resistor or choke) and connecting a milliammeter between the anode and the H.T. positive lead. The meter must, of course, be suitable for reading currents up to at least the maximum likely to be passed by the valve under test. This generally means that a multi-range meter is desirable, that two or more meters

adjusted to the average figure for the valve under test; this figure is generally given in the makers' instruction sheet. Besides having a check on the anode voltage it is necessary to know the grid voltage. If the set is battery operated, this can be measured easily enough by connecting a meter to the two G.B. tappings in use. Should there be any doubt concerning the high or low resistance characteristics of the meter, it is better to leave the meter in parallel

by The Experimenters

with the G.B. supply while measuring the anode current. The reason for this is that if the meter has a fairly low resistance it will reduce the applied G.B. voltage, so that the actual voltage registered will be less than that applied to the valve when the meter is not in parallel with the supply.

Permitted Variations

With a mains-operated receiver it is always desirable to employ a high-resistance meter, although the method just referred to does reduce the extent of error if the meter is of low resistance. In measuring the anode current a comparison should be made with the stated average current in similar conditions of H.T. and G.B. voltages given by the makers. Remember, however, that a variation of a maximum of

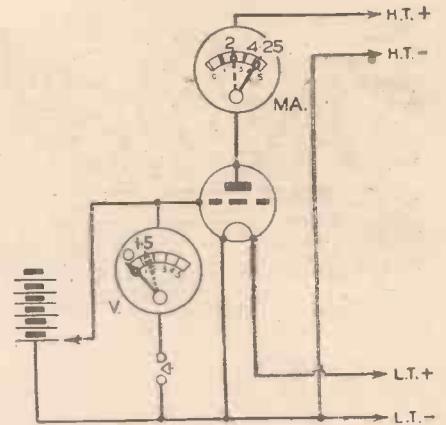


Fig. 1.—A simple circuit for testing battery triodes.

conductance or slope. This is given in milliamps per volt, and refers to the small change in anode current for a given small change in grid voltage. Thus, if the anode current is reduced by, say, 2 mA by increasing the grid voltage by one volt, the mutual conductance is said to be 2 mA per volt; this is generally written as 2 mA/V.

The measurement is usually made with 100 volts applied to the anode, and with a commencing grid voltage of zero. Fig. 1 shows the type of simple circuit that is employed when testing a battery triode, although similar tests could be made with mains valves by feeding the heater from a transformer and connecting the cathode to the earth line. It should be remembered that when testing tetrode or pentode valves it is extremely important that the correct auxiliary-grid voltage should be applied, since it has a pronounced effect on the anode current. This also applies when testing valves by the emission method, which we referred to above.

In Fig. 1 we have shown the two test meters, and have shown the needles in two positions. The needles shown in full lines refer to the grid voltage of zero, and those shown by broken lines to a grid voltage of 1.5. In the example illustrated it will be seen that the anode current at zero grid volts is 4.25 mA, and at 1.5 grid volts it is 2.25. This shows that the change in anode current for 1.5 volts change in grid potential is 2.25 mA. By dividing 1.5 into 2.25, it can be seen that the mutual conductance of the valve under test is 1.5 mA/V. In making the test it would generally be necessary to set the anode voltage to 100, or as near that as possible. This is not invariable, though, for in some cases the slope is given by the makers at other than 100 anode volts. In their literature, by the way, anode voltage is often given under the heading V_a or E_a , whilst grid voltage is given as V_g or E_g . Similarly, anode current is given under the heading I_a .

Amplification Factor

Sometimes, although it is not usual now, amplification factor is also given in the valve manufacturers' literature. This is the ratio between a small change in anode voltage required to produce the same change in anode current as a corresponding change in grid voltage. Thus, if the anode current at $V_g=0$ and $V_a=100$, is 3 mA, and this is reduced to 2 mA by increasing the G.B. voltage to minus .75, whilst it is necessary to reduce the anode voltage by 20 volts to produce the same effect, the amplification factor would be about 27. In determining the change in anode voltage

(Continued on page 383)

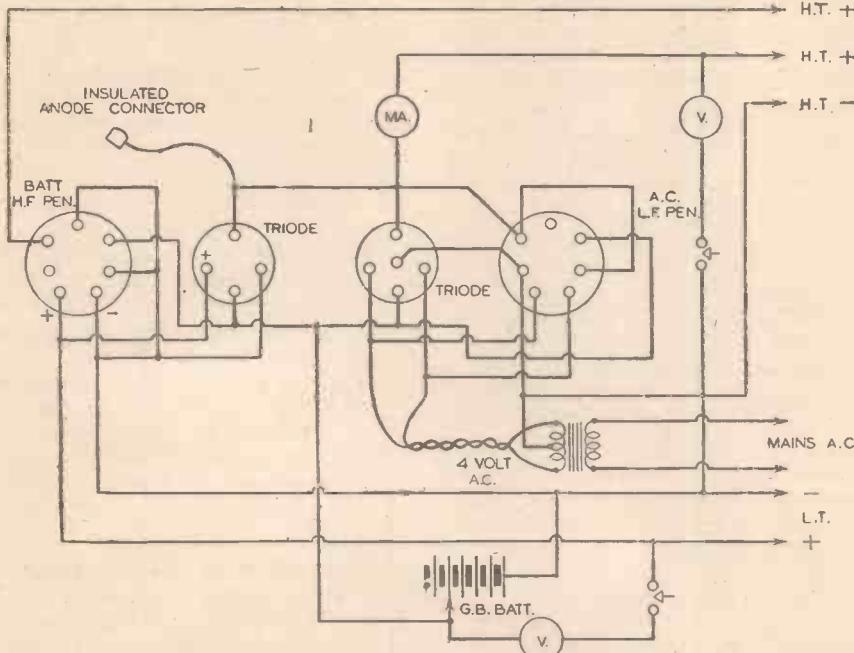


Fig. 2.—Details of a comprehensive tester for 7- and 4-pin valves—battery and mains.

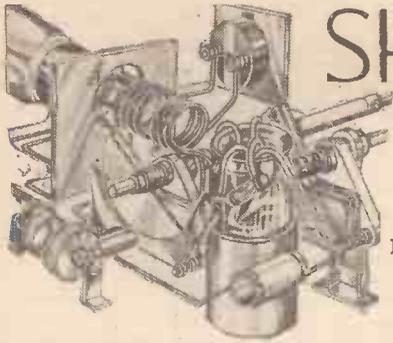
should be available for different types of valve, or that shunt resistors should be used to vary the scale indications.

It is also necessary that the anode voltage should be measured with reasonable accuracy, because the anode current is largely dependent on this. The voltage should be measured, and, if possible,

20 per cent. is not necessarily an indication of a valve fault. Valves of the same make and type do vary to a certain degree in spite of the accurate methods of production.

Measuring Slope

A more accurate method of testing a modern valve is by measuring its mutual



SHORT-WAVE SECTION

TWO-IN-ONE RECEIVERS

How to Obtain Maximum Results on the Short Waves and on the Broadcast Wavebands

By W. J. DELANEY

READERS who have tried short-wave reception will have found that the requirements called for in short-wave apparatus are entirely different from those needed on the ordinary broadcast wavebands. Almost any components may be used in a broadcast receiver, and good results may be obtained. On the short waves, however, unless properly-made and designed apparatus is used, results will be disappointing. For the broadcast wavebands, there are two alternatives open to

tions in the equipment so that the circuit itself may be changed, operating as a superhet in one case and as a powerful straight set in the other. The constructor can make use of either of these schemes or can adopt separate units which may be connected up as required. For the short-waves a straight circuit generally proves best in the hands of the experimenter, and quite a good plan is to build an H.F.-Detector short-wave unit, mount this on the baseboard or chassis, and on the same unit build a straight

three aerials and three receivers to pick up the American stations, and the output from these receivers was mixed and fed to the land-line to Broadcasting House. In the new system the two aerials are spaced half-wavelength apart, and it has been found that as the signal on one aerial fades, that on the other aerial will increase proportionately. Therefore, the idea seems to be to connect two receivers to these two aerials and change from one to another as required. It would be impossible to make the change quickly enough, so the aerials are permanently connected to the two receivers. The output from the detector stage of each is then taken to a common amplifier, and the signal will remain of constant (or more or less constant) strength. The drawback to this idea is that as the signal fades on one aerial the background noise due to atmospherics and other static will increase, or in other words the background will remain constant, and will thus appear to grow in proportion to the fade out on the signal. Consequently, if the two receivers are simply adjusted in the usual way although the signal would keep constant, the background noise would vary

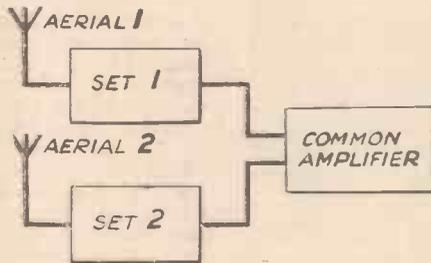
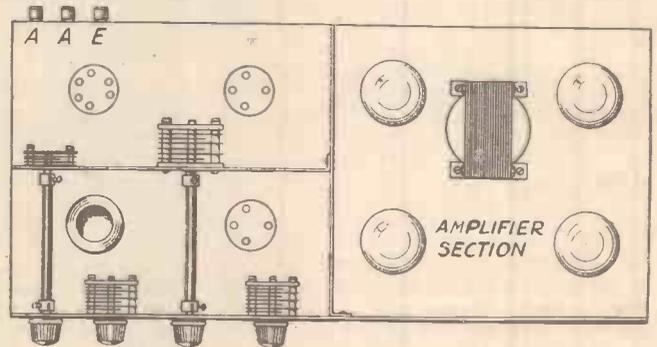


Fig. 1 (left).—Using two separate receivers and aerials to overcome the effects of fading.

Fig. 2 (right).—How to arrange a combined short-wave and broadcast receiver.



the listener. He can build a set to give what might be termed "general" reception, or he can make a receiver to give him only the local stations. The latter can be just as expensive and complicated to make up as the "general" receiver. Whilst the latter will give a wide choice of stations, it will, in the majority of cases provide a noisy background and the quality obtainable will not be the best that can be obtained from modern apparatus. On the other hand, a local-station quality set, as it is generally called, will be perfectly quiet in operation, and if properly designed it should be impossible to tell whether it is switched on or off, even when using an A.C. receiver with mains-energised speaker. Furthermore, in tuning from, say, the National to the Regional, not a sound should be heard between the two stations.

Two Receivers

It is obvious, therefore, that if we need to reach out either on the short waves or on the normal bands, and also wish to hear the locals at their best, we will require two separate receivers. This is expensive and certain manufacturers have found that there is definitely a demand for this type of equipment, and as a result have combined the two in one. There are various schemes available for such combinations. The simplest is to build the L.F. section first, designing this for high quality, and then using in front of it a superhet circuit with transfer aerial connections. In this way it may be used as an all-wave superhet for long-distance work, and then when local quality is required, a switch is operated which makes the receiver a simple H.F.-Det. arrangement followed by the amplifier.

In some cases there are certain duplica-

broadcast set. The amplifier could be common, and the separate sections should be screened. Some idea of the arrangement may be gained from Fig. 2.

Separate Controls

Separate tuning controls would have to be employed, but by using standard extension rods this difficulty could be overcome and the short-wave unit would be removed from the operator thus avoiding hand-capacity effects. Certain old components are still available, which could be ganged so that a common control could be employed to tune the medium- and short-wave coils. A scheme such as this enables each unit to be built on ideal lines, with the special components and valves which are called for, but the cost of the total equipment is reduced by using the common amplifier. Furthermore, as the latter will be designed for high quality, better results will be obtained on the short waves. Whilst it might seem expensive to make up two separate units or receivers of the type mentioned, it should be borne in mind that the results obtained will definitely justify the additional cost, and a quality receiver for the local stations is well worth while.

Diversity Reception

There is one other type of two-in-one receiver which should appeal to the experimenter and short-wave listener, and that is the type known as a "diversity receiver." The short-wave stations suffer considerably from fading, the effects varying from hour to hour and from day to day. Many attempts have been made to overcome this, but the latest idea which is being used in America is to use two receivers connected to two aerials. The B.B.C. some time ago used

considerably and spoil reception. A novel form of A.V.C. is therefore adopted, and as the signal on one aerial fades the gain of that receiver is reduced at the same time, so that noise is also cut down. The other receiver gain will then increase and as the signal increases the combined effect of these two receivers will be to give a constant signal output with a minimum of background noise. No doubt receivers designed on these lines will soon be available on the English market.

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Practical Television

December 24th, 1938. Vol. 3. No. 131.

Another Camera Scheme

WE have mentioned before in these columns that several suggestions have been put forward for the purpose of allowing the mosaic screen of an electron camera to be scanned by a beam of electrons normal to the plate's surface instead of obliquely. This is for the purpose of overcoming one of the main defects of the Iconoscope, and the methods proposed for this purpose seem in no way to be exhausted. The latest takes advantage of an electrostatic field arranged to act on the electron image as if it was a mirror reflecting surface. The scene to be televised is first of all focused optically on to a transparent photoelectric cathode. The electron image emitted from the surface inside the tube is focused by a magnetic and electrostatic field so that it travels beyond the signal-generating mosaic. At the far end of the tube this electron image meets what is termed a zero equipotential surface formed by two oppositely charged tubular electrodes. This formation acts as a complete reflector to the electron image so that it is made to reverse its direction and strike the photo-electric mosaic. Secondary emission takes place and the resultant elemental charges brought about are neutralised by the scanning beam of electrons generated in the neck of the tube remote from the original transparent cathode. In this way the usual form of television signal is generated and trapezoidal scanning distortion avoided. In the device proper the field of force acting as a mirror to the electron image serves as a focusing field to the scanning beam of electrons. Somewhat complicated to set up accurately, the idea certainly seems to overcome successfully the keystone distortion, which is the main purpose of the invention.

South Coast Reception

IN certain parts of the South Coast it is now becoming quite common for television pictures radiated from Alexandra Palace to be watched consistently on receivers installed in the home. Care has to be exercised in choosing the aerial sites, while directional antenna help matters considerably, as also does a pre-amplifier in those cases where signal strength is rather low but outside interference is negligible. As a case in point a radio exhibition was organised recently in Portsmouth in aid of charity and although between 80 and 90 miles from the transmitter, one of the attractions was a commercial television set which enabled visitors, in many cases for the first time, to be entertained by the normal B.B.C. service programmes. Now the local Municipal College is engaged in organising an "open day," and the work devoted to television will be evidenced by the display of actual receiving sets built by the students themselves.

Projection C.R. Tube Receivers

ALTHOUGH the projection type of cathode-ray tube receiver was featured by one or two firms at this year's Radiolympia Exhibition it would appear that only a few of these models have found their way into practical use. Although the enlarged picture size, when compared with the normal domestic model, is a big factor to consider, the question of cost has



An engineer "mixing" the television waves so that the screen image will maintain its proportion, during the recent television broadcast from St. Martin's Theatre.

certainly limited the field of sale to a very narrow one. There are certain inherent defects which make these sets less efficient than a 12in. or 15in. cathode-ray tube model, and among these mention can be made of brightness and the rather directional effect exhibited by the reproduced picture. In most models the semi-opaque screen positions itself vertically at the front of the set at the top when the lid is raised. The received television signals trace out a brilliant miniature picture on the optically ground glass face of the projection tube, and this is focused on to an inclined mirror which reflects it to the rear of the viewing screen. Now the Germans at the moment place no faith in the small type picture domestic receiver (5in. and 7in tube set), and in consequence they have directed

their attention towards the production of a projection form of cathode-ray tube which reproduces the picture on the front of the remote screen. The fluorescent screen of the tube is not arranged at right-angles to the tube axis, but has a definite inclination. The resultant trapezium shape of the picture is corrected, however, by adjustments which take place automatically on the width of the line scan pulses. From this inclined screen a double reflecting mirror combination in conjunction with a lens front projects the picture on to a screen located in the lid at the top back of the set. It is claimed that in this way the loss of light is reduced, while directional effects are not so apparent as in the case of other types.

Work In Italy

IT is at least six years ago since the Italian authorities purchased equipment to carry out their first serious television experiments. The apparatus was made by Fernseh A.G., of Germany, and comprised a film scanner, together with an ingenious form of the spot light arrangement. A disc was used to provide the requisite moving light areas, but the photoelectric cells, which were arranged on a circular ring stand to pick up the light reflected from the person being televised, had their active cathodes facing away from the person! Actually, the cathode surface of each cell was located at the focal point of a parabolic reflecting mirror. The mirror, therefore, collected the light reflected at every instant from the scanning spot and focused it on to the cathode. A much better signal was generated in this way. Furthermore, by an ingenious mechanical arrangement it was possible to allow either horizontal or vertical scanning to be undertaken at will; the decision as to which form was to be employed depending on the nature of the subject or scene it was desired to transmit. For example, if only the head and shoulders were required then vertical scanning would be used, but in the case of a

more extended scene or if two people were to be shown, a quick changeover to horizontal scanning was made. The receivers used with this system were adaptable in the same way, the only additional control being a simple change-over switch. Since that time various reports have been made dealing with television developments in Italy, and the company which has apparently devoted the most time to this work is Safar. It is now learned, however, that early in the New Year a regular service of television signals will be inaugurated in both Rome and Milan. Many of the important radio manufacturers are already engaged in research in receiver design.

Making a Simple Oscillograph

How to Construct a Mechanical Oscillograph Which May Be Used for Various Purposes

MOST of our readers are familiar with the cathode-ray oscillograph which is used for receiver tests of all kinds. The production of waveforms by means of this instrument is very fascinating, and some interesting results may be tabulated. A substitute for the cathode-ray instrument may be built up and made to give fairly accurate results, the performance depending, obviously, on the efficiency of the workmanship.

To make our "mechanical" oscillograph we need a loudspeaker, a gramophone, some mirror glass, and some type of light-projector. For the light-projector, even the simplest type of child's magic lantern will suffice, whilst, if a gramophone be unobtainable, a substitute for it may generally be contrived in the form of some analogous revolving mechanism.

The Loudspeaker

Let us begin the construction of the oscillograph with the loudspeaker. This should be of the usual moving-coil type. Obtain a 2 or a 2½ in. length of springy wire and exactly in the middle of it cement by means of a tiny drop of sealing-wax, a small mirror about ½ in. square. This mirror should be selected with care. It should be as thin and as light as possible, since, to function efficiently, it should possess a minimum amount of weight. Usually such a small scrap of mirror glass may be obtained from scientific supply stores or even from jewellers' emporiums.

The short length of springy wire with the mirror attached to the middle of it has one end stuck with sealing-wax to the spider of the coil speaker, and the other end of the wire is similarly attached to the cone of the speaker.

The Mirror Drum

We have now to make a simple type of mirror drum. This is best constructed by cutting out of a block of wood a six-sided piece, the length of the six-sided block being about 3 in., each of the sides having an equal width of ½ in. or 1 in. We must now obtain six strips of mirror glass to fit the sides. These may readily be cut with a diamond from any odd sheet of mirror glass, and a local glazier or woodwork store dealer will usually do the job of cutting up the mirror glasses to size for a few pence.

Having obtained our six equal-sized strips of mirror glass, each strip being, say, 2½ in. by 1 in. in dimensions, we arrange these around our six-sided wooden block, securing the mirror glasses in position by means of strong rubber bands placed at the upper and lower ends of the mirror-glass assembly.

The lower end of the six-sided wooden

supporting block has a hole drilled centrally up into it, and by means of this central hole the completed mirror-drum is slipped over the spindle of a gramophone turntable, so that the mirror-drum rotates with the turntable.

Light-projecting Apparatus

We must now provide some type of light-projecting apparatus. A small magic lantern, even of the toy variety, will suffice for this purpose. Whatever projection device we employ, however, must be

and the projection lamp at the other, while on the third side we hang the white screen.

The above arrangement will be seen quite clearly in the diagram. The loudspeaker, projection lamp, and gramophone are so arranged and positioned that the narrow pencil of light from the projection lamp impinges upon the tiny mirror attached to the loudspeaker. The light-beam reflected from this mirror is then made to fall upon



The home-made six-sided mirror-drum of the oscillograph mounted on the spindle of a gramophone turntable. The mirrors are secured in position on the supporting block by means of rubber bands.

masked by a very small hole, so that only a narrow pencil of light is projected by it.

Finally, we require some sort of screen—a sheet of white card or paper, or a suitably mounted sheet of cloth.

The components of our "mechanical" oscillograph will now be complete. It but remains for us to co-ordinate them and to set them in correct adjustment.

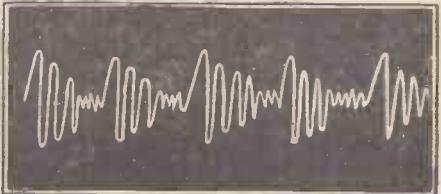
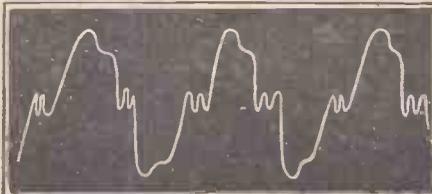
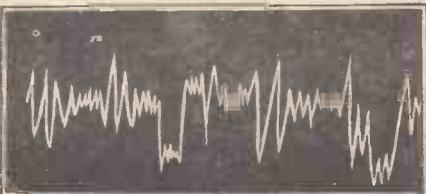
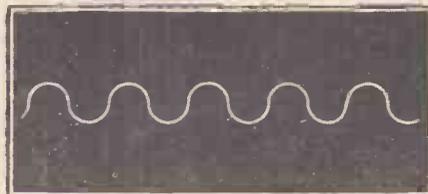
Placing the gramophone centrally on a table, we fix the loudspeaker at one side

the mirror-drum mounted on the gramophone turntable spindle, and the white screen is so arranged that the light from the mirror-drum falls upon it.

In practice it will be found necessary to tilt the gramophone upwards or downwards slightly in order that the light beam reflected from the mirror-drum will not cross the path of the projector-lamp beam.

The Spot on the Screen

When the oscillograph components are correctly positioned and adjusted a white spot should appear on the screen immediately the projector lamp is switched on. When the gramophone turntable is set into rotation, the spot on the screen should spread out into a thin line. If, now, the loudspeaker is switched on, the luminous line on the screen will at once break up into innumerable and ever-changing com-



Characteristic wave forms of sounds obtained by means of the oscillograph.

plex waveforms which constitute, of course, the graphical representations of the sounds which are emanating from the loudspeaker.

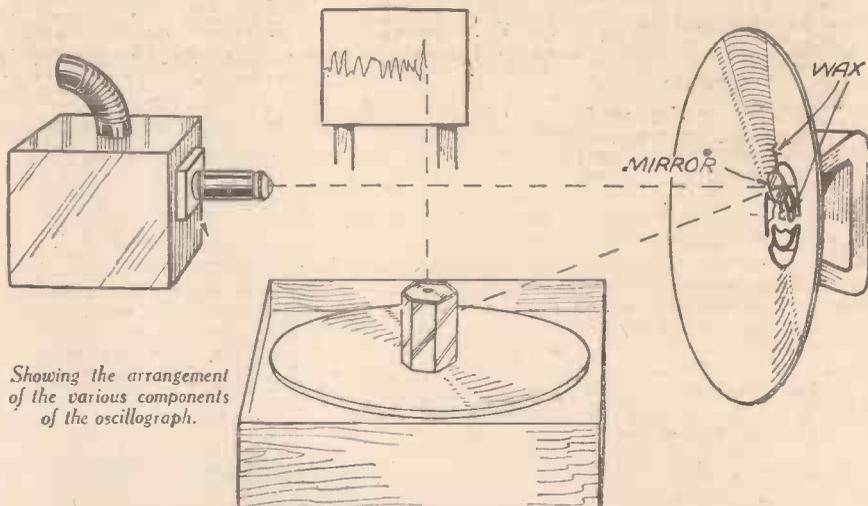
The clarity of the projected wave-forms and also their fidelity depends upon the narrowness of the projected light-beam, the lightness of the loudspeaker mirror, and the speed of the revolving mirror-drum. Rotated at "ordinary" gramophone speeds, i.e. about 80 revolutions per minute, a carefully constructed mirror-drum will give effective results.

The graphical representations of sound which are obtainable with the aid of this simple "mechanical" oscillograph are interesting in the extreme. They become doubly interesting when they can be repeated at will, which requirement may be effected by connecting the speaker to a radiogram or record-playing desk and by playing the same record over and over again.

If you possess or can obtain a constant-frequency record you can connect this to your receiver and feed the loudspeaker in the usual way. You can then see the effects of reproduction and changes may be made in the circuit and the results carefully noted on the "screen." Ordinary broadcast

programmes could be reproduced by this means, but the complexity of the sounds delivered to the loudspeaker would be rather too much for the simple arrange-

ment and therefore a simple note such as is obtained from a constant-frequency record will furnish the most useful type of signal for study.



Showing the arrangement of the various components of the oscillograph.

Leaves from a Short-wave Log

Rome Broadcasts in Czech

THROUGH IRF, Rome - Torrenova (Italy), on 30.52 m. (9.83 mc/s), the E.I.A.R. broadcasts every Thursday at G.M.T. 17.40 a concert, and talk, destined to Czech listeners. The transmission is simultaneously given through Rome (11) on 245.5 m. (1,222 kc/s).

Another Short-waver in China

IT is reported that a 35-kilowatt station has been opened at Chunking, the present seat of the Chinese National Government. It is provided with beam aerials directed on Europe, in order to permit the reception in the Western hemisphere of official Chinese war bulletins in the English, French and German languages.

Time Table of Villarica

ZP14, Villarica (Paraguay), on 25.59 m. (11.725 mc/s), 300 watts, is now on the ether nightly from G.M.T. 22.00-04.00. The call is *Radio Cultura* or *La Voz del Corazon de Sud America*. The broadcasts usually close down with the playing of the *Stars and Stripes for Ever*.

La Voz del Sud

CB1180, Santiago (Chile), on 25.42 m. (11.8 mc/s), formerly *La Voz del Comercio*, transmits nightly programmes sponsored by R. C. A. Victor, and others provided by the International Broadcasting Club of Chile. Intervals in the entertainments are marked by three chimes: the transmission ends with chimes similar to those of Big Ben.

Melbourne's Radio Schedule

THE Lyndhurst (Victoria) transmitter acting as the short-wave outlet of the Melbourne radio programmes now works daily as VLR3, on 25.25 m. (11.88 mc/s), from G.M.T. 16.00-08.00, and as VLR, on 31.32 m. (9.58 mc/s) from G.M.T. 08.15-13.30. VK3ME, Braybrook (Melbourne), broadcasts daily (Sundays excepted) from

G.M.T. 09.00-12.00, on 31.55 m. (9.5 mc/s), with a power of 3.5 kilowatts.

A Strong Signal

EXCELLENT reception is now being obtained during the afternoon hours, from G.M.T. 14.00-16.00 of KZRM, Radio Manila (Philippines), on 31.35 m. (9.57 mc/s). The station works from G.M.T. 10.00, but it is not easy to pick up the signals before the above-mentioned time. A metronome is used as interval signal and most announcements are made in a female voice. At G.M.T. 13.45 a weather forecast is broadcast for the Philippines and the island of Formosa (Taiwan). The station closes down at about G.M.T. 21.30 with gong notes, and a "very pleasant good night" is wished to listeners. The distance from London is roughly 6,400 miles, and the Standard Time eight hours ahead of G.M.T. Another station at Manila testing is KZIB, on 31.58 m. (9.5 mc/s), 1 kW. It is owned and operated by I. Beck, Inc., and broadcasts have already been logged in the British Isles.

A Mystery Solved

WHAT was deemed to be a broadcast from a station at Kingston (Jamaica) is now confirmed as a transmission from HH2S, Port-au-Prince, Haiti. By arrangement with the West Indies Broadcasting Company this station transmits nightly-sponsored programmes in the English language on 49.94 m. (6.007 mc/s). The studio is run by a woman announcer, works from G.M.T. 23.00-04.00, and as an interval signal has adopted two double chimes of four chimes when preceding a time signal. Announcements in the course of the programme are given out in both English and French.

New Chilean Transmitter

LISTENERS report reception of signals from a broadcasting station at Valparaiso on 30.88 m. (9.715 mc/s); the transmission was heard at G.M.T. 04.30, but so far the call-sign has not been logged.

Another Broadcast from China

XGAP, Peiping (Peking), China, on 31.38 m. (9.56 mc/s) has been brought into operation by the Japanese authorities for the daily transmission of a war news bulletin. It is on the ether between G.M.T. 13.00-19.00.

PROGRAMME NOTES

Christmas Songs and Carols

THE B.B.C. Midland Singers, conducted by Edgar Morgan, will give a programme of Christmas songs and carols on December 26th. The eleven numbers will include some that are traditional, arrangements by Dr. Vaughan Williams and Gustav Holst, and a few songs by modern composers.

Musical Games

ANOTHER Boxing Day programme from the Midland Station, which will also be heard by Regional listeners is "Musical Games." Devised by Reginald Burston, who conducts the Midland Revue Orchestra, this programme will be compered by Martyn C. Webster. It is the second programme of the kind on which they have collaborated.

B.B.C. Symphony Orchestra

WE are informed that the B.B.C. Symphony Orchestra, under the direction of Sir Adrian Boult, will visit the North, West of England and Midland Regions next year, giving concerts at Preston (Public Hall), on March 29th; Bristol (Colston Hall) on April 15th, and Wolverhampton on April 19th. It was previously announced that the concert in the North Region would take place at Liverpool, but it was subsequently found that the new Philharmonic Hall would not be completed by the date fixed for the concert.

Bournemouth Cabaret

DANCE Cabaret will be broadcast from the Royal Bath Hotel Ballroom, Bournemouth, in the West of England and Regional programmes on December 28th. The artists will be: Walsh and Barker, "The sophisticated stylists of song and satire"; Jeanne de Casalis, "Mrs. Feather"; Cavan O'Connor, "The Vagabond Lover"; Payne and Hilliard, "In burlesque episodes"; Cyril Fletcher, "compère"; and Benny Loban and his Dance Band, with the Royal Bath Singers.

A PAGE OF PRACTICAL HINTS

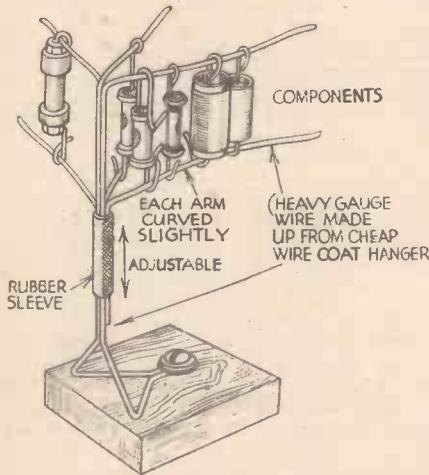
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Rack for Wire-ended Components

HAVING broken one or two 1-watt resistors and impaired the winding of an ultra-short-wave choke through laying these on the table whilst carrying out tests on a heavy chassis, I decided to con-



This simple rack keeps wire-ended components always at hand.

struct a wire rack so that miscellaneous wire-ended components could be temporarily mounted, and thus kept out of harm's way.

A stout wire coat-hanger provided the necessary heavy-gauge wire, and by forcing the arms through a short length of thick rubber sleeving, bending after inserting each length of wire, I managed to make this quite firm, yet adjustable. Each arm was slightly curved, as illustrated, these curves preventing any tendency of slack components sliding off when the arms get crowded.

A heavy piece of oak was used for the mounting base, with a spring washer included under the head of the wood screw for the sake of rigidity.—T. E. ANDERSON (Luton).

A Step-by-step Resistance with Auto-adjustment

WITH some lengths of 1 1/2 in. diameter bakelite former (F) I have wound a number of different resistances (R), using oxidised nickel copper wire, the track covering only 140 degrees; thus, as will be noticed from the sketch, allowing for the fitment of the ebonite control rod operating in the vertical slot.

Instead of commonly mounting the cams and each resistance "element" on a threaded rod, which would make interchanging rather awkward, I devised an assembly employing short pieces of ebonite bushing with a larger diameter length of bushing acting as a friction coupling between the resistor section and the adjacent cam.

In this manner, and by including a light spring at each end of the movement, the resistor assembly, and the cams, can be

THAT DODGE OF YOURS!

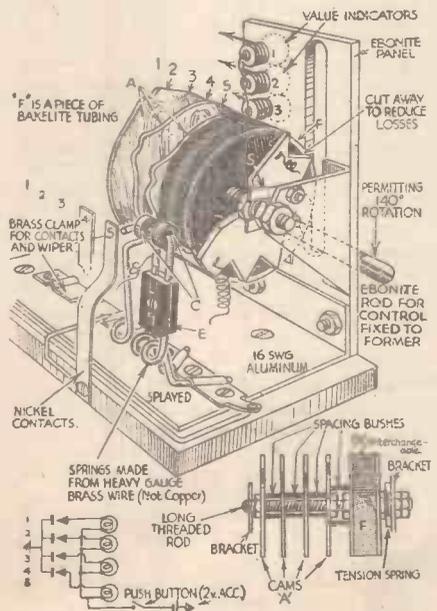
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account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

treated as independent parts, facilitating adjustment when certain values are being arranged, and permitting ease of replacement in the case of the resistance.

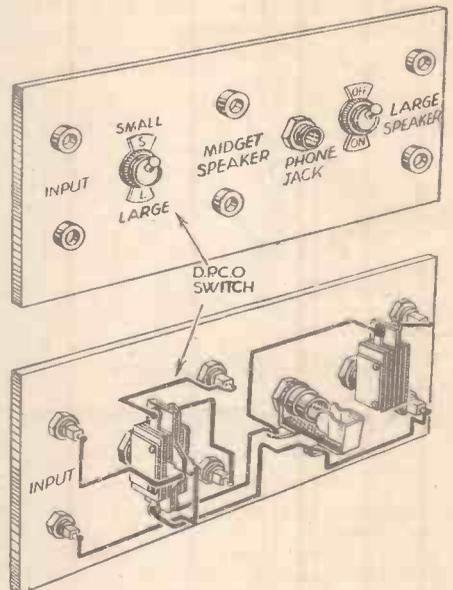
The cams (A) were shaped out of plywood, the one clamping the resistance at the end being cut or "toothed" for the purpose of low losses. C are curtain-runner bearings, and are insulated from the aluminium mounting base by small pieces of ebonite (E) grooved to prevent slip. The rest of the assembly is clearly indicated in the drawing, and with regard to the operation, after fitting a resistor covering the range required by the tests, each cam is adjusted so that the progressive indicating bulbs light up at the allocated resistance values over the contacts.—L. R. SMYTHE (Ealing).



A novel step-by-step resistance unit with automatic adjustment.

A Useful Output Switchboard

WHEN carrying out searching during the late hours it is often found that signals vary on different stations, and much interest is lost when one has to remove headphones and connect speaker, and vice versa. During my tests I evolved the neat little switchboard shown in the accompanying illustration, and as a result my log has increased considerably as I am able to hear



A neatly arranged output switchboard.

with comfort all signals from R2 to R9. As will be seen, speakers of different kinds and 'phones may be permanently connected, and at the flick of a switch it is possible to change from one to another and thus obtain a better idea of comparative volumes, as well as avoiding missing some stations due to the use of the loudspeaker alone.—A. W. COOKE (Harrow).

PRACTICAL MECHANICS HANDBOOK

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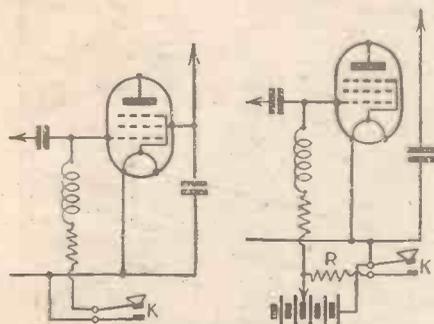
The Amateur Transmitter

Telegraphic Modulation : Where to Insert the Morse Key : Waveform Distortion, and Points to Watch are Discussed in this Article - - - By L. O. SPARKS

BEFORE leaving the original oscillator chassis which has been used for the elementary experiments described in previous articles, it is necessary to consider "modulation" and "frequency doublers."

Although these items have been covered in the original series and in detail in the book "Wireless Transmission for the Amateur," it is hoped that those familiar with the theory will appreciate that the "hams" of to-morrow have to get a clear understanding of such essential sections of a transmitter.

So far, we have been concerned with the generation of suitable continuous waves by



Figs. 1 and 2.—Examples of controlling the valve by grid-bias methods.

means of a valve oscillator, and the amplification of the power thus obtained through the addition of a P.A. stage.

If the continuous waves were allowed to radiate, it would be found that they are useless, so far as conveying information is concerned, unless they are subjected to some further process or treatment.

All listeners are familiar with the fact that a receiver has to be in an oscillating condition before it is possible for continuous waves to produce an audible sound through their loudspeaker. For example, between items during a broadcast transmission it is not possible, except for a slight swishing noise on a sensitive high-gain receiver, to hear the "carrier," or continuous waves, which is still being radiated, unless the reaction control is advanced to a certain point when a high-pitched note or whistle will be produced.

A moment's consideration will reveal why this is so. The "carrier wave" is nothing more than the oscillations generated by the oscillator of the transmitter, and as such are at radio frequency they are well beyond the limit of audible frequencies; in other words, they do not come within the range of oscillations to which the human ear can respond.

If, however, the receiver is made to oscillate and generate oscillations of its own, then an audible note will be produced by the frequencies representing the difference between those transmitted and those produced by the receiver.

This state of affairs is not too satisfactory, at least, when one is considering telephony, so it becomes necessary to make certain

modifications to the continuous waves before information can be conveyed.

Modulation

This modification comes under the heading of "modulation," which can be roughly divided into two distinct sections, namely, telegraphy and telephony.

For telegraphy, use is made of the International Morse Code, with which all budding transmitters should, by now, be very familiar. As all numbers and letters of the alphabet are represented by an arrangement of "dots" and "dashes" in Morse, it only remains for some means to be provided to enable the stream of continuous waves to be broken up, at will, into the required sections representing "dots" and "dashes."

This would seem quite an easy matter, and it is, up to a certain point, but it must be appreciated that as we are really dealing with "amplitude modulation" it is possible to set up severe distortion in the radiated waves, and cause vile unreadable signals to be sent out, apart from causing violent interference to nearby listeners, unless certain precautions are taken.

To obtain the control over the transmitter required by the Morse Code, a switch or key has to be used, and so located in the circuit that it causes breaks in the generation or radiation of the oscillations.

It should be noted that I mention generation or radiation; it would seem that the most obvious spot to insert the Morse key would be in the actual oscillator circuit. That is quite correct, but as there are other items to be considered, it is not to be recommended, although it is quite widely used.

One of the first things to avoid when keying a circuit is the possibility of causing any variation of the frequency of the oscillations. This is one of the snags of keying the oscillator; even with a crystal-controlled stage the possibility is not completely removed, and in any case, unnecessary strain is thrown on the crystal by such procedure.

It is more usual, therefore, if circuit conditions permit, to arrange the key in one of the stages between the oscillator and the aerial.

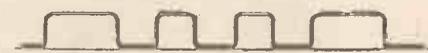


Fig. 5.—The wave form of a Morse signal. Note rounded corners.

Where to Insert the Key

The most simple method is to insert the key in the negative high-tension supply, but as there is a possibility of the operator getting a shock from the key contacts when the key is open, it is not advisable to use this arrangement in circuits other than those of a low-power rig. The same applies to those circuits where the key is sometimes shown in the positive H.T. supply.

Other methods not having the above disadvantage make use of the effect of grid bias on the operation of the valve,

and the breaking of the cathode return lead or the centre tap of the filament supply in the case of directly-heated A.C. valves. Two examples of the grid control system are shown in Figs. 1 and 2. The first of these operates by virtue of the grid becoming highly negative when the key is open, and causing the anode current to cease flowing. There is one point to watch with this arrangement; the insulation of the grid circuit and of the key must be good, otherwise perfect isolation of the grid will not take place, with the result that a very poor and ragged note will be produced.

In the circuit shown in Fig. 2 it will be seen that the key is wired across an

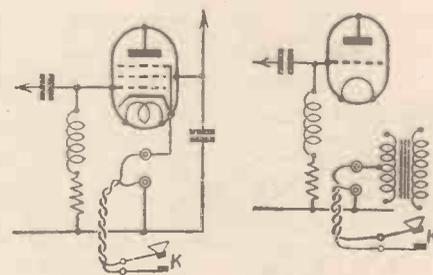


Fig. 3.—Placing the key in the cathode circuit. Fig. 4.—The method used for indirectly heated valves.

additional grid-bias battery which is in series with the normal grid return. The positive supply of the battery is taken to the common negative line, while the negative end is joined to the grid via the usual grid leak and H.F. choke, if one is used.

The operation is as follows: It is assumed that the valve is so arranged that it receives its correct bias when the additional battery is not in circuit. When the key is open the battery is no longer short-circuited and the grid, therefore, receives the excessive bias, the value of which is adjusted to produce a cut-off of the anode current.

The resistance R has to be included to avoid a complete short-circuit of the battery when the key is closed, otherwise the life of the cells would be very short. The value of R should be on the high side, depending on the total voltage used, a safe approximation being 5,000 ohms for every volt.

If, as in some P.A. stages, a G.B. battery is already in use, then the additional one must be connected in series, the key being joined across only the extra cells.

In Fig. 3 keying the cathode circuit is shown, this, of course, being intended for mains-operated valves. This method is both simple and effective as it will be appreciated that it controls both the grid circuit and anode current.

Another form of this is indicated by Fig. 4, which is the equivalent for a valve of the directly-heated type. Instead of the centre-tap of the heater or filament transformer being taken direct to the common negative line, it is broken by the key.

(Continued on next page)

THE AMATEUR TRANSMITTER

(Continued from facing page)

Distortion and Filters

With all the methods described, the operation of the key will cause the current to start and stop suddenly, and if the resultant waveform of the radiated signal was examined it would be found that it had, so to speak, a rectangular shape, i.e., vertical sides and sharp corners. This might look very orderly and desirable on paper, but, actually, such characteristics are associated with signals spreading over a very wide band of frequencies at the moment of opening and closing the key. It is very important for such wave formation to be avoided, as it is possible for the signals to cause most annoying interference to nearby listeners, even on the normal broadcast wavebands.

Another form of distortion can be produced by poor regulation of the H.T. supply which allows a high-voltage surge to be created when the normal load is broken by the key being open. The effect of this is to cause peaks in the waveform each time the key is closed or a signal radiated.

The ideal signal is obtained when the rectangular shapes mentioned above have their corners rounded off as shown in Fig. 5, and if this is made possible, then there need be little fear of causing interference.

This state of affairs can only be secured by using suitable filters in conjunction with the key, but such details will be dealt with next week.

Co-operation Circle

A call this week from Coventry. A. B., of this town, would like to get in touch with others in the same area interested in transmitting and S.W. work. S. E. C., of Banbury, Oxon, also wishes to make contacts with other enthusiasts in that county but, first of all, will he make contact with us again and let us have his full address.

Isle of Wight. Will the secretaries of any radio club in the Island let us have details of activities, as C. L. wishes to get in touch with a live Club. Initial contacts are made through PRACTICAL AND AMATEUR WIRELESS, so send your letters in and get in touch with all the others who are making the most of the amateur movement.

SIMPLE VALVE TESTS

(Continued from page 376)

required to produce the particular change in anode current it is, of course, necessary to keep the grid voltage fixed at zero.

Another interesting fact is that the mutual conductance is equal to the amplification factor divided by the internal impedance of the valve in ohms and multiplied by 1,000. Thus, if a small power valve had an amplification factor of 10 and its impedance were 4,000 ohms, the slope would be 10 divided by 4,000 and multiplied by 1,000—or 2.5 mA/V. You might find it interesting to try working this out for a few valves of which all data is available and comparing your results with those given in the data.

Valve Impedance

The measurement of valve impedance (sometimes called A.C. resistance) is often misunderstood. Although it would appear to be equal to the applied anode voltage divided by the anode current passed, this is not strictly true. To obtain anything approaching an accurate figure it is necessary to divide a small change in anode voltage by the corresponding small change in anode current. For this test it is customary to start with an anode voltage of 100 and a grid voltage of zero. Then the voltage is reduced to, say, 90, and the change in anode current noted. Thus, if the anode current were reduced by .75 mA when the voltage were reduced by 10 volts, the impedance would be 10 divided by .75, which is about 13. But as the current is in mA, the result must be multiplied by 1,000 to convert the milliamps to amps. In other words, the impedance of the valve under test would be approximately 13,000 ohms.

Conversion Conductance of F.C. Valves

The tests so far dealt with apply to triode, tetrode and pentode valves (although the amplification factor is not usually given for tetrodes and pentodes), but do not apply to frequency changers. For heptodes, triode pentodes and other types of frequency changer it is the conversion conductance (also in mA/V) which is employed instead of the mutual conductance. Conversion conductance is the ratio

between the I.F. component of the current passed through the primary of the first I.F. transformer and the input signal voltage. It need hardly be pointed out that these readings cannot well be taken by the average experimenter. Consequently, we will not delve any further into the question. In any case, it is usually sufficient in making a general test of a valve of this type to measure the anode current passed by the first-detector and oscillator portions of the valve at average G.B. and anode voltages in order to determine whether or not the valve is defective.

A Simple Test Panel

For the benefit of any readers who propose to make a valve tester we give a few details of the connections required in Fig. 2. Here we have simply shown four-pin and seven-pin holders for battery and A.C. valves, the connections applying to the types of valves indicated. Additional valveholders could be added with connections appropriate to other valves, the whole being wired with grids, anodes and auxiliary grids in parallel. As there are so many types of valve base and alternative pin connections we have not attempted to give connections for every type. Nevertheless, those shown apply to the most-commonly-used valves.

It will be seen that push-button switches are included in series with the grid and anode voltmeters, and that a milliammeter is in the common anode circuit. When measuring anode current of pentodes and tetrodes it will generally be best to connect the auxiliary grid to the anode, so that the current for both passes through the ammeter. If the milliammeter in the anode circuit is of very high resistance it will be necessary to connect the H.T. voltmeter to its "anode" terminal instead of to its "H.T." terminal, as shown, so that the voltage given will be the actual anode voltage and not merely the nominal H.T. voltage.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM.

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LONDON'S NEW RADIO CITY

Some Interesting Details of the New Extension to the B.B.C. Headquarters

EXCAVATION of the Portland Place site upon which Broadcasting House will be extended to more than double its present size is to begin immediately.

More than a million cubic yards of earth will be removed, and the depth to

and for the erection of retaining walls around the site, which has already been cleared. The work will be complete by about the middle of next year. Soon afterwards work will begin on the construction of the new building, which it is hoped, will be ready for occupation by the end of

feet of "loading concrete" will be superimposed upon it. The main structure, therefore, will virtually be built into a huge "tank." The lower part of the "tank" will be below the standing level of sub-soil water, a fact which will demand special measures to ensure that the asphalt seal is perfect at the junction of the new "tank" with that of the existing building, to compensate for settlement when the weight of the new building comes to be taken upon the foundations.

The site area at ground floor level is 20,950 square feet, compared with 17,390 square feet of the existing building.

The elevation—one of five schemes submitted—has been approved by the Royal Fine Art Commission. The architectural treatment of the extension will continue and amplify that of the existing façade to Portland Place, the two portions of the building forming a complete architectural entity that will be both dignified and in harmony with its surroundings.

Five underground studios will be incorporated in the extension, and, in order to eliminate all possible risk of extraneous noise, each will be constructed as a separate shell, floated and isolated from the building itself. A General Purposes studio will be eighty feet long, fifty-four feet wide, and thirty feet high. Three Dramatic studios, an "Effects" studio and a number of rehearsal rooms are also being provided.

Above ground-floor level the extension is designed as an office building, with rather more accommodation than Broadcasting House has at present. A Control Room suite will be situated on the seventh floor and this will be in addition to the present Control Room. On the sixth floor will be a Staff Rest Room, while a restaurant with accommodation for nearly three hundred people is to be built on the top (eighth) floor. A light court will occupy the centre of the extension above first floor level; the building itself will have a maximum height of approximately 110 feet.



The artist's perspective view of the extension to Broadcasting House as it will appear from the north-west.

which the building will go—fifty-four feet below pavement level—will be lower than the vaults of the Bank of England. Broadcasting House is probably London's deepest building. So large will be the volume of the pit from which the superstructure will ultimately rise that it would have a capacity of nearly ten million gallons of water.

Messrs. Higgs and Hill Limited have been awarded the contract for the excavation

1940. This work will be the subject of a later contract.

The first stage of the present work will be the opening of a trench around the site, some thirty feet wide and fifty-four feet deep, in which self-supporting retaining walls will be constructed to withstand all external pressure. Asphalt will face these walls and will be returned, beneath them, and laid over the whole of the site. Five

in that country. A station is being built on experimental lines, and it is hoped to put this into operation early next year. With the Du Mont system ordinary interlacing is not resorted to as in this country. Here, alternate lines are scanned; the picture frequency is one half the frame frequency, which is set at 50 to eliminate flicker. With the Du Mont method four interlacings are resorted to, thus giving a frame frequency of 60, and a picture frequency of 15. As this would complicate matters if the synchronising pulses were injected at intervals into the vision modulation, this company does not radiate pulses for the purpose of governing the speed or triggering action of the receiver's time-base generator. Instead of that, the actual line and frame saw-tooth scanning waveforms are radiated on the sound carrier. These are then filtered out at the receiving end, and after suitable amplification are applied direct to the receiving cathode-ray tube to produce the correctly formed scanning field. It is apparent, therefore, that as the receiving set does not include its own time-base generator, the radiated pulses need only be selected and amplified. There is thus no question of lack of syn-

chronism with such effects as line or frame slip, while the receiver construction is simplified. Furthermore, since the transmitter has in this way absolute control over the receiver, changes in picture definition may be undertaken at will when found necessary without in any way rendering the receiver obsolescent or inoperative. Whether electrical interference in any way upsets this television system is not known, for the scanning waveform may be mutilated if it is severe. Only two carriers are required, however, as in the more usual methods, and if the idea brings about a material cheapening in receiver costs, then it merits the closest examination by all authorities charged with the task of providing a public service of high-definition television signals.

Film Industry and Television

IN certain quarters of America the view has been quite freely expressed that television should be in the hands of the film industry, both as regards the distribution and sale of the receiving sets and the methods to be adopted for broadcasting programmes. To support this belief it is stated that films have played an important part in the development of television in England. This, of course, is not strictly true, but there are one or two film companies who are displaying keen interest in the work of television in this country, notably the Gaumont and Odeon circuits, but it would appear that they are more concerned with its application to big screen working. In any case, the Paramount Company of America has acquired a half interest in the Du Mont Laboratories, who are pioneering a special television system

PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

6/- or 6/6 by post from George Newnes Ltd., Tower House, Southampton Street, W.C.2.

Items of Interest



Leeds Gas Department A.R.P.

ARRANGEMENTS whereby the manager and staff of the New Wortley Gas-holder Station may carry on in safety during an air raid have been perfected by the incorporation of an Ediswan Loud-speakerphone installation.

During the wiring of the equipment for normal intercommunication service, provision was made in the wiring for each unit, including the master, to be removed to various bomb-proof shelters where remote control apparatus for operating the Gas-holders Station has been installed. Thus, the entire organisation can be transferred and work go on in safety.

Under normal conditions, the Master Unit is connected to a 7-pin multi-plug, and this is connected to a 7-pin baseboard-type valveholder. In one shelter there is also a 7-pin baseboard into which the Master can be plugged, the two holders being connected in parallel. The change-over has been timed to take three minutes.

B.B.C. Staff Representation

THE results of the B.B.C. Staff Representation Ballot shows that 77.1 per cent. of those who voted were in favour of a Joint Council Scheme, 11.6 per cent. were against, and 11.3 per cent. neutral. The poll was 2,627—79.6 per cent. of those eligible to vote. The Board of Governors has decided to proceed with the setting up of a Joint Council Scheme. A Drafting Committee, on which both the official and the staff sides in London and in the Regions will be represented, is being appointed.

It will be remembered that the Report of the Treasury Committee on B.B.C. Staff Representation, of which the members were

Sir James Rae (Chairman), Mr. J. W. Bowen, formerly General Secretary of the Union of Post Office Workers, and Mr. G. L. Darbyshire, Establishment Officer of the L.M.S. Railway, was circulated earlier in the year to all staff, with a memorandum by the then Director-General. He suggested in that memorandum that the staff should hold private meetings of their own as a preliminary to a vote by ballot.

Change of Address

WE are informed that on and after December 25th, 1938, all communications for International Tin Research and Development Council should be addressed to:—Fraser Road, Greenford, Middlesex.

Mr. J. B. Selby's New Appointment

A VOICE which has become well known to listeners all over the North—that of Mr. John B. Selby, North Regional announcer for the last two years—will not be heard in regular announcements on the home ether in future. But it will be heard by listeners thousands of miles away. Mr. Selby was recently transferred to London for work as an Empire Announcer in the Overseas Department of the B.B.C., and took up his new duties on Monday, December 5th. In addition to regular duties as announcer in the North, he has from time to time been heard as a commentator or compère in programmes from the Outside Broadcasts Department. He has travelled extensively on the Continent and speaks several European languages. Before joining the B.B.C. in November, 1936, he was for a short time an announcer at one of the broadcasting stations in France.

Television on Xmas Day

THIS year, for the first time, television is to visit a hospital. A party in the Children's Ward of St. George's Hospital, London, will be televised in the afternoon of Christmas Day. Frederick Grisewood and Margareta Scott will be entertaining the children with stories as the television cameras come into action to show everyone waiting for the arrival of Father Christmas, and viewers will see the gaily-lighted Christmas tree as the camera gives a "long shot" of the ward. Father Christmas's arrival with his sack of toys will be followed by that of Leonard Henry, the famous broadcast and television comedian, and other visitors who will "drop in" will include Derek McCulloch ("Mac" of the Children's Hour) and Eric Cardi, the conjurer. Soon afterwards the doors will open to admit seven clowns from Bertram Mills's circus who will perform acrobatics and run obstacle races.

Children aged between three and fifteen years occupy this ward and some of them, it is hoped, will be well enough to gather round the Christmas tree. Television cameras will pay special visits to the beds of those children who are not allowed to get up. It is hoped that the party will include as many nurses, doctors and staff as can be spared.

Philip Dore will present the programme for television from the scanning van parked outside the hospital, and the television signals will be conveyed by cable to Broadcasting House and thence to Alexandra Palace. Incidentally, the television mobile unit will be working within a few yards of the spot at

which it scored its first triumph in May, 1937, when the Coronation procession was televised at Hyde Park Corner.

Fantasy

The transmission from St. George's Hospital will be immediately followed by a joyous slapstick sketch in the Alexandra Palace studio by Richard Hearn and George Nelson, entitled "Puddings, Christmas." This will be followed by a cartoon film, after which viewers will see "Moonshine," a fantasy by Laurence Housman, in which both humans and puppets will take part. The characters of the play include Father Christmas, Pirot, a policeman and even the Moon, and the puppets will be introduced to double the parts of the living characters in some escapades which would be impossible in the television studio, such as clambering over roof-tops and descending chimneys. The players will be Arthur Hambling, Lawrence Hanray, Frank Reynolds and Leonard Sachs. The string, shadow and glove puppets have been made by Ann Hogarth, Kitty Tyzack and Victor Hodgkiss.

Light Comedy

"Hay Fever," the brilliant light comedy by Noel Coward, will occupy the whole of the evening programme on Christmas Day with Kitty de Legh in Marie Tempest's original part—Judith Bliss—and a distinguished cast which includes Maurice Denham, Guy Verney, and Olga Edwards. The play will be produced by Reginald Smith.

Soldering Connections

WHEN making connections between leads and soldering tags some care is needed to make certain that the joint is sound. A commercial component was recently being tested, and on normal inspection this was quite in order. All connections appeared sound, although in one or two cases the lead could not be got at in order to apply a "pull" test. Subsequent tests with a meter showed that one of these inside connections was unsound, the bare wire supporting a blob of solder which was surrounding the soldering tag. In its normal position in the receiver the springiness of the wire held the solder clear of the tag and thus left an open circuit. Vibration restored the circuit and an intermittent fault was thus produced. An application of a hot iron for a second or two completed the connection. It is important, therefore, to hold the iron in position long enough to permit the solder to attach itself to the larger metal surface, without overdoing matters by leaving it too long.

Pick-up Tracking

A COMPLAINT was recently investigated where poor results were obtained from a new reputable make of pick-up. The circuit in use was in order and gave good results on radio. It eventually transpired that the constructor had merely mounted the pick-up arm on the motor-board without any consideration as to the correct position to obtain proper tracking. It should be remembered that the position of the armature is such that the needle must move in a certain direction, and if the pick-up is wrongly positioned, not only will the needle be prevented from making the proper movement, but the records will be damaged.

Speakers in Phase

THERE still appears to be some confusion regarding the method of using two speakers to obtain a balanced output. The two models should first of all be chosen to give the desired frequency range, and the total load of the two speakers should be correct for the valve or valves feeding them. Normally a small cone and a large one will give the desired results without special filter circuits. An important point often overlooked, however, is that the two speakers must be connected so that they are in phase—that is, so that at any given moment the cones move out or back together. This may be tested by applying a 1.5 volt cell to the speaker leads and watching the movement of the cones.

Broadcasting House, Aberdeen

THE opening of Broadcasting House, Aberdeen, is the last big event in a year of outstanding developments in the broadcasting service in Scotland. It follows closely on the opening of the B.B.C.'s new studio centre in Glasgow in November and the bringing into operation in September of the new Aberdeen transmitter.

It was in January, 1937, that the B.B.C. announced the construction of both a new transmitter and a new studio centre to replace the existing plant and premises in Aberdeen. A site for the transmitter was found at Redmoss, some two miles south of the city, and on September 9th last the new transmitter there took over the service.

studio construction. Oak panelling round the walls rises to a height of 7ft., while about this the walls have lath and plaster surfaces broken by sound-absorbing panels of rock-wool. The floor is of narrow oak strips. The dominating feature of this studio is a pitched roof with an open grille ceiling, which, in addition to housing ventilating fans and ducts, performs an important function in acoustics. Decoration, which has to satisfy both acoustic and æsthetic demands, includes beige walls above the oak panelling, a white ceiling and a light oak floor.

A listening room is provided with this studio; in it are controls for bringing into use any microphone in the studio and for

gramophone recitals and "effects." The first two are completely different both in decoration and acoustic treatment. The talks studio has oak-panelled walls up to within 2ft. of the ceiling, the remaining frieze being covered by rock-wool and other sound-absorbing materials. The ceiling is untreated and is of ordinary lath and plaster, cream in colour. The floor is completely carpeted. Attached to this studio is a listening room similar to that associated with Studio 1.

The drama studio is acoustically "dead," having practically no reverberation period. This is brought about by completely covering the walls and ceiling with rock-wool and carpeting the floor. The decoration is nevertheless light, being of a beige tint and well illuminated, helping to offset the somewhat depressing effect of a "dead" studio. The effects studio is treated similarly, and contains all the "properties" for producing the varied noises used in the production of plays. Studio No. 5 is untreated acoustically and is used for the production of sound effects from gramophone records. It contains a bank of six gramophone turntables, with parallel tracking pick-up arms of the latest type and faders for bringing into use any pick-up.

A Dramatic Control room, situated on the first floor, is used in the production of plays or other programmes in which items from a number of studios or other sources are combined. The actual mixing is carried out at a panel which has six input channels, each with its separate fade controls. A loudspeaker is provided for listening to the complete programme, and there is a "talk-back" microphone.

When it is desired to add artificial "echo" (reverberation) to a programme, it is produced in a special "echo room." This room is devoid of any sound-absorbing material and contains only a loudspeaker and microphone. A portion of the studio output is fed to the loudspeaker, and after being picked up by the microphones, complete with "echo," is mixed with the studio output in the required proportion.

A corner of the control room in the new Broadcasting House at Aberdeen.



A suitable site for the new studios was found in a private residence known as Beechgrove House, standing in its own grounds at Beechgrove Terrace. The necessary alterations and extensions to this building have now been completed and the studios have been in use since November 14th. The new premises are known as Broadcasting House, Aberdeen, and were opened officially by the Marchioness of Aberdeen and Temair on December 9th.

The Building

The original building, which is of a substantial character, having external walls of solid granite two feet thick, is two storeys high, the rear portion having an additional floor with a mansard roof. Considerable internal adaptation was necessary to accommodate four of the studios, a control room and offices. An extension has been built on the north-east side to contain a large orchestral concert studio measuring 46ft. by 36ft. by 24ft. high. The extension has been made to harmonize with the architectural character of the old building, the walls being of solid brickwork rough-cast, with granite dressings to match the existing building. The roof is gabled and covered with Scottish slates.

The Studios

There are altogether five studios, and in their construction the latest results of research into studio acoustics have been incorporated.

The orchestral studio in the new extension, the dimensions of which have already been given, is a striking example of modern

mixing their outputs if required. The control desk is mounted in front of a double-paned glass window through which the studio can be seen. The studio programme is reproduced on a loudspeaker to assist in obtaining the correct balance of the programme.

The other four studios, which are somewhat smaller, are used for talks, drama,



Artists rehearsing in one of the studios.

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

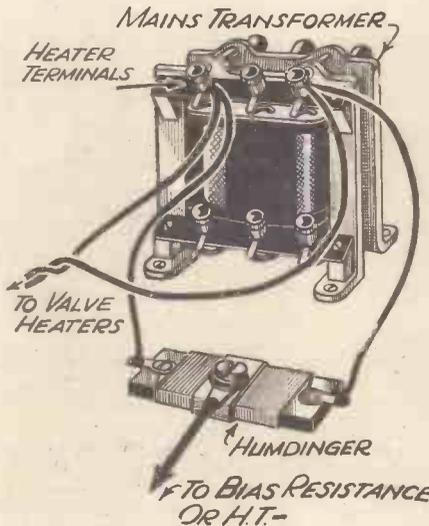
Multiple Mains Connections

A MEMBER some time ago sent us a suggestion for a multiple mains arrangement in connection with the design of a workshop layout. The idea which has prompted these notes, is to use a single light socket as a junction point for several mains leads, and is arranged on the lines shown in the illustration below. Up to a point, this is quite a good suggestion, as it avoids the necessity of having the room wiring altered, and the flexibility of the various connections will enable many electrical instruments to be used, whilst at the same time permitting the light to be placed where it is most needed at any particular moment. There is, however, one very important point to be considered in this connection. The ordinary electric wiring used for light pendants is of 5-amp flex, and therefore the total load in use at any time must be carefully considered to avoid the risk of fire. Although the house fuses placed in the lighting circuit will blow in the case of an overload, should there be a weak spot in the pendant flex, this may arc on an overload and the cotton covering will catch fire. Therefore, as any addition is made to a multiple wiring system such as this, the load which is being added should first be worked out and great care taken to keep within safe limits.

Mains Hum

WHEN an A.C. set is in use, it is sometimes found that hum cannot be completely eradicated, and this is especially the case in a short-wave receiver. The heater winding is generally provided with a centre-tap, brought out to a separate terminal on the transformer, and this is usually connected to earth. In theory this prevents hum in the heater circuit, but in practice the leads to the heater terminals

or sockets may be of unequal lengths, or taken in such a manner that the circuit is unbalanced, and hum results. Therefore, when hum troubles are experienced and the usual tests and modifications fail to remove it, the centre tap connection should be removed and a humdinger or centre-tapped potentiometer connected across the heater winding. The centre arm of the potentiometer should be joined to earth. In some cases this humdinger may be placed near the transformer as shown in the

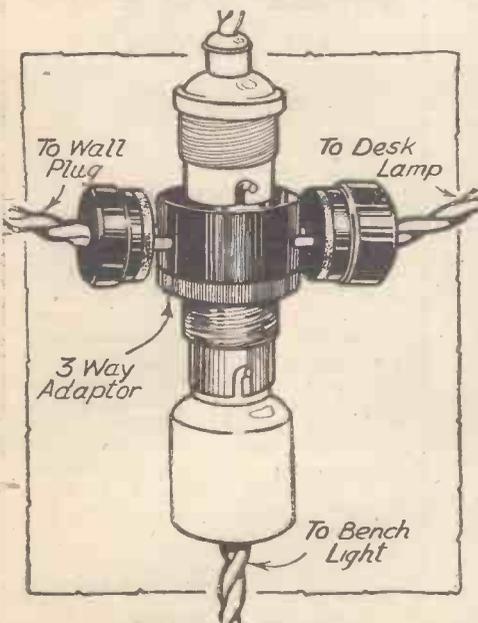


To remove hum a separate artificial centre tap may be provided in A.C. receivers as shown here.

accompanying illustration, but in short-wave receivers it may be found preferable, where all valves are operated from the same winding, to place it directly across the detector heater sockets. In long-distance reception, weak signals will be very difficult to follow whilst there is any background of hum and therefore all possible precautions should be taken to make the set hum-free. It is often desirable, as was found in the Air Hawk 9, to remove the centre-tap connection entirely, and to take the H.F. valve heater direct to earth. In an extreme case one side of each valveholder may be earthed in this way, but care should be taken that the same side of the circuit is earthed in each case, as otherwise the heater supply will be short-circuited. By using red and black flex for the heater wiring, this point may easily be watched. The actual side of the heater which is earthed may also be found by trial and error, as in some cases it proves better to earth one side than the other, and this appears to depend upon the position of the heater winding in relation to the other windings in the transformer.

PATENTS AND TRADE MARKS

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



Multiple mains connections may be arranged in the workshop as shown here, but care must be taken not to overload the pendant flex.

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 EXETER AND DISTRICT WIRELESS SOCIETY
Headquarters: Y.W.C.A., 3, Dix's Field, Southernhay, Exeter.

Meetings: Mondays at 8 p.m.
Hon. Sec.: Mr. W. J. Ching, 9, Sivel Place, Heavitree, Exeter.

AT the meeting of this society, held on Monday, December 5th, a lecture was given by Mr. W. S. Pyrah, entitled, "Electricity in Harness." This was illustrated by many photographs and slides, and Mr. Pyrah brought very vividly to the minds of his audience modern methods of electrical engineering, and the ways in which electricity has made the industry safer, speedier, and more efficient.

Many interesting queries were dealt with, in particular the various types of motor control.

There will be no more meetings until the end of January, and the complete programme for the second half of the Winter Session will be issued within the course of a week or so. All those interested should get in touch with the secretary, Mr. W. J. Ching.

WOLVERHAMPTON SHORT-WAVE RADIO SOCIETY

Headquarters: 76, Darlington Street, Wolverhampton.

Secretary: V. C. Hague (G3TI), 76, Darlington Street, Wolverhampton.

THE society was founded in 1935 at a dinner given to celebrate the return of G6PC from U.K. The society has fifty members and includes nineteen fully-licensed transmitters, and is affiliated to R.S.G.B. The society has an excellent club-room made possible by the generosity of Mr. F. Henn (2BCD), and is equipped with a transmitter and receiver. These headquarters were officially opened in September by the President. The annual general meeting was held on November 21st, and the annual dinner was held at the Star and Garter Hotel on December 2nd. Meetings are held at headquarters each Monday evening at 8 p.m. and Morse classes are held at 7.30 p.m. Membership is 5s. per annum, but it has been decided to allow young people from fourteen to sixteen years of age to join at 2s. 6d. per annum. A very interesting programme has been arranged for the coming year, including two field days. A very special lecture on television will be held in February at the Public Library and admission will be free to the public.

ASHTON AND DISTRICT AMATEUR RADIO SOCIETY

Secretary: K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

OWING to unforeseen circumstances, the visit to the local radio relay station had to be cancelled on short notice, and presumably due to the inclement weather conditions, only four members arrived at the meeting place. However, these "spartans" made a station visit to G6TL, where they spent a very enjoyable and interesting afternoon. The 28 mc/s band was "open," and several QSO's with W stations were made on 'phone. G7L also explained and demonstrated his 56 mc/s gear.

At a meeting held on November 23rd it was unanimously resolved that the society be affiliated to the R.S.G.B. On the suggestion of several members it has been decided to provide refreshments at all future meetings.

On January 25th, 1939, Mr. Collinge, of Messrs. Ferranti, Ltd., is to give a lecture on "Electrical Measuring Instruments," and it is hoped that as many members as possible will attend.

EDGWARE SHORT-WAVE SOCIETY

Headquarters: Constitutional Club, Edgware.
Secretary: F. Bell, 118, Colin Crescent, Hendon, N.W.9.

ON December 7th Mr. Nixon, of the C.E.C., described his Sound Expansion Control and Amplifying Equipment. After an interesting showing of lantern slides describing various outputs using valves in push-pull, Mr. Nixon gave a demonstration with his equipment. On Wednesday, November 30th, Mr. Menage, of Messrs. Rothemels, described and demonstrated his piezo-electric crystal pick-ups and microphones, also special types for deaf aids, medical and mechanical purposes. Members heard heart beats and the ticking of a wrist watch, also how clocks could be checked in a short time.

The club's general meeting will be held at the club on January 4th. At the next meeting Mr. J. Clarricoats, Secretary of the R.S.G.B., will give a chat. On December 21st there will be a Junk Sale.

The club has now hired Messrs. Welbs McElroy automatic Morse sending equipment which will be used at meetings on Wednesdays at 7.30 p.m. and Sundays 11 till 1 p.m.

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).

The Economic One-valver in Java

SIR,—Just a few words of praise for your circuit of the Economic One-valver; I have constructed a set according to that circuit and have obtained very satisfactory results, but the valve used is an Osram H210. It is impossible to get the exact valve you specified, as there are only a few makes of valves that are importable to the Dutch East Indies. I have 45 volts for the H.T. and for the L.T. I use several 1½ volts torch cells, joined in parallel. The coils used are the Eddystone 6-pin ones. Why is it never mentioned in P. AND A. WIRELESS that it is possible to use the 1½-volts cells for the filaments? My one-valver gives good results, having logged almost all the short-wave stations in Java, and the Singapore, Bombay, Hongkong, Manila stations. In the morning, when the conditions are good, I am able to receive the B.B.C. which I recognise by the Big Ben striking twelve midnight, and the followed announcement (this is on 31 metres). All reception is on phones.

I have been a reader of PRACTICAL AND AMATEUR WIRELESS for nearly three years, and I am grateful for the knowledge gained from it.

I would like to know how many of your readers have logged the Java stations with a one-valver?

Lastly, I would like to correspond with any of your young readers who are interested in short waves and set construction. Best wishes to the PRACTICAL AND AMATEUR WIRELESS.—CHIA FOON FOCH (77, Moleno-riet, Oost, Batavia—C. Java).

Back Numbers Wanted

SIR,—I would be greatly obliged if you could put me in touch with any of your readers who have back numbers of PRACTICAL AND AMATEUR WIRELESS which contain constructional details of the Cyclo Converter. I should like to get the issue containing the short-wave convertor to add to the £4 superhet. I will willingly pay the price of the issues and return postage.—H. BARNETT (2, Church Street, Bengeworth, Evesham, Wores).

Correspondents Wanted

SIR,—After reading about transmitting in your invaluable paper I should like to take it up, but find I have difficulty in learning the Morse Code. I should, therefore, be pleased to correspond with someone in my district also taking up amateur transmitting.—VINCENT BELL (22, Oxford Place, Doncaster).

SIR,—I would much appreciate if some of your readers would correspond with me. Amateur short-wave logging is the main thing I am interested in, and overseas friends would be very welcome. I shall do my best to reply to all those that write me.—W. B. COOKE, (36, Elde field, Letchworth, Herts).

Car Radio

SIR,—Although somewhat belated, I feel I must add my comments to the discussion on the "Car Radio" hint published in your October 22nd issue.

In his reply your correspondent points out that a 6-volt dynamo will build up to 40 volts without damage. (I presume he means on open circuit.) I must confess that I have yet to see a car dynamo that will undergo this exceedingly abnormal overload, and not burn out either the fields or armature windings, or both, if it remains so for any length of time. Familiarity with car dynamos would confirm this view, judging by the number of dynamos that burn out because of "opens" on the positive main lead. The reason for fitting field fuses is to obviate this. When there is an open circuit the excessive field current blows the fuse, and prevents the dynamo building up.

Another point: the "simple matter to remove the brush-holder and insert insulating washers, etc." is like a dream of heaven to an auto-electrician.

The task of re-insulating riveted brush-gears that have "gone down to earth" is hazardous enough without having to do it unnecessarily, when a resistance in the field circuit would be much more simple, safe and effective.

In any case, most radio-fitted cars have C.V.C. which adjusts itself to the load on the battery.

Your correspondent may know a considerable amount about radio, but he shows an abysmal lack of knowledge of car electrical equipment.—F. E. SCALES (King's Lynn).

A Reader's Thanks

SIR,—With reference to my letter published in a recent issue of PRACTICAL AND AMATEUR WIRELESS, I want to say how grateful I am to your fine paper for the tremendous response I received in reply to my request. I want to add, also, that owing to the great number of letters I have received I have not had time to reply to all yet, so if those readers who were kind enough to write, and have not had a reply, don't mind waiting, I will reply to every one.—V. ROBERTS (Stoke-on-Trent).

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

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

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LATEST PATENT NEWS

Group Abridgements 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.

THERMIONIC VALVES.—M.O. Valve Co., Ltd., and Forward, P. G. No. 491,526.

In valves having two or more grids of non-circular cross-section, only portions of which control the electron stream, e.g. grids of rectangular cross-section of which only the long faces are employed, the grids are formed by so winding wire on frames that the portions of the wire of the two grids employed for control are in alignment. Fig. 1 shows a side view of a pair of such grids, Fig. 2 an end view, the portions of wire on the long faces being horizontal and those on the short faces inclined at different angles as shown. An arrangement in which the wires on the long faces are inclined is also described.

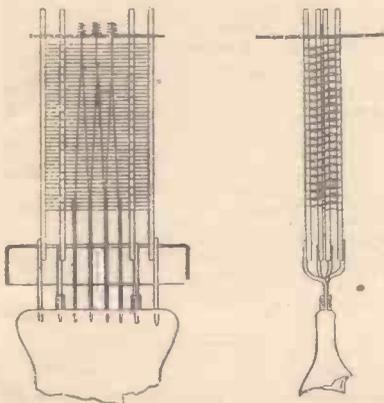


Fig. 1

Fig. 2

DISCHARGE APPARATUS; TELEVISION.—Low, A. M. No. 491,011.

A method of producing a mosaic of photo-electric elements of the type which may be scanned by a cathode ray for use in television apparatus consists in coating one face of a carrier plate *a* of conductive material, such as copper, with a coating of material *b* possessing photo-electric properties, such as caesium alloy, applying a backing *c* of non-conductive material, such as resin, to the reverse face of the carrier and sectioning the carrier with its coating *b* by crossing cuts extending completely through the carrier and coating to form a mosaic of separate photo-electric elements. The insulating material may be allowed to run in between the completed elements and a frame may surround the whole structure. Each element may be connected by a separate wire *f* to a commutator connected to a transmitter or to a land-line. (Fig. 3.)

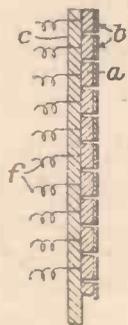


Fig. 3.

Each element may be connected by a separate wire *f* to a commutator connected to a transmitter or to a land-line. (Fig. 3.)

VARIABLE-SPEED GEARING.—General Electric Co., Ltd., and Spiers, R. W. No. 491,446.

The invention relates to known slow motion epicyclic ball bearing reduction drives for electric condensers and like tuning devices, for example, as described in Specification 439,152, wherein the driven member is connected to the cage of a ball or roller-bearing and the driving member

to one of the races and the other race is constrained so that the balls or rollers rolling between the two races carry round the cage and with it the driven member.

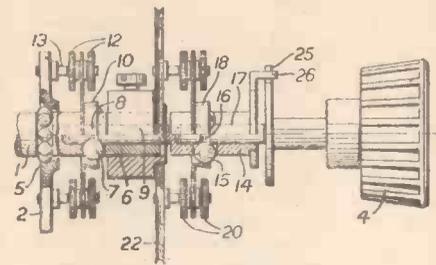


Fig. 4

According to the invention two of these reduction drives are used in series and in one of them means, which automatically

connect the driving member to the cage on continued rotation of the driving member, are provided to reduce the reduction ratio thereof to unity for coarse adjustment. The condenser shaft 1 rotatably mounted in a frame 2 forms at its front end a cage 6 in which balls 7 are rotatably mounted between an inner race 8 carried by the driving shaft 9 and an outer race 10 adjustable by nuts 12 on bolts 13. The shaft 9 forms at its forward end a cage 14 in which balls 15 are rotatably mounted between an inner race 16, carried on the driving shaft 17 of the adjusting knob 4, and an outer race 18 adjustably mounted by nuts 20 on a disc 22 rigid with the cage 6. For coarse adjustment, the shaft 9 is turned directly by the adjusting knob 4 through a radial arm 25 on the shaft 17 of knob 4 engaging a projection 26 on the cage 14 whereby the condenser is adjusted through the first mentioned epicyclic reduction drive 9, 7, 10, 6, only. (Fig. 4.) The condenser is coarsely adjusted to slightly beyond the desired position, when for fine adjustment the knob 4 is turned backwards and the condenser driven backwards through both reduction drives in series.

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 and 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.

- 34652.—Baird Television, Ltd., and Grayson, H.—Thermionic valve oscillation generators. Nov. 28.
- 34823.—Caen, H.—Controls for radio receivers. Nov. 30.
- 34506.—Cole, Ltd., E. K., and Kennedy, F. W. O.—Tuning of radio receivers. Nov. 26.
- 34884.—General Electric Co., Ltd., and Edwards, G. W.—Apparatus for receiving television. Nov. 30.
- 34356.—Kolster-Brandes, Ltd., and Beatty, W. A.—Television time bases, etc. Nov. 25.
- 34770.—Kolster-Brandes, Ltd., and Beatty, W. A.—Television, etc., systems. Nov. 29.
- 34769.—Kolster-Brandes, Ltd., and Brigham, C. E.—Thermionic valve circuits. Nov. 29.
- 34918.—Marconi's Wireless Telegraph Co., Ltd.—Radio receiving circuits. Nov. 30.
- 34448.—Metcalfe, C., and Parrish, H. J.—Push-button mechanisms for tuning radio-receivers. Nov. 26.
- 34883.—M.O Valve Co., Ltd., and Cosgrove, C. W.—Tuning indicators in radio receiving sets. Nov. 30.

Specifications Published.

- 496,119.—White, E. L. C.—Television and like transmitting systems.
- 496,123.—Beatty, W. A.—Wireless receiving systems.
- 496,217.—Marconi's Wireless Telegraph Co., Ltd., and Appleton, W. A.—Direction-finding radio receiving systems.
- 495,879.—Birdseye, L. F.—Indicators particularly for radio receiving apparatus.
- 496,053.—Beatty, W. A.—Radio receivers combined with clocks.
- 496,140.—Beatty, W. A.—Wireless reception.
- 496,275.—Murphy Radio, Ltd., and Boyd, J. D. A.—Tuning of radio receivers.
- 496,239.—Standard Telephones and Cables, Ltd., and Wagstaffe, C. F. A.—Wireless direction-finding systems.
- 496,246.—Marconi's Wireless Telegraph Co., Ltd.—Radio receivers and the like.
- 496,145.—Marconi's Wireless Telegraph Co., Ltd.—Radio receivers and the like.
- 495,902.—Radioakt. Ges. D. L. Loewe.—Synchronization of television scanning means.

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.

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QUERIES and ENQUIRIES

EITHER of these amplifiers will be found quite suitable for your purpose, but in addition we have also described a 2½-watt battery amplifier (issue dated June 18th last) and a 12-watt A.C. amplifier (issue dated October 30th, 1937). There are no blueprints for either of these amplifiers.

Speaker Difficulty

"I have built a 3-valve battery amplifier which works very well on the 'phones (resistance 4,000 ohms) but will not work my speaker, which is an M.C. model. This has a separate transformer with four tappings, one is not marked, but the other three are marked 18, 23, 32 respectively. I have tried all the numbers without success. My output valve is Hivac PX230. Could you please help me in this problem?"—T. S. C. (Nottingham).

In many respects this is equivalent to the problem which was published in our Solve This panel recently. If the speaker fails to give any results, the transformer must be defective. On the other hand, however, the unmarked terminal may be the "end" of the primary winding, and the remaining three marked terminals are the tapping points giving various matching ratios. Your valve requires an optimum load of 4,000 ohms and your speaker should provide this load at one of the tappings. A continuity test should be made with 'phones and battery.

Frame Aerial Details

"I am building a small portable set, using S.G., Det. and Pen. I wish to wind a frame aerial inside the cabinet to cover from 175 to 500 metres. The internal dimensions of the cabinet are 5in. by 8½in. by 5½in. Can you give me full details?"—C. J. (Sheffield, 7).

A FRAME of the size mentioned would not be very efficient. For best results the sides of a frame should not be less than 12in. in length. However, if you wind on 47 turns of 22 D.C.C. wire this should cover approximately the range mentioned with a .0005 mfd. tuning condenser in parallel.

Erratic Reaction

"I am sending a three-valve circuit of a set I have built. I have experienced one small fault which I have been unable to rectify. The set as a whole works very well, but the reaction is rather erratic. I have tried various condensers and also differentials."—R. A. (Wimbledon).

WE note that no anode by-pass condenser is shown in your detector stage. This is generally found very critical and you should try the effect of various capacities at this point. The H.F. choke in the detector anode circuit is also a critical component, especially where the receiver is designed to cover a wide wave-band. The value of the grid leak will also be found critical and values from .1 to 5 megohms should be tried. We presume that you have tried various values of H.T. on the valve.

Amplifier for Home Broadcasting

"Would you kindly let me know if your blueprints for the Enthusiast's Power Amplifier or the Listener's 5-watt A.C. amplifier are suitable for home-broadcasting with a microphone or gramophone?"—T. B. (Dover).

G.B. Battery Life

"I am constantly renewing the grid bias battery on my set. This is run from an eliminator, with a separate G.B. battery. I have tested out fixed condensers and found everything in order. Do you think there is a short in the coils?"—W. F. S. (Eastleigh).

A G.B. battery does not last indefinitely, and naturally has to be replaced from time to time. If it is kept in a place where there is undue heat it will "dry up" and will not last so long as when it is kept in a cool, dry place. Therefore look to its position in the set. As a test, a good milliammeter should be included in series

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.E. The Coupon must be enclosed with every query.

with the positive G.B. lead and the current noted. There should be no current indication, and if a high reading is given you will know that there is a short-circuit which may occur on either side of the battery. By transferring the meter to the different leads it should be possible to locate any short-circuits which may exist.

Resistance Values

"On buying a .5 megohm resistance, the dealer gave me a 500,000 ohms resistance and said this was the same. Could you give me a list of resistances in megohms and ohms and also the colour code. I can understand your chart for resistances but not for grid leaks."—C. P. (Dartford).

1 MEGOHM is one million ohms (1,000,000). Therefore .5 megohms is half a megohm or 500,000 ohms. .1 megohm is one-tenth of a megohm or 100,000 ohms, and so on. The colour code for resistances is also applicable to grid leaks, which are only resistances under another name. The term "grid leak" actually explains the function of the resistance in that particular part of the circuit.

Mains Aerial

"I have built an A.C. mains straight 5 and I would like to add a mains aerial, if this is possible. I have a commercial set with a mains aerial, giving good results provided there is a good earth, but I cannot trace the connections. Could you tell me how to fix this type of aerial and what components to use?"—T. L. M. (Shrewsbury).

ALL that is necessary is to connect a fixed condenser between a socket marked "mains aerial" (or a terminal) and one side of the mains input leads. It is sometimes found that one side of the mains will give better results than the other. The condenser value should be between .0001 and .0005 mfd. and a good component designed for 500-volt working should be used.

Beginner's One-valver

"I am considering building the Beginner's One-valver, details of which appeared early in the year. Could you let me know if it is possible to build this set now, or have the various makers altered the designs of the important parts. Also, is it possible to cover a baseboard with some metallic covering?"—P. P. (Sth. Harrow).

IT is still possible to obtain all the parts required for the receiver in question. A baseboard can be covered with aluminium or copper foil and will prove perfectly satisfactory in use. The copper is more useful as it enables soldered earth connections to be made where desired.



Replies in Brief

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

W. G. (Halifax). We have published A.C. amplifiers but not D.C. or all-mains types. There is the Listener's 5-watt Amplifier and a 12-watt amplifier, but there is no blueprint available for the latter.

E. W. K. (Windsor). The speaker and energising source may certainly be used and are regarded as a combined assembly. The two speaker leads are then joined to the extension speaker sockets.

L. A. (N.15). Full coil-winding data will be found in our book, "Coils, Chokes and Transformers." We could not give coil-winding data in the form of a reply.

G. J. R. (Wing). We are afraid your arithmetic is responsible for the apparent error in the article in question—8 over 10 is not 14, but four-fifths. You will find that the question is quite correct, and that there is no error in the article.

D. C. (Ore). Ordinary varnish should be suitable, but we would advise care so as not to destroy the characteristics of the cone. Perhaps Messrs. R. O. Bridger and Co., of No. 4 Factory, Shelford Place, London N.16, could help you.

L. R. (Woodstock). The Sprite Three, blueprint No. PW. 87, would meet your requirements.

W. C. (Prestwick). We have no circuits which would meet your particular requirements. It is always difficult to attempt to find a design which will fit an existing cabinet of limited dimensions.

R. B. (Cockfield). The set was not described by us and we have no details of the coils, which were apparently of special design. They are not standardised and so far as we are aware are not interchangeable.

P. B. S. (Basildon). All the details have been given in past issues, and will be found in the Wireless Constructors' Encyclopaedia, which we suggest you obtain. DX terms will also be found in the book, "Wireless Transmission for Amateurs."

J. B. (Perth). The transformer is perfectly suitable and may be used in the receiver referred to.

R. E. W. (York). Screening the mains section should prove satisfactory, and sheet iron should be employed.

L. E. (N.W.10). A mains aerial may give hum, but generally a reversal of the mains leads to which the condenser is joined should cut this out.

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

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The "Pyramid" One-valver (HF Pen)	27.8.33	PW93	Mains Sets : Blueprints, 1s. each.		
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Four-range Super Mag Two (D, Pen)		PW36B	D.C. £5 Superhet (Three-valve)	1.12.34	PW42
The Signet Two (D & LF)	24.9.33	PW76	Universal £5 Superhet (Three-valve)		PW44
Three-valve : Blueprints, 1s. each.			F. J. Camm's A.C. £4 Superhet 4	31.7.37	PW59
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2	F. J. Camm's Universal £4 Superhet 4		PW60
Selectone Battery Three (D, 2 LF (Trans))		PW10	"Qualitone" Universal Four	16.1.37	PW73
Sixty Shilling Three (D, 2 LF (RC & Trans))		PW34A	Four-valve : Double-sided Blueprint, 1s. 6d.		
Leader Three (SG, D, Pow)	22.5.37	PW35	Push-Button 4, Battery Model	22.10.38	PW95
Summit Three (HF Pen, D, Pen)		PW37	Push-Button 4, A.C. Mains Model		
All Pentode Three (HF Pen, D (Pen) Pen)	29.5.37	PW39	SHORT-WAVE SETS.		
Hall-mark Three (SG, D, Pow)	12.6.37	PW41	One-valve : Blueprint, 1s.		
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	Simple S.W. One-valver	9.4.38	PW83
F. J. Camm's Silver Souvenir (HF Pen, D, Pen) (All-wave Three)	13.4.35	PW49	Two-valve : Blueprints, 1s. each.		
Genet Midget (D, 2 LF (Trans))	June '35	PM1	Midget Short-wave Two (D, Pen)		PW38A
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51	The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.33	PW91
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)		PW53	Three-valve : Blueprints, 1s. each.		
Battery All-Wave Three (D, 2 LF (RC))		PW55	Experimenter's Short-wave Three (SG, D, Pow)	30.7.38	PW30A
The Monitor (HF Pen, D, Pen)		PW61	The Project 3 (D, 2 LF (RC and Trans))	7.8.37	PW63
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62	Tio Band-Spread S.W. Three (HF Pen, D (Pen) Pen)	1.10.33	PW68
The Contour Three (SG, D, P)	14.8.37	PW64	PORTABLES.		
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.39	PW69	Three-valve : Blueprints, 1s. each.		
The "Colt" All-Wave Three (D 2 LF (RC & Trans))	5.12.39	PW72	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)		PW65
The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82	Parvo Flyweight Midget Portable (SG, D, Pen)	19.6.37	PW77
F. J. Camm's Oracle All-Wave Three (HF, Det, Pen)	29.8.37	PW78	Four-valve : Blueprint, 1s.		
1038 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.33	PW84	"Imp" Portable 4 (D, LF, LF, Pen)	19.3.33	PW86
F. J. Camm's "Sprite" Three (HF Pen, D, Det)	20.3.33	PW87	MISCELLANEOUS.		
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.33	PW89	S.W. Converter-Adapter (1 valve)		PW48A
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.0.33	PW92	AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.		
Four-valve : Blueprints, 1s. each.			Blueprints, 6d. each.		
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	Four-station Crystal Set	23.7.33	AW427
Fury Four (2 SG, D, Pen)	8.5.37	PW11	1934 Crystal Set		AW444
Beta Universal Four (SG, D, LF, Cl. B)		PW17	150-mile Crystal Set		AW450
Nucleon Class B Four (SG, D, (SG), LF, Cl. B)	6.1.34	PW34B	STRAIGHT SETS. Battery Operated.		
Fury Four Super (SG, SG, D, Pen)		PW34C	One-valve : Blueprints, 1s. each.		
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)		PW46	B.B.C. Special One-Valver		AW387
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67	Twenty-station Loudspeaker One-valver (Class B)		AW440
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79	Two-valve : Blueprints, 1s. each.		
"Acme" All-Wave 4 (HF Pen, D, (Pen), LF, Cl. B)	12.2.38	PW83	Melody Ranger Two (D, Trans)		AW388
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.0.33	PW90	Full-volume Two (SG det, Pen)		AW392
Mains Operated.					
A.C. Twin (D (Pen), Pen)		PW18	Lucerne Minor (D, Pen)		AW425
A.C.-D.C. Two (SG, Pow)		PW31	A Modern Two-valver		WM109
Selectone A.C. Radiogram Two (D, Pow)		PW19	Three-valve : Blueprints, 1s. each.		
Three-valve : Blueprints, 1s. each.			Class B Three (D, Trans, Class B)		AW386
Double-Diode-Triode Three (HF Pen, DDT, Pen)		PW23	New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
D.C. Ace (SG, D, Pen)		PW25	Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
A.C. Three (SG, D, Pen)		PW29	£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
A.C. Leader (HF Pen, D, Pow)		PW35C	Lucerne Hanger (SG, D, Trans)		AW422
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B	£5 5s. Three : De Luxe Version (SG, D, Trans)	19.5.34	AW435
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A	Lucerne Straight Three (D, RC, Trans)		AW437
Armada Mains Three (HF Pen, D, Pen)		PW38	Transportable Three (SG, D, Pen)		WM271
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW59	Simple-tune Three (SG, D, Pen)	June '33	WM327
"All-Wave" A.C. Three (D, 2 LF (RC))		PW54	Economy-Pentode Three (SG, D, Pen)	Oct. '33	WM337
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW56	"W.M." 1934 Standard Three (SG, D, Pen)		WM351
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70	£3 3s. Three (SG, D, Trans)	Mar. '31	WM354
All-World Ace (HF Pen, D, Pen)	28.8.37	PW80	1935 £6 6s. Battery Three (SG, D, Pen)		WM371
Four-valve : Blueprints, 1s. each.			PTP Three (Pen, D, Pen)		WM389
A.C. Fury Four (SG, SG, D, Pen)		PW20	Certainty Three (SG, D, Pen)		WM393
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D	Minute Three (SG, D, Trans)	Oct. '35	WM396
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45	All-Wave Winning Three (SG, D, Pen)		WM400
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47	Four-valve : Blueprints, 1s. 6d. each.		
A.C. All-Wave Corona Four	6.11.37	PW81	65s. Four (SG, D, RC, Trans)		AW370
			"A.V." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
			2HF Four (2 SG, D, Pen)		AW421
			Self-contained Four (SG, D, LF, Class B)	Aug. '33	WM331
			Lucerne Straight Four (SG, D, LF, Trans)		WM350
			£5 5s. Battery Four (HF, D, 2 LF)	Feb. '35	WM381
			The H.K. Four (SG, SG, D, Pen)	Mar. '35	WM384
			The Auto Straight Four (HF, Pen, HF Pen, DDT, Pen)	Apr. '36	WM404
			Super-quality : Blueprints, 1s. 6d. each.		
			Super-quality Five (2 HF, D, RC, Trans)		WM320
			Class B Quadradyne (2 SG, D, LF, Class B)		WM344
			New Class B Five (2 SG, D, LF, Class B)		WM340

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Amateur Wireless	4d.
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Mains Operated.		Two-valve : Blueprints, 1s. each.	
Consolomatic Two (D, Pen) A.C.			AW403
Economy A.C. Two (D, Trans) A.C.			WM286
Unicorn A.C.-D.C. Two (D, Pen)			WM394
Three-valve : Blueprints, 1s. each.			
Home Lover's New All-electric Three (SG, D, Trans) A.C.			AW383
Mantovani A.C. Three (HF Pen, D, Pen)			WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '35		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)			WM370
Mains Sets : Blueprints, 1s. 6d. each.			
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		AW390
Holiday Portable (SG, D, LF, Class B)			AW393
Family Portable (HF, D, RC, Trans)	22.9.34		AW447
Two H.F. Portable (2 SG, D, QP21)			WM363
Tyres Portable (SG, D, 2 Trans)			WM367

SHORT-WAVE SETS—Battery Operated.		One-valve : Blueprints, 1s. each.	
S.W. One-valver for America	15.10.38		AW429
Rome Short-waver			AWJ52
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		AW465
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)			WM313
Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35		WM383
Superhet : Blueprint, 1s. 6d.			
Simplified Short-waver Super	Nov. '35		WM397

Mains Operated.		Two-valve : Blueprints, 1s. each.	
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"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.		8.W. One-valve converter (Price 6d.)	
Enthusiast's Power Amplifier (1/6)			WM387
Lister'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
New Style Short-wave Adapter (1/-)			WM283
Trickle Charger (6d.)	Jan. 5, '35		AW462
Short-wave Adapter (1/-)			AW456
Superhet Converter (1/-)			AW457
B.L.D.L.C. Short-wave Converter (1/-)	May '36		WM405
Wilson Tone Master (1/-)	June '36		WM406
The W.M. A.C. Short-wave Converter (1/-)			WM403

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ROSEBACK Wire, Gysis, 6d., heavy, 9d. Resin-cored Solder 1 1/2 lb., 6d. Screened Flex, single, 6d. yd.; twin, 8d. yd. Assorted Solder Tags, 6d. packet. Humdimmers, 6d. each.

W.B. Sin. Permanent Magnet Speakers at one-third cost. Extension Type (no Transformer), 7/6. Standard Type (with Transformer), 12/6.

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44, HOLLOWAY HEAD, BIRMINGHAM, 1

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1938-1939
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13 v. .2 amps. Gen. Purpose Triodes, 5/6; H.F. Pens. and Var.-Mu. H.F. Pens., Double Diode Triodes, Oct. Freq. Changers, Full-wave and Half-wave Rectifiers.

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VOLTAGE MULTIPLIER RESISTANCES, guaranteed accuracy ± 2 per cent. All standard ranges, 1/3 each.

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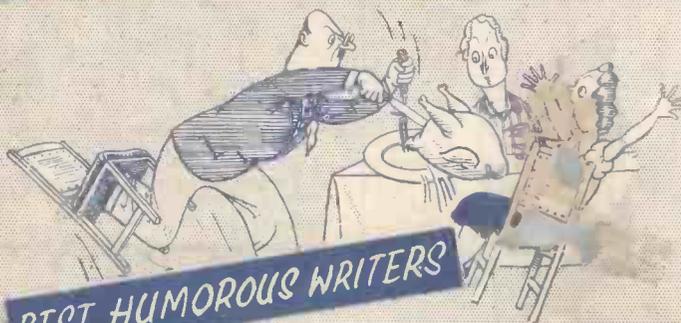
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MAKING AN 18-WATT AMPLIFIER— See Page 403

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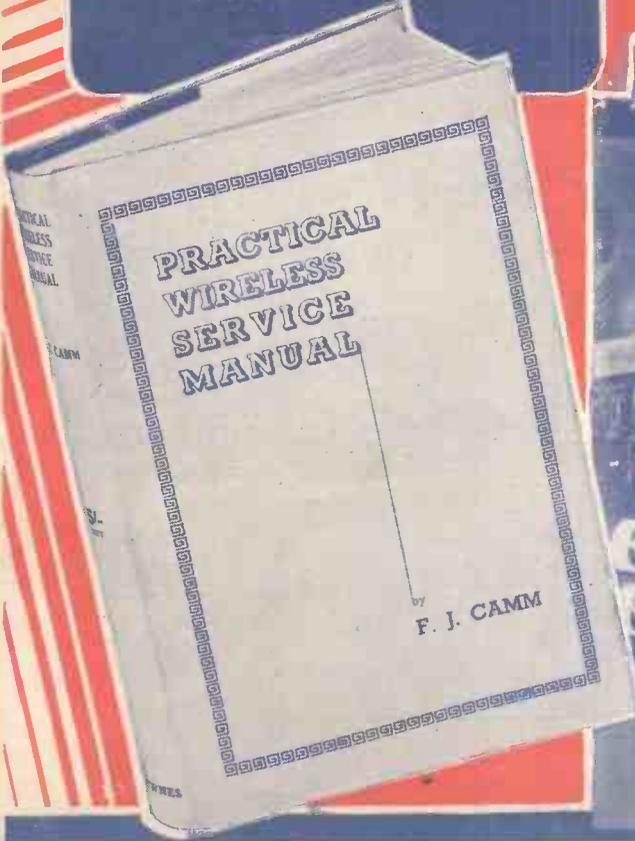
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Publication

Vol. 13. No. 328.
December 31st, 1938.

AND PRACTICAL TELEVISION

The Amateur's TEST ROOM



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CARD GAME



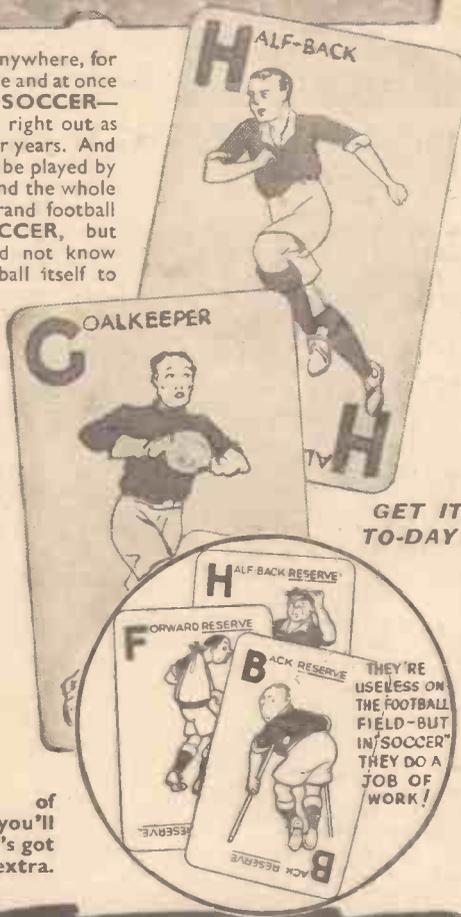
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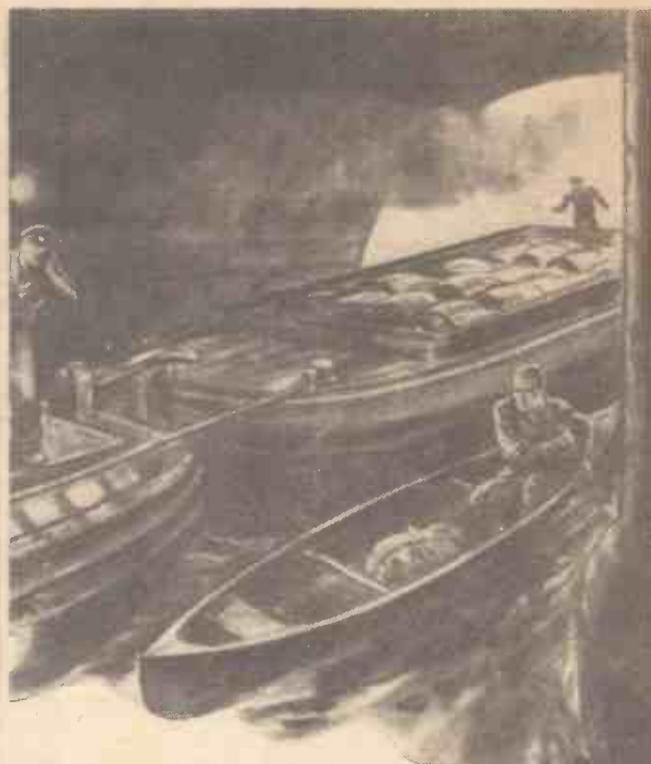
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2/6



LONDON to ROME by CANOE

It seemed that he must be crushed between barges and tunnel wall. (The author's thrilling experience on the Burgundy Canal.)

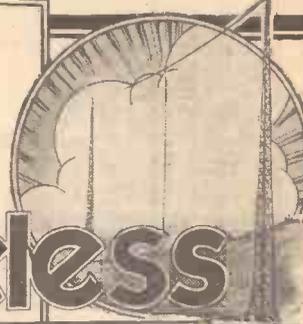
The personal narrative of a Canadian who made a remarkable, single-handed canoe voyage across Europe is one of the 14 true-life adventures in the January **WIDE WORLD MAGAZINE**. Almost from the beginning of his venture the writer was penniless, and in addition to navigating his small craft he had to earn his keep as he passed from place to place.

IN THE **WIDE WORLD MAGAZINE**

Of all Newsagents and Bookstalls, or by post 1/23d., from the Publisher, George Newnes, Ltd., Tower House, Southampton St., Strand, London, W.C.2.

1/-

Building a "Range-Getter" — See Page 397

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. 328. December 31st, 1938.

ROUND *the* WORLD of WIRELESS

Our 1939 Programme:

IN this issue it is appropriate that we should give our readers an indication of the practical part of our programme for 1939. First of all, once again we express our sincere thanks to all readers who so loyally support this paper. It is a matter of extreme gratification to us to know that our net sales are even greater this year than they were last. We shall continue our policy in 1939 of issuing designs for guaranteed sets, and our star receivers will, of course, be made the subject of blueprints. Additionally, we propose to produce a new series of receivers which will appeal especially to beginners. They will be designed to a high standard of efficiency within, of course, the limitations of cost. We propose to design these receivers on a low-price basis, and the first of them will appear shortly.

There are also in existence many thousands of components now reposing in constructors' junk boxes because designs are not available for them. We therefore propose to publish designs which will incorporate some of the components which constructors may already have. We shall also publish a new series of articles on making coils, giving circuits for which they may be used, and we have a strong practical programme in addition to our regular features and our articles on servicing and principles. We would ask all new readers to place a regular order with their newsagents, and this is an appropriate time in which to make *your* New Year's Resolution.

Sexton Blake Serialised

ONE of fiction's most famous detective characters, Sexton Blake, together with Tinker, will be adopted by the B.B.C.

in a series of ten-minute stories commencing early in the New Year. An actor has not yet been chosen to play the name part. Each episode will end with a tense-hair-raising situation which will leave listeners guessing—until the week following.

A Happy New Year

NEW YEAR greetings will be mutually broadcast by members of the International Broadcasting Union on the evening of New Year's Day. Members of the Union are busily recording brief greetings characteristic of their countries and these, in the majority of cases, will be preceded by and concluded with music or sound identifiable with the country of origin. The English greeting will take the form of a peal by the bells of St. Clement Danes and a B.B.C. announcer wishing the world a Happy New Year. All records will be combined on one master disc which will subsequently be distributed to members of the Union. On New Year's Day these will be played at pre-arranged times.

Pantomime Peeps

IN the first week of the New Year Midland is representing four of the pantomimes in towns where claims in the past have been rather overshadowed by Birmingham with its tradition of three-month runs. Under the title of "Pantomime Peeps" these short broadcasts are designed as appetisers for the people of the immediate districts. The first will be broadcast on January 2nd from the Theatre Royal, Nottingham, where the pantomime is "Puss in Boots."

The second will be "Aladdin," on January 4th, from the Opera House, Leicester.

On January 5th an extract from the matinee of "Mother Goose" at the New Theatre, Oxford, will be given.

The fourth will be broadcast on January 7th from the Derek Salberg pantomime, "Dick Whittington," at the Grand Theatre, Wolverhampton.

A Contributor On The Air

MR. ARTHUR ASHDOWN, who formerly contributed to PRACTICAL AND AMATEUR WIRELESS, and is now in South Africa, took part in a broadcast play in Johannesburg recently. The play was entitled "The Jury Retires." Mr. Ashdown was, of course, prominently associated with amateur theatricals in England.

Interference in Algeria

ALL countries are now taking active steps to combat interference with broadcast programmes, occasioned by the use of certain electrical equipment not fitted with adequate interference-suppressing devices. The Algerian Post Office recently installed four interference suppression locator units, consisting of a car and directional apparatus for locating offenders. In 43 cases of interference recently reported 33 were eliminated.

U.S.W. Radio-phone

THE efficiency of the experimental radio link between Belfast and Stranraer, which is of the nine-channel type, has resulted in the Postal Authorities placing an order with Standard Telephones and Cables and Le Matériel Téléphonique for a similar but improved system for communication across the English Channel. Each group of nine circuits will have independent aerial systems designed to give a gain of approximately 18 db. over the normal half-wave aerial. The aerial will be polarised vertically for England-to-France transmissions and horizontally for the opposite direction. The transmitters will be remote controlled from repeater stations.

Danish Ship-to-Shore Radio

A NEW installation has been ordered by the Danish Post Office for use at station OXB, to maintain communication between the shore and ships at sea. The new station will have five wooden masts located half a mile from the three masts now in use. There are four transmitters in the new station, the main telegraphy transmitter operating on the 400-850-metre band with a power of 900 watts. In addition there is a stand-by telegraphy transmitter of 500 watts. The telephony transmitter has an output of 500 watts with a 60-watt standby unit.

Wireless School, Reunion Dinner

THE Officers' reunion dinner will be held at the R.A.F. Club, 123, Piccadilly, W.1, at 7 p.m., for 7.30 p.m. on Saturday, January 21st, 1939.

Officers who are not members of the Club will be regarded as honorary members for the night. Those wishing to attend, please communicate with Flight Lieut. F. S. Wainscot, R.A.F., The Electrical and Wireless School, Cranwell, Lincs.

ROUND the WORLD of WIRELESS (Continued)

Proposed New Yugoslavian Station
A FOURTH broadcasting transmitter is to be added to the Yugoslavian network, namely, at Stolp. Work is to be started on the construction of the station immediately in order that it may be brought into operation in the spring of 1939.

New Egyptian Stations Planned

AS the 20-kilowatt Abu Zabal (Cairo) transmitter does not give an adequate service throughout Egypt, and the relay stations only permit reception of the programmes in and around Cairo, Alexandria, and Assiut, the Government plans to install new and more powerful transmitters, one of which will work on short waves in order that the voice of Islam may be heard throughout the world.

The First All-wireless Robot

MR. AUGUST HUBER, an engineer of the Swiss village of Niederteufen, in the Canton of Appenzell, has just completed



The all-wireless Robot gives its master's dog a drink.

a ten years' task with the production of the first all-wireless Robot, shown in the illustration on this page.

Fitted with an ultra-short-wave receiver the Robot reacts to orders spoken into a microphone many miles away, and the answers to questions delivered in person to the Robot itself are picked up by this far-distant microphone.

Microphones are fitted inside the ears of the Robot, and the aerial is projected from the ears. Batteries concealed in the legs supply current for the twenty motors with which it is equipped, and which enables it to walk, talk, sing or yodel. The Robot's lips

INTERESTING and TOPICAL NEWS and NOTES

synchronise with its speech. This seven-foot marvel weighs over 400 lbs.

Cycle of Old English Melodies

FROM the Newcastle studios on Saturday evening, December 31st, will come a programme called "Flora's Holiday," a cycle of old English melodies by H. Lane Wilson. Those taking part will be the Northumbrian Quartet, Ada Alsop (soprano), Margaret Magnay (mezzo-soprano), James Etherington (tenor) and Fred McIntyre (baritone).

"Hail 1939!"

VICTOR SMYTHE is planning a big entertainment tour round Blackpool—"Hail 1939!"—for Friday evening, January 6th. In this 45-minute programme listeners will pay visits by microphone to a number of the famous resort's places of entertainment. London Regional will take this broadcast as well as North.

Duke of Kent to Broadcast

WE are informed that the Duke of Kent, as Governor-General designate of the Commonwealth of Australia, has consented to broadcast a message to the Commonwealth on Australia Day, January 26th next. His Royal Highness's message will be broadcast from 9 to 9.10 a.m. from the Empire station at Daventry, and will be recorded for subsequent use in the home programmes.

Northern Concert Orchestra

"SWIFT SERENADE"—music in the modern manner, with concert arrangements by Ray Terry and Ralph Bruce—is continuing in the Northern programmes. This should be good news to many listeners, for these programmes by Tommy Matthews and his Concert Orchestra have had a wide popularity—even with some of the listeners who called themselves "highbrow." Matthews and his orchestra (and the Swing Time Quartet) have another programme on Wednesday evening, January 4th.

Pantomime Broadcast

WHEN the New Year edition of "Northern Notions" is broadcast on January 6th, one item will be a visit by microphone to the New Manchester Hippodrome, where "Red Riding Hood" will be playing. Victor Smythe arranges and produces these popular programmes, parts of which come from the studios, and parts from O.B. points or from "newsy" topical

interviews recorded shortly before the broadcast. Claud Branston is the entertainer-compère of each edition of "Northern Notions."

"Famous Music-halls"

THE North is to provide a second theatre for the Regional series of entertainment pageants, "Famous Music-halls,"



Count John McCormack, the famous singer, rehearsing at the B.B.C. for his first broadcast on British Radio. He is seen discussing the music with Mark H. Lubbock, the conductor (standing), at Broadcasting House.

when the Palace Theatre, Halifax, is featured on Friday, January 6th. The broadcast is bringing to the microphone great figures of both past and present.

SOLVE THIS!

PROBLEM No. 327

After reading that push-pull gave improved results, Jagers decided to convert his four-valve battery receiver to incorporate the circuit. He did not wish to buy a push-pull transformer and as he had two old L.F. transformers in his junk box he decided to connect these together to act as a centre-tapped push-pull component. He therefore joined the primaries in series and connected these in the anode circuit of his second L.F. valve and joined the secondaries in series and fed these to two power valves in the output stage. Results were very disappointing. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must 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. 327 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, January 2nd, 1939.

Solution to Problem No. 326

When Trimble connected his stopper resistance, he joined it in series with the grid leak and the combination of these two resistances acted the same as a tapped volume control, with the grid tapped down to such a position that it reduced volume. The stopper resistance should, of course, have been in the grid lead, joined to the junction of coupling condenser and grid leak.

The following three readers successfully solved Problem No. 326, and books have accordingly been forwarded to them: C. Eaton, 10, Vicarage Road, Gillingham, Kent. A. C. Dean, 36, Trelawney Road, Cotham, Bristol 6. K. H. Elkins, 24, Chesterfield Road, Newbury, Berks.

THE AMATEUR'S TEST ROOM

In this Article the Systematic Lay-out of Testing Apparatus in an Amateur's Radio Den is Discussed

WHEN it is possible to acquire a room in one's home for conversion to a radio den, the principal advantage lies in the possible maintenance of a fairly constant temperature to the benefit of the test apparatus, but to obtain full use of the available space, the question of preserving the walls from disfigurement inevitably crops up, and the free use of "hook-up" benches, and tables, often seems to be the only solution to the problem.

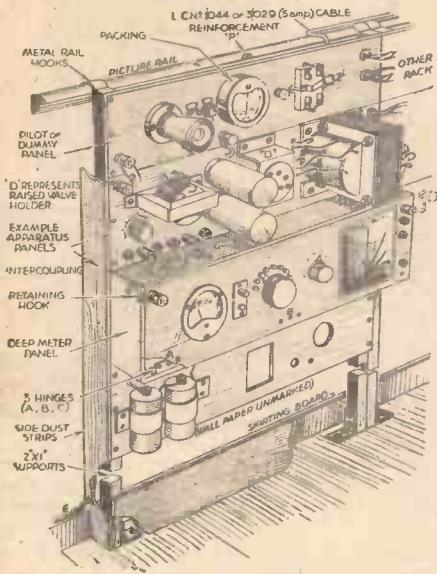


Fig. 1.—General idea of the method of mounting test components on a rack.

It is proposed, therefore, to consider the re-equipment of such a room, bearing in mind the facilities which must be allowed for the removal of any apparatus without damaging walls or wall paper. In the present case the cost of the racks will not be prohibitive, since wood forms the basis of the whole installation.

Picture-rail Support

First, with regard to the suggested arrangement illustrated in Fig. 1, disregarding for the moment the duties of the various panels which are shown equipped: it may not be generally known that, usually, rather fine wire nails are used for the fitment of a picture rail, therefore any undue strain imposed upon this rail will cause it to work loose, with attendant damage to the plaster work. It is a good plan, therefore, to reinforce the curtain rail with a long wall-plug and wood screw ("P"). One will be sufficient for each rack section of reasonable size, thus any tendency for heavy transformers or other apparatus to "drag" the rack and pull on the rail will have little effect.

Rack Assembly

It will be seen that the rack assembly comprises two wooden supports for each section, these being anchored by the fitment of small aluminium or brass hooks to the top of the supports for cleating over the picture rail, the other ends being clamped to the floor boards by suitable angle brackets;

these brackets should be aligned with the skirting board, and not fitted so that they protrude to the front of the rack.

Wood strip 2in. by 1in. will be suitable for the construction of the supports, whilst the panels can be made from 3/4in. by 6in. or 9in. slats. The dust cover strip, which should be provided at any open section of the rack, can be obtained from the same type of wood used for the panelling, and this will, of course, depend on the depth afforded to permit clear wiring at the back.

There is a very important point which will arise in apparatus carrying a fairly heavy current; any wiring which is likely to get rather hot, or any valve or valve base which is similarly inclined, should be arranged so that the wall paper will not be affected and for preference such components, or wiring, should be kept to the front of the panel, thus obviating the possibility of any danger arising through the user being unaware of any fusing which can easily ignite the adjacent woodwork. However, the arrangement should be such that there would be no objections from the insurance people.

Mounting Components

For mounting deep components, and keeping the wiring reasonably clear of the wall, it may be necessary to use packing blocks to attain the desired panel depth, as shown in Fig. 1. These blocks form a secondary consideration, so there is no need to make any alterations in the original rack design if it is found that sufficient depth has not been allowed for in the preliminary design.

If the picture rail is rather high, it may be advisable to preserve a uniform lay-out by fitting a dummy panel at the top, and, judging by the accessibility of the different panels, to arrange a second rack, and inter-coupling them.

It may be desired to form some type of shelf fitted to a certain section which will permit a piece of apparatus to be tested without resorting to the use of long leads from the bench, so to prevent any further load on the picture rail it is a sound plan to mount this shelf to the rack supports by angle brackets, re-inforcing by dropping a couple of legs to the floor, similarly anchor-

ing these with angle brackets; Fig. 2 depicts a simple assembly on these lines.

It is not advisable to include loud-speakers in the rack installation as the vibration at different frequencies can prove to be a nuisance, particularly when a sensitive meter reading is being taken and apart from the fact that the depth and amount of baffle which would be required for satisfactory reproduction would be prohibitive in most cases, whilst there is again the possibility of terminals working loose through the vibration.

Mains Supply

Now with regard to the duties of the various panels, and bearing in mind the question of interference and load. The

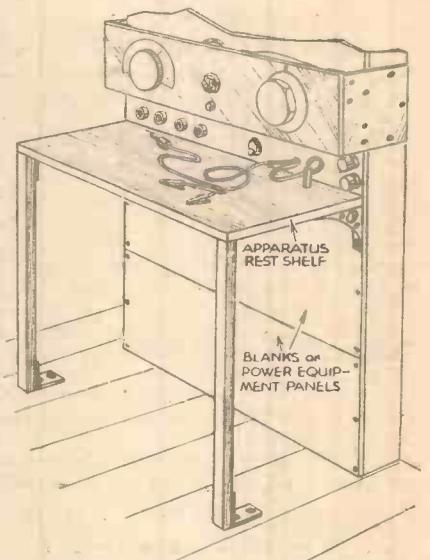


Fig. 2.—Table and test instruments supported in a convenient position.

first consideration concerns the mains supply, and high and low potential points of both alternating and direct character. A good plan is to allow for a definite A.C. section and an independent D.C. section, thus preventing any possibility of super-imposed ripple.

If any outside servicing to receivers occasions the bringing home of the chassis for, say, re-alignment or fault finding, then various types of plugs will have to be provided, so, with due regard to expense, an endeavour should be made to mount the standard range of power plugs (5-amp. type) including two- and three-pin types, also one or two baseboard mounting power sockets. This should be duplicated for the two supplies, A.C. and D.C., and it will be surprising how quickly and more efficiently a job can be carried out.

Fusing

Adequate fusing should be provided, but if there is the advantage of the use of more than one supply point in the room, then in cases where a bowl fire is in use consuming, say, 500 watts, there is a marginal safety of about 250 watts for the average 5-amp.

(Continued on next page.)

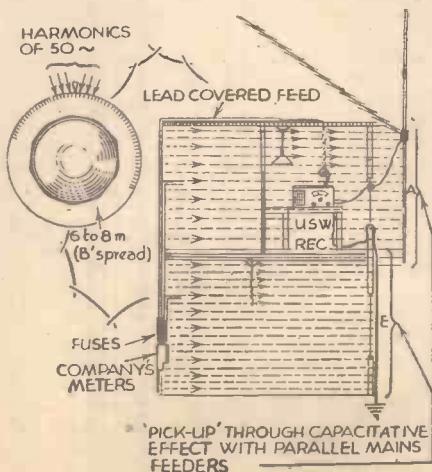


Fig. 4.—Diagram illustrating the pick up of interference and its effects.

THE AMATEUR'S TEST ROOM

(Continued from previous page)

point, which means that the soldering iron, which may be rated at 100 watts, can safely be used from the same supply.

Tests at the same time can then be carried out on the other supply without fear of overload, whilst should one point in any way become overloaded inadvertently, then the stand-by lamp can be plugged in to the remaining supply whilst the fuses are replaced.

Fig. 3 illustrates a "service" panel of the pattern described, and particular attention is drawn to the way in which the wiring is carried out. Lead-covered wire of the gauge indicated is recommended for most requirements, and it will be noticed that an exception is made here in the facing of the panel with aluminium; this is purely a precautionary method, and in such cases it is necessary to earth the metal work separately.

A suitable mains power pilot lamp can be simply provided and economically run by employing a neon lamp of the Osclim type (.5 watt), this being independently fitted at the most convenient point, not necessarily on the supply panel.

Test Equipment

With regard to the test equipment, the only notes which can be made here concern the differentiation which should be made in the various types of apparatus of which the "den" can boast, but in all cases where there is any H.F. measurement to be made, it may be essential for the maintenance of accurate calibrations, etc., to effect suitable screening, either between one or two components or possibly to the extent of completely shrouding one section from another, and in such instances it will be found a comparatively easy and economical procedure if thin copper foil is used, making doubly sure that there is a low impedance earth return, in fact, where it is possible, a separate earthing system should be arranged.

In coming to the question of earthing, the same principle as mentioned for the mains supply feeds should be adopted, inasmuch as a number of earth return points would be preferable to prevent inter-coupling, the wiring being carried out with heavy gauge bare copper wire.

Although space will not permit of further

dition, for example, the loudspeaker leads, or the mains connecting leads and transformer, it is not only necessary to ensure adequate spacing apart, but the directional properties should be checked to see that there is not a common induction set by parallel connecting wires; a typical condition is depicted in Fig. 4, which shows diagrammatically the harmonics which may

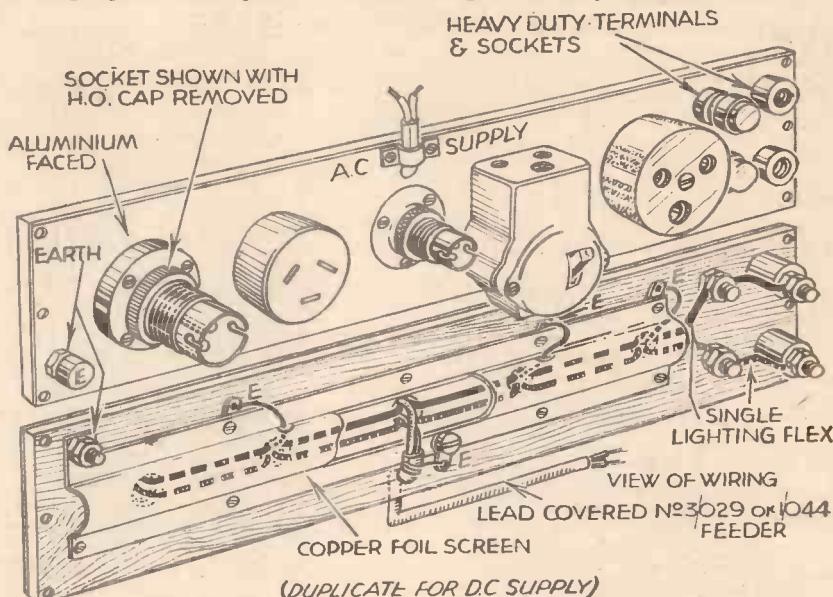


Fig. 3.—A useful suggestion for a service panel.

examples of the different purposes of the apparatus panels, a final word, however, can be given on the aerial feeder system.

Aerial Leads

Varying requirements will, of course, govern the types of aerial used, but to prevent the occurrence of, say, a modulation hum, or any other form of interference through the relationship of the aerial leads to any wiring likely to induce this con-

arise if, in ultra-high frequency reception, the use of a vertical antenna results in "pick-up" from vertical mains lines from the fuse boxes feeding the upstairs room used for the "den."

Whatever form of rack assembly the tester decides to adopt, the value of interchangeability will prove to be an asset, since modification to any apparatus after a period of use can be correspondingly adjusted in the panel lay-out.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, December 28th.—Variety: Crooners' Corner.

Thursday, December 29th.—Little Londoners Banquet at Guildhall.

Friday, December 30th.—Hail Pantomime.

Saturday, December 31st.—New Year's Greeting programme.

REGIONAL (243.1 m.)

Wednesday, December 28th.—Dance Cabaret, from the Royal Bath Hotel Ballroom, Bournemouth.

Thursday, December 29th.—Wales, a parable in verse by T. Rowland Hughes, from Wales.

Friday, December 30th.—Dance Band, from France.

Saturday, December 31st.—The Veterans of Variety, radio burlesque.

MIDLAND (297.2 m.)

Wednesday, December 28th.—Midland Farmers' Club: The Farm Must Feed Itself: a discussion.

Thursday, December 29th.—Band concert.

Friday, December 30th.—Edward Nelson Players in The Wind and the Rain.

Saturday, December 31st.—Pantomime: Robinson Crusoe, an excerpt from the matinée at the New Hippodrome, Coventry.

WEST OF ENGLAND (285.7 m.)

Wednesday, December 28th.—Dance Cabaret, from the Royal Bath Hotel Ballroom, Bournemouth.

Thursday, December 29th.—Sing We Merrily, a programme of traditional carols from Dorset and Cornwall.

Friday, December 30th.—Mer Pert, a curious story of the Christmas season, written and read by Frank Baker.

Saturday, December 31st.—Sports Special: a feature for fans—special New Year's Eve Number.

WELSH (373.1 m.)

Wednesday, December 28th.—Goodly Fragrance; some choral and organ music, from St. Seiriol's, Holyhead.

Thursday, December 29th.—Wales, a parable in verse by T. Rowland Hughes.

Friday, December 30th.—The Babes in the Wood, a studio pantomime.

Saturday, December 31st.—Orchestral concert.

NORTHERN (449.1 m.)

Wednesday, December 28th.—Harrogate, a Christmas entertainment tour of Harrogate.

Thursday, December 29th.—Stagshaw Searchlight Review.

Friday, December 30th.—Further Familiar Fables, No. 7, Jungle High Jinks! Another of Aesop's Fables, told in a new way.

Saturday, December 31st.—The Wakefield Second Shepherd's Play, a radio version modernised and arranged by James R. Gregson.

SCOTTISH (391.1 m.)

Wednesday, December 28th.—An excerpt from the Pantomime, Robinson Crusoe, from the Theatre Royal, Glasgow.

Thursday, December 29th.—Hogmanay, a Gaelic play by Hugh Macphie.

Friday, December 30th.—An excerpt from the pantomime, Babes in the Wood, from the Empire Theatre, Glasgow.

Saturday, December 31st.—New Year's Eve programme.

NORTHERN IRELAND (307.1 m.)

Wednesday, December 28th.—Dance Cabaret, from the Royal Bath Hotel Ballroom, Bournemouth.

Thursday, December 29th.—Industry, a radio play by Thomas Carnduff.

Friday, December 30th.—Orchestral programme.

Saturday, December 31st.—All Kinds of Musick, presented by Raymond Glendenning.

MAKING A "RANGE-GETTER"

How to Design and Build a Useful H.F. Unit to Improve the Simpler Type of Receiver - - - By W. J. DELANEY

MANY listeners own simple types of receiver in which a detector alone, or followed by L.F. stages, is employed. The range of such a receiver is limited, and although exceedingly long distances can be covered, there is a limitation imposed by atmospheric conditions. Reaction has to be pushed to the limits to get long-distance stations, and a small unit which could be added when desired, or which could be made a permanent addition to the receiver, is often called for. Contrary to the belief of many beginners, there is nothing difficult in the design of such a unit, although when it is made part of a complete receiver troubles often arise. These are generally due to interaction between the

high-inductance type, and a simple reaction type of choke will definitely not give the best results.

For volume control purposes a potentiometer with a value of 10,000 ohms should be used, and this is joined across a 9- or 16-volt grid-bias battery, the exact value depending upon the type of valve which is used. The maker's instructions will be followed in this case. A standard dual-range tuning coil should be used for the unit, together with a standard .0005 mfd. tuning condenser. This may be provided with a slow-motion drive if desired. A 1-mfd. non-inductive condenser should be joined from the screen of the valve to earth, and a flexible lead attached to the S.G. terminal for insertion in the H.T. battery. The voltage used should be found by experiment and some value between 60 and 90 volts generally proves satisfactory. Again, the maker's instructions will assist in ascertaining the approximate voltage needed. To prevent the G.B. battery from discharging through the control potentiometer, an on/off switch should be connected in the positive lead, and by obtaining a volume control with self-contained switch

namely, the choice of coupling. If the H.F. transformer of Fig. 2 is now in use in the receiver there are two alternatives, as shown in Fig. 3. Here the anode only of the H.F. valve is shown, and it will be seen that an H.F. choke may be joined in the

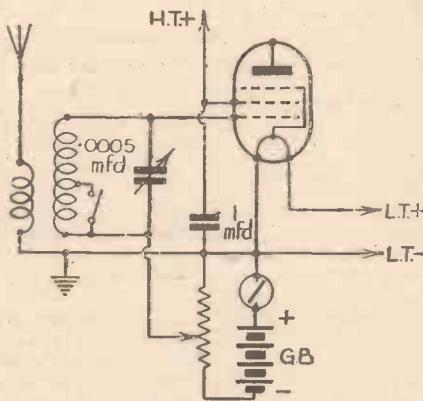


Fig. 1.—Circuit of the range-getter.

H.F. and the detector stages, or to the use of wrong voltages, and, therefore, if a separate unit is built it may be made in such a manner that interaction cannot take place, and the correct voltages may be found very easily without upsetting the rest of the receiver.

The requirements of such a unit are merely a valve which may be of either the screen-grid or H.F. pentode type, and a tuning circuit. In addition, an H.F. choke may be required, but this will be dealt with in due course. Maximum results will be obtained if the valve is of the variable- μ type, as it will then be possible to fit a volume control on the unit panel and a ready means of controlling volume will thus be presented, by means of which overloading can be avoided.

The Circuit

A circuit for a unit of this type is given in Fig. 1, and the necessary modifications will be now explained. In Fig. 2 may be seen the two normal types of aerial circuit, such as will be found in the standard type of simple receiver. The first is known as an H.F. transformer and the second as a tuned grid coil. From the point of view of selectivity the first arrangement is definitely to be preferred. If you have this type of coil now in use a slight alteration to the wiring will be needed, and you can use it directly coupled in the H.F. unit, or by using a choke may retain it in its present condition. If you have the second type of coil, then you will have to use an H.F. choke. The choke required must be of the

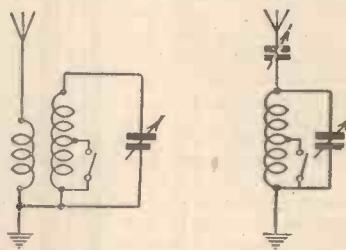


Fig. 2.—Typical aerial circuits.

a component will be avoided, wiring simplified and the panel layout improved. A two-point switch should be selected. The

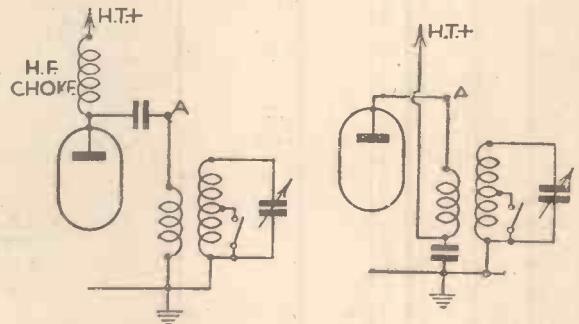


Fig. 3.—How the aerial circuits of Fig. 2 may be used as H.F. couplers.

anode circuit and a lead taken through a condenser to the original aerial terminal on the receiver in order to connect the unit to the receiver. If the second method is adopted, the primary winding of the transformer will have to be disconnected from the earth line, and a 1-mfd. fixed condenser joined between that end of the winding and earth. A lead must then be taken from the junction of the coil and condenser to H.T. positive, whilst the anode of the H.F. valve is joined to the aerial terminal.

If the simple type of coil is now in use, then an H.F. choke must be joined in the anode circuit, as shown in Fig. 4, and a lead taken from the anode to the aerial terminal on the receiver. It will be noted in this illustration that the condenser is shown as being of the pre-set type, and this is an advantage as it governs the degree of signal voltage which is passed on to the detector stage, and there is a critical value which will be found on experiment. If the existing aerial condenser is of the fixed type it may be left, provided that it is of the

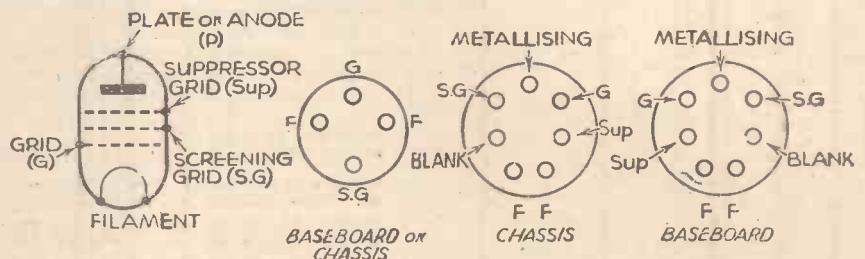


Fig. 5.—Details of the connecting points of H.F. valveholders and the electrodes of an H.F. valve.

L.T. leads should be taken to the filament valveholder terminals in the receiver with which the unit is to be used and then the valve will be switched on and off by the receiver switch and the necessity for another switch avoided.

H.F. Coupling

We now come to the difficult part—

order of .0001 or .0002 mfd. It should, of course, be of the non-inductive—preferably mica—type.

Construction

The valve may be mounted on a wooden baseboard of a small chassis and an aerial and earth strip fitted. A flexible lead

(Continued on page 414.)

Radio to Locate "Time Capsule"

How Future Scientists will Find the Buried Records of Our Generation

FIVE thousand years from now historians of the future will receive an 800-pound metal letter, a Cupaloy *Time Capsule* containing information about us and our times. It will be deposited fifty feet below the surface of the New York World's Fair grounds by the Westinghouse Electric and Manufacturing Company and officials of the Fair.

And if future historians do find the *Capsule*, major credit will go to a Canadian geophysicist, Sherwin Kelly, head of Geophysical Explorations, Ltd., of Toronto, upon whom the Westinghouse Electric and Manufacturing Company called to provide information for discovering the *Capsule* by electro-magnetic prospecting.

Mr. Kelly's message to the future is to be published in a specially prepared *Book of Record of the Time Capsule*, which will be preserved in libraries, museums, and other repositories throughout the world. The book is printed on special rag paper, with specially compounded permanent inks, and well bound. It is expected that some copies will survive for 5,000 years, and will guide future historians back to the spot where the metal *Capsule* waits. In addition to exact latitude and longitude, given accurately enough to locate a spot less than an inch in diameter on the earth's surface, instructions are given for building and using geophysical prospecting instruments to locate the *Time Capsule*.

The message to the future, signed by Mr. Kelly, is as follows:

"Though in all probability methods more sensitive than any we have to-day will be employed in the future to seek for metallic bodies beneath the earth, it is possible, too, that this will become a lost art. It is therefore suggested that the *Time Capsule* may be discovered by detecting the secondary electro-magnetic field induced in it by a strong primary electrical field created at the surface of the ground.

"Construct a loop some ten feet in diameter, composed of several turns of well-insulated wire, fashioned in such a manner that it can be moved systematically over the area within which the *Capsule* is believed to lie. While the loop stands vertically, pass through it an alternating current of 1,000 to 5,000 cycles, using a power source of approximately 200 watts. The primary electro-magnetic field thus set up around the loop will intersect any metallic material in the vicinity such as the *Capsule*, and induce in it a secondary current. This current will produce a secondary electro-magnetic field such as will distort the primary field of the 'energising' loop. This distortion, properly interpreted, will indicate the location of the *Time Capsule*.

"To investigate this phenomenon, construct a second, smaller coil, approximately a foot in diameter, made up of a large number of turns of insulated wire. To the coil should be connected an amplifier which in turn is connected to some type of current indicator, such as a galvanometer or telephone receiver. Some means should be provided for accurately measuring the 'strike' or direction of the coil in the horizontal plane, as well as its 'dip' or deviation from the vertical position. On level ground, where there is nothing to distort the primary field, the current generated in the small, or 'pick-up,' coil will be at a minimum (that is, produce the

least deflection of the galvanometer needle or the least sound in the telephone receiver) when its plane is perpendicular to that of the large coil. Conversely, the maximum current will be observed when the two coils are in the same plane. It is well to take both observations as a check-up before beginning the search for the *Capsule*. If the instrument is working properly, the positions of minimum and maximum current in the pick-up coil should be at right angles to each other.

"In exploring for the *Capsule*, observations may be made with the pick-up coil in two ways.

"*First*: Take measurements in the plane of the energising loop, moving farther and farther away from it in short stages of 5 or 10ft. Do not work too close to the energising loop. If during this survey the pick-up coil passes over buried metallic material it will be noted that the positions of the coil do not correspond to those described for an undistorted field. The divergence from the normal dip will be at a maximum over the hidden body, whereas the deviation from the normal strike will increase as the metallic substance is approached, reverse to a maximum in the opposite direction as the spot is passed over, and then decrease as the coil moves farther away.

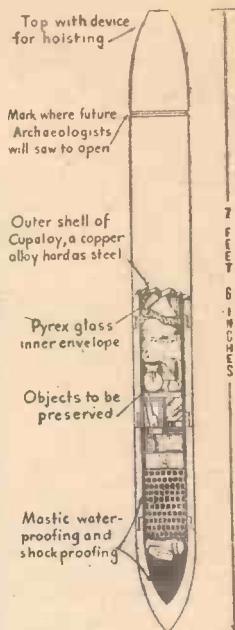
"*Second*: Take readings along lines at right angles to the measurements suggested in the *First Method* above. These readings should be taken approximately 5 to 10ft. apart, extending 50 to 100ft. each side of the plane of the energising coil. The lines of observation should cross the first line every 5ft. Observe the position of maximum current in the pick-up coil. In an undisturbed field the coil should stand vertically. As the metallic body is approached the position of maximum current in the pick-up will stand at an angle from the vertical, and its plane will point roughly to the buried metallic mass. When it passes over the *Capsule*, the plane of maximum current of the pick-up coil will again become vertical. As the coil passes beyond, it will reverse, and point in the opposite direction. The strike will undergo a maximum deviation from its normal position as the *Capsule* is passed.

"By a combination of these two methods it should be possible to locate the position of the *Time Capsule* within a few feet. However, if any other metallic objects lie within the area, they may also give indica-

tions. In our day we know of no way to distinguish by geophysical prospecting between different types of metallic substances when they are concealed beneath the ground."

The 5,000-year Westinghouse *Time Capsule* will contain books reproduced in micro-film, statements of this age's scientific engineering, industrial, social, religious and philosophic achievements. It will also contain specially preserved small articles that moderns wear or use; motion picture film illustrating how we look, act and talk; photographs of famous people and things of our time, and messages from great men of to-day for the future.

Westinghouse engineers and metallurgists have designed the *Time Capsule* for permanence. It is torpedo-shaped, 7½ft. long and 8ins. in diameter. The outer shell is made of Cupaloy, a new temperable alloy of copper which has the strength of steel and high resistance to corrosion. The inner crypt is lined with a Pyrex glass envelope set in waterproof plastic. This crypt will contain film and articles, preserved in an inert gas (nitrogen).—*Radio News*.



How the *Time Capsule* is made up and loaded.

Television and Fog

IN a recent issue of this journal attention was drawn to the successful B.B.C. television transmission of the arrival of King Carol of Rumania at Victoria, in spite of the thick fog which had penetrated into the station itself. With a photo-electric device sensitive to the infra-red end of the spectrum the work will present no difficulty provided the objects being televised are capable of emitting infra-red rays. To meet other cases it has now been proposed in America to "flood" fog-obscured objects with a searchlight beam from which all light rays have been filtered, except the infra-red. In this way it is hoped to focus on the television camera mosaic a picture which can be scanned and reproduced subsequently on a receiver screen. This is, of course, an up-to-date extension of the nocto-vision experiments undertaken by Baird in 1928 on a low-definition standard. From time to time hope is expressed that a really satisfactory fog penetrating device will be developed which can be employed commercially, and so remove some of the terrors associated with fog. That an adaptation of television's principles is the most likely way in which this will be done now seems to be generally accepted, and it is hoped that both time and money will be found for the work as its importance to navigation and various commercial activities cannot be over-estimated.

NOW READY!

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CHOKES AND
TRANSFORMERS,
AND HOW TO
MAKE THEM**

2/6, or 2/10 by post from Geo.
Newnes, Ltd., Tower House,
Southampton Street, Strand, London,
W.C.2.

ON YOUR WAVELENGTH



Thanks!

MY gratitude and thanks to those many readers who sent me Christmas and New-Year's Greetings. I am sorry that I shall not be able to reply to each of them individually, for the very good reason that most of the cards did not contain the name and address of the sender. I want them all to know, however, that I greatly appreciate their sentiments.

The Army Marches On

SEE by the latest returns that the Post Office issued 1,054,659 wireless receiving licences during November, 1938. This figure represents a net increase of 41,681 in the number of licence-holders during the month, after making allowance for expired licences and renewals.

The approximate total number of licences in force at the end of November, 1938, was 8,870,700, as compared with 8,423,620 at the end of November, 1937, an increase during the year of 447,080. During the month there were 526 successful wireless prosecutions.

Reply to a Letter

MR. A. A. B., of Warwick, wrote to me the other day stating that he did not think that we published sufficient constructional material. This gave me such a jolt that I conducted a little research by consulting the bound volumes of many of the wireless journals, including this one, and all of those now defunct. I carefully measured the space per year devoted to constructional articles, and I found that in one year this journal published more practical information, not only on making sets, but on making coils, chokes, transformers, cabinets, etc., than did most of the others in three years. Moreover, whereas most of the practical material in certain papers now defunct was confined entirely to set-building, ours has not been. We have also published more experimental circuits for readers to try than any other journal of similar kind. As I have pointed out before it is inevitable that a few features in a periodical will not appeal to every reader. We have to cater for all. A. A. B. does not like theoretical articles, but there are many thousands

By *Thermion*

who do. He then goes on to explain the gravamen of his grouse, and this is what he wants: A two-valve very modern and efficient all-wave circuit using not more than 8 mA; a gramophone radio-switch incorporated, and the whole kit of parts with a plain cabinet and 8in. moving coil speaker, to cost not more than £5!

I am afraid this reader will have to wait a long time before his needs are satisfied, for the excellent reason that it is not possible to give him everything he wants at the price. He also puts in a plea for practical articles, and then makes an impracticable suggestion! However, there are many other parts of this reader's letter which contain sound arguments, and I have passed them along to the Editor for his consideration. I can assure A.A.B., of Warwick, that the macabre doubt contained in his last paragraph ("I hope that I shall not read the casual announcement in one of your issues that you are ceasing publication") is without foundation. Papers come and go, but we go on and on . . .

A Cuttings File

HEREWITH a letter from F. L., of Las Palmas, which speaks for itself:

"Though 'On Your Wavelength' is one of my favourite items in the paper, I have not written to you previously as I am sure you have quite enough correspondence to attend to without my adding to it. This week, however, there is one paragraph headed 'A Cuttings File' on which I wish to comment, partly because I use a similar idea, though not quite so simple, and also because I can see a snag in your correspondent's system.

"Taking the latter first: you unfortunately do not print PRACTICAL

AND AMATEUR WIRELESS on one side of the paper only. What does he do when two interesting articles are printed one on each side of the same sheet—such as A for aerial and W for wattage? The obvious solution is buy two copies; good for business from your point of view, but though I'm not Scotch it sounds expensive. I will briefly explain my system:

"I use similar cardboard or paper files, with a small metal clip (price about 2d. each) and thin typewriting paper. Files are divided more or less as follows: H. F. stages, detector stage, L.F. stages, L.S., 'phones, volume and tone controls, aeri-als and earths, coils, screening, etc. Total: five files at the moment.

"As each issue comes along I copy out interesting items under their respective headings and file in their files, noting the volume and page number in the margin for more detailed reference, if necessary. Long articles I do not copy, but just give a rough outline of the contents so that they can be looked up when required.

"As each volume is completed I have it cheaply bound (please note that economy is my strong point) and it takes its place in my workroom.

"I forgot to mention that each file is further sub-divided into sections such as: Aerial transformers, aperiodic coupling, var-mu valves, inter-valve couplings, decoupling anode, ditto screen, and so on.

"As a definite example, I have just added the following along with other items: File: General Notes. 1.—Screening. XIII. 261. Movement between screens at different H.F. potentials through 'pick-up' can cause crackles. (Illustrated.)

"This may be of interest to other readers, and let me take this opportunity of wishing you and the paper all the best for the coming season, and also my kind regards to 'The Experimenters'; they have been most helpful on many occasions."

The Licence and the Post Office

WITH reference to my recent paragraph on this subject I have received the following letter from Norman A. L. Timbers, G5TR, of 10, Parramatta Street, Rawtenstall, Rossendale, Lancs. He says:

"I should like to have the privilege

of replying to the letter published in your page on December 3rd.

"As the holder of a transmitting licence for some years, I find myself at a loss to account for the treatment your correspondent alleges was given to him by both the Post Office and the amateur fraternity.

"Taking the Post Office first, I myself have met with nothing but courtesy from them, and I have had plenty of correspondence with them. By calling the Post Office unfair because they have seen fit to refuse him an AA call, your correspondent seems rather in the position of the fox who, when he couldn't reach the grapes, called them sour! Being the friend of several local short-wave fans who have recently got their AA call, I find it hard to believe that the P.O. would refuse a genuine application.

"As regards amateurs, of course there are a few exceptions to the ham spirit rule, but, believe me, they are few and far between. Nearly all are only too willing to allow others to inspect their stations. The very first amateur station I ever saw was owned by a person who, though he had neither the time nor the convenience to spend on schoolboys, which was all I was at the time, went out of his way to instruct me in the rudiments of short-wave radio.

"Anyhow, here's an invitation to your correspondent, if he is anywhere near me, to come and get acquainted."

New Year's Eve Programme

SENTIMENT and good cheer will form the basis of this year's New Year's Eve programme. Many reasonable suggestions are being explored and their accomplishment will depend upon technical and other considerations. Among them are the following:

It is proposed to pay a visit with the microphone to the Artists' Benevolent Fund Homes where a B.B.C. commentator will attempt spontaneous interviews with a few of the still physically active variety artists of former days. Some of them may be persuaded to sing one or other of the songs which perchance made them famous.

Listeners like to hear what the rest of the world is doing at this time, and so they may be assisted to eavesdrop on an international telephone exchange, to hear the operator at work linking the Empire with New Year greetings.

One of the most thrilling broadcasts on record was that of the singing miners at the bottom of a pit. A repetition of the event may be attempted on New Year's Eve,

Notes from the Test Bench

Push-button Four

A COMPLETE coil unit was specified for the two versions of the Push-button Four receiver, and this unit is supplied by the makers with the majority of connections ready made. As supplied, there will be found five leads projecting from the switch plate, two being attached to one tag on the plate and one each on the three remaining tags. Viewing the plate from the rear the lower right-hand lead is taken to the .0001 mfd. condenser off the oscillator anode, and the lead next to it is taken through a hole in the screening plate to the filler unit. The upper pair of leads are taken through the chassis to the two sections of the gang condenser. The remaining lead of the pair joined to a single contact on the switch plate is taken to the oscillator grid.

Reaction Winding

IT is often found that reaction control is ineffective, not only in home-built receivers but in commercial products. In many cases this has been found to be due to a reversal of the connections to the reaction winding, and therefore where trouble of this nature is experienced, before making any drastic tests or alterations, the leads to the reaction winding should be changed over.

D.C. Mains Supplies

MANY listeners are still living in districts in which there is only a D.C. supply and they accordingly obtain the small D.C. or A.C./D.C. apparatus. It should not be forgotten that it is possible to operate the high-power A.C. equipment, such as television receivers or powerful radiograms, although a D.C. supply only is available. This may be carried out by using a D.C. to A.C. rotary converter, and these are now available in many different patterns suitable for the loads imposed by the A.C. apparatus mentioned. The D.C. mains leads are merely joined to one side of the converter and the other side of the converter is taken to the apparatus exactly as in the case of A.C. mains.

Are They Annoyed?

ARE the spiritualists annoyed with me? My worst fears have been confirmed by the paragraphs which have been penned in certain rags dealing with spiritualism. And am I chortling! Evidently "Torch," the rhymester, is chortling too, for this is what he says:

WHY THE ECTOPLASM WOULD NOT ACT

By the Ghost of John James Christopher Benjamin Binns

SCEPTIC Thermion taunts and roasts
Those who put their faith in ghosts!

Come, ye fellow "sitters,"
Hither, mediums, gather round!
Make the welkin wide resound,
Give this worm the jitters!

Make his dentures shake and chatter,
On the ground his blood bespatter!

Wizards come, and witches
Harrow him with hollow moans!
Evil fingers pinch his bones,
Buttons off his breeches!

Thunder roar and lightning flash!
Chimney pots about him crash!

Show our ghostly power!
In his sleeping chamber creep
When the blighter's fast asleep
At the midnight hour!

Nightmares rack him, dreams annoy,
Our Black Magic arts employ,

Terrors grim consume him!
Anguish with his every breath,
Let him die a dreadful death,
Through the ages doom him!

Colic rend him every hour!
May his cream be ever sour!

May his soup be cold!
Be his nasal organ blue,
Give him everlasting flu',
Serve him eggs grown old!

Look! He's trembling! No, he's not!

Heaven his sceptic carcass rot!
Cur-r-rse him, loathsome man!
See, his grin grows ever worse,
Mocks he at our vilest curse!

He doesn't care a dam!

"TORCH."

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SHORT-WAVE SECTION

FIFTEEN YEARS OF SHORT WAVES

This Week the Experimenters are in Reminiscent Mood and Tell of Some of Their Early Short-wave Experiments.

ABOUT Christmas and towards the end of the old year it is not unusual to fall into reminiscent mood, as we did while discussing the progress of short-wave radio the other evening. It all started due to one of the "old hands" among our members saying that, as clearly as he could remember, it was just fifteen years ago on Boxing Night—or early the following morning—that he first listened to KDKA on short waves. At least, the wavelength of about 180 metres was considered short in those days, even though it is now put in the medium-wave range.

by the use of what was then called a vernier condenser—a variable condenser with about three moving vanes, connected in parallel with the main tuning condenser.

by The Experimenters

A similar tuning arrangement is to-day often looked upon as fairly new, but is referred to as a bandspread system, the larger condenser being described as a tank and

type for the L.F. stages, with a then-popular Dutch valve for detection. To reduce the capacity of the detector—although this probably had no really beneficial effect on 180 metres—the cap was removed by soaking the base in methylated spirit and unsoldering the electrode wires from the pins. The valve was then supported in a holder made with soft felt, connections being made by soldering leads to the electrode wires; these were opened out still further to reduce capacity.

The "speaker" was made by clamping the Brown A-type 'phones (three guineas, please!) over the ends of a length of cardboard tube, to the centre of which was fitted a crude trumpet made from soft card. In those seemingly far-off days one was inclined to say that reception was at full loudspeaker strength if it could just be followed in a small room. Of course, you could buy a real speaker if you had sufficient financial resources. Still, there was probably far more enjoyment to be had from simple home-constructed apparatus.

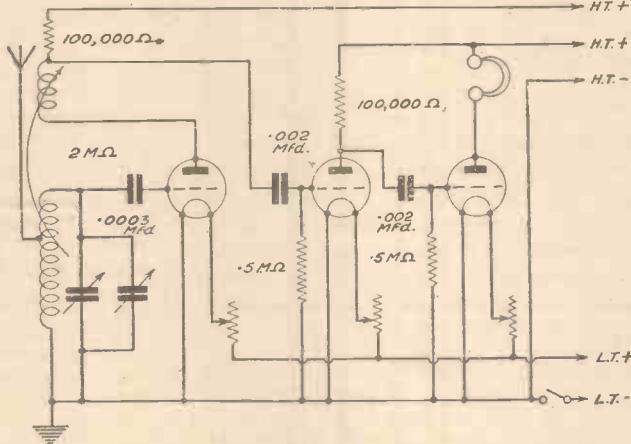
Dutch Valves

When our talk veered round to the Dutch valve a number of questions came from the younger members of our "select" body. It was explained that they were excellent detectors as long as they lasted, and if you bought four or five so that a good sample could be chosen. But if you knew the ropes you could often obtain them for about 7s. 6d. each, which was less than half the price of the almost-standard "R" valves, which were "general-purpose" in every sense of the term. The merit of these Dutch valves was that they were very "soft"; in other words, the electrodes were not within a complete vacuum, for a fair proportion of air and other gases remained in the glass bulb.

This had the effect of making them particularly good detectors. You had to be very careful about the anode voltage you applied, though. The maximum might be anything between 12 and 60 volts, according to the particular valve, and if the voltage was too high the valve would "blue glow" for a short time and then end its period of usefulness. The glow consisted of a blue halo round the electrodes, and was due to ionisation of the gases remaining in the glass bulb. The secret of their successful use was to raise the voltage to the highest possible value without allowing the glow to appear. But you had to reduce the voltage as the

(Continued on following page)

Fig. 1.—A three-valve circuit for short waves and using bright-emitter valves. It is fairly typical of S.W. circuits in use fifteen years ago.



Det.-2L.F.

On mentioning reception of American short-wave radio, questions were immediately asked concerning the type of receiver used, especially since the reception boasted was claimed to be at good loud-speaker strength. Surprisingly enough, the set was a perfectly simple Det.-2L.F. with R.C.C. coupling throughout. To the best of his recollection, our "old hands" receiver had a circuit like that shown in Fig. 1. As you can see, there is swinging-coil reaction, and the coils were of the plug-in type, although wound on large-diameter low-loss skeleton formers. The aerial coil was centre-tapped and tuned by a slow-motion drive condenser rated at about .00025mfd. (that probably means that the capacity was somewhere between .00015 and .00035 mfd., for values of components were seldom extremely accurate then).

Vernier Tuning

Due to the fact that the slow-motion drive was through a pair of brass gears it was inclined to be noisy electrically, and back-lash was far more noticeable than it ought to have been. To make matters worse, hand-capacity effects were so serious that it was necessary to learn to what extent the set should be de-tuned while holding the condenser knob to ensure correct tuning when the control was released!

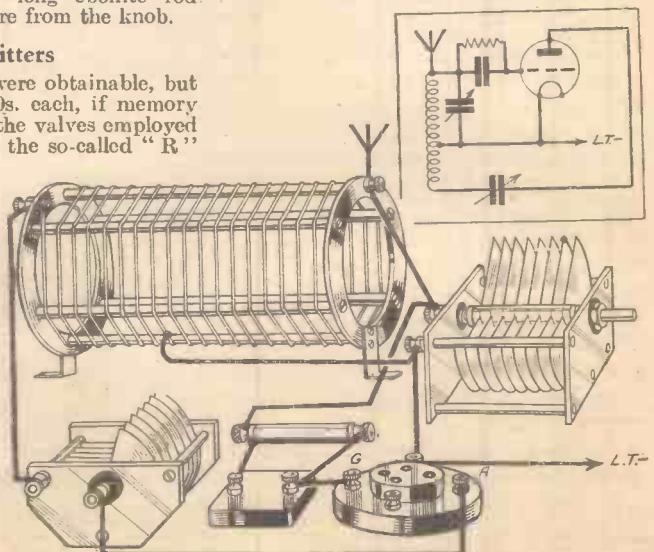
But tuning was simplified to a fair degree

the vernier as a bandspread condenser. Whereas nowadays hand-capacity troubles would be largely overcome by suitable screening and the use of better tuning condensers, the desired result was (sometimes) obtained then by attaching a very long bakelite extension spindle to the vernier condenser knob. Similarly, the control knob of the swinging-coil holder was provided with a long ebonite rod extending a foot or more from the knob.

Dull- and Bright-emitters

Dull-emitter valves were obtainable, but the price was about 50s. each, if memory serves. Consequently, the valves employed were bright-emitters of the so-called "R"

Fig. 2.—This Reinartz tuning system was used satisfactorily with many S.W. receivers about 1924-1928. Note the large-diameter coil, space-wound on a skeleton former. It must be remembered that wavelengths below 200 metres were then regarded as "short."



SHORT-WAVE SECTION

(Continued from previous page)

valve grew older because the glow would then begin at a lower anode potential.

So efficient were the best of these valves that a good single-valver employing one would give very satisfactory headphone reception of all the British and several of the Continental stations then "on the air." It was not unusual, however, to use as many as three replacements within a month—or within a week if you were especially unlucky or rather careless.

Strange

In looking over the circuit, one of our younger members remarked on the variable resistors in each filament circuit and the absence of grid bias. The resistors—then called rheostats or variable filament resistances—were necessary if the valves were to operate at maximum efficiency and if the life of the valves was to be made as long as possible. You always included as much resistance in the circuit as you could without seriously impairing "reproduction" or preventing the detector valve from oscillating. As to grid bias, this just was not necessary with the early valves unless the H.T. voltage was in excess of the customary 60.

Reinartz Reaction

It was not long after the time of which we have been writing that the so-called Reinartz reaction circuit came into fairly general use. The Reinartz coil consisted of a single winding with a tapping about one-third of the distance from the "anode" end, and the other portion was the usual tuning winding. Fig. 2 shows the circuit used, and gives an idea of the type of coil that was

generally used for "efficient" short-wave reception. As you can see, the former was built up from two ebonite rings, about 3in. in diameter with a series of threaded ebonite rods placed between them. This former was wound with wire of about 22-gauge d.c.c., and the turns were spaced, as they often are to-day.

Variable condensers for short-wave use were generally made from ordinary tuning condensers (usually with semi-circular vanes) by removing about half the plates and fitting additional spacing washers between the vanes that were left. The latter procedure helped to reduce the minimum capacity, as well as to cut down the maximum. Even then, the minimum was probably from 10 to 20 times as high as that of the cheapest types of variable condenser now made. Still, we realised that a low minimum capacity was important if we were to have a reasonably wide tuning range.

A Novel Valve

By about 1926 it was possible to buy dull emitters for as little as about 21s.; we are still relying on memory. Soon afterwards they became still less expensive, and the price has gradually fallen to the low level which now prevails. One interesting valve that was introduced about 1926 was known as the Myers. It was a good contribution to the low-capacity idea, but was not in production for very long. This was mounted horizontally, had a cap at each end and each cap had two pins; the idea was to separate the grid and anode leads, and so to reduce the capacity between them. This was not exactly an innovation, because similar valves had been made by Marconi-Osram in the bright-emitter days, and were used for a number of years in commercial and ship receivers.

S.W. Transmission

All valves available were triodes, but we soon had comparatively inexpensive and, then, efficient power valves of which the B.T.H. B.4 was a very good example. One of our number recalled using two of these valves in parallel in a simple transmitter operating on 180 metres. It employed a Hartley circuit and received its power from three 60-volt H.T. batteries wired in series to give 180 volts, and later from a hand generator—which had to be turned throughout the transmission. A considerable amount of practice was required before this could be operated with one hand while a morse key was "punched" with the other.

And So To-day

Those were early days in short waves, but they were full of interest and paved the way for the more efficient and convenient systems that followed. Nevertheless, it is interesting to note that slightly-modified forms of the early Reinartz circuit were used with complete success from that day to this. In fact, it is only during the past few years that there has been a tendency to add an H.F. stage or to use a superhet circuit for short waves. We have also found that better reception can be obtained by using tetrode and pentode valves. Throughout, it has been the amateurs who have pioneered and helped to perfect short-wave transmission and reception. This they are still doing with marked success. Probably one of the readers of these reminiscences will eventually show that micro-wave radio is by no means as circumscribed by "visual" ranges as it appears to be now. Good old days! Better present days! What of the future?

Leaves from a Short-wave Log

Lobito Calling

CR6AA, Lobito (Angola), Portuguese West Africa, is now using one channel only, namely 39.4 m. (7.61 mc/s) with a power of 1.75 kilowatts. Broadcasts are made thrice weekly, on Mondays, Wednesdays and Saturdays from G.M.T. 19.45-21.45. All announcements in opening and closing the transmissions are given out in the Portuguese, French and English languages. Interval signal: 3 notes on a piano. The approximate distance from London is 4,500 miles. Address: Estação Radiodifusora CR6AA, Caixa Postal, 103, Lobito, Angola.

Suva Changes Wavelength

VDP2, the Amalgamated Wireless (Australia) station at Suva (Fiji Islands) has altered its frequency to 9.542 mc/s (31.44 m.) and is now on the air daily from G.M.T. 10.00-12.00, Sundays excepted. The power of the station, now 400 watts, will later be considerably increased.

Radio Mogadiscio

THIS call, from Italian Somaliland, East Africa, has been logged on 17.32 m. (17.32 mc/s) occasionally at G.M.T. 12.30, when the station appeared to be in communication with Rome and Tripoli.

Reception Conditions

SINCE the end of November conditions have varied greatly from day to day, and reception of programmes from distant transmitters has suffered accordingly. Al-

though broadcasts on the 13-, 16- and 19-metre bands have on most days been good towards sunset, signals have badly faded and between G.M.T. 19.00-21.00 the 19-metre band has sometimes completely disappeared. As a rule the 25-metre band has remained satisfactory throughout the evening, as have broadcasts in the region of 31 metres, but occasionally all transmissions on channels below that figure have only been faintly heard on certain evenings.

Radio-telephony from S.S.

Normandie
FNSK, the French transatlantic liner Normandie, may now be heard on 22.72 m. (13.205 mc/s) twice daily, namely at G.M.T. 11.00, and again at 18.00.

Broadcasts from Chengtu

BOTH XOZ and XOY, on 19.34 m. (15.51 mc/s), and 32.02 m. (9.37 mc/s) respectively, have been heard during the past two weeks. The station broadcasts daily an English talk and war news bulletin from G.M.T. 14.45-15.30.

Singapore's Revised Schedule

THE British Malaya Broadcasting Corporation's station at Singapore advises that the channel now used by ZHP is 30.96 m. (9.96 mc/s). Although no alterations have been made in the times of the week-day transmissions, on Sundays the schedule is G.M.T. 03.40-06.10, and from 10.25-14.40.

Guatemala City on Increased Power

ADVICE has been received that TG2X, Guatemala City, the station operated by the National Police authorities, has had its power raised to 500 watts. The wavelength is 50.51 m. (5.94 mc/s). Broadcasts are made on weekdays from G.M.T. 21.00-23.00, and from G.M.T. 02.00-04.00; on Sundays from G.M.T. 21.00-22.00 only.

Japan's Winter Radio Programmes

ALTERATIONS have been made in the time-table of the Tokio (Japan) transmitters since December 1st. The schedule has been established as under: Broadcasts for Europe are now carried out by JZJ, 25.42 m. (11.8 mc/s), or JZI, 31.46 m. (9.535 mc/s), between G.M.T. 21.30-22.30; for the Atlantic Coast of the United States by JZJ, from G.M.T. 01.00-01.30, and from 12.00-12.30; for the Pacific Coast by the same station from G.M.T. 05.30-06.30, and for China and the Far East by JZJ and JVP—the latter on 39.95 m. (7.51 mc/s), from G.M.T. 13.00-14.30. The JVP programme is frequently jammed by RKI, Moscow (U.S.S.R.) now working on the same channel.

TO FIND THAT FAULT!

THE WIRELESS CONSTRUCTOR'S
ENCYCLOPEDIA

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George Newnes, Ltd., Tower House, Southampton St., Strand, London, W.C.2.

Building an 18-watt Amplifier

Interesting Constructional Details of a 6-valve Push-pull Amplifier

ALTHOUGH we published constructional details of a 12-watt A.C. amplifier in our issue dated October 30th last year, we still receive requests for a more powerful unit suitable for Public-Address work. There is, of course, a limit to the power which can be employed in simple home-constructed apparatus,

could be used, care must be taken that they do not differ in any degree which would render their use undesirable.

The Circuit

There are five valves in the circuit, plus a full-wave rectifier. The output stage consists of two valves in push-pull, and these

are fed from a phase-reversing valve in which load resistances are included in the anode and cathode leads. This is often referred to as the paraphase system. This valve is fed from two R.C.-coupled stages, and it will be noticed that the volume control is connected not to the input stage, but to the second stage. Under all normal conditions the first valve will not be overloaded and therefore a more comprehensive input system may be employed, whilst the use of a fader control enables the input from the first valve or from a pick-up to be controlled. The additional input valve then gives added sensitivity where an insensitive microphone is employed, or when the amplifier is fed from a small radio unit. A variable-bias control is provided for the output stages so that maximum results will be obtained, and the bias control, which in combination with a fixed bias network, will enable the user to obtain an initial working position which will not subsequently need modification.

On the input side a polarising potential is provided for the microphone by means of the resistances R1 and R5. This gives, when properly operated, 2.5 volts with a

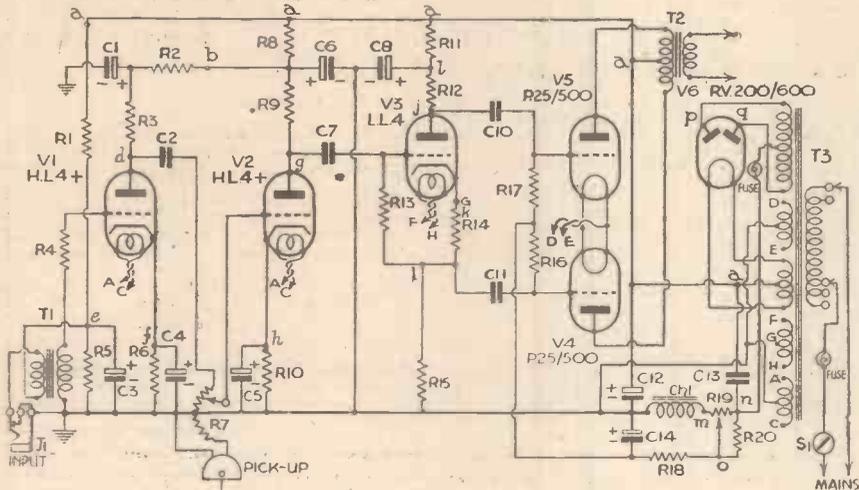
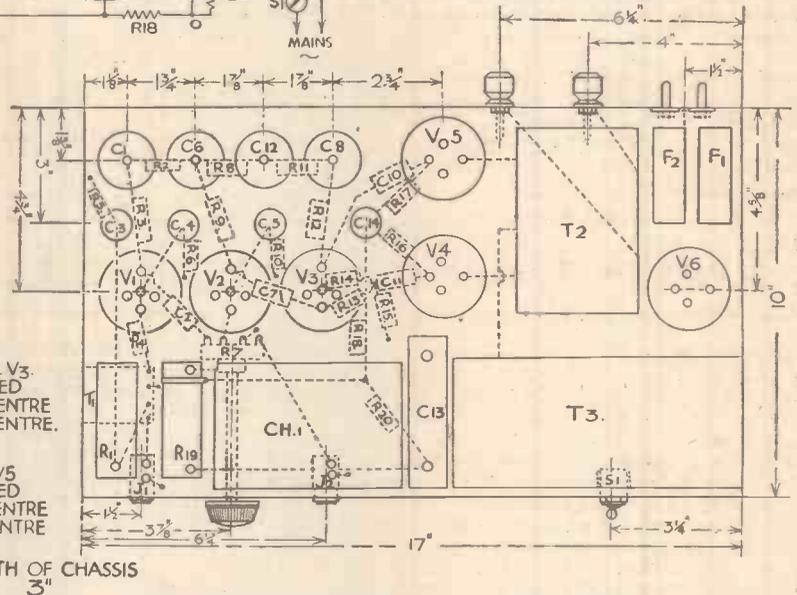


Fig. 1.—(above) Theoretical circuit of the 18-watt amplifier.

Fig. 2.—(right) Chassis layout. The components shown dotted are on the underside.



and although very powerful units may be constructed, the various difficulties which may arise in servicing or fault-finding generally result in disappointment. From 18 to 20 watts will, therefore, be found the maximum to which the ordinary constructor should go, and this will be found suitable for various functions and will fill quite a large hall, as well as providing adequate output, when suitable horn speakers are used, for outdoor meetings or similar functions.

The amplifier to be described has been tested and built by Messrs. Tungram and incorporates six of their valves. The components specified have been found satisfactory in the amplifier and, although others of a similar rating and characteristics

200-ohm, and 4.9 volts with a 500-ohm microphone. If the amplifier is to be used with a microphone not needing the polarising supply, R5 and condenser C3 may be dispensed with and resistance R1 then earthed direct.

Operating Notes

A screening box is specified for the microphone transformer, and when this is employed the transformer may be mounted direct on the chassis. This may be dispensed with, however, but then the microphone transformer will have to be very carefully positioned to avoid pick-up of hum. In order to reduce to a minimum the electrostatic induction of hum in the first valve, connection between the microphone transformer and the grid should consist of the resistance R4 only—no undue lengths of wire being employed. Without the screening suggested, the microphone

VOLTAGE DISTRIBUTION		CURRENT DISTRIBUTION.	
Between chassis and points shown on Fig. 1.			
POINT.	VOLTAGE.		
a	500 D.C.	Microphone current	(approx.) 16 mA.
b	440 "	V1	3 mA.
c	380 "	V2	6 mA.
d	80 "	V3	11 mA.
e	11.9 (No. Mic. J1 Open)	V4, V5, standing approx. (per pair)	120 mA.
	9.9 (500 ohm Mic.)	Total current drain..... (approx.).....	156 mA.
	2.5 (200 ohm Mic.)		
	0 (J1 closed)		
f	6 D.C.	Total mains consumption	140 watts
g	140 "		
h	6 "	Approximate voltage to load output stage:—	
i	390 "	V1	0.07 v. peak.
j	280 "	V2	1.9 v. peak.
k	128 "		
l	110 "	Anode to Anode load of output stage, 6,000 ohms.	
m	-25 "		
n	-56 "		
o	-25 -56 A.C.		
p	500 A.C.		
q	500 "		
All Filament Windings.	2+2 "		

BUILDING AN 18-WATT AMPLIFIER

(Continued from previous page)

transformer will have to be placed at least 6ft. away from the amplifier, and even then it will have to be carefully oriented to avoid hum and the amplifier line will have to be very thoroughly screened.

A pick-up giving an output of 1.9 volts peak is required fully to load the output stage. Working into their proper load they will then deliver the full 18 watts with 5 per cent. harmonic distortion. When setting up the amplifier the bias control should be operated simultaneously with the volume control until the point is found where maximum output is available with the minimum of distortion, and the bias control will not then need any further adjustment unless the output valves are replaced.

Working Characteristics

When set up, the voltage at various points should be carefully checked, together with the current, and the data on page 403 shows all readings, taken with a high-resistance voltmeter such as the Avometer at the high setting.

**PRACTICAL MECHANICS
HANDBOOK**
By F. J. CAMM

6/- or 6/6 by post from George Newnes Ltd.,
Tower House, Southampton Street, W.C.2.

LIST OF COMPONENTS FOR THE "18-WATT AMPLIFIER"

- One 15 to 1 nickel alloy microphone transformer, type T.V.1, primary inductance 0.4 henries, with 16 mA polarising current. (G. A. V. Sowler.)
- One Mu-metal box, type No. 15, for screening. (Telegraph Construction and Maintenance Co.)
- One output transformer, type T18/0 (line or speech coil impedance must be specified when ordering. (N. Partridge.)
- One mains transformer with following secondaries (N. Partridge):
500+500 at 160 mA.
2+2 at 1.2 A.
2+2 at 2 A.
2+2 at 1.2 A.
2+2 at 4 A.
- One L.F. choke, 13 henries at 200 mA, 160 ohms, type C13/200. (N. Partridge.)
- One single fuseholder, type 1045, with 1.5 A fuse. (Belling and Lee.)
- One single fuseholder, with 250 mA mag nickel fuse. (Belling and Lee.)
- Two type B terminals. (Belling and Lee.)
- One mains plug and connector, type No. 1115. (Belling and Lee.)
- 17 fixed resistors:
20,000 ohms 1/2 watt (R2)
100,000 ohms 2 watts (R3)
50,000 ohms watt (R4)
700 ohms watt (R5)
2,000 ohms watt (R6)
10,000 ohms watt (R8)
100,000 ohms 2 watts (R9)
2,000 ohms 2 watts (R10)
10,000 ohms 2 watts (R11)
10,000 ohms 2 watts (R12)
250,000 ohms watt (R13)
1,600 ohms watt (R14)
10,000 ohms 2 watts (R15)
30,000 ohms watt (R16)
30,000 ohms watt (R17)
20,000 ohms watt (R18)
100,000 ohms watt (R20)
- One 250,000+250,000 ohm fade-over volume control. (Dubilier.)
- One 8 mfd. electrolytic condenser, type 805 (C1)
- One ditto (C6)
- One ditto (C8)
- One 8 mfd. electrolytic condenser, type 902A (C12)
- One 4 mfd. 1,000 v. D.C. working petroleum jelly condenser, type 111 (C13)
- One 100 mfd. electrolytic condenser, type CW (C3)
- One 50 mfd. ditto (C4)
- One 50 mfd. ditto (C5)
- One 24 mfd. electrolytic condenser, type CW with insulating bush (C14)
- One .1 mfd. tubular paper condenser, type 43 (C2)
- One .1 ditto (C7)
- One .5 mfd. ditto (C10)
- One .5 mfd. ditto (C11)
- One single pole Q.M.B. switch, type S80
- One 30,000 ohms 20 watt wire-wound resistance, type PR.15
- One 200 ohms 20 watt ditto, type PR.24
- One midget jack, type P72 } (Peto-Scott.)
One midget jack, type P71 }
6 valveholders, type V1. (Clix.)
One chassis, type No. T/A18. (J. & H. Walter, Ltd.)
- Six valves:
Two HL4+ }
One LL4+ } (Tungsram.)
Two P-27/500 }
One RV-200/600 }
- One Piezo electric crystal pick-up, type S8. (Rothermel, Ltd.)
- One transverse current microphone, type MR204. (M.R. Supplies.)

The N.C.S. Penta-kit

An Interesting Low-priced 3-Valve All-wave Receiver

WE recently received for test a neat low-priced three-valve of novel design from the New Times Sales Co. The accompanying illustration shows a general view of the set, which is made up on a metal chassis, 8in. by 6 1/4in. This is 3ins. deep, and on the top the only mounted component is a metal-cased fixed condenser. All the remaining components are mounted on the underside. The circuit consists of a detector-two-L.F. combination with resistance-capacity coupling between the first two valves and a transformer (direct-fed) to couple the L.F. and output-pentode valves.

The aerial is coupled through a variable condenser to the tuned circuit, and this condenser, together with the main tuning and reaction condensers are all mounted on the front runner. The main tuning is effected through a slow-motion drive which may be operated as a direct drive by turning through the end of the pointer, for which purpose a small knob is fitted. The dial is in gilt, but there are no dials or indicators for the remaining two controls, although these could easily be fitted to the panel or cabinet front. The on/off switch is mounted on the rear runner, together with the aerial/earth and 'phone terminals. The latter are fed from a choke filter circuit to avoid hand-capacity (or head-capacity) effects.

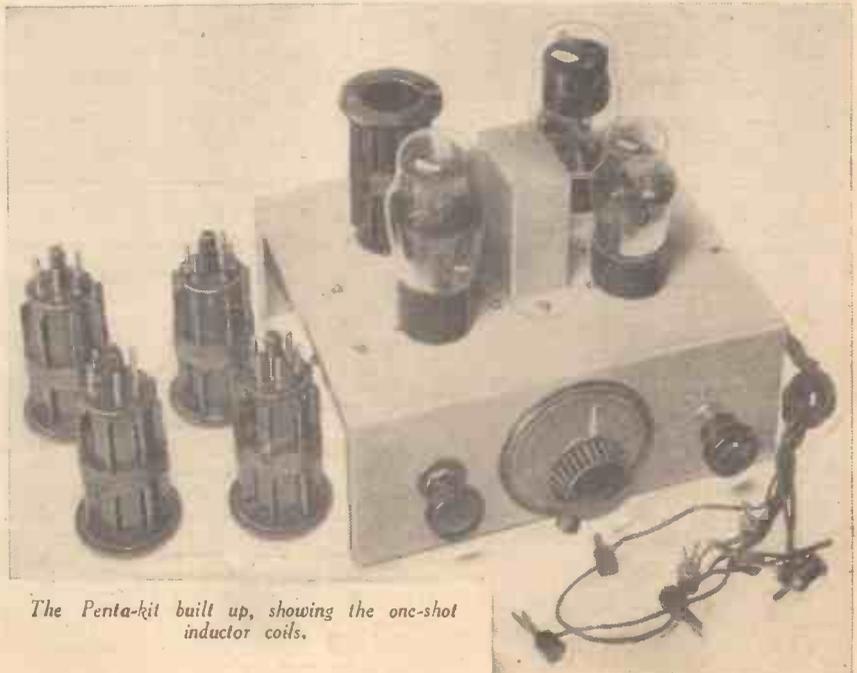
Test Report

The circuit is designed to utilise the famous B.T.S. One-shot inductor coils, which are, of course, 6-pin coils with a special locating pin at the base which enables the coils to be plugged into the holder without the slightest difficulty, and they may be inserted correctly even in the dark. When supplied the kit is complete with five coils providing a tuning range from 9 to 2,000 metres. The performance on all

bands is fully up to standard, although on the medium and long waves, as may be expected from a simple type of all-wave set, the selectivity is not too high. It is, however, adequate for all normal purposes, and the aerial condenser enables the results to be adjusted for the particular conditions obtaining at any time. On the short-waves the receiver performs admirably, and even on the lower range reaction is smooth and effective over the whole scale. A large

number of stations were heard on all bands, and the receiver is remarkably sensitive and easy to handle. There were no signs of instability and the quality of reproduction was quite satisfactory.

The receiver is supplied in kit form, with all components, full instructions, three valves and coils, and the cost is 42s. If desired it may be obtained for 2s. 6d. down and twelve monthly payments of 3s. 9d. It is interesting to note that with the components and chassis as supplied it is possible to build up the complete three-valver, a short-wave adaptor, a short-wave converter, a one-valve or a two-valve all-wave set, and thus there is, in effect, five sets in one.



The Penta-kit built up, showing the one-shot inductor coils.

A PAGE OF PRACTICAL HINTS

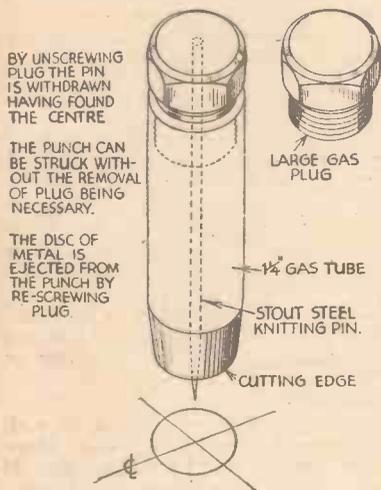
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Simple Hollow Punch

HOLLOW punches of the size necessary for valveholders in chassis work are expensive, if obtainable. Having tried various methods of making a neat round hole I hit upon the idea of using a short piece of gas tubing (which was threaded inside) by filing the opposite end to a sharp cutting edge to form a punch.



BY UNSCREWING PLUG THE PIN IS WITHDRAWN HAVING FOUND THE CENTRE

THE PUNCH CAN BE STRUCK WITHOUT THE REMOVAL OF PLUG BEING NECESSARY.

THE DISC OF METAL IS EJECTED FROM THE PUNCH BY RE-SCREWING PLUG.

LARGE GAS PLUG

1/4" GAS TUBE

STOUT STEEL KNITTING PIN.

CUTTING EDGE

A piece of gas tubing is utilised for making this handy punch.

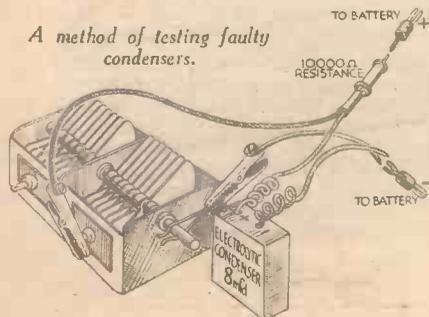
I have made refinements by drilling a hole part way through a gas plug and inserting a stout knitting pin. This finds the centre of the hole to be punched, and can be withdrawn when the punch is struck by unscrewing the plug slightly; re-screwing the plug ejects the metal disc cut away.—JOHN THOMPSON (Croydon).

Testing Faulty Condensers

WHEN a fault develops in a modern condenser with very narrow spacing, or in one in a set half hidden by components, patience is often sorely tried in locating the fault.

A simple dodge which I have found very useful is illustrated in the sketch. Any handy large-capacity condenser (I use an old 8 mfd. electrolytic) is connected across the faulty tuner, which in turn is connected through a series resistance of about

A method of testing faulty condensers.



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.

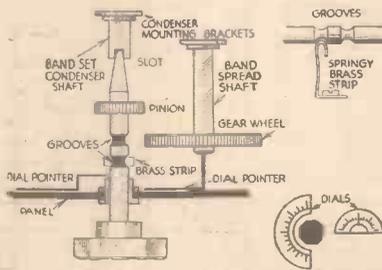
SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page 410.

10,000 ohms across a partly-used high-tension battery. On rotating the vanes a spark, due to the discharging of the large condenser, will indicate where the vanes are shorting. The resistance prevents the H.T. battery from being shorted and limits its current. Service engineers may find it well worth while to connect up permanently a condenser and resistance, complete with crocodile clips and wander plugs, as illustrated, ready for immediate use when required.—D. ALLANSON (Whitby).

A Dual-control Device

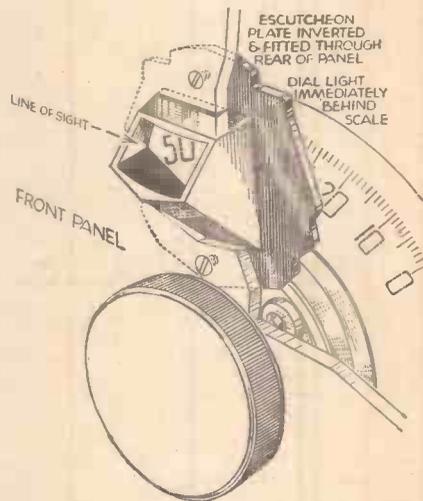
WHEN building an experimental short-wave receiver recently I devised a novel system of operating both band-spread and band-set condensers from one control knob. A slot is cut in the end of the band-set condenser shaft, and a gear wheel is bored to fit the end of the band-



Operating band-spread and band-set condensers from a single control knob.

spread condenser to which it is attached. A piece of 1/4 in. shafting is fitted to the control knob, which is preferably some distance from the condensers to prevent hand-capacity effects. The end of the control rod is filed to an edge to engage the slot in the shaft of the band-setter. A small pinion gear is bored and fitted to the control shaft, thus providing a reduction gear when operating the band-spreader. Two grooves are cut in the control rod to engage a piece of springy brass strip, bent as shown in the sketch;

this prevents the control rod from slipping out of position when driving either of the condensers. Two pieces of stiff wire are bent, as shown, and soldered to the condenser shafts to indicate their positions on two dials, which are fitted into slots cut in the panel, and which may be made of stiff paper or card. The rod passes through a collar and bolt taken from an old condenser. The arrangement is very useful in a short-wave set, as it provides both extension control and fine tuning.—R. A. GRANT (Poole, Dorset).



A simple dial improvement.

A Dial Improvement

HAVING found it rather awkward to read the dial settings on a receiver of mine which has a low front panel, it occurred to me that by refitting the escutcheon in the manner indicated in the accompanying sketch, a much better "line of sight" could be obtained. In so doing, it was necessary to move the existing fixing bolts which were "set" in the moulding, and this I did by drilling. Then, using the two holes which resulted, and with 1/4 BA bolts, nuts and spring washers, the escutcheon plate was simply let into the front panel from the rear as illustrated.

I do not have to stoop down now when taking dial readings, whilst from the point of view of appearance, this modification has, I think, considerably improved the panel symmetry.—I. N. GRACE (Faversham).

NOW READY!

WORKSHOP CALCULATIONS, TABLES AND FORMULÆ

By F. J. GAMM

3/6, by post 3/10, from George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

The Amateur Transmitter

This Article Deals with a "Click" and "Thump" Filter, its Construction and Operation; the Microphone and Modulator Amplifier for the Experimental Chassis By L. O. SPARKS

THE fundamental keying filter is shown in Fig. 1. Its object is to eliminate interference to nearby listeners by preventing the radiation of key "clicks" and "thumps."

To understand its operation, it must be appreciated that when the key is closed a sudden surge of energy is released in the associated circuit, and this has the effect of creating a momentary oscillation which, if allowed to radiate, is received in the form of a sharp "click." If the frequency of these radiations were limited to those of the transmitter their effect would not be so distressing, although no self-respecting transmitter would allow his signals to be spoiled by such noises, but, unfortunately, they radiate over quite a wide band, and it is possible for broadcast listeners to receive them.

To stop or retard the sudden surge, use is made of the property of inductance, which opposes rapid current changes, in the form of the low-frequency choke L.

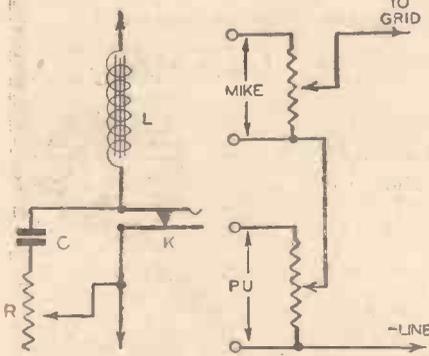


Fig. 1.—The fundamental "click" filter circuit.

Effect of Inductance

It will be noted that this is connected in series with the key, and when the key is closed the surge is, so to speak, smoothed out, and the anode current of the valve increases to its maximum value at a comparatively slow rate.

When the key is opened, however, the energy stored in the choke L tries to get away, and as its only path is via the key, it is inclined to jump the gap formed by the key contacts, thus producing a spark.

It is this spark which also contributes to key "clicks," as it is virtually a minute transmitter; if the key is operated for any period under these conditions, the sparking will ruin the surfaces of the contacts and thus cause further trouble. It is now necessary to provide some means of overcoming the complications introduced by the choke L; fortunately, this is not a difficult matter as a condenser possesses the property of accepting or storing a sudden charge of energy.

This accounts for the condenser C, which is shown connected across the key contacts. Its value is not critical, as it might be anything between .25 mfd. and 2 mfd., depending on the circuit characteristics.

Condenser Discharge

There is another point, however, which must not be overlooked with regard to C. In the majority of keying circuits, an appreciable voltage exists across the key contacts; therefore, if the condenser is connected in parallel, as shown in the diagram, it will receive a charge while the key is open.

When the key is closed, this charge will cause further sparking across the contacts by virtue of the sudden release of the stored energy. To eliminate this possibility, the energy must be dissipated before reaching the contacts, so for this purpose the resistance R is embodied in the ultimate filter circuit.

It is not possible to give exact values for any of the components, as so much depends on the operating conditions. The figures mentioned are the approximate limits, and the same applies to the choke, as one circuit might require 10 Henries, while another will call for at least 25 Henries. Experiment and practical observations are the only ways to secure the best combinations, and in view of this it is advisable to make R variable, having a maximum value of, say, 1,000 ohms.

When making preliminary tests, it should be remembered that it is very desirable to keep the values of L and C as low as possible, consistent with satisfactory operation,

the output to a value suitable for superimposing on the generated oscillations.

How much amplification will be required depends on the sensitivity of the microphone, the percentage modulation desired, and the wattage of the "carrier" waves.

It should be noted here that the more faithful the microphone as regards frequency response, the lower will be its output; similarly, a very sensitive model usually has a higher output, but its response might not be so perfect as that needing the greater amplification.

Bearing in mind that a microphone can give a considerable period of service, it is always advisable for the amateur to purchase the best model his pocket will allow, as one cannot expect perfect quality of transmission if the input to the modulator is, in itself, far from true.

There are various types to choose from, and each one has its merits, but for the beginner, and those not blessed with too much money, a good make of "transverse current" microphone will prove most satisfactory, provided that reasonable care is taken in the design of the amplifier and the selection of the microphone transformer. Don't pay a high price for the mike, and then use any old transformer for its coupling. A good instrument can be ruined by a poor or unsatisfactory ratio transformer.

Fig. 2.—A simple mixer input circuit.

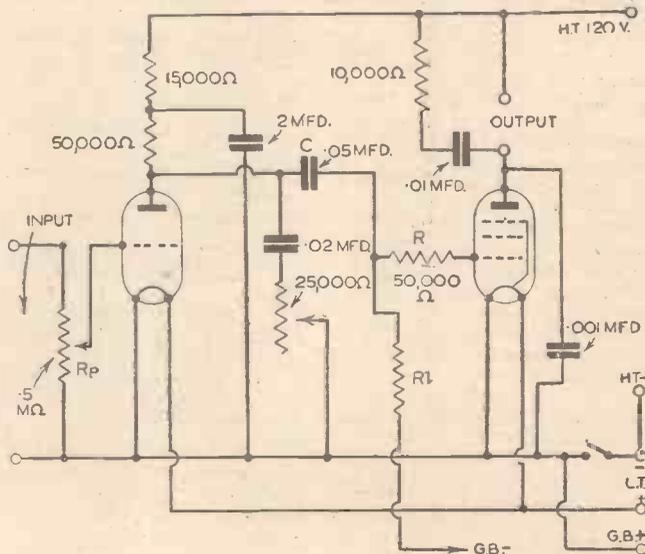


Fig. 3.—A useful L.F. amplifier for battery operation. It is suitable for modulation of C.O. and P.A. chassis.

otherwise, if high L and C are used the resultant signals will not be clearly defined, owing to the retarding effect of the inductance and capacity.

Modulators

With telephony modulation it is essential to use a microphone to enable the sounds to be transmitted to be converted into their electrical equivalents. We are ignoring for the moment the use of a pick-up for modulation. As the output of an average microphone is on the low side, it becomes necessary to provide an amplifier to increase

The Amplifier

Considering for the time being the original oscillator chassis and its associated P.A. stage, the modulator necessary for 'phone operation need not be too ambitious or powerful. A single high-slope output pentode would be satisfactory when used with a "mike" having a reasonable output, but to be on the safe side, and to provide a reserve of power, it would be better to have an additional stage preceding the pentode.

If batteries are being used, the inter-valve coupling can be transformer or

TRANSMITTING—(Contd. from previous page)

resistance-capacity. The latter is better in many respects, therefore, this form has been used in the circuit shown in Fig. 3.

The first valve should be of the H.F. type, although an H.L. can be used, with a slight reduction in the gain. The anode circuit is decoupled to remove any possibility of L.F. instability, and a simple tone corrector is connected between this electrode and the common negative line. This item is essential, as it is possible for the microphone to be on the high side as regards response.

L.F. Coupling

The output of the first valve is fed into the pentode via the coupling condenser C and the H.F. stopper R, the bias being provided in the normal manner through the grid leak R1. It will be noted that a single input circuit is used, regulation being obtained by the potentiometer Rp, but if it is desired to use a microphone and pick-up, a mixer input circuit can be used as indicated in Fig. 2.

All the components should be mounted on a neat baseboard or chassis assembly, the complete unit being made as compact as possible and provided, for the best results, with its own batteries.

Before attempting to use the amplifier with the transmitter, careful tests must be carried out to prove that its output is free from distortion. Both microphone and pick-up should be used for this purpose, and the setting of the volume control for each should be noted to determine the input required fully to load the output valve.

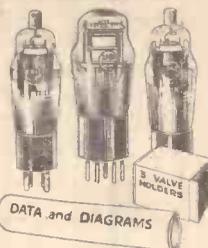
IMPROVING THE TELEVISION SERVICE

It is hoped that in two years' time the vast extensions to Broadcasting House will have been completed, thereby giving the B.B.C. a central organisation building which should be the envy of every other country in the world. Opinions are divided, however, as to whether it is proposed to include a television studio or not. Surely it would be a very short-sighted omission not to have a central studio in such a convenient spot in London. Broadcasting House is already linked with Alexandra Palace by coaxial cable, and for the televising of important people or programme items where the journey to and from the Palace would mean a loss of valuable time, the installation of camera equipment at Broadcasting House would be admirable. It is hoped that wiser counsels will prevail and ensure this useful adjunct as an improvement to the present service. Yet another item which is exercising the minds of dealers, and others, is the small amount of programme time available to them during the day for demonstrating sets to prospective purchasers. For installation engineers a pattern signal with no subject movement in the picture is quite satisfactory, but to impress a potential buyer of a television receiver, suitable programmes are essential. The morning film transmission fails to achieve this object, and is the subject of much criticism. It has been suggested, therefore, that this time be replaced with a pattern radiation, and the resulting hour be made available at a more convenient time—say between 6 and 7 p.m., to coincide with the businessman's shopping period. This would help to avoid so much demonstration outside trading hours, and is a service improvement which merits the very close consideration of those in charge of the present television transmissions.

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STATION-NAME DIAL

2/6 down secures, balance in 12 monthly payments of 2/10. A World-beater on the short, medium and long waves. 3 Short-wave ranges. Easily assembled and thousands of "World 3" owners will testify to the amazing results obtainable. Two S.G. and Pentode stages. For N.T.S. or B.T.S. 6-pin type coils. Kit for Battery use with Steel Chassis Tuning Condenser. Slow-motion Tuning. Station-name dial, Transformer, Resistances, etc., and assembling instructions. Matched, tested and brand new valves FREE.

WORLD S.G. 4 MODEL Marvellous station-getter with Pre H.F.S.G. Det., S.G. audio and Pentode output. All components supplied extra to 3-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 3/9. **COILS—SPECIAL OFFER.** 10 B.T.S. coils for "World" 3 and 4-valve receivers, 3-2,000 metres, 3 short-wave ranges; list value 27/-. Bargain, 17/6. Or add 1/6 to above Kit deposit and payments.

New 0-V-2 SHORT WAVE



9-200 METRES With Bandspread

LIST VALUE £4-7-6 BARGAIN

Cash C.O.D. 42/-

Yours for 2/6 down and 12 monthly payments of 3/9

WITH FOUR COILS. VALVES GIVEN FREE! Band spreading plays its most important part in the operation of this amazingly efficient 3-valve Pentode short-wave receiver. This wonderful value-for-money and easy-to-assemble N.T.S. kit comes to you absolutely complete with all special tuning condensers, transformer, etc., coils for 12-94 metres, 3 matched valves and building and operating instructions.

New 1-V-2 Bandspread SHORTWAVE

Complete Kit—COILS—4 valves FREE!

A powerful S.G., Det. L.F., Pentode short-wave receiver, employing a special bandspread tuning arrangement and providing amazing efficiency over the effective wave-range of 9-200 metres. This is the set for the short-wave Ham and beginner alike. This N.T.S. kit is, of course, supplied complete down to the last screw, coils for 12-94 metres and 4 FREE valves. Yours for 3/6 down and 12 monthly payments of 4/3. **IMPORTANT.** Extra coils are available at Bargain prices covering 9-2,000 metres. The fact that nearly 100,000 N.T.S. short-wave Receivers are in use throughout the World, is an assurance of your complete satisfaction.

BRAND-NEW 3-Valve ALL-WAVE S.G.3 CHASSIS



BATTERY MODEL LIST VALUE £5; 19:6

BARGAIN 69/6

Yours for 5/- down, balance in 15 monthly payments of 6/-

4 WAVEBANDS: 14-31, 28-62, 200-550, 500-1,200 metres. Slow-motion drive, 8-1 and 100-1; Low capacity switch; Airplane dial (stations and wavelengths).

SPECIFICATION: Provides reception from all parts of the world. Variable Selectivity. Slove enamelled steel chassis, size 11 1/2" w, 9" h, 9" deep. Screened coils. Low H.T. Consumption. Each chassis supplied complete with Screen Grid, Detector and Pentode output valves. Fully tested on all wavebands before despatch. An excellent bargain you must not miss.

4-VALVE A.C. VERSION. Highly efficient 9-0 Bandpass and Pentode output circuit. Station-name dial. Slow-motion tuning. Sensitivity control. Wave-range 18-2,100 metres. 3 watts output. P.U. sockets. Brand new, guaranteed fully tested. Complete with 4 valves, knobs and escutcheon.

LIST VALUE £6:6:0 BARGAIN CASH 79/6

Yours for 5/- down and 18 monthly payments of 5/-

NEW 5-IN-1 PENTA-KIT

See Mr. Camm's special review on page 404. **LIST VALUE £4-10-0 BARGAIN 42/-**

You can build alternatively a short-wave adapter or converter, 1, 2 or 3 valve receiver with this amazing value-for-money kit, supplied complete with 5 coils for 9-2,000 metres, steel chassis, transformer, s.m. dial, etc., and 3 matched British valves GIVEN FREE. Yours for 2/6 down and 12 monthly payments of 3/9. **NOTHING MORE TO BUY DOWN**

MORE PARCELS

Offer No. 1 LIST VALUE 35/- BARGAIN 6/11

Comprising: 2 brand new screened Iron-cored Dual-range coils, each size 3in. by 2 1/2in., with solid contacts and leads. 1 brand new 2-gang bar type .00043 mid. condenser for broadcast or all wave sets. 1 brand new abraded L.F. transformer with terminals. 3 valve-holders. 1 steel chassis. Tested circuit S.G.3 diagram showing all coil connections.

OFFER No. 2. Bargain parcels, list value 35/- to £2, comprising universally ready-drilled brand-new steel chassis, transformer, 3 resistances, fixed condensers, 2- or 3-gang tuning condenser, reaction condenser, potentiometer, and coil; for battery or mains sets. State which when ordering. Amazing value for constructors and servicemen: will save you 2 £ 2s. **4/11** post 6d.

STRAIGHT BATTERY 3-Valve CHASSIS

WORTH 55/-. WONDERFUL opportunity to replace that old set. Brand new highly efficient 3-valve Chassis, size 11 1/2in. wide, 8 1/2in. high, 9in. deep. Screened coils, no-trouble switching. Slow motion dial calibrated 200-2,100 metres. Cash or C.O.D. 12/6. Matched British valves 10/6 extra. **BARGAIN YOU MUST NOT MISS** Fully tested.

★FREE! NEW N.T.S. SHORT WAVE BOOK

Containing full descriptions with photographs of the complete range of bargain Bandspread and World kits and amplifiers with useful data for enthusiasts. **SEND NOW for your FREE copy and also Receiver and chassis lists, and Bargain Valve Replacement chart.**

NEW TIMES SALES CO.

56 (Pr.W.20), LUDGATE HILL, LONDON, E.C.4. Phone: City 5516 Est. 1924 **SEND FOR BARGAIN LISTS**

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.

ROMFORD AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters: Red Triangle Club, North Street, Romford.

Hon. Sec.: Rowland C. E. Beardow, 3, Geneva Gardens, Chadwell Heath.

AT our last two meetings we have had lectures by Mr. D. Bradley (2DVA) on the relationship of chemicals to radio; also Mr. Hollings of Millards Wireless Service gave a demonstration and talk on cathode-ray tubes, at which meeting we had 21 members.

A competition has been started for artificial-aerial members, and Morse classes have now recommenced. The club is also applying for a portable licence to study propagation with relation to conditions surrounding its temporary position. Membership is invited.

RADIO, PHYSICAL AND TELEVISION SOCIETY

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

Meetings: Friday evenings.

Hon. Sec.: O. W. Edmans, 15, Cambridge Road, North Harrow, Middx.

OWING mainly to the inclemency of the weather the visit to Kensington Telephone Exchange arranged for Friday, December 9th, was not particularly well attended. Those who chose to stay away on account of the rain missed an exceedingly interesting and instructive evening, the whole visit occupying a little over three hours. Everything of importance was shown and very explicitly explained. In the course of the visit the party was shown the cable-chamber, the test-room, the power-plant, and accumulator charging switchboard, the main control rooms with their thousands of relays, the 50-volt, 2,000 ampere-hours accumulators, the meter-room where every call made by each subscriber is recorded, and the manual-room used mainly for toll-calls.

Many interesting visits and lectures have been arranged for early in the new-year. New members are welcome. Further particulars may be obtained from the hon secretary, or from the headquarters of the society.

THE EXETER AND DISTRICT WIRELESS SOCIETY

Headquarters: Y.W.C.A., 3, Dix's Field, Southernhay, Exeter.

Meetings: Mondays at 8 p.m.

Hon. Sec.: Mr. W. J. Ching, 9, Sivel Place, Heavitree, Exeter.

AT the meeting of this society held on Monday, December 12th, an illustrated lecture by many excellent slides was given by Mr. F. S. Rumball, who, incidentally, is the chairman of the society.

His talk was entitled "From Coal Stack to Consumer," and the audience were able to follow various processes which the conversion of coal into electric power entail.

Mr. Rumball was accorded a hearty vote of thanks for his talk, which is the last talk before Christmas. The society will reopen again at the end of January, and further announcements will be made in due course.

All those interested should get in touch with the secretary at the above address.

WIRRAL AMATEUR TRANSMITTING AND SHORT-WAVE CLUB

Headquarters: Beechcroft Settlement, Whetstone Lane, Birkenhead.

Meetings: Last Wednesday evening each month at 7.30 p.m.

Hon. Sec.: J. E. Williamson, 13, Harrow Grove, Bromborough.

"MODERNISING the Straight Receiver" was the title of an address given by Mr. W. Rogers (G30C) at the last monthly meeting on November 30th. Mr. Rogers gave the circuit of an interesting T.R.F. receiver in use at his station, employing cathode regeneration in both H.F. and detector stages, and claimed that by employing unusual coupling arrangements between H.F. stage and detector and in the aerial coupling, extreme selectivity could be obtained.

At the January meeting a lantern lecture will be given by a representative of the G.P.O. on the Post Office systems of ultra-short-wave communications.

NORTH MANCHESTER RADIO SOCIETY

Headquarters: 14, Fairfax Road, Prestwich.

Hon. Sec.: R. Lawton, 10, Dalton Avenue, Thatch Lane, Whitefield, Nr. Manchester.

OWING to the increase in the membership of the above society, and the arrival of the winter season, meetings have from November 6th been held every Sunday from 3.30 p.m., at the club's headquarters, (the rooms being open for the use of members from 3 p.m.). On Sundays, January 8th, 22nd, February 5th, 19th, March 5th and 19th, the official business of the society will be discussed, and on the

Sundays in between, only important announcements will be given out, the rooms on these Sundays being open mainly for the use of members to attend, to carry out Morse practice, construct receivers, etc. At the official meetings during January, the B.T.S. "Trophy 8" receivers will be demonstrated, and during February the Premier 5v5 Communication receiver will be demonstrated. At a recent meeting a committee of six members was appointed to represent the different areas from which members come, as well as the usual committee duties.

Members were taken on a conducted tour of Telephone House, Salford, a few days ago, and spent a very interesting evening. Early in January a visit is to be made to Rochdale to enable members to see the radio and electrical equipment installed at the fire station there, and also to visit some of the amateur transmitters in the district. Visits to Broadcasting House, Moorside Edge, are among other visits to take place in the future.

The officers and committeemen are now as follows: Mr. R. Lawton, Whitefield, secretary; Mr. A. Park, Whitefield, chairman; Mr. A. M. Boyce, Prestwich, and Mr. L. H. Oates, Swinton, technical advisors; committee members: Mr. F. Hilton, Prestwich; Mr. E. Birchenall, Moston; Mr. H. Ronson, Whitefield; Mr. B. A. Wilbraham, Sedgley Park; Mr. S. G. Whitworth, Heaton Park; and Mr. C. Weekes, Flixton. Anyone interested in radio is welcome at meetings of the Society. Further details can be obtained from the secretary, at the above address.

EASTBOURNE AND DISTRICT RADIO SOCIETY

Hon. Sec.: T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

AT the meeting of the above society held on Tuesday, December 6th, Mr. D. Ashby, B.Sc., A.M.I.E.E., A.M.I.Mech.E., of the Westinghouse Brake and Saxby Signal Co., Ltd., gave a lantern lecture and demonstration on "Westinghouse Battery Chargers."

First of all, he explained the theory and construction of the metal rectifier, and one could quite understand why this type of rectifier was an expensive object. He also explained the difference between the disc-type rectifier (for low wattage outputs) and the plate-type rectifier (for high wattage outputs). Different types of circuits were dealt with, showing their relative efficiencies. He made clear that apparatus with metal rectifiers was on the whole more reliable than apparatus with other types of rectification.

He then went on to some of the industrial and commercial uses of the metal rectifier, such as: Battery charging for domestic and commercial uses, supply for cinema projector arcs, electro-plating installations, tele-communication applications, electrical measuring instruments, radio receiving and transmitting apparatus, testing cables, etc.

OUR FREE CATALOGUE SERVICE

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

RADIOMART LIMITED

A NEW edition of the popular Raymart list is now available, and may be obtained by readers on sending a 1d. stamp to 44, Holloway Road, Birmingham, 1. There are numerous new lines in the list and several price reductions in the case of current lines. For the benefit of new readers it may be mentioned that this list covers mainly short-wave apparatus, and in addition to many well-known English lines there are a number of American items which are not normally available in this country. Coils, condensers (both fixed and variable), insulators, feeders and accessories, chokes, I.F. transformers, crystals and crystal units, transmitting inductances, keys, meters, name-plates, valve shields, mains transformers and microphones are only a few of the many quality items listed, and every short-wave experimenter should obtain a copy of the list which is profusely illustrated.

ELECTRO DYNAMIC CONSTRUCTION CO., LTD.

A NEW edition of the Radio & Television Converter leaflet is obtainable from this firm, and shows all the models now made by them for modern receivers. Several new models are noted in this list, chiefly in the television section. In addition to listing the various converters which they make, the manufacturers have included three pages giving the models required for popular receivers, all of which are listed alphabetically under the makers' names. The leaflet is issued free.

R.-M. ELECTRIC, LTD.

THE new Rogers-Majestic catalogue now includes a television receiver combined with a standard R.-M. receiver. There are 19 valves in this receiver—9 for radio and 10 for television. The receiver utilises the reflected image principle, and gives a picture 10in. by 8in. Only one control knob is provided. The price is 95 guineas. The remainder of the R.-M. range will be found in this well-produced catalogue, and photographic illustrations of the various models are included.

Television Programmes

"Charley's Aunt"

"CHARLEY'S AUNT," the world-famous farce by Brandon Thomas, which was televised on Christmas Eve, will be repeated on December 28th.

The play has run continuously more years than any other play that has ever been written, but has never yet been broadcast. It was first produced in London on December 21st, 1892, at the Royalty Theatre, and some time afterwards the road was so blocked during the daytime with the carriages of people trying to book seats that a protest was sent from the shopkeepers of Dean Street. From the Royalty Theatre it was transferred to the Globe Theatre, and its original London run lasted four years. When a silent film of "Charley's Aunt" was shown in London in 1923 the cinema management installed loudspeakers outside so that passers-by could hear the almost continuous laughter from inside, but this had to be removed owing to the enormous crowds which gathered.

In 1933 a few slight revisions were introduced to change certain mannerisms of 1892, but nothing of importance was altered, and Desmond Davis, who is presenting the play for television, will offer it as a production of the 'nineties. The original design of Charley's Aunt's costume will be retained.

Patrick Barr will be seen as Jack Chesney, Holland Bennett as Charley Wykeham, and John Wood as Lord Fancourt Babberley. Peggy Simpson will play Ella Delahay, and William Stephens will appear as Stephen Speltigue. Desmond Davis, incidentally, is familiar with the play, having taken the part of Charley on two stage tours.

"The Ringer"

THE murder of a man who is surrounded by policemen is one of the big moments in Edgar Wallace's famous play, "The Ringer," which will be televised again on New Year's Eve.

The Ringer is an international criminal who, in his own queer way, attempts to serve justice by dealing with the more vicious criminal types who, as a result of money or position or wits, succeed in evading the police. When the play opens, Scotland Yard has received news that the mysterious Ringer is back in England on the trail of Maurice Meister who, although known to the police as a criminal, is used as bait by the police in order to catch the Ringer.

Secret panels and other trick effects add to the thrills of Edgar Wallace's dramatic masterpiece, which is also packed with comedy. Gordon Harker's original comedy part of Samuel Hackitt, the ex-convict sergeant, will be played by Ivor Barnard; Gina Malo, Henry Oscar, Garry Marsh and Jack Livesey, will play leading rôles.

"The Ringer," which was first televised on December 23rd, will be produced by Royston Morley.

EVERYMAN'S WIRELESS BOOK

By F. J. CAMM

Wireless Principles and Fault Tracking simply explained.

3/6 or 4/- by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2

A Modern Superhet Course

Details of the New T.C.R.C. Radio Course

THE Technical and Commercial Radio College, of Fairfax House, High Holborn, W.C.1, are now providing a most interesting course of study on the modern superhet receiver.

With some radio courses you have to study for months before you begin to learn anything about radio; you have to study dry theory without knowing why you are learning it. You get discouraged.

This new T.C.R.C. Course is quite different. Because the modern radio receiver is the superhet, this course teaches you about the superhet. Right from the start, from the very first lesson, you are learning about the superhet.

Out-of-date theory has no place in this new course. Unnecessary subjects are not included. The lessons are written and arranged in such a manner that, even if you know nothing about electricity or radio or mathematics, you will be able to understand them thoroughly. Intermingled with the lessons on the superhet are lessons dealing with the basic theory of radio. As you learn about the superhet, you also learn about other types of modern radio receivers.

The following is a synopsis of the lessons.

Synopsis of Lessons

The supersonic-heterodyne receiver, what it is and how it works; analysis and purpose of various features; types of modern receivers.

How the signal is received and tuned in; wavelength and frequency; tuned circuits; band-pass tuners; side-band theory; fading; image signal interference; second channel interference; signal-to-noise ratio; T.R.F. circuits; H.F. circuits.

The frequency changer, what it is and how it works; the oscillator; oscillator tuned circuits; cathode injection; electronic coupling; H.F. pentode; hexode; pentagrid; triode-hexode; triode-pentode; conversion conductance; optimum heterodyne; oscillator drift; squegging; wavechange switching.

Short wave and all-wave circuits; modifications necessary in all-wave receivers.

Intermediate-frequency circuits; types of I.F. couplings; aligning and adjusting; band-width response; variable selectivity.

Modern detector circuits; diodes; double diodes; double diode triodes; double diode pentodes; the detector and A.V.C. Automatic volume control; delayed, amplified and quiet A.V.C.

L.F. and output circuits; volume control; tone control; tone correction; push-pull; Q.P.P.; Class B; negative feed-back.

The power supply; battery, universal and A.C. circuits; decoupling; screening; smoothing; voltage dropping; automatic grid bias.

Aerials; earths; short-wave aerials; car radio; loudspeakers; radio-gramophones.

Modern developments; press button tuning; automatic tuning; automatic frequency control; examples of modern circuits.

Practical servicing methods; valve testing; modern testing equipment; earning money as a Service Engineer.

Combined with the above and introduced at the appropriate stages: The principles of electricity and magnetism; how to read and draw circuit diagrams;

dictionary of radio terms and symbols; the thermionic valve; valve curves and curve plotting; battery and mains TRF circuits; simplified calculations, etc., etc. Television and short waves may be taken as additional subjects, if desired.

The complete course comprises over 50 lessons, divided into approximately ten sections; arranged and prepared according to the knowledge and progress of each individual student.

The time taken to complete the course varies from about six to twelve months, depending on the time which the student can devote to his studies.

MODERN SUPERHET COURSE
Cash Fee £7 7s
—or
21s. with enrolment, followed by 7 regular monthly payments of 21s. each;
—or
10s. 6d. with enrolment, followed by 17 regular monthly payments of 10s. 6d. each.

MODERN SUPERHET COURSE with TELEVISION AND SHORT WAVES
Cash Fee £9 9s.
—or
21s. with enrolment, followed by 9 regular monthly payments of 21s. each;
—or
10s. 6d. with enrolment, followed by 21 regular monthly payments of 10s. 6d. each.

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

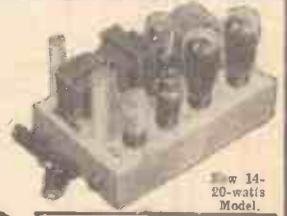
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A.C. MODEL 67 AMPLIFIER. Ideal for Public Address, Club Meetings, Dance Band Work, etc. Employs a highly efficient 4-valve push-pull output circuit. Undistorted output of 6-7 watts, with pleasing tone balance. Sound range 500 feet. Solidly constructed on a steel chassis with volume control fitted. Recommended for speech and grammo. amplification. Complete with 4 valves, fully tested and ready for immediate use. A.C. Mains only, 200/250 volts. Normal list value, £5 : 5 : 0.



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New 14-WATT A.C. MODEL SUPER QUALITY MICROPHONES

5 valves, including 2 in push-pull. Provides over 14 watts undistorted output. Will give peak output of 20 watts without noticeable distortion. 3 smoothing stages. Input volume control. Highest grade component parts. Guaranteed 12 months. For use with P.M. speaker. Normal value 17 gu.

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REPLACE YOUR OLD SET with a Peto-Scott All-Wave Chassis

16 Models, including Press-Button and Hand Tuning types only, are available from Peto-Scott. Send now for complete list.

6-Stage All-Wave A.C. S/Het Model 905.

3 wave-ranges 19-2,000 metres. Station-named dial. 4-valve 6-stage superhet circuit. A.V.C. 3 watts output. 6-station press-button and manual tuning. Volume and tone controls. Chassis size, 11 1/2 in. w., 9 1/2 in. h., 8 1/2 in. deep. Guaranteed, fully tested. A.C. Mains only 200/250 volts 50 cycles. Normal list value £8.19.6. OUR PRICE

We Save You £2.0.0 £6:19:6 Or 8/6 down and 18 monthly payments of 8/7.

7-Stage All-Wave Hand-Tuning Battery Superhet Model 902.

Sensitive 4-valve superhet circuit with filter to triode pentode frequency changer. Litz-wound transformer coupled to H.F. pentode as I.F. amplifier similarly coupled to double diode triode followed by output pentode. Wave range 10-2,000 metres. Size 11 1/2 in. wide, 9 1/2 in. high, 8 1/2 in. deep. Station-name dial as illustrated. Guaranteed. Normal list value, 61 gu.

We Save You £1.19.0 £4.17.6 Or 5/1 down and 18 monthly payments of 6/1.

PUSH-BUTTON 4 KITS

KIT "A" CASH or C.O.D. YOURS £5:5:0 CARR. PAID FOR or 9/- down and 12 monthly payments of 9/-

Something Everyone Needs!

A good Meter saves Time and Money. AVOMINOR TESTMETER

Universal A.C./D.C. Model (Illustrated), 22 ranges. In bakelite case on rubber feet, with clips and testing prods. Cash or C.O.D. £5/10/0, or 10/- down and 11 monthly payments of 10/-. D.C. Mains and Battery Model (10 ranges), £2/5/0 or 2/6 down and 11 monthly payments of 4/4

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Complete outfit. Normal Value 35/- OUR PRICE 17/6 Yours immediately for 2/6 down and 7 monthly payments of 2/6.

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Always a lap ahead, McCarthy gives you advanced design, the best components made, the unhurried workmanship of craftsmen who are above mass-production methods. The result is superb reproduction—and real "all-wave," with continuous coverage from 13 to 550 metres. McCarthy Chassis are steadily building up a wonderful reputation, at home and overseas.

- RS639. 8 stages, 0 valves, 4 wavebands, for A.C. Mains £9 0 0
- RS639U. As above, for A.C./D.C. Mains.
- RS739. 9 stages, 7 valves, 4 wavebands, for A.C. Mains £10 17 6
- RS739U. As above, for A.C./D.C. Mains.
- PP739. 9 stages, 7 valves, 4 wavebands, push-pull output, providing 10 watts undistorted, A.C. £11 11 0
- PP939. 11 stages, 0 valves, 4 wavebands, push-pull output, providing 12 watts undistorted. Noise suppression, variable selectivity, non-drift I.F. transformers, permeability tuned. Wave range 10-2,200 metres, A.C. £14 14 0
- PP939U. As above, for A.C./D.C. Mains.

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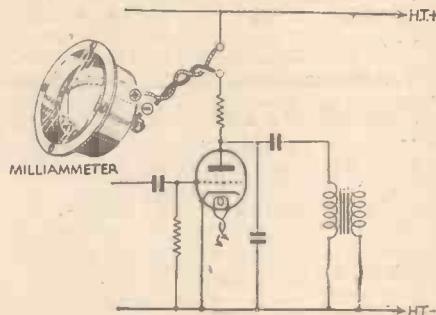
FREE ADVICE BUREAU COUPON

This coupon is available until January 7th, 1939, and must accompany all Queries and Wrinkles, PRACTICAL AND AMATEUR WIRELESS, 31/12/38.



Current Measurements

IN recent issues we mentioned the question of taking current tests and stated that the meter should be on the earth side of the anode load. It appears that this expression is not fully understood by some members as they state that the anode load is not connected to earth. Unfortunately in wireless parlance the word "earth" is often wrongly applied, and a better expression would, of course, be "earthly." If a normal valve circuit is examined it will be seen that the anode is joined to some component—either a transformer or resistance, and this is known as the anode load component. The other end of this com-



How to connect a meter in the anode circuit of a valve.

ponent is then joined to H.T. positive, and the H.T. supply is at earth potential, compared with the anode. An alternative set of expressions would be high-frequency potential and low potential. However, to make the idea quite clear we show above a resistance-coupled L.F. stage with the position of the meter indicated pictorially. In some cases it may also be necessary to connect a 2 mfd. fixed condenser between earth and the junction of the anode load component and the meter, the latter then acting as a decoupling resistance and thereby avoiding instability. We hope that this point is now quite clear.

Police and Fire Radio

SEVERAL members have asked for details of the wavelengths used by the American Car Police radio. Unfortunately, there are now so many Police and Fire radio transmitters in action that a complete list cannot be given, and it is important to remember that a number of these now make use of the ultra-short wavelengths and accordingly cannot be received in this country. Our own Police and Fire Departments are using radio and the signals may be heard on various wavelengths. Recently some interesting tests were heard on approximately 20 metres and were carried out by the London Fire Brigade mobile station.

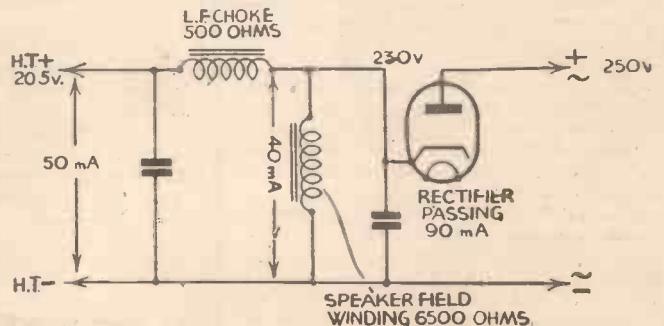
to remember that a number of these now make use of the ultra-short wavelengths and accordingly cannot be received in this country. Our own Police and Fire Departments are using radio and the signals may be heard on various wavelengths. Recently some interesting tests were heard on approximately 20 metres and were carried out by the London Fire Brigade mobile station.

Energised Speaker Connections

A PROBLEM was recently put to us concerning the use of an energised speaker with an A.C./D.C. set used on a D.C. supply. The member in question wished to use this type of speaker, but was under the impression that it had to be inserted in the H.T. positive lead and he queried the resultant drop in voltage which would be obtained. Owing to the limited output in a D.C. receiver of this type the standard method of connection cannot be adopted, but there is a good alternative available and the arrangement to be employed is shown below. It will be seen that instead of the usual 2,500 ohm field a higher winding is required, preferably 6,500 ohms. This is then connected across the H.T. supply where it acts as a bleeder resistance. The current flowing in the case indicated will be in addition to the total valve current and the total load should therefore be considered when contemplating the addition of an energised speaker in this type of receiver.

Resistance-controlled Reaction

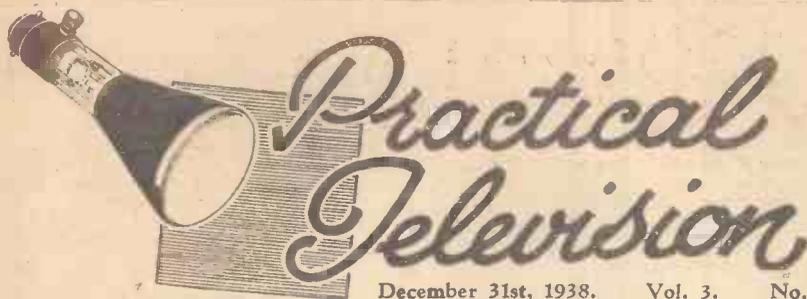
WHEN reaching out, the use of reaction is called for in simpler receivers, and it is often found that this may be used up to a certain point and then oscillation sets in before the maximum volume is obtained. Many suggestions have been made from time to time to simplify this control and it should not be forgotten that the resistance method of controlling feedback offers many advantages. In its simplest form a variable resistance may be joined across the reaction winding, but probably the most effective arrangement is to use an S.G. valve, with a potentiometer controlling the screen voltage. The reaction circuit is then arranged in the normal manner, and the reaction condenser advanced to a certain position where adjustment of the screen potentiometer brings the set into and out of oscillation in a perfectly smooth manner, without overlap. In some cases a variable anode resistance controlling the



How an energised speaker may be used on an A.C./D.C. receiver.

H.T. on the valve may be used when a simple triode is employed, but this is usually not so effective as the screen-grid arrangement. The value of the resistance must, of course, be chosen according to the valve and the H.T. which is available, but it is not usually very critical.

READ "THE CYCLIST"
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Practical Television

December 31st, 1938. Vol. 3. No. 132.

STANDARDISED TELEVISION TERMS AND RECEIVER CONTROL MARKINGS

THE following terms have now been standardised by the trade as set out in the centre column. The references for receiver controls are as follows:—

Contrast Control.—The control which normally affects the sensitivity of the receiver, when it is a major control situated on the front should be marked "Contrast." When it is located in a position other than the front of the receiver it should be marked "Sensitivity."

Brightness Control.—The control which affects the general level of illumination of the observed picture should be marked "Brightness."

Focus.—The control which affects the sharpness of the observed picture should be marked "Focus." (Note: It should be remembered that the words "focusing" and "focused" should properly be spelt with one "s.")

Tuning Control.—The control which primarily affects the sound tuning is a minor control and should be marked "Tuning." When alternative television transmissions are available it is assumed the tuning would not be continuous throughout the range of the desired frequencies.

Line-hold and Frame-hold.—The controls which normally alter the line and frame generated frequencies until synchronism is obtained should be termed "Line-hold" and "Frame-hold."

Picture Height.—The control which normally adjusts the height of the picture to fill the mask depth should be marked "Picture Height."

Picture Width.—The control which normally adjusts the width of the picture to fill the mask breadth should be marked "Picture Width."

Inverter.—The control which up to the present has been more generally known as "black spotter" and is for the purpose of reducing interference of the ignition type should be marked "Inverter."

Line Shift.—The control which normally positions the picture so that it is centred within the vertical edges of the mask should be marked "Line Shift."

Frame Shift.—The control which normally positions the picture so that it is centred within the horizontal edges of the mask should be marked "Frame Shift."

Line Linearity.—The control which corrects the output wave form to bring about uniform velocity of scan in the horizontal direction should be marked "Line Linearity."

Frame Linearity.—The control which corrects the output wave form to bring about uniform velocity of scan in the vertical direction should be marked "Frame Linearity."

Synchronising Separator.—The control which sets the synchronising separator network to its optimum working condition should be marked "Synchronising Separator," and prefixed, when required, as "Line and/or Frame."

Astigmatism.—The control which adjusts

the electron optical system to the condition in which the minimum aberration due to astigmatism is produced should be marked "Astigmatism."

The following are now the correct definitions for standard terms:—

Television.—The art of instantaneously producing at a distance a visible image of an actual or recorded scene by means of an electrical system of communication.

High-definition Television.—A system of television in which the number of scanning lines into which the complete picture is divided is 100 or more.

Low-definition Television.—A system of television in which the number of scanning lines into which the complete picture is divided is less than 100.

Scanning (Exploring).—(a) In a transmitter. The process of analysing the scene or object into picture-elements or elemental areas; (b) In a receiver. The process of building up the image from picture-elements or elemental areas.

Progressive Scanning.—A system of exploration of the scene or image in which

The Technical Section of the R.M.A. Television Development Sub-Committee has recently given consideration to the desirability of television equipment manufacturers and television engineers using a common form of nomenclature.

It has been decided to recommend that, with a view to securing uniformity of practice and general understanding, manufacturers of television equipment should, as far as possible

(a) Make use of the technical terms recommended in Sub-Sections 108 and 109 of the B.S.I. "Glossary of Terms Used in Electrical Engineering" (No. 205, 1936) in their literature and in any instruction classes which they may operate.

(b) Apply markings to the various controls on television receiving sets as indicated on this page.

contiguous strips of the scanning-field are traversed in order.

Interlaced Scanning.—A system of exploration of the scene or image in which complete scanning is accomplished in two or more operations, the strips of scanning-field successively traversed in the course of one operation not being contiguous. During subsequent operations the lines previously omitted are scanned according to some set rule or order.

Picture-element (Elemental Area).—That portion of the scene which determines or is determined by the instantaneous value of the signal current.

Scanning - line (Picture - strip).—A sequence of picture-elements extending throughout one dimension of the picture and represented by successive signal values.

Line-frequency (Strip-frequency deprecated).—The number of scanning-lines traversed per second.

Picture-frequency.—The number of complete images transmitted per second.

Frame-frequency.—The number of scanings of the frame by the scanning-beam

per second. In interlaced scanning the frame-frequency is an integral multiple of the picture-frequency.

Synchronism.—The operating condition which obtains when all the elements of the image are reproduced in the same special relationship as the elements in the scene.

Phasing.—That process by which the forming of the image is brought point for point into the same space-time relationship as the exploring of the object.

Framing.—The process by which that portion of the exploring device upon which the phased image is formed is brought into an allocated relationship with a fixed screen.

Isochronism.—The operating condition which obtains when the reconstruction of the image and the scanning of the object occur at the same rate.

Scanning-field.—The area explored by the scanning-apparatus at the sending or receiving ends.

Blocking-oscillator.—A type of oscillator in which oscillations are generated by the charging of a capacitor through an impedance followed by the discharging of the capacitor through another impedance, and used in conjunction with an electronic device to produce a scanning-field.

Phase-distortion.—That type of distortion produced by inequality of transmission-velocities of the individual frequency-constituents of the electrical output from a vision-frequency generator.

Vision-frequency.—The frequency of any single frequency-component of the electric wave produced by a scanning-device.

Vision Frequency Generator.—The apparatus at the output of which appear electric currents corresponding to successive scene-elements.

Photo-electric Cell (abb. Photocell).—A device in which electron-emission is produced by the incidence of light on an electrode, and containing one or more electrodes for the utilisation of these electrons.

Dot-frequency.—Half the number of elements transmitted per second.

Aperture.—That part of the vision-frequency generator which determines the ratio of the area of an element to that of the scene.

Time-base (Time-scale).—The trace of the spot of light on the screen of a cathode-ray tube, which spot of light moves with a predetermined velocity for the purpose of imparting a time-scale.

Kerr-cell.—A device wherein the optical properties of a medium are modified by an electric field in such a way that when a beam of polarised light is passed through the cell, after optical resolution, the intensity of the emergent light can be controlled by the field.

Faraday-cell.—A device, wherein a magnetic field causes a rotation of the plane of polarisation of a beam of plane-polarised light.

Electron-lens.—A system of electric or magnetic fields having an action upon a beam of electrons analogous to that of an optical lens upon a beam of light.

Time-base Generator.—A device for producing a potential varying in a definite and periodic manner and used to impress on the beam of a cathode-ray tube a time-scale deflection (usually linear with respect to time).

Cathode-ray Tube.—A vessel containing an electrode system arranged to emit electrons and to project them in the form of a well-defined and controllable beam. In general, the beam is incident upon a luminescent screen.

Cathode.—The primary source from which

(Continued on next page)

PRACTICAL TELEVISION

(Continued from previous page)

the electrons constituting the beam are emitted.

Directly-heated Cathode.—A cathode heated by a current which passes through the whole or part of it. This type of cathode is commonly known as a *filament*.

Indirectly-heated Cathode.—A cathode heated by an electrically separate element known as the *heater*.

Anode, Accelerator.—An electrode normally positive with respect to the cathode whose primary function is the acceleration of the electrons forming the beam.

Grid.—An electrode which does not primarily serve for the acceleration of the beam, but is for the purpose of otherwise controlling the flow of electrons.

Modulator.—A grid or other device to which a varying potential is applied in order to produce a modulating action on the intensity of the beam.

Focusing.—The concentration of the electron beam in order to produce a sharply-defined small luminous spot on the screen.

Methods of focusing are classified as follows:

- (a) *Gas Focusing*, in which the beam is constricted by its ionising action on traces of gas present in the tube.
- (b) *Magnetic Focusing*, in which the

electron beam is constricted by means of a magnetic field, parallel to the axis of the tube.

- (c) *Electrostatic Focusing*, in which the beam is caused to converge by the action of electrostatic fields between two or more electrodes through which it passes.

Focusing Electrodes.—Anodes or accelerators or other electrodes to which a potential is applied in order to produce the focusing action on the beam.

Deflector Plates.—Those electrodes, the primary function of which is to change the position of incidence of the beam on the screen. (The deflector plates are distinguished by the letters X1 and X2, Y1 and Y2.)

Screen (Fluorescent Screen deprecated).—A specially prepared surface which becomes luminescent under the stimulus of the electron beam at the point of impact.

Afterglow (Persistence deprecated).—The persistence of screen luminosity after the stimulus has been reduced or removed.

Colour.—The predominating colour of the luminous radiation from the screen under the electron impact.

Screen Luminous-efficiency.—A measure of the ability of the screen to convert the beam energy into luminous radiation.

Screen Characteristics.—The relation between the brightness of the screen beam

current, and beam velocity expressed in volts at the final anode or accelerator.

Beam Current.—The electron current of the beam arriving at the screen.

Beam Current Characteristics.—The relation between the beam current and the potentials applied to the electrodes.

Brightness Characteristics.—The relation between the brightness of the screen and the potentials applied to the electrodes.

Sensitivity (Electric).—The displacement of the spot on the screen produced by the application of unit potential difference between the deflector plates.

The electric sensitivity is usually expressed in terms of millimetres (on the screen) per volt (between plates).

Sensitivity (Magnetic).—The displacement of the spot on the screen produced by the application of unit magnetic field, perpendicular to the axis of the beam, and acting on unit length of the beam.

Electrode Currents.—The magnetic sensitivity is usually expressed in terms of millimetres (on the screen) per ampere (through the deflecting coil).

The sum of the currents flowing into or out of any electrode. This term includes, for example, anode current and deflector plate current.

Shield.—Any electric or magnetic screen placed internally or externally to the tube.

TELEVIEWS

Selling by Television

AT an address given recently the speaker stated that in the future salesmanship and television will be combined. There will be no need for buyers to attend fairs and exhibitions to see the wares explained, for a conducted television tour will enable people to sit at home, and both see and hear all about the good points of the products displayed. This is a somewhat similar argument to that inferring that people will not want to take part in mass entertainment at the theatre and cinema when the present service of television is extended. Surely this is all wrong. The actual value of a commodity can only be assessed correctly by examining it at leisure, asking questions on any doubtful points, and, where necessary, making comparison with others of a similar nature. General interest in one or more products can be stimulated by a television "selling" transmission, but to suggest that it will change the whole gamut of ideas is a little too futuristic to worry the present generation.

American Activities

THE recent television spurt made in America is reflected in the additional patent applications which are being made in that country. Constant improvement appears to be the keynote of the inventors. They are developing television receiving or cathode-ray tubes that last longer, and give brighter and sharper images. Systems that ensure proper synchronisation between the transmitter and receiver are being perfected. There is constant endeavour to obtain larger images, and systems are being reduced practically to automatic operation, so that the number of tuning knobs on the receiver may be no more than the one or two now present on broadcast sets. Of course, most of these points have either been realised or achieved in this country and serve to show that we are still in the lead, but with the almost unlimited resources of the large United States radio organisations there must be no relaxing in British efforts to maintain

what it has proudly won. In one interesting case relating to a patent for a television system particularly designed to televise talking films it is stated that there is a tendency for the picture frames of the film to drift out of proper position, with the result that part of one picture frame and part of another are broadcast simultaneously. The new system is claimed to counteract this, keeping the frames in proper position at all times. Then there is the news that one of the most powerful

television stations in the country is being built by General Electric engineers at Indian Ladder, twelve miles east of Schenectady, on the road to Albany. The application, having been approved by an examiner of the Federal Communications Commission recently, the company expects the licence to be issued shortly, after which plans for the station will be announced. Dr. E. F. W. Alexanderson, a veteran radio and television engineer, is directing the installation.



Inside the wireless room of the Liverpool Airport control tower, showing the radio beacon control which is the only one of its type in the country. The whole buildings are arranged in terraces from which the general public can watch all operations or have easy access to the restaurants on the second floor. There is a spacious reception hall and commodious company and administrative offices. Rising centrally is the control tower for keeping check on the airport traffic and illuminations. Incoming and outgoing planes can use the airport with the utmost confidence with the aid of the radio beacon.

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).

Amateur Radio Station VS2AR

SIR,—The following particulars of my station may prove of interest to other readers. It is situated at a Colliery Company, which is roughly about thirty miles away from the capital of the Federated Malay States, Kuala Lumpur, and the location is fairly isolated, being almost entirely surrounded by jungle.

The transmitter consists of a 47 oscillator valve employing a 40-metre crystal used in a straight oscillator circuit, and this is followed by an 802 valve which is used as a doubler, doubling down to 20 metres. The final stage consists of a pair of RK25 valves used in push-pull. The whole of that deck of the transmitter is the top but one panel (see illustration), the top panel being used for the double-pole double-throw antenna switch, which enables the same antenna being used both for transmitting and receiving.

The deck below the transmitter consists of the modulator—two 6C6 valves in series driving two 76 valves in push-pull, which, in turn, drive two 42 valves in the final stage, which is used for modulating the RK25's. Class AB modulation is used.

The panel below the modulator is the power supply for the three radio-frequency stages, and employs an 83 rectifier and its associated equipment.

The lowest panel is the power supply for the modulator, and the rectifiers used are an 82 and an 83 valve, both with their associated equipment. The coupling of the final plate tank circuit is link coupling to an antenna tuning unit which cannot be seen in the illustration.

The receiver used is an HRO Senior, and is one of the finest receivers I have ever handled.

Various antennas have been tried out, including the Windom and Diamond. At present I am using a two half-waves in phase antenna, and it is the pick of the bunch so far, with, of course, the exception of the Diamond, which is purely a directional antenna.

A few QSL cards can be seen on the wall behind the receiver, and the usual contacts are maintained between amateur stations.—J. W. LUCAS (Batu Arang, Federated Malay States).

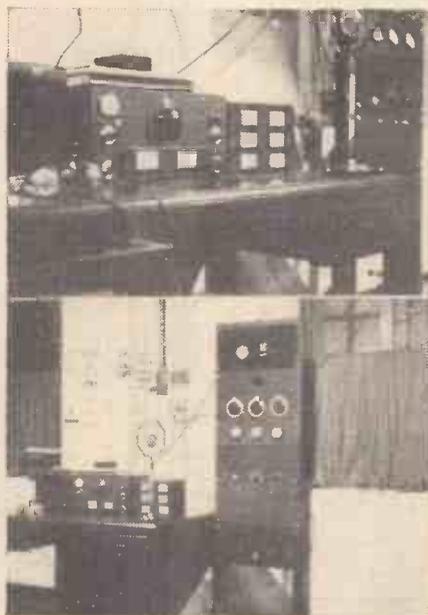
Selectivity and Sensitivity

SIR,—I was interested in reading the notes under the above subject in your issue dated December 10th. These notes, of course, are perfectly correct—or rather, they are correct in accepted practice, but not correct in accepted theory!

Selectivity in theory is still spoken of in terms of a sideband-spread or width of so many kilocycles. But it is a simple matter to make an unmodulated carrier spread itself over the whole of the tuning dial, and that spread cannot be due to sidebands as there are none. Personally, I am not troubled with problems of selectivity

—but perhaps I am fortunate (or unfortunate) as an amateur set designer.

There is another point which bears on this subject. Volume controls are generally placed in the low-frequency end of the receiver, to reduce the audio output, whilst at the same time they allow the radio-frequency tuned circuits to become overloaded with consequent lack of selectivity, or distorted quality of reproduction. Hence variable tone controls become necessary. A proper place for a volume control is before the first tuned circuit, because by reducing the strength of the input to the first tuned circuit, the selectivity is considerably improved, and the quality also.—D'ARCY FORD (Exeter).



Two views of amateur station VS2AR, operated by Mr. J. W. Lucas, of Batu Arang, Federated Malay States.

Amateur Transmitting—The Friendly Spirit?

SIR,—I must reply to the distasteful letter sent by a reader on the subject of non-friendly spirit amongst amateur transmitters, etc.

After a perusal of his letter I think the whole of his remarks can be classed as "sour grapes."

In the first place, the matter he furnished to the G.P.O. cannot have conformed with the fairly reasonable standard expected, hence the rejection of his application.

It is very unfair for this person to criticise the G.P.O. in the manner he did, and he must bear in mind that the amateurs in this country are the only amateurs in the world who can obtain a permit to build transmitting apparatus and test it prior to a full

permit, and I think the G.P.O. is very lenient to the public in this respect. Regarding his accusations of the unfriendly spirit amongst amateurs, I regard this as sheer nonsense, and one has only to read letters written by foreign amateurs to realise that British amateurs are "tops" in both manners and operating procedure.

He says, in part of his letter, that "during my short stay I just sat like a component on his shelf." Well, this person could ask himself the question: "Am I sociable?" because 90 per cent. of the people who are snubbed in company have only themselves to blame!

Finally, this dispirited person further trips himself up by criticising the method of testing applicants, because to write clearly on a subject the subject must be known thoroughly.—H. R. FOX (G8RZ) (High Harrington, Cumberland).

A 20-metre Log from Eire

SIR,—I append my log of 20m. amateur stations during the past few months, excluding W's (all districts) and Europeans, as they would take up too much space. All listening was done between 21.00 and 02.00 (G.M.T.), on an AW6, using an indoor aerial, and all stations are on telephony: CE: 1AO, 1AF, 1BE, 2BX, 3AT, 3BK, 3CH, 3BH. CN: 1AF, 8AM. CO: 2AW, 2SU, 2JJ, 2CO, 2HY, 2LY, 2RA, 2RH, 2SE, 7CX, 7VP, 8DV. CR: 8AS. CX: 2AK, 1AA. HC: 1FG, 1LC. HH: 2T. HI: 6Q, 1C. HK: 3AG. HP: 1A. K4: EMG, EAF, EVC. KA: 7EF. LW: 1QA, 4AW, 6KE, 7AG, 7BK, 8AB, 8AC, SDR, 8QA, 9BB, 9BV. PY: 1GJ, 1FR, 2AV, 2CK, 2JC, 2BJ, 2FF, 2GC, 2KT, 3EN, 4GJ, 4CT. SW: 1GP, 1RO. TG: 5JG, 9BA. TI: 2AV, 3AV. VE: 3LW, 3NS, 3AEL, 3YY, 4UK, 4ZK (numerous VE1's and VE2's). VO: 1D, 1Y, 6D. VP: 1BA, 3AA, 3BG, 5BR, 6MR, 9L, 9G, 9R. VU: 2CQ, 2BG. YV: 1AP, 5AA, 5AC, 5AG, 5BY. ZB: 1E, 1L, 1R. —PEADAR O MONEAIGH (Ballaghaderreen, Eire).

CUT THIS OUT EACH WEEK.

Do you know

- THAT in ultra-short wave apparatus by-pass condensers should be of mica, or ordinary condensers should have mica components connected in parallel.
- THAT the link winding in a band-pass coil may be used for reaction purposes when a stand-by coil is required.
- THAT the tone-control in an output circuit may be mounted on a metal panel if desired, the circuit then being between anode and earth.
- THAT selectivity in the I.F. stages may be controlled by using special quartz crystals.
- THAT grub screws on the controls of Universal receivers should be well sunk in the control and covered with Chatterton's Compound.

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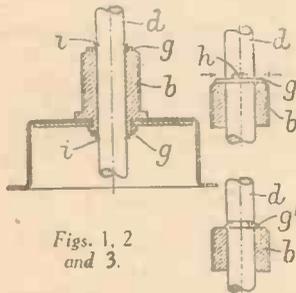
LATEST PATENT NEWS

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.

ELECTRIC RESISTANCES AND CONDENSERS.—Steatit-Magnesia Akt.-Ges. No. 492809.

The spindle *d* of a variable electric resistance, condenser, or inductance is prevented from moving axially in one or both directions relative to its bearing bush *b* by a collar *g*, Fig. 3, produced by deforming the spindle or by a separate collar *g*, Figs. 1 and 2, held by one or more projections *h*, *i* made by deforming the material of the spindle, *h* being produced by oppositely moving dies and *i* by making notches at a few points.

The Specification as open to inspection under Sec. 91 comprises also securing a separate collar *g* by continuous or spot welding. This subject-matter does not appear in the Specification as accepted.



Figs. 1, 2 and 3.

BATTERIES.—Oldham and Son, Ltd., and Mair, T. G.—No. 492897.

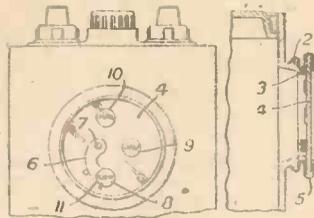
An accumulator container is provided with a removable window 4 secured to the exterior of the container by a resilient member 5 which engages a projecting boss 2. The window is separated from the boss 2 by a ring 3 which may be made in one piece with the window. A specific gravity indicating device, such as described in Specifications 417,237, 417,238, and 442,312, [all in Group XX], may be carried by the

MAKING A "RANGE-GETTER"

(Continued from page 397)

should be provided for the H.T. supplies to anode and screen, and the maximum H.T. available should be used for the anode. The tuning of the receiver will remain unaltered when this unit is added, and by using a coil and condenser similar to those now in use the readings on the new condenser should agree with those on the existing set and thus tuning will be simplified. Remember, that both circuits now have to tune to the same frequency or wavelength, and thus tuning will now have to be carried out "two-handed." As the existing set will no doubt have been in use for some time an idea of the positions of the various stations will be known, and thus tuning with the additional stage should not be difficult. To avoid interaction, mount a metal panel at the side of the unit so that it may then be pushed up close to the side of the existing set (either in its cabinet or outside) and a lead should be taken from the panel to earth to complete the screening. If a pentode valve is employed the additional grid (known as the suppressor grid) should be connected to earth in the case of a 7-pin valve. In the 4-pin valve it is internally joined to the filament. To assist beginners we give the electrode identifica-

window or mounted on a disc held between the boss 2 and ring 3. As shown in Fig. 4, the specific gravity indicator comprises an arm 6 pivoted at 7 to the window and



Figs. 4 and 5.

provided at its lower end 11 with a chamber containing air. Indicating discs 8, 9, 10 are cemented to the window or the latter may be provided with a scale of specific gravities.

TELEVISION RECEIVERS.—Baird Television, Ltd., and Gilbert, A. H. No. 491886.

Translucent material 3, such as ground glass, is used to obscure the detail in those parts of the image falling on the sharply curved areas of the fluorescent screen 1, without reducing the light emitted. Light lost in transmission through the glass may be compensated by mirrors behind the glass (Fig. 6).

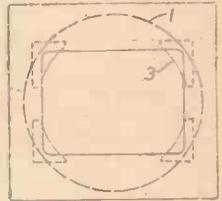


Fig. 6.

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.

- 35262.—Duncan, W. O. (Intercontinental Service Corporation).—Control means for radio transmitting system. December 3.
- 35040.—English Electric Co., Ltd., Fraser, J. A., and Taffs, J.—Sound-reproducing device. December 1.
- 34967.—Ferranti, Ltd., Easton, H., and Hodgkinson, E.—Electrical, etc., apparatus for use in the vicinity of high potentials, etc. December 1.
- 35633.—Ferranti, Ltd., Taylor, M. K., and Wood, H.—Focusing systems for electron beams. December 7.
- 35685.—General Electric Co., Ltd., Espley, D. C., and Edwards, G. W.—Thermionic amplifiers. December 7.
- 35686.—General Electric Co., Ltd., Stenning, L. C., and White, R. W.—Means for receiving morse, etc., signals. December 7.

- 35304.—Murphy Radio, Ltd., and Moxon, L. A.—Control of selectivity in radio receivers. December 3.
- 35178.—Scophony, Ltd., and Rosenthal, A. H.—Television receivers. December 2.
- 35179.—Scophony, Ltd., and Rosenthal, A. H.—Television transmitters. December 2.

Specifications Published.

- 496487.—Murphy Radio, Ltd., and Brayshaw, G. S.—Cabinets for sound-reproducing instruments.
- 496398.—Baird Television, Ltd., Jones, V. A., and Nuttall, T. C.—Electronic attenuators.
- 496710.—M-O Valve Co., Ltd., Le Rossignol, R., and Duke, S. M.—Thermionic valves.
- 496425.—Triggs, W. W. (Farnsworth Television, Inc.).—Cathode-ray oscillator.
- 496619.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Loudspeakers.
- 496634.—Huber, E.—Wireless receiving arrangement with frame antennae.

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.

tions to a 7-pin valveholder, as seen from above and below the valveholder. The former will be followed if a baseboard component is used, and the latter if a chassis type of holder is employed.

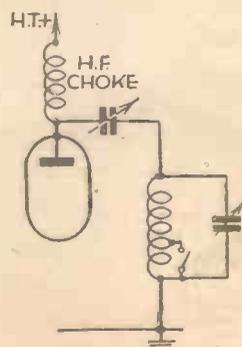


Fig. 4—How the amplifier should be coupled when a simple aerial coil is used.

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QUERIES and ENQUIRIES



Amplifiers and Mikes

"Will the amplifiers described in your December 3rd issue give satisfactory results with a cheap 5s. or 7s. 6d. microphone?"—J. D. W. (Inverness).

THE output of small microphones will naturally be limited, not only from a volume point of view, but also from the point of view of quality. Consequently, the results will not be equal to those obtained with a more expensive instrument. The amplifiers are quite standard and will do justice to any type of microphone with which they are used, and if you only need the equipment for home-broadcasting purposes you will find it quite in order. Furthermore, should you at any future date obtain a better microphone the amplifiers may still be employed without alteration or modification.

Experimenter's S.W. Three

"I should be glad if you could tell me the makers and the price of the L.F. coupling unit used in the Experimenter's Short-wave Three, described in your issue dated July 30th, 1938."—J. J. (Harrow).

THE unit in question was a Benjamin, but unfortunately this is no longer obtainable. There is an alternative, however, in the Bulgin range, list No. L.F.10, and this may be used in its place. Alternatively, you can use an ordinary L.F. transformer with the addition of a coupling condenser and anode resistance—the specified component consisting actually of a parallel-fed transformer complete with coupling resistance, decoupling resistance and coupling condenser.

Short-wave Receiver Design

"In your issue of October 29th last a Short-wave Three is dealt with in the Short-wave Section. In the text the grid condenser is quoted as .00001, yet in the pictorial at the foot of the page it is shown as .0001. Also the choke is shown direct on to the plate of the detector valve, yet in the diagram it is between the reaction coil and primary of transformer. Also the L.T. positive is going to earth, instead of the customary negative. As I am constructing this set I should like to know the correct details."—J. E. A. R. (E.16).

FOR the grid condenser in a short-wave set any value from .00001 to .0001 mfd. may be used, and exact values are best found by test. The H.F. choke may be joined direct to the anode, but both arrangements are correct. The L.T. positive lead is often joined to earth, and it is not essential to connect L.T. negative to earth. In the latter case the grid leak has to be joined to the L.T. positive leg, but in the circuit as published you will note that the leak is in parallel with the grid condenser, and thus is joined to L.T. positive through the aerial coil, which, as this is a short-wave set, will be of very low resistance.

Speaker Grille

"I have noted recently that the opening for speakers is covered with open-work netting in place of the silk which we at one time used. I have been told that this improves the tone, and I should like to know whether this is so, and what material I could use in place of the stuff now across my speaker opening."—H. R. (Barking).

AT one time speaker openings were fretted to include intricate designs, but it has since been found that all obstructions in front of the speaker tend to spoil the tone of reproduction and also reduce volume. Therefore, a plain opening, and an open-work material will be found desirable, especially where the set is of the quality type giving good reproduction. Plaited string may be 'woven' for the

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.

purpose, or special material obtained from your local radio dealer.

Using 'Phones with Mains Sets

"I am going to operate my battery set from a D.C. mains eliminator, and I have been told that it will be dangerous to use 'phones when searching on the short waves. Will you tell me if this is true, and if so, how I can overcome the trouble, as I prefer 'phones for late night listening."—G. H. F. (Milford Haven).

IF the headphones are connected direct in the output anode circuit there may, under certain conditions, be a risk of a shock. It is advisable in this case, therefore, to use an output filter circuit, or a 1 to 1 transformer through which the 'phones may be fed. In the latter case, the primary of the transformer would be joined in the anode circuit and the 'phones joined to the secondary. For an output filter, a good iron-core choke should be joined in place of the 'phones (between anode and H.T. positive) and a 2 mfd. fixed condenser

joined between the anode and 'phones. The other side of the 'phones should then be joined to earth through a further 2 mfd. condenser.

Choosing an Output Choke

"I am in some doubt regarding the type of choke needed for an output circuit to feed an extension speaker. In looking at some old catalogues there appears to be a number of chokes all having different ratings, and I should like to know what characteristics I must look for in this particular case."—J. T. (Bristol).

IN the output circuit you need a high inductance with a low D.C. resistance. You will find that choke ratings are in henries with a certain D.C. flowing. The greater the current the lower the inductance. A good all-round value would be 30 henries at the current passed by your output valve. The D.C. resistance should be as low as possible to avoid a serious voltage drop and thus to enable the valve to obtain as much H.T. as possible.

Aerial Efficiency

"I am rather puzzled regarding the effects of metal bodies in close proximity to an aerial. I notice, for instance, that you used metal masts for your aerial and I had thought of doing this, but considered that the signals would be conducted to earth and that loss would therefore occur. Is not a wooden mast better, therefore, for maximum signal strength?"—L. E. T. (Hull).

ALTHOUGH the metal mast in contact with earth would provide a good conductor, it will not cause loss of signal strength for the following reason. When you tune to a station you tune the aerial, which is attached to the tuning coil. Thus you have a resonant circuit from aerial to earth, and this offers a much lower H.F. resistance than the aerial mast unless, of course, that was "tuned" to the same frequency. It is often found, in fact, that a metal mast will act as a leakage path for atmospherics and similar "untuned" impulses and thus give a quieter background without any signal loss.

Inefficient Earth

"I was recently overhauling my aerial-earth equipment, and I found that when I took the earth plate out of the ground it made no difference to the signals. I thoroughly examined the plate and the earth lead was firmly soldered to it, and a test with battery and meter showed that the earth lead was unbroken. Can you say whether this indicates any fault in the aerial coil or receiver?"—J. F. M. (Highgate).

THE fact mentioned by you does not necessarily indicate any fault in the receiver, although there is a possibility that some form of instability is present which results in the set providing the same signal strength at one frequency, irrespective of an earth connection. This has been found on more than one occasion. On the other hand, if your earth plate was buried in a very dry position it would be inefficient and no improvement would be obtained when it was buried. We suggest that you thoroughly soak the ground from which it was removed and re-bury it, placing round it a good layer of coke or similar material to retain the moisture, when an improvement should be noticed.

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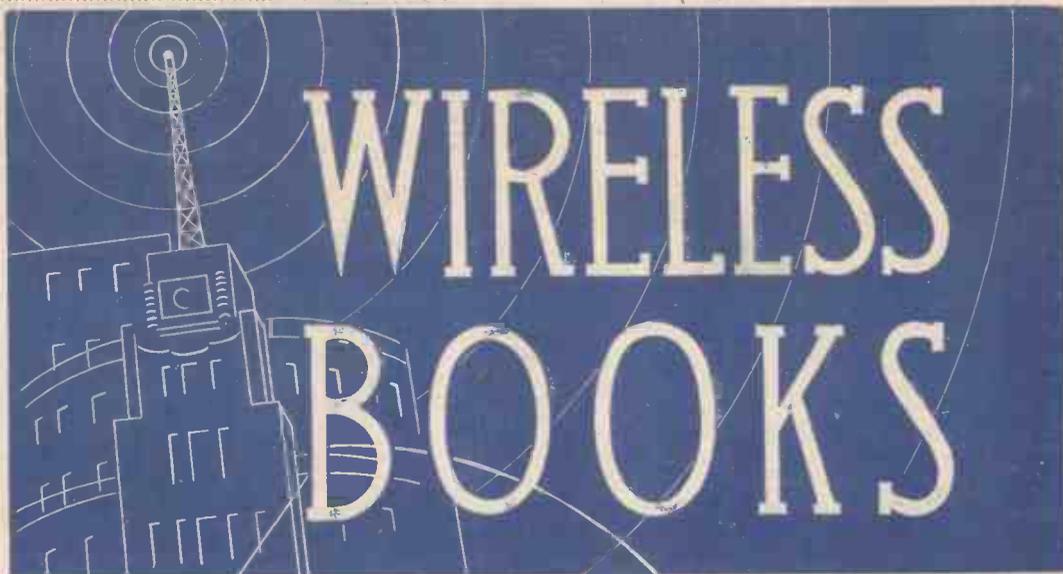


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