

S. Bracken

MAKING A WAVE-TRAP— See Page 587

Practical and Amateur Wireless

3^d
EVERY
WEDNESDAY

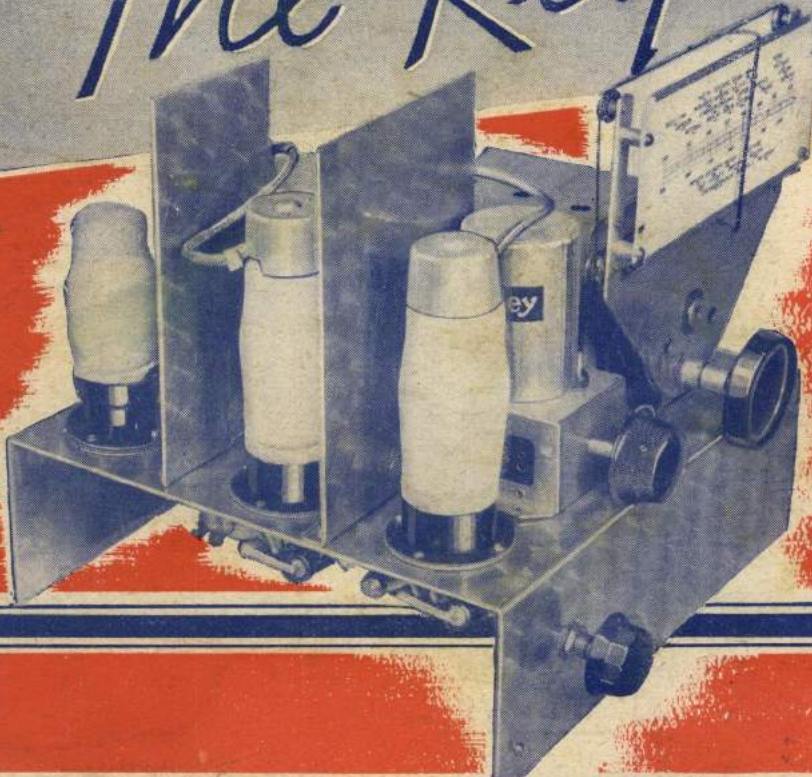
Edited by F.J. CAMM

a GEORGE
NEWNES
Publication

Vol. 13 No. 336.
February 25th, 1939.

AND PRACTICAL TELEVISION

The "Request"



STRAIGHT

6

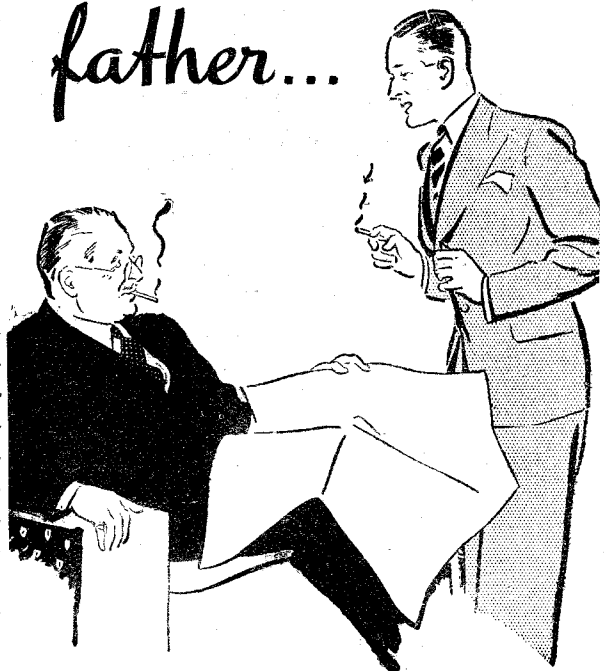
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The "Mountie" caught the Eskimo by the throat and threw him down.

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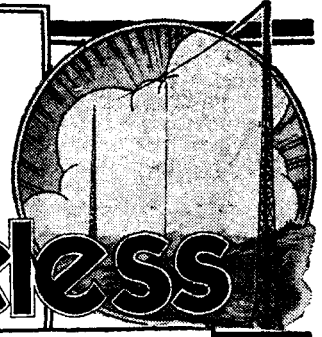
LANDING AIRCRAFT BY TELEVISION See Page 589.



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. 336. February 25th, 1939.

ROUND *the* WORLD of WIRELESS

The "Request" Straight Six

A LARGE number of readers have expressed a wish to have constructional details of a powerful battery receiver which may be regarded as the best type of straight circuit. The superhet has, of course, a large following, but the average constructor without suitable instruments often finds great difficulty in lining up a set of this type. The straight receiver, on the other hand, only has to be ganged, and if not more than three circuits are used this is not a difficult procedure. Two H.F. stages are, of course, essential if high selectivity is desired, and from a point of view of range of reception and selectivity this arrangement is very hard to beat. In this issue we give the main constructional details of a receiver of this type which has been divided into two sections. The amplifier section may be built on the lines shortly to be described, or the amateur may add the section to an amplifier already in existence. The only point to be observed is that the H.T. voltages applied to the H.F. unit are suitable for the valves in use, and adequate decoupling arrangements have been provided to take care of any instability which might be introduced on this score. Full details of the H.F. unit will be found on page 596.

Radio Nations

CHANGES have been made in the times of English transmissions from Radio Nations in order to permit the station to be used as a link between America and Eastern European capitals. The English programme now starts at 7.30 p.m. and is radiated on two wavelengths: HBO on 26.31 metres and HBQ on 44.94 metres.

Cossor Television Classes

MESSRS. COSSOR are now giving instructional classes for dealers who are stocking Cossor television receivers. There are two courses, one being a full four or five days' course covering theory, installation, service and maintenance, and the other for engineers who have already attended a television service school.

Farewell to "In Town To-night"

"IN Town To-night," the B.B.C.'s popular Saturday night interest programme, will end its sixth season with its two

hundredth edition on May 27th (National). Plans are already being made for a special gala broadcast, rather on party lines, which will run for one hour—twice the normal time for the programme.

"Mike" Meehan, the B.B.C. producer responsible for the broadcasts, intends to bring back that night a number of old favourites, in addition to the customary new characters and celebrities, whose fame, topicality and "human interest" make up the pageant of personalities.

Theatrons Broadcast

THE second broadcast of the Theatrons of the Regal Cinema, Darlaston, played by Leslie Taff, will be heard on February 28th. This Compton organ has no pipes. The sound is produced from a set of discs on which are engraved sound frequencies, and these are amplified and reproduced through a bank of ten speakers.

French Radio Conference

A MEETING was recently called in Paris where representatives of the radio press and wireless industry could discuss questions concerning State Broadcasting. As a result of this meeting, Mr. Jules Julien, French Radio Minister, hopes to increase the number of listeners to exceed the 5,000,000 mark.

American Radio

IT is stated that during 1938 68 new valve types were registered in the U.S.A., and of these 10 are of the metal type and the remainder glass. We understand that these figures take no account of special 150 mil. 12-volt and 50-volt types nor of television valves.

Empire Transmissions Jammed

REPORTS from certain Colonial possessions indicate that deliberate jamming is taking place on certain wavelengths, to prevent reception of the B.B.C. Empire programmes. No definite information can be obtained regarding the jamming, but it appears that in South Africa the trouble is most acute.

Tommy Handley's Fourteen Years with the B.B.C.

TOMMY HANDLEY, a B.B.C. comedian since 1925, is also one of the hardest worked entertainers in the country. At the moment he has music hall "dates" up to the end of this year. "The odd things is," he explains in a special interview in *Tit-Bits*, out on February 24th, "I can never get going until the last possible moment. Suppose, for example, I had to prepare a new act to broadcast next Saturday, I should not get going until Friday night, when I suddenly realised that I couldn't put it off any longer. Then I should polish it a bit at the Saturday morning rehearsal, and probably add a few 'gags' during the actual broadcast."

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Australia Speaks

FIRST America spoke, then Canada; now it is Australia's turn. In a series of six talks (which because of reception difficulties will have to be recorded in situ) speakers representing all sides of Australian life will tell listeners something of their homeland. The broadcasts will be made in collaboration with the Australian Broadcasting Commission, and Michael Terry, who is known to listeners both at home and in Australia, will introduce each speaker. Many of them are personally known to him, and as an explorer he is at home in the whole vast Continent.

The series will be opened by Professor G. V. Portus on February 24th.

ROUND the WORLD of WIRELESS (Continued)

A Mushroom Radio Station

FROM Prague (Czecho-Slovakia) comes the news that in the course of only seven days a 400-watt broadcasting transmitter has been erected in the town of Chust, Carpathian Ukraine, for broadcasts to the Czechs in that district.

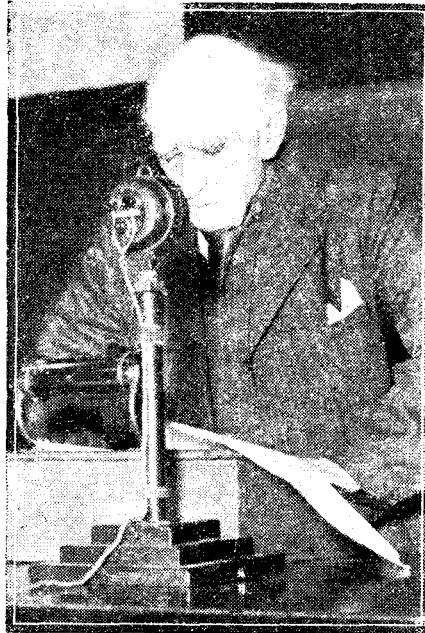
British Industries Fair

THE President of the Board of Trade (the Rt. Hon. Oliver Stanley, M.P.) is to be the chief speaker at the Birmingham Chamber of Commerce banquet on the occasion of the opening of the British Industries Fair (Engineering and Hardware Section) at Castle Bromwich, and this will be broadcast in the Midland Regional on February 27th. Inside the buildings at Castle Bromwich no fewer than 240 full-size tennis courts could be laid. A complete tour of the stands would involve a walk of nearly twelve miles. A new feature this year will be the indoor and outdoor A.R.P. section, including actual trenches. On March 1st His Majesty the King is to visit Castle Bromwich. The closing date of the Fair is March 3rd.

England v. France (Rugby League)

THE Rugby League International between England and France will be the subject of a running commentary from the Knowsley Road ground, St. Helens, in the National programme on February 25th. The first half only of the game will be broadcast.

INTERESTING and TOPICAL NEWS and NOTES



Sir Ambrose Fleming, the G.O.M. of science and radio, is here seen at the microphone, when he spoke to the Physical Society at the Imperial College, South Kensington, recently. Sir Ambrose, who was 90 last month, is the well-known inventor of the valve which made broadcasts possible.

Swiss Romande Orchestra

BY arrangement with the Société Suisse de Radiodiffusion, Midland is relaying a concert, on February 22nd, from Sottens, in which Ernest Ansermet will conduct the newly-formed Swiss Romande Orchestra in Bach's B minor suite and Bela Bartók's No. 2 concerto. The composer is himself the pianist for the latter work.

B.B.C. Symphony Concert

THE conductor at this concert, on Feb. 22, will be Sir Thomas Beecham, and the B.B.C. Symphony Orchestra will play under his direction a programme of music by Wagner, Berlioz, Delius and Tchaikovsky. The latter will be represented by his Fifth Symphony.

"Theatres of Variety"

A VARIETY programme will be broadcast from the stage of the Palace Theatre, Plymouth, in the feature entitled "Theatres of Variety," on February 22nd, for West of England and Regional listeners.

Variety—and its Rehearsal

NORTHERN and Regional listeners will hear an excerpt from the variety programme at the Palace Theatre, Blackpool, on February 24th, and a good number of those who tune in to this broadcast will no doubt have listened also to the "Rehearsal" programme from this theatre during the morning of the same day. This earlier outside broadcast, like similar ones from other theatres, will enable listeners to "overhear" some of the preparations for the evening's variety broadcast, direct from the Palace stage itself.

Old English Melodies

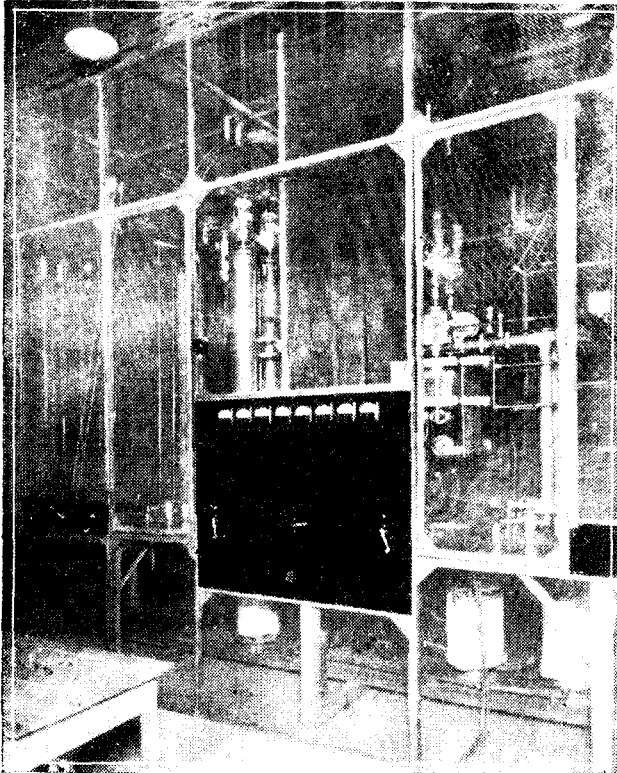
THE second of the programmes arranged by Dr. Desmond MacMahon, who has collected about 1,500 old English melodies of various dates before 1800, will be heard on February 23rd. It will be presented by Dr. W. K. Stanton, who will conduct the B.B.C. Midland Orchestra. The vocalist will be George Gibbs, the Wolverhampton baritone.

Czecho-Slovakian Amateurs

IT is reported that about two hundred amateur transmitters in Czecho-Slovakia, who were licensed before October 10th, 1938, have been granted permission to carry on with their transmissions. The authorities, however, are not prepared to issue new licences.

City of Bristol Orchestra

THIS well-known orchestra, led by Maurice Alexander and conducted by Malcolm Sargent, will give a concert at the Colston Hall, Bristol, on February 25th. The soloist will be D. G. A. Fox (pianoforte).



The first high-powered "staticless" radio station in the world, employing an improved system of transmission and reception, has just been put into operation, according to Major Edwin N. Armstrong, Professor of Electrical Engineering at Columbia University, who designed and built the broadcasting equipment. The programmes are broadcast through the amplifier pictured here, by station W2XMN, which is located on top of the Palisades, near George Washington Bridge in New York City. The station should have a service area of 100 miles.

SOLVE THIS!

PROBLEM No. 336

Lewis had a four-valve battery receiver and was given a pick-up by a friend. He was told how to connect this and carried out the instructions correctly, joining the pick-up in the first L.F. circuit with correct bias. When tested out, however, he could obtain no signals from records. He thought the pick-up may have been damaged, but a continuity test showed that the pick-up and associated leads were quite in order. What was wrong? 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. 336 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, February 27th, 1939.

Solution to Problem No. 335

When Wilkinson omitted the fixed condenser from the tone control circuit he overlooked the fact that the resistance would be an effective short-circuit from H.T. positive to H.T. negative. The following three readers successfully solved Problem No. 334 and books have accordingly been forwarded to them: J. Hopkins, "Gracedene," 9, Gouge Avenue, Northfleet, Kent; B. W. Montague, "Omega," Chipstead Valley Road, Chipstead, Surrey; J. B. Young-Evans, Cathedral School, Hereford.

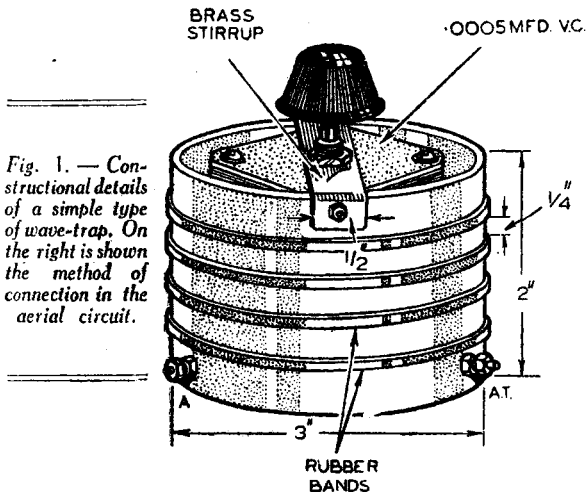
Making Your Own Components—8

Wave-traps, T.C. Chokes and H.F. Filters

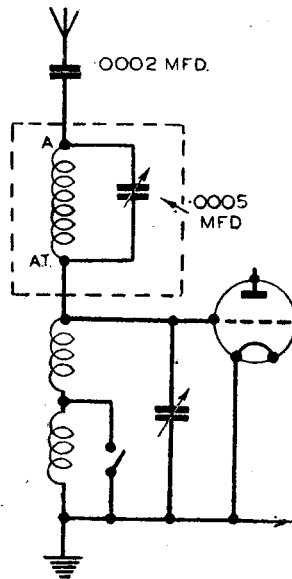
Simple Methods of Construction for a Number of Small Components which are Frequently Useful to the Experimenter - - - By FRANK PRESTON

WAVE-TRAPS are by no means as widely used as they were a few years ago, but they are still useful in some circuits and when the receiver is used very near to a transmitter. The simplest type of wave-trap consists simply of a tuned circuit, similar in form to the aerial or grid circuit of the receiver, inserted between the aerial lead-in and the aerial terminal on the set. When the wave-trap is tuned to the frequency of the unwanted signal it offers almost an infinite resistance to that signal, so that it is

prevented from reaching the input tuning circuit of the set. For obvious reasons, this type of trap is often referred to as a series filter. Since the wave-trap must be tuned to a frequency within the normal wavebands covered by the set it is clear that a standard tuning coil with variable condenser could be used. But this is unnecessarily expensive and often too bulky. A very compact and handy form of trap can be made, as shown in Fig. 1; this also shows the method of connection.



Dimensions given in Fig. 1 are those which would apply to a trap for long waves, and if medium waves only were to be covered the former could be made at least $\frac{1}{2}$ in. shorter, when there would be only two rubber bands, to give a single winding section. For medium waves, a total of 45 turns would generally be correct, whilst for long waves approximately 160 turns would be used. In the latter case the total number of turns would be roughly divided between the three spaces provided by the rubber bands.



It will be seen that a 3in. diameter paxolin or shellacked cardboard tube is used. Four rubber bands are tightly fitted on this at the approximate intervals indicated. Suitable bands are those of square section often used inside lids of preserve jars for making the lid air-tight. Similar rings are also used in many tobacco tins for the same purpose. In addition to fitting fairly tightly on the tube, they should be fixed in place with adhesive. If

Waveband to be Covered

Before making the unit it is necessary to find on what waveband the interfering signal appears. If it is on the medium-waveband the wave-trap coil should be wound to tune over that band; if interference is from a long-wave transmitter the winding must be designed to cover the long-wave band. In most cases interference will be from a Regional or M.W. National station, so the trap coil can be wound to tune over the M.W. band. Especial efficiency of the tuning circuit is not essential, for which reason it is suggested that the windings be hand-wound—turns not side-by-side, that is.

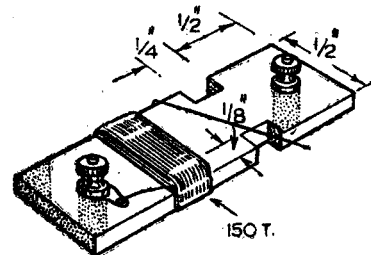


Fig. 2.—How a small anti-breakthrough choke can easily be made.

suitable bands are not available it is possible to make suitable separators by winding a narrow strip of paper round and round the tube.

Wire and Winding

Once the former has been prepared in this manner the two terminals can be fitted and a brass stirrup made to fit across the top. This stirrup is drilled in the centre to take the mounting bush of a bakelite dielectric variable condenser, and also near each end so that it can be attached to the tube with a couple of small bolts and nuts. Then drill holes for, and fit the terminals. Wire of any gauge between 26 and 38 could be used, but 30-gauge enamelled is as good as any and can easily be wound in the space available. The method of winding, as well as of anchoring the ends of the wire is precisely the same as described in earlier articles of this series in connection with coil winding. One end of the winding is connected—inside the tube for neatness—to one terminal, and the other end to the second terminal; a lead is also taken from the terminals to the two sides of the variable condenser.

In using the trap the procedure is first to tune the receiver to the wavelength of the unwanted station and then, leaving the set tuned to that wavelength, to turn the tuning condenser on top of the trap until signal strength is at a minimum. It will seldom be necessary to alter the setting of the trap again, so it could conveniently be mounted within the set or alongside the aerial lead-in tube. In that case it is generally desirable to connect a small fixed condenser between the lead-in and the unit, not using the series condenser fitted between the aerial terminal and the input coil inside the set.

Anti-breakthrough Choke

Another form of wave-trap is that known as an anti-breakthrough choke. Its purpose is to prevent breakthrough of the local medium-wave station when listening on long waves. Essentially, it consists of a small choke (small so that its field is small) connected between the aerial and the aerial coil. Probably the simplest form of construction is that shown in Fig. 2, where it will be seen that a strip of fibre or stout shellacked card is used. Two pairs of slots are cut in the strip, and 150 turns of fine wire wound in these, making a 300-turn winding altogether. The wire should for preference be 38-gauge enamelled, but the size of wire is not important within fairly wide limits.

The anti-breakthrough choke must be short-circuited when listening on medium waves. This can, of course, be done by connecting a separate switch across it, but a better method is to use a switch that can be ganged with the normal wave-change switch. The most suitable form for this can be decided only when it is known what type of W/C switching arrangement is used in the set.

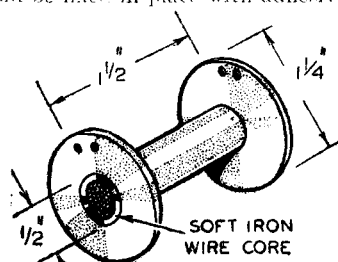


Fig. 3.—Core and winding spool for a small tone control, iron-core choke.

(Continued on next page)

MAKING YOUR OWN COMPONENTS

(Continued from previous page)

Tone-control Choke

A tone-control choke is always useful to the experimenter, and a suitable component can easily be made. It is worth mentioning in passing that excellent chokes of this type can be bought cheaply, but that will not deter the keen constructor from making his own. Readers will remember that details of a tone-control unit with tapped choke were given in the issue dated February 11th, and the following instructions can be applied to a choke suitable for use in such a unit.

An iron-cored choke is required, but it is not necessary to buy a set of laminated stampings in view of the comparatively low inductance required. The simplest method is to use a former and core of the type shown in Fig. 3. It will be seen that a length of cardboard or fibre tube is used, and is fitted with two end cheeks. The tube is filled tightly with lengths of soft-iron wire; the kind used by florists and often by butchers is suitable if cut into the short lengths needed.

For the winding use 3,000 turns of enamelled wire, taking tappings at every 500 turns. The method of anchoring and making connections and tappings is precisely the same as described previously for transformers and L.F. chokes. Any gauge of wire between 32 and 40 enamelled could be used, whilst a gauge even heavier than 32 could be employed by making the spool and core longer. Thus, if it were proposed to use 30-gauge enamelled wire the spool should be about 2in. long.

Scratch Filter

An experimental whistle or scratch filter could be made in a similar manner, but by omitting the iron core. It could be "tuned" by connecting a .002-mfd. pre-set condenser in parallel with it. When used in conjunction with a gramophone pick-up the choke-condenser would simply be joined between the two pick-up terminals. By experimenting with different tappings and different settings of the pre-set condenser it should be an easy matter to find the point at which needle scratch is reduced to a minimum without affecting the quality. The filter could also be used as an effective tone control in the same manner.

Another use for the filter is in the anode circuit of a superhet of old type with which a background whistle cannot be completely eliminated by other means. In that case a .001-mfd. fixed condenser should also be connected between the anode of the detector and earth, if that is not already included in the circuit. It should be explained that this form of filter is fully effective in many cases when whistle trouble is not very pronounced.

ENTIRELY NEW 8 h.p. CAR

IN the issue of our companion journal "Practical Motorist," dated February 25th, and on sale on Friday, will be given full details of a Test Report on an entirely new "eight." This has been produced by one of the best-known British manufacturers, and "Practical Motorist" was the first journal to be given the opportunity of testing the car. It will also be the first to publish full details, which are being kept strictly secret until Friday, February 24th.

Also in the same issue will be found many practical articles, including one dealing with the maintenance of the popular Vauxhall "Twelve-Four." There will also be the first of a new beginners' series entitled "How It Works," as well as all the usual features, latest motoring news and replies to Readers' queries.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, February 22nd.—Symphony Concert from Queen's Hall, London.

Thursday, February 23rd.—Orchestral Concert: Chopin Concerto, relayed from Poland.

Friday, February 24th.—Final of the World Snooker Championship.

Saturday, February 25th.—Commentaries on the Rugby League International, England v. France, from Knowsley Road Ground, St. Helens, and the Rugby Union International, Ireland v. Scotland, from Lansdowne Road Ground, Dublin.

REGIONAL (342.1 m.)

Wednesday, February 22nd.—A variety programme from the Palace Theatre, Plymouth.

Thursday, February 23rd.—Romeo Coates, a portrait of failure, by Edith Sitwell.

Friday, February 24th.—Rocking-Horse Winner, from the story by D. H. Lawrence, from Midland.

Saturday, February 25th.—Dance Band programme: Birthday Party.

MIDLAND (297.2 m.)

Wednesday, February 22nd.—Orchestral concert, relayed from Sottens, Switzerland.

Thursday, February 23rd.—Old English Melodies: Orchestral concert.

Friday, February 24th.—Rocking-Horse Winner, adapted from the story by D. H. Lawrence.

Saturday, February 25th.—Sport in the Midlands.

WEST OF ENGLAND (285.7 m.)

Wednesday, February 22nd.—West Country Speeches—No. 1.

Thursday, February 23rd.—Sweet Rhythm: a programme of popular tunes, from the Palace Hotel, Torquay.

Friday, February 24.—Western Worthies—The Soldier, Sir Richard Grenville of Stow.

Saturday, February 25th.—Orchestral concert, from the Colston Hall, Bristol.

WELSH (373.1 m.)

Wednesday, February 22nd.—What the small nations have contributed to the world's literature: a talk in the "Small Nations" series.

Thursday, February 23rd.—The Annual Welsh Service, in honour of St. David's Day, from St. Paul's Cathedral.

Friday, February 24th.—Inter-College Bee: A General Knowledge competition between students of the four colleges of the University of Wales.

Saturday, February 25th.—A programme of old Welsh Ballads.

NORTHERN (449.1 m.)

Wednesday, February 22nd.—Cinema organ recital from the Lido Theatre, Bolton.

Thursday, February 23rd.—Hark Forward: 3rd edition of West Cumberland variety.

Friday, February 24th.—The tale of the North Sea, by D. G. Bridson, feature programme.

Saturday, February 25th.—Saturday Concert Hall.

SCOTTISH (391.1 m.)

Wednesday, February 22nd.—An organ recital from Glasgow Cathedral.

Thursday, February 23rd.—Reid Symphony Concert, from the Usher Hall, Edinburgh.

Friday, February 24th.—A Letter to Rome, by George Malcolm Thomson, adapted for broadcasting by Gordon Gildard.

Saturday, February 25th.—Gaelic Concert.

NORTHERN IRELAND (307.1 m.)

Wednesday, February 22nd.—Country Concert, from Ballymena, County Antrim.

Thursday, February 23rd.—Elopement, a tragedy by Joseph Tomelty.

Friday, February 24th.—The Belfast Philharmonic Society third subscription concert of the sixty-fifth Season, from the Ulster Hall, Belfast.

Saturday, February 25th.—Choral programme, from the Ulster Hall, Belfast.

WLW (Cincinnati) Improvements

THE completion of a two-year programme of transmission improvements that now make WLW (Cincinnati) an ultra-modern, high-fidelity broadcasting station, was announced recently.

The rebuilding programme, which has been in progress at the Mason, Ohio, WLW plant, extends the fidelity of transmission considerably beyond the standard required by the Federal Communications Commission. Of primary interest to listeners is the report that the possibility of any broadcast being interrupted is only one-twelfth as great as formerly, due to elaborate automatic-switching equipment recently installed.

The improvements include obsoleting all motor generating equipment previously used to supply 150,000 watts of filament power to the several banks of 100,000-watt water-cooled valves. The power is used to heat the valve filaments, producing a glow similar to that in the tubes of an ordinary radio receiving set, which must be heated

in order to function. Instead of receiving power from motor generators, the filament tubes are now supplied from 84 transformers specially designed by the WLW engineering staff.

It was also revealed that WLW has installed new audio-amplifying equipment, used to build up the programme as it comes to the WLW transmitter plant via telephone line, to broadcast strength. All the audio-amplifier stages previously used to magnify the electrical impulse up to the 350,000-watt amplifiers have been discarded. They have been replaced by ultra-modern equipment employing new-type valves, also water-cooled, of a revolutionary design not in use elsewhere.

The fidelity of the transmission is of the highest type, and new safety factors and duplicate equipment, switching over automatically in case of a failure somewhere in the regular equipment, substantially increase the protection of listeners against programme interruption.

Landing Aircraft by Television

A Brief Account of a Novel System for Guiding an Aeroplane when Approaching an Aerodrome During a Fog

THE most interesting department at the E. M. I. Factories, at Hayes, in Middlesex, is probably the Research Building, where white-coated scientists are engaged in the task of wresting from unseen matter information which will eventually lead to improvements in radio technique.

Their investigations sometimes lead them into subjects which, to the casual observer, appear to bear no relationship to the matter in hand, and frequently result in discoveries which are beneficial to science and to industries outside our immediate sphere of commercial activities.

A Recent Instance

As an instance, here is an account of recent research work at Hayes which might quite easily revolutionise the present methods used for landing aeroplanes in fog.

The use of radio to help the airman when flying "blind" is fairly well known and extensively used, but read how the scientists in the E.M.I. Research Department devised a system whereby television can be used to real advantage for the purpose of landing a 'plane safely during a fog.

They set out with the idea that it would be much better for a pilot to see the aerodrome as he approaches it, and this is how it can be achieved. The aeroplane (4) is in position A while approaching the aerodrome. (Fig. 1.) It transmits a signal which is picked up by the directional aerial (3) situated in the centre of the aerodrome. On the field itself, beneath the aerial, is a room containing an Emitron television camera and miniature transmitting apparatus (7) (Fig. 2). The camera would be focused on a miniature model of the aerodrome and surrounding district, as shown. The model replica of the landing field is so fixed that it will pivot round to any angle with respect to the axis (10) of the camera. This angle is made to depend on the position of the directional aerial taking up the signals transmitted from the aeroplane. A picture

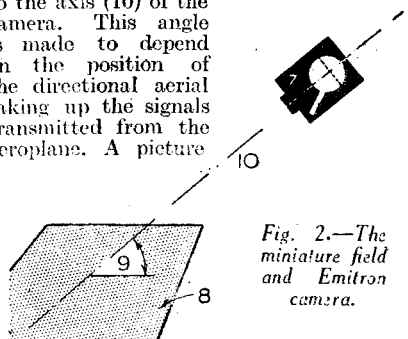


Fig. 2.—The miniature field and Emitron camera.

of the landing field is then transmitted to the aeroplane, where it is picked up on a television screen; this will ensure the pilot seeing a picture of the landing field exactly in relation to the present position of the 'plane.

Actual Location

Now, obviously, the aeroplane might be anywhere along the line connecting the aeroplane transmitter and the directional

aerial on the ground; for example, in Position B, Fig. 1, and would need location before the system could be of use. This can be achieved in several ways.

One method would be to arrange a second directional aerial (5) at a

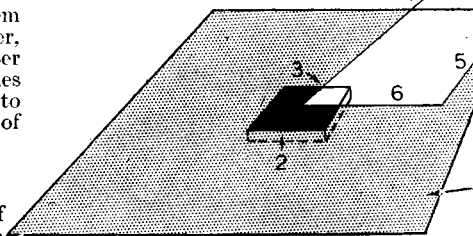


Fig. 1.—How the aeroplane approaches the landing field and directional aeriels.

distance from (3), which also picks up the signals transmitted from the aeroplane. The length of the base line (6) and the angles of inclination of the two aeriels allow the distance of the 'plane to be measured and thus keep a check between the model of the aerodrome and the camera.

An Alternative Method

What might prove to be a better method of finding the distance the 'plane is from the field is to make the signal transmitted from the aeroplane take the form of short pulses. The moment at which these pulses are sent out would be dependent on the incoming synchronising pulses contained in the transmitted picture. The pulses coming from the 'plane and the synchronised pulses

could be superimposed, the latter going through a time delay network with a variable delay. The amount of delay necessary is an indication of the distance of the 'plane from earth and can be used to give automatic control of the distance between the camera and the model landing field.

Obtaining Direction of Travel in Relation to the Aerodrome

None of this would be of any value without a means of showing the pilot in which direction he is flying in relation to the field, and to accomplish this the aerial of the 'plane must be directional. If an indication of the horizontal and vertical direction is required, two aeriels could be arranged, or one which could be rotated through 90 deg. The position of the aerial (or aeriels) moves an arrow on the dial in the cockpit, and, as it would always point to the centre of the field, the pilot could not only see the aerodrome at the correct angle of the approach but could also judge his distance as he draws nearer to it.

Position for Transmitting Station

For simplicity in explaining the idea, the transmitting station has been indicated in the centre of the field, but this position is not essential. The station could be set up in almost any part of the field, but care would have to be taken to correct the parallax accordingly. It will be appreciated that all sorts of temporary obstacles which might prove of danger to the flyer could be shown on the model landing field; for example, motor cars, other 'planes, etc.

This scheme has immense possibilities, for it could be applied to other problems, such as guiding ships into harbour, etc.

REGULAR TELEVISION PROGRAMMES FROM THE LONDON COLISEUM

IT is interesting to note that a series of monthly television transmissions from the London Coliseum began, by arrangement with Sir Oswald Stoll, on Tuesday, February 21st, when the first half of the programme, which commenced at 9 p.m., was televised direct from the stage.

"Coliseum Night" will normally be a Tuesday evening feature between 9.0 and 10.0 o'clock, and subsequent transmissions will be on March 14th, April 18th, May 23rd, June 20th, and a date in July to be announced later. The new arrangement follows upon the success of the recent inaugural television transmission from the Coliseum stage. The theatre is now specially wired, and is thus the first in the world to be permanently equipped for television.

B.B.C. productions staff and cameramen will watch the performance in the theatre on the day before each transmission, and will conduct their preliminary rehearsal over a closed circuit during the "first house" on the day of the broadcast.

It is emphasised that television transmissions will be of ordinary performances. Television cameras will be inconspicuously placed at the side of the dress circle to give comprehensive views in long shot, and close-up, of practically the entire stage. The transmission will be produced for television by Philip Dorte in the mobile control room parked outside the theatre. From here the vision signals will be conveyed by cable to Alexandra Palace for radiation to viewers in London and the Home Counties.

London's Novel Television Exhibition

Details of the Interesting Selfridge Theatre and Show to Boost Television

A MAMMOTH television exhibition—the largest of its kind ever held—opened at Selfridge's famous West-End Store on Monday, February 13th. Over £20,000 worth of the most up-to-date television equipment in the world is on view there. A special announcement and programme from Alexandra Palace signalled the opening at a special Press demonstration during the morning, and Mr. Jack Hulbert, the famous radio, stage and screen "star," opened the Exhibition at 3.30 p.m. in the Palm Court on the Fourth Floor. The Exhibition

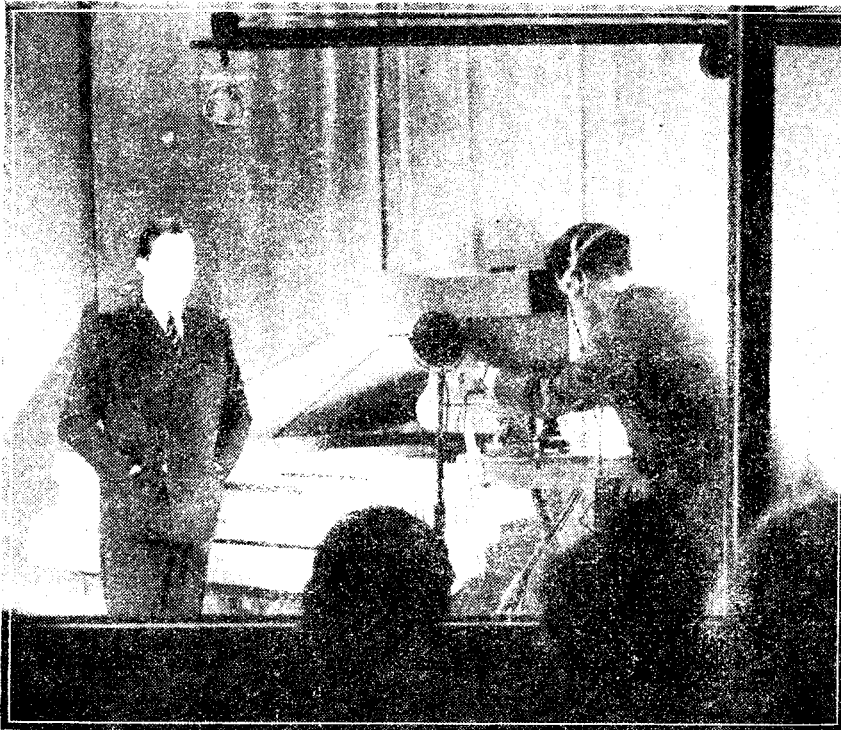
Famous Artistes to Appear

Famous artistes have been booked to appear in the Store during the run of the exhibition, and it is planned to include in the frequent daily programme excerpts from West-End Shows. The regular B.B.C. television programmes from the London television transmitter at Alexandra Palace may also be seen.

Talent-spotting Competitions

Competitions are being arranged to enable auditions to be given to aspiring

television world—their first regular broadcasts begin in the spring, and America says that before the end of the year they will have a greater number of television sets in use than England. It is up to us to see that the lead which this country possesses is maintained, and we here at Selfridge's believe that if the public can be given an opportunity now of seeing just how good television really is, then there will be little or no possibility of America making good her challenge—hence the Exhibition."



Mr. H. Gordon Selfridge, Jr., being televised at the opening of the exhibition mentioned on this page.

has been arranged in the heart of the West End so that the general public will have an opportunity of seeing the very latest television developments under ideal conditions (and, of course, without cost or obligation).

Complete Transmitter and Studio

With the co-operation of H.M.V. a complete Marconi-E.M.I. television transmitter has been installed, and a large, glass-fronted, sound-proof studio erected equipped with scenery, lighting, microphone and a mobile Emitron camera. All of the equipment is in operation in full view of visitors.

For the first time, the public is now able to see at least one representative model of every television set at present on the market in the same room and all working simultaneously—so that by moving round the room they are able to compare the quality and results obtainable by each individual receiver in a way which is both novel and unique. In addition, and perhaps the most interesting feature of this arrangement, visitors to the Exhibition are able to compare the results on the screen with the actual performance of the artistes in the glass-fronted studio.

television artistes, and a number of novel and many amusing contests will be announced from time to time.

Interesting broadcasts from the Selfridge Television Studio will include a series of talks and demonstrations concerning life in this great Store, showing the many-sided activities of such a vast organisation in the presentation of its varied merchandise to the public.

Baird's Original Television Apparatus on View

One of the historical features of the exhibition is the original apparatus, a weird collection of wire, valves, bits of tin and perforated discs, etc., from which television has been developed. The original apparatus is now an historic piece of work, and has been kindly loaned by the Science Museum, South Kensington, where it is normally housed.

Mr. H. G. Selfridge, Jr., in an interview, said of the Exhibition:

"It is interesting to recall that this modern marvel—Television—began in this country, and its inventor, John Logie Baird, gave his first public demonstration in the Palm Court at Selfridge's as far back as 1925. America has only now entered the

TELEVISION TEST PATTERNS

ANYONE who has seen a modern television receiver in operation is familiar with the pattern which the B.B.C. radiate as a tuning signal about five minutes before the programme actually starts. It enables any simple defects in the picture to be rectified, if required. For example, there are height and width, while synchronising locks can be adjusted to prevent line tearing and line pairing, and brightness and contrast can be operated to give the necessary degree of balance, and show effectively the right half-tones in the picture. Any absence of line and frame linearity will also be noticeable, but the pattern has not been chosen to reveal all the possible defects in the set, but rather to permit the receiver owner to bring about a good overall effect. In the case of the test pattern employed by the N.B.C. transmitter for the R.C.A. transmissions in America, however, more attention has been paid to the devising of a pattern which can give the engineer a considerable insight into the performance of the set undergoing reception tests. By means of two sets of converging lines, one horizontally disposed and the other arranged vertically, it is possible to learn almost exactly the degree of horizontal and vertical definition inherent in the receiver. This is given at the point where it is found impossible to differentiate optically between the separate lines of the converging patterns. This will naturally depend on the band width for which the vision channel of the receiver has been designed, and any falling short of the correct figure will be immediately visible. Bad interlacing, wrong aspect ratio, non-linearity, ghost images, phase distortion, incorrect synchronising adjustments, and the proper contrast features will all be made apparent to the engineer when tuned in to this device. It forms a very critical test for a set, but unless any of the defects mentioned are of an exaggerated character, they are almost completely undetectable when the ordinary subject matter of a broadcast programme is being radiated. If the B.B.C. at any time do contemplate transmitting a pattern for the sole use of manufacturers to carry out stringent tests on their sets, then the form or design will have to be very carefully thought out if it is to reveal all these features satisfactorily.

**WORKSHOP CALCULATIONS,
TABLES AND FORMULÆ**
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ON YOUR WAVELENGTH



Wireless Licences

THE latest figures issued to me showed that the Post Office issued 1,483,030 wireless receiving licences during January, 1939. This figure represents an increase of 2,568 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 January, 1939, was 8,930,100, as compared with 8,536,560 at the end of January, 1938, an increase during the year of no fewer than 393,540. During the month there were 312 successful wireless prosecutions.

I wonder how many of those new licences have been taken out as a result of television?

Television Interference

SEE that the suggestion which the Editor of this journal tells me he made to the members of the Television Interference Sub-committee of the R.M.A. suggesting that owners of television sets should be invited to state causes of interference, is being put into practical effect. I do not think that dealers can help for as dealers will be selling suppressing apparatus for motor-cars, it is a foregone conclusion that the majority will blame motor-car interference.

I therefore invite those readers who have experience of television viewing to let me have their considered opinion as to the causes, if any, of interference in their particular locations. I shall have much pleasure in tabulating the results, and passing along the information to the sub-committee of the R.M.A.

It seems a grievous pity that this sub-committee has not invoked the co-operation of the Press, which alone can provide it with the information it desires. As it is, the committee is sitting behind locked doors, and has not issued statements to the Press except to one particularly-favoured journal. The committee may have "opinions," but what it wants is facts, and it can only get them by appealing to the people who suffer the annoyance which this committee has been brought into existence to remove. There is no quicker way of getting this information than by making a personal appeal through the Press to those owning television

By *Thermion*

receivers. I ask my readers, therefore, to help me in my desire to provide practical evidence to supplant pious opinions unsupported by fact or reason.

More Inky Paper from "Torch"

"BREAK not the chain," the sender said,
"Which three times round the world has led ;

Good luck shall then be thine !
But he who fails, and breaks the chain,
Good luck shall never know again."

Says Thermion : " I opine.
I know the proper place for this,"
And with an aim that cannot miss,
Into his fireplace tosses
The Magic Postcard number five ;
He will not keep such tosh alive,
He'll risk all pains and losses.

" Beware ! Beware ! O Thermion
rash !

Our Evil Powers shall cook thy hash !
This is the third time running,
First 'twas the table-rapping games,
Then gibes at hyphenated names,
And now at Magic Postcards
funning !

Scurrilous scribes, whose blood is ink !
Thermion and Torch are names of
stink

With us whose powers they flout,
Abracadabra ! Magic word.
Now let our thunder's roar be heard !
Our lightnings blast them out !!!

Club for Pioneer Constructors

C.P., of London, expresses his views on this subject thus :
" Re your question in PRACTICAL AND AMATEUR WIRELESS dated February 4th, as to a club for 'Pioneer Constructors,' why not make one of the rules for membership that the applicants produce a certain number of wireless licences, dating not later than 1925, 1924, or, say, 1923? This would be near enough to

convince anyone that the applicant was a constructor, as very few commercial sets were on the market then, and those that were were very costly and unreliable, and most wireless listeners built their own sets from costly parts to plans given in about half-a-dozen wireless weeklies that then began to appear, but which are long since dead !

" I still have a good laugh when I think of those days when I had a pet fad. If I built a set and it did not work, I always used to put it down to the fact that I did not use a certain part made by a certain firm ; not because it was the wrong part, or value, but because it had not a certain firm's name on it. Well, well, I know better now, and so do thousands of other constructors. Perhaps that is why some firms who sold inferior parts have fallen by the wayside. I am only one out of thousands who, although wishing to go in for television, are hanging back until we are sure of our step. I simply rushed into wireless and paid any price asked for parts, even paying about 7s. 6d. for reconditioned valves which had their bulbs opened and new filaments fitted.

" I believe they were fitted with a patent 'hooded anode' for which it was claimed that it trapped the electron stream and prevented its escape."

I have received a goodly response from some of the early constructors who, of course, were operating long before licences were introduced. I cannot agree that we should make membership open to those who held a licence in 1925, for many thousands could qualify for membership under that arrangement.

The Story of the Palace Theatre

THOUGH it sounded thoroughly unbusinesslike at the time, the loud laughter which emanated from Producer Gordon McConnel's office behind St. George's Hall recently was the harbinger of a radio programme which should have a wide appeal among listeners.

The cause of it was Lewis Sidney, one of the original "Pelissier's Follies," whom S. R. Littlewood, the author and dramatic critic, had brought along for a discussion about the first

of two programmes that he is writing about the Palace Theatre, London. It will be broadcast on February 28th (National) and March 2nd (Regional).

In those far-off pre-war days, "The Follies" were frequent visitors to the Palace and, next to Pelissier himself, Lewis Sidney was the chief laughter-maker; he is one of those supremely melancholy comedians whose mobile face continually expresses the lowest depths of gloom. And if this recital in McConnel's office of his famous version of "Kissing Cup's Race" halted, as it did, any serious business, it certainly indicated the value of arranging his participation in the broadcast.

From Opera to Revue

THAT is the sub-title of this illustrated history of one of London's best-known theatres. Ben Davies, one of the first famous singers to be heard when the Palace was opened as the home of opera and comic opera, has also been booked for the broadcast, and it is hoped that the cast will include a number of other artistes whose careers have been associated with the theatre. Gordon McConnel will produce the programme in collaboration with Gwen Lewis. The B.B.C. Theatre Chorus and Orchestra will be under the direction of Stanford Robinson.

Scholarships in Practical Radio

I AM informed that in order to promote a greater interest in the principles and practice of radio broadcasting, with special emphasis upon agricultural service by radio, station WLW, Cincinnati, has established a competitive project open to all senior students of agriculture at land grant institutions of the United States. Six-months scholarships in practical radio training at WLW are offered to two students chosen by a committee of three nationally-known judges under terms of the plan.

The competition is open to those students who will receive their degrees in 1939. They will be trained in all phases of radio programme work at WLW between July 1st and December 31st of this year, with \$500 provided for each man for expenses during the period. Announcement of the "practical experience" scholarship winners will be made on June 1st.

Another Suggestion

IN connection with my suggestion for the formation of a Wireless Pioneers Association (See previous page) I have received the following letter from one of my Parisian readers:

"I think your idea of a 'Society of Pioneer Constructors' an excellent



Push-button Four

A NUMBER of readers have found difficulty in setting up this superhet, and it appears that in the majority of cases the main trouble is due to failure to adjust the parallel trimmers and tracking condensers in the correct relationship. The position on the dial at which stations are received depends not only on the maximum tuning capacity—as determined by the adjustment of the parallel trimmers—but also on the padders which are used for both medium and long waves. In most cases it will be found most satisfactory to adopt the following procedure. First tighten up the trimmer on the aerial filter. Next tighten up both trimmers (aerial and oscillator) for the medium wave—centre condensers. Now turn to the North Regional setting on the dial and adjust the padder until the station is received at maximum volume. Tune next to the London National on the dial and adjust trimmers for aerial and oscillator together until correct volume and setting are obtained. A slight adjustment on padder and aerial filter may then be necessary to ensure that tracking holds throughout the range.

Interference

IN some cases of radiated interference listeners have gone to the expense of installing anti-interference aerials without effecting a complete elimination of the trouble. In most of these cases it has been found that the main reason for this is that the interference field extends to the receiver and thus inter-connecting wires pick up the trouble. If, therefore, an aerial of this type is erected and mains filters are also fitted, but interference is still experienced, the best plan is to enclose the entire receiver in a metal case, earthed. In some cases it may only be necessary to place a sheet of metal under the chassis so that the latter is totally enclosed, but in others there may be leads on the top of the chassis which may pick up the interference. The importance of screened leads in this connection—especially anode leads and the lead from the aerial terminal to the aerial coil should not be overlooked.

A Reaction Effect

A D.C./A.C. receiver was recently being tested and when tests were nearly complete a fault developed which made itself evident by absence of reaction. The anode circuit of the detector was checked and the reaction circuit found in order. Eventually it was found that the by-pass condenser had become disconnected from the screen of the H.F. valve and immediately this was reconnected reaction was once more obtainable.

one and a suggestion for a name is the 'Wireless Pioneers Association.'

"As to the formula for membership, your proposal that applicants should have built a set at least twenty years ago seems to me to about cover most things. The chief difficulty seems to me to be how to check the facts unless, of course, it is a question of transmitters, who must have had a dated licence. In my own case, I am a quite humble experimenter whose name will never be inscribed upon the roll of fame, but (having a rotten memory) I cannot remember whether I built my first set in 1919 or 1920.

"Anyway, I remember when there was only 'Wrrrrittle' to listen to on Thursday evenings, and then the Eiffel Tower and Königswusterhausen on Sunday mornings. And that by clipping the aerial terminal to the hook supporting the ear-piece on the old type telephones and using the telephone earth wire (for which I believe the reward is twenty years hard) I discovered that I had the best aerial and earth system known to science at that time. And the thrill I had when, listening once to the aeroplanes, I heard an English pilot saying, 'I am now winding in my aerial before landing at Amsterdam' and reading next day in the papers that this transmission had beaten the aeroplane distance record.

"I may say that I am very much English (and not Scotch) in spite of my name. All my early experimenting was done in Putney."

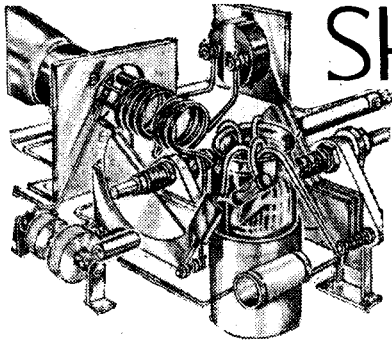
Another Solution

HEREWITH letter from E. Y., of H.M.S. *Fenelope*, which speaks for itself:

"I am probably a little late with my opinion of G. J. D.'s 'phenomenon,' but assuming, as he was testing for hum, that his pick-up was connected, would not the coil/coils in this act as an untuned H.F. stage, so receiving the stations mentioned 'all in a bunch,' with relative strength, according to his locality? I think so."

And another from J. R., of Caithness:

"On reading the query on page 535 of the current issue of your paper, *Transformer Primary Burnt Out*, I cannot help thinking that same gives rise to a wrong impression, as L.F. transformers seldom or never burn out as a mains transformer sometimes does. What happens, as doubtless you, 'Thermion,' are aware, is the winding usually parts company due to corrosion, especially where same is soldered to the tapping-out wires."



SHORT-WAVE SECTION

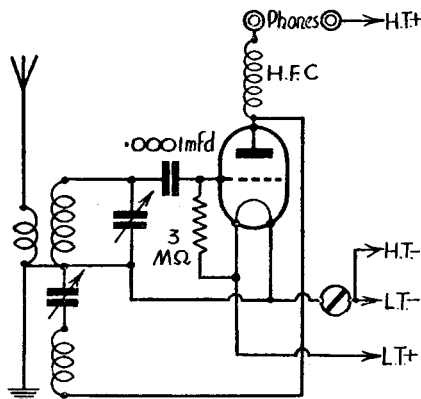
A "UNIT" SHORT-WAVE RECEIVER

Short-wave Apparatus Lends Itself Admirably to the Unit System, and a Multi-valver is Here Described by W. J. DELANEY

MANY amateurs who wish to enter for the first time the short-wave listening field are in doubt as to the best type of receiver to use. They hear such a lot about the advantages of one circuit and another that they may be pardoned for expressing doubt as to which will suit them. We hear of one-valve sets which bring in America without difficulty, and on the other hand some users of multi-valve superhets express difficulty in hearing even the more powerful Colonial stations. Therefore, it would appear that the best thing a beginner could do would be to start at the beginning with a simple one-valve set and add to this as desired to suit his particular local conditions

a pair of terminals to which aerial and earth or the output from another stage are to be joined and thus by placing these pairs of terminals in a suitable position the chassis may be linked together in a simple manner and the accommodation of components on both sides of the chassis will permit a very compact form of unit construction to be adopted.

In this issue we show the detector stage or unit and give the wiring, from which it will be seen that a perfectly orthodox arrangement is adopted, with a 6-pin coil for tuning purposes. In the circuit which a 6-pin coil provides the primary winding may serve as either an aerial coupling coil or as the transformer primary for H.F. coupling purposes, but when using an H.F. stage to precede this stage, it is possible to cut out the primary and thus a little more latitude for experimental work is provided. A metal panel is used in addition to the metal chassis and a wiring diagram will be found on page 594.



Theoretical circuit of the simple detector stage. A B.T.S. mechanical bandspread tuning drive is used for this set.

and his requirements regarding range, volume, etc. In the ordinary way this is not a difficult matter, but when it is desired to add the extra stages complications are often experienced. A suggestion which will no doubt prove welcome to many readers in the above class is to build a special type of receiver, making use of what at one time was known as the "Unit" system. The detector stage is the basis of a receiver of this nature, as it may be used alone and is a complete receiver in itself. To this may be added L.F. stages when more volume is required, or an H.F. or two H.F. stages if greater range is required. Thus, eventually the set may take the form of a four-valver and at this point it will be appreciated that the ultimate receiver may assume undue proportions.

Neat and Efficient

We have carried out one or two tests and have found that it is not difficult to make a really neat receiver on these lines, provided that the chassis form of construction is adopted. The output of any of the stages in such a receiver will terminate in two terminals, and to these either phones, loudspeaker, or an input circuit may be connected. On the input side we have also

pick-up on the inter-connecting wires. At the rear strip a hole is drilled to clear battery-connecting wires, but for aerial and earth it is desirable to use sockets. The H.F. stage may then, when built, incorporate two pins which will go into the sockets to complete connection. As an alternative, two terminals may be mounted at the rear of the top surface of the chassis, and these may be linked to two similar terminals on the H.F. chassis if this is used. Both forms of connection are equally efficient. The H.F. chassis, when this is built, will measure the same length (8in.), but will only be 3in. wide. This is ample to accommodate the coil, valveholder and condenser mounted on a suitable bracket, and to avoid interaction a vertical screen should first be attached to the front runner of that strip. However, this will be explained next week.

Wiring

The dial should be mounted by means of two bolts in the positions indicated on the wiring diagram, and the small bracket which forms part of the dial should be locked into position when it is firmly bolted to the chassis. When using a metal chassis, shake-proof washers are a desirable addition beneath lock-nuts. The valveholder must be mounted by drilling a 1in. hole through the chassis, but the coil-holder is of the baseboard-mounting type and holes are then required for inter-connecting wires. This arrangement simplifies construction and also enables the connections to the tuning condenser to be kept short—a vital point in short-wave apparatus. The condenser is mounted on a bracket, and a slotted bracket should be cut from stout metal so that the exact height of the tuning condenser may be obtained to enable the dial to work without difficulty. The reaction condenser is mounted on the front runner, and as this is at earth potential the condenser is connected, as will be seen from the theoretical diagram, on the earth side of the reaction winding. The remainder of the wiring and component mounting details may be gathered from the wiring diagram. The two output terminals on the chassis top must, of course, be insulated from the chassis, and you can use either the insulated type of terminal or bolt a short strip of insulating material to the chassis and mount the terminals on this. The valve used in this stage should be metallised and of the detector or H.L. type, with H.T. between 60 and 80 volts applied. The exact voltage is not critical, but too low a value will result in failure to obtain reaction over the entire band, whilst too much will cause fierce, uncontrollable oscillation.

Waveband Coverage

It should be remembered that standard 6-pin coils as supplied by firms such as Eddystone are capable of being used down to 9 metres, but maximum performance will only be obtained on these low ranges when every possible source of loss has been removed in the receiver design. In this respect it should be borne in mind that expense incurred in obtaining really high-class short-wave components is amply repaid in the improved performance which is generally obtained. Accordingly we have specified Eddystone tuning condensers and coils, whilst a Clix ceramic valveholder is employed for the valve. The same arrangement will be adopted for the H.F. stage.

The chassis for the detector stage is 8in. by 6in., with runners 3in. deep. The runners should extend all round, as by that means it is possible, if found necessary at a later date, to enclose the bottom and thus prevent interference due to direct

Leaves from a Short-wave Log

Another Illicit Transmitter

A NEW "mystery" station styling itself *Radio Corse Libre* (Free Corsica) has been heard on the southern coast of France. Broadcasts are carried out in the French language by a foreigner every evening between G.M.T. 20.00-21.00 on a wavelength varying between 31 m. (9.677,4 mc/s) and 31.35 m. (9.57 mc/s).

Radio Eireann on Short Waves

THE initial tests of the short-wave station at Moydrum (near Athlone), Eire, are expected to take place shortly. The channels allotted to this transmitter

are 16.83 m. (17.84 mc/s); 25.55 m. (11.74 mc/s), 31.27 m. (9.595 mc/s) and 48.47 m. (6.19 mc/s).

And Egypt. . . .

IT is reported by listeners that the Egyptian authorities are carrying out experimental broadcasts daily between G.M.T. 13.30 and 15.30 on 35 m. (8.572 mc/s).

S.W. Radio Station in Newfoundland

VOEB, a 500-watt station at St. John's, has recently been opened; the channel used is 31.15 m. (9.63 mc/s).

LEAVES FROM A SHORT-WAVE LOG

(Continued from previous page)

Two Interesting Expeditions

THE Lincoln-Ellsworth Antarctic Expedition now located at about 67 deg. south and 75 deg. west, or a thousand miles or so off the extreme point of the South American Continent, broadcasts

every Tuesday and Friday at G.M.T. 04.30 on 14 mc/s, or roughly 21.42 m. The call-sign is LDUC.

From Greenland, under call-sign OX7OU, the Oxford University Expedition operates almost every night at G.M.T. 02.30 on 21.35 m. (14.005 mc/s) when it gets into communication with Great Britain and the United States.

Colon Increases Wavelength

H5F Colon (Republic of Panama) has moved from 49.9 m. (6.012 mc/s) to 61.29 m. (4.895 mc/s). Power: 750 watts. Address: Apartado Postal, 867, Colon.

Colombian Alterations and Additions

HJ3ABH (now HJ3CAH), Bogota, La Voz de la Victor, has moved from 49.9 m. (6.012 mc/s) to 61.29 m. (4.895 mc/s). Power: 750 watts. Address: Apartado Postal, 565, Bogota (Republic of Colombia).

HJ3CAF, a new 750-watt station at Bogota, is on 61.79 m. (4.85 mc/s). HJ3ABD (now HJ3CAD), Bogota, 1 kilowatt, Colombia Broadcasting, is now working on 61.92 m. (4.85 mc/s). Address: Apartado Postal, 509. HJ3ABA, in the same city, a 5 kW transmitter, is operating on 62.5 m. (4.8 mc/s). HJ3ABF, La Voz de Bogota, 1 kW on 49.4 m. (6.073 mc/s) has slightly increased its power. Address: Apartado Postal 317, Bogota.

HJ3ABX (now HJ3CAX), Bogota, moved from 49.88 m. (6.015 mc/s) to 63.22 m. (4.745 mc/s), 1 kW. Address: La Voz de Colombia, Sociedad Anonima, Calle 14, No. 738, Bogota. HJ3ABO, Bogota, is a new station (5 kW) working on 61.5 m. (4.07 mc/s). HJ3CAT, another new transmitter erected by the Colombian Posts and Telegraphs is working on 31.15 m. (9.63 mc/s). HJN, Radio Nacional, also in the capital, remains on 49.5 m. (6.06 mc/s) and is operating on a power of 1 kW.

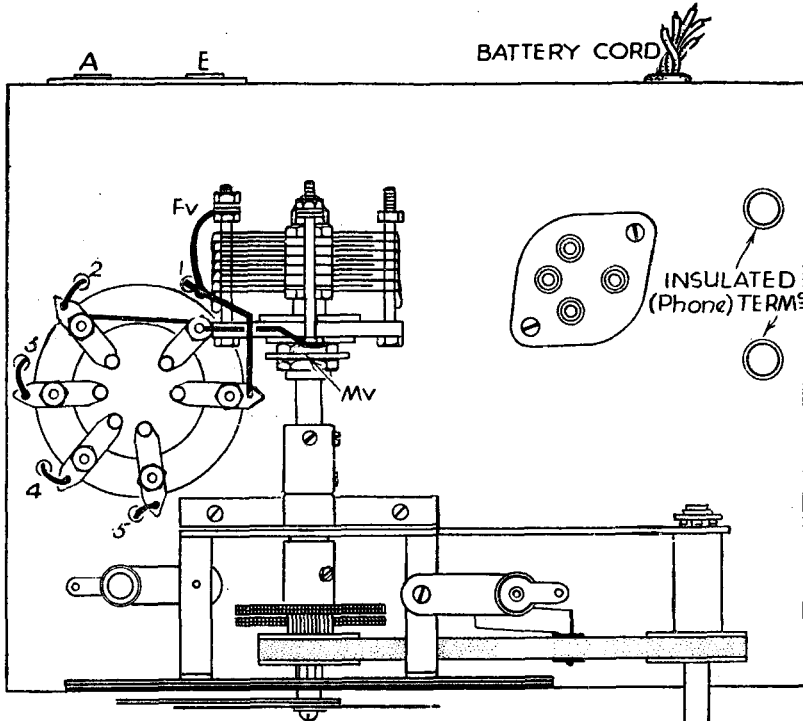
HJ1ABJ, Santa Marta (now HJ2BAJ), broadcasts on 61.66 m. (4.865 mc/s), 1 kW. HJ4ABU changed to HJ4ADU, Medellin has moved from 51.02 m. (5.88 mc/s) to 62.43 m. (4.805 mc/s). HJ6ABE becomes HJ6FBE, and the wavelength is altered from 61.86 m. (4.85 mc/s) to 62.96 m. (4.785 mc/s).

HJ1ABE, Cartagena, is now on 62.05 m. (4.835 mc/s); power has been raised to 5 kW. Address: Apartado Postal, 31, Cartagena. HJ1ABP, in this city, has developed into a 600-watter, working on 60.91 m. (4.925 mc/s). Address: Apartado Postal, 37. HJ2ABC (now HJ2BAB) has moved from 62.63 m. (5.799 mc/s) to 62.31 m. (4.815 mc/s). HJ5ABD, Cali (now HJ5AED) has changed owners and is now operating with a power of 1 kW on 62.18 m. (4.825 mc/s). Address: Apartado Postal, 270, Cali. HJ1ABG, Barranquilla, moved from 49.59 m. (6.05 mc/s) to 61.16 m. (4.905 mc/s). Address: Apartado Postal, 445. HJ4ABC, Ibague (now HJ6AFI) has reduced its wavelength to 62.57 m. (4.795 mc/s). Power: 750 watts. Address: Apartado Postal, 39.

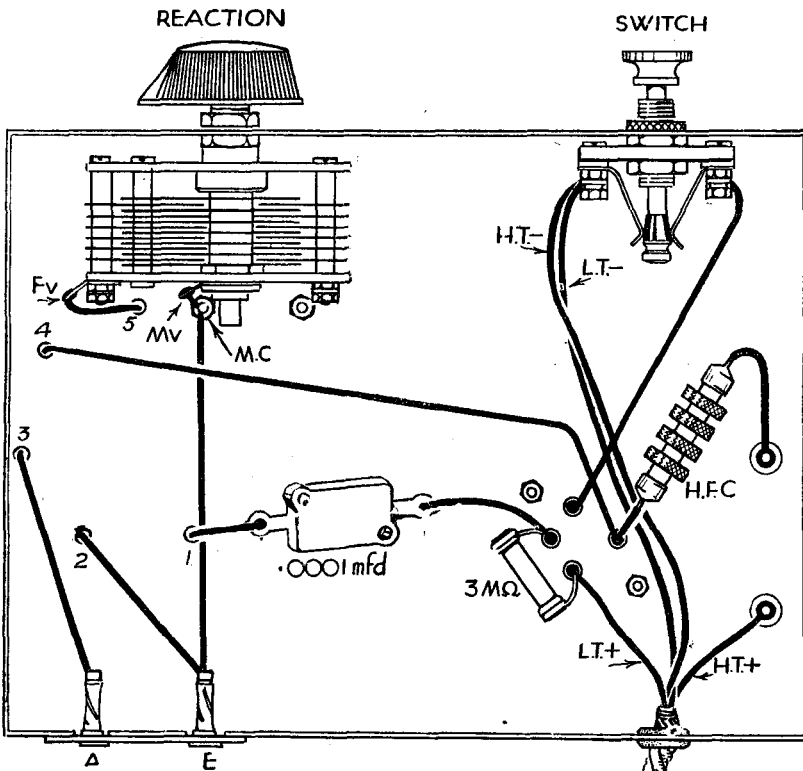
At Bucaramanga, Colombia, HJ7ABD (now HJ7GAH), a 5-kilowatter, is on 61.35 m. (4.89 mc/s). Address: Calle 2A, No. 1,205. HJ7GAB is a new 750-watter on 62.83 m. (4.775 mc/s). Address: Sr. Francisco Bueno, Radiodifusora HJ7GAB, Bucaramanga.

At Buenaventura (Valle), Colombia, HJU becomes HJEH and has altered its channel from 31.55 m. (9.51 mc/s) to 63.09 m. (4.755 mc/s). Power remains at 1 kW. Finally, HJ6ABH, Armenia (Caldas) has changed to HJ6FAH, and is working daily on 61.54 m. (7.875 mc/s) with a power of 600 watts. Address: Señores Hoyos y Gutierrez, Armenia, Caldas, Republic of Colombia.

WIRING DIAGRAM OF DETECTOR UNIT



Next week the H.F. and L.F. stages will be given.



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A PAGE OF PRACTICAL HINTS

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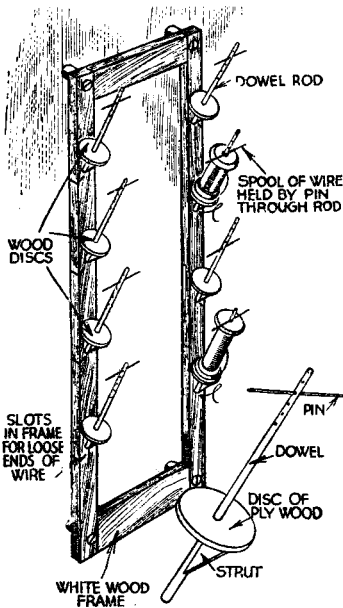
READERS WRINKLES

THE HALF-GUINEA PAGE

A Rack for Spools of Wire

THE framework of the rack illustrated was easily constructed from white wood, and fitted with four rubber stump feet. Screws are passed through holes drilled in these feet, fastening the whole rack to the wall.

The spokes, or spindles, are of dowel rod, and discs of plywood are attached to them



A novel rack for holding spools of wire.

as a platform for the spools of wire, when these spools are in position on the spindles.

Short pins are inserted to prevent the spools working up and off, and wire can be wound off these without any displacement at all, short slots being cut into the edge of the frame ensuring that no loose or slack ends are left hanging, and wire can be taken at any time free from kinks.—T. LOUGHLIN (Palmer's Green).

Recessed Control Knobs

WHEN designing a really small stand-by receiver, I decided to keep the set in a home-made canvas bag of the box-camera pattern, not only for portability but to preserve the finish of the aluminium faced front panel, as I have noticed that unless aluminium is kept in an absolutely moisture-free atmosphere, the polish become irreparably dulled.

To provide a snug fitment in this bag, and to enhance the appearance of the set, it was necessary to recess the single tuning-control knob, and so I utilised a fairly deep ashtray of brass, as illustrated. The tray required thoroughly cleaning and sand-papering with a fine grade paper until a "satin" finish was obtained, then after making a 3/8 in. hole in the panel and drilling the centre for the 3/16 in. brass bush,

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SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page 603.

the tray was fixed (invisibly) by soldering three countersunk-head screws to the flange, as shown.

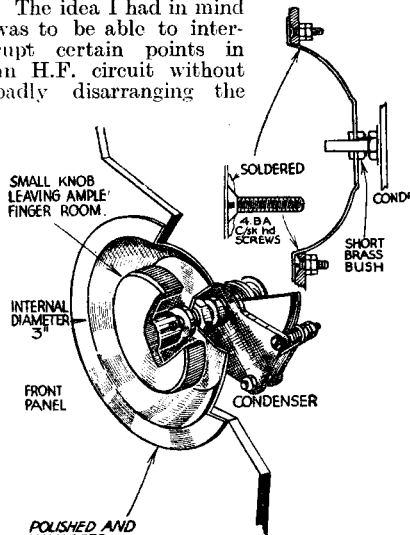
The final touch, prior to fitting the knob, was provided by coating the tray with shellac, and so further preserving the finish.—A. E. HOLCOTT (Louth).

Interconnecting Insulation Pillars

TO get the best results from a new circuit design on the H.F. band, it is essential that the same care be taken in the "hook-up" circuit, as in the finished job (electrically), and I have found it a wise plan to prepare a few "general use" components so that an element of quickness can be introduced without any doubts arising on the efficiency of these components.

The accompanying illustration shows how I have converted some insulating pillars for plug-and-socket method of inter-connection.

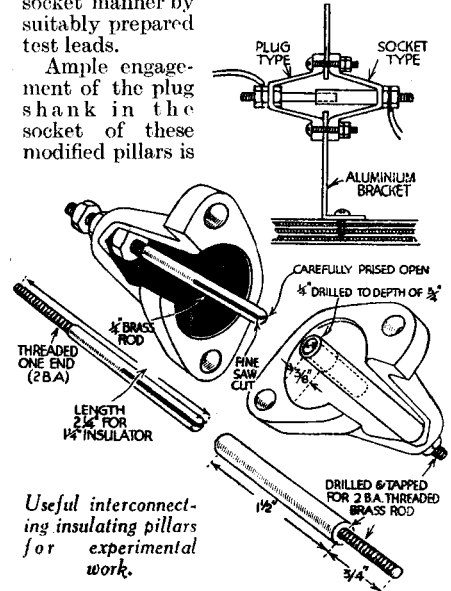
The idea I had in mind was to be able to interrupt certain points in an H.F. circuit without badly disarranging the



A method of recessing control knobs on small portables.

wiring and introducing "sloppy wires"; at times, a meter would be inserted and this would be connected in the same plug and socket manner by suitably prepared test leads.

Ample engagement of the plug shank in the socket of these modified pillars is



Useful interconnecting insulating pillars for experimental work.

arranged by allowing both plug and socket to protrude beyond the base to the extent of 3/16 in. and the inset depicts this point clearly.—T. J. ANDREW (Wickford).

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THE chassis of the H.F. and detector unit is made from 14 or 16-gauge aluminium, the dimensions being 10in. long, 9in. deep and 3in. high. It is a perfectly straightforward job; no awkward bends, sub-panels, or cut-outs being required or specified. This allows any constructor, with very modest equipment, to make the chassis from sheet aluminium, the only care needed being to see that all markings, ruling and bending are set up perfectly square. For those who do not fancy this part of the work, or who require a professional finish, Messrs. Peto Scott, Ltd., will supply the specified chassis ready for the assembly of the components.

Chassis Details

Starting with the sheet of metal cut to the exact size, namely, 10in. by 15in., scribe a line parallel to each of the long sides 3in. in from each edge. These strips form the front and back turned down runners or sides.

Before any bending is carried out, mark off all drilling posi-

tions according to the dimensional plan, Fig. 5, and register such points with a centre punch or sharp bradawl.

It is particularly advisable to take your time over this part of the work, and make frequent cross checks, as it is very easy to spoil the look of the chassis by having to drill fresh holes to make good a careless slip.

All marking off should be done on the underside of the chassis. Fig. 5 is drawn in this manner, so don't forget that the holes shown on, say, the right of the plan, represent the points or components on the left of the chassis when it is standing in its correct position. This may seem too obvious, but the point is worth stressing.

After locating all points on the chassis, the two screens should then be cut to the shapes and dimensions shown in Fig. 3 and the holes for the fixing bolts and the screened cable marked.

Drilling

Drilling can now be commenced. The sheet of metal should be placed on a suitable flat piece of board which has been covered with a piece of stiff brown paper. Drill all the small holes first and, if the metal is moved between drillings, remove all metal fragments from between the board and aluminium by shaking the brown paper thoroughly. If this precaution is ignored, cuts and scratches will appear

BUILDING THE "REQUI

Main Features of the Constructional Work of this together with Details of the Items to Watch so that The Preliminary Details were Given in last week's

on the upper side of the chassis, due to metal turnings from the drilling. It is best to clamp the sheet of metal to the board, and not move it until all holes are drilled.

Take care when drilling out the larger holes for the valve-holders to avoid tearing or distorting the edge of the holes; drill halfway through from one side, and then turn the metal over and continue from the other side.

Don't forget to remove all drilling-burrs. This can be done, in the case of the small holes, by a sharp twist of a larger drill or a rose bit. The larger holes should be smoothed

off with a half-round file or a piece of emery cloth.

When all drilling has been done, and the job cleaned up, the bending operations can be commenced. Clamp the metal in a vice between two flat metal bars, and cover the surfaces with stout paper to prevent markings. The bars should be as long as the chassis, and clamped dead on the line marking off the depth of the runners. If a vice is not available, quite a satisfactory

bend can be secured by screwing or clamping the metal between two boards of hard wood. Start the bending action evenly and gently, gradually working the sheet down to a right-angle position. Before removing from the clamps, a more acute bend can often be obtained by judicious tapping with a flat-headed hammer or beating block. Don't strike the aluminium, interpose a flat strip of smooth wood between the job and the hammer.

Mounting the Components

The valve-holders, A and E, strip, H.F. choke, 2 mfd. condenser, and volume-control potentiometer, can now be mounted, and a certain amount of the wiring completed, taking care to see that efficient connections are made in all instances. This is another part of the work which must not be rushed.

After this follows the mounting of the coil unit, to which the battery control switch has already been fitted securely. Check the operating action of the switch cam, and see that it works without strain in any part of its movement.

The three connecting wires between the coil unit and the three-ganged condenser should also be fitted to the unit before placing and bolting it in position.

The remainder of the wiring can now be completed, and special attention paid to the placing and connecting of the various fixed resistances. On no account must these be allowed to straggle all over the place. Fix them in the positions shown, cut connecting wires to the correct length, and make sure that they are rigid, as a

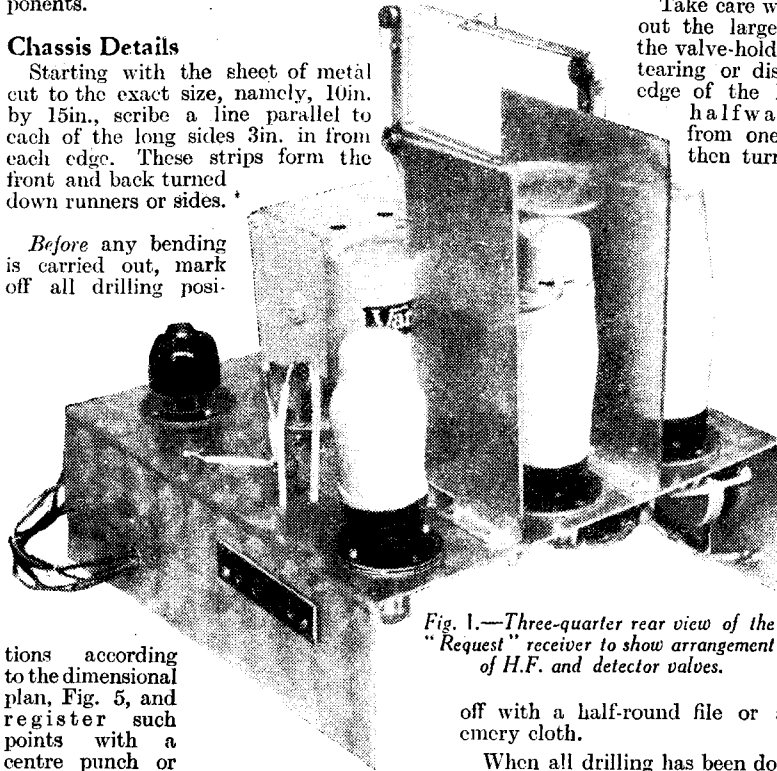


Fig. 1.—Three-quarter rear view of the "Request" receiver to show arrangement of H.F. and detector valves.

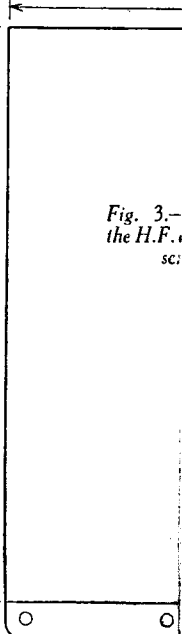


Fig. 3.—The H.F. chassis

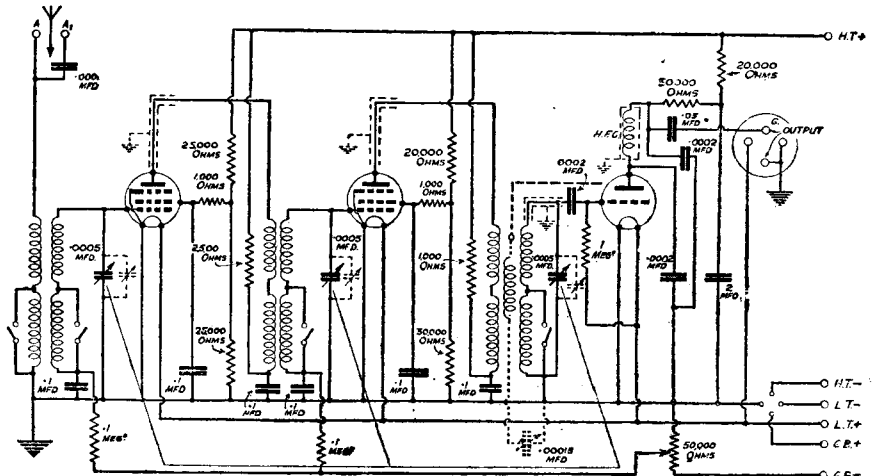
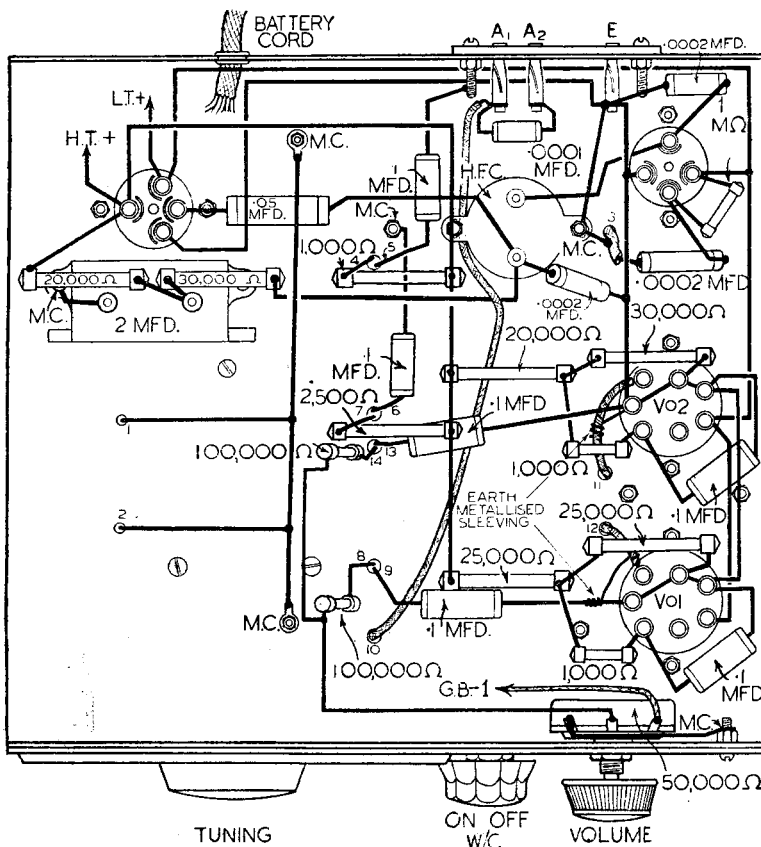
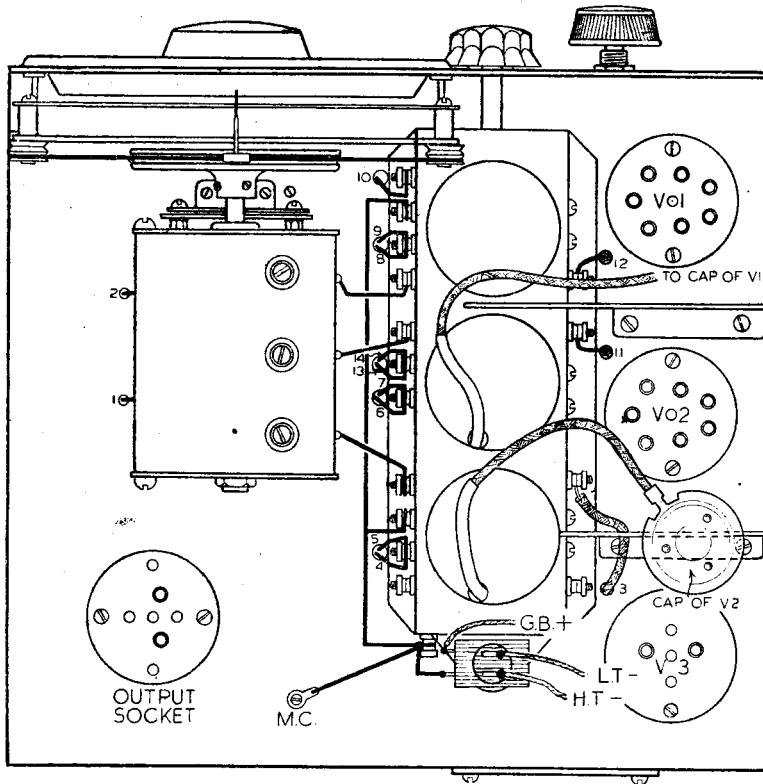


Fig. 2.—Theoretical circuit diagram of "The Straight Six."

WIRING DIAGRAMS OF THE H.F. SIDE OF THE "REQUEST" STRAIGHT SIX

AN IMPROVED TELEVISION CAMERA



OVER a period of twelve years the image-dissector tube, conceived originally by Farnsworth, has been developed until now it is ready to take its place side by side with any other form of electronic device capable of synthesizing pictures for transmission purposes. It is now claimed that the new tubes are about ten times as sensitive as the conventional Iconoscope, and are free from the spurious shading signals which so often mar the present B.C.C. transmissions. From a uniform photo-electric surface an electron flow is brought about, and parallel to this plane cathode, and just in front of it, is what Farnsworth calls a "photo island" grid which is roughly analogous to the mosaic of the electron camera. This is made up from a sputtered silver caesium oxide layer, and under working conditions assumes a potential distribution dependent upon the optical image. It controls the electron flow from the cathode, and the resultant electron image is drawn through the grid meshes. At the other end of the tube is a beam of electrons which is made to scan across the back surface of the photo island by electro-magnetic deflection and focusing. Under the beam influence this grid emits secondary electrons which are drawn through the interstices in an amount depending upon the potential existing at the point then scanned. An electron multiplier structure collects these electrons, and they constitute the actual television signal. Considerable storage periods are possible with this device, and it is in this connection that it exhibits one of its main differences with the standard image dissector tube in which this principle was absent. Although secondary emission takes place at the grid it has been proved that there is no local redistribution and hence the shading effects are absent, as mentioned earlier. When it is desired to transmit standard talking films a non-storage tube is used in conjunction with a continuous film projector. An eleven stage electron multiplier of the D.C. variety provides sufficient signal amplification, for it must be remembered that in this case the tube-cathode is being activated by pictures of high light intensity, and in consequence there is a satisfactory signal to mush ratio.

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Trawler Telephone Service

THE Postmaster-General announces that short-range telephone service with trawlers, coasters, and other small craft equipped for radio-telephony is now available to all telephone subscribers in the United Kingdom through the Post Office coast stations Humber Radio (near Grimsby), Seaforth Radio (near Liverpool), and Portpatrick Radio (near Stranraer). Calls to ships cannot, however, be accepted from call offices or from subscribers' coin-box lines.

The service is available to trawlers and other fishing vessels irrespective of the voyages on which they may be engaged; and to tugs, coasters, river craft, and other ships which normally do not proceed more than 200 miles from ports in the British Isles.

Sea Range

Under normal conditions reliable communication may be expected up to a sea range of about 100 miles from the coast station (Humber, near Grimsby, Seaforth, near Liverpool, and Portpatrick, near Stranraer); but this distance may often be exceeded in practice.

The Humber station provides service with ships operating in the North Sea, the Seaforth station with ships in the River Mersey and the eastern part of the Irish Sea, and the Portpatrick station with ships in the Firth of Clyde, in the North Channel, and in the northern part of the Irish Sea.

On board ship the service will be available to and from both passengers and crew. Calls will be accepted for a particular person on board a ship but cannot be accepted for a particular person on shore.

The inclusive charge for a conversation to or from a ship at sea is 7s. for three minutes and 2s. 4d. for each additional minute. Of these amounts 2s. and 8d. respectively are credited to the ship. No additional charge is made for the land-telephone connection, whatever the distance.

Calling a Ship

A telephone subscriber outside the London Telecommunications Region, wishing to call a ship, should ask his exchange for "Humber Ships Telephone Service" (for ships off the East Coast), "Seaforth Ships Telephone Service" or "Portpatrick Ships Telephone Service" (for ships off the West Coast) and state his requirements. A subscriber within the London Region should first proceed as if making an inland long-distance trunk call, and when the Trunk operator answers, should ask for the particular ships service required.

If the ship required is not in com-

munication, the subscriber will be informed at what time communication may be expected and will be called by the radio station as soon as it has been established.

In the case of calls from ships, the Control operator at the radio station will call the subscriber and inform him that a ship desires to speak, quoting the ship's name, and will immediately complete the sea-to-land connection, putting the ship into direct communication with the shore subscriber.

Simplex and Duplex Service

Portpatrick Radio operates both a simplex and a duplex service, and conversation with suitably-equipped ships can take place as on the ordinary telephone system. In the case of ships equipped only with sim-

plex apparatus the use of the word "over," as described in the next paragraph, will be necessary.

The service through Humber and Seaforth radio stations is at present a simplex one, that is, conversation can only be maintained in one direction at one time; but in practice this will be found to give rise to little difficulty. It will be necessary for one person to cease speaking before the other can reply. The word "over" should be used to indicate that the speaker has finished speaking and is ready to listen for a reply. The control operator will immediately reverse the connections of his apparatus in order to allow speech to pass in the opposite direction.

The control operator at the radio station will monitor and control all calls, and will be pleased to give any information or assistance required.

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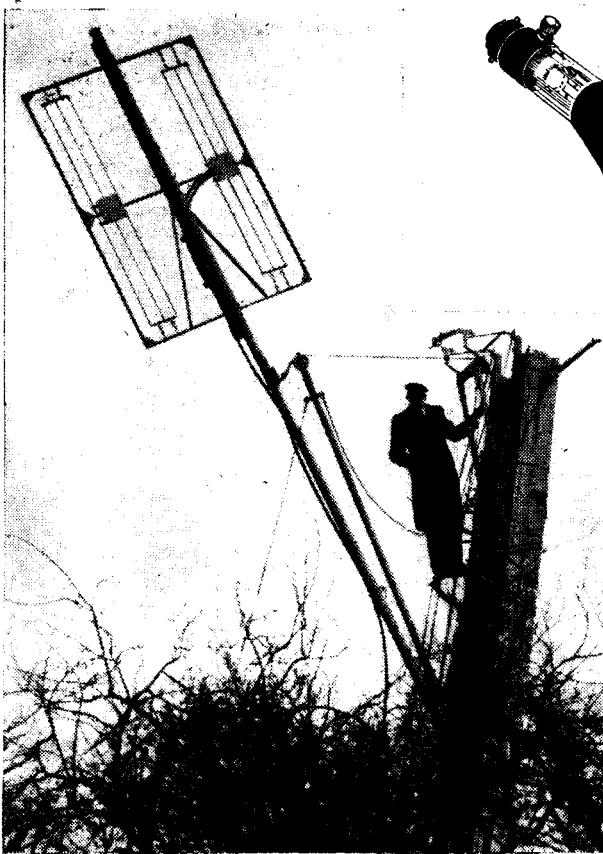
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An interesting close-up view of the portable transmitting aerial used by the O.B. department of the B.B.C. Television Section.

FOR some time it has been known that considerable research work had been undertaken in big-screen television development, but the recent announcement concerning the public presentation in cinemas came as a surprise to most people. It was to the effect that in the Tatler and Marble Arch Pavilion cinemas the boxing match between Boon and Danahar at Harringay Arena will be seen by the audience as televised pictures on a 15ft. by 12ft. screen. Both these theatres have been equipped with the most advanced Baird projectors, which show a marked improvement on those used for the Derby, Cenotaph service, Trooping of the Colour, Test Matches, etc. The screen area has been nearly quadrupled and is easily the largest television image yet demonstrated. Special arrangements have been made with all the authorities concerned, and there is no doubt that this latest advance will be received with the greatest interest by the cinema industry, which has kept a constant watch on progress since the series of private demonstrations given during the course of last year. The original equipment comprised a projection type cathode-ray tube with associated lens, which front projected the small but intensely bright picture on to a screen 8ft. by 6ft. This, of course, was materially different to the three zone land-line transmission made from the Epsom Downs to a screen 10ft. by 8ft. located in the Metropole Cinema, London, 1932. The picture definition was then one of 90 lines, while back projection was employed, three separate Kerr cells being made to modulate individual arc lamp beams. This was a technical triumph for those days, but obviously the 1939 result will show a vast improvement, and bring home vividly to those privileged to see the results the enormous strides which have been made in television technique, both

Practical Television

February 25th, 1939. Vol. 3. No. 140

BIG-SCREEN DEVELOPMENT

and Other Important Television News

at the transmitting and receiving ends. During last year the pictures shown on the Tatler big screen reached a remarkably high standard, there being a degree of clarity little short of news reel presentation. The new Baird double projectors, however, show considerable technical improvements, and it is anticipated that very soon steps will be taken to equip other cinemas in the London service area.

In order to prevent this occurring special shield electrodes in strip form have been incorporated, these being located near the main target and accelerating electrodes. By applying a suitable bias these are made to repel any electrons which tend to deviate from the main stream, and the proper working balance is restored. Then, again, it is often found that when using electron multiplication principles in the case of modulation applied to high cathode emission, the output has a large unwanted direct current component. To overcome this multipliers have been proposed which work on the push-pull principle so familiar to users of low-frequency amplifiers.

Extensions

IN the campaign to expand its television audience the B.B.C. is playing its part in more ways than one. Perhaps the most obvious are the special programmes which are being radiated, but in anticipation that the present co-operative effort will bear fruit the B.B.C. are preparing for future developments. One result of this is the extension of the Alexandra Palace itself. Two more sections have been added, and the former Art Gallery is undergoing extensive alteration so as to form a modern carpenter's shop. The scenery used for studio productions is now a very important item, and proper facilities must therefore be provided to enable the work involved to be carried out rapidly and efficiently. The section vacated by the carpenters when they take over their new accommodation is to be converted into offices to better house the increased staff who have joined the television service within the last few months.

Proper Balance

TO the critical viewer the true illusion of vision and accompanying sound in a received picture when employing a modern set is sometimes spoilt by the mere fact that when, say, a film is being televised the sound volume is unaltered irrespective of the size of the objects on the screen itself. For true illusion it is natural to expect that a face seen in close-up would produce sound coming from a point nearer to the viewer than would be the case in an extended scene. A very careful manual control on the part of the sound engineers could, of course, bring this about, but a suggestion has been put forward whereby this illusion can be effected automatically. The idea is to have a photo-electric device which is controlled from a section of the picture that is capable of giving a representation of the whole area. The magnitude of the resultant current can then be used as a relay to control the sound volume within certain prescribed limits, so as to give the sound effects needed.

An Ambitious Plan

FOR some days prior to the announcement concerning the big-screen television presentation, rumour had been afoot that a scheme was being propounded for showing the Boon-Danahar lightweight championship fight to an audience of bigger dimensions than usual. Any attempt to secure exact details, however, failed to obtain a satisfactory answer, this of course, being due to the fact that the final arrangements were not settled. The plan which has now been conceived, however, may be destined to have a far-reaching effect on sport and its relation to television. The fight will be televised in its entirety, and in order to give a complete programme other attractions will be included for the benefit of the cinema audiences. In many quarters the film industry is regarding these rapid developments as something which will bring about changes ranking in importance with that which occurred when the talking film replaced the silent one. It is, of course, too early yet to be in any way dogmatic, but whatever happens, the domestic side of television with sets in viewers' homes will in no way be upset; on the contrary, there is no doubt that it will make the public still more television-conscious and so stimulate sales of sets.

Electron Multiplication

NOW that the principles of electron multiplication by secondary emission have become so well established, every effort is being made to improve the efficiency of equipment made to work on these lines. For example, it has been shown that in some forms when the amplification of weak signals is being undertaken the ratio of the signal to the disturbing noise level has not been as high as anticipated. This has been traced to the action of stray electrons which have produced harmful negative charges inside the tube container.

PRACTICAL TELEVISION

(Continued from previous page)

Ultra-short-wave Interference

ALTHOUGH it is generally agreed that the ignition systems of motor-cars do provide interference in television reception, it is necessary not to overlook other forms of trouble which through being persistent, and continuous, produce a more distressing effect than the occasional light splashes on the screen caused by a passing motor-car. It has already been made known that a harmonic of the Daventry Empire transmitter completely ruins any picture received within the radius of that radiation. Then, again, there are certain amateur transmitters whose equipment radiates a wealth of harmonics which can irreparably damage a picture to an extent far outweighing that wrought by a travelling car. Other cases could be cited, but enough has been said to show that it is necessary to maintain a carefully balanced sense of proportion in any form of investigation which has the praiseworthy aim of eliminating or reducing materially, interference in television reception. Every avenue must be explored at both the transmitting and receiving ends of the service, as well as the offending apparatus itself, and it is for that reason alone that the claims of Major Armstrong for his frequency modulation must receive the closest study. He states, for example, that most forms of interference are eliminated by his methods, and more important still, it is said that from 1,000 to 1,500 additional wavelengths for radio transmission between ten to one metre will become available for the first time. Differing radically from the present system of amplitude modulation the principle, although not new, should be examined. Then, again, it is known that patents are being taken out for special forms of aerials which have as their main object the reduction of inductive forms of interference.

PERSONAL PARAGRAPHS

LORD CADMAN has accepted the Chairmanship of the Television Advisory Committee which had become vacant through the death of Lord Selsdon. The Committee includes representatives of the Department of Industrial and Scientific Research, the British Broadcasting Corporation and the Post Office; and its function is to advise the Postmaster-General on the development of the television service.

Sir Noel Ashbridge, Chief Engineer of the B.B.C., is contributing two sections, Scientific Developments in Radio and Television, to a review of world events during 1938, to be published under the auspices of the "Encyclopædia Britannica" in March.

Mr. T. S. Eades, managing director of the Automatic Telephone and Electric Co., Ltd., has been appointed a director of B.I.C.

Mr. G. H. Nisbet has been elected deputy chairman of the board of directors of British Insulated Cables, Ltd., while retaining his position as managing director.

Sir Robert McLean has been appointed a director of Electric and Musical Industries, Ltd., and of the Gramophone Co., Ltd.

Mr. H. C. Roberts is to continue representing Mullard in the North as area manager, following the closing of the firm's Manchester depot.

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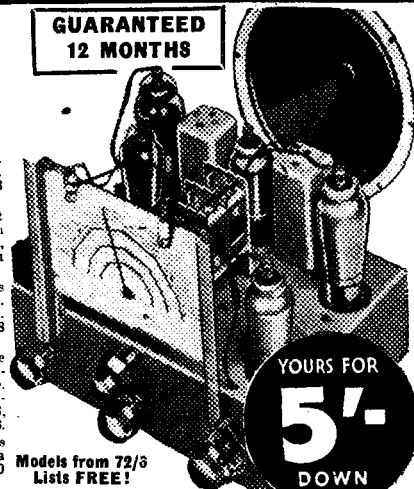
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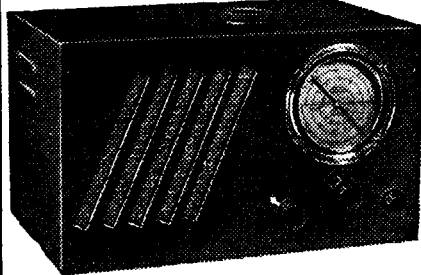
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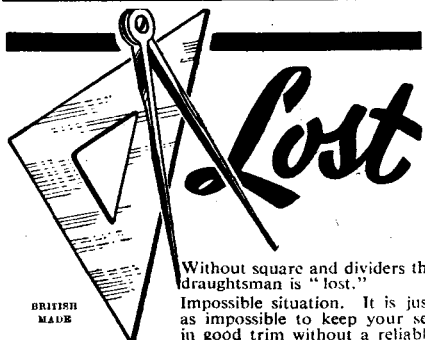
TROPHY 5 A.C. 5-valve Junior communication type. Bandsread dial. Incorporated speaker. £9 cash, or 10/9 down and 18 monthly payments of 10/9.

TROPHY 8 A.C. 8-valve communication-type. Wave-range, 7-550 metres. Bandsread dial. Complete in cabinet, for use with separate P.M. speaker. 12 gns. cash, or 15/6 down and 18 monthly payments of 15/8.

MR. F. J. CAMM states of the TROPHY 5: "Tested in our laboratories over a considerable period, this receiver has been found to function in a very satisfactory manner."

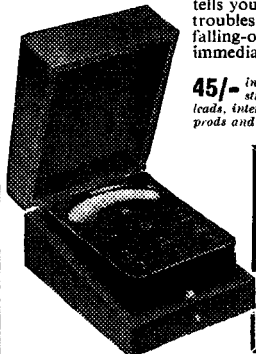
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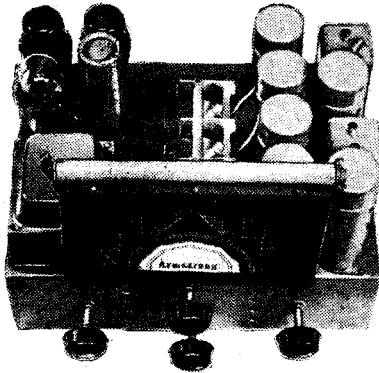
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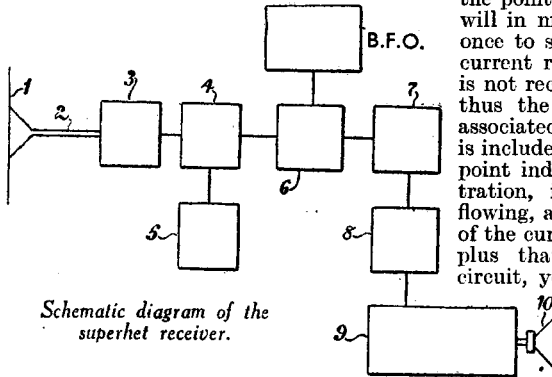
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The Superhet

A NUMBER of members are still in the dark regarding the superhet receiver and are uncertain either as to its method of working or the meaning of the name. As one reader puts it: "Sometimes I see it called a super; at other times a superhet, and at other times a superheterodyne." Actually, of course, the full name is the superheterodyne. A heterodyne, as most members are aware, is the arrangement which results from two different frequencies. It is not special to radio. When



Schematic diagram of the superhet receiver.

travelling in a car, railway train or other vehicle, one can often hear a heterodyne beat. Bells ringing or any other method of deriving two or more sounds or vibrations may give rise to the production of a third note or vibration, and this latter is known as a beat. The prefix super in the term under discussion merely indicates that the beat or heterodyne is at a very high frequency—actually above audibility. In the schematic diagram above, a superhet (which is merely an abbreviation) is shown in stages. The aerial 1 is fed to the first stage 3, via a lead-in wire 2, which may be a single wire or a twin feeder if a doublet aerial is used. This first stage is a perfectly ordinary H.F. amplifier and is, in many superhet receivers, omitted. The next stage (or combination of stages) is where the superhet feature takes place. The stage marked 4 is a detector stage, but coupled to it is another stage, 5, which is an oscillator, and the oscillations from this are tuned to a certain frequency and then fed back to stage 4. The resultant heterodyne beat will be of the same frequency no matter what station is tuned in, and this new frequency is passed to the next stage. It is then dealt with exactly in the same manner as in any normal receiver, being again detected and amplified by standard L.F. stages.

One slight difference on this side of the receiver is sometimes met with in amateur type receivers, where another oscillator is employed and coupled back to enable continuous wave signals to be obtained, and this extra oscillator is known as a beat frequency oscillator.

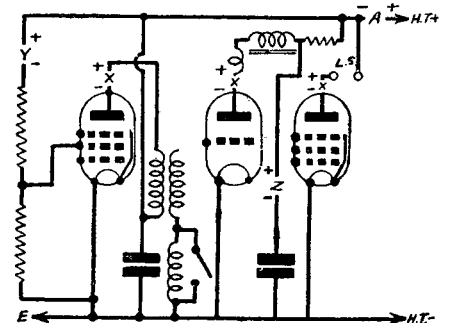
Current Tests

WHEN making current tests in a receiver some experimenters experience difficulty in ascertaining the correct way round to connect the meter. It is not difficult to remember that the earth

side of any valve circuit or associated component is negative in respect to the H.T. line and thus, when connecting a meter, the negative terminal should always be placed on the "earthy" side of the circuit. In the sketch below is a skeleton circuit of three valves and the points where a meter may be inserted are indicated, and the polarity at these points has been marked to make the matter quite clear. When a receiver is failing to give proper results and tests are called for, one of the first things to do is to include a meter at the points indicated. The current reading will in most cases enable the operator at once to see where the trouble arises. No current reading will show that the valve is not receiving H.T. or L.T. or both, and thus the valve may be tested and the associated circuits checked. If the meter is included in the H.T. positive line at the point indicated on the right of the illustration, it will show the total current flowing, and if this is in excess of the sum of the current shown in each anode circuit, plus that in the screen potentiometer circuit, you will know at once that there is an additional short-circuit at some point; perhaps one of the decoupling condensers is leaking and thus reducing the H.T. applied to the valves.

Valve Characteristics

A MEMBER is anxious to know whether it is possible to work out valve characteristics when only a few brief particulars are given. Certain of these may be calculated, but it is always worth while, where possible, to obtain proper curves and data. If, for instance, the amplification factor and the slope are known, the impedance may be calculated by dividing the amplification factor by the



Where to include a meter in a normal circuit for current tests, showing the correct polarity.

slope and multiplying by 1,000. The wattage output of a power valve may also be calculated by squaring the grid bias, multiplying this by the amplification factor squared, and dividing by eight times the normal impedance.

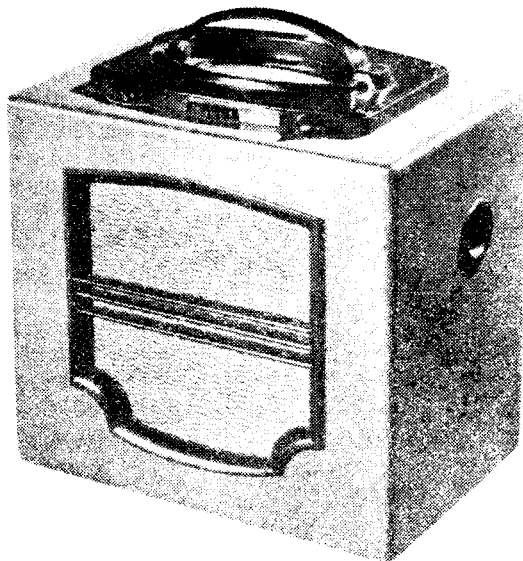
PATENTS AND TRADE MARKS

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NOTES from the TRADE

New Philips Portable

MANY listeners remember the model 225B Philips Portable which was such a success last year—having a high standard of performance and combining neatness and lightness of weight in its make-up. A new model is now announced and is illustrated below. This gives an improved quality of reproduction; the control panel has been improved, and the controls are much easier to handle. As may be seen from the illustration, the



The new Philips Portable, Model 228B, which costs 8½ guineas.

controls are placed flat and are operated by the thumbs—a scheme which is not only neater but is more effective when fine tuning is needed. The carrying handle sinks flush with the panel and adds to the neatness of the top of the chassis. The circuit incorporated is a 4-valve superhet with an efficient A.V.C. circuit, but is in other respects similar to the model already mentioned. The type of speaker which is fitted is an improvement on the original model, and this accounts for the improved quality of reproduction. Battery consumption has been kept at the low figure of 8 mA. The price is 8½ guineas, complete with batteries, and the model number is 228B. Hire purchase terms are, of course, available.

Electradix Lists

AN enlarged edition of the popular Electradix list is now off the press, and consists of 16 pages. As usual, this is divided into sections which include chargers, resistances, dynamos, tools, cables, switchgear, meters, aeriols, condensers, crystals, microphones and hundreds of similar items, all of which will be found of use by the experimenter—either in receiving or transmitting. In addition to the electrical items in the list there are, of course, many scientific pieces of apparatus such as compasses, telescopes, thermometers, microscopes, focometers, mirrors, etc. The list is free on application to 218, Upper Thames Street, E.C.4.

Cossor American Valves

A COMPLETE range of American-type valves is now available from Messrs. Cossor, and these include battery as well

as mains types. A list is available showing all types and prices, whilst the same list contains details of all of the Cossor valves which may be used as replacements in Philco receivers—either standard radio apparatus or car radio receivers.

Messrs. Cossor also announce the release of a new Mains Superhet, Model 70. This is a table model of the 5-valve type with an Sin. wide-response M.C. speaker, fed from a 4 X.P. valve. Single-knob tuning, edge-illuminated scale, volume and tone controls are other important features of the model, which costs 8½ guineas. It is, of course, for A.C. mains operation only, and provision is made for the use of a pick-up and extension speaker.

Epoch Speakers

MESSRS. HALFORD RADIO, of 31, George Street, Hanover Square, W.1, inform us that they have taken over the manufacture and sale of Epoch speakers, the sole rights for which they now hold. They will be concentrating chiefly upon the 16in. Auditorium model, which handles up to 20 watts, but at the same time they are in a position to deal with repairs, service or conversions of any of the previous Epoch models which may now be in use.

New Mazda Valves

THREE new valves are announced by Mazda, models TH41, TH233 and U403. The first is a triode-hexode for A.C. receivers with octal base and designed to meet the special requirements of all-wave receivers. The second is an A.C./D.C. version of this with a 23-volt 2 amp. heater. The U403 is an indirectly-heated half-wave rectifier for A.C./D.C. sets and also has an octal base. The heater rating is 4 volts 2 amps and maximum anode voltage 250.

Midget Portables

TWO more portables of extremely small dimensions are announced—one by Pyc, Ltd., and the other by Pilot Radio. The former is known as the Mite Midget and is of the A.C./D.C. type, utilising 4 valves with a built-in aerial system. It weighs 7½ lb. and measures 11½ in. by 8½ in. by 6½ in. The price is £4 19s. 6d.

The second is known as the "Little Maestro," and is also for A.C./D.C. use. It incorporates 5 valves, but other than that the price is 5 gns. no further details are at the moment available.

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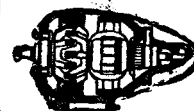
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Meetings: Tuesdays at 8 p.m.

Hon. Pub. Sec.: Mr. E. L. Cumbers, 14, Campden Road, S. Croydon.

Mr. H. BEVAN-SWIFT, a past president of the Radio Society of Great Britain, gave a talk on "Radio Reminiscences" to the Croydon Radio Society, on Tuesday, February 7th, in St. Peter's Hall, S. Croydon. Mr. P. G. Clarke was in the chair. In recalling the vast amount of important pioneer work done by the amateur, the lecturer mentioned how, for instance, the first religious service ever sent over the air, was done by amateurs. In due course came the historic days of Writtle, with Captain Eckersley giving his impromptu broadcasts on 440 metres. As regards the amateur, Mr. Bevan-Swift said, he was permitted the use of 1,000 metres for transmitting; he was then dethroned to 440 metres, and later to 200 metres. It was discovered, however, that the short-waves were very useful for long-distance work. In this respect unstinting praise was due to the British amateur, who alone showed what could be done, and led the way for commercial firms to follow. Above all, the unceasing work of the Radio Society of Great Britain in the cause of the amateur was a thing never to be forgotten. At the present time, the amateur was still being forced on to lower wavelengths, now on 5 metres. Nothing daunted, he had already spanned the Atlantic on that wavelength. Once again commerce would follow him. Next Tuesday, February 28th, is a delight for the home constructor, when Messrs. Everett Edgecumbe, Ltd., will consider radio servicing instruments, and their uses.

SLOUGH AND DISTRICT SHORT-WAVE CLUB

Headquarters: 35, High Street, Slough, Bucks.

Meetings: Alternate Thursdays at 7.30 p.m.

Hon. Sec.: Mr. R. J. Sly, 10, Buckland Avenue, Slough.

At the last meeting 2FAU gave a very interesting talk on oscillators. It was decided to build a short-wave receiver for use at meetings, and to apply at a later date for an A.A. licence.

BRENTWOOD AND DISTRICT RADIO SOCIETY, G8HV

Hon. Pub. Sec.: J. R. Deane Sainsbury (2CYW), "Brunook," Crossways, Shenfield, Essex.

At the annual general meeting, held recently, the following officers were elected for 1939:

Chairman: Mr. E. D. Hellyer.
Vice-Chairman: Mr. W. G. Goult, G2WG.
Hon. Secretary: Mr. B. A. Pettit, G3VD.
Hon. Treasurer: Mr. C. P. Turner, G4AG.
Hon. Publicity Sec.: Mr. J. R. Deane Sainsbury, 2CYW.

The society's transmitter, G8HV, is active on 160 metre-phone, and would like reports of transmissions on 1,500 kc/s. The society produces its own journal every month, the "HV" Bulletin. Meetings are held on the first and third Thursdays of each month at G8KM, "Old Basing," Alwyn Avenue, Shenfield, Essex, and an interesting programme has been arranged for future meetings. All inquiries regarding the society should be addressed to Mr. B. A. Pettit, G3VD, "The Laurels," Worrin Road, Shenfield, Essex.

THE SUSSEX SHORT-WAVE AND TELEVISION CLUB

Hon. Secs.: E. C. Cosh, Anshyn, Mill Road, Angmering.

C. J. Rockall, Aubretia, Seafeld Road, Rustington.

RECENT activities of the club included a lecture by Messrs. Standard Telephones and Cables, Ltd., entitled "Modern Short-wave Valves"; a demonstration and lecture by Messrs. Voight Patents, Ltd., on "Sound Reproduction"; and a visit to the Electrical and Radio Laboratory of the Portsmouth Technical College, was paid by the club members.

Forthcoming Morse classes will be held on February 23rd, March 9th and 23rd, April 6th and 20th, May 4th and 18th, and June 1st. Further lectures and demonstrations on "The Cathode-Ray Tube" will be given by Mr. R. F. Hansford, on March 23rd and April 11th.

On February 24th a special meeting of the club will be held, to be presided over by the club's president, G. Marcuse, Esq., and the same evening there will be an address by F. C. Charman, Esq., on "Aerials from the Amateur Standpoint."

Particulars of membership to the club can be obtained from the honorary secretaries at the addresses given above.

EASTBOURNE AND DISTRICT RADIO SOCIETY

Hon. Sec.: T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

At the meeting of this society, held on Tuesday, January 31st, Dr. E. W. Smith, Ph.D., M.I.E.E., of the Telegraph Construction and Maintenance Co.,

Ltd., gave a lecture entitled "Telecon High-frequency Cables."

He started by giving the theoretical formulae for designing these cables which proved very useful. He then went on to the dielectric materials used in these cables, excluding rubber. There are two substances used in the coaxial and ordinary types of cables: a variety of gutta percha and Teleconax, the two together providing a very efficient dielectric at high-frequencies. Continuing, he turned to twin cables where it was desired to have as much air dielectric as possible. The cable consisted of a lead tube as outer conductor, with a copper wire as inner conductor insulated and held in position at intervals, depending upon the size of the cable, by Polystyrol discs, possessing very good high-frequency characteristics. A slightly different type is used where the cable isn't permanently fixed, a flexible low-loss dielectric tube wound with copper tape takes place of the lead tube in the former type. These cables have a dielectric constant of less than 1.1 and a power factor of less than .0005.

He also showed how these cables are very carefully tested with intricate apparatus before leaving the factory.

A demonstration of the cables was given including special submarine types, and a very high-power carrying capacity type for transmitters of about 45 kilowatts.

THE MEDWAY AMATEUR TRANSMITTERS' SOCIETY

Headquarters: The Navy Wives' Club, Dock Road, Chatham.

Hon. Sec.: S. A. C. Howell (G5FN), "Veronique," Broadway, Gillingham.

THE Annual General Meeting of the above society was held on January 3rd, and the committee for the current year elected. On the 10th, a paper on the use of cathode-ray tubes in television was read by Mr. J. E. Bryden (2BOL), and illustrated with lantern slides kindly loaned by Messrs. Edison Swan Electric Co., Ltd. The meeting of January 17th was taken by Mr. Greaves of The Mullard Wireless Service Co., Ltd., and he delivered a most interesting lecture on the development and manufacture of thermionic valves. The evening of January 24th, was devoted to Morse

code practice, under the instruction of Mr. W. E. Nutton (G6NU), President of the society, and to constructional work on the club transmitter, which is now almost completed. Dr. F. C. Stephan of The Telegraph Condenser Co., Ltd., visited the M.A.T.S., on January 31st, and his lecture on capacitors proved of absorbing interest to the members. He dealt at great length with the development and applications of electrolytic condensers, dissecting various types to show their construction. The ceramic disc and cup types of condensers also received his attention, and their use in H.F. circuits explained. Meetings are held every Tuesday, at 8.15 p.m., and a very interesting programme has been arranged for several months ahead, details of which will be gladly supplied on application to the hon. secretary, or to the hon. assistant secretary, at 8, Pine Road, Strood. All interested in radio, receiving or transmitting, are invited to come along to the N.W.C. Hall on Tuesday evening, and are assured of a very cordial welcome.

SOUTHALL RADIO SOCIETY

Hon. Sec.: H. F. Reeve, 26, Green Drive, Southall, Middlesex.

At the meeting of this society, held on Tuesday, January 31st, 1938, Mr. H. D. Cullen (G5KH) gave a very interesting talk on the use of measuring and testing instruments and demonstrated, among other things, a cathode-ray oscillograph, a valve testing panel arranged to make all the necessary tests on any make and type of valve, and a Wheatstone bridge, employing a neon type of indication in place of the more usual galvo, and specially arranged to incorporate tests of importance to radio experimenters.

ROUSDON SHORT-WAVE CLUB

Secretary: E. A. D. Rutherford, Whitlands, Near Lyme Regis, Dorset.

It may interest some readers to know that a short-wave wireless club has been inaugurated, having its headquarters at Allhallows School, Rousdon, Devon. Membership is open only to members of the school. The club will deal mainly with short-wave work, and will be concerned solely with the experimental side of wireless. The chairman is, Mr. C. J. Briscoe, and the president is, Mr. H. L. Jakeman.

ASHTON-UNDER-LYNE AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters: Commercial Hotel, 86, Old Street, Ashton-under-Lyne.

Secretary: K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

ACTIVITY is still very high, and it is hoped that the membership will top the 50 mark very soon. 2CDY has now obtained the call of G6DV, and is putting out a good signal on the top band. G3PM was unsuccessful in his first attempt to pile up points in BERU, but managed to work several W stations on 14 mc/s with 25 watts into a W3EDP antenna. Strangely enough the reports were not so good as those when only 10 watts were used prior to the period of the contest. Several stations have changed their antenna to the W3EDP, and report improved results over the popular end-on Hertz.

Programme Notes

Radio Development in U.S.A.

ACCORDING to the recent report issued by the Federal Communications Commission, forty-seven new radio stations were authorised during 1938, thus bringing the total number of broadcasting transmitters to 763.

The increased use of radio transmission made by the Marine, Police, Fire, Aviation, and other kindred services, has resulted in the direct employment of nearly 40,000 operators. Some 50,000 licences have also been issued to amateur experimental transmitters.

Variety from Cheltenham

REGIONAL as well as Midland listeners will hear variety from the Opera House, Cheltenham, on March 2nd. Scott and Whaley will be the principal act.

Songs from the Amateur Shows

DOROTHY MASON has travelled through several B.B.C. regions contacting amateur operatic societies and producing programmes of the songs they have sung on the stage with the original artists as performers. She visited Scotland in January and gave auditions to singers from all over the country. The chosen ones will present at the microphone on February 25th the songs which they gave in small theatres and even village halls when their club ran its charity show. The chorus has

been drawn from various societies and the B.B.C. will supply the orchestra which accompanies them.



Mr. George Shearing, the blind pianist, who recently broadcast in the "New Voices" section of "Band Waggon," is here seen at the piano during a recent recital in South London.



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).

Aerial Tuning

SIR—With so much attention paid to the correct matching of short-wave transmission aeriels, and the comparatively small amount devoted to the reception side, it would seem a natural corollary that no correspondent appears to have written in praise of the aerial tuner described in your issue of August 13th, 1938. As a keen experimenter in S.W. reception I would like to tender my congratulations and thanks. It does all that is claimed for it—and more.—F. G. H. MACRAE (Potters Bar, Middlesex).

Long-distance Television

SIR—I read with interest the article, "Long-distance Television" in a recent issue, and the following was of special interest. "Another curious factor that has been learned by using the directive receiving array is that these television signals often travel by the longer route to America, the better results being secured with the aerial beamed west, instead of east." To me, this suggests that ultra-short waves act in a similar manner to short waves between 10 and 31 metres, and checks up with my experiments in 1931 with the variable directional aerial, and short-wave reception. I found that during certain periods the strongest signals were obtained from the 31 metres Empire transmitters during daylight, and at a distance of 240 miles, with the aerial system 180° off true direction. The same applied to W2XAF during darkness. Gradual rotation away from the reverse path followed by the signal, to the true direction showing a reduction of signal strength.

Recently, theories have been put forward suggesting that ultra-short waves might be better received, and a higher signal gain obtained, if directional arrays were erected at an angle from the vertical. Should this prove correct, it will also check up with my findings as applied to my own patent system, and waves between 10 metres and 31 metres as, also in 1931, I found that by erecting the rotating beam system at an oblique angle, greater signal gain was obtainable. For this reason I suggested angular, as well as vertical, erection.

With the above in mind, I am in entire agreement with the opinions expressed on the subject by Thermion under the heading, "Seeing Across the Atlantic," and to my mind the application of short-wave principles to ultra-short-wave development is at least worthy of serious consideration. Thermion appears to consider, as I have long done, that theories are too quickly developed, and adhered to, and anything which does not conform to theory is impracticable in that light, so far as research workers are concerned. Much which has contributed to short-wave development

has centred around the work of amateurs who went ahead with a total disregard for theory, and so far as my own findings are concerned, relative to S.W. directional reception, those have since been confirmed by amateurs and others overseas, and in various parts of the country.—A. W. MANN (Middlesbrough).

Anyone Heard This Station?

SIR—Listening on the S.W. band in the evening of Sunday, January 29th, about 8.45 p.m. I heard a complete broadcast of "Snow White and the Seven Dwarfs," in English, from a foreign station, but I am at a loss to know which station it was.

I should be glad if any reader could tell me the name of this station. The wavelength was approximately 25 metres.

I should also like to know if there is a Chinese station transmitting on 25.5 metres.

I would also like to take this opportunity to tell you that I have been a reader of your fine paper for several years now, and that I think it is still the best ever.—S. SEABROOK (Bramley, Hants).

A 20-metres Log from Kent

SIR—My log of 20m. may be of interest to local short-wave enthusiasts, and other readers.

W2AWR, G8WS, OZ5BW, W2CWC, W8CD, GM3LG, W2JKQ, W2KC, W1FH, HA2C, W1AKY, W1AVK, W8CD, W1KIV, W1AEP, ZBIL, W1KIU, W2LXY, GM3TR, W8QXT, PK1VM, W8IHU, KA1ME, G5RV, and YU7XU.

I picked up these stations between 12 o'clock and 2 o'clock on Sunday afternoon. The set I am using is a commercial push-button set. When operating on short-waves a special dial is used to obtain a slow-motion movement. The aerial, 30ft. (outside) with a television cable lead in.—GEORGE SWAYSLAND (Gravesend, Kent).

Medium-band Reception on 1,600 m.!

SIR—I have been a regular reader of PRACTICAL AND AMATEUR WIRELESS since last September, and I should like to say what an excellent magazine it is for amateurs like myself.

I have recently been interested to find that on my wireless set I can receive the Radio-Normandie (274 metres) transmissions on a wavelength of about 1,600 metres (just above Droitwich). The signals are quite loud when the volume control is at maximum, although they do not impede the National transmissions. I have noticed this both at Dormansland (Surrey) and Cheltenham, on my 5-valve A.C./D.C. superhet transportable receiver.

I thought perhaps that this might interest other readers of PRACTICAL AND AMATEUR WIRELESS.—A. G. Forsyth (Cheltenham, Glos.).

Logged on a 2-valver: Correspondent Wanted

SIR—I have been a regular reader of PRACTICAL AND AMATEUR WIRELESS since last October, and I read with great interest the articles on Amateur Transmitting and Leaves from a Short-wave Log.

I have a 2-valve short-waver and have received the following stations: GSA (49.95 m.), OLR5A (19.75 m.), OLR2A (49.92 m.), OLR4B (25.54 m.), HVJ (48.47 m. and 19.84 m.), I2RO3 (31.13 m.), I2RO6 (19.61 m.), I2RO4 (25.54 m.), DJN (31.45 m.), DJC (49.83 m.), TPA2 (19.68 m.), TPB11 (31.41 m.), RNE (50 m.), TAP (31.70 m.) and EAQ (30.43 m.). All received at R7-9. I have also logged many others. I have written to Prague, Vatican City and Berlin for veri. cards, but have received no answer yet. Does anyone know if these stations send veri? I would like a correspondent anywhere, age 14-17, preferably abroad, interested in short-wave work, and amateur transmitting.—M. PARKE (Woodhouse Grove School, Apperley Bridge, near Bradford, Yorks.).

A 5-valve Battery S.W. Superhet

SIR—I was very interested in C. Heyne's letter published in a recent issue. I agree with C. Heyne on the matter of a six-valve battery communications receiver. I am sure the circuit suggested would be very suitable, particularly if bandspread tuning is incorporated.—A. COPLEN (Mus-selburgh).

Correspondent Wanted

SIR—As a regular reader of your paper I would be grateful if you could put me in touch with a correspondent interested in short-wave radio.

My age is fifteen, and my chief interest is the technical aspect of short-wave communication.—J. BODDY (1, Cowper St., Southwick, Sunderland).

CUT THIS OUT EACH WEEK.

Do you know

—THAT a cathode-ray oscilloscope is one of the best pieces of apparatus for the service-man as it enables the performance of the receiver to be tested?

—THAT the H.F. used for A.V.C. purposes is often taken direct from the anode of the I.F. valve?

—THAT damaged aluminium panels may be restored by filling holes with "cold solder" and emerying the surface? A rubbed finish may be obtained with emery or emery powder on a cork.

—THAT a swaying aerial, even if not near an earthed object, can cause "fading" effects?

—THAT a universal (A.C./D.C.) receiver as well as a straightforward D.C. receiver should have a fixed condenser in the aerial and earth leads?

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.

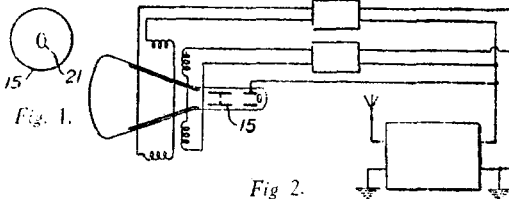
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LATEST PATENT NEWS

Group 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.

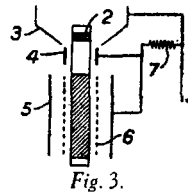
TELEVISION RECEIVERS. — Blumlein, A.D. No. 495,724.

An interlaced transmission is reproduced by a scanning spot of such size that the lines of one partial scan just meet or overlap and are displaced with respect to the lines of the preceding partial scan. For disc scanning, two spirals are located on the disc, the apertures being elongated radially. For cathode-ray scanning, the first anode 15, Fig. 2, on the cathode shield (not shown) may have an oval aperture 21, Fig. 1. Alternatively, an asymmetric focusing field may be employed, two opposing magnetic fields serving to defocus the spot to an oval form. The invention may be used in the system disclosed in Specification 432,485 in which several spots co-operate in scanning.



DISCHARGE APPARATUS.—M.O. Valve Co., Ltd., Benjamin, M., and Smith, H. S. No. 495,732.

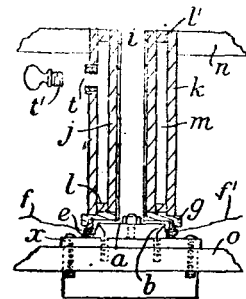
A tuning indicator comprises a conical anode 3 coated with luminescent material on part of its interior surface, a conical or cylindrical cathode 2 (Fig. 3) coaxial with and within the anode, the length of the cathode parallel to the axis being much less than the length parallel to the axis of the coated part, and a control electrode 4 in the form of a ring coaxial with the anode, wider than the cathode and preferably displaced towards the narrow end of the anode. As shown the controlling ring projects just within the narrow end of the cone 3. The indicator is associated with a triode portion, the anode 5 being connected to the control electrode and through a resistance 7 to the anode 3 and a positive potential. When a signal is applied to the control grid 6 the current through 7 increases, the



ring 4 becomes less positive relative to the cathode 2 and the annular fluorescent portion expands. The narrow band of emissive material may be contained in an annular groove in the cathode core or confined between two bands of nickel; preferably it is applied with a draughtsman's pen.

SOUND-MAGNIFYING APPLIANCES.—Inkster, S.H. No. 495,147.

In a loud-speaker a diaphragm *a* secured at its centre communicates with the external air by means of a sound conduit formed by a tube *i* (Fig. 4) surrounded by a chamber *m* into which a liquid may be introduced.



The chamber *m* which is formed between walls *j, k* and is closed by rings *l, l'*, has an aperture *t* closed by a plug *t'*. The tube *i* may be tapered or flared and the walls *j, k* may be similarly shaped or they may have a shape different from that of the tube *i*.

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.

- 3352.—Cole, Ltd., E. K., Shackell, A., and Kennedy, F. W. O.—Motor-operated press-button tuned radio-receivers. February 1.
- 2997.—Guanella, G.—Television system. January 28.
- 3311.—Kolster-Brandes, Ltd., and Beatty, W. A.—Wave transmission systems for television. January 31.
- 3138.—Marconi's Wireless Telegraph Co., Ltd.—Antennae for short-wave radio transmitters, etc. January 30.
- 3139.—Marconi's Wireless Telegraph Co., Ltd.—Antennae for short-wave radio transmitters, etc. (Cognate with 3138). January 30.
- 3140.—Marconi's Wireless Telegraph Co., Ltd.—Antennae for short-wave radio transmitters, etc. (Cognate with 3138). January 30.
- 3141.—Marconi's Wireless Telegraph Co., Ltd.—Antennae for short-wave radio transmitters, etc. (Cognate with 3138). January 30.
- 2988.—Marconi's Wireless Telegraph Co., Ltd., and Bohm, O.—Directional aerials, etc. January 28.
- 2987.—Marconi's Wireless Telegraph Co., Ltd., and Cooper, V. J.—Automatic tuning control arrangements. January 28.

- 3233.—Marr, J.—Screening of constant-voltage dynamos for prevention of radio interference. January 31.
- 3090.—Pearce, R. T.—Automatic station changer for radio. January 30.

Specifications Published.

- 499,815.—Radioakt.-Ges. D. S. Loewe.—Television cathode-ray tube apparatus.
- 499,661.—Fernseh Akt.-Ges.—Light-sensitive electron-discharge devices.
- 499,662.—Fernseh Akt.-Ges.—Electron-discharge devices for use in television and like systems.
- 499,602.—Cork, E. C., and Pawsey, J. L.—Aerial mountings.
- 499,771.—Midgley, A. H., and Midgley, A. M.—Electrical musical instruments.
- 499,828.—Baird Television, Ltd., and Lance, T. M. C.—Electron-discharge devices for use in television and like systems.
- 499,774.—Marconi's Wireless Telegraph Co., Ltd., and Keall, O. E.—Radio and like receivers.
- 499,830.—Bosch Ges., R.—Loud-speaker magnet assemblies.
- 499,425.—General Electric Co., Ltd., and Espley, D. C.—Radio and television receiving apparatus.
- 499,714.—Farnsworth Television Inc.—Stabilised electron-discharge tube oscillator.

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.

FLASHES ROUND THE GLOBE

FOR its daily transmissions on short waves the NIROM has brought several stations into operation; they are: YDB, Sourabaya, on 19.61 m. (15.3 mc/s), and YDC, Bandoeng, which work simultaneously on weekdays (excepting Saturdays) from G.M.T. 09.30-15.30; on Saturdays broadcasts are made from G.M.T. 23.00-00.30, and from 01.30-07.00. PLP, Bandoeng, on 27.27 m. (11 mc/s), may be heard on weekdays from G.M.T. 09.30-15.30 and again from 03.30-07.00; PMN, Bandoeng, on 29.24 m. (10.26 mc/s), is on the air from G.M.T. 09.30-10.30, 23.00-00.30, and from 03.30-07.00, and on Saturdays from 00.30-07.00 only. YDB, another Sourabaya station, on 31.4 m. (9.55 mc/s), transmits every day (except Saturdays) from G.M.T. 23.00-00.30, and on Saturdays from 03.30-07.00. YDX, Medan (Sumatra), on 37.08 m. (8.09 mc/s), is a 1-kilowatt station working daily from G.M.T. 00.30-07.00. PMY, Bandoeng, on 58.3 m. (5.15 mc/s), less frequently heard in Europe, takes a programme from G.M.T. 10.30-17.00. All reports of reception made in the British Isles should be sent to the Nederlandsch-Indische Radio Omroep Maatschappij (N.V.), Koningsplein 5, W. Batavia (Centrum), Java (Netherlands East Indies). International Postal Reply Coupon should be enclosed with report.

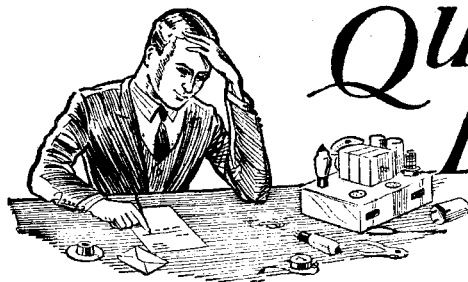
High-fidelity 40-kilowatt

AT a cost of over 300,000 dollars. Major Edwin H. Armstrong, Professor of Electrical Engineering at Columbia University has erected the 40 kilowatt W2XMN ultra-short-wave station now broadcasting on 7.211 m. or 41.6 mc/s. It is giving a high-fidelity transmission of musical programmes relayed from WQXR, the medium-wave studio at New York. It is claimed that the reception is free of static interference, and that if the system were generally adopted some 1,350 transmitters could be operated in a band comprised between 1 and 10 metres.

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM

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



QUERIES and ENQUIRIES

Spark Gap and Crystals

"Please could you let me know where I could get a spark gap similar to those used in spark transmitters? Also, what is the price? I should also like to get hold of mineral detectors and should like to know what these cost also."—W. W. (Pendeen).

SPARK gaps, opening up to $\frac{1}{16}$ in. may be obtained from Electradix Radios, 218, Upper Thames Street, E.C.4, price 3s. 6d. This firm can also supply crystals at prices from 4d. upwards.

Speaker Switching

"The loudspeaker in my receiver is built-in, with no provision for an extension speaker. How can I cut out the built-in speaker at intervals and extend the programmes to extension speaker in another room by means of a plug and jack?"—D. W. (Bristol).

THE sketch on your letter is not clear, as a third terminal on the speaker is marked CS. If the speaker is fed from a single output valve it is a simple matter to use plug-and-jack switching. Merely connect a jack of the open-circuit type in place of the speaker, and take leads from each side of the jack to the distant listening point or points. At these points connect a similar jack. Your speaker may then be provided with an ordinary plug and when inserted into any of the jacks will reproduce the programmes. If, however, a push-pull output stage is in use it would be preferable to replace the speaker by a centre-tapped choke, and use a filter circuit for speaker connections, when the same method as above mentioned may be adopted. The latter would, in any case, be desirable as it would avoid the necessity of running the H.T. through the extension leads when only the extension speakers are in circuit.

Coil Holder Markings

"I am constructing a short-wave 2-valve receiver from American plans, but find that the pins on the S.W. plug-in 6-pin coils are not numbered 1-6 as in the British practice, but are lettered as follows: S, G, H, H₁, P, K. Could you please tell me how these letters respectively correspond with the figures 1-6, which are found on English coils, as I find it very difficult to trace the wiring through the circuit to correspond with the English wiring-up?"—E. S. S. (E.9).

IN the American design you are following it is apparent that the designer has used an ordinary 6-pin valveholder as a coil mount. The letters thus stand for Screen, Grid, Heaters, Plate, and Cathode (spelt with a "K"). As valveholders are not all identical, and the coil itself may be of a special type, it is not possible to give you corresponding references and a wiring check is the only way out of your difficulty, unless a standard three-winding coil is in use, in which case you should obtain an English 6-pin coil and wire this to our standard.

Book for Beginner

"I wish to purchase a book which will allow me to understand the general technicalities of radio with a view to improving and servicing modern commercial sets. I have in mind the 'Encyclopædia,' but am not quite sure whether this will be too technical. Perhaps you would be kind enough to send me details of the book which will meet my requirements."—L. W. (Leyland, Lanes).

THE Encyclopædia explains all the terms met with in modern radio, as well as giving principles, diagrams, etc.

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.

In conjunction with this, if you wish to carry out servicing, we would suggest the Service Manual. We think that armed with these two books you should be able to understand modern circuit design and practice.

Thames Valley Club

"Could you tell me which is the nearest radio club in my district for short-wave receiving and transmitting? I did hear of a club called the Thames Valley Radio Club, but I could not find out the address. Could you please tell me if there is such a club, and if so, the address."—V. C. (Walton-on-Thames).

THERE is a club of the name mentioned, the full title being Thames Valley Amateur Radio and Television Society. The address of the Secretary, J. N. Roe, is 19A, The Barons, St. Margarets-on-Thames, Middlesex.

I.F. Transformer Adjustment

"Some time ago I had a superhet but had the misfortune after a while to break a connection in one of the I.F. transformers. The makers repaired these but I cannot now get the same performance. Power and noise may be heard in the speaker but I cannot get oscillation in the least."—H. W. (West Hallam).

ALTHOUGH the I.F. transformers have been repaired it is possible that they are now in need of adjustment to the correct intermediate frequency, and until this has been done you will be unable to obtain

the original performance. We therefore suggest that you adjust the trimmers on these components in the usual way, not altering the present padding or other trimmers which have presumably not been touched whilst the transformers were being repaired.

REPLIES IN BRIEF

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

H. T. (Breaston). The only cure is to clean the terminal thoroughly and then after the lead has been attached to smear it with petroleum jelly (vaseline).

R. J. S. (S.E.1). It is generally risky to modify the windings. Furthermore, if the idea is to use the winding for the supply of two-volt valves, we would remind you that this will prove unsatisfactory as a perfectly smooth D.C. supply must be employed for the purpose.

T. C. (Morden). The change in resistance makes would not affect results. It would therefore appear that you have made some error in construction, but we cannot assist you without further details.

J. B. (Arran Quay). We have not used the coils in question, and cannot therefore supply a blueprint. You could gang the condensers in the design referred to, but to compensate for variations on the second tuned circuit when reaction is used, a vernier type of ganged condenser is called for—that is, one with a separate trimmer operated by a concentric knob.

J. V. (Coventry). We have not designed an electric gramophone of the type indicated. You should write to the makers of your set for details as to the best way of adding the pick-up, and that should then give you all that you need.

E. K. M. (Manningham). Our "Wireless Constructors' Encyclopædia" will assist you, in conjunction with the articles published in these pages.

S. T. C. (Feltham). H.T. is applied to 3 and 4 in your sketch. Polarity is immaterial in this case: 1 and 2 are for the component under test only, and phones are joined across 5 and 6. No other connections are called for.

A. A. W. (Glasgow, S.W.1). We regret that we are unable to assist you as the set was not designed by us.

A. S. O. (Wellington). We do not recommend doubling the aerial back on itself or making acute bends. Try and run a straight length of wire direct to the set. The book you require is obtainable from F. L. Postlethwaite, 41, Kinfauns Road, Goodmayes, Ilford, Essex, price 6s.

W. M. (Mitcham). The difference depends upon the amount of wire on the bobbin and you should adhere to instructions given for particular models. When a wire is used on its own, of course, there is little risk of heating owing to ventilation, and thus a different figure may be used.

R. H. (Exeter). Bias must be applied to the valve, and you should use either the detector or the L.F. stage—not the H.F. stage. More detailed instructions could be given upon receipt of a sketch showing how you have carried out connections.

L. M. C. B. (Cheltenham). Blueprints cost 1s. each, and PW91 would meet your requirements.

S. M. (Dundee). You would certainly be able to carry out the ideas indicated in your letter, but we are unable to supply a special diagram for the purpose. You might find it difficult to restrict tuning to one station, but this would not be a material point.

A. G. S. (Edinburgh). The circuit is merely a straight-forward R.C. coupled push-pull amplifier, and there is no negative feed-back in the circuit.

L. S. (Liverpool, 5). We regret that we have no data of the coil in question.

D. O. (Newcastle). The issues describing the arrangement are now out of print. The main drawback is the background noise, although this disappears when a signal is properly tuned in. The arrangement is, of course, incorporated in commercial apparatus, such as police radio sets and similar receiving gear.

P. R. W. (Berkshire). We regret that we have no design which would be of use to you.

J. H. (Ilford). We do not supply blueprints of commercial receivers, and advise you to get into touch with the makers.

H. W. A. (S.E.18). We advise you to consult the makers as there is possibly some fault in the receiver.

F. B. (Chelsea). It would appear that the G.E. battery is defective, or one of the leads to the chassis is making poor connection. Trace through the G.B. positive lead for continuity.

L. A. C. (Dover). The coils could undoubtedly be used, but we have no details of them, and, accordingly, cannot give you the appropriate connections.

J. S. M. M. (Oxford). The makers will be able to make recommendations concerning your proposed modification. Some care will be necessary as the receiver is a superhet.

The coupon on page 603 must be attached to every query.

Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS		No. of
CRYSTAL SETS.		Blueprint
Date of Issue.		
Blueprints, 6d. each.		
1937 Crystal Receiver	—	PW71
The "Junior" Crystal Set	27.8.38	PW94
STRAIGHT SETS. Battery Operated.		
One-Valve : Blueprints, 1s. each.		
All-wave Unipen (Pentode)	—	PW31A
Beginner's One-valver	19.2.38	PW85
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen) The Signet Two (D & LF)	24.9.38	PW36B 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)	12.8.37	PW41
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35	PW43
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35	PW49
Genot (Midget (D, 2 LF (Trans))	June '35	PM1
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonitone Three-Four (HF Pen, HF Pen, Westcoater, 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	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39	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	PW78
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW34
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.33	PW37
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.33	PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	8.9.38	PW92
Sonotone : 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)	0.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW40
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)	9.10.37	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))	8.9.38	PW90
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Pow)	—	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—	PW23
D.C. Ace (SG, D, Pen)	—	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow)	—	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
U'buque (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	—	PW33
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	—	PW54
A.C. 1936 Sonitone (HF Pen, HF Pen, Westcoater, Pen)	—	PW56
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

SUPERHETS.		
Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-valve)	5.8.37	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	PW88
Two-valve : Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)	—	PW38A
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)	30.7.38	PW30A
The Prefect 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	PW80
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)	—	AW437
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
Minitube 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
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)	—	WM360
£5 5s. Battery Four (HF, D, 2 LF)	Feb. '35	WM381
The H.K. Four (SG, SG, D, Pen)	Mar. '35	WM394
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

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

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

The Index letters which precede the Blueprint Number indicate the periodical in which the description appears: Thus P.W. refers to Practical Wireless, A.W. to Amateur Wireless, P.M. to Practical Mechanics, W.M. to Wireless Magazine.

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

Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	—	AW403
Economy 2 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. 1938 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	July '33	WM326
Harris' Jubilee Radiogram (HF Pen, D, LF, P)	May '35	WM386
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
'Varsity Four	Oct. '35	WM395
The Request All-Waver	June '36	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
Heptode Super Three A.C.	May '34	WM350
"W.M." Radiogram Super A.C.	—	WM366

PORTABLES.		
Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	—	AW393
Family Portable (HF, D, RC, Trans)	—	AW447
Two H.F. Portable (2 SG, D, QP21)	—	WM363
Tyers Portable (SG, D, 2 Trans)	—	WM367

SHORT-WAVE SETS—Battery Operated.		
One-valve : 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 Coll Two (D, Pen)	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	Jan. 19. '35	AW463
The Carrier Short-waver (SG, D, P)	July '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35	WM383
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super	Nov. '35	WM397

Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread 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-valver A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391

MISCELLANEOUS.		
S.W. One-valve converter (Price 6d.)	—	AW329
Enthusiast's Power Amplifier (1/6)	—	WM387
Listener's 5-watt A.C. Amplifier (1/6)	—	WM392
Radio Unit (2v.) for WM392	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-)	—	WM399
De-Luxe Concert A.C. Electrogram	Mar. '36	WM403
New Style Short-wave Adapter (1/-)	—	WM388
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/-)	—	WM408

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Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 8/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

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Surplus, Clearance or Secondhand, etc.

VAUXHALL.—All goods previously advertised are still available; send now for latest price list, free.—Vauxhall Utilities, 163a, Strand, W.C.2.

BANKRUPT BARGAINS.—List free. All new goods. Ferguson chassis all-wave 5-v. complete, 75/-. Good stock of new receivers, valves and components. Get my price for anything radio.—Butlin, 6, Stamford Avenue, Brighton.

NEW RECEIVERS, COMPONENTS AND ACCESSORIES

BANKRUPT BARGAINS.—Brand new 1938 radio sets in makers' cartons with guarantees at less than half retail prices; send 1d. stamp for list bargains.—261-3, Lichfield Road, Aston, Birmingham.

LOUDSPEAKER REPAIRS

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

REPAIRS in Moving Coil Speakers, Cones and Coils fitted and Rewound. Fields altered. Prices Quoted including Eliminators, Loudspeakers Repaired, 4/-; L.F. and Speech Transformers, 4/-, post free. Trade invited. Guaranteed. Satisfaction, Prompt Service, Estimates Free.—L.S. Repair Service, 5, Balham Grove, London, S.W.12. Battersea 1321.

VALVES

AMERICAN valves, all types, 4/- each, guaranteed. 5-valve A.C. sets, brand new, £2/19/6. Lists Free.—Morris Radio, 307, Gateford Road, Workop.

AMERICAN Valves in Sealed Cartons, all types, 5/6 post paid.—Valves, 661/3, Harrow Road, N.W.10.

REPAIRS AND SERVICE

FINEST home-constructed-receiver servicing, re-building or modifying is given by Clark and Randall, late "Popular Wireless" Research. Diagrams prepared.—S.T. Specialists, 15, Nimrod Road, S.W.16. Streatham 4566.

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WANTED.—Ambitious young men to prepare for well paid posts in TELEVISION, the great career of the future. Apply for free booklet from BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 15P, Stratford Place, W.1.

MISCELLANEOUS

VIBRATOR H. T. Units: 2 to 12 volts input and specials. Lists, stamp. Trade and export supplied.—Simmonds Bros., Rabone Lane, Smethwick.

TRANSFORMERS: several used, best makes; Ferranti, etc.; from half-crown.—"Experimenter," 88, Russell Avenue, Wood Green.

BESTERH for wireless.—Particulars: John Holmes & Sons, 16, Isleworth Drive, Chorley.

THERE'S MONEY IN RADIO!—If you understand radio you can make substantial profits in spare time. For hints and ideas get MONEY-MAKING MADE EASY, by L. Harvey Wood. Available from all booksellers, 2/6 net, or by post, 2/10, from the Publisher, C. Arthur Pearson, Ltd., Tower House, Southampton Street, London, W.C.2

PREMIER 1939 RADIO

PREMIER BATTERY CHARGERS. Westinghouse Rectification. Complete. Ready for use. To charge 2 volts at 1/2 amp., 10/-; 6 volts at 1/2 amp., 16/6; 6 volts at 1 amp., 19/6; 12 volts at 1 amp., 21/-; 6 volts at 2 amps., 32/6.

MOVING COIL SPEAKERS. Magnavox Sin. P.M.s with Output Transformer, 10/6. Magnavox Sin. Energised, 2,500 ohm field with Transformer, 9/11. Rola Sin. P.M. with Transformer, 15/- Rola 10in. P.M., 19/11. B.T.M. 10in. Energised L.S., 1,650 ohm field, less Transformer, 9/11. Rola G.12 12in. High-Fidelity Speakers with Output Transformer, Energised, 1,250 or 2,500 ohm field. 59/6. P.M. Model, 79/6.

Premier Transverse Current Microphone, 20/-. Microphone Transformer, 6/- Table Mike Stand, 7/6. **BRAIDED METAL SCREENED WIRE** for mikes, pick-ups, etc. Single, 4d. yd.; Twin, 6d. yd.

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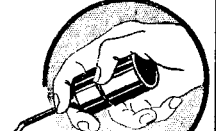


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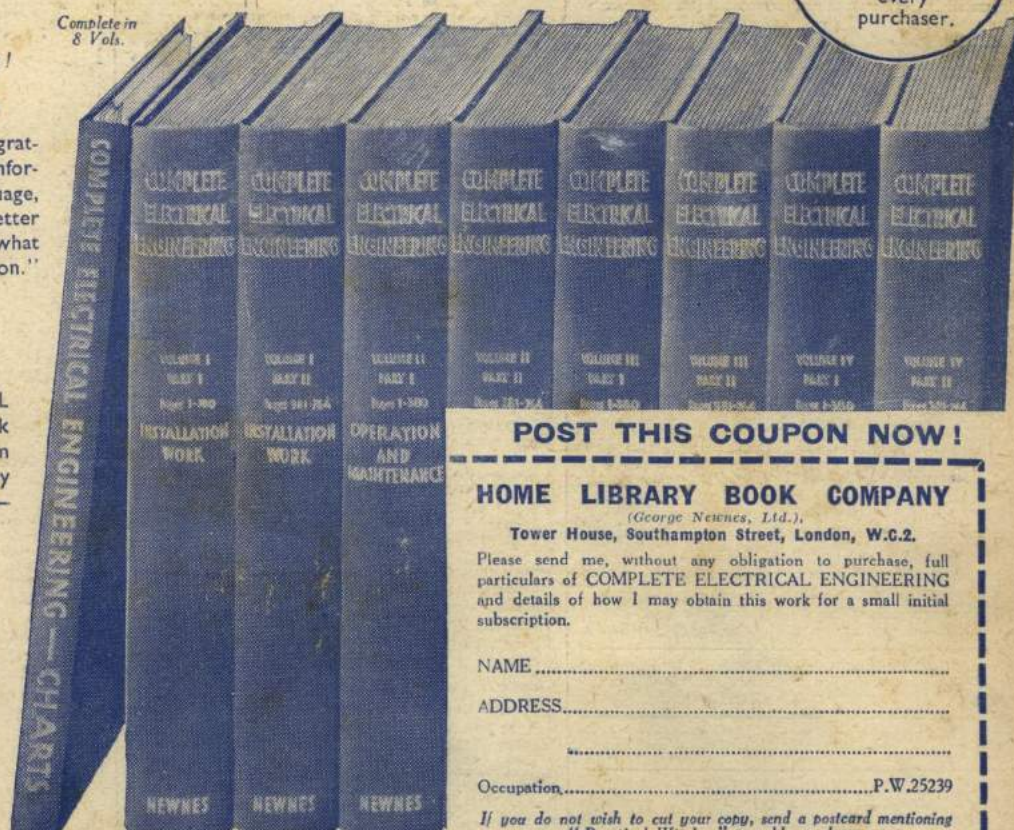
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