F. J. CAMM'S NEW MIDGET PORTABLE Coming Shortly

Practical and Amateur Wireless

3D. EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 8. No. 189. May 2nd, 1936.

AND PRACTICAL TELEVISION

All about Short-Wave Coils

COMING SHORTLY! F. J. CAMM'S NEW MIDGET PORTABLE

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Edited by F. J. CAMM

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VOL. VIII. No. 189. May 2nd, 1936.

ROUND *the* WORLD *of* WIRELESS

The Radio Exhibition

IT is now announced that there will be only one R.M.A. exhibition this year, and it will be held at Olympia, as in previous years. It has been decided that no R.M.A. exhibition will be held at either Manchester or Glasgow, but local bodies may decide to inaugurate exhibitions in these localities. The actual date of the Olympia opening has now been fixed, and will extend from Aug. 26th, to Sept. 5th, inclusive. The period during which the exhibition will be open will again be ten days.

B.B.C Plans for the Near Future

IT is fully expected that the new 50-kilowatt North Scottish broadcasting station will be ready by next autumn, and that the tests of the North-West relay at Bangor (North Wales) will also take place this year. This station will also serve as a model for the Plymouth and Bournemouth relays which are to replace the existing transmitters in these regions. The power of North-West Regional has been increased to 70 kilowatts, and the output of the London and Scottish Regionals will be the same in the course of a few weeks. The new North-East Regional transmitter will be rated at 100 kilowatts.

Proposed 120-kilowatt Station at Bordeaux

THE P.T.T. authorities have decided to install a 120-kilowatt transmitter at Cantenac, which is roughly seventeen miles north-west of Bordeaux. It will feature a novel aerial, inasmuch as, to provide better reception over central France, it will work on the beam principle.

Cutting Down Night Broadcasts

DURING the construction of its new station at Louvetôt, Radio-Normandie (Fécamp) will be compelled to curtail its daily broadcasts. From April 1st the transmitter has been silent between 10.00-11.30 a.m., and there is a possibility that the studio may have to close down nightly at midnight: Later, it is hoped, when the new station is brought into operation, Radio-Normandie may greatly extend its broadcasts.

An Omni-directional Aerial

FOR the transmissions carried out by the E.I.A.R. Rome short-wave stations tests are being made with a new aerial consisting of a metal globe some thirty-three feet in diameter. It is perched on the top of an 800ft. mast, and it is anticipated that the service area of the transmitters will be greatly increased.

A Babel of Tongues

THE English, Greek, Amharic, Coptic, Armenian, Arabic and Latin languages were used in a broadcast made during the Easter Festival from the new Jerusalem station, when a service was given by the Patriarchs, or head priests, of the different communities to which the listening population belongs.

ON OTHER PAGES.

Where Parliamentary Debates are Broadcast

IN view of the popularity achieved by the relay of speeches from the New Zealand House of Representatives, the authorities have decided to make them a regular feature, and are seriously considering the question of using a special station solely for these transmissions.

Peace, Perfect Peace!

ALTHOUGH Greece only possesess a small "broadcaster" at Salonica, there exists a large listening community to foreign broadcasts in the capital. The Athens police has now decreed that from 11.0 p.m. there is to be no diffusion of radio programmes by loud-speakers in outdoor restaurants, and so on, overlooking streets and public places. By the same edict motorists are also forbidden to sound their horns after that hour. All of which is, of course, absurd.

Future of the Old 2LO Studios

THE original Savoy Hill headquarters of the B.B.C. are being completely transformed for the use of the technical section of the Air Ministry. In these former offices will be housed the A.M. staff dealing with radio and other kindred matters appertaining to aircraft.

World's Largest Radio Network

BY acquiring control over six more transmitters the National Broadcasting Company of America now owns ninety-seven stations in seventy-one different cities connected by twenty thousand miles of special cables. The gross output of the transmitters in this huge network is 1,741,400 watts. Broadcasts over the system are heard daily by over fifty-one million listeners. In addition, the N.B.C. disposes of eleven short-wave transmitters, or a grand total of 108 stations!

Only One Broadcaster in Morocco

ALTHOUGH reports to the effect that two further transmitters have been installed in Morocco, it is now definitely stated that so far Rabat is the only one providing a radio programme. Studios have been opened at Marrakesh and Fez, and this fact may have given rise to the rumour.

The Musician at the Gramophone

IN this series, Dr. Henry Coleman, Organist and Master of the Choristers at Peterborough Cathedral, will give the next talk on May 1st, illustrated by some of his favourite gramophone records. He has occupied his present position at Peterborough since 1921, and has broadcast organ recitals both from the Cathedral and from the small organ in the Song School. Dr. Coleman is a composer of church music and is the author of two books on choir training.

ROUND the WORLD of WIRELESS (Contd.)

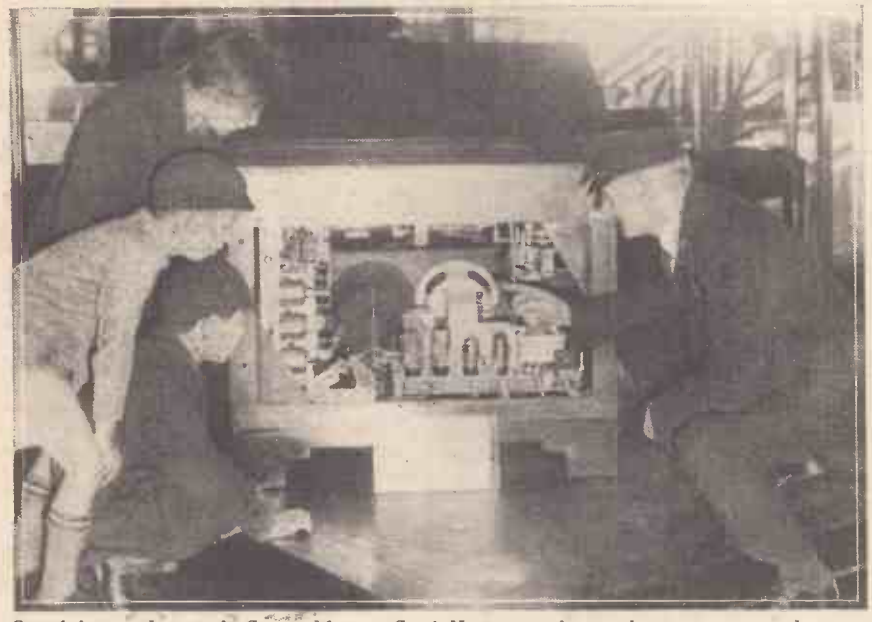
Empire Day Programme

THE fourth in the series of Empire Day broadcasts will be given in the National programme on May 24th. The first of these programmes came from this country in 1933. In 1934 there was a relay from Australia, and in 1935 one from Canada. This time it is South Africa's turn, and details of the programme she will provide will shortly be available.

INTERESTING and TOPICAL PARAGRAPHS

(coloured vocalist) of "Soft Lights and Sweet Music" fame, Shaw and Weston (Scottish comedians), Ray Saxe (American musician), and Stuart Hirc and Eaton (harmonising and comedy).

A SUPER RADIOGRAM



One of the attendants at the Science Museum, South Kensington, showing three young visitors the newest exhibit—an "H.M.V." 15-valve Auto-radiogram. It represents the latest developments in radio and gramophone research.

Birmingham City Police Band

THIS Band, the foremost among Police Bands in England, will be conducted by Richard Wassell in a programme which includes Winterbottom's arrangement of "Finlandia," by Sibelius. This broadcast will be given from the Midland Regional on May 9th.

R. L. Stevenson

"TREASURE ISLAND," by R. L. Stevenson, has been adapted as a radio play by E. M. Delafield, and will be produced by Cyril Wood in the National programme on May 6th and in the Regional and Western programmes on May 7th. It is of particular interest that the West Country figures in the story—the *Hispaniola* sailed from Bristol—and the lively dialogue will be heightened by a strong tinge of Devon and West Country dialect.

"Brand New"

THE Northern Revue Orchestra, conducted by Thomas Matthews, will present a new kind of programme on May 8th. Its title is, in fact, "Brand New," and it will consist for the most part of new tunes by Northern composers. The works will all be of the type which is popularly known as "symphonic jazz."

Variety from Blackpool

VARIETY will be broadcast from the Palace Theatre, Blackpool, on May 7th. It is not yet possible to give definite details, but the bill from which an excerpt will be taken will include Elisabeth Welch

The City of Bristol Orchestra

THIS well-known orchestra, conducted by Maurice Alexander, will broadcast for the first time on May 9th, from the Western Regional. The orchestra was formed in March, 1935, but has not yet made a public appearance. Maurice Alexander was for five years leader of the Queen's Hall Orchestra under the conductorship of Sir Henry Wood. Dorothy Hall (soprano) will be the vocalist at the concert.

Teversall Colliery Band

THIS Band comes from Nottinghamshire to the Birmingham studios on May 4th for its first broadcast. It was formerly known as the Stanton Hill Silver Band, and has had many successes at festivals. In 1931 it was in the prize list at Crystal Palace, Belle Vue, and Leicester. The conductor is J. T. Parkes. In the interludes, Howard Booth, the Derby comedian, will entertain; he has been Jester and King at Derby Hospital Carnivals.

Talk from the Smeaton Tower

PLYMOUTH HOE on a Saturday night will be described by John Betjeman from the Smeaton Tower on May 2nd. In a broadcast of this nature only a weather prophet can predict the nature of the crowd and whether their spirits will be preponderantly cheerful or depressed. Whatever the circumstances may be, however, John Betjeman will describe the scene as it is rather than in the form of a carefully prepared essay.

May Day: Northern Ireland

NORTHERN IRELAND heralds the first of May with a programme characteristic of spring. The B.B.C. Northern Ireland Chorus and Orchestra, led by Philip Whiteway and conducted by E. Godfrey Brown, will give a programme devoted to May Day. It consists of "The Revels," by MacFarren and W. Sterndale Bennett's Pastoral, "The May Queen." The artists taking part are Evelyn Gibb (soprano), who will be the May Queen; May Latimer (contralto), who will be the Queen; John Kentish (tenor), who takes the part of the lover, and Hooton Mitchell (baritone), captain of the foresters.

"Cavalcade"

PREPARATIONS for the broadcasting version of Noel Coward's "Cavalcade" are well advanced, and despite the obvious difficulties of adapting such a complex dramatic panorama for the microphone, it is safe to say that even those listeners who saw the play at Drury Lane cannot fail to be thrilled anew when they hear, without seeing, this great pageant of London and the Empire. Four performances of "Cavalcade" have been arranged; two to take place in June and two in October. Details as to the cast are not at present available.

The Phantom Five

IT is not always easy to find a title for an instrumental combination which will attract the attention of the public, and Mr. Charles H. Lockier got the inspiration for the title "The Phantom Five" as the result of a sailing adventure with Edgar Hawke some months ago. A fog came down very quickly and there were many anxious moments on board the dinghy, during which time various phantom sounds were heard and lights seen. Eventually a safe mooring was made, and it was then Mr. Lockier suggested to Mr. Hawke the name of his new quintet. "The Phantom Five" will be heard in a concert from the Bristol Studios on May 6th.

SOLVE THIS!

PROBLEM No. 189.

Ellis constructed a receiver of the H.F., Detector, L.F. type, using an H.F. pentode in the first stage, and an L.F. pentode in the output stage. Volume was controlled by a variable condenser in the aerial circuit and by the reaction condenser. Reception was satisfactory on the medium wave-band, but although chirps could be heard at the correct dial positions of the long-wave stations a definite telephony signal could not be formulated on this band. Why was this, and what is the best remedy for this trouble? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 189 in the left-hand corner, and must be posted to reach this office not later than the first post Monday, May 4th, 1936.

Solution to Problem No. 188.

The straight type of short-wave receiver is invariably fitted with a reaction control, and if this is rotated past the oscillation point, continuous wave signals can be picked up. In most superhets this control is absent, however, and therefore C.W. morse reception cannot be obtained. If the I.F. valve of the superhet is made to oscillate by bringing its cap lead near its grid lead, reliable C.W. reception may be obtained.

The following three readers successfully solved Problem No. 187, and books are accordingly being forwarded to them:—Peter Johnston, 15, Wardrop St., Paisley; T. L. Gale, 27, Thorpe Rd., East Ham, E.6; H. Williams (Staff), Angleton Mental Hospital, Bridgend, Glam.

All About Short-wave Coils

The Various Principles of Design, the Efficiency Factors, and Other Interesting Data Concerning Tuning Inductances for Short-wave Receivers are Here Discussed by W. J. DELANEY

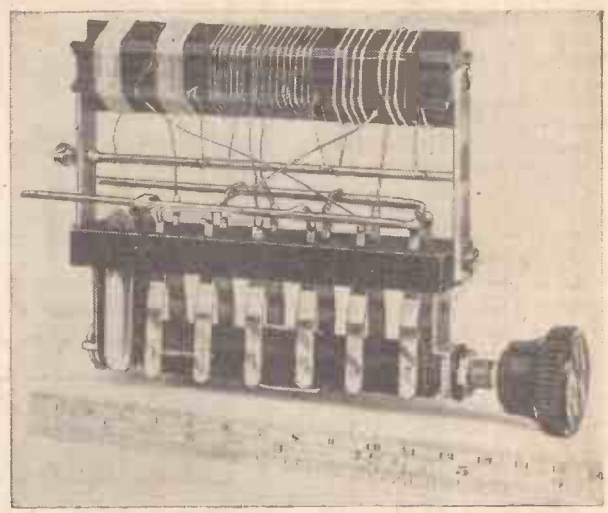


Fig. 4.—A commercial short-wave coil designed to cover three bands on one coil.

THE illustration on our cover this week shows just a few of the many types of coil which are available to the user of a short-wave receiver, and the newcomer may well be pardoned if he expresses astonishment that there should be such a vast difference in pattern between such simple components. Does the variation in design contribute to the performance? Is one pattern as efficient as another? Which is the most suitable model for the constructor to make for himself? These are only a few of the questions which at once present themselves to a beginner, and we will therefore try to analyse the different features incorporated in a short-wave tuner and explain the differences in design.

Firstly, the ordinary short-wave band is not a definite range, and some manufacturers include 10 metres in this range, whilst another would refer to a coil for that wavelength as an ultra-short-wave coil. In general terms, however, short waves may be taken to refer to those between 10 metres and 100 metres. From

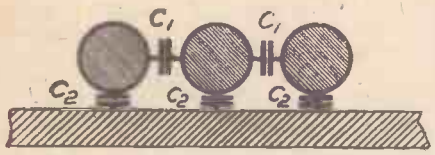


Fig. 1.—This diagram illustrates the stray capacities which exist in a coil.

10 up to, say, 50 metres somewhat different treatment is required as compared with the range from 50 up to 100 metres, whilst from 100 metres up to 200 practically the same features as are incorporated in a standard broadcast coil may be adopted.

Coil Efficiency

In general terms it may be taken that the most efficient coil is one which is wound so that its diameter is equal to, or greater than, its length. Theoretically a coil should consist of inductance only, and capacity is included in parallel with the coil for tuning purposes. In other words, the wire of the coil acts as one part of the circuit, and this is made to resonate at a certain frequency by including capacity with it. The capacity takes the form of a variable tuning condenser, and thus the adjustment of the condenser, and thereby the capacity, affects the resonance point and so carries out what is referred to as tuning. Unfortunately, however, when two wires are placed near each other, a capacity exists between the surfaces, and thus when a coil is wound it is practically impossible to avoid the introduction of stray capacities which are virtually in parallel with the coil. If the turns of wire are nearly touching the capacities will be greatest, whilst as the wires are separated it will decrease. Now if we wish to tune to a low wavelength such as 10 metres, we must use a fair amount of wire for our inductance, and this is already connected to an aerial and earth system. Thus only a very small capacity will be needed to obtain the necessary resonant frequency, and if the coil is so wound that a large capacity exists between the turns, we shall be unable to use any additional capacity or tuning condenser and thus we shall be unable to tune the coil. When we think in terms of frequency, rather than in wavelengths in metres, we can see that the problem of tuning a short-wave coil, even with a parallel tuning capacity of only .00015 mfd., is a rather difficult one.

Reducing Capacity

Maximum signal strength is only obtained when a certain ratio exists between inductance and capacity, and without going into formula and calculations at this stage it may be taken that as much inductance as possible should be employed. Thus we must reduce the capacity in the coil so as to permit of the use of a reasonable tuning condenser to cover a given waveband, and therefore the turns of wire on the short-wave coil must be separated from one another. By referring to the cover illustration it will be seen that in some coils the turns of wire are separated by very wide spaces, whilst in others the space is only equivalent to two or three thicknesses of the wire. The Bulgin three-range coil which is seen at the rear of the group shows very clearly how this separation is modified the lower we go in the wave-range. The upper part of the coil which covers the band from 48 to 95 metres has the turns placed much closer than the next winding, which covers a band from 24 to 49 metres. The lowest winding, which is intended for the band from 12 to 25 metres, has the turns very widely separated, whilst in the ultra-short-wave coil seen in the foreground the coil is very open indeed, and the exclusion of any former upon which the wire is supported still further reduces the stray capacities. In addition to the stray capacity losses there are other forms of loss in a short-wave set, and the principal loss in the coil will be found in the material from which the coil former is made, or through which the ends of the coil are passed. In the ultra-short-wave coil in the foreground of our cover illustration the two ends of the coil are mounted in a highly efficient ceramic insulating material and no other insulator or dielectric exists. In the coil on the left of this the turns of wire are supported on ribs on the former to reduce the capacity, but the ends are joined to pins having a spacing the same as ordinary valve legs and thus there is a capacity between the ends of the winding via the pins. Thus, this type of coil could not be used on the very short waveband. In the coil on the right of the illustration no solid material is used at all, and it is intended that the ends of the wire be mounted direct on the tuning component, or otherwise mounted on special porcelain or similar pillars, held the required distance apart. Similarly, in the remaining coils, the adjacent turns are rigidly held at the required separation by the minimum of dielectric material, although the ends of the coil are brought fairly close together in order to make use of a suitable mount.

(Continued overleaf)

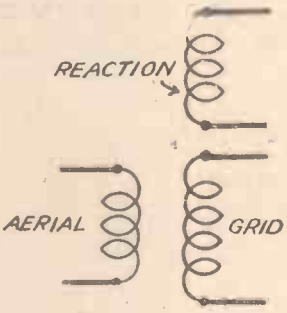


Fig. 2.—The short-wave tuner generally consists of three coils arranged as shown here, but the aerial coil may be eliminated.

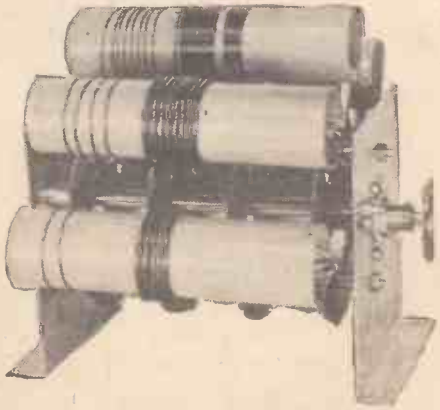


Fig. 3.—This commercial coil, by Bulgin, is designed to cover a number of wavelengths and uses a different coil on each waveband.

ALL ABOUT SHORT-WAVE COILS

(Continued from previous page)

Most Suitable Sizes

It will be seen in all the coils illustrated that the diameter is great compared with the length, and thus all of these coils fulfil our first requirement for efficiency. With regard to the remaining factors, it is obviously of little use employing a low-loss scheme, such as is shown in the foreground component, if the remaining parts of the circuit are inefficient. Thus, the tuning condenser for such a coil should also employ the ceramic material, and the valve should be mounted in a similar type of holder, whilst wiring should be short and carried out in a heavy gauge of wire.

For normal types of apparatus, where standard valve-holders and tuning condensers are employed, the ordinary ebonite or bakelite former, with pin or tag connections such as in the B.T.S., Eddystone, Bulgin, Raymart and similar coils are quite suitable and no noticeable improvement would be obtained by cutting away any of the solid material or otherwise modifying the coils. If the last ounce of efficiency is required, then the coil such as the Ward and Goldstone shown on the right of the group could be employed, together with special transmitting type variable condensers, and a de-capped valve, but it is doubtful whether improved signal strength would be obtained unless the aerial and earth insulation were improved and the connections for these two leads were modified to exclude ordinary insulating material. Where the tuning range is to extend down to 10 metres, a former having an overall diameter of 2in. and provided with a number of ribs to hold the wire clear of the former will be found ideal, and ready-made formers of this type may be obtained from Eddystone, Raymart, Becol and other firms. Bare wire should be employed, and to reduce surface losses due to H.F. resistance the wire should preferably be silver-plated. Alternatively, tinned-copper wire may be employed, but when this becomes oxidised the H.F. resistance is increased. For this reason, some manufacturers prefer to employ enamelled wire as the lesser of two evils. The thicker the wire the greater the capacity between adjacent turns, but this will be offset if the coil is correctly designed by reduced H.F. resistance, and in some coils the makers adopt tubing instead of solid wire in order to provide a greater surface area.

Leaves from a Short-wave Log

WITH the approach of the longer days an increasing number of stations are either slipping back into a lower waveband or extending their schedules on their existing channels. W2XAD, Schenectady N.Y.), on 19.57 m. (15,330 kc/s), is on the air daily from now until the autumn between B.S.T. 14.00-18.00, the broadcasts of WGY being passed over to W2XAF for transmission between B.S.T. 20.00-04.00. When the Eastern States go over to Summer Time—usually towards the end of April—we must add one hour to the above-mentioned times. From April 5th last the hours of the Dutch transmissions from Eindhoven and Huizen (Holland) have undergone considerable alterations. To begin with, PHI, on 25.57 m. (11,730 kc/s), is closed down for the duration of the summer, and the broadcasts have been resumed on 16.88 m. (17,775 kc/s). The new schedule reads as under: PHI, Huizen (16.88m.-17,775 kc/s), on Saturdays and Sundays from G.M.T. 13.00-16.00; on Mondays, Thursdays, and Fridays from 13.00-15.00. These are destined to the Netherlands East Indies. On Sundays a special broadcast is made from G.M.T. 18.00-19.00 for Africa. PCJ, Eindhoven, on 19.71 m. (15,220 kc/s), works from G.M.T. 08.00-11.00 on Tuesdays and from G.M.T. 12.00-16.00 on Wednesdays. On Sundays, at G.M.T. 12.00, a special transmission is made for Asia. PCJ, on 31.28 m. (9,590 kc/s), operates only on Sundays from midnight to 01.00 (Mon.) with a broadcast for listeners in North America.

Russian Broadcasts

Moscow has also altered its timings for the summer season. The 24.99 m. (12,005 kc/s) channel is again being used for the afternoon broadcasts and the 50 m. (6,000 kc/s) for the evening programmes. Talks and news bulletins in the English language are transmitted at B.S.T. 23.00 (Sundays and Fridays) and at 22.00 (Mondays and Wednesdays). Occasionally, I have heard the 50-m. musical programme simultaneously given through RKI on 39.89 m. (7,520 kc/s), but this does not appear to be a regular feature. On the other hand, RKI, on 19.88 m. (15,090 kc/s), transmits an English broadcast every Sunday between B.S.T. 16.00-17.00. Relays of operatic performances from the Great Academy Theatre in the capital are carried out regularly on the 5th, 11th, 17th, 23rd, and 29th day of each month from B.S.T. 17.25, on either 25 or 50 metres, and to make them understandable to foreign listeners, a preliminary commentary is given in French, German, English, and Spanish.

Podebrady

Possibly by the time these notes are in print you may have picked up tests by the Czech short-wave station at Podebrady, which is to relay the Prague programmes for the benefit of overseas listeners. The channels allotted to the 34-kilowatt transmitter for this purpose are as follows: 49.06 m. (6,115 kc/s), 31.57 m. (9,504 kc/s), 25.54 m. (11,745 kc/s), 25.51 m. (11,760 kc/s), 25.26 m. (11,875 kc/s), 19.70 m. (15,230 kc/s), and 13.99 m. (21,450 kc/s). So far, no announcement has been made regarding the frequencies to be adopted for the broadcast service.

Mr. R. Lawton, Secretary of the North Manchester Radio Society, recently made a test with typical English and American short-wave receivers. On a British receiver (Lissen Model 8114), Mr. Lawton logged 23 short-wave stations all over the world.

Port-au-Prince (Haiti)

In addition to HH3W, Port-au-Prince (Haiti), on 31.27 m., recently reported in these columns, another Haitian station has been well heard in the British Isles; it is HH2R, also at Port-au-Prince, operating on 31.44 m. (9,525 kc/s). Announcements are given out in French, English, and Spanish. Although the schedule is not yet a regular one, the broadcasts have been picked up between B.S.T. 04.00-06.00. Reports of reception should be sent to the *Société Haitienne d'Automobiles, Box* 103, *Port-au-Prince, Haiti*. Another transmitter also situated in the capital is HH2S, on 50.76 m. (5,910 kc/s), which relays HH2T, a medium-wave station from B.S.T. 01.00-04.00 daily. The interval signal consists of four chimes.

Ecuador

HCJB, Quito (Ecuador), which has been working on 34.19 m., has raised its wavelength to 36.01 m. (8,330 kc/s), and is installing more powerful plant. The station is to be heard daily from B.S.T. 01.00-04.40 from Tuesdays to Saturdays inclusive. Actually, simultaneous broadcasts are made on 308 m. for local consumption in Quito, on 73 m. for the rest of Ecuador, and on 36.01 m. for other States in South America, and the world at large. The interval signal adopted is the striking of four gongs of different notes, and the slogan given out in English with the call: *The Voice of the Andes*.

Wayne (New Jersey)

Lastly, W2XE, Wayne (N.J.), which takes the WABC, New York, Columbia, radio entertainments, is now working its five channels at the following times: 13.94 m. (21,520 kc/s) from B.S.T. 13.30-17.00; 16.89 m. (17,760 kc/s) from 17.00-19.00; 19.64 m. (15,270 kc/s) from 19.00-21.00; 25.36 m. (11,830 kc/s) from 21.00-04.00; and 49.02 m. (6,120 kc/s) from 04.00-05.00.

Some Simple "Quality" Circuits

Details are Given of Suitable Circuits for Battery, A.C. and Universal-Mains Operation, and the Chief Requirements of Three-Stage High-Fidelity Receivers are Outlined.

By "THE EXPERIMENTERS"

IT is generally agreed that a receiver which is designed for high-quality reproduction must be more expensive than one which is only required to give "good" reproduction. In fact, a "quality" set is often considered as being too expensive for the amateur constructor. This might be the case if the set were wanted to give first-class reproduction as well as having long range and ultra-sharp selectivity, but if one is content to have first-class reproduction from two or three transmissions only, the set need not be too expensive. And since the present-day trend is towards better and better reproduction the simple "quality" receiver is in greater demand than ever.

Simplest Arrangement?

One might well ask: "What is the simplest circuit arrangement for an inexpensive receiver designed expressly for the purpose of giving really good reproduction from the local stations?" Different designers would supply different answers, but it can be taken as being fairly well agreed that the main requirements are: Band-pass tuning, at least one H.F. valve, a power-grid detector, and either a push-pull output stage or one comprising a single super-power valve having a rated undistorted output of not less than 2.5 watts. This general description applies to either a battery or mains-operated receiver, although when considering a battery set it will probably be necessary to be content with an undistorted output of rather less than 1 watt unless an H.T. accumulator or an eliminator is to be used for high-tension supply. If, however, the constructor is prepared to tolerate the very slight amount of distortion introduced by modern high-efficiency pentode valves, an output of nearly 2 watts can be obtained for a total anode-current consumption of 30 mA. or so.

Let us first consider a general circuit arrangement which is suitable for battery, A.C. or universal-mains use. The main features are shown in the skeleton diagram in Fig. 1, from which it will be seen that a screened H.F. pentode follows a single-circuit tuner, and is itself followed by a band-pass filter, a power-grid detector and a transformer-coupled push-pull stage including a pair of super-power triodes. There is no reaction circuit, for that is better omitted when quality is the first consideration, and only a low value of decoupling resistance is included in the detector anode circuit.

Position of Band-pass Filter

The reader might query the position of the band-pass filter, thinking that this should be in the aerial-input circuit. In the present case it is better in the position indicated, for it is unaffected by aerial capacity, whilst tuning is not damped to such a great extent by the power-grid detector. Another point is that any slight lack of accurate trimming of the gang condenser is not as important as it would be if the single-circuit tuner followed the first valve. Some may even consider that band-pass is unnecessary in a circuit such as this in which selectivity is not of very great importance. But quality is of little use if there is any sideband interference which produces those annoying "tizzing" sounds, due to interference from a powerful transmission on a near wavelength to that of the local station. In any case, a properly-designed band-pass filter produces smaller losses of the higher frequencies than does a single-circuit tuner, which is tuned rather too sharply.

There may be many designers who would rather see a double-diode valve in the detector position. It would certainly be almost as good as the power-grid triode, but the connections to it are not quite as simple, and practice suggests that the triode is slightly better in the simpler type of set.

The Battery Circuit

Particular makes of components will not be specified, but any good coils and three-gang condenser can be used—perhaps by slightly modifying the connections according to the particular make chosen. For a battery set the first valve could be one such as the Cossor 210S.P.T. or Hivac H.P.215; the detector should be of the L.F. type, whilst the two power valves must be chosen according to the output required and the H.T. current available; if the to talcurrent is to be less than 30 mA., valves such as the Mullard P.M.202 are very suitable, and these would provide an output of approximately .75 watt when using 120 volts H.T. If a full 1-watt were required the total H.T. current would be in the neighbourhood of 45 mA. (which is too high for dry batteries) and valves such as the Cossor 230X.P. could be used.

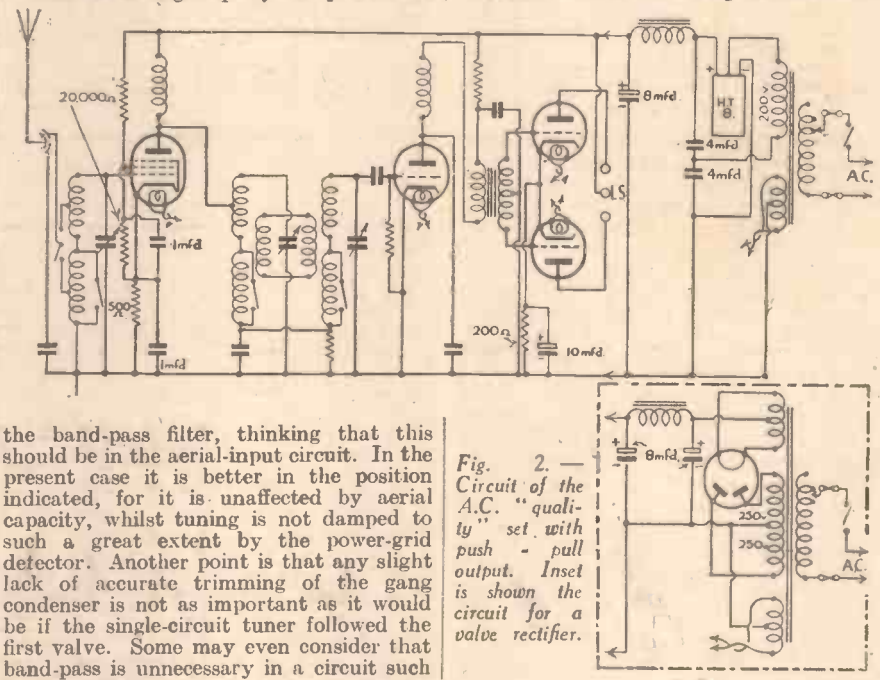


Fig. 2.—Circuit of the A.C. "quality" set with push-pull output. Inset is shown the circuit for a valve rectifier.

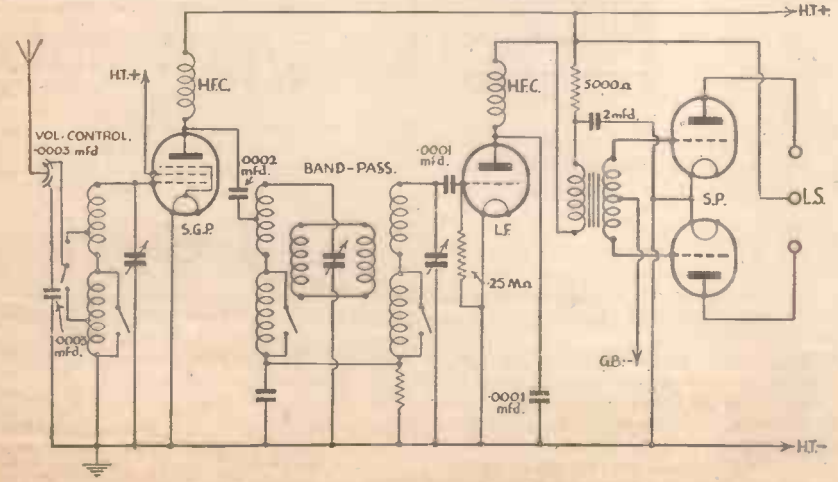


Fig 1.—Skeleton circuit of a simple "quality" set.

Push-pull

The push-pull transformer is an important component, and this should be a really high-grade instrument with a ratio of not less than 1 : 3.5. It is assumed that a speaker with built-in centre-tapped transformer would be used, but if the transformer fitted were not of suitable type a good push-pull output choke or transformer would be required.

(Continued overleaf)

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A.C. Operation

Were the set for A.C. operation the valves would be: First, Cossor M.S./Pen., Osram S.24 or similar; second, Cossor 41M.L.F., or similar; output, Cossor 41M.P., Mazda A.C.P.1 or similar valves taking about 25 mA. at 200 volts. Such a combination could be supplied by a mains transformer and rectifying valve with an

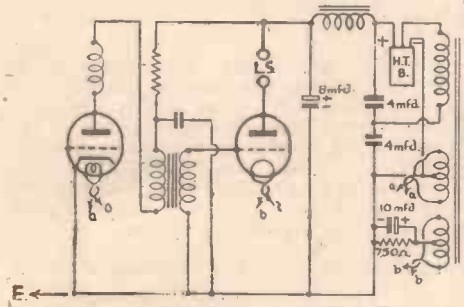


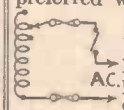
Fig. 3.—The connections required when using a single-valve output stage in the A.C. set. Note the separate L.T. winding for the directly-heated output valve.

output of 250 volts at 60 mA. if a permanent-magnet type loud-speaker were employed. If it were proposed to use an energised speaker the rectifier would have to provide an output of 300 volts or more to permit of the voltage drop across the field coil. This will not be considered, since most constructors of simpler types of receiver prefer to keep to the Class A type of rectifier.

The complete circuit, with approximate component values for the A.C. valves mentioned, is given in Fig. 2, and here a Westinghouse style H.T.8 metal rectifier is indicated, whilst the modified connections required when using a Class A valve rectifier (Ferranti R.A., Osram U.10, for example) are indicated in the inset circuit. The two valves mentioned are rated to give an output of about 270 volts at 60 m.a. when fed from a double-500-volt mains transformer. This allows for the necessary grid-bias voltage and the voltage drop across a standard 500-ohm smoothing choke, and the drop across the output transformer, and leaves just about 200 volts for the anodes of the output valves.

Single-valve Output

Those who prefer one large power valve to the push-pull could use the output circuit shown in Fig. 3, where a valve such as the Cossor 4X.P. or Osram P.X.4 is used to provide an output of about 2.5 watts, which is similar to that given by the pair of valves previously suggested used in push-pull. These super-power valves take a maximum anode voltage of 250 at 48 mA., with a grid-bias voltage of about 30, and to ensure that such a voltage reaches the anode it is necessary to use a smoothing choke of rather lower resistance (the Wearite H.T.410—40 henries, 250 ohms is suitable) and to choose a speaker transformer with a reasonably low resistance.



The push-pull arrangement is to be preferred where the extra expense is felt to be justified, but the difference in quality is not very marked provided that high-grade components are used throughout, especial attention being paid to the L.F. transformer, which should be a Ferranti A.F.5 or Varley D.P.3 for preference; these two instruments will carry a fairly high primary current and give the necessary high step-up.

A.C. or D.C. Operation

The push-pull circuit arrangement suggested is most suitable for use with universal valves, a typically-suitable combination being: First, Cossor 13S.P.A.; second, Ferranti D.A.; third and fourth, Cossor 40P.P.A. The output valves listed are pentodes, as there are no suitable triodes in the universal series. A circuit incorporating these valves is given in Fig. 4, where the rectifier is Cossor 40S.U.A., whilst the barretter is a Philips C.Z.

The other components are the same as those used for the corresponding battery and A.C. versions, but the choke should be that recommended for use when using a single P.X.4-type valve, since it is better to have the lowest resistance possible in order to ensure the greatest possible H.T. voltage on the anodes of the valves.

Circuits Only

It will be appreciated that in every case the circuits are not intended for use by those who have not had previous experience of constructional work, because complete wiring diagrams cannot in any circumstances be supplied. In any case the lay-out is not critical, but it is important that components such as bias resistances should be chosen with care according to the exact valves employed. Suitable values are always given in the valve makers' literature, so no difficulty need be experienced in this respect. Should there be any readers who are interested in the construction of a quality set on the lines suggested, and who are not able to work to the theoretical diagrams, it might be added that the "Hall-Mark Four" series of circuits published in these pages in issues dated January 26th and February 2nd, 1935, are of rather similar type and are most nearly in keeping with the main principles which have been detailed. The most important difference is that those sets did not incorporate a band-pass filter and were thus not quite as selective as might be desired at the present time and when the set is used in conjunction with a fairly long, open aerial situated within a few miles of the local transmitter.

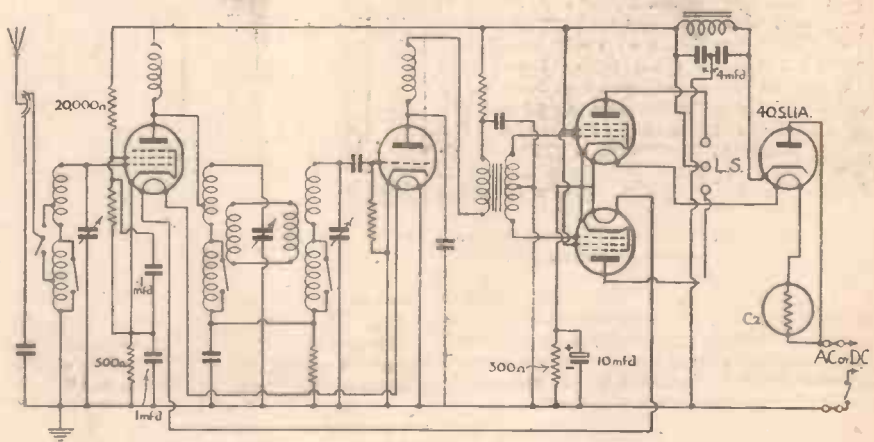


Fig. 4.—This universal-mains circuit compares with the others shown in Figs. 1 and 2.

ITEMS OF INTEREST

The New Italian Stations

BOLZANO, now 20 kilowatts, was inaugurated simultaneously with the high-power Radio Marconi (Bologna) transmitter, both of which are included in the North Italian network. Bolzano will retain its former channel, 559.7 m. (536 kc/s), but Bologna temporarily will share the wavelength used by Trieste (245.4 m.—1,222 kc/s). Later, Trieste and Turin will be synchronised to work on the same channel, namely, 263.2 m. (1,140 kc/s).

P.T.T. Rennes-Bretagne

THE 120-kilowatt station which the P.T.T. engineers are putting up at Thourie, near Rennes (Brittany), and which is to give an adequate service to western France, will begin testing towards the beginning of May. The station will be gradually brought into operation about June, and will work on the present Rennes P.T.T. wavelength of 288.5 m. (1,040 kc/s).

London's Underground Railway

THE most famous subterranean railway in the world, the Underground of London, will feature in the National programme on May 8th.

Felix Felton, B.B.C. Drama Producer, with the co-operation of the London Passenger Transport Board, is exploring the system in order to decide on the treatment. The idea at present in greatest favour is to reinforce the actuality method of treating such a broadcast by giving the staff who run the railway the opportunity to make the organisation speak for itself. There are many questions passengers put to themselves when rushing through the tunnels, with nothing to occupy their minds but gay advertisements. How is it that one train does not run into another? What happens when all the lights go out? How do you get out of the Underground when shut in after the last train? Where does the conditioned air come from? These are some of the questions that may occur to passengers—and there are many others. The B.B.C. Recording Unit will record a pattern of sound representing all the workings of the railway to lend colour to this broadcast. It is the B.B.C.'s experience that the employees appreciate these programmes and are only too willing to go out of their way to help the producers to give a true picture of the organisation in which they pass a great part of their lives.

FROM MICROPHONE TO LOUD-SPEAKER

An Explanation of Some of the Points Met With in the Production, Transmission, and Reproduction of Wireless Programmes

ONE of the great advantages of a wide band of radio frequencies is that different transmitting stations can select different frequencies for their own use, so that hundreds of programmes may be sent ranging through the ether at the same time without serious interference. The process of tuning a receiver is simply a matter of making the receiver, for the time being, specially sensitive to the frequency adopted by the wanted station, and comparatively insensitive to all others.

Fig. 1.—A view of the amplifiers and control panels of a modern transmitter.

Frequency Separation

As there is such a wide band of frequencies in the radio frequency range, it would appear a simple matter to prevent any interference at all between different stations, but the actual facts are somewhat different, and at the present time there is much congestion of the ether. For reasons which cannot be gone into at present, it is impossible to separate two programmes *and also get good quality reproduction* if their carrier frequencies differ by less than 9,000 cycles. As part of the useful wave band has to be reserved for commercial and ships' radio, and others for official use, only a limited wave range is available for broadcasting, and even with 9,000 cycles separation between allotted station frequencies, the ether is overcrowded.

Although it is strictly correct to talk about the frequency of the wave used by different stations, there is another way of describing different waves, which is much used. This is the "wavelength." As a radio wave travels at a speed of 186,000 miles a second, or 300,000,000 metres per second, it is clear that at the end of the one second from the beginning of a transmission, the ether over a radius of 300,000,000 metres could be mapped out into waves equal in number to the frequency of the wave, and that the length of each wave could be found by dividing 3,000,000,000 metres by the frequency.

Thus a station transmitting at a frequency of 1,000,000 would be said to be using a wave of 300 metres.

With a full understanding concerning the currents and radio waves which are employed in wireless transmission and reception, we can proceed to trace their progress through the successive stages. We know now that the air vibrations produced by the performer are converted by the microphone into an audio-frequency electric current.

How is this done? There are several types of microphone, but for our purpose we will take one of the simplest forms. Most people know that an electric current can only be set up when a force called an "electro-motive" force exists. If a battery or a dynamo, both devices for producing an electro-motive force, is applied to a complete electric circuit, an electric current will flow, and the strength of the current will depend upon two factors—the magnitude of the electro-motive force and the amount of "resistance" offered by the circuit.

Simple Microphone

The idea of electro-motive force and resistance can be readily understood if the former is compared with a steadily applied pressure which tends to force water through a system of pipes, and the latter to be the friction of the pipes. It is clear that, other things being equal, an increase of pressure will increase a flow of water in proportion, while an increase in pipe friction will reduce the flow.

The simplest form of microphone consists of a "box" containing a quantity of loosely-packed granules of carbon, the "lid" of the box being a thin diaphragm which is capable of vibration. An electric current, supplied from a battery, is made to pass through the carbon, and the microphone is so placed that the air vibrations produced by the performer will fall on the diaphragm, causing it to vibrate in sympathy. As the diaphragm vibrates it alternately compresses and releases the carbon granules, thus decreasing and increasing their electrical resistance, and this is reflected in corresponding changes in the strength of the microphone current, which will vary, of course, at audio frequency.

Before the microphone current can be imposed upon the radio-frequency current, which, it will be remembered, produces the radio wave, it must be strengthened or "amplified," as it is termed. This process is performed by one or more valves, the operation of which must now be described.

The Valve

The type of valve employed for amplification is termed a three-electrode valve, and consists of a glass bulb from which every trace of air has been removed, and containing three metal elements. These are, first, a filament, which is similar to the filament of an electric lamp; second, an "anode," which is a piece of metal plate or gauze surrounding the filament but not touching it, and, third, a "grid," which is an open-work metal structure (often a wire spiral) which also surrounds the filament and lies between it and the anode, touching neither.

When the filament is heated by the flow of an electric current through it, quantities of minute electric particles called "electrons" are emitted, these particles being actually small negative electric charges. It is one of the laws of electric science that a positive electric charge will attract a negative electric charge, so by maintaining a strong positive charge on the anode of the valve a large number of the negative electrons will be attracted from the filament to the anode through the vacuous space within the bulb. Electrons in motion are, in effect, an electric current, and the

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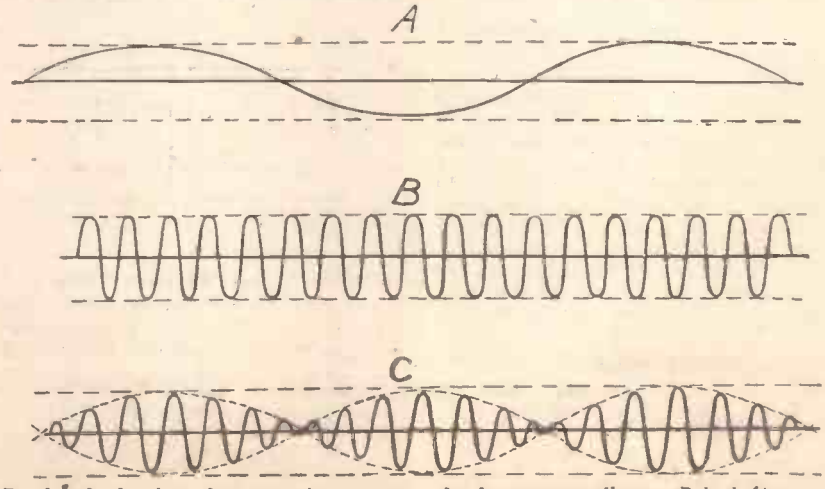


Fig. 2.—In the above diagrams, A represents audio-frequency oscillation, B high-frequency oscillation, and C modulated high-frequency oscillation.

(Continued from previous page)

stream of electrons passing from the filament to the anode form what is termed the "anode" current of the valve, and will flow through any apparatus connected in the external circuit.

Varying the Current

Now the strength of the anode current, like that of the microphone current, depends on several factors, one of which is the value of the positive charge applied to the anode, which is measured by the electro-motive force of the battery which supplies the charge. For a given set of conditions, the value of the anode current will be a certain amount, which will be constant unless the conditions are altered. One way in which we can alter conditions, and hence the value of the anode current, is by applying a negative charge to the grid of the valve, for such a negative charge would tend to neutralise the positive charge applied to the anode, and will reduce the value of the anode current.

When it is desired to use a valve to amplify a signal, the signal to be amplified—in this case the microphone current—is made to supply a varying negative charge to the grid of the amplifying valve, the variations of this charge being, of course, at audio frequency. The consequent variations in anode current will also be at audio frequency and in sympathy with the variations of the microphone current, but by suitably arranging circuit conditions the anode current variations can be made much greater than the changes in microphone current, or, in other words, the valve has amplified the signal.

In the next stage, it will be remembered, the programme, which now takes the form of an audio-frequency current of considerable power, is combined with another current which vibrates at a constant radio frequency—a frequency which is selected as the standard frequency of the particular broadcasting station.

Producing the High-frequency Oscillations

In the production of the radio-frequency current valves also play an important part. The action of a valve as a generator of radio-frequency oscillations depends upon the fact that if a radio-frequency current of quite small strength is applied to the grid of a valve it will be amplified and will appear as a stronger radio-frequency variation in the anode current. If, now, a part of the radio-frequency energy in the anode current is returned to the grid it will be re-amplified by the valve. This effect will be cumulative, and eventually quite powerful oscillations will be generated. Various means are provided for keeping the frequency at the correct value. These cannot be described here, but will be explained more fully under the heading of "tuning."

The generation of free oscillations in a valve can be compared with the production of strong vibrations by applying gentle taps, carefully timed to a pendulum. If each tap is given just as the pendulum has reached the end of its swing and is about to return, the energy of each tap is added to the energy already stored in the pendulum, and gradually a violent swing is built up.

The oscillations produced in the transmitting oscillator valve are of the correct constant frequency, and are also constant in strength or "amplitude." In the next stage the circuit in which the amplified microphone current is flowing is coupled to the circuit carrying the radio-frequency current in such a way that the audio-frequency energy is combined with the radio-frequency energy. As a result, the radio-frequency current, while maintaining its constant high frequency, changes in strength or "amplitude" in sympathy

Fig. 3.—Regulating the filament current of two large valves used in an amateur short-wave transmitting equipment.

with the audio-frequency current. A rough idea of audio-frequency, radio-frequency, and modulated currents can be gained from the accompanying diagram, Fig. 2, where the upper portion represents the comparatively low-frequency audio current, which changes in strength in sympathy with the music; the middle section represents the rapidly-vibrating radio-frequency current of constant amplitude, and the lower portion shows the effect of combining the two.

From the transmitting aerial the wireless wave radiates in every direction, travelling with the speed of light—186,000 miles a second. At the risk of the accusation of undue reiteration, we will repeat that this wave has a constant frequency—chosen separately and maintained accurately for each individual station—but the strength or amplitude of the wave varies from instant to instant in accordance with the audio-frequency signals which make up the original programme. Thus, every wave has two distinct properties—the carrier frequency, which identifies it with a particular station, and the modulation, which is, in fact, the programme.

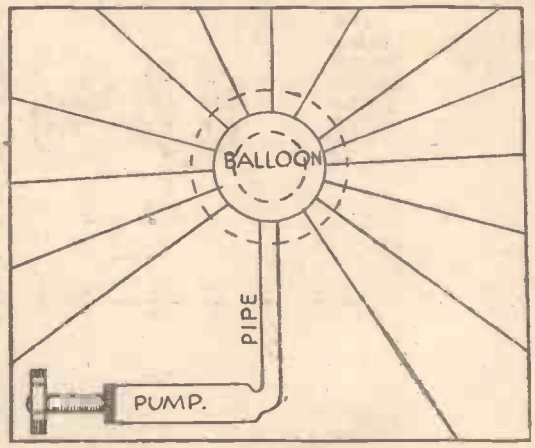


Fig. 4.—The water analogy illustrating the principle of transmission.

When a wave impinges upon a receiving aerial, certain phenomena takes place, which are the converse of those taking place in a transmitting aerial. Instead of a radio-frequency current giving rise to a wave, in this case the wave produces a radio-frequency current, so that in the aerial-earth circuit of your receiver flows a current oscillating at radio-frequency and still bearing the programme modulation.

Selecting the Station

Now, as there are several hundred broadcasting stations, each of which sends out its own wave and each producing currents of its own standard frequency in your aerial, the first essential in a receiver is some device whereby it is possible to select the current corresponding to the station to which, for the moment, you are desirous of listening.

This operation is known as "tuning," and it is upon the fact that it is possible to tune electric circuits, and to tune them very accurately indeed, that the success of both radio transmissions and reception depends. To illustrate the effect of tuning, let us consider an example in simple acoustics. If we take an ordinary tuning fork and strike or bow it, it will give out a note—the sound being due to the vibration of the fork—and a given fork always gives out the same note and no other. This is because the fork can only vibrate at one set frequency—a frequency known as its natural frequency.

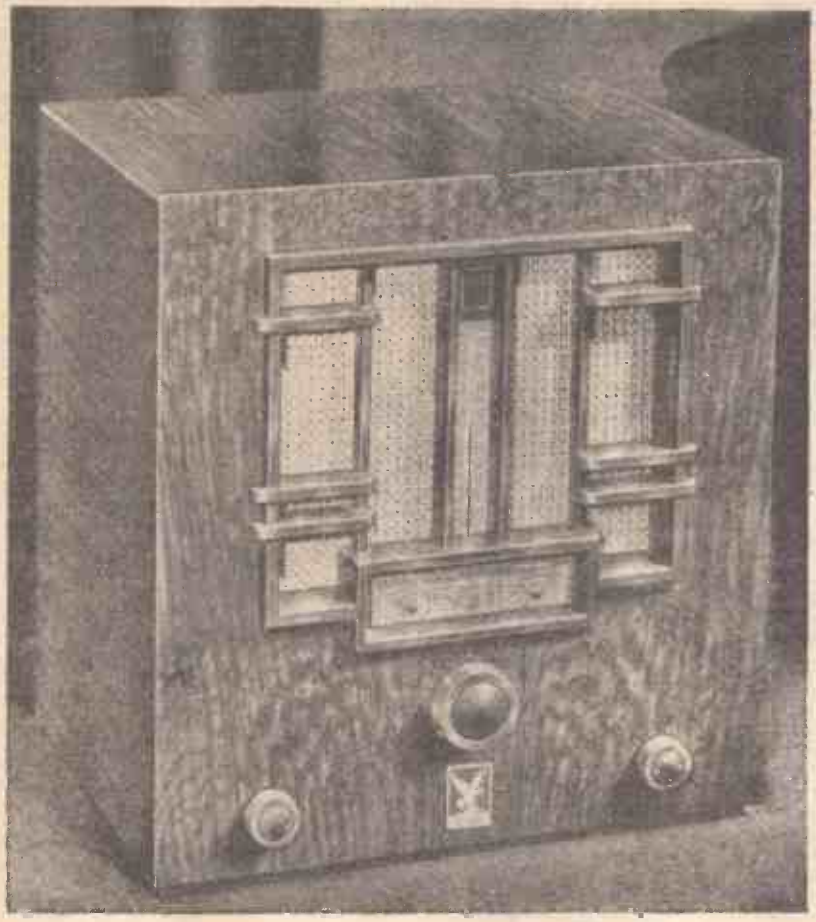
Now, if a second tuning fork, having the same natural frequency as the first, is placed near it, when the first is struck the second will commence to vibrate and to sound. The reason is that the air waves emitted by the first fork, when they reach the second, give it a little jerk and tend to make it vibrate. The amount of energy transmitted by a single wave is very small, but as the incoming waves are of the same frequency as the natural frequency of the tuning fork, each arrives at the correct interval behind the previous one, so that the effects of all the waves are added to each other. As a result, quite a big amplitude of vibration is built up in the second fork. If the second fork had a different natural frequency to that of the first, it would not resonate when the first was sounded, because the successive impulses applied by the first would not be correctly timed to the natural frequency of the second.

Natural Frequency

These properties of natural frequency and resonance can also be possessed by electrical circuits; that is to say, electrical circuits can be so adjusted that they will accept and build up oscillations of one particular frequency, but will not so respond to other frequencies. To understand this it is necessary to know why such systems as pendulums and tuning forks possess a natural frequency.

If you consider for a moment, you will see that when an impulse, such as an air wave, acts on a tuning fork, it will move the prong slightly. But because the fork is springy, or "elastic," as engineers will call it, the prongs will ultimately spring back to their normal position. In so doing, however, the comparatively heavy metal achieves a certain momentum, and, due to its inertia it overshoots the mark and deflects in the opposite direction. Again the elasticity of the fork tries to bring it back to its normal position and, again, inertia forces it past the mark, and for a certain degree of elasticity and inertia a body will have a fixed period of oscillation.

SIMPLIFIED CONTROL



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On Your Wavelength

By Thermion

Max Beerbohm on Speed

IT is not often that I feel incensed at a B.B.C. talk, but the other evening I happened to be listening in to a talk by one Max Beerbohm, and in a preliminary notice in a B.B.C. publication he was referred to as a wit and caricaturist. That being so, I expected a humorous skit on things in general, instead of the serious talk elaborating the views of one who, because he has been out of the country so long, could not be qualified to speak upon it. Max Beerbohm may be an excellent wit and caricaturist—never having inspected any of his work I am unable to say—but I cannot too strongly deprecate the policy of the B.B.C. in allowing anyone but an expert to talk on subjects of which they can only have personal, rather than national, views. Few motorists are interested in what Max Beerbohm thinks about speed and modern traffic, and his views are of no more importance than those of any other citizen. As it is, his views have been elevated to the importance of a national talk and contradict the views of experienced motoring organisations and experts who have been wrestling with these problems all their lives. I was a motorist long before I became interested in wireless and held my first motoring licence in 1908, long before there was any age limit.

Mr. Beerbohm may represent the views of a very few, but he should remember that each succeeding method of road travel has met with the same opposition. As he sets himself up as a critic, he will doubtless remember the famous case of a magis-

The Watchman's S.W. Set.

trate of the martinet type who advised a plaintiff to throw his whip into the wheel of any bicycle which passed him when he was driving a horse-drawn carriage. Bicycles were then the fastest vehicles on the road, and when motor-cycles came along they met with opposition from the cycling interests. Had it not been for the motor-car it is conceivable that Mr. Max Beerbohm would not have been afforded the opportunity of airing his views over the radio. The whole tendency of the world to-day is towards speed, and you cannot speed up our commercial and industrial life by slowing down its means of distribution. Let Mr. Max Beerbohm stick to wit and not endeavour to foist obsolete views upon a public already overburdened with restrictive regulations, harshly treated in the police courts, and subject to a system of justice which would disgrace even the days of the Feudal system. I have never in this feature criticised the B.B.C. before, but I feel that it will be well advised not to allow humorists to talk on serious subjects, otherwise we shall have that famous comedian George Robey telling us how to conduct an aerial war. Eddie Cantor, the well-known film star, you will remember, after his interview with Mr. Hore-Belisha, gave somewhat similar views in his broadcast talk. I am sure the Minister of Transport must be highly delighted with this assistance.

That Announcers' Union

MR. G. GREIG, of Kentish Town, after paying me a compliment, disagrees with my remarks under the above title in our issue dated April 18th. He says: "In spite of what you read, I can assure you that no union member would strike for the reason you give. Incidentally, an active union member stands a good chance of being sacked without breaking any law. The millions who are trade unionists are not extremists, but are compelled sometimes to have resort to the obnoxious method of downing tools to obtain the barest minimum of justice. I feel you are not the sort of person who would hit below the belt and your article is unworthy of you." I can assure this reader that I have more than a nodding acquaintance with trade unions, and am by no means so opposed to them as he seems to think; but his reference to justice reminds me that this is a somewhat transitory thing, the standard of which changes with the times. A few years ago it was an offence punishable by hanging to steal a sheep; in Biblical days it was permissible for a man to have a thousand wives; not so many years ago it was an offence to exceed twenty miles an hour, whilst now you may legally do so. Justice is not a question of degree; you cannot have a "barest" minimum; justice is justice: you either have it or you don't.

How Long Ago?

CAN you answer without reference to books the question: When did the B.B.C. make its first broadcast from Savoy Hill? Try this question on your friends and you will receive some astonishing answers. The correct answer, of course, is on May 1st, 1923. This date, thirteen years ago, makes me feel quite old. One or two other anniversaries have just fallen due—Marconi's birthday, for example, was on April 25th, for he was born in 1874. Samuel Morse was born on April 27th, 1791. Marconi was only twenty-two when he first demonstrated wireless to the G.P.O.; this was on May 2nd, 1896.

Hole in the Road

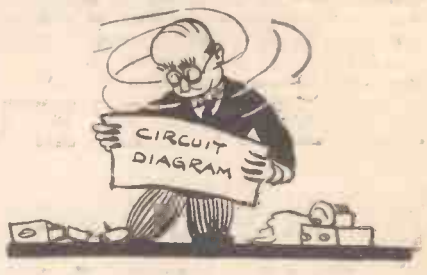
WHO says that the average night watchman is comatose and torpid? I came across one the other night who was minding a hole in the road and who was passing the time listening on a two-valve short-wave set which had accompanied him over nearly the entire south-west district of London. He gave me some interesting details of the variations of reception in certain districts. Whilst he drew a blank from some roads, round the corner station after station would roll in at 'phones-on-the-table strength. He finds W2XAF the most consistent.

Symbols and Strange Devices

THE theorist loves a symbol in the same way as a mathematician likes to complicate the simplest bit of arithmetic. All mathematicians are fools, and what one fool can do another can. Designers of wireless circuits love to make a simple diagram look difficult, and almost daily our list of theoretical symbols has a new one added to it. No one decides what that symbol shall be, and each firm and each designer can invent his own. Someone ought to standardise wireless symbols and ruthlessly scrap half of them. In the early days it was easy to follow the symbols, and now it is almost necessary to consult a book. I saw a diagram the other day of an indirectly-heated double-diode-pentode-variable-mu, and there are very few readers who could put down a symbol for this valve without reference.

An Ingrate

I WAS called into a neighbour's house the other day to vet. a set. Nothing seriously wrong with it, merely that one of



Are we to have any more symbols?

the valves had blown. Showed him how to test the receiver and the valves therefor. Recommended him to buy a good meter such as the Avominor or the Pifco. Located the broken valve and told him what sort to buy. In spite of this valuable professional advice, I have gone down in his estimation because I was not able to waggle the magic wand and put things right. Yes, blow thou winter wind, thou art not so unkind as man's ingratitude.

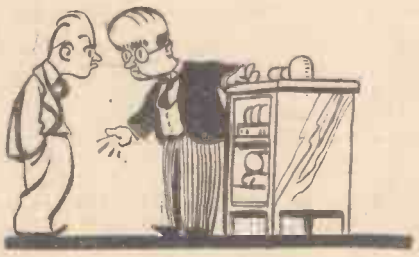
A Peculiar Fault

READERS who pride themselves on their ability to trace faults might be interested in the following peculiarity which occurred recently in a set to which I was listening. This was a powerful all-mains "quality" set which had been built up to give a high standard of reproduction, but

(Continued on opposite page)

(*Continued from opposite page*)

which had never functioned in the desired manner. It was quite good, but there was a slight hum in the background (and the set had been designed to be "hum-proof") and there were rather more than the usual background noises. Thus, when tuned to the local station and the announcer paused between intervals in the news bulletin, for instance, there was an apparent liveliness, accompanied by faint rustling or crackling noises. These were not serious and were, in fact, not more prominent than in the ordinary type of set, but as this particular model had been designed and built to be rather above the average the results from this point of view were disappointing, and the receiver was due for dismantling and rebuilding at the earliest opportunity. It had been used for over two months at odd periods and probably had given forty or fifty hours' service in all, when the following peculiar effect occurred. The Week's Good Cause had just been read, and the announcer uttered about three words of the weather report preceding the news bulletin,



He was ungrateful because I could not wave a Magic Wand.

when there was a faint click in the speaker, and although the volume of speech remained exactly the same as before, all hum and background noises ceased forthwith. The set now functions in the originally-intended manner, and there is a most uncanny background of silence. Remember, nothing was touched and we were all sitting down quietly listening to the set, so that there was no vibration of the floor or receiver cabinet to rectify a loose connection; and, incidentally, all joints were thoroughly well soldered. I shall be interested to receive suggestions regarding the effect, which, incidentally, I have now discovered, but whether or not this is usual or unusual I shall not say at the moment.

Receiver of Death

I WAS very grieved the other day to read that an experimenter had received a fatal shock from a mains receiver while searching for a fault. Now a case of this nature is always put well to the front in the daily Press and much harm is done by the publicity, as many people think that a wireless set on the mains is a dangerous thing to have in the home and that it is a potential source of death. Actually, however, it is no more dangerous than the ordinary electric lights, and no one thinks of putting their fingers into the lamp socket and touching the contacts. Yet this is the equivalent of what happens when one tampers with the interior of a mains set *without first switching off the supply*. When a person is in poor health, has wet hands, or is in very good contact with the earth (such as when standing on a stone floor, etc.), he is in the most favourable condition to receive a shock from even a small voltage source, and therefore one should always switch off before touching any part of the interior of a mains set. If voltages are to be measured under working conditions, then good insulated test prods of ample length should be employed and the greatest care should be taken to avoid touching any part of the set with the bare skin. Unfortunately, it is always possible to be wise after the event, and although this information has been given in these pages before, I feel constrained to repeat it in view of the above tragedy.

Notes from the Test Bench

Hum Cures

WHEN hum is experienced in a battery receiver, it indicates that there is some component or joint at fault, usually in one of the grid circuits, but when a receiver is supplied from the mains excessive hum can be experienced even though all components are in order. This is particularly the case with home-constructed sets where attention has not been paid to lay-out details. If hum occurs in an A.C. mains receiver in which the components are known to be in good order, interaction between the heater and grid leads or between chokes and transformers is probably taking place. The average constructor knows that the heater leads of an A.C. mains receiver should be twisted tightly together and therefore hum due to the heater lead field is very rarely experienced.

Importance of Lay-out

THE position of the chokes and transformers is often decided in a haphazard manner, however, with resultant interaction between the fields of the mains transformer and smoothing choke and those of the choke and transformers in the receiver. The best procedure is to keep the mains unit and the receiver well apart so that interaction cannot occur, but in most cases this procedure cannot be adopted, owing to lack of space, and the mains unit has to be mounted quite near the receiver. If excessive hum is experienced when this method is employed, the choke and transformer in the receiver should be wired to their associated components by means of flexible leads so that the transformers can be rotated on their axis. A position will be found—usually when the windings of the receiver components are at an angle of approximately 30 degrees with respect to those of the choke and transformer in the mains unit. If the receiver wiring has been finished and all components have been securely screwed down it may sometimes be found easier to move the mains unit chassis bodily until a position is found where hum is negligible.

A.C.-D.C. Receivers

IN receivers of this type hum is generally more prevalent than in sets of the A.C. type. This is primarily due to the fact that a mains transformer is not incorporated and therefore the mains are in direct contact with the earth line of the receiver. There is also the possibility of radiation from the heater leads as the valves are wired in series and therefore the twisted wire method of suppressing hum which is recommended in A.C. receivers cannot usefully be adopted. Heater leads should be kept clear of grid leads and in some cases screening of the grid leads proves very effective.

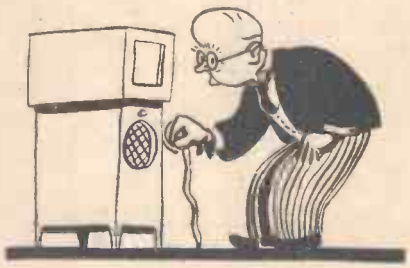
A receiver of the A.C.-D.C. type which was brought to us recently suffered from a severe 50-cycle hum when supplied from A.C., but was quite silent when supplied from D.C. The hum in this particular case was entirely eliminated by screening the grid lead of one of the output valves and connecting the screening cover direct to earth—not to the chassis.

Weather and Wireless

NO doubt all old hands have noticed the peculiar effects of the weather on wireless signals, but there are some effects which are not concerned directly with the travel of the waves through the ether. At the aerial and earth of our receiver we may also experience peculiarities due to the weather existing at any given moment, and it should be kept well in mind that a so-called lightning arrester can give trouble if not well designed or if not erected in the correct manner. For instance, I heard of a case a few days ago where intermittent crackles were experienced on a battery set and after many hours' search by the user he discovered the noises to be due to drops of rain trickling from one part of the arrester to another. Slight static charges are sometimes held by the raindrops and this trouble may be avoided by using a closed-in or protected arrester. Strange as it may seem, a spider's web can also cause noises due to moisture collecting or running across the strands when they pass from the aerial or lead-in to an earthed body. I have not yet heard whether a worm travelling across an earth plate, or eating its way through a "chemical earth" will cause any noise in the set, but perhaps this is being saved up for one of my "off" days!

"Radio Gazette"

A NEW feature that is likely to prove of exceptional interest to listeners will be introduced for the first time in the "Saturday Magazine" of May 2nd. It will be entitled "Radio Gazette," and will consist of a summarized news feature presented in an exciting and dramatic manner. This reproduction in sound of a "news-reel" will consist not only of home events, but will be as all-embracing in content as



To think back to the first broadcast makes me feel old.

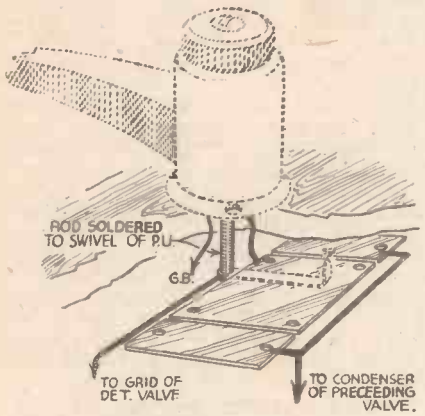
possible. A B.B.C. recording van, acting as a sort of robot "special correspondent," will scour the country for interesting items; and, in addition, engineers at Tatsfield, the B.B.C's receiving station, will be always ready to pass on any suitable foreign news for recording purposes. When the complete week's material has been collected in the form of a series of recorded news flashes, these will be edited and broadcast. It is possible that "Radio Gazette" may branch out as a short regular feature on its own account, while a further development might well be the recording on the spot of dramatic events abroad by B.B.C. recording vans. In fact, if the experiment proves successful, there seems no end to the interesting ways in which it might be developed.

A PAGE OF PRACTICAL HINTS

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

An Automatic Radiogram Switch

THE accompanying sketch shows a simple automatic radiogram switch. The materials used are a piece of thin brass plate, a thin strip of springy brass, and



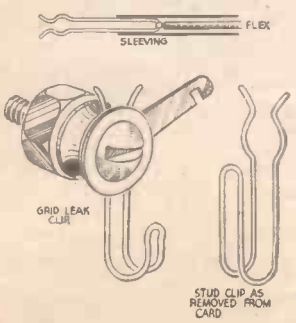
A simple automatic radiogram switch.

a small brass rod, screwed at one end. The rod is soldered to the swivel pin of the pick-up, and the strip of springy brass is screwed to it. The bottom end of this strip is turned up and makes contact on the divided brass plate which is screwed under the motor board.

When the pick-up is lifted off the rest, and is moved to the turntable of the motor, it automatically cuts off the radio, and switches over to gramophone. Should you have an automatic stop on your motor, it is a simple matter to add a third piece of brass plate to switch over to radio when the automatic stop operates. The sketch explains the simple construction of the switch.—W. MARSHALL (Fife).

Improvised Clips

THE accompanying sketches show how simple clips can be made from the bent wire clips which hold studs and buttons on cards. These clips can conveniently be used for making grid leak clips, clips for S.G. valve cap leads, tags for 'phone leads, and clips for battery plugs. They can also be adapted for use as test-meter clips, by clipping them on to the valve leg while the valve is in its holder, or any other part



Useful clips made from bent wire stud holders.

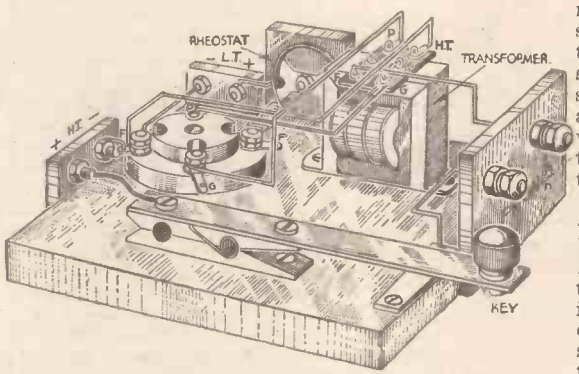
THAT DODGE OF YOURS!

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

to be tested. They are simple to make, and I have found them very useful.—E. NORWOOD (Margate).

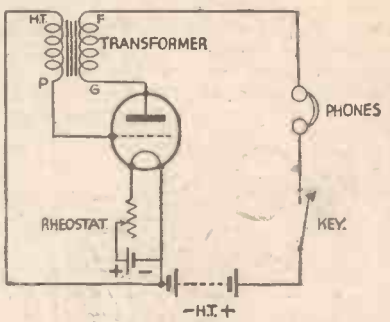
A Morse Tapper with Valve Oscillator

I HAVE found the morse tapper shown in the accompanying sketches very useful for practice purposes. The measurements of the board upon which the components are mounted is 9in. by 7in. by ½in.



General arrangement of a morse tapper with a valve oscillator.

The three pieces of ebonite on which the terminals are fixed measure 2½in. by 1¾in. by ¼in., whilst the piece of ebonite necessary for mounting the rheostat is 2½in. square and ¼in. thick. The rheostat serves partly to economise L.T. current, but its chief use is to alter the pitch of the morse note heard in the 'phones. The morse tapping key is made from a clothes peg of the spring type. The bottom of the clothes peg is carefully drilled and screwed to the board. A piece of brass 6in. by ⅜in. by ⅛in. is carefully drilled and fixed to the top of the clothes peg, as shown in the sketch. The handle of the

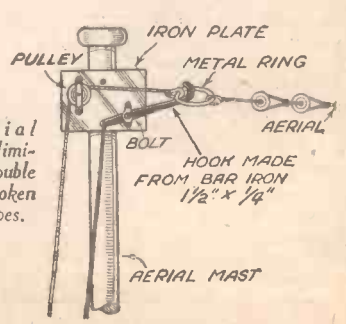


Circuit diagram of the morse tapper and valve oscillator.

tapper consists of the head of a flat-topped wander plug, fastened to the metal strip by means of a small bolt. The key taps on to a small piece of brass screwed to the board. A standard L.F. transformer and an L.F. or small power valve complete the apparatus.—J. F. BARLOW (Darlington).

An Aerial Hint

NO doubt many readers have had trouble with their aerials, due to breaking ropes, jammed pulleys, etc. The accompanying sketch gives details of a device that leaves the rope free, with no weight to support. After the aerial has been pulled up in the ordinary way, the rope attached to the hooked lever is pulled and this causes the hook to engage with a metal ring on the end of the aerial, thus leaving both ropes free. The hooked lever is formed from a piece of 1½in. by ½in. bar iron, and is pivoted to a metal plate fixed to the top of the mast, as shown. The hook is released by pulling on the rope attached to the ring.—R. N. PARRY (Llanelly).



An aerial dodge for eliminating trouble due to broken aerial ropes.

£4 Superhet Refinements

Instructions for Adding an Extra Tuned Circuit and a Tuning Indicator to this Efficient Receiver

The A.C. version of the £4 Superhet 4, which may also be modified to include the visual tuning indicator as explained in this article.

OUR correspondence indicates that the £4 Superhet is giving entirely satisfactory reception to thousands of our readers, but there are a few remote cases in which morse interference has been experienced owing to the listener's aerial being situated in close proximity to a busy shipping route. Ship transmitters of the spark type are notorious for the spread of their signal, and although these are shortly to be replaced by the modern intermittent continuous-wave type, listeners situated near the entrances to our ports have, for the time being, to put up with occasional interference from the signals of spark transmitters unless a very selective receiver is used.

Morse Interference

In a superhet receiver the general selectivity is governed by the degree of coupling between the primary and secondary windings of the intermediate-frequency transformers—increasing the distance between these windings improves the selectivity at the expense of sensitivity. With the £4 Superhet, stations transmitting on wavelengths between 200 and 550 metres can be confined to a degree on the tuning scale, but as an intermediate frequency of 465 kc/s is used (i.e. a little higher than 600 metres), it is possible for very strong signals transmitted on a wavelength of approximately 600 metres to break through. This is the type of interference that has been complained of in a few cases, and generally emanates from the above-mentioned spark transmitters. To prevent these interfering signals reaching the intermediate-frequency stage the selectivity of the tuned circuit preceding the pentagrid frequency-changer must be improved, and in most cases a sufficiently high degree of pre-selector selectivity can be obtained by connecting a low-capacity condenser between the aerial lead and the aerial socket; this component should have a value of .0001 mfd. or .0002 mfd., its required value being governed by the length of the aerial used.

Band-pass Tuner

In some exceptional cases, however, this simple method of improving the selectivity is not sufficiently effective, and it is found necessary to add another tuned stage between the aerial and the existing tuned circuit. It is permissible, of course, to add a high-frequency amplifying valve of the H.F. pentode type between the tuned circuits, thereby making the receiver into an efficient five-valver, but as the sensitivity of the receiver is already of a very high order this addition is not likely to appeal to many readers owing to the expense involved. The simplest method of adding the extra circuit is to couple the two coils to form a band-pass filter. The specified H.F. coil (Varley B.P. 80) is very suitable for this type of connection as it is provided with a special coupling winding which can be used to couple the two circuits together.

The diagram of the additional circuit is shown in Fig. 1. It will be noted that a B.P. 80 coil and a solid dielectric type of condenser are used. An air-spaced condenser could be used, of course, but the solid type has been chosen as it can easily be mounted between the volume control and the wave-change switch without the necessity for altering the receiver layout. There is also ample room underneath the chassis for the additional coil; this can be mounted horizontally to the side runner underneath the existing B.P. 80. Terminal 6 of the new coil should be connected to the spindle of the existing wave-change switch, or if a four-point switch is readily available this may be used in place of the existing three-point type. When these additions are fitted the aerial socket should be disconnected from terminal 1 of the existing B.P. 80 and connected to the new coil, as shown. Tuning is effected in the usual manner by rotating the main tuning control, final adjustment being then made by means of the extra condenser control. A reduction of volume is to be expected when the extra circuit is in use, of course, but this is not sufficiently serious to materially affect reception.

Visual Tuning

Many readers have written to ask us whether a visual tuner can be added to the £4 Superhet, and therefore we propose giving details of a simple type of indicator. This takes the form of a milliammeter having a full scale deflection of approximately 5 m.a., connected in the anode circuit of the detector valve, as shown in Fig. 2. Provided that the full-scale

(Continued on page 189.)

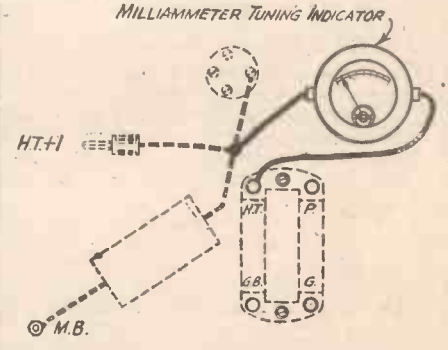


Fig. 2.—A milliammeter tuning indicator added to the £4 Superhet.

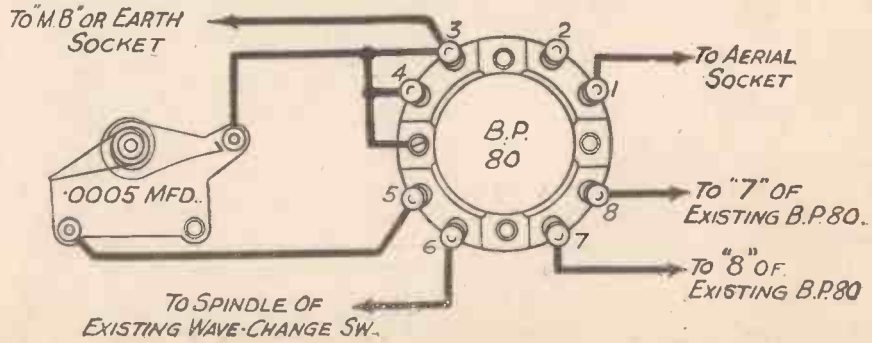


Fig. 1.—Showing the connection of the band-pass filter coil and condenser.

WIRELESS

How to Modify a Receiver for Use in Cycle or Motor-cycle Portable is

By FRANK

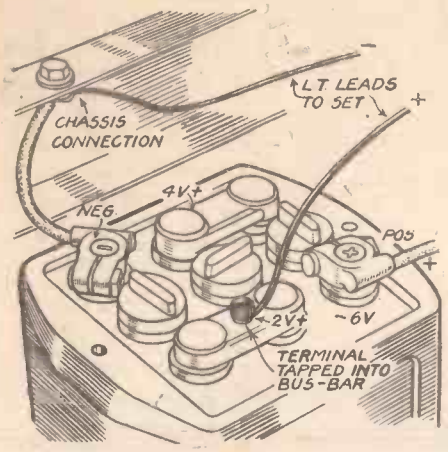


Fig. 1.—Showing how the L.T. supply can be obtained from the car battery. A 6-volt battery is indicated, but the method is not altered when a 12-volt system is provided.

WIRELESS reception has become such an important part of our everyday life that we are not satisfied merely to listen in our homes, but must take a receiver with us on our travels. Midget portable sets have simplified matters in this direction, and we now have receivers which are small enough and light enough to be carried even by hikers (the PRACTICAL AND AMATEUR WIRELESS midgets are best known in this respect). Quite apart from the developments which the Technical Staff of this journal have made in developing what might be called the "hand" portable, great strides have been made with car-radio sets, of which there are now many extremely efficient examples. A couple of years or so ago there was, in this country, a good deal of prejudice against car-radio, but that has been lived down, and there are very few people to-day who can raise any real objection to it.

Chief Requirements

The construction of a really effective car-radio is not a very easy matter for the amateur, due in the main to the difficulty of obtaining the necessary components at a low price, but there is little difficulty in modifying an existing "fixed" set for use in the car. A primary essential of the receiver is that it should be sensitive, so that it can operate satisfactorily from an inefficient aerial. Another important point, however, if the use of a comparatively expensive H.T. converter is to be avoided, is that the consumption of high-tension current should be low. Fortunately, there is a splendid instrument in the PRACTICAL AND AMATEUR WIRELESS series of Guaranteed Receivers which fits in particularly well with these requirements—it is the "£4 Battery Superhet," described in the issue dated November 16th, 1935. The complete instrument is very compact, and, without batteries, can be housed along with a midget speaker in a very small cabinet or metal containing case. The latter is preferable, because it provides adequate screening against electrical interference. The method of mounting the set in the car must depend almost entirely on the size and design of the bodywork, but the set can generally be fitted at one end of the rear seat, behind the front seats, or (by placing the speaker alongside the set) just beneath the dash-board.

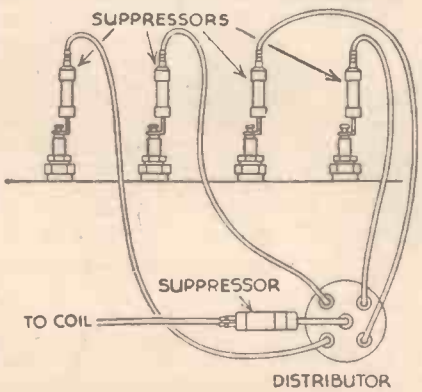


Fig. 2.—Suppression resistances should be fitted to the ignition system of the car, as shown here, when the set is to be used while the car is running.

Using A.C. Valves

Low-tension current is best derived from the car battery, and the requisite 2 volts can be obtained by connecting one lead to any convenient part of the chassis, and another to the first bus-bar of the accumulator from the negative terminal, as shown in Fig. 1. Noticeably better results can be obtained by using the valves specified for the A.C. version of this receiver and slightly modifying the wiring. This means that the cathodes or centre valve-holder pins must be connected to the negative filament terminals, so that the cathodes and heaters are joined together. When this is done, high-tension current can be drawn from a 120-volt H.T. battery (preferably of the super-capacity type), which can generally be placed underneath one of the seats, or even in the luggage compartment at the rear. Low tension will again be drawn from the car accumulator, but the positive connection must then be taken to the second bus-bar, so that a heater voltage of 4 is obtained.

Aerial and Earth

Many cars are now supplied with an aerial already built into the roof, but, when this is not available, it is possible to arrange a fairly satisfactory "collector" by taking a length of silk-covered flex of the same colour as the inside roof covering in zig-zag fashion from end to end. A good earth-return connection is ensured automatically

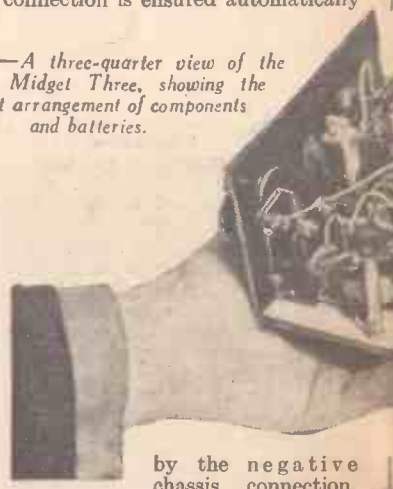


Fig. 4.—A three-quarter view of the Cameo Midget Three, showing the compact arrangement of components and batteries.

by the negative chassis connection, since the chassis of the car makes a reliable counterpoise earth. Another type of aerial is available for fitting underneath the running boards, this being most satisfactory when wooden boards are used; if boards are replaced by extended metal valances, this type of aerial might prove unsatisfactory, due to the heavy screening. If it is not wished to buy an aerial, it will be found that a suitable one can be provided by fitting a piece of copper gauze, or even perforated zinc, underneath the running boards and mounted on porcelain insulators.

Interference Suppression

The use of a set arranged as described above is perfectly satisfactory when the car is stationary, but further alterations must be made if it is intended to listen whilst driving. One point of importance is that the ignition system of the car acts as a

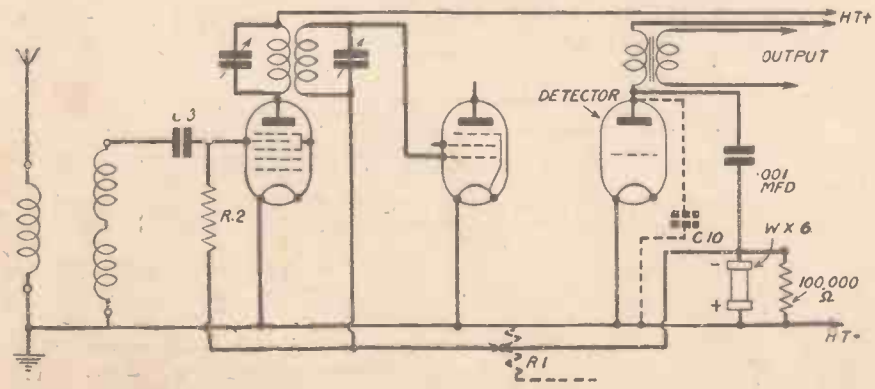


Fig. 3.—This skeleton circuit shows how a system of A.V.C. can be arranged on the "£4 Superhet."

AWHEEL

e in the Car, and How to Make a Explained in this Seasonable Article

PRESTON

powerful transmitter of "crackles" and other forms of interference. In consequence, suppressors must be provided. These consist of resistances, one of which is connected in series with each of the leads to the sparking plugs, and one in series with the main lead to the centre of the ignition distributor, as shown in Fig. 2. Additionally, it is worth while to connect a fixed condenser between the positive dynamo terminal and the chassis. A complete set of suppressors can be obtained for any make of car from Belling-Lee or any good radio dealer. The set is boxed, together with instructions for fitting.

Although the suppressors will eliminate interference, they do not compensate for the fading effects which are always present when the car is moving, and which are due to the variable-screening effects of buildings which are being passed. In order completely to eliminate this fading, an extremely efficient system of A.V.C. is required, which generally means that at least six valves should be used. Reasonably good compensation can be provided in the case of the set in question, however, by using a "Westector" connected as shown in Fig. 3.

Motor-cycle Radio

So much for improvised car-radio equipment, although it should be mentioned in passing that a number of readers who have adopted a scheme such as that briefly outlined above have met with a reasonable measure of success. When we come to consider the question of carrying a receiver on a motor-cycle the method of solution is somewhat different, mainly because of the more confined space at our disposal. Even when considering a side-car machine, it is best to concentrate on a set which will provide good 'phone reception rather than attempt to install a loud-speaker. A receiver such as the PRACTICAL AND AMATEUR WIRELESS "Cameo" Midget (in the issue dated June 8th, 1935) shown in Fig. 4, can always be accommodated, and suppressors such as those referred to above can be fitted to the ignition equipment. An aerial can sometimes be provided by winding a length of flex round the side-car hood, or one might feel disposed to fit a short "mast" at the front and rear of the side-car, attaching one of the many spiral indoor aerials between them. On the other hand, if the set is to be used only when the machine is stationary, a length of flex used as a "throw-out" aerial will prove very good. In either case the chassis of the machine will provide a counterpoise earth connection.

A Bicycle Set

Conditions are different again when the portable radio equipment is to be carried on a bicycle. It must obviously be extremely light; it must also be compact; and must be designed so that it can either fit into the frame or be carried in the pannier bag at the rear. Telephone reception only can be considered, and this means that the set will be used only when the cycle is not being ridden. Because of this a throw-out aerial only is required, and this might well consist of a 20ft. length of flex with a large washer tied to one end, which can be thrown over the

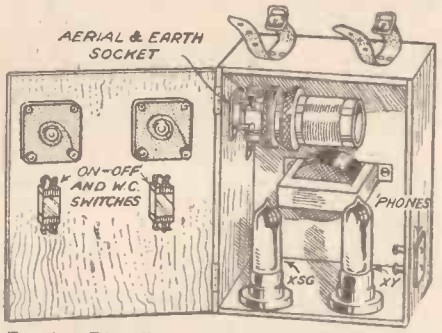


Fig. 6.—This illustration gives an idea of how the components can be arranged in a small cigar box.

branch of an adjacent tree, or even thrown along the ground. The bicycle frame again can be used as a counterpoise earth, although it is better to use a short copper or brass spike which can be pushed into the ground. Alternatively, the bicycle can be used as the aerial, making connection to a bright part, such as the handlebars or pedal crank; an earthing spike is then practically essential.

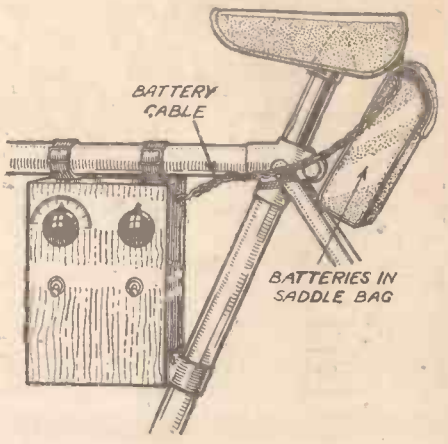


Fig. 7.—A suggested method of mounting the midget set in the frame of the bicycle.

Two-valve Circuit

The receiver itself can be a two-valve arrangement comprising a pair of Hivac midget valves—preferably an S.G. valve used as detector and a pentode output valve, the two being coupled together by means of a midget L.F. transformer. A suitable circuit is given in Fig. 5, from which it will be seen that there is a very close resemblance to an ordinary "fixed" receiver circuit. The chief difference lies in the fact that automatic grid bias is provided, and that the total H.T. voltage is only 45. It will be found best to construct the receiver itself as a unit, arranging leads to run to the midget 2-volt accumulator and H.T. battery, which may be carried separately. The set can be built into a cigar box without any difficulty, following the general arrangement indicated in Fig. 6. Here it will be seen that a midget coil is employed (the Bulgin or B.T.S. component is suitable), and that bakelite-dielectric condensers are used for both tuning and reaction control; suitable components are to be found in the Graham-Farish list. There is no H.F. choke, and the midget L.F. transformer is directly wired in the anode circuit of the detector. The resistances can all be ½- or ⅓-watt type, and the fixed condensers should be tubulars. Terminal-socket strips, such as Clix or Belling-Lee, are used for aerial, earth and 'phone connections, whilst it is suggested that a four-way battery cable should be used for connecting up the batteries.

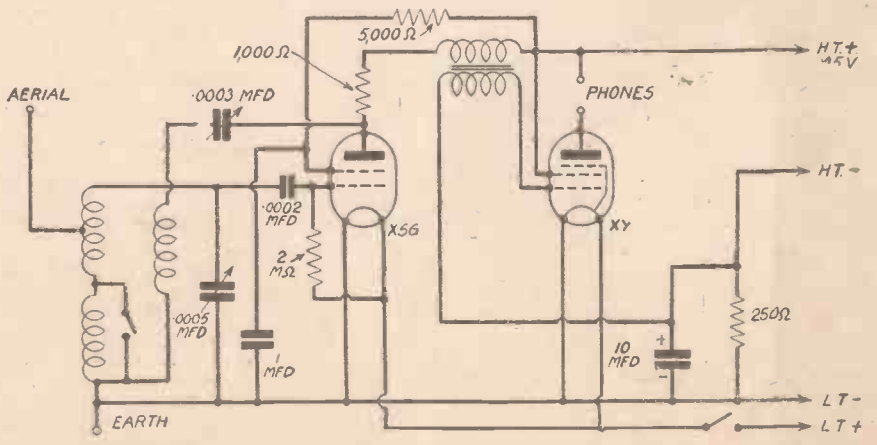


Fig. 5.—Circuit of a simple midget cycle portable, using Hivac valves.

Random Jottings

By JACE

Television Lectures

A SHORT course of six lecture-demonstrations on television by Mr. H. J. Barton-Chapple will commence on Thursday, April 30th, at 8 p.m., at the Norwood Technical Institute, Knight's Hill, West Norwood, S.E.27. The fee for the course is 5s., and the six lectures are as follows :—

April 30th.—Introduction. Reasons for scanning. Different methods of scanning.

May 7th.—Photo-electric cells. Practical examples of television transmitters, both mechanical and electrical. Control equipment.

May 14th.—Why ultra-short waves are necessary. Signal wave form. Light modulation.

May 21st.—Cathode-ray tubes. Time base and exciter equipment.

May 28th.—Practical examples of television receivers. Importance of synchronising.

June 4th.—Large screen television. Commercial developments. Special applications.

Forms of admission to the course may be obtained on application to the Principal at the Institute.

How to reach the Institute : Train to West Norwood or Tulse Hill stations; trams numbers 33, 48 or 78 to West Norwood terminus; 'buses numbers 68 or 169 pass the door; number 2 passes within two minutes' walk of the Institute; number 49 passes Knight's Hill.

Polskie Radio

IN our issue of April 4th, under the heading "Broadcasts from Russia," we published a note concerning short-wave broadcasts from Babice, near Warsaw. The heading should, of course, read "Broadcasts from Poland."

Aircraft Watch-keeping

THE Air Ministry have issued the following notice to aircraft radio operators :—

No. 1 of the Year 1936.

AIRCRAFT WATCH-KEEPING.

1. Cases have been brought to notice of important radio messages being missed owing to interrupted radio watch on aircraft.

2. Attention is drawn to the importance of maintaining continuous listening watch during flight, particularly in congested areas.

3. If radio watch is interrupted by "atmospheric" storms, the appropriate radio station should be notified.

By direction of the Secretary of State,
C. Ll. Bullock.

Air Ministry, London, W.C.2.

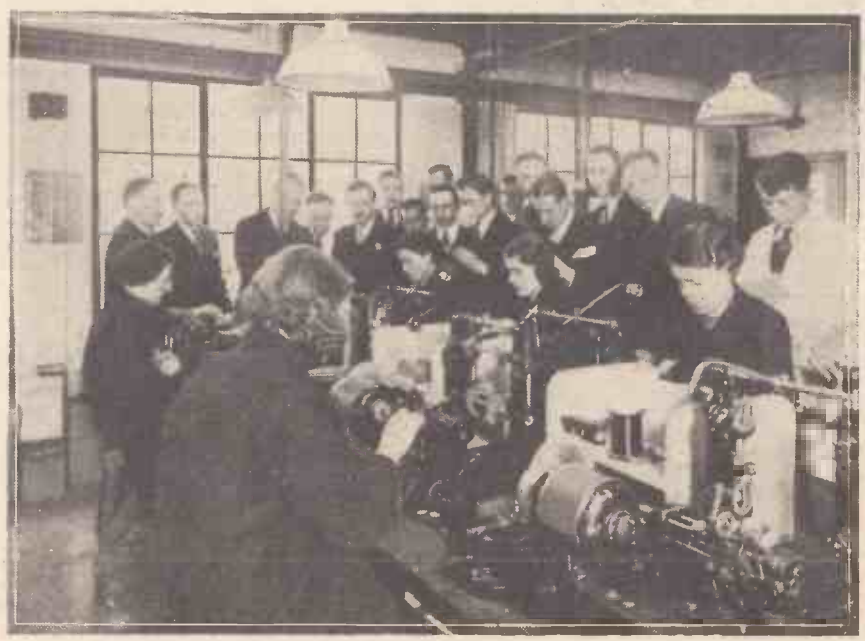
"Week-end Out of Doors"

WITH the beginning of summer a series of what might be termed "composite talks" appears in the Northern Ireland programmes. The object of these talks is to offer advice to listeners on the best way of spending the week-end, and this advice will be given by experts in week-ending : yachtsmen, motorists, hikers, cyclists, anglers, and so on. The talks will be read each Friday by an announcer. This series, the first broadcast of which will be given on May 8th, will surely be welcomed by British listeners, for "the week-end" is something characteristically British.

Amateur Broadcast

THE first Amateur Hour to be given in this country—a programme contributed entirely by members of amateur operatic societies—will be broadcast from Regional on May 1. The programme will be on the lines of the famous "Songs from the Shows" series and will be compèred by John Watt. It has been arranged by Gale Pedrick, with the assistance of Frederick G. Lloyd. The programme will include songs, duets and choruses from comic opera and musical comedy, and has been drawn up with the idea of showing the high standard of amateur talent. It is stressed that this "Amateur Songs-from-the-Shows" will in no way offer competition with professional actors and actresses, but is in the nature of a friendly comparison.

Among those who will sing are members of the Stock Exchange, underwriters at Lloyds, members of the Societies sponsored by the "Big Five" Banks, typists, travellers, and others who work on the railway and in transport generally. Although for this first broadcast many singers will come from London Societies, there will be others to represent the rest of the country. In the programme being drawn up by Mr. Pedrick and Mr. Lloyd there will be singers from Scotland, Wales, the Midlands, and the West Country. Mr. Pedrick is a well-known writer on the amateur theatre and Mr. Lloyd is Controller of the Scala Theatre, London, and an expert producer of amateurs. There will be a military chorus and tap-dance in the programme, a double octet for chorus-work, and Stanford Robinson is to conduct the Theatre Orchestra.



A party of students interested in manufacturing processes in the W/B factory.

New Northern Ireland Regional Transmitter

IN connection with the above station, particulars of which were given in the April 4th issue, it is interesting to note that amongst its equipment are included a number of large Ferranti choke coils, the following being brief specifications :—

Two 5-henry oil-immersed choke coils, each capable of carrying 35 amps. D.C. plus 5 amps. R.M.S. at 30 cycles, insulated for a working pressure of 20,000 volts D.C.

Two 25-henry oil-immersed choke coils, each capable of carrying 2.5 amps. D.C. plus 1 amp. R.M.S. at 40 cycles, insulated for 20,000 volts D.C. working.

Two air-cooled choke coils having an inductance of 20 henrys when carrying 0.6 amps. D.C., insulated for a working pressure of 5,500 volts D.C. These chokes are over 6ft. high and weigh 3¾ tons.

With regard to the 5-henry oil-immersed chokes, we believe these to be the largest in use by the B.B.C. In the largest of these chokes the iron core weighs not less than one ton; 8 cwts. of copper are used in the windings, and 230 gallons of oil for filling the tank.

Specialists

As is well known, Ferranti Ltd. have had very many years specialised experience in the manufacture of choke coils for all purposes, from the largest sizes, such as the foregoing, down to the smallest, which may weigh as little as 1lb., as used in wireless receivers.

That Brasov-Huizen Mixture

DOUBTLESS some steps will have to be taken to clear the channel used by these two high-power broadcasters (1,875 m.—160 kc/s) as most listeners complain that it is impossible to secure clear reception of either programme. There is, unfortunately, no other channel through which the Huizen broadcasts can be heard, but the Romanian entertainments may be well received from Bucharest direct on 364.5 m. (823 kc/s), immediately below the condenser setting for Milan.

TWO NEW PORTABLES

DETAILS have just been received of two portables which have been introduced by well-known manufacturers to take advantage of the forthcoming fine weather periods. At this time of the year there is a demand for a receiver which may be taken into the open air and used on picnics, etc., although there is also a good field of utility for a simple type of receiver which may be carried from room to room independent of any aerial or earth system.

The Burndept portable showing the loud-speaker grille outside the cabinet.

Such a receiver must incorporate a frame aerial and must also house the batteries, and one of the great drawbacks to this type of receiver is the overall weight. In both of the receivers shown here the weight has been reduced to a minimum, but the period of activity of the batteries has not been unduly shortened. Obviously a very small H.T. battery may be used in order to reduce weight, but then the length of life will be correspondingly shortened, and in these two receivers the circuit has been so designed to take advantage of low consumption and other factors, and thus permit of good service without undue bulk.

The Burndept "Attaché"

The first model is from Burndept, and this weighs 14¾lbs. with new batteries ready for use. The overall size is 11⅜in. by 6¾in. by 9½in., and resembles the ordinary type of leather-covered attaché case. The receiver employs high-efficiency S.G. H.F. amplifier and detector valves and feeds a permanent magnet M.C. speaker. Both broadcast wavebands are covered, the medium waveband being from 200 to 550 metres and the long wave from 850 to 2,000 metres. The case is covered throughout in grey crocodile leatherette, and is fitted with lock-type fasteners which prevent it from falling open unexpectedly. The price is £5 18s. 6d.

The Vidor Portable

In the Vidor model the weight has been reduced to a minimum and is approximately 14lbs. The dimensions are 11⅜in. by 6¾in. by 9½in., and an important feature is that the speaker is mounted in the lid which is fretted on both sides, thus permitting the set to be used with the lid either open or closed. The case is covered in stout brown crocodile leatherette, and lock-type fasteners are fitted for safety. The price complete with batteries is £5 18s. 6d.

The new Vidor Portable showing the small and neat control layout.

£4 SUPERHET REFINEMENTS

(*Continued from page* 185)

deflection of the meter is not lower than the normal current consumption of the detector valve the use of a low scale deflection meter is distinctly advantageous, of course. If H.T.1 is plugged into the 60-volt socket, a 2 mA. meter may be used. When no signal is being received a reading of between 1½ and 2½ mA. will be registered, according to the voltage applied to H.T.1, but when a strong signal is received the current consumption of the detector valve will decrease, as the valve works on the leaky-grid principle. The exact tuning point can therefore be obtained by rotating the tuning control to a point at which the minimum reading is registered on the meter. The meter can be mounted at any convenient position provided that its connecting leads are not too long.

£4 Superhet Troubles

Some readers have had trouble in trimming this receiver, but no difficulty should be experienced if the specified coils, gang condenser and tuning dial are used. It is only necessary to adjust the trimmers of the I.F. transformers and C2 until stations tune in at the correct scale reading on the medium wave-band; if stations tune in at the correct reading at approximately 250 metres but tune high at 500 metres it indicates that the I.F. transformer trimmers have to be rotated in an anti-clockwise direction.

We have examined a few receivers that have been fitted with a straight .0005 mfd. gang condenser instead of the 465 k/cs type. The latter can easily be differentiated from the straight type as the moving vanes of the back section are much smaller than those of the front section.

In cases where no H.T. current consumption is registered, and the valves are known to be in order, the M.B. connections should be suspected, and if the metallised surface of the chassis is very dirty it is advisable to join the M.B. screws by means of ordinary connecting wire.

TELEVISION NOTES

Television's Finance

WITH the financial year commencing on April 1st, 1936, the B.B.C. will have an extra quarter of a million pounds for broadcasting, while the provision for television is £60,000. This, of course, does not take into account the very big increase in income which was proposed by the Ullswater Committee. This and other proposals of the committee have yet to be considered by the Government. There is no doubt that as far as television is concerned the amount will be increased very substantially, for on the programme side alone the proposals are of a very ambitious nature and in the first few months at least will necessitate fairly heavy payments.

Service Range

During the course of an interesting address to the Television Society, Sir Noel Ashbridge made it very clear that the B.B.C. are completely in the dark concerning the service range of the ultra-short-wave signals which are to be radiated from the Alexandra Palace. Not only the range, but the signal strength in London and the suburbs are two items of extreme importance to manufacturers of television receiving sets. The figures when available will govern the degree of gain in the radio sets so as to ensure that the required picture signal is well above any form of mush or interference signal. Judged from a contour map, the Alexandra Palace aerial, standing 600ft. above sea-level, gives a very satisfactory "horizon range," but it is hoped that this distance will be exceeded under working conditions so as to embrace a much larger number of potential recipients of the dual sound and vision signals. Tests both at home and abroad have proved very conclusively that the shorter the wavelength in this ultra-short-wave region, the greater is the shadow or masking effect of hills, large buildings, etc., while the forms of interference peculiar to these transmissions become more pernicious the lower the wavelength. Until data has been collated on all these points, therefore, it seems certain that for a period at least there will be little change in the degree of picture definition. If the number of scanning lines per picture is increased, then automatically the frequency of the carrier wave should increase in order to maintain the figure for frequency modulation. According to theory the Alexandra Palace aerials for sound and vision have been designed to give a radio beam which will be similar in characteristic to a lighthouse beam except that it will not revolve, but will be like rays of light from a shaded lamp.

Where Television Will Help

It is now learned that the reserved seats in the principal stadium of Berlin where the 1936 Olympic Games are to be held are sold out. This will add special value to the proposed television transmissions which are to be carried out at that period, as it will enable those who are unable to gain entrance to see in miniature what is happening by watching television screens. According to reports the actual scanners themselves will be located underground, and the only evidence of their presence will be periscopes protruding at every point of vantage. Now that television development in Germany has come under Government jurisdiction no equipment details or data concerning the results achieved are being made known, this applying specially to the wholly electrical methods of scanning in which it is claimed the Telefunken Co. have made considerable strides. Perhaps a little nearer the actual date it will be possible to glean further information, as was the case in the telephone and television experiments inaugurated at the Leipzig Fair.

Demonstrating the latest type of Baird television receiver which gives a brilliant black and white picture measuring 12 in. by 9 in.

Television at Olympia?

Conjecture is already rife concerning the possibility of including television in this year's Radio Exhibition which will be held at Olympia in August. Last year all reference to television was banned by the R.M.A. organising committee, an action which provoked considerable comment, and was in striking contrast to the German policy, where a large section of the Exhibition in Berlin was devoted to a display of both transmitting and receiving equipment for the public to examine. The marked opposition of some sections of this country's radio trade to television in general is a policy which seems very short-sighted. The present high quality of the received pictures and the rapid rate of development are two factors which cannot be overlooked, and the public are entitled to see results. The idea that television is liable to upset the sale of ordinary radio sets has been proved quite wrong, and Radiolympia seems to be an ideal place where the television service initiation can be featured. It will certainly restore the attendance figures to normal, and make good the drop which occurred last year, so it is to be hoped that every facility for public shows will be afforded for those who are keen to judge for themselves present-day high-definition television pictures.

Positive or Negative Films?

Several times the question has been raised concerning the transmission of films by television wherein both the actual film negative may be scanned in some cases, whereas prints from the film negative may be used in others. The real point at issue relates to the methods which have to be adopted in order to ensure that at the receiving end the picture is correct in so far as the whites and blacks are in their correct order. With the normal tele-cine scanner, whether disc or electronic, standard film prints are employed just as supplied to a cinema. That is to say, they resemble an ordinary photograph, where black is black and white is white. Knowing that when passing through the signal amplifier stages, phase changes are effected with certain types of interstage coupling, it is merely a matter of standardising the number of these to ensure that white in the picture brings about increased intensity modulation at the receiving end and black *vice versa*, in order to maintain the correct relationship of picture shading. When a film negative is to be scanned, as would be the case with intermediate film apparatus, one of the stages which brings about a phase change must be switched out, or another stage added.

Air Safety and Television

Steps are now being taken to equip some of Britain's airports with apparatus to guide aeroplanes to the ground when visibility is obscured by fog. Receiving apparatus in the aeroplane picks up a radio beam from the ground station and instruments in the cockpit guide the pilot along the beam to the ground. The beam transmission has a small range, while it is essential for the successful working of the equipment that no interference from other stations or electrical machines should upset the received signal. It is for this purpose that a wavelength in the ultra-short-wave region is to be used, nine metres being mentioned as a possibility. Furthermore, each ground station must work on the same wavelength to enable the pilot to land in different countries or different districts. If nine metres is adhered to then no interference from television transmitting stations should be experienced as the stations usually work between 6 and 7½ metres. If, however, it is found that to safeguard commercial flying 9 metres is too long, the television stations may be compelled to increase their carrier frequency.

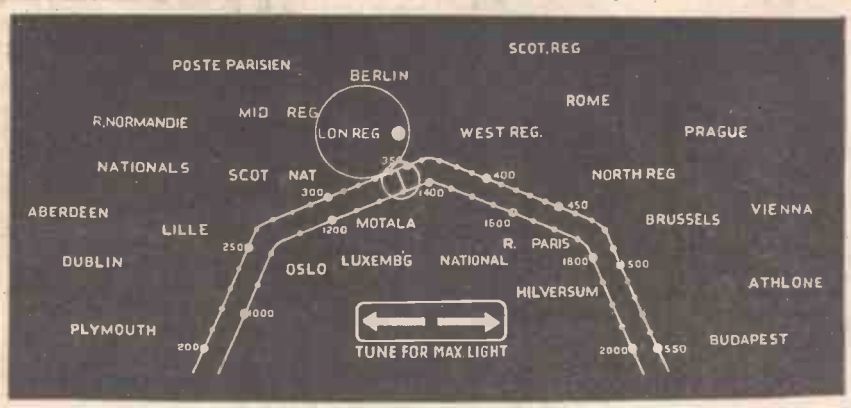
THE NEW H.M.V. - - RECEIVERS - -

Some Details of the Modern Refinements which are Incorporated in the Latest H.M.V. Receivers

ALTHOUGH the home-constructor is not primarily interested in the commercial receiver, he should familiarise himself with the features which are embodied in the modern commercial set, as he will wish to emulate the principles involved in such features as the tuning indicator, or will desire to keep himself up to date in the knowledge of receiver design. The latest H.M.V. receivers embody a number of features which are completely original and which have not been seen before and therefore we feel justified in devoting some space to a discussion of these features.

The first important feature in these receivers is the tuning indicator, and the principles involved in this have given rise to the name by which the sets are known. The makers have called it the "Station Selector Ray" and this device will go a long way to popularising the receivers amongst non-technical listeners. There have been many ingenious tuning devices seen from time to time, but generally they are of single application. That is to say, they will appeal either to the non-technical user, or to the more keen listener who is concerned with station searching under all conditions. In this new selector ray indicator both categories are adequately catered for, and the illustration of the dial which is shown on this page will show how the location of a station is carried out. First, the names of the more important stations are spread out more or less at random over the large rectangular panel, which is black and opaque, and the customary scale is given in the centre of the panel in unusual form. Two parallel lines are marked with dots corresponding to the various wavelengths in metres and beneath there is a double-headed arrow which serves as a visual tuning indicator. When the receiver is switched on a thin ray or strip of light is projected from behind the scale on to the marked scale and it extends from one line to the other; this gives an exact indication of the exact wavelength to which the receiver is tuned, but for the listener who is not concerned with wavelengths or frequencies, an additional spot of light is also projected at the same time, and this illuminates a mark at the side of the station name to which the set is tuned. As the tuning control is turned this light spot is extinguished and when the next station is arrived at the appropriate name is illuminated and so on, whilst the ray of light travels slowly across the tuning scale. The accuracy of tuning is controlled by watching the light on the double-headed arrow, and as may be seen by the lettering under this panel, the set is adjusted for maximum light.

One of the new Selector Ray receivers. This is Model 445 and shows the new speaker fret as well as the novel tuning dial.



This illustration shows the method of tuning indication which is called by the manufacturers "Station Selector Ray."

The Loudspeaker

A new feature is also incorporated in the loudspeaker, which has been designed to provide more even amplification and diffusion, and instead of using the customary circular cone the diaphragm in these models is elliptical in shape and has a very wide angle. This results not only in better diffusion but gives improved response due to the fact that the cone is in effect more rigid, and it acts in a totally different manner from the familiar cone having a circular edge. To take full advantage of this new reproducer the speaker fret or opening has also been modified, and in the model shown on this page it is carried round the sides of the cabinet and the appearance as well as the tonal response is enhanced, by using a special metallic gauze in place of the now familiar silk.

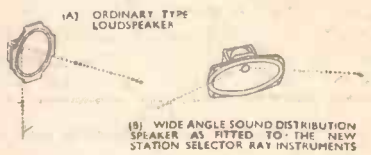


Diagram showing the angles covered by the old and the new speakers.

PROGRAMME NOTES

A Play by R. C. Sherriff

PURSUING his policy of instituting a personal campaign among famous dramatists for original microphone plays, Val Gielgud has invited R. C. Sherriff, whose "Journey's End" was one of the most sensational theatrical successes of recent years, to write a play specially for broadcasting. Mr. Sherriff has accepted, but will not divulge the plot of his latest venture; it is understood, however, that the play will not deal with the Great War.

"Between Ourselves"

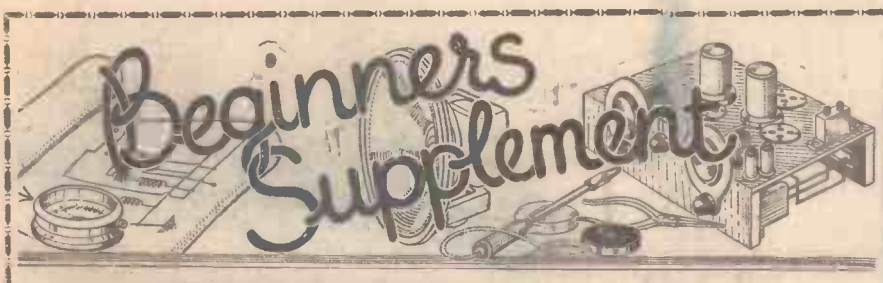
VINCENT LADBROOKE and his music, with Dick Barker, vocalist, will give a programme of sweet harmony under the title "Between Ourselves," from the Midland Regional on May 7th. This band had its first studio broadcast about six weeks ago. Mr. Ladbrooke, who was born in Birmingham, is running five bands in the Midlands.

Memories of the Klondike Gold Rush

THE series of talks entitled "I Remember" is being continued in the West of England programmes under the title "Personally Speaking," and on May 5th G. A. Street will give his reminiscences. He has been actor, author, cowboy, and intelligence officer, and his wanderings have enabled him to speak six languages fluently. He went to Klondike during the gold rush of 1897, and he will tell listeners about the thrilling experiences he had at that time.

B.B.C. Midland Orchestra

REGINALD BURSTON will conduct the B.B.C. Midland Orchestra on May 7th in a programme which is to include the Montague Phillips suite, "In Maytime," and a number of songs. The vocalist, Cuthbert Reaveley, is Lord of the Manor of Kinnersley in Herefordshire, and has the record of being the only regular officer to sing in Covent Garden opera. He made his reputation as an operatic singer on the Continent under the name of Carlo Rivoli.



IMPROVING SUMMER-TIME RECEPTION

Although Reception Conditions are Not So Good in Summer As in Winter a Good Deal can be Done to Compensate for Losses in the Transmission as Explained Here.

EACH year at about this time the PRACTICAL AND AMATEUR WIRELESS Technical Staff is besieged with letters from comparatively new listeners who think that their receivers have suddenly become inefficient. The point is that conditions, as far as long-distance reception is concerned, become rapidly worse with the approach of lighter days. It is not necessary fully to explain the reason for the impaired conditions, but it should be made quite clear that signals do not travel anything like as well over any other than short or "local" distances during hours of daylight as they do after dark. The chief reason is that that portion of the transmitted signal which is radiated in an upward direction is not reflected back in the same manner as it is when the ionised upper atmosphere known as the Heaviside Layer is in darkness and acts as a satisfactory "mirror."

Selectivity Less Important

But it is not the reasons for the impaired reception which interest the average reader, but the methods of compensating in whatever measure is possible for the conditions, by modifying the receiver or aerial system. It is generally realised that the various methods which are employed for increasing the selectivity of a receiver necessarily have a certain adverse effect on the sensitivity of the set; thus, it is feasible to consider the possibility of dispensing with some of the aids to selectivity, at least, until next winter. In many instances the *apparent* selectivity will not be reduced when the various sharp-tuning devices are eliminated. This is because the number of transmissions which can be received at comfortable strength is limited, particularly when a receiver of the simpler type is employed. At the same time, it will very often be found that by making slight alterations most of those signals which provided pleasurable reception during winter can still be heard, although perhaps at slightly reduced strength.

Aerial-Earth System

The very best and most fundamental method of improving reception during the lighter months is by increasing the length of the aerial, particularly when this has been cut down to 40ft. or 50ft. in order to obtain the necessary degree of selectivity. This applies to both outdoor and indoor aerials and, where possible, aerials of the latter type should be replaced by others erected outside the house. Particular attention should also be paid to the earth lead, and if the previous one has been in use for a year or so it will nearly always prove well worth while to replace it. If a buried plate or tin box is employed this might be dug up, the wire re-soldered and the plate replaced as low as possible with a mixture of common salt and finely-crushed ashes packed round it; the latter mixture helps to retain moisture and to absorb further moisture, which, during dry spells, should be provided by pouring a bucket of water over the earth connection. The special chemical earthing devices which are obtainable cheaply are particularly good during the summer months, because the chemicals used have the property of attracting moisture and ensuring good connection between the earth plate and the surrounding soil. Even when a chemical earth has been in use before, it is a good plan to replace it, since the chemicals do become exhausted after a time.

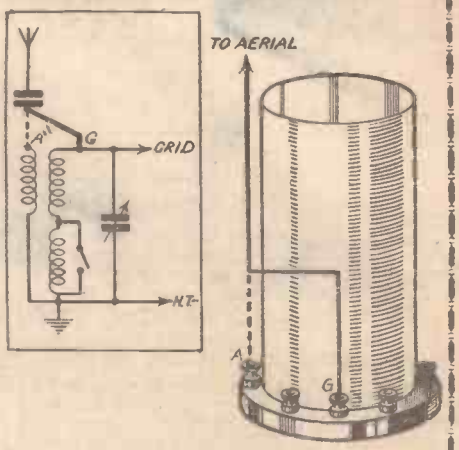


Fig. 1.—Sensitivity can sometimes be improved by modifying the aerial connection as shown above by the heavy lines.

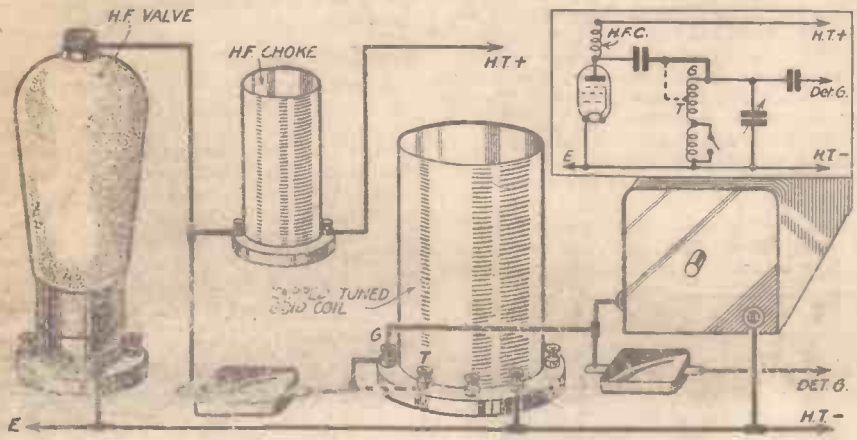


Fig. 2.—Another method of improving sensitivity by altering the connection to the tuned-grid coil.

Eliminating Selectivity Devices

Where a fixed or variable condenser is used in series with the aerial lead it might satisfactorily be disconnected or increased in capacity for the summer months. If the condenser is variable, the method of increasing the capacity is obvious, but the maximum capacity of the component might not be quite enough. Thus, if the condenser used is rated at less than, say, .0005 mfd. try the effect of putting a .0003-mfd. fixed condenser in parallel with it. Another arrangement which may be tried is to disconnect the aerial lead, or the series condenser, from its usual terminal and to join it instead

(Continued on facing page)

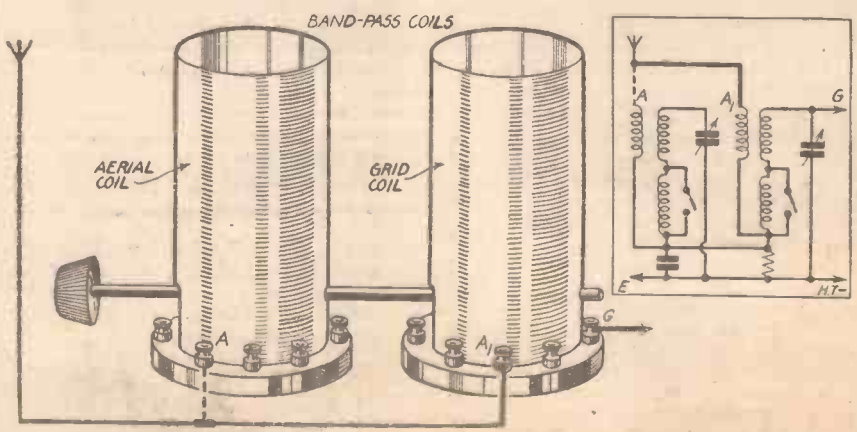


Fig. 3.—When a band-pass filter is used an improvement may often be effected by transferring the aerial connection to the second coil. The connections shown above may have to be modified according to the exact coils used.

BEGINNER'S SUPPLEMENT

(*Continued from facing page*)

to the fixed vanes of the tuning condenser which operates on the aerial coil, as shown in Fig. 1. It should be remembered that this is not always a satisfactory solution, since in some cases the alteration might affect the ganging when a two- or three-gang condenser is used.

A similar change can be made when the anode of a screen-grid valve is connected to a tapping on the following grid coil; the connection should be changed so that the coupling condenser is joined directly to the grid end of the coil, as shown in Fig. 2. After this has been done it will probably be necessary slightly to modify the settings of the trimmers on the gang condenser. As an alternative or additional modification, the condenser used to couple the anode of the screen-grid valve to the tuning coil might be increased in capacity.

Should a band-pass filter circuit be used it will often be found worth while to eliminate the first tuned circuit by transferring the aerial lead to the second coil

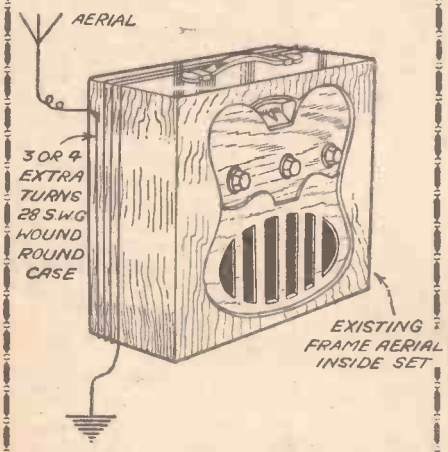


Fig. 4.—A simple and effective method of connecting aerial and earth leads to a portable.

as suggested in Fig. 3. Here again it might be found necessary to modify the trimmer settings, and this can be tried.

With a Portable

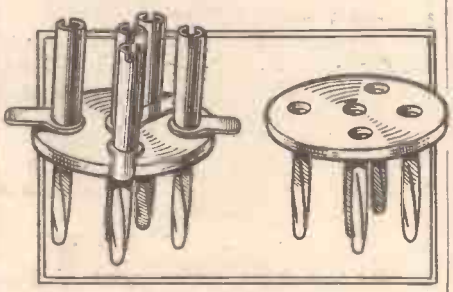
In those few cases in which a frame aerial is used—mainly in conjunction with a portable receiver—it will generally be found that by making a very slight alteration summer-time reception can be as good as that obtained in winter. The alteration consists of using an external aerial in conjunction with the frame, the latter serving merely as a tuning coil. One method is to connect the external aerial to the grid terminal of the first valve through a .0002-mfd. fixed or pre-set condenser, and the other is to wind a few turns of wire round the frame, or even round the outside of the containing case, joining the aerial to one end and the earth to the other, as shown in Fig. 4. An additional improvement might be obtained by connecting the earth end of the new winding to the negative terminal of the accumulator, or to H.T. negative in the case of an A.C. mains set; if the receiver is operated from D.C. mains this connection should *not* be used. The number of turns used for the improvised aerial-coupling winding is not critical and depends largely upon the distance of the turns from the frame aerial winding itself.

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

New Clix Accessories

TWO new Clix sockets have just been received for review and they are shown below. On the left is the Tapping Adapter, skeleton type, which is designed for any apparatus where it is desirable to include external wiring with a valve and its associated holder. Such examples are to be found in the Short-wave Converter; anode, screen grid, or grid current and voltage readings, etc. As may be seen, the device consists of a disc of paxolin upon which is mounted a combined plug and socket. These are screwed together and a soldering lug is clamped between them. Consequently, the adapter may be inserted into a valveholder and the valve then inserted into the adapter, when any desired lead may be joined to the projecting lugs. In the model submitted to us the lug for the centre connection was brought out between the grid and filament sockets and it needed only a slight twist to loosen it, when it was free to rotate and come into contact with either the grid or filament socket. As there is a risk of this



Two new Clix lines, an adapter and a useful multi-purpose socket.

burning out a valve or causing other damage the constructor should take the precaution of slipping a length of systoflex or similar insulating material over the lead and lug after the lead has been soldered into position.

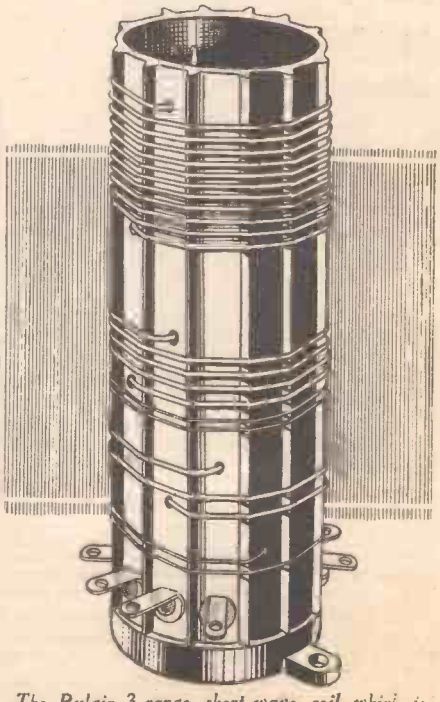
The remaining component is a miniature Multiplug, skeleton type, and is intended for loud-speaker connections or other multiple connecting or junction point, and the sockets are smaller than standard valve legs to avoid any risk of wrong use. The price of this component is 4d. for the 4-pin, 5d. for the 5-pin, and 6d. for the 7-pin type, whilst the Tapping Adapter costs 9d., 10d., or 1s. for the 4-, 5- or 7-pin model.

Wearite Price Reduction

THE importance of the design of the H.F. choke is well known, and the use of an iron core to such a component is rather unusual. When properly designed, however, the core enables a higher inductance to be obtained with lower self-capacity and less stray field than a similar type of choke without the core, and in many circuits it will be found that such a component gives a decided improvement. It may be used in all-wave circuits of either the straight or the superhet type, and the Wearite component, type H.F.O., has an inductance of 250,000 mH, with a self-capacity of only 3.5 mmfd. The effective range of this choke is from 10 to 2,000 metres, and the D.C. resistance is 190 ohms. The price has now been reduced to 4s. 6d.

Bulgin Triple-range Short-wave Coils

GREATER entertainment is obtained from a short-wave receiver when a large wave-range is covered without the necessity for coil changing, and this applies particularly when more than one coil is employed. The coil illustrated below is designed and manufactured by Messrs. Bulgin and covers three separate short-wave ranges, covering the entire bandf rom 12 to 95 metres in three steps which overlap slightly to avoid blank places in the short-wave range. Each section is complete with grid and reaction winding, and two separate models are made, one designed for the aerial circuit and the other for use as an oscillator coil in a superhet. The grid winding is wound with tinned-copper wire and the remaining winding is of silk-covered wire, and the turns are accurately placed and afterwards cemented to prevent alteration of inductance and consequent modification of tuning points. For wave-changing the Bulgin type S.122 switch will be found admirable. The three wavebands covered are approximately from 12 to 25 metres, from 24 to 49 metres, and from 48 to 95 metres, with a .00015 mfd. tuning condenser. The coils are 1½in. in diameter and 4½in. in height, with holding-down lugs moulded into the base. The price is 3s. 6d. each.



The Bulgin 3-range short-wave coil which is reviewed above.

RADIO CLUBS AND SOCIETIES

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

THE GOLDERS GREEN AND HENDON RADIO SCIENTIFIC SOCIETY

MEMBERS of this society paid a visit recently to the laboratories of Mr. J. H. Reyner, B.Sc., A.C.G.I., D.I.C. The tele-cine transmitter was first inspected and explained, and afterwards demonstrated. A cathode-ray scanner using 6,000 volts H.T. is used, the film being analysed by photo cells which are amplified by a seven-stage amplifier containing correcting circuits to compensate for capacity loss and aperture distortion. The receiver used was of great interest in that it could be used to demonstrate a varying number of lines, different picture speeds, and the effect of top and bass loss. A 90-line direct vision transmitter afterwards was demonstrated. A three-foot scanning disc was employed, on to which was focused the image of various members present, and followed by a nine-stage photocell amplifier. A synchronising signal is generated by a separate photocell and amplifier. Battery valves were used throughout. The picture shown on the cathode-ray tube was most pleasant, and although it was placed within a few feet of two 3 kW spot lights, its brilliance was fully adequate.—H. Ashley Scarlett, 60, Pattison Road, Hampstead, N.W.2.

THE CROYDON RADIO SOCIETY

THIS society concluded its reunion on April 7th in St. Peter's Hall, Ledbury Road, S. Croydon, with the annual general meeting, presided over by Mr. G. S. Vellacott, vice-president. Officers elected for next season were: Chairman, Mr. W. J. Bird; vice-chairman, Mr. W. S. Y. Hancock; hon. treasurer, Mr. C. R. Amos; hon. secretary, Mr. H. G. Salter, and hon. publicity secretary, Mr. E. L. Cumbers. The programme committee was re-elected with an additional member in Mr. R. P. Jones, hon. librarian.

After a vigorous discussion on the society's future policy which threatened to become lengthy, Mr. Salter concluded the evening with one of his programmes on records. He said that since his last concert the nation had suffered an irreparable loss, and so the records of speeches of King George V were very fitting. Included were those given on Jubilee Day and Christmas Day, 1935, and it was realised that here was a use of the gramophone for the future when similar historic events could be kept for succeeding generations.

The publicity secretary will be pleased to give PRACTICAL AND AMATEUR WIRELESS readers any information and a welcome to the opening meeting of the next season in October.—Hon. Publicity Secretary, Mr. E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

BRADFORD SHORT-WAVE CLUB

THIS club had a very interesting evening on Friday, April 17th, when Mr. L. A. Warbrick, of Messrs. Lissen, Ltd., gave a lecture and demonstrations of the Lissen Allwave Superhet (A.C. model), and also of their Kit receiver "The Bandspread Three."

Mr. Warbrick explained the circuit of the Allwave "Super," how A.V.C. comes into operation, and the use of the variable selectivity control which is incorporated in the receiver, illustrating this with fidelity curves.

The club is now affiliated to the British Short-Wave League, for which the club's secretary is the Yorkshire representative.

The Bradford S.-W. Club is the Bradford Chapter of the British Long Distance Listeners' Club. All particulars may be obtained from the Secretary, Mr. G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

BOOKS RECEIVED

TALKS FOR DISCUSSION GROUPS

IN a pamphlet issued by the B.B.C., and intended for the use of group leaders, particulars are given of the series of talks which will be given during May and June. These talks will consist of four series, the first being by Professor J. Ritchie with the general title of "Behind the Scenes in Nature." These talks will be given on each Monday until June 22nd. Following twelve spring talks on the Public Social Services, a new series entitled "The Voluntary Social Services" will be broadcast each Thursday until May 21st. On Tuesday evenings until June 23rd, Professor R. Coupland and H. V. Hodson will talk on "The British Commonwealth and Colonial Empire."

A series of late evening talks will be "Down to the Sea in Ships: 1. Sea Communications," and at 10.0 p.m. on Tuesdays until June 16th the world of shipping will be reviewed from a wide variety of angles by such speakers as Mr. Leslie Runciman, Sir Richard Holt, "A Seaman," Lord Essendon, and Sir Alan Anderson.

Other evening talks will include the popular "Topics in the Air" (Saturdays: half an hour between 8.0 and 9.30 p.m.) and occasional examples of the series "Is that the Law?"

The new series of weekly talks with the title "World Affairs," which began recently, will continue every Monday at 10.0 p.m. The speakers will include Sir Frederick Whyte, Raymond Swing, and F. A. Voigt.

LETTERS FROM READERS

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

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

Times for Best S.W. Reception

SIR,—Reading the various reports sent in by short-wave amateurs, I noticed the lack of reports of European and DX stations received during daylight hours. I find the hours given below best for receiving the various countries.

7 *Mc.* (42 *metres*),

07.00 hours to 12.00 hours—VK, ZL, PA.
12.00 hours to 17.00 hours—F, SM, OZ, YL, W4, PA, OK.
17.00 hours to 19.00 hours—F, HB, ON, W, I, CN, FA, FT, OE, VP3, EA, CT3.

14 *Mc.* (20 *metres*).

07.00 hours to 12.00 hours—W, VK, ZL, D, SM, U, LA.
12.00 hours to 17.00 hours—J, ES, LA, VO, W, ZBi (Malta), OK, ZC6, OH.
17.00 hours to 19.00 hours—W, VE, VO, VP6, J, KAi, CM (O), OE.

These stations are received, of course, mostly on C.W. (Morse), but a great number can be received on 'phones if a good receiver is employed.

During the past month I have received the following at good signal strength on the 7 and 14 Mc. bands:—

CM8MN, FA8CC, FT4AG, VO1I, HB9T, HB9P, LA1G, LA4A, ZL4FW, VK2QH, YL3TH, D4DIC, D4SNP, ZB1H, OH3OI, PA0DK, U9QM, U9MJ, OK2PN, ZC6CN, OK2SR, SM6UQ, OZ4J, TS3MA, ES5C, OE3AH. All these stations were received on an 0-V-2 set, with 'phones, and Hertz type aerial.

May I congratulate your paper on being by far the most interesting weekly wireless journal, and for containing such interesting news for the short-wave enthusiast!—DESMOND M. WHITEHOUSE (Cannock, Staffs).

A S.W. Log from Buntingford

SIR,—I have been a reader of your excellent paper for two years, and I think it is one of the best wireless papers published. I have not seen a short-wave log from this district, so I forward mine, as follows:—

W2XAD, W2XAF, W8XK, W2XE, W1XAL, W3XAU, W1XK, W3XL, W3XAL, W4XF, W8XAL, WQP, VK3LR, VK2ME, VP3MR, COCD, CJRX, HAS3, VUB, JVM, VQYLO.

All these stations were received during March. I have just received a QSL from VK2ME. I would like to get in touch with another S.W. listener in this district.—F. C. SMITH (Church Gate Cottages, Buntingford, Herts.)

Back Numbers Available

SIR,—I have several back numbers of PRACTICAL WIRELESS from No. 1 up to about June, 1935, and also issues from 1931 to 1934 of AMATEUR WIRELESS.

If any of your readers would care to communicate with me I should be happy to forward the issues they may require, if they would enclose postage.—M. EAST (23, Seymour Street, Euston, N.W.1.)

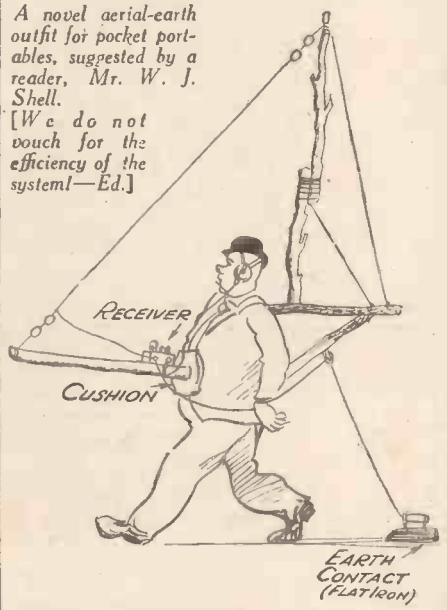
"P. and A.W." Volumes for Sale

SIR,—As I shall be shortly leaving this district, I am desirous of selling my seven *unbound* volumes of PRACTICAL AND AMATEUR WIRELESS. I may add that this includes all free blue-prints that have been presented from time to time.

Should any reader like to purchase all or any volume, perhaps he would be kind enough to get in touch with me, through the Editor.—L. G. SCULLARD (Boscombe).

Outdoor Radio Up-to-date

SIR,—An efficient aerial-earth system for the "pocket receiver" can be arranged as shown in the accompanying sketch. Best results are obtained if the listener walks in the road with the earth trailer on the tram lines.—W. J. SHELL (Bath).



A novel aerial-earth outfit for pocket portables, suggested by a reader, Mr. W. J. Shell.

[We do not vouch for the efficiency of the system!—Ed.]

"Practical and Amateur Wireless" Dated 14-7-34

SIR,—I would be very much obliged if any reader could supply me with (or loan or sell) a copy of the above issue, containing details of a "Home-Made Coil Two." I shall be pleased to pay postage, etc.—H. MOORE (National Bank House, Donnybrook, Dublin.)

[*Will our readers kindly note that several readers have complained of the non-return of loaned copies?*—ED.]

Back Numbers of "A.W." Wanted

SIR,—I should be very much obliged if any reader could supply me with a copy of *Amateur Wireless* containing the wiring diagram or blueprint of the Britain's Superhet, October 31st, 1931. I shall be pleased to pay for the book and postage for the same.—W. PRESCOTT (5, Strand St. West, Preston, Lancs.)

SIR,—I should be very grateful if any reader will loan me a copy of *Amateur Wireless*, dated May 6th, 1933. I will return it within a week.—J. FOIRET (132, Cromwell Road. Kensington, S.W.7.)

JVP (Japan) Wants Reports

SIR,—I have just received a verification from Station JVP (Japan), and in the letter they request me to ask all listeners who have heard this station to report to them and they will receive a QSL card. The address of the station is Kokusai-Denwa Kaisha, Ltd., No. 3I -chome, Uchisaiwaicho, Kojimachiku, Tokyo, Japan. At present they broadcast only on Tuesdays and Fridays.—WILLIAM TENNANT (Johnstone).

A Challenge!

SIR,—I have often heard that a simple detector-L.F. set on the short-waves is capable of receiving as many countries as a big superhet. So I decided to see how many countries I could get from 00.00 hours on April 1st to 00.00 hours on April 3rd. I succeeded in logging a total of 39 countries as follows: 00.00 hours, April 1st to 00.00 hours April 2nd: W6HEW R6 (Portable); NY2AE, R4; CT2AB, R8; TI2HU, R8; VK2IG, R5; OH3NP, R7; U2AZ, R6; LA4R, R6; OK2AQ, R6; VE1HG, R5; ON4REX, R8; YL2BB, R7; F3CP, R8; D4GND, R8; OZ2N, R5; SM7WS, R8; SP1EB, R7; OM2N, R5; VS8RA, R8; ES5C, R7; OEFH, R7; EI8B, R7; VO4X, R6; VQ3FI, R5; HB9AY, R6; ZL4AO, R4; CO8RT, R8; ZB1H, R7; PA0BN, R5; LU1AH, R6.

00.00 hours, April 2nd to 00.00 hours, April 3: PX1A, R6; D3BEN, R6; VP5PZ, R5; EA8AV, R6; ON4EJ, R7; K3HJ, R5; YA1OD, R7; XE2AC, R3; G5NI, R5.

Wavebands used were 20 and 40 metres, and the stations are in chronological order. It will be seen that all continents have been heard as VK2IG represents Oceana, VS8RA represents Asia, VQ3FI represents Africa, D4GND represents Europe, W6HEW represents North America and LU1AH represents South America. Also many lesser-known countries.

Now, you owners of big sets, prove yourselves!—J. S. TUKE (Broadway, Worcestershire).

CUT THIS OUT EACH WEEK.

Do you know

—THAT practically every type of receiving aerial is directional, and thus should be erected with some care and thought.
—THAT iron should be avoided in the H.F. portions of a receiver unless a sound knowledge of its action is first obtained.
—THAT copper, aluminium, etc., are of little use in screening components from low-frequency radiations.
—THAT for a given output a push-pull stage is to be preferred to a single output stage.
—THAT the field of an iron-cored inductance is not so great as the field of a similar inductance without the core.
—THAT when interference is very bad it may prove of advantage to take the lead in from the aerial wire at the end remote from the house or receiver.
—THAT in such a case a screened lead should be employed in conjunction with an impedance-matching transformer to overcome the losses in the long lead.

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

Owing to the rapid progress in the design of wireless apparatus and to our effort 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.

QUERIES and ENQUIRIES

Battery Set and Energised Speaker

"I have a four-valve battery set in which there are two L.F. stages with a high-efficiency pentode output, and this is driven from a home-made mains unit. I have just had the offer of a well-known energised speaker, and if I can operate this from my set I should be glad of details and precautions, etc. Could you state whether the set is powerful enough to drive the speaker to give better results than my present permanent magnet type?"—B. N. (N.9).

YOU do not give any details of the field winding of the energised speaker and this makes it difficult to advise you concerning the best method of using the speaker. Firstly, if this is of the low-resistance type, designed for use with a 6-volt supply, you will probably find that your present permanent-magnet model is just as sensitive. If, however, it is of the high-resistance type, and your mains supply is of the D.C. type, then the speaker may be connected direct across the mains and will probably prove more sensitive than the P.M. model. If, however, your mains are of the A.C. type, then a transformer and rectifier (such as the Westinghouse H.T.12) will be required, and the additional expense is probably not worth while. If the correct matching transformer is used to feed the speaker the set should certainly operate it satisfactorily.

Push-pull Output

"I enclose a diagram of the output section of my receiver, from which you will see that two valves in push-pull are used. There are three terminals at the output, two to the anodes and one to H.T. positive, and these are joined to three terminals on the speaker used with the set. I have now obtained a new speaker, but this only has two terminals and I should like to know how to join it to my set. Should I have to get a centre-tapped choke, or another centre-tapped transformer?"—J. W. (Holmfirth).

IF you wish to use the new speaker in addition to the speaker at present fitted, the only additional components required will be two fixed condensers. These should have a value of 2 mfd. and one terminal of each condenser should be joined to each of the terminals which are connected to the output valves. The remaining terminals on the condensers should then be joined to the two terminals on the extra speaker. If, however, you wish to use the speaker in place of the present one, you will have to employ either a centre-tapped choke or a push-pull output transformer. It must be remembered, however, that in this case you will have two sources of iron loss, one in the choke or transformer and another in the transformer fitted to the speaker, and thus, although the new speaker may be better than the original model, you may lose the advantages owing to the fact that two iron components will have to be employed. If you communicate with the makers of the new speaker, and send them the transformer now fitted to the speaker they will, no doubt, supply you with a suitable push-pull component to use in place of it. They will require to know the details of the valves you intend to employ.

£5 Superhet

"I have been using this novel set for some long time now with every satisfaction, but now something has broken down. There is a peculiar intermittent crackling which seems to vary when I adjust the trimmers on the I.F. transformer. I think that it is this component which has gone and should like to know how to test it and also how to eliminate the I.F. valve in case it is this which is troubling me. Your advice would be valued."—G. B. (Hadleigh).

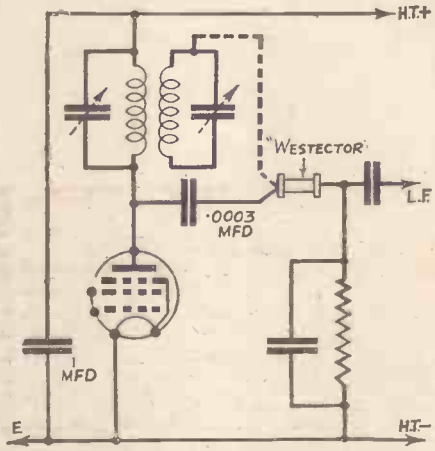


Diagram to illustrate the method of cutting out a valve and component as referred to in the reply to G. B., of Hadleigh.

THERE are many possible causes of the crackling, but we presume that in tracing out the circuit you have some good reasons for suspecting the I.F. transformer. Probably the simplest scheme would be to change round the two transformers and cut out the I.F. valve. The Westector should be joined for this purpose to the anode of the valve through a fixed condenser. The tapping on the secondary of the I.F. transformer could be ignored, and the diagram shows the two alternative schemes. Instead of joining the Westector to the anode of the I.F. valve, it could be joined to the frequency-changer anode, and, no doubt, you will thus be able to locate the faulty component.

H.F. Volume Control

"When using a variable bias potentiometer for H.F. pentode I gather one should be able to note the effect produced? Having put together one three-valve set from your pages which incorporates this I get nothing but harsh, grating noise, which finally cuts out reproduction when turned less than half its rotation. I have tried leads reversed with same effect. Instrument is Centralab 25,000 ohms graded. Set O.K. if left alone. Can you suggest an antidote for the trouble?"—A. G. C. (Swindon).

THE effect of the control should certainly be noticeable, and should be noiseless and smooth in action. At one setting there should be practically dead silence, and as turned towards maximum the signals should gradually increase in volume. A poor component will give rise to grating or scratching noises as the arm travels across the resistance track, but the component you have should certainly not do this as it is well designed and should be perfectly noiseless in action. If the grid bias applied is too high the change in volume would be sudden, whilst if too low there would be a cut-off point as mentioned by you. It would therefore appear that you are using the wrong bias and you should ascertain whether the valve in question is of the short base or long base type, and use the correct value of bias. It may also be advisable to have the control tested in case it is faulty, due to misuse.

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

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 queriists.

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

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

Practical and Amateur Wireless
BLUEPRINT SERVICE

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless" at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7½d., and "Wireless Magazine" at 1/3d., post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send (preferably) a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS

STRAIGHT SETS. Battery Operated.

	Date of Issue.	No. of Blueprint
One-valve : Blueprints, 1s. each.		
All-Wave Unipen (pentode)	—	PW31A
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (trans.))	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.))	2.12.33	PW34A
Leader Three (SG, D, Pow.)	—	PW35
Summit Three (HF Pen, D, Pen)	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow.)	—	PW41
Hall-Mark Cadet (D, L.F. Pen (R.C.))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF (trans.))	*June* '35	PM2
Cameo Midget Three (D, 2 LF (trans.))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53
Battery All-wave Three (D, 2 LF (R.C.))	31.8.35	PW55
The Monitor (HF Pen, D, Pen)	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	7.12.35	PW64
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF, Cl. B)	15.4.33	PW17
Nucleon Class-B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's Superformer (SG, SG, D, Pen.)	12.10.35	PW57

Mains Operated.

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

SUPERHETS.

Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three valve)	—	PW40
F. J. Camm's 2-valve superhet (two valve)	13.7.35	PW52
F. J. Camm's £4 Superhet 4	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (three valve)	—	PW43
D.C. £5 Superhet (three valve)	1.12.34	PW42
Universal £5 Superhet (three valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	7.12.35	PW59
F. J. Camm's Universal £4 Superhet 4	11.1.36	PW60

SHORT-WAVE SETS

Two-valve : Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Power)	—	PW30A
The Prefect 3 (D, 2 LF, RC and Trans.)	9.2.36	PW63

PORTABLES.

Four-valve : Blueprints 1s. each.		
Featherweight Portable Four (SG, D, LF, Cl. B)	—	PW12

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)	23.2.35	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Blueprints, 6d. each.		
Four-station Crystal Set	—	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each		
B.B.C. Special One-valver	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG, Det, Pen)	—	AW392
Iron-core Two (D, Trans)	—	AW395
Iron-core Two (D, Q.P.P.)	12.8.33	AW396
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen)	—	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cossor Melody Maker with Lucerne Coils	—	AW423
P.W.H. Mascot with Lucerne Coils (D, RC, Trans)	—	AW337A
Mullard Master Three with Lucerne Coils	—	AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
£6 6s. Radiogram (D, RC, Trans)	—	WM318
Simple tune Three (SG, D, Pen)	*June* '33	WM327
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
Graduating to a Low-frequency Stage (D, 2LF)	—	WM378
P.T.P. Three (Pen, D, Pen)	*June* '35	WM389
Certainty Three (SG, D, Pen)	*Sept.* '35	WM393
Minitube Three (SG, D, Trans)	*Oct.* '35	WM396
All-wave Winning Three (SG, D, Pen)	*Dec.* '35	WM400
Four-valve : Blueprints, 1s. 6d. each.		
65/- Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal four (2SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2SG, D, Pen)	—	AW421
Crusaders' A.V.C. 4 (2HF, D, QP21)	18.8.34	AW445
(Pentode and Class-B Outputs for above: blueprints 6d. each)	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B)	*Aug.* '33	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	*Feb.* '35	WM381
The H.K. Four	*Mar.* '35	WM384
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	*May* '33	WM320
New Class-B Five (2SG, D, LF, Class B)	*Nov.* '33	WM340
Class-B Quadradyne (2SG, D, LF, Class B)	*Dec.* '33	WM344
1935 Super Five (Battery Superhet)	—	WM379

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C./D.C. Two (D, Pen)	*Sept.* '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383
S.G. Three (SG, D, Pen) A.C.	—	AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF, Pen, D, Pen) A.C.	23.6.34	AW430
Mantovani A.C. Three (HF, Pen, D, Pen) A.C.	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan.* '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	*July* '33	WM329
Harris Jubilee Radiogram	*May* '35	WM386

SUPERHETS.

Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
Varsity Four	*Oct.* '35	WM395
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C.	10.3.34	AW425
Heptode Super Three A.C.	*May* '34	WM359
"W.M." Radiogram Super A.C.	—	WM366
1935 A.C. Stenode	*Apl.* '35	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
Midget Class-B Portable (SG, D, LF, Class B)	20.5.33	AW638
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)	*Aug.* '34	WM367

SHORT-WAVERS—Battery Operated.

One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (price 6d.)	—	AW329
S.W. One-valve for America	—	AW429
Roma Short-waver	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SGdet, Pen)	*Feb.* '36	WM402
Home-made Coil Two (D, Pen)	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	*Jan.* 19, '35	AW463
The Carrier Short-waver	*July* '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-wave World Beater (HF Pen, D, RC, Trans)	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valve Short-waver	*Mar.* '35	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.	*Aug.* '34	WM368
"W.M." Long-wave Converter	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	*Aug.* '35	WM391

MISCELLANEOUS

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

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. McC. (Clydebank). The figure for the secondary was a misprint, and your component is apparently in order. Your trouble may be due to overloading of the detector or to a too-efficient input circuit, and it may be desirable in your case to fit a further tuned circuit, thus converting the input to band-pass.

C. E. N. (Swinton). For the aerial circuit the aerial is joined to terminal No. 6 and terminals 3 and 5 are earthed. The grid is joined to terminal 1. For the detector stage the H.F. anode is joined to terminal 6 and terminal 5 is joined to H.T. Terminal 1 goes to the grid condenser, terminal 3 to earth, and terminal 4 to the detector anode or reaction condenser. Terminal No. 2 on each coil must be joined to a contact on a three-point switch for wave-change purposes. The coils were employed in the Pentaquester, blueprint AW431.

J. B. (Ringmer). As you already have AW449, we suggest you obtain PW31A, which is an all-wave two-valver, or one of the ordinary two-valve sets as shown in the list of blueprints published each week.

J. O. (Pandy). Two chokes will be required in the anode circuit in order to use the set as a converter. It could, however, be used in place of the detector stage in your four-valve set and would then act as an adaptor and enable you to hear the short-wave stations.

R. J. T. (Ealing). The only satisfactory solution is to fit an H.F. stage. The additioual amplification has made the flatness of tuning of the detector stage more apparent and therefore you would no doubt find that an H.F. stage and the exclusion of your added L.F. stage would be well worth while.

S. H. B. (Purley). The trouble would appear to be due to H.F. instability and therefore the wiring on the H.F. side should be modified and the leads moved about to avoid interaction between them.

R. B. S. (Thorpe Bay). We regret that we have no blueprints or other details of a set on the lines mentioned by you.

R. O. (Islington). The H.F. unit described in our issue dated February 1st last would meet your requirements. The use of this unit on short waves is, however, not recommended, and you will probably find that the present arrangement is all that is needed for short-wave reception. A switch could be incorporated for cutting out the stage when changing wavelengths.

W. A. C. (Mile End, E.1). The connections shown are quite correct, and therefore it would appear either that the switch is faulty or you have not correctly identified the three connecting points. Examine the switch and test it with a battery and bulb in order to locate the two contacts and the change-over arm.

O. C. R. (Bedford). The records are no longer obtainable, and, of course, they have no application now in view of the fact that the 30-line transmissions have ceased and will not be re-introduced.

J. H. (Glasgow). The speaker field is too high for use in this particular arrangement. If you are on D.C. mains it could be joined direct across the mains leads, but you should enquire from the makers regarding the necessary field wattage and take care not to exceed this. The condensers are quite in order, but are not essential.

E. T. (Sheerness). There are several mistakes in your circuit. Firstly, the H.T. at the detector should be 80, not 180 volts, and to obtain reaction effects there should be an H.F. choke between the point P on the L.F. transformer and terminal 5 on the coil. Next, the terminal 4 on the coil should not be joined to No. 1, but should go only to the reaction condenser, the other side of which should be earthed. G.B. plus should be joined to L.T.— and not L.T. plus. We cannot understand the reference to terminal P on V1 being joined to F on V2 as this would burn out the valve.

W. H. A. (South Shields). We regret that we have no blueprint which meets your requirements. In any case you do not mention the type of the coil or the reference number.

W. P. (Preston). It is only necessary to adjust the pointer to "S" on the oscillator unit and then tune in. Failure to obtain any short-wave signals indicates some fault in the set, and if this is quite in order on medium and long waves it would appear that the oscillator coil or the switch therefore is faulty.

A. H. B. (North Harrow). If the two transformers are of different construction the connection of the two would result in interaction between the windings and a consequent balancing out of the hum. If, however, they are identical, it may indicate that one is faulty or that the connection at the terminal is not sound. We do not recommend the substitution of a ganged condenser unless you obtain a new set of coils to match a modern component.

A. G. P. (Epsom). Our £4 Superhet would be suitable, or if you wish to reduce the number of valves the £3 Superhet Three could be adopted. We cannot recommend any simpler type of receiver to give you guaranteed reception of the distant stations.

J. G. H. S. (Edgware). The type of whistle referred to may generally be overcome by reversing the connections to the secondary winding of the L.F. transformer. Sometimes a resistance in series with the output valve grid will cure it, but the change in phase introduced by the reversed secondary is sufficient in most cases.

T. K. (Clifden). It is impossible to obtain valves at the price mentioned by you, and you should obtain good standard valves in order to replace the existing ones. Of course, you should ascertain that it is the valves which are causing the trouble and not the receiver wiring. A modern moving-coil speaker is to be preferred to the model mentioned, but it would probably prove cheapest and more satisfactory in the long run to dispose of the set as it stands and get an up-to-date one, or the parts with which to build one of our modern designs.

F. S. L. (Wallington). We regret that the issues in question are now out of print.

A. W. (Oldham). We cannot give full replies to all your queries in this part of the book. No stamped addressed envelope was enclosed and we would remind you that queries should be limited to two per reader. Blueprints cannot be sent C.O.D.

M. R. T. (Edgbaston). A grid winding of eight turns of twenty-two tinned copped wire with spaced turns should be used, and for aerial coupling five turns of twenty-eight cotton-covered should be placed close to the "earthed" end of the grid winding. A reaction winding of six turns of similar wire could be interwound at the lower ends of the grid winding.

A. S. (Pershore). It would appear that either the long-wave windings are faulty or the padding condenser is of incorrect capacity. Try connecting a fixed condenser (say .002 mfd.) in parallel with the padding condenser.

W. A. (Welling). The stabiliser may be obtained from Messrs. Cossor, who will also supply details of connections.

H. W. (Battersea). You cannot expect to get the tone and volume of the original with a simple battery set, and a very powerful and well-designed mains receiver would be necessary with at least 12 watts output.

C. W. (Croydon). We recommend our Television and Short-Wave Handbook which covers all the points raised by you and deals with short-wave conditions and receivers.

J. W. (Sydenham). The largest output would be obtained with the 362 Company's BX2. If you require an ordinary triode the highest rated output is the 362 P.2 rated at 900 milliwatts.

G. B. (Broadstairs). You should follow the text in the article in question, and not the details on the drawing.

M. H. (Kirkdale). Almost any eliminator may be used, but in the event of difficulty it should only be necessary to introduce decoupling components in the H.T. feeds.

Miscellaneous Advertisements

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15/11 LISSEN SKYSCRAPER 3 CHASSIS. Less Valves, shop soiled. Built and Aerial tested.

25/11 LISSEN SKYSCRAPER 3 CHASSIS. Complete with Valves, shop soiled. Built and Aerial tested.

84/- LISSEN 4 VALVE BAND PASS A.C. MAINS SET. Screen Grid, Detector, Pentode, Valve Rectification, Iron Cored Coils, Band Pass tuned, fitted energised Moving Coil. A super bargain. List £9 15s. Brand new.

70/- LISSEN BAND PASS 3 BATTERY SETS. Complete in handsome Walnut Cabinets, Iron Cored Coils, Band Pass tuned, P.M. Moving Coil Speaker and Valves. Brand new. List £8 10s.

45/- LISSEN 100 STATIONS SET. Complete in Cabinet with Valves and Speaker, Aerial tested, few only.

5/6 TRIAD VALVES. 01-A, 24A, 27, 30, 31, 32, 33, 35, 37, 38, 39, 41, 42, 43, 45, 46, 47, 53, 55, 56, 57, 58, 59, 71A, 75, 78, 80, 6A6, 1C6, 6F7, 2A3, 5Z3, 12A7, 6A7, 6C6, 6D6, 12Z3, 25Z5.

ALL THESE VALVES CARRY A 90-DAY GUARANTEE AND FREE REPLACEMENTS, PROVIDED THAT THE FILAMENT OR HEATER IS INTACT AND THE GLASS IS NOT BROKEN WHEN RETURNED TO US. 5/6.

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BRYCE MAINS TRANSFORMERS.

8/11 250-0-250, 80 m.a. 2-0-2 Volts, 2.5 amps., 2-0-2 Volts, 4 amps. Shrouded.

9/6 350-0-350 volts, 120 m.a., 2-0-2 volts, 2.5 amps., 2-0-2 volts, 4 amps. Shrouded.

11/6 350-0-350 volts, 150 m.a., 2-0-2 volts, 2.5 amps., 2-0-2 volts, 4 amps., 2-0-2 volts, 2 amps. Shrouded.

17/6 500-0-500 volts, 150 m.a., 2-0-2 volts, 2.5 amps., 2-0-2 volts, 6 amps., 2-0-2 volts, 2 amps., 2-0-2 volts, 2 amps. Shrouded.

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17/6 DITTO. With H.T.8 Metal Rectifier.

ALL THE ABOVE TRANSFORMERS ARE OF FIRST CLASS MANUFACTURE, BRAND NEW AND CARRY MAKERS' GUARANTEE.

2/6 8 mfd. and 4 mfd. DRY ELECTROLYTIC CONDENSERS. By well-known manufacturer. 450 volt working, 500 volt Peak. Brand new.

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2/6 PEAK 4 mfd. PAPER CONDENSERS. 750 volt test.

HIVAC VALVES. Complete range in stock, send for lists.

2/- G.E.C. 110 kc/s INTERMEDIATE FREQUENCY COILS. Complete with two trimmers.

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LIST PRICE 16 GNS. **OUR PRICE 8 GNS.**

● 2 H.F. Stages, Detector, Driver and Class B Output. ● Moving Coil Speaker. ● Exceptional degree of selectivity. ● Long range. ● FINE VOLUME. ● Complete with all valves, H.T. battery and accumulator. ● Ready to play.

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For A.C./D.C. mains. 200/250 volts, 25/100 cycles.

Complete with 4 B.V.A. valves (including rectifier). Pentode output, moving-coil speaker, handsome walnut cabinet, as illustrated, 200-550 and 1,000-2,000 metres. Single knob tuning. With indoor aerial. Ready to play. No earth required.

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LIST PRICE £1 : 7 : 6 *BARGAIN at* **7/6**

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4-PIN interchangeable short-wave coils; set 3. Cover 15-100 metres, latest ribbed former, 7/9.

1½IN. ribbed short-wave coil forms; valveholder type, loloss, 4-pin, 1/6. 6-pin, 1/9. Threaded for winding, 2d. extra.

UTILITY 8/6 microdisc dials, fitted famous micro-high reduction, only perfect short-wave dial, 3/11.

SHORT-WAVE H.F. chokes, 9d. *Wireless World* states: "Very efficient—100 to below 10 metres."

UTILITY microvariables 15, 40 mmfd., 1/-; 100 mmfd., 1/3; 465 kc/s litz wound I.F.'s, 5/6.

RADIOPHONE super ceramic insulated short-wave condensers, .00016, 3/6; series cap, 3/9.

CONTINENTAL A.C. valves, 4/6, VMPT, HPT, VMSG, ACSG, ACH, ACHL, PT4. Most American types, A.C. Pen., 5/6.

2V, types, H.F. detector, L.F., 2/3; LP2, P2, 2/9; Supower, 3/3; VMPT, HPT, 5/6; Class B, 4/6; S.G., VMSG., 5/-.

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SPECIAL. Set Lissen 3-gang superhet coils, two Lissen I.F.'s, 3-gang superhet condenser value 63/- for 10/-.

CABINETS. Climax horizontal set and speaker cabinets, 2/11. Vertical, 3/9. Part postage 6d. extra. Ekco chromium set stands, 12/6.

TELSEN 7/6 Ace transformers made for leading company, boxed, 1/11.

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