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Vol. 11. No. 268. November 6th, 1937.

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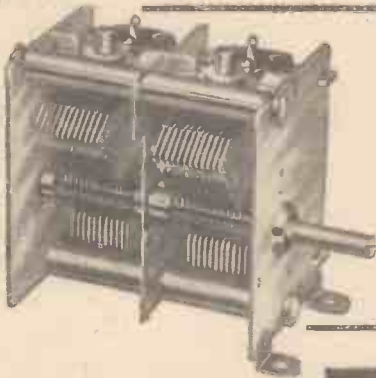
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Push-Pull Pitfalls

See page 203



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

VOL. XI. No. 268. November 6th, 1937.



ROUND *the* WORLD of WIRELESS

Servicing Sets

ONE of the reader service features upon which we place a great deal of pride, is in the servicing of those receivers which have been built to our specification and which, for some reason or another, fail to function as we claim. The work involved is considerable, and, as mentioned on another page, some of the receivers which are submitted to us are put together in the most astounding fashion. It would be impossible to include in one issue all of the defects which are traced and which are due to either carelessness or failure to follow carefully the instructions which are given in our constructional articles. Such things as the use of cold solder, or twisted leads instead of sound connections lead to no end of difficulties, and one case occurred where a constructor had employed aluminium solder for connecting certain points. As this consists of powdered aluminium in a chemical vehicle, which is an effective insulator, the effects of using it do not need emphasis. There is apparently always an incentive to hurry construction in order to hear a programme, and it is no doubt in this one respect that the majority of failures lie. It should be remembered that a wireless receiver is being built to fulfil a definite function—either to provide entertainment for domestic purposes, or for experimental use, and therefore, no pains should be spared to make the constructional work really sound so that the finished receiver may be relied upon to carry out the work for which it is intended.

Television Tests

THE National Broadcasting Company of America have just finished a model of a girl to be used for their television tests similar to that which was used years ago in the British television experiments. It is found that a human being cannot be employed owing to the change in complexion colour, hair brilliancy, etc., due to conditions of health from day to day, and the television camera is so critical that it is essential that the identical colouring, etc., shall be maintained from day to day so that the camera may be given a reliable subject for test purposes. The American model is to be known as Miss Patience.

New Chinese Station

A 10-KILOWATT station is being erected by Telefunken in Tching-tou, which is situated on the border of Tibet. The

wavelength to be used when the station is finished is fixed at 536 metres, good radiation being anticipated by the use of two 120ft. masts with a "T" aerial.

N.B.C. Network

THE National Broadcasting Company of America announce that they now control 150 stations, 138 of which operate on medium waves and 12 on the short waves.

Speakers and Signal Strength

SOME interesting figures are given in a recently published public address manual. When a moving-coil speaker

convey "thoughts" to them by means of radio signals.

Listener's Night Out

A NOVELTY will be introduced by a Scottish listener on November 12th. A microphone is to be installed in his house—by his chair at the fireside—and he will call for his items and pass comments on the programme as it proceeds. His demands have led to a tremendous task for the outside broadcast department of the B.B.C., and one and a half hours will be occupied with this O.B. programme.

American Valves

A NUMBER of readers are experiencing difficulty when trying out circuits published in American magazines due to the fact that they are trying to use American valves with British components. In some of the circuits referred to special American parts have to be used, and failure will follow the attempted use of mixed parts.

B.B.C. Symphony Orchestra Tour

TO enable all the Regions to see the B.B.C. Symphony Orchestra in operation a tour under the direction of Sir Adrian Boult will commence next year, and the following towns will be visited: Newcastle-upon-Tyne (North Region), City Hall, January 12th; Nottingham (Midland Region), Albert Hall, March 9th; Aberdeen (Scottish Region), Music Hall, March 23rd; Plymouth (West of England Region), Guildhall, April 20th.

Horby Power Increase

IT is announced that the power of the Swedish station at Horby is shortly to be increased to 100 kW. The actual date of the inauguration of the new apparatus has not yet been announced.

Fire in Finland

THE broadcasting station at Sordavala in Finland was recently destroyed by fire. The only part of the station which was left undamaged were the masts carrying the aerial system.

Danish Amateurs Celebrate

THE radio amateurs in Denmark recently reached their tenth anniversary, and at a banquet which was held to celebrate this event the well-known Professor Pedersen was present. During a speech he recalled some of the interesting experiments and uses of his singing arc transmitter.

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on a baffle is employed 100 watts would be needed to relay a small orchestra for entertainment value over a given area. For a similar power effect with an exponential horn speaker only 15 watts would be needed.

Invisible Rays

IT is announced that a scientist has succeeded in capturing power radiated by insects. This power is on an ultra-ultra-short wavelength, and can operate a special meter. The meter readings vary as the insects are annoyed or teased, and no doubt attempts will shortly be made to

ROUND the WORLD of WIRELESS (Continued)

New Police Transmitting Station

WE give on this page an illustration of the control room of the new Metropolitan Police transmitting station recently erected at West Wickham, Kent. Control is exercised from the Information Room at New Scotland Yard, just as effectively as if the station was still operating there, by means of a system of remote control. Apart from the transmitting side of the new building at West Wickham, provision has also been made for experimental workshops and garage accommodation to enable police cars to be fitted with wireless apparatus.

Secret Radio Code

IT is reported that the U.S. Navy have developed a system which makes it impossible for wireless messages in code to be decoded. The importance of this invention will be realised when it is recalled that during the Great War practically every code message transmitted could be decoded.

Change of Address

WE have been notified that Runbaken Electrical Products, of Manchester, have moved to more commodious premises at 13-15, Liverpool Road, Deansgate, Manchester 3. At these new premises there are a showroom, trade counter, and also a service department dealing with al



Elsie Carlisle, the popular radio vocalist, who is appearing regularly with Jack Harris and his band.

classes of repairs to equipment. The works remain at Hapton, Lanes.

Dramatic Programmes

IT is interesting to note that two popular dramatic programmes are to be broadcast at the end of the present month and early in December. On November 23rd and 24th, in an adaptation of "Berkeley Square," Leslie Howard will make his first appearance at the microphone. He will play the part of Peter Standish, in which he scored a sensational success both in this country and in America.

Marie Tempest, who charmed listeners by her recent brilliant performance in Noel Coward's comedy, "Hay Fever," returns

INTERESTING and TOPICAL NEWS and NOTES

to the microphone on December 9th and 10th. As Mrs. Alving, in Ibsen's "Ghosts," she will play a rôle very different from her previous one.

Televising 1,100 Miles

ACCORDING to a recent report, German Post Office engineers have successfully carried out an interesting television

with a commentary on the story of the opera. The recording used will be that made by the Chorus and Orchestra of the Paris Opéra, conducted by Henri Busser, with the famous bass, the late Marcel Journet, as Mephistopheles, Cesar Vezzani as Faust, and Miçelle Berthon as Marguerite.

The Lord Mayor's Show

COMMENTATORS at various vantage points on the roof of the Mansion House on the morning of November 9th will again describe the annual scene of the



The control table for the transmitters at the new Police Radio Station at West Wickham, Kent.

experiment. After completing the television cable between Berlin and Munich, they connected the two lines forming a continuous cable from Berlin-Leipzig-Nurnberg-Munchen, and back. Over this they sent a 180-line picture on one section, and it was returned on the other section.

Public Address Equipment at Earls Court

THE high standard of efficiency attained by the public address equipment at the new Earls Court Exhibition Buildings has created much favourable comment, and it is interesting to note that the loudspeakers employed are Benjamin, Model 66 (manufactured under Magnavox Patents), of which 150 are installed. This installation, which is one of the largest in the country, was carried out by Brighton and Preston Relay Station, Ltd., and the General Electric Co's amplifiers are used, which have an output of 1 kW.

Gounod's "Faust"

READERS who are opera lovers will be interested to know that a recording of Gounod's "Faust" is to be broadcast from Northern Ireland on November 4th. The experiment of broadcasting a complete opera on gramophone records has proved very successful, and so "Faust" is to be broadcast with opera house effects to give the illusion of a stage performance, and

new Lord Mayor, escorted by the usual colourful pageant, beginning his journey through the city. John Snagge will be responsible for the description.

SOLVE THIS!

PROBLEM No. 268

Morris built a battery superhet of the all-wave type, using a pentagrid frequency-changer, an H.F. pentode in the I.F. stage, with a double-diode-triode and an output pentode in the last two stages. Satisfactory reception was obtained on the medium- and long-wave bands, but no signals could be received below 20 metres on the short-wave band. The coils and wave-change switches were found to be in order. What was the fault? Three books will be awarded for the first three correct solutions opened. Solutions should be addressed to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 268 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, November 8th, 1937.

Solution to Problem No. 267

The fault could be in the aerial-earth system or in any of the components or wiring of the H.F. stage. The following three readers successfully solved Problem No. 266, and books are accordingly being forwarded to them: F. Northeast, 31, Coombe Terrace, Lewes Road, Brighton; D. Allanson, 17, The Avenue, Castle Park, Whitby; F. Walsh, 124, Stanton St., Clayton, Manchester, 11.

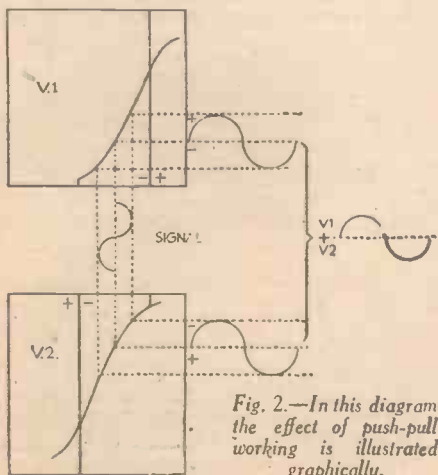
PUSH-PULL PITFALLS

Class A, Class A-B and Other Forms of Push-pull Amplification are Explained in this Article, Together with the Causes of Failure to Obtain Satisfactory Operation - - By W. J. DELANEY

IN ordinary L.F. (low-frequency) amplifiers the signal is passed from one stage to another through the medium of a coupling agent. The amplification of each stage is governed by the valve and by the coupling which is employed between successive stages, and if the coupling is suitably designed the signal should not become distorted in passing from one stage to the next. The term push-pull is now applied to all forms of amplification where, instead of passing on the signal in the form in which it appears at the anode circuit of one valve, it is split into two parts and each part is fed into a separate valve, the output from these two valves then being combined in order to feed the loudspeaker. The term push-pull was derived from the fact that as the signal in one of the dual valves caused a rise in the anode current, that in the corresponding valve of that stage decreased, and thus one valve "pushed" whilst the other "pulled." In order to follow more easily the working and causes of distortion which are present in a push-pull stage it is necessary to remember that an L.F. valve has to be correctly biased and selected so that it will handle the signal fed to it, and for this purpose we must refer to the usual grid-volts-anode-current curve of a valve, as shown in Fig. 1. In this diagram there is a sine curve below it to represent a signal, and it may be seen that as the signal causes the grid to become more negative the anode current will fall, and as the grid becomes more positive the anode current rises.

Harmonic Distortion

Thus, the grid fluctuations (signal voltages) will result in anode-current fluctuations, and these should be identical to the grid variations, thus providing an amplified signal for subsequent use. At this stage we should consider the forms of distortion which can arise in the valve and coupling and which are generally referred to as "harmonic distortion," but the majority of listeners are unable to detect such things as second or third harmonic distortion, and in any case these variations are in most cases masked by distortion due to the speaker, and so, except for remembering that they do exist, we can carry on



without considering just what they are and how they really take place.

The simplest and first form of push-pull amplification is known as Class A and for this the signal is divided into two equal parts, usually by means of a transformer having a centre-tapped secondary winding.

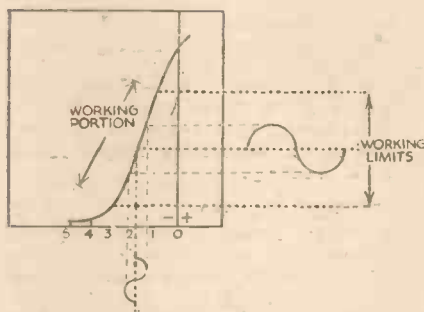


Fig. 1.—The standard curve for a valve working as a low-frequency amplifier.

Each end of this winding is joined to the grids of the two push-pull valves, and the centre-tap is joined to earth or grid bias according to whether battery bias or self-bias is being used. The signal voltage appears right across the secondary winding, and as the centre is at zero potential it will be obvious that when one end of the secondary is positive the other will be negative. If we take the same signal voltage as is used in Fig. 1, then we can see that as valve V1 of the push-pull stage becomes a certain amount positive the other will become an equal amount negative, and the two valves may thus be said to operate "back to back." Therefore, by drawing the same grid-volts-anode-current curve for the two valves in this form we can more easily see how the signal affects both valves and the output becomes combined to form our new signal.

Causes of Failure

It will be seen that in both cases in Fig. 2 an exact reproduction of the signal is shown, but in practice this may not occur for several reasons. Firstly, if the valves are not correctly chosen so that the curves are identical it will be obvious that one of the anode signals will differ from the other and this will cause the combined signal to have some form of distortion. Similarly, if the coupling component does not correctly "split" the signal the same thing will happen. Thus, failure to obtain satisfaction in a normal push-pull stage is generally attributable to the fact that the valves are not matched, or the L.F. transformer is not well-designed. Apart from the fact that the latter must be correctly (electrically) tapped at the centre, there are several other factors which must be taken into consideration, such as magnetic leakage, etc., but if a component of reliable make is chosen these facts should be in order. It is also obvious that the signal must be controlled before passing it to the two valves so that at no point will it pass to the flattened portion of the grid-volts-anode-current curve.

Class B

In the Class B circuit an exactly similar state of affairs exists except that the bias which is employed is just double that which should normally be used for the valve. Thus the centre line of the signal curve will be moved along in Fig. 1 until it arrives at the point where further negative variations will not affect the anode current. When a positive variation occurs, however, there will be a big change in the anode current, and thus it will be seen that the output anode current will vary with the signal. The usual causes of distortion and failure to obtain good results with this circuit are generally found to be bad choice of components, as the majority of good L.F. valves will work satisfactorily without the need for correct matching. The output load is the most important factor and the bias must be chosen to bring the working point to the position which will give the correct variation of grid potential with the signal fluctuations. This arrangement is very similar to the quiescent-push-pull circuit, except that in this the grids are not permitted to go positive, but most amateurs appear to find it difficult to obtain such good results with this circuit as with Class B—due no doubt to the choice of the value of bias.

Class A-B

The circuit which is now more commonly used in connection with push-pull is a compromise between Class A and Class B, and accordingly this is known as Class A-B. The only theoretical difference is that the bias employed is such that the working point is brought half-way between Class A and Class B, and thus the anode current will vary with the signal, slightly less than with Class B. The exact result may be seen in Fig. 4, and it will also be noticed that if the signal is so reduced in volume that the anode current change is small, the working is actually identical to that in ordinary Class A push-pull. For satisfactory results in this type of circuit the transformer must be more carefully chosen than for Class A push-pull, and it may be found that many ordinary push-pull transformers

(Continued on next page)

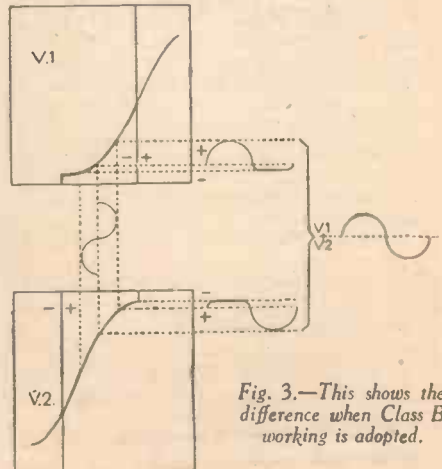
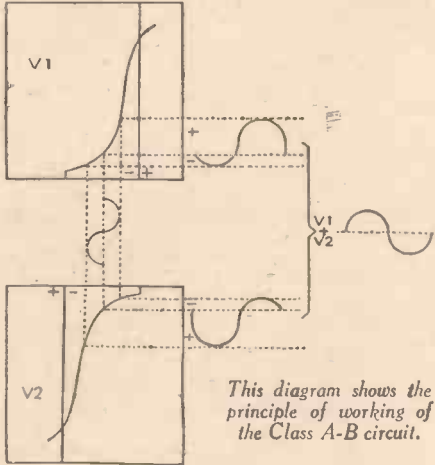


Fig. 3.—This shows the difference when Class B working is adopted.

PUSH-PULL PITFALLS*(Continued from previous page)*

are not suitable for this type of working. Similarly, the transformers designed for Class B push-pull, although the secondaries are designed with a knowledge that grid current will flow in a Class B circuit, may not prove suitable for distortionless Class A-B working. When obtaining a transformer for this type of amplifier, therefore, the makers should be instructed as to the type of valve which is to be used, when they will supply a transformer of the most suitable type.

It will be seen from the preceding remarks, that Class A is the simplest type of amplifier to adopt and will probably give



This diagram shows the principle of working of the Class A-B circuit.

rise to the least trouble. For maximum output with low running costs, the Class A-B circuit is preferable, but care must be taken to obtain a suitable transformer, or the results will fail to come up to those obtained with the ordinary Class A circuit. Class B will prove as simple to set up, but also requires a special transformer, and the fluctuating anode current may result in a poor performance unless a really reliable H.T. supply is employed, and in general it will not function with a mains H.T. supply. The same remarks apply to Q.P.P. amplification, although as pentodes are employed in this type of circuit a greater degree of amplification is usually obtainable. The necessity for tone correction is one factor which results in many constructors abandoning this type of amplifier.

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

Wednesday, November 3rd.—Symphony Concert from the Queen's Hall, London.

Thursday, November 4th.—Radio Pic, variety programme.

Friday, November 5th.—A Commentary on Bertrand's Women's Foils Championships.

Saturday, November 6th.—Music Hall programme.

REGIONAL (342.1 m.)

Wednesday, November 3rd.—Dancing Through: dance band programme.

Thursday, November 4th.—The Yellow Iris, a play (Agatha Christie).

Friday, November 5th.—Family Tree, a play by Philip Wade.

Saturday, November 6th.—Commentaries on the International Fencing, England v. Denmark, from the Salle Bertrand, and on the Ice Hockey League Match, from Wembley.

MIDLAND (296.2 m.)

Wednesday, November 3rd.—Choir and Congregation, a programme of Church music, from the Church of the Messiah, Birmingham.

Thursday, November 4th.—The Microphone at Large, a visit to Rockingham.

Friday, November 5th.—A Selection of new gramophone records.

Saturday, November 6th.—The Creation (Haydn): Orchestral and choral programme, from the Drill Hall, Derby.

NORTHERN (449.1 m.)

Wednesday, November 3rd.—Orchestral programme.

Thursday, November 4th.—Hallé Concert from the Free Trade Hall, Manchester.

Friday, November 5th.—Variety from the Winter Gardens, Morecambe.

Saturday, November 6th.—Young and Old, a sketch.

WEST OF ENGLAND (285.7 m.)

Wednesday, November 3rd.—A Variety programme from the Hippodrome, Southampton.

Thursday, November 4th.—Please to Remember: Guy Fawkes Eve programme.

Friday, November 5th.—Instrumental recital.

Saturday, November 6th.—Choral and instrumental programme.

WELSH (372.1 m.)

Wednesday, November 3rd.—Music for two pianofortes.

Thursday, November 4th.—Richard Savage, a radio play by Gwyn Jones.

Friday, November 5th.—Vocal and instrumental programme.

Saturday, November 6th.—The New North Road, a discussion on the proposed new arterial road from South to North Wales.

SCOTTISH (391.1 m.)

Wednesday, November 3rd.—Scottish Dance Music.

Thursday, November 4th.—The Bean-nachy Bomb, a comedy by Hal. D. Stewart.

Friday, November 5th.—Scottish Dance Music.

Saturday, November 6th.—The Play's the Thing: three phases of a village dramatic society's winter activities.

NORTHERN IRELAND (307.1 m.)

Wednesday, November 3rd.—Choral programme.

Thursday, November 4th.—Faust, a recording of Gounod's opera.

Friday, November 5th.—Ulster Schools: The Christian Brothers Schools: a talk.

Saturday, November 6th.—Military Band concert.

ITEMS OF INTEREST

New Radio Factory Extensions

TO cope with the ever-increasing demand for radio accessories, cables and insulated wires, the well-known firm Ward and Goldstone, Ltd., have recently opened commodious extensions at their Pendleton, Manchester, factory. Every day the new plant produces over a quarter of a million mouldings, and the new factory extension provides accommodation for 1,000 workers. Some idea of the extensive plant necessary to deal with this enormous output may be gathered from the fact that over 80 hydraulic presses are in operation on one floor alone.

Television at Moston

ALTHOUGH the normal range for television is about 25 miles, Ferranti engineers at Moston, Lancs, have succeeded in picking up a television programme of sound and vision—a distance of 200 miles from the Alexandra Palace. A standard Ferranti home receiver was used, with a normal H aerial. Reception was made at a height of 600ft. above sea-level.

Bird Mortality

RECENTLY, A. M. C. Nicholl gave a broadcast about some West Country birds, in which he asked for the observations of listeners on the mortality of young birds.

On November 5th he will discuss, in the West of England programme, the subject again in the light of the communications he has received. Mr. Nicholl has studied bird life since he was a boy, spending most of his spare time in the West Country. He has been a member of the British Ornithologists' Union and the Zoological Photographic Club for over twenty years.

A Mexican Newcomer

ON 31.51 m. (9.52 mc/s), using the same channel as HJ4ABH, Armenia, Caldas (Colombia), a Mexican station gives out its call letters as XEDQ, situated at Guadalajara, Jalisco. It is advised as relaying the programmes of XED, in that city. The times of transmission announced are: Daily: G.M.T. 13.00-14.00 and 17.00-04.00. Address: Compania Radiofonografica, Apartado Postal, 197, Guadalajara, Jalisco, Mexico.

First Noel Coward Play for Television

MR. NOEL COWARD has cabled permission from America for the televising of his play, "Red Peppers," and it will be produced by Reginald Smith on November 1st and 5th in the afternoon and evening programmes respectively. The comedy is one in the famous one-act series, "Tonight at 8.30," with a back-stage setting for the adventures of Mr. and Mrs. Pepper, whose altercations are set to music in some typical Noel Coward melodies which will be played by the B.B.C. Television Orchestra.

The Amateur Set Designer

Band-pass Coupling, Tuning Coils, and T.R.F. Amplification are among the Subjects Dealt With in this Ninth Article of the Series

(Continued from page 190, October 30th issue)

If reaction is used, the consequent gain of sensitivity may sometimes be regarded as a means of, giving the designer greater scope in using loose couplings, "tapped down" connections, etc.

The disadvantages of the use of reaction, apart from the obvious risk of an inexpert listener running the receiver into oscillation are: (1) Every change of reaction adjust-



Fig. 37.—Direct inductive coupling between two circuits is shown here.

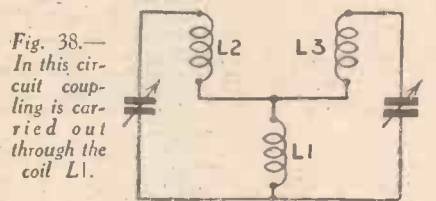


Fig. 38.—In this circuit coupling is carried out through the coil L1.

ment alters the characteristic of the circuit to which the reaction is applied and it is, of course, a mark of good design to make each H.F. circuit behave in as consistent a manner as possible; (2) If the selectivity of the receiver is fairly good without reaction, then the use of reaction will tend to give high-note cutting, due to the exaggerated peak introduced into the H.F. response characteristic.

If reaction is employed only in receivers having no more than one H.F. stage, the amateur designer will almost certainly consider that these disadvantages are more than offset by the fact that the reception range of the receiver will be far greater with reaction than without it.

Band-pass Coupling

As we have already stated, band-pass characteristics arise when two tuned circuits are coupled to a degree greater than the "critical" coupling value.

The coupling of the simplest types of band-pass filters may be either inductive or capacitive. Figs. 37 to 39 show various kinds of inductive couplings. In Fig. 37 the two tuning coils are placed in direct inductive relation to each other. In this case the coils must not be of the individually screened type.

In Fig. 38 the coupling between the two circuits is provided by the common inductance L1. In this case L2 and L3 can be screened coils with L1 externally connected.

Fig. 39 illustrates what is usually called "link" coupling. Each of the two coil assemblies are of the screened type and the coupling coils associated with the main coils are connected in series.

Capacitive coupling is illustrated in Fig. 40, the coupling being provided by the

condenser C, which is common to the two tuned circuits. The greater the capacity of C the looser will be the coupling. In some cases it will be necessary to shunt a resistance across C, to prevent the latter forming a D.C. break in the grid circuit of the valve which follows the band-pass filter. L1 and L2 can be screened coils. Values commonly used for C range from .02 to .06 mfd.

With the couplings illustrated there is a disadvantage where signal-frequency tuning is concerned. The peak separation (i.e., the band width at the top of the response curve) will vary with change of frequency. Thus in tuning over the waverange the characteristic of the band-pass filter alters. With inductive coupling the peak separation increases as the circuit is tuned down in wavelength, while with capacity coupling (Fig. 40 type) the peak separation increases

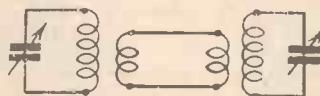


Fig. 39.—An inductive link is employed here to couple the two circuits.

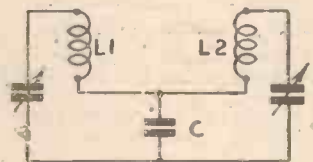


Fig. 40.—Capacity coupling is carried out in this circuit through condenser C.

as the circuit is tuned up in wavelength. Naturally, this has led to the introduction of mixed coupling filters where double coupling is used with the object of steadying the peak separation.

Fig. 41 shows a case of a band-pass filter using a combination of inductive and capacitive coupling.

Double capacity coupling ("bottom end" and "top end") is sometimes employed, as shown in Fig. 42. The condenser C1 will be of very small value, something of the order of a micromicrofarad or so being usual. C2, of course, will be of normal value for common condenser coupling.

Input Coils

A good range of coils has been placed upon the market by the component manufacturers, and the amateur designer should

experience little difficulty in finding coils to suit all normal purposes.

Among the iron-core types will be found coils of remarkably small dimensions and of good efficiency. For medium-wave and long-wave tuning there are plenty of "dual range" coils to choose from. With these coils there are normally two windings in series, both being in use for long waves, and one shorted out for medium waves. Coils are available with switching incorporated, and also for use with external switches.

For reception upon one or more short-wave ranges, in addition to medium and long waves, there is no doubt that the best scheme is to use completely separate coil assemblies for each range, the switching being arranged to switch the coil assemblies in or out as required. Mr. Camm's Corona receiver provides a very good example of this.

When ganged condenser tuning is to be employed it is vitally important to choose coils which are specified as being suitably matched for ganging. It is also necessary to watch points in regard to circuit arrangements. For example, condenser C, of Fig. 40, is in series with each of the two tuning condensers. If these condensers form sections of a ganged condenser the presence of C will not upset the ganging of the two circuits, but if a third section of the ganged condenser tunes an H.F. inter-valve circuit, care will have to be taken that the latter matches up properly. It may be necessary to insert a fixed condenser into the third circuit to bring it into line with the others.

As far as band-pass input coils are concerned it is possible to purchase separate coils which can be coupled up to make a band-pass filter. In such a case the manufacturer's instructions regarding the coupling should be carefully noted. There are also available complete band-pass assemblies with self-contained switches and coupling.

T.R.F. (Tuned Radio Frequency) Amplification

Some of the facts regarding the action of an H.F. amplifying stage are of particular importance to the designer.

In Fig. 43 is shown a valve to which is applied an H.F. input voltage V1. For the valve to act as an H.F. amplifier one requirement is that the anode circuit must contain a load, the impedance of which must be high at the frequency that is being handled. If conditions are suitable the voltage V2 developed across the load will be greater than the input voltage V1.

The simplest form of anode load would be a resistance, but there are snags where resistance loads for H.F. are concerned. One disadvantage is that the shunting effect of the stray capacities severely limit the effective load impedance and, moreover, cause the stage gain to change considerably from one end of the frequency range to the other. Another and obvious disadvantage is represented by the loss of anode volts caused by the D.C. component of anode

(Continued on next page)

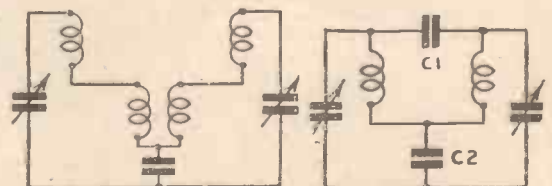


Fig. 41.—Combined inductive and capacitive coupling. Fig. 42.—Combined top capacity (C1) and bottom capacity (C2) coupling.

THE AMATEUR SET DESIGNER
(Continued from previous page)

current passing through the resistance. Further, the anode circuit contributes nothing towards the selectivity of the receiver, and this is a big disadvantage with a T.R.F. system.

An H.F. choke as an anode load represents a possibility and, indeed, was a familiar feature of portable sets some years ago, but there are difficulties here, too. It is difficult to construct an H.F. choke which will have a sufficiently high impedance to give adequate stage gain and, as with the resistance case, the anode circuit will not help towards selectivity.

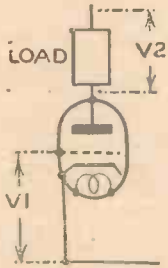


Fig. 43.—Diagram illustrating the relationship between input (grid) and output (anode) circuit.

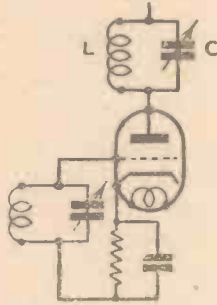


Fig. 44.—This is the standard tuned-anode circuit.

The high dynamic resistance of a tuned circuit can be utilised to form the required radio-frequency load with considerable advantages, and in Fig. 44 we have the well-known "tuned anode" system. Stray capacities acting between anode and cathode of the H.F. valve now come effectively in shunt with C and, while they affect the tuning adjustment of the L.C. circuit they will not cut down the anode load in the manner that these strays do with resistance or choke loading. The load presented by LC to the valve is at maximum only at the resonant frequency, and the falling off at other frequencies gives us, of course, an addition to the selectivity of the receiver. Naturally, the circuit LC will have to be variably tuned in order that the dynamic resistance may be adjusted to maximum for any wanted signal frequency. As far as amplification is concerned this will be largely dependent upon the ratio of anode load to valve impedance, and would be at maximum if these two were equal. There are reasons, however, why the designer will have to work towards a stage gain less than the theoretical maximum.

The tuned anode circuit LC of Fig. 44 is actually coupled to the tuned grid circuit via the inter-electrode capacity from anode to grid of the valve. The consequent feed back to the grid will have a damping effect upon the latter if the anode load is capacitive in character, but will give rise to reduction of effective damping if the anode load is inductive. If the latter effect is very pronounced the stage may go right into continuous oscillation. The circuit LC (Fig. 44) behaves as a pure resistance when it is exactly in resonance, but if the signal frequency is higher than the resonant value LC acts as a capacity, from the anode load point of view, and if the signal frequency is below resonance LC acts as an inductance load. Thus, passing from one side of resonance to the other brings about very abrupt changes. This critical state of affairs is bound to cause instability if LC is anything like an efficient circuit, and if

the anode/grid capacity is large, comparatively speaking.

As a consequence of this the triode valve has had its day as an H.F. amplifier in T.R.F. receivers. Owing to the considerable feed back that occurs at radio frequencies through the comparatively large anode/grid capacity, the triode becomes unmanageable when arranged in the manner shown in Fig. 44, unless the tuned circuits are very inefficient. To hold the stage into stability by the method of employing heavy damping is, however, hardly to be regarded as a desirable system of working. There is the alternative of employing external reverse feed back to counteract the internal feed back (the once familiar neutrodyne system), but this complicates the design and adjustment of the receiver. In any case the introduction of screen-grid valves made the triode into a back number as far as H.F. amplification is concerned. This does not imply that instability due to feed back is impossible with screen-grid valves, but the conditions obtainable with the latter are very much more favourable for H.F. amplification than with triodes and, what is perhaps the really important fact to the amateur designer, much higher stage gain values can be obtained.

Before considering any details regarding

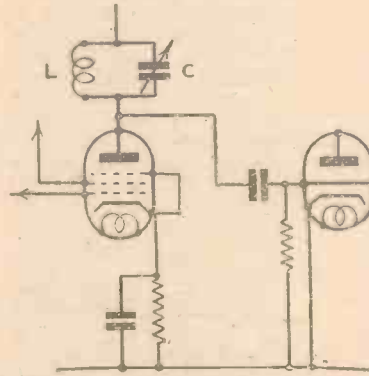


Fig. 45.—An H.F. and detector stage employing tuned-anode coupling.

the use of screen-grid valves, however, there is one consideration, general to all, H.F. stages, which the amateur designer needs to keep very much in mind. As we have already emphasised, the tuned circuits of the H.F. stages can contribute considerably to the over-all selectivity of the receiver. Now, referring again to Fig. 44 it may not be very obvious but it is a fact that, from the selectivity point of view, the internal valve impedance is a damping shunt on the LC circuit, and will have the effect of limiting the selectivity of that circuit. This effect can, in some circumstances, be serious, and is one of the reasons why some degree of amplification is often deliberately sacrificed. We will return to this point presently.

Screen-grid and H.F. Pentode Stages

The screen-grid valve has a lower anode/grid capacity, a higher amplification factor, and a higher internal impedance than a triode. The reduced anode/grid capacity means, of course, that feed-back effects are correspondingly less, but instability due to feed-back is possible and, as a matter of fact, with any given S.G. valve the anode load dynamic resistance can only be allowed to go up to a certain value before instability will be experienced. The greater the inter-electrode capacity and the higher the mutual conductance, the lower will be the maximum permissible value of the load resistance, but the S.G. valve will take loads very much in excess of the highest

value that a triode can handle. The combination of an efficient anode circuit and high valve impedance is all to the good for selectivity.

Even with the S.G. valve, however, the need to sacrifice some amplification for gain of selectivity arises.

It should be obvious that if full advantage is to be taken of the reduced inter-electrode capacity provided by the S.G. valve, it will be most essential to have the absolute minimum of external coupling between the anode and grid circuits. Any lack of care over screening or disposition of components and wiring could very well undo most of the good that the valve manufacturer has done with internal valve screening.

The H.F. pentode is the popular valve of to-day for H.F. amplification, for it will accept a bigger signal input than the ordinary S.G. valve (owing to the action of the suppressor grid in extending the useful length of the anode current characteristic). It will also satisfactorily work with a very high load value.

H.F. Interval Couplings

Fig. 45 shows straightforward tuned-anode coupling. There are certain disadvantages of plain tuned anode coupling which it is as well to know. The internal valve impedance is, from the selectivity point of view, acting across the whole of the tuned circuit, and the consequent reduction of selectivity is sufficiently serious, even with the high impedances of S.G. and H.F. pentode valves, to make some modification desirable. In a mains receiver any slight A.C. ripple in the H.T. feed to the anode of the valve containing the tuned anode circuit may give sufficient voltage at the next grid to cause hum. The reader may possibly feel inclined to query why this particular possibility is being raised in connection with tuned-anode H.F. coupling, and was not mentioned in connection with R.C.C. or other L.F. couplings. The point here is that an H.F. valve must necessarily come early in the receiver's chain of valve stages and, therefore, may have considerable amplification taking place after it.

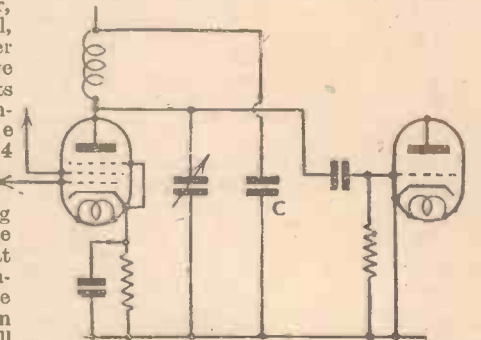


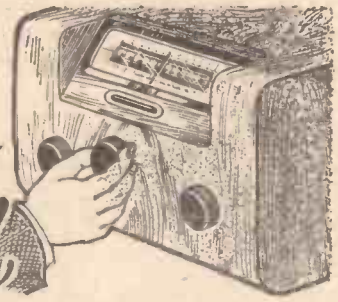
Fig. 46.—A similar arrangement to Fig. 45, but with the condenser connected to the earth line.

It will be observed from Fig. 45 that neither side of the tuning condenser can be directly earthed, so a section of the normal type of ganged condenser could not be used with the arrangement shown. Fig. 46 shows a possible modification which would enable one side of the tuning condenser to be earthed safely. The H.F. anode circuit is now closed off by the condenser C, which could well be a decoupling condenser. Care will have to be taken, however, to see that the inclusion of C does not upset the ganging balance between the various H.F. circuits of the receiver. Special modification of the other circuits may be necessary,

(To be continued.)



On Your Wavelength



By Thermion

"Is Home Construction Worth While?"

I WAS amazed to read in the wireless notes contributed to a Sunday paper that home set making is not worth while if you want a superhet! Now it is hardly within the province of a Sunday paper to deal with set construction, and none of them to-day do so, although a few years ago a few successful sets did appear in them. The contributor concerned thinks that unless you know quite a bit about wireless it does not pay nowadays to build receivers, and he advises readers to buy them ready made. He goes on to say in reply to a request from a reader for the design of a three-valve all-waver: "If I did design a set it wouldn't be a three-valver; it would be a superhet. Though I know that some will disagree with me I regard the superhet as by far the best set for all-wave listening to-day; but the worst of the superhet is that it is not at all simple to build at home, it needs complicated valves, and they mean complicated wiring. One little slip in the wiring—it is so simple to make it—and the set won't work." Perhaps this contributor can tell me why "it wouldn't be a three-valver; it would be a superhet." Does he think that it is impossible to build a three-valve superhet? Or has he not yet heard of the very successful three-valve superhet designed by the Editor of this journal and published not very long ago herein? Has he not yet heard that three-valve superhets are on the market?

He is quite wrong in stating that a superhet is not simple to build at home. Very many thousands of them have been successfully built from designs which have appeared in these pages. We are still selling blueprints for the three-valve and four-valve superhets, and our service report book shows that very little

trouble has been experienced. The wiring is less complicated than with a straight all-waver, and with the coils selected for our sets even matching and trimming is no more difficult than with a straight set. The really humorous part is of the comment: "One little slip in the wiring—it is so easy to make it—and the set won't work." If you make a slip in the wiring of any set it "won't work." Such a fault is not peculiar to the superhet nor to all-wave receivers. I am referring to this matter as so many readers have taken the trouble to send me cuttings of the article,

Sunday, the dealer stated that he thought it was needed for a cycle dynamo. He added, "You did not ask for radio flex." The flex can be sold on a Sunday as a cycle or car accessory. The law is that shopkeepers must satisfy themselves as to the purpose, and a fine of 5s. was inflicted. It appears, therefore, that if you want some flex on a Sunday you merely have to ask for some flex to wire up a cycle dynamo or a car, and you will be served, if you are purchasing it from a cycle shop. It seems that it is only a little matter of being careless with the truth, for no one could deny that you really did want the flex to wire up a cycle dynamo or a car. The law on this point as it is on so many others, is contemptuous and laughable. Such



The annual Exide luncheon took place at the Clarendon Restaurant, Hammersmith, on October 14th. Can you spot Thermion?

asking for my comments. All of them disagree with the remarks made in the article.

Sunday Sales at Cycle Shops

SOME of my readers will have heard of the Shops (Sunday Trading Restriction) Act which limits the accessories which can be sold on a Sunday. A certain dealer at Canvey Island was summoned under this Act for selling wire flex on a Sunday. An inspector purchased two yards of flex and when he inquired of the cycle dealer why he had sold it on a

The Exide Luncheon

I HAD to toss up on October 14th to decide which luncheon I should eat—the very excellent one served by the R.M.A. at the Savoy, or the equally excellent Exide luncheon which is an annual affair at the Clarendon, Hammersmith. Exide won, and I went along and had a most pleasant lunch meeting old friends in the radio and motor trade. Was very intrigued with a handsome "volume" with which

they presented every one present. It was lettered on the spine "Long Life" by Exide. On lifting the cover



Here is the neat Exide First-aid outfit referred to in the accompanying note.

of the book it was apparent that it was not a book at all but a very neat, complete and compact first-aid outfit which they propose to retail at 3s. 6d. It includes antiseptic lint, aspirin, tweezers, safety-pins, scissors—nearly thirty items altogether. Speeches were interesting and amusing. Even the stories were funny.

A Catalogue of Records

DO not deny that I get as much fun out of the radiogram part of my receiver as I do out of the broadcast part of it. I have a fine selection, including Gilbert and Sullivan, Lehar, Schubert, and so on. I always look forward to an issue of an H.M.V. catalogue, and regard it as one of the text-books of the gramophone trade—almost an encyclopædia of recorded music. It is well arranged and well indexed; the classification enabling you to find any piece of recorded music quickly either under its title, composer, or vocalist. The new H.M.V. 1937-1938 Record Catalogue is issued under the title of "Recorded Music," and it costs 6d. It is well worth it, for it extends to 480 pages. It includes a complete general list, and society, historic, and connoisseur collections. There is also a numerical index of album works and a selected list of records again appears.

Are You Sure?

IF you ever do buy a wireless set see that you buy one from a reputable dealer. I heard of a particularly cute trick which is being played. A man will go to a wireless shop and say



Rectifier Substitution

WE often receive inquiries concerning the use of a metal rectifier in place of a valve type, or vice versa. Most constructors proposing to make a modification of this nature think that it is an easy matter, merely necessitating the choosing of the correct type of rectifier and slight wiring alterations. In practice, the substitution involves several important alterations besides the wiring, however. The mains transformer has to be changed, as a transformer designed for feeding a valve rectifier is unsuitable for use in conjunction with a metal type. Let us take, for example, a receiver requiring 250 volts at 60 mA. A valve rectifier of the 250-volt 60 mA type, or an HT9 or HT16 metal rectifier, could be used. If a valve were used the mains transformer would require an H.T. secondary output of 250-0-250 volts at 60 mA, whereas the metal rectifier would require 200 volts at 200 mA. It will therefore be realised that if the rectifiers are interchanged the transformers must also be changed. Apart from this somewhat drastic alteration, an extra reservoir condenser will be necessary for the metal rectifier, if this is to be connected on the voltage doubler principle.

Adding A.V.C.

IN order to obtain effective automatic volume control a heavy signal must be available for application to the detector valve. This can only be obtained by using at least two amplifying stages preceding the detector. A certain measure of control can, of course, be obtained when only one H.F. stage is used, but it is preferable to use an H.F. manual control in a receiver of this type. Reasonably effective control can be obtained in a straight set if two efficient H.F. stages are employed, and in a superhet by using a frequency-changer followed by one I.F. stage. If A.V.C. is to be incorporated in a receiver of this type, having an H.F. manual control fitted in the original design, it is advisable to remove this control and fit a new manual control in the L.F. amplifier.

Push-Pull Transformer Ratio

MANY readers seem to be doubtful concerning the correct transformer ratio to be used in the output stage when the output valves are connected in push-pull. The formula for calculating the required ratio when a single output valve is used is fairly well known—the ratio is equal to the square root of the valve optimum load divided by the speaker speech coil impedance. When the valves are connected in push-pull the optimum load value for one valve should be doubled.

that he has a firm order for a particular set, and will the dealer order it? The man reappears in a week after the dealer has obtained the set, and apologises, stating that his customer has let him down and purchased a receiver of another make. He assures the dealer that it will be quite all right, and he can sell it if the dealer will let him have it a short while. In this way he accumulates quite a number of receivers which he sells for cash, no doubt, at a discount. When sued he elects to go to prison for a few days, and thus wipes out a debt of some hundreds of pounds. If the real owners of the sets can trace the customers they can, of course, claim the return of the sets. If a soft-tongued individual calls at your door and says that he is a radio salesman and offers to sell you a set at a discount, be more than ordinarily careful. Ask him to leave the set for a few hours, and then ask local dealers about it.

Television—Ban on Variety Artistes

ACCORDING to my news the contracts of variety artistes contain clauses which forbid artistes to broadcast or perform for television, and in an interview Mr. George Black gave his opinion for these clauses. He says that he would not allow his artistes to be televised under any circumstances, for while previously his artistes have had his permission to broadcast, such has been granted because hearing artistes has created a desire among the public to see them. This has publicity value, but if artistes can be seen as well as heard the reason which made it possible for artistes to broadcast has vanished. I understand that other impresarios are making similar clauses, and whilst the B.B.C. adopts the attitude that it cannot afford to pay artistes a fee which will make them independent of the theatres, these bans will continue to be effective. The only effective answer the B.B.C. can make is to train its own artistes. It may not be able to find all first-class material, but then go per cent. of variety artistes are only fifth raters, as far as the pay they can command is concerned. No doubt when television develops to the stage it ought to have reached two years ago theatre managements will relent. It is all a question of money. The stage cannot stop artistes from doing film work, and any attempt to forbid them from doing so would merely mean that artistes would desert the variety stage altogether. If you pay well you will attract the right people. If you offer small salaries you will not attract them.

Practical Television

November 6th, 1937. Vol. 3. No. 73.

Time-base Generator Design

AT present, the time-base generator equipment employed with cathode-ray tubes used for television picture reconstruction follows a variety of designs. One of the main differences, however, is associated with the use of what has come to be known as soft valves and hard valves. The former term is applied to the thermionic device which has a vapour filling, and is often rather confusingly referred to as a gas-filled relay. The word "Thyratron" is another expression, and this was derived from the Greek word meaning a door, together with the common form of word ending signifying that it is a member of the electron tube family. This word was first coined in America, but is now a trade name, and in consequence cannot be employed indiscriminately. When used in time-base generator equipment its action resembles that of a relay, for its function is to bring about an ionisation discharge inside the tube as soon as the charging voltage across the fixed condenser associated with it has reached an appropriate predetermined value. This type of valve proves very efficient when used in that section of the time-base generator which has to provide the frame pulses at a frequency of 50 per second. It is sometimes found, however, that at the high line frequencies (10,125 per second) there is often a tendency towards instability. If the valve is allowed to get overheated when boxed up inside the receiving set, it is inclined to "choke" or reduce scan width if due care is not paid to the design of the ventilation incorporated in the equipment. On the other hand, the hard valve—that is, the more common high-vacuum type—has an inherent increased stability owing to the absence of any form of ionisation delay. Furthermore, any circuit embodying hard valves is capable of functioning at frequencies which cannot be reached by the vapour-filled counterparts. If there should happen to be some future increase in the degree of line definition for the radiated television pictures, then the hard valve time-base generator is likely to be capable of adapting itself more readily to these alterations. Readers will be interested to learn that the hard valve type of time-base generator can be employed up to frequencies of one million cycles per second, and was first suggested and put into operation successfully by Cossors.

Viewing to Advantage

WHILE the modern television receiver is a delicate instrument, anyone possessing a set must not regard it with awe. Many cases have come to light where after installation has been undertaken by the expert engineer of the company or dealer concerned, the user has been afraid to touch the controls apart from the simple process of switching on and off. While it is the aim of all designers to produce sets of such a nature that the essential controls to be handled are reduced to a minimum, those that are provided are put there for a purpose. The average user of a radio set has come to appreciate the need

for judiciously handling his volume and tone controls to suit the various types of programmes radiated, and the same situation must arise with the contrast and brightness controls found on a television set. As a rule, when films are being televised, it is found that results are better if the brightness and contrast knobs are advanced slightly. The former is generally associated with the voltage bias applied to the modulator electrode, and is for the purpose of setting the average static level of cathode-ray tube screen illumination, which, of course, is varied for each picture element when building up the desired picture. An excess or insufficiency of initial brilliance will bring about distortion in the form of a picture lacking in half tones. After practice, the user, if he watches the effects carefully, will be able to recognise

the degree of signal amplitude from the extreme black-and-white condition (full contrast as is nearly always required for film transmissions) to the lighter and softer condition preferred by some users. It does for the eye what some volume controls do for the ear, where the speaker volume can range from its full wattage, where blasting is sometimes evident, to the softened reproduction often used when the music heard is for the sole purpose of providing a pleasant background to some other activity.

Which Method?

THE continued reports which keep coming to hand concerning the reception of the Alexandra Palace signals over distances more than treble the original anticipated service range, raises a variety of problems associated with the extension of the service to the provinces. To obtain pictures at points a long distance from the B.B.C. station the standard receiver is, as a rule, modified to make it more sensitive and the degree of amplification increased by adding stages in the set itself, or by using a pre-amplifier as an additional external unit. Added to this the aerial array is rather more elaborate than the standard dipole or half-wave with reflector separated either by eighth or quarter wavelength.



The modern televisior is just as suitable for entertaining a small family gathering as for a room full of people.

when brightness level changes are advantageous, although this must not be meant to infer that continuous alterations are either desirable or necessary. To keep rising from a comfortable chair while looking-in would be both annoying and tiresome, but an occasional adjustment will help to increase the degree of pleasure furnished by the pictures.

In the case of the contrast control this can really be regarded as a volume control, for its purpose is to increase or decrease the strength of the vision signal applied to the modulator electrode after the synchronising pulses have been filtered. That is to say, any alteration to this knob will in no way affect the strength of the synchronising pulses applied to the appropriate sections of the time-base generator. The picture steadiness is not altered, therefore, but a means provided for varying

The question that arises, therefore, concerns the best policy for distributing television signals. Is it better to have a few very high-powered television transmitting stations erected on suitably chosen high sites, and throw the onus of range on the receivers, or is it preferable to have a very much larger number of local transmitters covering a smaller area so that standard or even cheaper sets can be employed? The former suggestion would no doubt be the best from the point of view of wavelength allocation, but the latter seems a fairer solution from the viewer's standpoint. While reducing the number of stations which can ultimately be seen on his set, it will tend to make the results obtained more definite in character. Perhaps the situation may be met best by a combination of the two ideas in much the same way as is done for aural broadcasts.



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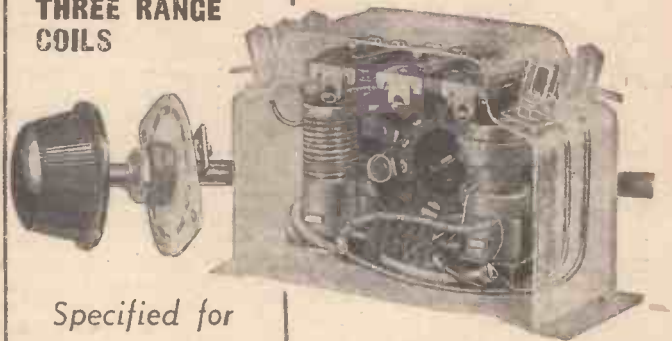


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Servicing "P. & A. W." Receivers

An Interesting Account of the Work Involved in Testing Readers' Receivers in the New "P. & A. Wireless" Laboratories

ONE of the services upon which this journal prides itself is that connected with the design of receivers which are published in our pages, and which are guaranteed by us to perform in the manner which we indicate. When a reader builds one of these receivers, and it fails to do what we claim, provided that it is correctly built from the parts which we specify, then we are prepared to test the receiver here, correct the faults which are found to exist, and return the receiver to the reader in a working condition. Very few readers realise the tremendous amount of work which this involves, as apart from the fact that defective components may be incorporated in a set built at home, a number of readers (fortunately, not many) seem to have a very poor idea of how a receiver should be built. It would be impossible in the course of an article to deal with all the failings of the receivers which we have so far tested, but there are several points which appear to present difficulty to the beginner. Before dealing with these, it would perhaps be as well to explain the procedure which is adopted in our laboratories in order to clear up any misconception which may exist regarding the manner in which this work is carried out.

Special Test Reports

Those readers who have taken advantage of our service will have received with the set a special Test Report. These reports are all numbered, and carry the owner's name and address, the initials of the technician who tests the receiver, the cause of the trouble which is found in the receiver, and the steps taken to cure it. Where a component is found partially defective, this fact is mentioned, and the reader is then able to return the component to the makers for exchange. It should be mentioned here that receivers should not be sent to us until we give instructions for you to do so. It is obviously necessary before we undertake the work of testing a receiver that the constructor himself should have made some attempt to obtain working results. If we do not insist upon this rule, some constructors would simply wire the parts together in any old fashion and then send off the set for us to finish their work. In some cases this has actually occurred, and we regret that in such cases we must return the set.

Therefore, we will assume that a receiver has been built from one of our blueprints or published details, and fails to work in some manner. The first procedure is obviously for the constructor to make the usual tests for continuity, and preferably to use a good meter in order to ascertain that all the valves are working correctly. In many cases this test alone will reveal the cause of failure, and it will not be necessary to send the set to us.

The Next Step

We will suppose, however, that such tests fail to assist the constructor to find the cause of the trouble. The next step is to write to our Inquiry Bureau, giving details of the receiver and the results of the tests you have made. In some cases this alone will enable us to decide the cause of the trouble and we may be able to put you right straight away. If, however, the

effects seem a little obscure, we may ask for further details, or we may suggest that you send us the receiver. If we ask for further details and still fail to help you to get the set working, then we shall naturally suggest that you send it. As we have already pointed out, however, we can only examine the receiver if it is built exactly to our specification. If you have used some alternative part it may easily prove that this is the cause of the trouble, and when we have gone to the trouble of designing the receiver and finding the most suitable parts it is not fair to expect us to waste time trying another receiver with alternative parts. Similarly, if we specify, for instance, a chassis 18in. by 10in., and a reader wishes to make the set but desires to use up an old cabinet which will only accommodate a chassis about 12in. by 6in. we cannot be expected to find out why the set fails to work properly when it is crowded

and enclose with it a remittance for the return of the set.

Servicing Procedure

Upon receipt of the set it is given a serial number and the name of the receiver together with the sender's name and address are entered on the Official Test Report, which carries the same number as is given to the receiver. All sets are dealt with in rotation, and thus it is therefore important to remember that you cannot expect your set to be returned to you the day after you send it. Unfortunately, it is impossible to give any definite period which may be



A typical beginner's receiver—which does not present any difficulties in construction. This is the Universal Three-valve Superhet described in our issue dated Dec. 15th, 1934.

on to such a small chassis. If the receiver is built to specification, therefore, it may be sent in as just mentioned. When sending the receiver, make quite certain that it is well packed. The valves should be enclosed and should be kept in their cartons, packed carefully on the chassis, and the whole placed in a strong container.

Careful Packing Necessary

Some readers send the receivers loosely packed with newspapers in a cardboard box, and after a railway journey it is sometimes necessary almost to rebuild the set. In most cases, it will be found desirable to take off the tuning dial, as this is delicate, and is not easily protected unless the set is enclosed in a wooden box. Address it carefully to The Editor, PRACTICAL AND AMATEUR WIRELESS, Tower House, Southampton Street, Strand, London, W.C.2,

taken in servicing a receiver. In some cases, a few minutes' inspection will reveal a fault whilst in others it is possible to spend many hours before satisfactory results are obtained, due to a combination of faults which are not inter-related. The first procedure in testing a receiver is to check all connections, and in many cases it is found that really stupid mistakes may be made by a constructor and overlooked. Particularly is this so in relation to earthing points—generally shown on a blueprint by the letters M.B. These must be clean and firmly made. Similarly, all soldered joints must be soundly made if maximum efficiency is to be obtained. Whilst a bad joint may not prevent a receiver from functioning, it may easily result in some peculiar effect due to the fact that it acts as a high resistance. After a preliminary inspection, the set is connected up and tested on a standard aerial. Weak or distorted signals may then indicate the cause of the trouble to the technician in charge of this work, due to the particular type of signal which is received, and the experience which has been gained in the past. When many hundreds of sets have been

(Continued on page 216)

WHEN WAS IT?

DOUBT often arises concerning the date upon which some particular event in wireless history occurred and it is rather difficult at the moment to find any source from which dates may be checked. For instance, when was the first broadcast from St. Martin-in-the-Fields? When was the first commercial broadcast across the Atlantic? These and many other equally important events are well worth recording, and we have therefore had the following almanac prepared, and it should be cut out and kept in the wireless desk so that at any future date it will be possible to check up events of the nature herein recorded. *Lest We Forget!*

- January 1st, 1894, Professor Hertz died.
 January 7th, 1927, Transatlantic service opened.
 January 8th, 1923, First outside broadcast, "The Magic Flute" (Mozart), from Covent Garden.
 January 17th, 1706, Benjamin Franklin born.
 January 20th, 1904, First Press message across the Atlantic.
 January 21st, 1914, First presidential address to Wireless Society of London.
 January 22nd, 1775, André Marie Ampère born.
 January 22nd, 1901, Station at Lizard opened.
 January 27th, 1912, Aranjuez station opened by King Alphonso XII.
 January 31st, 1926, Rugby Telegraph Station opened.
 February 2nd, 1896, Marconi came to England.
 February 2nd, 1923, Cardiff station opened.
 February 3rd, 1870, Government take possession of British telegraphy system.
 February 4th, 1925, Oliver Heaviside died.
 February 8th, 1925, First amateur telegraphy between Australia and England.
 February 9th, 1928, Atlantic bridged by tele-
 vision.
 February 11th, 1847, Thomas Alva Edison born.
 February 11th, 1901, Wireless communication established between Niton and the Lizard; 196 miles.
 February 14th, 1922, Writtle (2MT) transmitter opened.
 February 15th, 1834, Sir W. Preece born.
 February 16th, 1923, First broadcast play.
 February 17th, 1923, First charity appeal by wireless.
 February 18th, 1900, First German commercial wireless telegraph station opened on Borkum Island.
 February 19th, 1745, Alessandro Volta born.
 February 22nd, 1857, Professor H. R. Hertz born.
 February 26th, 1900, "Four Sevens" tuning patent taken out by Marconi.
 February 27th, 1922, First Annual Radio Conference held in Washington.
 February 28th, 1900, Communication up to 60 miles between s.s. *Kaiser Wilhelm der Grosse* and Borkum Island.
 March 1st, 1901, Wireless service inaugurated in the Hawaiian Islands.
 March 1st, 1925, First amateur wireless telegraphy between Gt. Britain and New Zealand.
 March 3rd, 1847, Dr. Alexander Graham Bell born.
 March 3rd, 1899, First use of wireless in life-saving at sea.
 March 3rd, 1923, Glasgow station opened.
 March 5th, 1827, Alessandro Volta died.
 March 9th, 1930, First dual transmission from Brookmans Park.
 March 13th, 1932, First programme from Broadcasting House.
 March 16th, 1787, Georg Simon Ohm born.
 March 20th, 1727, Sir Isaac Newton died.
 March 23rd, 1906, First high-power directional aerial used at Clifden.
 March 27th, 1899, Communication established between Wimereux and South Foreland Lighthouse.
 March 30th, 1930, B.B.C. commence television broadcasts.
 April 2nd, 1872, Samuel Morse died.
 April 7th, 1927, First television demonstration by American Telephone and Telegraph Co.
 April 13th, 1924, First broadcast from St. Martin-in-the-Fields, conducted by the Rev. Dick Sheppard.
 April 15th, 1912, s.s. *Titanic* struck iceberg, and sank. Radio used to summon assistance.
 April 17th, 1790, Benjamin Franklin died.
 April 23rd, 1924, First broadcast by King George V and King Edward VIII (then Prince of Wales) at opening of Wembley Exhibition.
 April 24th, 1903, Cie Française Maritime et Coloniale de T.S.F. formed.
 April 25th, 1900, Marconi International Marine Communication Co., Ltd., incorporated.
 April 25th, 1874, H. E. Marchese Marconi, G.C.V.O., LL.D., born.
 April 27th, 1791, Samuel Morse born.
 April 29th, 1932, First demonstration of U.S. ultra-short-wave television by Baird.
 May 1st, 1922, Poldhu station closed.
 May 1st, 1923, First broadcast from Savoy Hill.
 May 13th, 1897, Communication established over eight miles.
 May 21st, 1901, First British ship, s.s. *Lake Champlain*, equipped with wireless telegraphy.
 May 30th, 1927, Baird television by wire between London and Glasgow.
 June 1st, 1916, Wireless first adopted by New York Police.
 June 2nd, 1896, Marconi's first British patent granted, No. 12039, for Hertzian Wave telegraphy.
 June 3rd, 1898, Lord Kelvin sent first paid radio telegram from the Needles station.
 June 10th, 1836, André Marie Ampère died.
 June 12th, 1851, Sir Oliver Lodge born.
 June 25th, 1902, First magnetic detection, installed in Italian cruiser *Carlo Alberto*.
 June 26th, 1824, Lord Kelvin born.
 July 5th, 1912, International Radiotelegraph Convention signed in London.
 July 5th, 1913, London Wireless Club inaugurated (the nucleus of the Wireless Society of London and the Radio Society of Great Britain).
 July 17th, 1897, Communication up to 10 miles between Spezia and Italian cruiser *San Martin*.
 July 20th, 1937, H. E. Marchese Marconi, G.C.V.O., died.
 July 20th, 1897, Wireless Telegraph and Signal Co., incorporated (from which the present Marconiphone Co. is directly descended).
 July 20th, 1898, Events of Kingstown Regatta reported by Radiotelegraphy.
 July 21st, 1925, First transmission from Chelmsford, 5XX, B.B.C. high-power experimental station.
 July 24th, 1903, Agreement by British Admiralty for the use of Marconi system in the Navy.
 July 27th, 1896, First demonstration of directional wireless, using reflectors.
 July 27th, 1915, Communication established between San Francisco and Japan via Honolulu.
 July 27th, 1925, Daventry 5XX officially opened.
 July 28th, 1916, Regulation published making wireless telegraphy compulsory on British vessels of 3,000 tons and over.
 August 1st, 1922, Dr. A. Graham Bell died.
 August 2nd, 1928, First demonstration of Telegoscopy by Baird.
 August 3rd, 1898, Communication established between the Royal Yacht *Osborne* and Ladywood Cottage, Osborne.
 August 4th, 1903, First International Conference on wireless telegraphy held in Berlin.
 August 4th, 1914, War declared on Germany and all private radiotelegraphy suspended.
 August 13th, 1888, John Logie Baird born.
 August 15th, 1904, Wireless Telegraph Act of Great Britain passed.
 August 15th, 1924, Hull relay station opened.
 August 18th, 1921, Leafield (Oxford) station opened by P.M.G.
 August 19th, 1920, Communication established between an aeroplane in flight to Paris, and a telephone subscriber in London.
 September 9th, 1737, Luigi Galvani born.
 September 12th, 1923, Sir E. Rutherford's address to the British Association at Liverpool simultaneously broadcast from all B.B.C. stations.
 September 16th, 1929, First Radio station, Brookmans Park, opened.
 September 22nd, 1791, Michael Faraday born.
 September 22nd, 1918, First messages transmitted by wireless to Australia.
 September 28th, 1837, Morse patented his telegraph.
 September 29th, 1909, British coast stations taken over by P.M.G.
 September 30th, 1922, First Radio Exhibition at Horticultural Hall.
 October 1st, 1922, First all-British wireless exhibition opened.
 October 3rd, 1906, Triode patented by Lee de Forest.
 October 7th, 1934, Droitwich station opened.
 October 8th, 1908, Russian Company of Wireless Telegraphs and Telephones formed.
 October 10th, 1923, Aberdeen station opened.
 October 15th, 1901, First fan aerials erected for experiments between Poldhu and Newfoundland.
 October 17th, 1907, Transatlantic stations at Clifden and Glace Bay open for public service.
 October 17th, 1923, Bournemouth station opened.
 October 18th, 1931, T. A. Edison died.
 October 19th, 1937, Lord Rutherford died.
 October 24th, 1924, Belfast station opened.
 October 25th, 1926, England-Canada Beam station opened.
 October 26th, 1901, Cie de T.S.F. of Brussels formed.
 October 26th, 1915, Radiotelephonic communication effected between Arlington, U.S.A., and the Eiffel Tower.
 November 1st, 1902, Marconi Wireless Telegraph Company of Canada formed.
 November 2nd, 1900, First wireless land station in Belgium opened at La Panne.
 November 14th, 1922, London (2LO), first British Broadcasting station, commenced.
 November 15th, 1832, Morse code first made public.
 November 15th, 1899, Communication up to 36 miles between the Needles station and s.s. *St. Paul*.
 November 15th, 1922, First programmes broadcast from the London, Birmingham and Manchester stations.
 November 16th, 1904, First Fleming Valve, patent granted No. 24850.
 November 22nd, 1899, Marconi's Wireless Telegraph Company of America formed.
 November 22nd, 1922, Wireless Society of London changed its title to the Wireless Society of Great Britain.
 November 25th, 1642, Sir Isaac Newton born.
 November 29th, 1849, Dr. J. A. Fleming born.
 December 1st, 1900, Wireless officially adopted by London Fire Brigade.
 December 6th, 1897, Communication established up to 18 miles between a steamer and the Needles.
 December 9th, 1932, Empire Broadcasting from Daventry began.
 December 12th, 1896, Sir W. Preece lectured on Marconi's invention at Toynbee Hall.
 December 12th, 1901, Signals received at St. John's, Newfoundland, from Poldhu, a distance of 1,800 miles.
 December 15th, 1922, British Broadcasting Company, Ltd., registered.
 December 17th, 1902, First wireless message transmitted across the Atlantic.
 December 18th, 1921, Demonstration of duplex radiotelephony between London and Amsterdam.
 December 18th, 1902, Messages dispatched by Senatore Marconi and Earl Minto to King Edward VII and King Victor of Italy.
 December 24th, 1910, Cia Nacional de T.S.H. formed.
 December 24th, 1923, Newcastle station opened.

A PAGE OF PRACTICAL HINTS

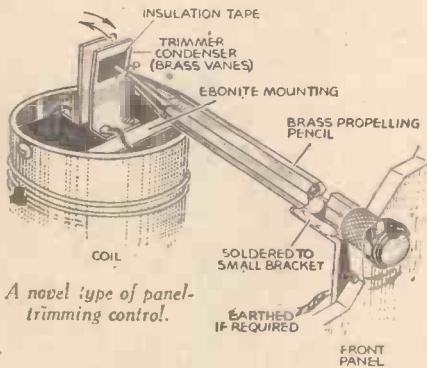
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Panel Adjustment for Trimmers

An efficient and attractive trimmer, with panel control, may be incorporated in a receiver without any extensive alterations if a propelling pencil is used in the manner shown in the accompanying sketch.

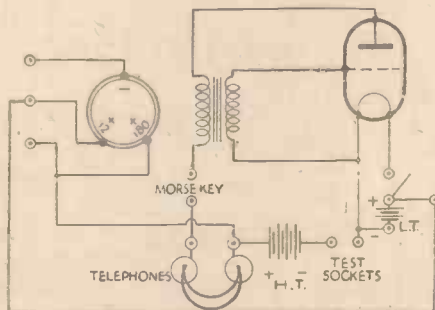


A novel type of panel-trimming control.

The pencil must, of course, be of metal to facilitate fixing to the rear of the panel, as shown, thus obviating any tendency to slip or turn during the adjustment of the trimmer vane. The two brass vanes are mounted on an ebonite block, which in turn is fixed into the top of the former and secured by two screws, a small piece of insulating tape separating the metal pencil from the vanes. The adjusting rod "P" may either be a piece of stout gauge wire or the actual control rod or socket of the pencil, providing it is long enough. The small adjusting medium at the end of the pencil will not be too obtrusive.—L. E. NETHERAL (Surbiton).

A Combined Morse Oscillator and Tester

The accompanying illustrations show a morse oscillator, combined with component tester and voltmeter, which I made out of the usual junk-box spares. A 1928 four-volt valve, two three-volt batteries at sixpence each, an old transformer, voltmeter, plugs, sockets, switch, wood, wire, and some cheap leatherette for covering the box, comprise the parts for making this handy testing apparatus, for which many uses can be found. Those interested in morse can practise without interfering with

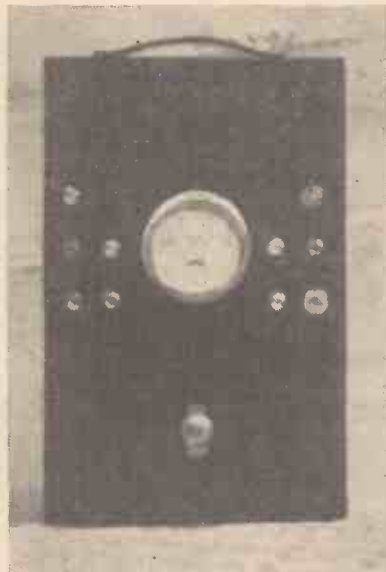


Circuit diagram of the morse oscillator.

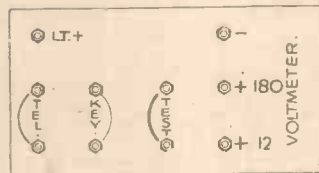
THAT DODGE OF YOURS!

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

other members of the family, and it will be found very cheap to run by using three-volt cycle-lamp batteries, both for high-tension and low-tension. A grid-bias battery could be used for H.T., but the valve will oscillate on a three-volt cell, while the filament consumes .06 amp. When practising morse



Front view of the finished morse oscillator and tester.



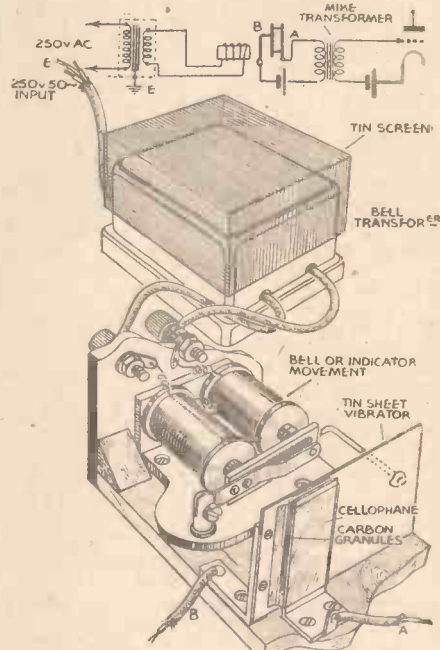
Arrangements of sockets on the panel of the instrument.

the test sockets must be shorted, while component testing entails the use of a shorting strip in the key-sockets, the phones remaining in circuit in both cases. Ample room for one earpiece, testing prods, etc., is provided on a small shelf fitted inside the cabinet above the voltmeter. Looking at the circuit diagram it will be seen that L.T.+ and H.T.+ are connected to the voltmeter; therefore, by inserting prod in test-

sockets and voltmeter negative the state of batteries can be found instantly. This idea of using an oscillating valve is not original, but I think the use of such small voltages, and the handiness of the combination, will interest many readers.—GEO. C. CASTLE (Newcastle-on-Tyne).

A Novel Signal Generator

To facilitate testing microphone equipment and circuits it is sometimes best to have some form of continuous signal,



Circuit diagram and general arrangement of a simple signal generator.

thus allowing an uninterrupted sequence of experiments. I have therefore designed a simple generator for giving the desired effects, and which is shown in the accompanying sketch.

The output from the bell transformer is from 6 to 8 volts when coupled to the 250v. 50c. mains, and the influenced armature of the bell movement vibrates, thus causing the attached vibrator sheet to disturb continually the carbon granules with the desired results. Between the tin vibrator sheet and the other contacting plate is a short strip of rubber—affixed at the base—and with the cellophane shroud a container is formed for the granules.

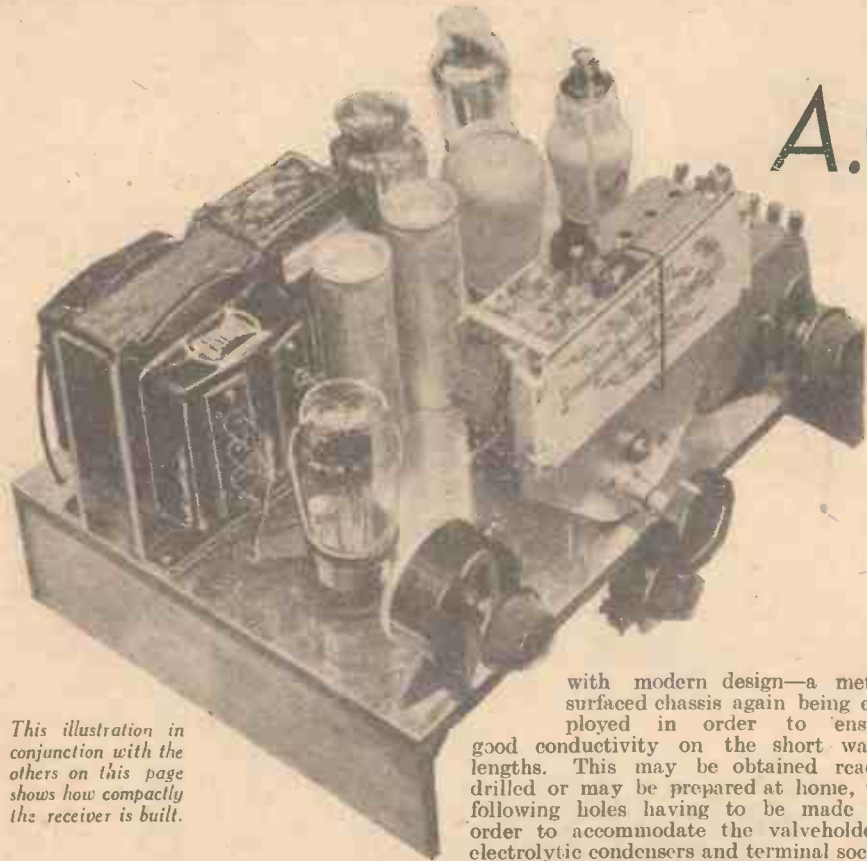
The striker rod of the original bell movement, which is bent as shown, and soldered to the vibrator, must have free movement; that is to say, it must be mounted slightly above the surface of the wood. Although the units are shown individually for clarity, the assembly, in my case, constituted part of a comprehensive tester which I have built. A three-wire cable is used on the input side, one wire serving as an earth connection for both laminations and new screen.—E. E. ENDLEIGH (Taunton).

BUILDING

A.C. ALL-WAVE

A Four-valve (plus Rectifier) Strapped range Coils, which is Simple to

it up. At the rear chassis runner holes will have to be made for the sockets, and in this case two $\frac{1}{4}$ in. holes may be drilled for each strip, and these may be cut across to form a slit or left as they are. As the strip is of wood no ill-effects should occur, even if the sockets come into contact with it, but with care the two holes may be



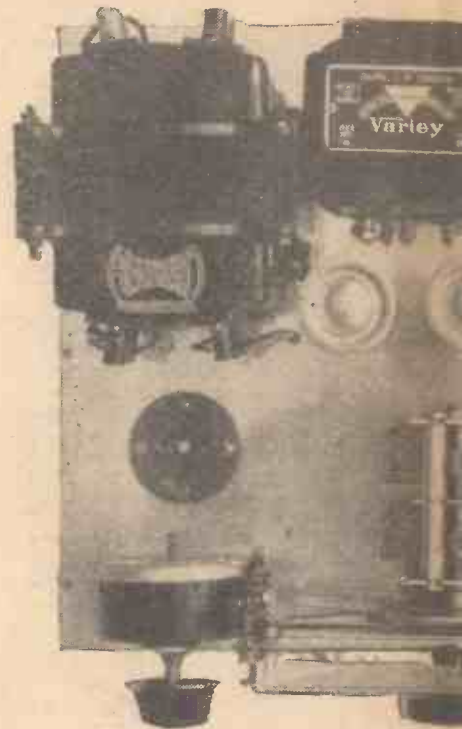
This illustration in conjunction with the others on this page shows how compactly the receiver is built.

AS we mentioned last week, we have designed this receiver in response to the many requests which we received for a 4-valve mains receiver capable of receiving the short waves but not utilising the superhet principle. The circuit adopted is similar to the battery version, a variable-mu H.F. pentode being employed in the first stage, with triodes in the detector, L.F. and output stages. A full-wave rectifier is employed for the mains section and the standard method of smoothing is adopted. Adequate decoupling is ensured in the detector stage by the use of an electrolytic condenser in conjunction with the usual resistance, and an H.F. stopper is included in the grid lead to the third valve. Variable bias control for the H.F. valve is the only volume control which is provided, but this is quite adequate to enable the output to be regulated to avoid overloading the output stage and to keep the volume down to the level which is required for listening purposes. It will be seen, therefore, that it will be necessary to use an additional control when a gramophone pick-up is employed, but this is easily arranged for by obtaining one of the pick-ups which is provided with a self-contained control on the carrier arm. The pick-up is, of course, joined between the grid and earth in the detector stage—the necessary biasing resistor and condenser being already included in the circuit, although pick-up terminals have not been shown. If, therefore, you desire to use this receiver without a pick-up the biasing components (R6 and C7) may be omitted and the junction of the grid lead, R5 and the cathode of V2 should then be joined to earth.

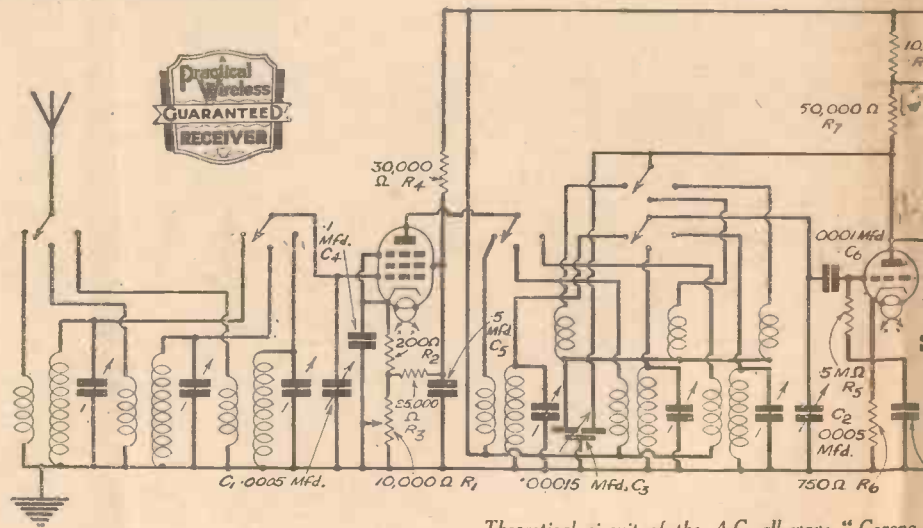
Constructional Notes

The illustrations of the receiver show that it is compact and fully in keeping

with modern design—a metal-surfaced chassis again being employed in order to ensure good conductivity on the short wavelengths. This may be obtained ready-drilled or may be prepared at home, the following holes having to be made in order to accommodate the valveholders, electrolytic condensers and terminal socket strips. For valve V1 a $1\frac{1}{4}$ in. hole is required, and for the remaining four valves a 1 in. hole is needed. For the electrolytic condensers a $\frac{1}{2}$ in. hole has to be drilled and all of these holes may be made with an ordinary wood centre-bit. Mark the positions accurately from the blueprint or wiring diagram and carefully drill from the metal side, exerting a light pressure until the tracer has cut through the thin aluminium surface. Do not permit the cutter to come into contact with the metal and no damage will be done to the bit. Then turn the chassis over and drill through from the back. If desired, when the aluminium has been cut through on the front the disc may be lifted off by placing a screwdriver or awl into the centre hole and prising



A plan of the receiver



Theoretical circuit of the A.C. all-wave "Corona"

THE A.C. ALL-WAVE "CORONA" 4
(Continued from previous page)

two top contacts and by using the connection to the bottom a certain length of wiring is avoided which might, on the short waves, have an adverse effect on the performance.

Mains Connection

A fuse is shown on the rear of the chassis, for connection in one of the leads from the

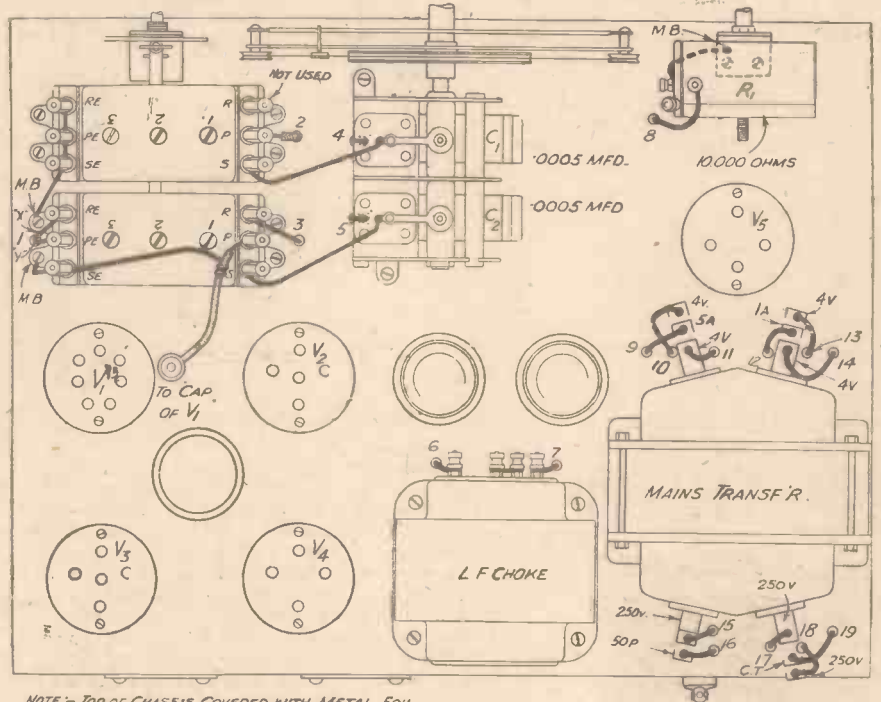
mains supply, and the method of making the mains connection will depend upon the type of cabinet which is to be used to house the receiver. If a permanent connection is desired, the mains leads may be joined to the fuse and one of the mains sockets on the mains transformer, and then the set will be switched on and off by means of the standard mains switch. If a radiogram cabinet is to be used it may be found preferable to mount an

ordinary Q.M.B. on/off switch on the side of the cabinet, and to connect the mains leads to the switch and to the fuse, additional leads being then taken from the switch and fuse for connection to the mains transformer. In this case the mains switch may be left in the "On" position and the switch on the cabinet used for switching the set on and off. Next week we will deal with the main operating details.

LIST OF COMPONENTS

- Two all-wave coils, type Triogen with 2-gang spindle (Wearite).
- One 2-gang condenser, .0005 mfd, bar type (Polar).
- One Micro-horizontal drive (Polar).
- Fourteen fixed condensers: Two .0001 mfd.; two .002 mfd.; .02 mfd.; .05 mfd.; .1 mfd.; .5 mfd.; type tubular; Two 25 mfd.; type 3016; 50 mfd.; type 3004; 4 mfd.; type F2921; two 8 mfd.; type F2920 (Dubilier).
- Thirteen fixed resistances: .5 meg.; two .25 meg.; 100,000 ohms, type F1; 50,000 ohms; 30,000 ohms; 25,000 ohms; 15,000 ohms; 10,000 ohms; 750 ohms; 600 ohms; 200 ohms; type F1; 600 ohms; type F2 (Dubilier).
- One volume control, 10,000 ohms, type CP158 (Varley).
- One reaction condenser .00015 mfd.; type differential (Polar).
- One L.F. choke, type DP11 (Varley).
- One mains transformer, type 803 (Heayberd).
- One Q.M.B. switch, type S80 (Bulgin).
- One fuse-holder and 1-amp. fuse (Bulgin).
- Two socket strips L.S., A.E. (Clix).
- Three component brackets (B.T.S.).
- Five valveholders: one 7-pin, two 5-pin, two 4-pin, type V1 and V2 without terminals (Clix).
- One Plymax chassis, 13in. x 10in. x 3in. (Peto Scott).
- Two ft. metal screened lead (Ward and Goldstone).
- Five valves: MVS/Pen. (7-pin met.), 41MHL (met.), 41 MLF, 4XP, 506BU (Cossor).
- One P.M. speaker, type Stentorian Senior (W.B.).

WIRING DIAGRAM OF THE A.C. ALL-WAVE "CORONA" 4

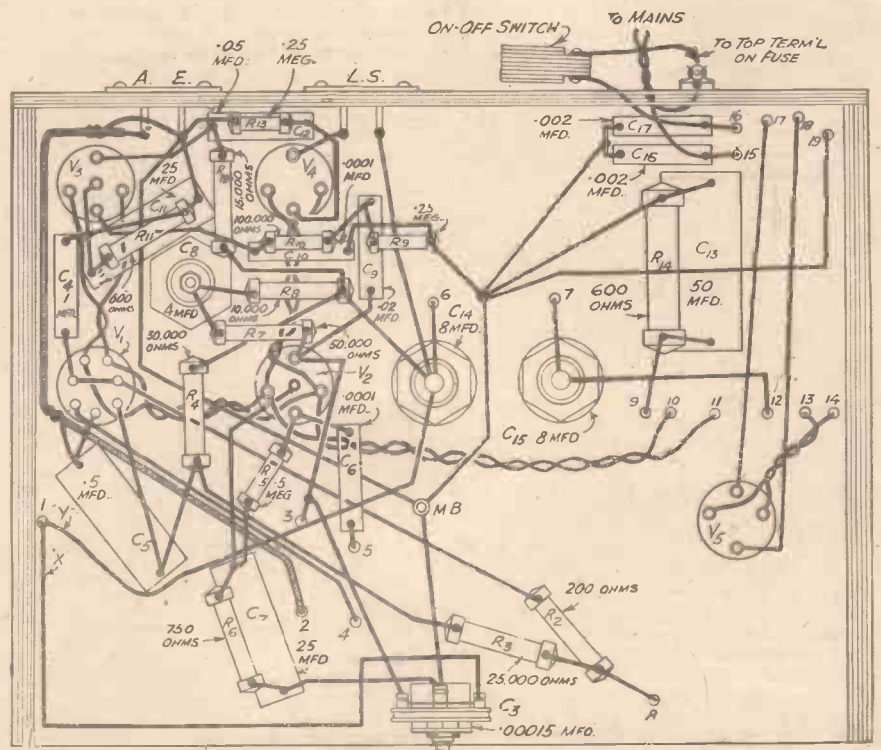


SERVICING "P. & A.W." RECEIVERS
(Continued from page 211)

tested it becomes possible to identify certain faults merely by hearing the output from the receiver, and this saves a considerable amount of time.

If the trouble is not indicated by this test, a systematic examination is then commenced with meters and other test equipment. Stage by stage tests with a meter will show whether components are faulty; resistance tests of coils, chokes and other components will indicate short-circuited turns; capacity tests will indicate open-circuited fixed condensers, or wrongly-marked components; and oscillator tests will reveal faulty adjustment of I.F. transformers, wrong types of oscillator coil or transformers. When the trouble has been located it is not a difficult matter to cure it, and when the necessary adjustments have been made the receiver is tested on various aerial arrays in order to judge of its final performance. When it is found to come up to the standard of the original receiver as designed by us, it is given a final check under the supervision of the Editor, the details are entered in the Test Report, and the owner is acquainted with the facts of the case and instructed either to call for the receiver, or it is dispatched under separate cover to him.

NOTE - TOP OF CHASSIS COVERED WITH METAL FOIL
"M B" = CONNECTIONS EARTHED TO FOIL

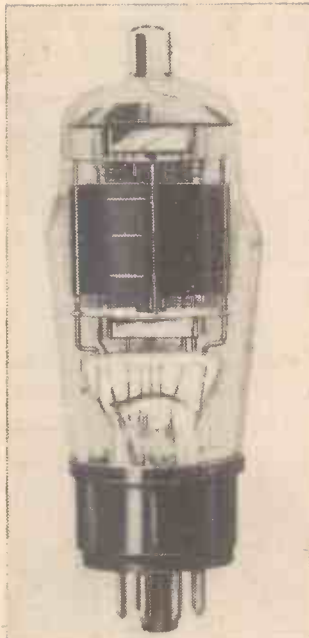


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New and Modified Osram Valves

TWO important items of news have just been received from the General Electric Company concerning Osram valves. The first relates to the popular PX4—an output valve which has found great popularity in the past among listeners who desire a high-quality output stage. Previously this valve was rated at 250 volts 12 watts anode dissipation. The output was in the region of 2 watts undistorted. It has now been found that it is possible to increase this rating and in future the valve will be rated at 300 volts 15 watts dissipation, enabling an increased undistorted output to be obtained. With a single output valve of this type it will thus be possible to obtain 3.5 watts, or with two of these in push-pull between 6 and 9 watts should be delivered. The price will remain unaltered at 12s. 6d. For the benefit of those readers who are not familiar with the characteristics of this valve they are repeated below:—

Filament volts ..	4.0	
Filament current ..	1.0 amp. (Directly-heated).	
Anode volts ..	300 (max.)	250v.
Grid volts ..	-42 approx.	-33 approx.
Anode current (average)	50 mA.	48 mA.
Anode dissipation ..	15 watts.	12 watts.
Load resistance ..	4,000 ohms.	2,400 ohms.
Cathode bias resistance	950 ohms.	750 ohms.
Power output for 5% 3.5 watts		2.5 watts
total harmonic distortion (approx.)		(approx.)
The total grid-cathode resistance should not exceed		0.25 megohms.



One of the new International Type Osram Valves.

A New Frequency-changer

The new valve is of the International type and is a triode-hexode frequency-changer, designed with a view to efficient operation on the short waves. The need for a good frequency-changer to include in a short-wave receiver has long been recognised, and the new valve—type X65—is designed bearing in mind all the experience gained with various types of frequency-changing multiple valves introduced during the past few years.

The main feature of the new X65 valve is the high input impedance at 20 megacycles—claimed to be the highest yet obtained at this frequency. There is an entire absence of "pulling" at the short waves, and a constant conversion gain over the whole band of wavelengths likely to

be met with in the ordinary type of receiver. In most receivers designed for efficient short-wave reception the frequency-changer will be preceded by a stage of signal H.F. amplification using a valve such as the type W.63, and this arrangement will give a very low noise-to-signal ratio. Another point of importance in this particular valve is the heater rating, which is 6.3 volts at 3 amps., thus permitting it to be used in both A.C. and A.C.-D.C. receivers, the heater being wired in parallel or in series with the other valves without the necessity for an additional type. The list price is 15s.

Battery Valves

We also understand that some interesting new types are shortly to be released

by the G.E.C., amongst which will be two of particular interest to the battery user. These will probably include a triode-hexode frequency changer and a special output tetrode. So far, of course, the battery user has not been able to take advantage of the improvements in design in superhets and special short-wave receivers owing to the lack of suitable valves for his use, but the introduction of these valves will no doubt be welcomed with enthusiasm by those who are forced to adopt battery supplies for the operation of their receivers.

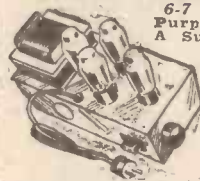
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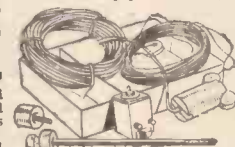
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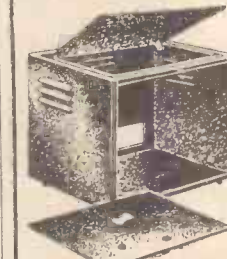
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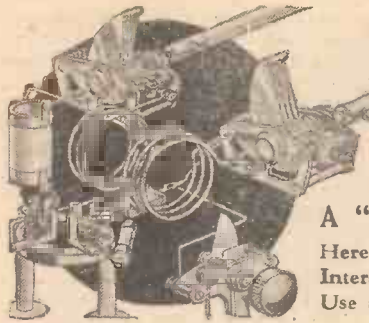
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Short Wave Section

A "UNIT" TYPE SHORT-WAVE RECEIVER

Here The Experimenters Describe the First of a Few Interesting Units which they have Designed for Combined Use as a Long-range Four-valve Short-wave Superhet

WE have found from our correspondence that many readers have joined the ranks of short-wave enthusiasts after we began to devote a greater amount of attention to this side of radio, and who want to build a more ambitious set than those with which we have previously dealt. This class of reader does not necessarily wish to build an expensive and highly efficient "communication" receiver, but one that is more sensitive than the simple "straight," and yet no more difficult to construct.

We have carried out a number of tests, based on previous experiments, and reached the conclusion that something on the unit principle would be most suitable. Thus, instead of making a complete multi-valve superhet we suggest that you build one unit at a time; the units will be arranged so that any number can be joined together as and when they are built. Let us make it clear that we claim no originality for this system, for it was used as far back as 1922, and probably before that.

"Expanding Bookcase" Idea

The scheme will be so arranged that experiments can be carried out at each stage of the work. It is not proposed to write a consecutive series of articles on this

valve arrangement that can be used alone. The circuit is shown in Fig. 1, from which you will see that the valve is a pentagrid,

by The Experimenters

although only the pentode portion is used for the time being. This is employed just as if it were an ordinary H.F. pentode, the

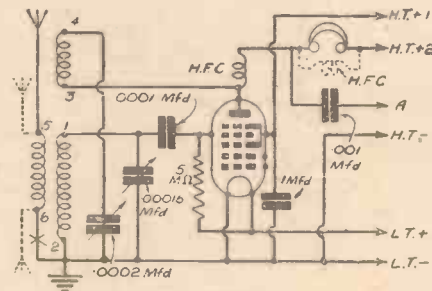


Fig. 1.—Circuit of the initial unit, which can be used as a plain receiver, or as a short-wave superhet converter.

previously described in these pages, or it can be a standard ready-made component such as the Eddystone or B.T.S. By using a coil with a separate loose-coupled aerial winding it is an easy matter to connect a doublet aerial in place of the ordinary inverted L; as our readers are by now well aware, we favour the doublet for nearly all reception purposes.

Tuning is by means of a .00016-mfd. condenser with slow-motion drive, and a .0002-mfd. condenser is employed for reaction control. For this position in the circuit, we suggest the Eddystone slow-motion reaction condenser, which has a 10:1 reduction drive. The choice of the tuning condenser we leave to you—but see that a good component of reputable make is employed. A short-wave H.F. choke is required, and any good type is suitable here.

The parts can be mounted on a chassis of the metallised or metal-covered pattern, and the lay-out shown in Fig. 2 is very suitable. You will observe from Fig. 2 that the battery connections, as well as those for the aerial, earth and 'phones, are brought out to terminal-socket strips. For present purposes, these could be dispensed with, direct flexible leads being used instead, but the sockets will be very convenient when another unit is added.

The Wiring

Connections are shown in Fig. 3. As would be expected, three terminals of the seven-pin valveholder are not connected, since two of these are for the oscillator portion, which is not being used for the time being, and one is a "blank." It can also be seen that there is a good deal of apparently-waste space on the chassis; this is to make room for the oscillator coil and a second tuning condenser when the valve is later connected as a pentagrid frequency-changer.

There are really very few points that call for explanation, since we are now assuming that this unit will be made by those who have had some previous experience in building S.W. sets of the simpler type. We should mention, however, that the wiring shown is on the assumption that an ordinary aerial system will be used; if a

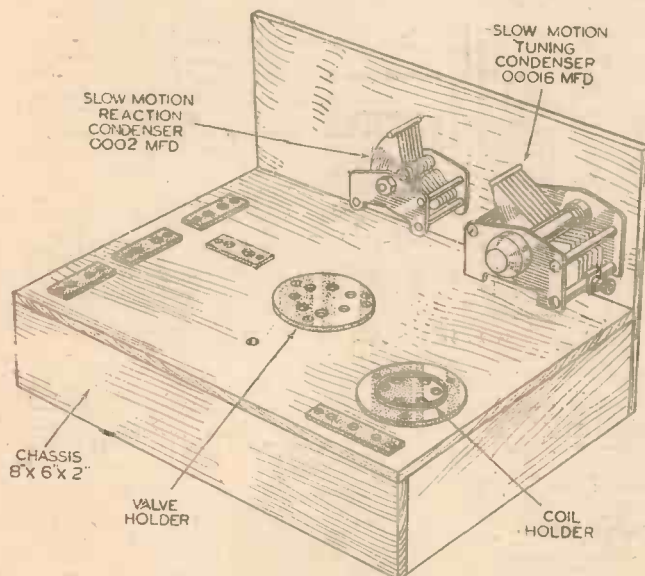
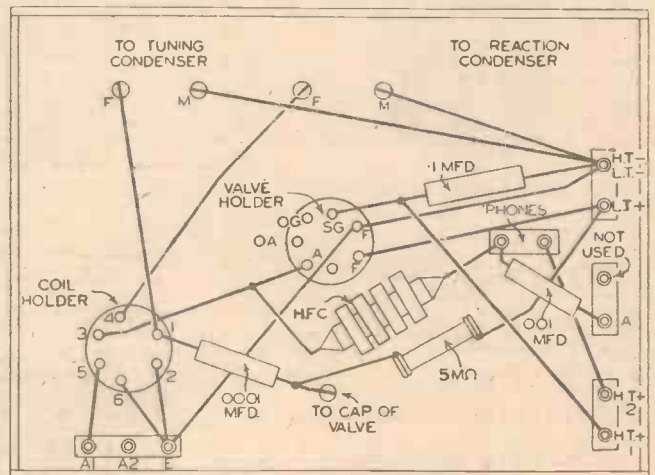


Fig. 2.—How the parts can be mounted on the chassis.

Fig. 3 (below).—Underside of the chassis, showing the connections.



subject, but rather to add to this first one, once every few weeks. This will allow ample time for you to try out various experiments before making the original set more complicated. An important point is that we shall contrive to use only components that can be retained however advanced the final design might become. First, we propose to deal with a single-

circuit being that of a single-valve receiver with reaction. Additionally, however, it could be used as a short-wave converter in conjunction with an existing broadcast set having an H.F. stage.

The One-valve Circuit

A six-pin coil is used in the aerial-tuning circuit, and this can be home-made, as

doublet is to be employed, the connection between terminals 6 and E on the coil should not be made. Instead, terminal 6 should be joined to the centre terminal on the three-pin socket strip used for aerial and earth leads. The two leads from the doublet should then be attached to sockets marked A.1 and A.2, the earth lead remaining connected to the E socket. In case these

terminal-socket strips are not known to some of our readers, we might mention that Clix components are as suitable as any, although other makes of corresponding pattern could be used.

Battery Connections

Another item that calls for explanation is the lead taken from one 'phone terminal to a socket marked A, through a .001 mfd. condenser; this is required only if the unit is to be used as a converter in conjunction with a broadcast set.

To employ the unit as a normal single-valve receiver, connect the 'phones to the separate socket strip mounted slightly away from the edge of the chassis, attach aerial and earth leads, and make connection from the battery sockets to the 2-volt accumulator and to the H.T. battery. Tapping H.T.+1 should receive about 48 volts, and H.T.+2, 60 to 72 volts. Battery leads should, of course, be fitted at each end with wander plugs, one is for connection to the battery and the other for joining to the terminal-socket strip. L.T. leads should have a wander plug at one end and a spade terminal at the other.

After connecting up as described, the set can be used in exactly the same manner as any ordinary single-valveset, and different wavelength ranges can be obtained by fitting appropriate six-pin coils into the holder. It is suitable for all wavelengths—broadcast included—provided that the .00016 mfd. tuning condenser is of good make, having a low minimum capacity. As an example, an Eddystone type 6G coil will tune from 260 to 510 metres in conjunction with the .00016 mfd. condenser, while a range of from 1,000 to 2,000 metres can be covered when using the 6GY coil. Short-wave ranges from about 9 metres upward are well covered by any make of S.W. coils.

Use as Autodyne Converter

Should it be desired to use the little set as a converter, an ordinary or "reaction" H.F. choke should be connected in place of the 'phones, a lead being taken from the terminal marked A to the aerial terminal on the broadcast receiver. It must be understood that a converter of this type can be used successfully only when the broadcast set is of the H.F.-Det.-L.F. type. Join the two L.T. terminals to the earth terminal and the "set" side of the on-off switch, respectively, and leave the H.T.—terminal on the converter disconnected; the H.T.—connection will be made through the earth connection of the receiver and L.T.—

The aerial lead must be transferred

from the set to the unit, and the earth lead can either be left on the set or transferred to the converter. When using the unit in this manner, tune the set to the lowest wavelength on the long-wave band and leave the tuning fixed. Advance the reaction condenser on the unit past the normal setting for oscillation, and tune by means of the converter tuning condenser. Although the reaction setting is not usually at all critical when using a converter, best reception is obtained by adjusting this with some care after a signal has been tuned-in.

Further Units

In the next article in this series we shall describe the method of adding the second tuning condenser and oscillator coil to the unit. After that, a two-valve unit, consisting of H.F. pentode I.F. amplifier and second detector, can be made for easy connection to the frequency-changer. For the second

unit we shall use two intermediate-frequency transformers and the two valves.

The three-valve set will be suitable only for 'phone reception, but it will have a very good range of reception. To make it suitable for loudspeaker use; we shall supply details of a third unit—an L.F. amplifier—that can be added to the other two by means of a few plugs and sockets. At each stage of construction you will have a set that can be used perfectly well just as it stands.

Thanks to those many readers who have written to us since last week. In our next article we hope to have something interesting to report in connection with our request for ideas about simple and inexpensive "quality" sets. Will those who have not yet written on that subject please make good their omission now; the more letters we receive, the better shall we be able to describe the set that you want.

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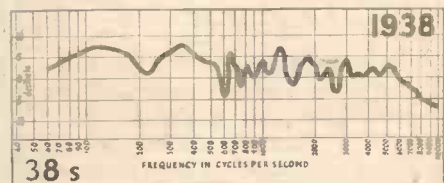
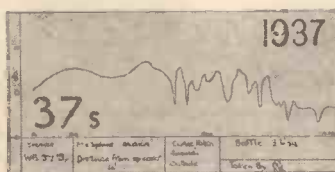
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"Listeners are fortunate in having at their command a speaker so sensitively responsive from the lowest to the highest frequencies. Good and bad sets will be improved by it. It is an important advance in speaker technique.—Mr. F. J. Camm, Editor of 'Practical and Amateur Wireless.'"

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WIRELESS COILS, CHOKES AND TRANSFORMERS:

AND HOW TO MAKE THEM

By F. J. CAMM

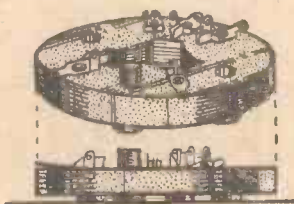
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New Components

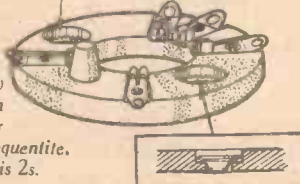
AMONG the new components recently released are three valveholders produced by Bulgin, Clix, and Belling and Lee. These are illustrated below and it will be seen that the first two mentioned are for the new Acorn valves, designed especially for short-wave work. The Bulgin component is manufactured from a special insulating material known as "Micro-loss" and the clips are of the quick-grip type designed to provide a firm contact round the legs of the Acorn valves which are now available. Small projections on the underside give added spacing when a metal surface or metal chassis is used for mounting, and the centre of the holder is



The new Bulgin low-loss Acorn valveholder. This costs 3s.

cut away still further to increase the leakage path and provide good low-loss properties. In the Clix holder, which is designed on somewhat similar lines, Frequentite, a ceramic material, is employed, and the special feature of this holder is the

SUNK METAL EYELETS



This is the new Clix Acorn valveholder made from Frequentite. The price is 2s.

method of providing clamping means which avoids the risk of breakage. If a nut is tightened when attaching this type of holder to a chassis there is a risk of fracturing the material if the holes are not correctly spaced, and the Clix holder is therefore provided



LONG LEAKAGE PATH

The Belling-Lee high-voltage valveholder, available in 4- or 5-pin types. The price is 1s.



with a specially inset metal eyelet which takes the strain of such a nut and bolt. Although intended primarily for use by manufacturers who rivet the holders and other components to a chassis this device will be found of great value to the home-constructor in avoiding breakage. The Belling-Lee holder, which is the last to be illustrated, is intended primarily for rectifying valves in television and other high-voltage apparatus and the special feature is the long leakage path provided between the pins and chassis. The sectional drawing illustrates how this has been arranged, and in addition a bakelite separator is inserted round the grid and anode pins extending for the full depth of the moulding.

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.

J. McS. (S.W.4). Your letter was returned by the Postal Authorities, marked "Not Known." Upon receipt of your new address we shall be pleased to give you the desired information, for which purpose additional details of your equipment should be given.

R. G. (N.3). Simply connect the phone in the grid circuit of a valve. The speaker may be used in the same way, and will probably give better results. A small collecting cone should be fitted to the earpiece to direct the sounds direct on to the diaphragm.

S. G. T. (Woking). The Simplest Short-Wave Two appeared in our issue dated April 3rd, 1937, and the remaining articles mentioned in the issues dated November 14th, November 21st, and November 28th, 1936.

W. H. L. (Penzance). We have not used a circuit recently of the type you refer to. It would not be so efficient as a multi-valve for frequency changing. Have you tried the triode-pentode?

J. S. B. (Wisbech). The arrangement does not appear to be standard, and we regret that we cannot identify the model. Write direct to the makers, Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17, giving them full details of the speaker. It may, of course, have been removed from a commercial receiver.

A. G. S. (Edinburgh). The valve has to be considered in conjunction with the speaker impedance and therefore it is the latter figure which is most important. You could not change the I.F. transformers unless you change also the oscillator coil and ganged condenser as the frequency chosen in that stage must be that at which further amplification takes place.

J. O'C. (Ebbw Vale). We regret that we are not familiar with the servicing difficulties of individual commercial receivers and suggest you write direct to the makers regarding your difficulties.

G. S. (N.W.1). The coil is a standard 6-pin short-wave component, but as the particular type indicated on the blueprint is no longer easily obtainable we suggest that you use one of the modern coils, fitted with a 6-pin base, although, of course, the connections will be slightly different. We recommend Eldystone, B.T.S. or Raymart coils for this particular set.

A. C. (Oldham). If you will send us a letter with your full address we shall be pleased to publish your request for the founding of a club in your district.

T. O. D. (Wanston). There is no book published which gives all of the names, addresses, wavelengths and powers. The "Radio Amateurs' Call Book, price 6s. post free from F. L. Postlethwaite, 41, Kinfans Road, Goodmayes, Ilford, Essex, is the nearest, but this obviously does not give every amateur transmitter, and does not include wavelength or power.

L. E. M. (East Grinstead). We have no circuit details of the particular set mentioned, but would point out that the modification would not be easy to make. First, the heaters are designed to take 4 volts at 1 amp. each and thus you would have to use an accumulator to run these economically. Secondly, the H.T. portion may be designed to deliver a voltage in excess of 250 volts and thus your D.C. mains would not operate the valves at a suitable potential. There may be many other difficulties of a similar nature.

G. S. (Boston). The speaker may be quite good, but the transformer used to couple it to the pentode may be unsuitable, and thus mismatching may be the cause of the distortion. Furthermore, you may be endeavouring to get too much volume from the two stages, and it may be worth while to consider the addition of an H.F. or another L.F. stage in order to obtain a good signal to suit your requirements. We think the makers would not approve of the method of connecting the batteries, and suggest that you obtain their decision as to the merits of the scheme.

NEW VOCALION RECORDS

COLEMAN HAWKINS, tenor sax king, already famous for his solo recordings on Decca, joins forces with Benny Carter and his Orchestra on *Vocalion S 104* in the revival of the old George Gershwin tune "Somebody Love Me." On the reverse Benny Carter offers a "band-new" arrangement of "Blues in my Heart."

Though best known as a mouth-organ virtuoso, Larry Adler is no mean performer on the piano. His latest record—*Vocalion 565*—is a vocal at the piano of "Smokin' Reefers", and "I Gotta Right to Sing the Blues."

Phil Harris and his Orchestra, favourite band of the Hollywood film stars, have a big part in the new film release "Turn Off the Moon." He has recorded two of the numbers featured by himself in the picture on *Vocalion 567*. They are "Jammin'" and "That's Southern Hospitality."

THE BRITISH LONG-DISTANCE LISTENERS' CLUB

Temperature Effects

AN important point in regard to receiver design in general has been raised by a member who has just had cause to regret the re-arrangement of the parts in a design which was published in our pages a year or so ago. In this design two electrolytic condensers were employed with a push-pull output stage utilising two mains-type valves. Due care had been taken in the design to provide adequate ventilation and spacing as these valves, and also mains rectifiers of the high-voltage types, become very hot when they have been in use for some time. The member referred to had endeavoured to use up an old cabinet and had not only revised the layout, but had also forgotten to leave the back of the cabinet open. The result was that both of

ganging and fading and similar effects may eventually be traced to the effects of temperature changes inside the set.

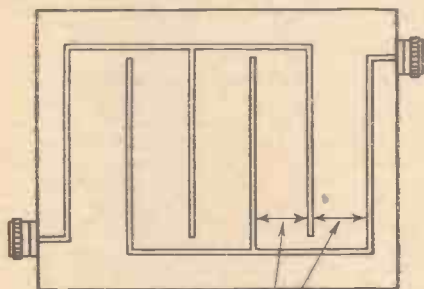
Electrolytic Condensers

Although many components are now quite low in price and reliable to use, it still appears that some amateurs find interest in trying to make their own parts. A letter has been received from a member who was obviously in a great hurry to post it as he left off his address, and only enclosed half of the letter. He gives details, however, of

some experiments he has carried out with electrolytic condensers and the attached sketches show the system of construction he adopted. He says that the results are quite good, but the letter does not mention what electrolyte he employed. Perhaps other members have carried out similar experiments and may be glad to place the results of these before others. We shall also be pleased to hear of any experiments on what may be called "unorthodox" lines which may prove of interest to other members.

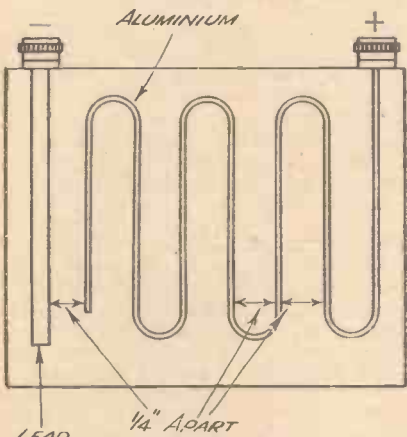
Tottenham Short-Wave Club

In connection with the forthcoming visitors' evenings that this Club are holding on November 11th, 12th and 13th, we shall be very pleased to send complimentary tickets to all B.L.D.L.C. members who are interested. Edwin Jones, Hon. Sec., 60, Walmer Terrace, Firs Lane, Palmers Green, N.13.



1/4" APART.

These two illustrations show the lines upon which a member built electrolytic condensers.



ALUMINIUM

LEAD

1/4" APART

the electrolytic condensers broke down after only a short period of use, and the sudden failure not only burnt out the rectifier valve, but also damaged the windings of the mains transformer. An expensive experiment! It should therefore be remembered that the majority of wireless components are designed to operate at normal temperatures, and not only electrolytic condensers, but many other parts of a normal receiver can receive damage if they are permitted to become warmed up. The insulation may become soft and break down; or the effects of moisture driven off by the heat may result in some other breakdown. Apart from these details, however, it must be remembered that metal expands when heated, and there are many peculiar faults which can be traced to this fact. In a critically tuned receiver, pre-set condensers, or even the ganged condenser, may move sufficiently to upset

YOU HAVE BEEN WARNED BY RADIO—

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

NOW BE ADVISED BY ME.

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

THERE IS NO OTHER COLLEGE IN THIS KINGDOM THAT CAN CLAIM ALL THE ABOVE ADVANTAGES.

It is not necessary for students to attend the College; we can send exactly the same tuition to you by post for a reasonable fee payable monthly. Anyone who reads the journals knows that there are many things advertised that one can study, and any kind of study is good. It is training for the brain, but the best thing to study, surely, is a course specially prepared to teach you your own vocation, or prepare you for the examination which you have in view. Knowing that you are master of your job gives you self-confidence and personality, but a Diploma from the College is absolute proof of your efficiency. We have agencies in all English-speaking corners of the world. The nature of our business makes us keep in touch with employment requirements in all parts of the world; therefore we specialise in preparing students for the good positions which we know exist, and for all the worth-while examinations.

THE ABOVE VAST ORGANISATION CAN HAVE BEEN CREATED ONLY BY THE SUCCESS OF OUR STUDENTS.

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



LET ME BE YOUR FATHER

Let me tell you how to make a success of your career. If your future is undecided or appears unsatisfactory, let us talk it over together. I want to help, and it will cost you nothing to get my help, you will be under no obligation what-ever.

We are prepared to produce, on demand, over 10,000 unsolicited testimonials from successful students, or in default we will hand over £100 to charity.

A STAFF OF 197

are in daily attendance at this College at your service.

YOUNG MEN

Young men physically fit and whose careers are not definitely fixed should join the Police Force. We have Special Courses for Entrance and Promotion. Full particulars Free. Address: POLICE Dept. 104.

ENGINEERS

Engineers, now is your chance to dig yourselves into a Key position and make your future solid. It needs Technical Training: we can give you that by post. Full-particulars Free. Dept. 104.

DEPT. 104, THE BENNETT COLLEGE, LTD., SHEFFIELD

A New 40-Page Booklet—Free



This booklet gives particulars of the many opportunities open to trained men engaged in the Radio industry. It also gives full information about the specialized instruction offered by the I.C.S. This instruction includes American broadcasting as well as British wireless practice, and provides ambitious men with a thoroughly sound training.

Here are the I.C.S. Courses :

Complete Radio Engineering
Complete Radio
Radio Servicemen's
Elementary Radio
Radio Service and Sales
Television

Preparatory Courses for :

I.E.E. Graduateship Exam.
I.W.T. Exams.
C. & G. Exams. in Radio Communication.
P.M.G. Certifs. in Wireless Telegraphy.

The Complete Radio Course covers equipment and radio principles as well as practice.

Efficient Servicing is of first importance to every wireless dealer and his assistants.

The Service and Sales Course enables the salesman to hold his own with the most technical of customers.

Television will soon be a tremendous branch of the industry. Our Course deals adequately with this subject.

I.C.S. Courses do not cost more than those of other reputable schools teaching by correspondence; indeed, in some cases they cost less. An important consideration lies in the fact that all I.C.S. instruction books and special textbooks are supplied without extra charge. The students of many postal concerns have to buy the books required, that often involving an additional expenditure of several pounds.

SEND FOR OUR "RADIO" BOOKLET
 And, if you wish, ask for our free advice.



**INTERNATIONAL
 CORRESPONDENCE
 SCHOOLS LTD.**

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

Leaves from a Short-wave Log

Daily Broadcasts from Huizen

WITH four channels at her disposal Holland now carries out daily transmissions for overseas listeners. PHI, Huizen, on 16.88 m. (17.775 mc/s), is on the air every day, excepting Wednesday, with a programme for the Dutch East Indies broadcast from G.M.T. 13.00; on Sundays it is preceded at G.M.T. 12.25 by a special transmission for Asia and the Far East. PCJ, also at Huizen, on 19.71 m. (15.22 mc/s) works on Tuesdays for Australia and New Zealand from G.M.T. 09.30, and on Wednesdays at G.M.T. 13.00 for Asia. The same station operating on 31.28 m. (9.59 mc/s) transmits at G.M.T. 19.00 for Africa, on Sundays; at midnight (G.M.T. 00.00) for North America, and South America on Mondays and Thursdays; on Tuesdays at G.M.T. 18.30 for Africa, and on Wednesdays at G.M.T. 13.00 for Asia. The 25.57 m. (11.73 mc/s) channel is not used at present, but will be brought into operation later in the year.

Salamanca War Broadcasts Beamed to U.S.A.

The Nationalist Station at Salamanca (Spain) broadcasts daily through EDR3, el Tablero, Tenerife, Las Palmas (Canary Islands) on 28.93 m. (10.37 mc/s) a special English war news bulletin which is directed to listeners in the United States of America. At G.M.T. 01.00 another English programme is transmitted every Tuesday, and Friday at G.M.T. 23.30 on 9.48 mc/s (31.65 m.) through EAQ2, Madrid-Vallecas, the *Voice of Spain*; in this case it is supplied by the *Republican Government*.

Moscow Now Uses a Longer Channel

Moscow (RKD) on 39.89 m. (7.52 mc/s), 25 kilowatts, is now being again used for broadcasts during the winter months, and has taken over the programme so far transmitted on 19.94 m. (15.04 mc/s) and 19.88 m. (15.09 mc/s). The majority of the talks given in this transmission is made in the English language.

New Schedule of Colombia Overseas Broadcasts

Wayne, W2XE, the main short-wave station of the Columbia Broadcasting network utilises three separate channels for its transmissions of interest to foreign listeners. From Monday to Friday inclusive, between G.M.T. 12.30-15.00, the broadcast is beamed on Europe; on Saturdays and Sundays the programme is given from G.M.T. 13.00-18.00. For Europe, W2XE is again on the air on 19.646 m. (15.27 mc/s) from G.M.T. 18.00-23.00 (Monday to Friday inclusive), and from G.M.T. 19.50-23.00 on Saturdays and Sundays. In addition, the station provides a special broadcast for South America daily, on this channel, between G.M.T. 01.00-05.00, and on 16.89 m. (17.176 mc/s) from G.M.T. 23.30-01.00.

All announcements are given out in English, French, German and Spanish every 15 minutes following the call.

Boston's University of the Air

WIXAL, Boston, in co-operation with the Harvard and Yale Universities, and other famous educational institutions in the

U.S.A., broadcasts every Sunday from G.M.T. 21.00-22.00 on 25.45 m. (11.79 mc/s), and on weekdays at the same time, but on 49.67 m. (6.04 mc/s). From G.M.T. 19.30-21.30, on 19.67 m. (15.25 mc/s), translations of these educational broadcasts in various foreign languages are given every week-day.

The Wonderful Isle of Dreams

WIOD, Miami Beach (Florida), a station of which the transmissions on a medium wave have been so frequently heard in Europe, is now trying out a new short-wave 5-kilowatt transmitter recently erected on Collins Island, Biscayne Bay. The channel used is the one which W4XB, utilised in previous years, namely, 49.67 m. (6.04 mc/s). The interval signal which assists identification is that of the N.B.C., or three notes (G,E,C). The studio closes down with the cheery greeting: *A happy good-night to all and God speed.*

Opera from Peru

Tune in on Sundays in the early hours of the morning or towards G.M.T. 02.30-02.45 to 32.09 m. (9.33 mc/s) and you may pick up a musical performance relayed from the Opera House at Lima, through OAX4J, in that city. The station is on the ether on week-days from G.M.T. 23.00. Interval signal: 3 notes of the N.B.C. type. The studio possesses both male and female announcers. Address for reports: Radio Internacional OAX4J, Apartado Postal, 1166, Lima (Peru).

HJ3ABD, Bogota, Moves to Another Channel

Formerly on 49.55 m. (6.055 mc/s) this 1-kilowatt Bogota (Colombia) station has been found working on 48.41 m. (6.198 mc/s) daily between G.M.T. 00.00-04.00. It requests overseas listeners to send their reports to Apartado Postal, 509, Bogota (Colombia); these will be acknowledged in due course if International Postal Reply Coupon is sent.

Interference on 25-metre Band

Although the actual identity of the transmitter which is heard almost nightly broadcasting continuously the melody *Ramona*, so popular a year or so ago, has not been definitely established, it is common knowledge that the purpose of the broadcast is to jam the transmission in German carried out by Moscow on 25 metres. Most listeners will have noticed that the interference is not present when the U.S.S.R. transmits its talks in another language. A peculiar kind of interference may also frequently be noted on Moscow's long-wave transmitter.

Ultra-short Waves

Another popular, and well heard, station, is W6XKG, at Los Angeles. This station operates on 11.56 metres with a power of 100 watts.

A programme sure to interest the DX enthusiast is radiated at 7 to 7.30 p.m. each Monday, Wednesday and Friday. It consists of a programme of short-wave "tips" broadcast by the Editor of the *California Broadcaster*.

Remember that the majority of ultra-short-wave transmissions are of an experimental nature.

RADIO CLUBS & SOCIETIES

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

Battersea and District Radio Society

THIS society have now commenced their Winter Season, and meet on Tuesday and Friday of each week at the Battersea Men's (L.C.C.) Institute, Latchmere Road, S.W.11. Talks on the everyday problems of the wireless enthusiast will be given each Tuesday, and Friday evenings will be devoted to practical work, and a Morse instruction class for those desirous of acquiring a knowledge of the code. The society has recently completed the construction of a broadcast receiver for the Institute common room, and hope shortly to commence work on a new short-wave receiver for use in the club room. Arrangements are in hand for visits to places of interest, and new members will be welcomed. The subscription of 1s. 3d. for three months also admits to all other facilities of the Institute. Particulars available any Tuesday or Friday evening from Mr. S. H. Harris (G5SH) at the above address.

Kettering Radio and Physical Society

THE above society have recently commenced their winter programme, and welcome all interested in radio or photography to their meetings.

The fifth annual radio exhibition was recently held at Kettering, and once again proved a great success, traders stating that they had done good business. The society's stand was a mecca for amateur radio enthusiasts, as a good display of receivers and transmitters was staged.

The photographic section, which is progressing rapidly, has some interesting work planned for the season.

A short-wave section has been formed, and a Morse class started, as it is hoped to shortly recommence transmitting under the society's call sign G5KN.

Lecturers on radio subjects are required for the session, and the secretary would be pleased to know of anybody who can be persuaded to give a talk on any aspect of radio.

Secretary/Treasurer, Irving L. Holmes, "Miami," The Close, Headlands, Kettering.

Slade Radio

THE following is the autumn programme of this Club:—

November 4th: "Visible ether waves," by Mr. Wynne, of Aston Technical College. NOTE.—MEET AT THE COLLEGE, WHITEHEAD ROAD, ASTON, at 7.30 p.m.

November 18th: Annual general meeting.

December 2nd: Annual supper.

December 16th: "The A.B.C. of short-wave listening," by Mr. G. Evans, G8MC.

The Slade Radio Society, founded in 1927, supplies Midland amateurs, experts and novices, with a centre where news and views may be exchanged and mutual interests promoted in an atmosphere of good fellowship and co-operation. An active and varied programme, with interesting outside events, is maintained, and anyone seeking radio-minded companionship is cordially invited to join us. Entrance fee,

2s. 6d.; annual subscription 10s.; club badge, 1s.—Hon. Sec., G. C. Simmonds, 38, Rabone Lane, Smethwick.

Southall Radio Society

AT the meeting of this society on October 12th a debate was held on the subject, "Telephony is more suited to amateur use than C.W." The speakers, Mr. Douglas Walters (G5CV) and Mr. Noel Bevan (G8IH), were in favour of the motion, while in opposition were Mr. Jack Maling (G5JL) and Mr. H. C. Spencer (G6NA). In the vote taken afterwards those for telephony won by the narrow majority of 27-22.

It was announced that Mr. W. Ancrum has presented a silver cup to the society, and this will be awarded to the member adjudged to have done the most useful research work during the year.

Visitors are welcome at all meetings, and there are still vacancies for a few members. Programmes can be obtained on request from the Hon. Sec., H. F. Reeve, 26, Green Drive, Southall.

Mid-Cornwall Short-wave and Television Club

THE above club holds a meeting once a month which includes Morse instruction, discussions, and some DX work. We have a good receiver and a transmitter in course of construction. At each meeting one hour is usually devoted to members who cannot build their own receivers. Meetings commence at 6.30 p.m., and finish around 10.30 p.m. Interested readers can obtain full particulars of membership from L. Phillips, Hon. Sec., 5, Graham Avenue, St. Austell, Cornwall.

The West Herts Amateur Radio Society

THE first meeting of the above society was recently held at the Handicraft Centre, Gossoms End, Berkhamsted. Business was of an informal nature, consisting of the election of officers, the reading of a paper on ultra-short wavelengths, and the demonstration of two short-wave receivers. It is hoped that a television demonstration can be arranged in the near future. A hearty welcome is extended to all who are interested in amateur radio and short-wave transmission and reception. Further particulars can be obtained from the Hon. Sec., Colin Peck, 2, Queen Street, Tring, Herts.

Faraday Radio Society

MEMBERSHIP of the above society is restricted to members of the Walworth Men's Institute, but membership of this Institute is open to all men over 18 years of age. In addition to club activities, an Instructor in Radio is provided by the L.C.C. Education Authorities and a substantial grant is made towards the cost of equipment and tools. The club meets every Tuesday and Wednesday evening at the Nelson L.C.C. School, Trafalgar St., London, S.E.17. A short-wave crystal-controlled transmitter and receiver has been installed; the transmitter has already been heard in New Zealand.

A very attractive programme has been arranged for the coming session and, in addition to the ordinary club activities, arrangements have been made with Marconi's Wireless Telegraph Co., Ltd., for a course of 12 lectures on "Marconi's Life and Works." These lectures will be illustrated by original photographs and lantern slides, together with representative

pieces of apparatus. Dates and titles of these lectures are given in the accompanying table:—

Wednesday, November 10th, "First Transmission of Wireless Signal Across Atlantic, 1901."

Wednesday, November 24th, "Commercial Wireless Services."

Wednesday, December 8th, "Beam Wireless System."

Wednesday, January 13th, "Naval and Marine Wireless" (including Direction finding).

Wednesday, January 27th, "Depth sounding with the Echometer."

Wednesday, February 10, "Military and Field Sets."

Wednesday, February 24th, "Aircraft Wireless."

Wednesday, March 9th, "Broadcasting."

Wednesday, March 23rd, "Picture Transmission."

Wednesday, April 6th, "Television."

Membership of the club is not in any way confined to experienced amateurs. All that is required is a genuine interest in the subject. Full particulars, both of the classes and the club activities may be obtained from the Hon. Secretary, Mr. John Payton, 39, Penton Place, London, S.E.17.

Exeter and District Wireless Society

ON Monday, October 11th, members of this society were given a lecture and demonstration by Dr. Wroth of the Devon and Exeter Hospital on high-frequency apparatus and X-ray work. Dr. Wroth took the members to the hospital, and showed them various X-ray tubes, ultra-violet-ray apparatus, and portable X-ray apparatus which was absolutely shock proof.

The subject of therapy was also touched upon and the members were especially interested in the high-tension supply of 2,000 volts.

At the meeting of the members on October 18th, Mr. F. J. Thorn demonstrated a full range of 1938 commercial radio sets, ranging in price from £5 to £100. This demonstration was eagerly awaited as it gave the members a quiet opportunity of testing various makes of sets one against the other.

The following list gives details of our programmes up to December 13:

Nov. 8th: The Ionosphere. An illustrated lecture by Mr. D. R. Barber, B.Sc., F.R.A.S.

Nov. 15th: Test of the Society's new amplifier.

Nov. 22nd: Atoms, Molecules and Electrons, by Mr. V. Searle, M.Sc.

Nov. 29th: Visit to the Power Station, The Basin. Conducted by Mr. L. C. Cornish.

Dec. 6th: Reserved for a lecture by the General Electric Company. Details to be announced later.

Dec. 13th: Loudspeaker Test.

	s.	d.
Annual Subscription	5	0
Juniors (under 17)	2	6
Entrance Fee	1	6
Juniors	1	0

Meetings are held each Monday at No. 3, Dix's Field, Exeter. Those interested should get in touch with the secretary, Mr. W. Ching, 9, Sivell Place, Heavitree, Exeter.

The Croydon Radio Society

THE feature of the Croydon Radio Society's gramophone pick-up night on Tuesday, October 19th, in St. Peter's Hall, Ledbury Road, South Croydon, was

(Continued on next page)

30 YEARS AND STILL PIONEERING

Three decades back, T.C.C. with a policy of strict specialisation, made condensers—and condensers only. Since then T.C.C. have pioneered almost every condenser development. Today T.C.C. are working on still more advanced ideas—anticipating tomorrow's need—thus is leadership won.



T.C.C. Condenser in the Green Case "Green for Safety"

T.C.C. ALL-BRITISH CONDENSERS

THE TELEGRAPH CONDENSER CO. LTD., Wales Farm Rd., N. Acton, W.3



3171

CLUBS AND SOCIETIES

(Continued from previous page)

the fact that nearly every model brought by a member had been adapted by him to his own ideas, and in so doing much ingenuity had been displayed. On Tuesday, November 9th, Mr. G. S. Taylor, of the Whiteley Electrical Co., Ltd., will talk on: "Some stepping stones in speaker progress—an onlooker's account of his technical department's experiments," with practical examples.

Hon. Publicity Sec.: E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

Hackney Radio Club

AT the meeting held on Monday, 18th inst., "Modern Receivers" was the title of the lecture; members brought their receivers along to the Club, and two receivers were repaired by members. The previous week's lecture was on Nickel Cadmium Accumulators, and the lecture the week before was on a typical amateur transmitter. Subscriptions are 4d. per week and 1s. per year. Full particulars from F. H. Brown, Chairman, H.R.C., 271, Well Street, E.9.

Bradford Short-wave Club

ON Friday, October 22nd, the Bradford Short-wave Club had a very interesting evening. Mr. T. M. Wood, of Messrs. Stratton and Co., who happened to be in the district at the time, kindly attended the meeting. He delivered a lecture on short-wave components in general, and raised numerous interesting ideas. He then answered many questions put by members, and finally produced two ultra-short-wave radio telephone stations, similar to those used on the 1936 Mount Everest Expedition, and kindly loaned by Messrs. Stratton and Co.

Friday, November 5th, will not be an open session, but any prospective members are invited. S. Fischer (Hon. Sec.), "Edenbank," 10, Highfield Avenue, Idle, Bradford, Yorks.

Southall Radio Society

AT the meeting on October 19th a display of 5-metre apparatus was staged, many of the members bringing receivers, transceivers and transmitters for exhibition. Research work is at present being done by the Society's Experimental Department in the use of 56 mc/s for direction finding, and better results than those previously obtained are expected in the near future. Meetings are held each Tuesday at 8.15 p.m. at the Southall Library, Osterley Park Road, Southall, and visitors are welcome. Full details and programmes can be obtained from Mr. H. F. Reeve, 26, Green Drive, Southall.

The Slough and District Short-wave Club

AT a meeting of this club held on October 12th, a general discussion of conditions was followed by the arrangement of a detailed scoring system and set of rules for a listening contest on the 10, 20, and 40m. amateur bands, to be held on October 17th. A discussion on pentodes as detector valves then followed, Mr. Thorn in particular describing with the aid of diagrams his experiences with this type of valve. Suggestions for future meetings were then put forward, including a series of lectures for the beginners of the club.

After the formal business of the meeting had been completed, informal discussion between members continued for some time. J. H. White, Hon. Sec., 20, Chalvey Road East, Slough, Bucks.

THIS WEEK'S BARGAINS



SMALL A.C. MAINS MOTORS.—Enclosed self-start on load. A.C. repulsion, 1/80 h.p. with pulley. Type 40, 1,500 revs., 18/6. Type 36, Ditto, 1/25 h.p., G.E.C. 3,500 revs., 27/8. Induction 1/25 h.p., 1,450 revs., 25/-, 1/10 h.p., 2,500 revs., 35/-, 1/4 h.p., self-starting, 1,425 revs., 55/-.

SMALL D.C. MAINS MOTORS.—1/40 h.p., Type 60, 220 v., K.E.B. series, 1,700 revs., 15/-. Ditto, 1/40 h.p., G.E.C. 230 v. series, 2,000 revs., 18/-. Ditto, 1/12 h.p., Croydon 110 and 230 v. shunt, 1,700 revs., 30/-. M.G. for A.C., 220 v. to 100 v., 1 amp. D.C., 60/-. 100 v. 15/-. All fully guaranteed.

ROTARY CONVERTERS for A.C. sets on D.C. mains. 7-watt P.M. model, 35/-; 15-watt 220 D.C./220 A.C., ball bearings, lam. field, silent running, enclosed, 65/-. Larger sizes 50 watts, 100 watts and 200 watts to 3 kw. M.G. D.C. 220 v. to 6 v. 5 amps., 65/-.

DOUBLE CURRENT GENERATORS, D.C. 600 volts 100 mA., and 6 volts, 3 amps., 27/8.

CONSTRUCTORS. Hand geared drills to 1/4 in., 1/3. Ceramic S/W lead-in, brass stem, 8d. 3/4 in. stand-off S/W insulators, 6d. Portable valve sets kits assembled in suitcase, partly wired, speaker, aerial, and all parts, less valves, 21/-. Metal rectifiers, chassis type, 180 v. 30 mA., output, 5/-. Lightning Arrestors, metal aerial safe, 1/-.

COILS. S.W. coils plug-in, 1/8. Ribbed formers, 9d. Long-wave and B.C. 2-pin, 1/-. Cossor 3- and 4-pin coils, 1/-. Reaction tuners, 9d. H.F. twin chokes, mains, 9d. Rugby and other coils in stock. All wavelengths in 2-pin, 1/3. Brownie dual-range 200/2,000, 1/6. M.I.C. concert coils, set of 4, 2/8; aerial, react., long, short and multiple, 1/3. S/W Formers ribbed and slotted, 4d.

CONDENSERS. Variable lowloss F type, .0005, 1/9. J.B., .0003-2/-. Reaction varia., 1/3. Type .0003 with S.M. dial, 5/-. 2-gang varia., all aluminium, 3/- only. Fixed condensers, 2 mid. 250 v., 10d., or 6 for 4/-, 4,000 v. 1/2 mid., 8/-, etc.

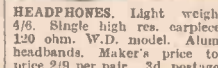
NEW PANELS. Polished aluminium, 18 and 16 gauge, bright or enamelled. 12 in. x 12 in. 3/-. 18 in. x 13 in., 5/8. Ebonyite 1/4 in. panels 24 in. x 24 in. for 5/6.

2-VALVE METAL B. CHASSIS. Drilled and fitted 2 valve holders, transformer, coil, etc., 2/8 each.

SLOPE FRONT TEAK CABINETS. New, make fine instrument panel, 10 x 7 x 11, 5/- each.

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LETTERS FROM READERS

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

A Novel Coil-winder

SIR,—Regarding my article, "A Novel Coil-winder," published in PRACTICAL AND AMATEUR WIRELESS dated October 23rd, I would like to point out that on my original winder, plate J. (Fig. 3) is made of paxolin, not brass, in order to prevent the wire from being scraped. You will notice that the wire does not touch metal throughout the machine. If made of brass, this would scrape the wire, as there is a certain amount of tension at this point.—S. MILLIGAN (Glasgow).

[If a small ebonite bush with a central hole is inserted in the brass plate where the wire passes through, this would prevent the wire being scraped.—Ed.]

A Log from Bradford: Correspondent Wanted

SIR,—Not seeing a log from this district in your columns I submit mine. All stations were heard on a S.G.-v.-2 set [with a 15ft. inside aerial directed N. to S. No earth is used.

SVICA, SVIKE, PAOWI, OZ5BW, OA4N, LA5G, LA1G, LY1J, H8LA, SP1DC, W2ZC, W5ZS, W8PX, W1JFG, W8MJC, W4EBW, W1JG, W3AIR, W1JFJ, W1BDB, F8SI, F8MG, F8XAT, F8BD, F3JF, FM7WR, FM8X, F8VK, F300, F3AI, ON4MS and ON4FG.

All these stations were heard between Monday, October 11th, and Tuesday, October 19th. As I am only a beginner on the short waves I would like to correspond with someone on S.W. work generally.

CUT THIS OUT EACH WEEK.

Do you know

- THAT faulty insulation between a heater and cathode can give rise to various troubles in an A.C. receiver.
- THAT in most cases the above trouble can only be detected by a special test of the valve.
- THAT an outdoor aerial may be joined to a portable with a self-contained frame.
- THAT if the above procedure is carried out the directional properties of the frame aerial will be lost.
- THAT spilt acid from an accumulator may be neutralised with soda.
- THAT high-frequency currents travel on the surface and thus a highly polished and smooth surface is desirable for all H.F. conductors.

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

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

Wishing your paper every success.—ARTHUR WALTON, 212, Intake Road, Fagley, Bradford, Yorks.

An Ultra-short-wave Log from Brighton

SIR,—Not having seen a 28mc. log from this district, in PRACTICAL AND AMATEUR WIRELESS recently, I enclose mine for the past few weeks, hoping it will be of interest to other ultra-short-wave listeners.

The receiver in use was an o-v-1, battery, and 16ft. indoor aerial. My log is as follows: CN8AV, EI2L, F8WK, G5ML, G6AG, G6LK, G8OQ, HI7G, I1KN, LU7AZ, SV1RX, U3FB, VE1DR, VE2KX, VE3MJ, VP5PZ, VU2CQ, YR5CF and countless W1-9's. Hoping to see more U.S.W. logs and articles published in the near future.—C. T. FAIRCHILD (Brighton, Sussex.)

A Reader's Thanks

SIR,—I duly received the loudspeaker which I won in your recent competi-

tion. Please accept my thanks for this splendid prize; it is indeed a wonderful speaker.

I have always felt that PRACTICAL AND AMATEUR WIRELESS met the needs of the amateur, and in my own case this is particularly so as I was needing a new speaker.

I have always been an enthusiastic reader of PRACTICAL AND AMATEUR WIRELESS.—S. HOLDEN (Blackpool).

That Mystery Station!

SIR,—It might interest reader Fisher to know that the mystery station he has heard on 25 metres only works during Moscow's German programme. I leave him to draw his own opinion about this mystery station.—GEORGE REID (Barry Dock, Glam.).

[See also the notes in Short-Wave Log on page 222.—Ed.]

VPD2, Suva, Fiji

SIR,—In the short-wave log in the October 23rd issue, reference is made to VPD2, Suva, Fiji, on the 31-metre band, as follows: European listeners hear Fiji calling on 31.45 metres 9.54 mc/s G.M.T. daily 10.30 to 12.00. This is slightly incorrect, as I have a card from this station, which reads as follows:

"We wish to acknowledge with thanks, and to confirm your report of May 24th, 1937, on the interception of broadcasts through our station VPD2. This station broadcasts on Mondays to Saturdays, 8.30 to 10.0 p.m. Sydney time, i.e., 10.30 a.m. to 12 noon G.M.T."—T. W. Moss (Topsham, Devon).

-2 SHORT-WAVERS for the D.X. FAN- AT AMAZING BARGAIN PRICES!

D.X. FANS' A.C. 4 SHORT-WAVE KIT List Value £5:10:0 BARGAIN 75/-

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ENTIRELY NEW DESIGN giving UNIQUE ALL-WAVE WORLD-WIDE RECEPTION 12-94 METRES.

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KIT '3' with Valves and 2,500 ohms Field Energised Speaker. Cash or C.O.D. £6/12/0, or 12/6 down and 11 monthly payments 12/-.

5/- DOWN

-4-valve BANDSPREAD SHORT-WAVE KIT LIST VALUE £3:9:6 BARGAIN 42/-

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Another wonderful N.T.S. Bargain Short-Wave Receiver Kit. Aperiodic H.F. reacting detector, 1 resistance and 1 transformer L.F. Stages. Pentode Output. Slow-motion bandspread tuning SIMPLIFIES WORLD RECEPTION! Efficient low-loss reaction condenser. Air-spaced bandspread and tank condensers. SPECIAL ANTI-BLIND SPOT CONDENSER. 3 scales calibrated in degrees and tenths.

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KIT '2' with 4 British valves, £3/9/0, or 5/- down and 11 monthly payments 6/6.

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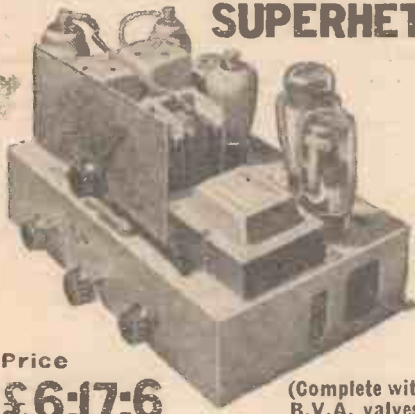
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Circuit includes: Latest type triode-hexode frequency changer, vari-mu pentode I.F. amplifier, double diode-triode operating as diode detector and I.F. amplifier, and providing full A.V.C. High-slope 3 watts output pentode. Wave-change and gram switch. As illustrated, but with new type dial with principal station names.

9-VALVE FOUR-WAVE SUPERHET DE LUXE



14 GNS.

(Complete with 9 B.V.A. valves)

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Controls.—A feature of the receiver is the number of independent controls fitted, making it extremely interesting to operate. These include: sensitivity control (varying bias on R/F stage), or Q.A.V.C. with manual muting control for inter-station noise suppression. 5-position wave-change and gramophone switch. Progressive variable tone control operative on radio and gram. Circuit in Brief—Aerial input to pre-selector circuit, ratio frequency amplifier, latest type triode-hexode frequency changer, 2 band-pass L.F.T. coupled L.F. amplifiers, double diode detector, triode L.F. amplifier, separate triode phase-changer capacity coupled to 2 large pentodes in push-pull. Heavy 16-gauge steel chassis. Finest components and workmanship throughout. Harrier tetodes in place of output pentodes if desired.

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The Signet Two	29.8.36	PW76	
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Sixty Shilling Three (D, 2 IF (RC & Trans))	—	PW34A	
Leader Three (SG, D, Pow)	22.5.37	PW35	
Summit Three (HF Pen, D, Pen)	8.8.34	PW37	
All Pentode Three (HF Pen, D (Pen), Pen)	29.5.37	PW30	
Hall-mark Three (SG, D, Pow)	12.6.37	PW41	
Hall-mark Cadet (D, LF, Pen (RC))	16.3.35	PW48	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35	PW49	
Genet Midget (D, 2LF (Trans))	June '35	PM1	
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53	
Battery All-Wave Three (D, 2 LF (RC))	—	PW55	
The Monitor (HF Pen, D, Pen)	—	PW61	
The Tutor Three (HF Pen, D, Pen)	21.9.36	PW62	
The Centaur Three (SG, D, P)	14.8.37	PW64	
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	29.8.30	PW66	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.30	PW69	
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	PW72	
Four-valve: Blueprints, 1s. each.			
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	
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Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B	
Fury Four Super (SG, SG, D, Pen)	—	PW34C	
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46	
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67	
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A.C.-D.C. Two (SG, Pow)	—	PW31	
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A.C. Three (SG, D, Pen)	—	PW29	
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A.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B	
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A	
Armada Mains Three (HF Pen, D, Pen)	—	PW38	
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50	
"All-Wave" A.C. Three (D, 2LF (RC))	17.8.35	PW54	
A.C. 1936 Sonotone (HF Pen, H.F. Pen, Westector, Pen)	—	PW56	
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A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D	
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45	
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Battery Sets: Blueprints, 1s. each.			
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Economy-Pentode Three (SG, D, Pen)	Oct. '33	WM337	
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM361	
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354	
Iron-core Band-pass Three (SG, D, QP21)	—	WM362	
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371	
PTP Three (Pen, D, Pen)	June '35	WM389	
Certainty Three (SG, D, Pen)	—	WM393	
Minutube Three (SG, D, Trans)	Oct. '35	WM400	
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM396	



QUERIES and ENQUIRIES

Corona, or would it be better to build a separate short and ultra-short-wave set with separate amplification stage, or is there any better suggestion?"—D. W. H. (Wigston).

It would not be very effective to use the separate unit as you state, especially as you wish to explore and study cause

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

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

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

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

and effect, as mentioned in your second letter. It would therefore be preferable to build a good superhet in two sections, making one section to consist of I.F., second detector and L.F. stages, and the second section to consist of the frequency-changing stage with or without a signal H.F. stage. In this way you could build on good low-loss principles for the ultra-shorts, and by changing coils, etc., could experiment on any desired wavelength. You could, of course, employ modern all-wave coils for the short, medium and long wavebands.

Energised Speaker

"I have an energised speaker with a field resistance of 2,500 ohms. I am making an amplifier with a mains transformer of 350 volts 60 mA. and rectifier, to feed the amplifier with a push-pull output stage with two PX4's. Should I therefore get a new transformer to give 120 mA. in order to energise the speaker properly, or will it be impossible to use the speaker?"—W. M. (Newhaven).

THE two PX4's will require a maximum voltage of 250 volts, at which the current will be 48 mA. for each valve, giving a total of 96 mA. To the necessary 250 volts H.T. must be added the biasing voltage, and thus you will see that with the proposed output stage alone you will

have a voltage drop through a 2,500 ohm field of 240 volts. Therefore to deliver the requisite 250 volts plus bias voltage you will have to use a mains section delivering 500 volts, and any earlier valves in the amplifier will have to be fed through a choke or resistance to give the necessary lower voltage.

Using a B.F.O.

"I am interested in making up the beat frequency oscillator described in your issue dated September 18th last, but am uncertain about one or two points. Firstly, how can I cut out the unit when receiving telephony, as I presume that the unit could not then be left in circuit? Secondly, is the design as published capable of providing various notes on a C.W. signal, as I believe this is the main feature of such a device? Any other details would be welcome."—J. O. (Lincoln).

THE unit may be eliminated in several different ways. By breaking the H.T. feed to the valve as indicated in the circuit diagram of the article referred to, the valve will cease to oscillate and thus will be rendered inoperative. Alternatively, you could break the feeder lead to the second detector valve. The midget variable condenser connected across the coil will enable the pitch of the received C.W. signal to be varied over a considerable range.

Anti-interference

"I am rather interested in the recently published details of anti-interference aerial systems, as these all seem to use a very long lead-in. I always remember in the early days that a long lead-in wire resulted in loss of signal strength. I fail to see, therefore, how such an aerial device can be efficient when used on a short-wave set, or with a modern all-wave receiver going down to the short waves. Can you give me any proof that these devices do not, in fact, lose volume, and what is the lowest wavelength upon which they may be used?"—F. E. W. (Bath).

THE long lead-in used with the modern anti-interference aerial does not result in signal loss owing to the fact that it is used in conjunction with matching transformers at each end of it. At the aerial end a step-down transformer is employed and this reduces the output to a low voltage. Thus the long lead-in will match in this case. At the receiver end a step-up transformer is employed to restore the signal to a high-voltage condition, and provided that the impedances are correctly matched no losses should be obtained. It should be remembered that the leading-in cable used for this type of aerial is screened and thus does not pick up either signals or interference.

FREE ADVICE BUREAU COUPON

This Coupon is available until November 13th, 1937, and must be attached to all letters containing queries.

PRACTICAL AND AMATEUR WIRELESS,
6/11/37.

Short Waves and Static

"When using the short-wave bands on my 6-valve commercial superhet I am troubled with interference from passing motor vehicles and other man-made static. Could you please instruct me how to make a dipole aerial suitable for short waves or, if possible, for all wavebands? If an article on this subject has appeared, perhaps you would send me a copy."—F. D. C. (Lincoln).

A DIPOLE aerial will not necessarily remove the interference. As the trouble is mainly caused by passing motor vehicles, the first step is to remove the aerial as far as possible from the roadway. This will mean that a long lead-in is required, but this will not matter provided that an impedance-matching transformer is connected at each end of it. As there is a risk that the lead-in itself may pick up interference, it should be of the screened type, or transposed throughout its length. A dipole will ensure that signals on frequencies relative to the dipole length are received at maximum strength, and this will give a better signal-to-noise ratio. The article in our issue dated June 12th last will no doubt be of interest to you.

Battery Connections

"Quite recently I bought a second-hand receiver, but on examining it I found that the H.T.—lead was connected to the L.T.—lead and that in turn was connected to the G.B.—lead. Could you tell me the correct way of connecting these?"—D. E. S. (Gravesend).

THE usual method of joining the battery leads is, of course, to connect the G.B. positive lead to the junction of L.T.—and H.T.—. This enables a negative potential to be applied to various stages such as H.F. and L.F. In certain old-type receivers, however, the detector valve was provided with a positive potential, and the L.F. valves operated without bias (or with some form of automatic bias). Thus, your set may be an old one using this scheme. Alternatively, it may have been modified by the last owner and the connections wrongly made. It would probably be preferable to re-wire the set to incorporate an up-to-date circuit arrangement.

Receiving the Ultra-short Waves

"I am interested in the Corona 4 and note that in the same issue you describe the construction of an ultra-short-wave converter. Could this be used with the

Build the ALL-WAVE A.C. MAINS SUPERHET RECEIVER (465 K.C.)

Three wave bands, Short, Medium and Long. Write for Blue Print BP120 (price 6d.) and full constructional details of this new receiver. Easy to build and inexpensive to buy.

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SHORT-WAVE MANUAL

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 7½d. including catalogue.

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44, HOLLOWAY HEAD, BIRMINGHAM 1

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, improved type, 120 watt output at 22/10/0. Send for our comprehensive list of speakers, resistances and other components.

WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

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

HEADPHONES.—Brown, Ericsson, G.E.C., B.T.H. Standard Telephones, Nesper, Western Electric, Sterling, etc., 2,000 ohms, 2s. 6d.; 4,000, 5s. Postage 6d. **SPECIAL.** Ericsson, 4,000 ohms, as new, 7s. 6d. Telefunken, lightweight, adjustable, 7s. 6d.

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CORONA Four. First specified kit, 5s. 7s. 6d. Complete, "Fifty-Fifty" Kit Guaranteed Components 23 7s. 6d. Cash, C.O.D. Easyway. Exchanges, etc. Lists and Quotations Free.—P.L. Co., Terminus Road, Brighton.

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All mail orders to Southern Radio, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). Phone: Euston 3775.

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

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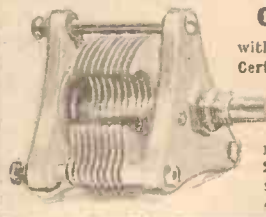
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6/6, 3½ watt energised Rola, 7½in., 1,000 ohms field with output transformer.

1s/6, 3-4 watt P.M. with Multi-ratio Transformer. List price, 37/6.

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

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November 13th, 1937.

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Practical and Amateur Wireless

Edited by F. J. C.A.M.M

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sc.,
B.Sc., A.M.I.E.E., Frank Preston.

VOL. XI. No. 269. November 13th, 1937.

ROUND *the* WORLD of WIRELESS

What is a Portable?

IN the early days of radio a portable consisted of a receiver, generally housed in a suit-case, complete with a frame aerial and two batteries. Such a receiver is entirely self-contained and may be made to work practically anywhere. The drawbacks to this type of apparatus are many—but the most important is the weight which has to be carried, as the batteries alone are in most cases considerably heavier than the receiver itself. There are many people whose manner of livelihood necessitates considerable travel, and they often find that a portable receiver is of great value to them. They do not, of course, require to be bothered with the problem of accumulator charging or of H.T. battery replacements, and in most cases the places at which they stay have mains facilities. Consequently, a universal type of mains receiver, that is, one suitable for use on D.C. or A.C. mains without modification, will be found of the greatest use. Furthermore, by keeping down the overall weight the field of usefulness is still further widened, and such a receiver may be relied upon to provide good entertainment practically anywhere in the British Isles. On page 242 will be found constructional details of a one-valver in which the reflex principle has been incorporated, and a metal rectifier employed in place of a valve in the detector stage. Consequently, the circuit is almost identical with a three-valve arrangement with economy in initial cost and maintenance.

League of Nations

THE new broadcasting studios of the League of Nations headquarters in Geneva are practically complete. It is proposed, when they are finished, to broadcast any important proceedings through the two short-wave transmitters at Prangins. A recording room is to be fitted so that records may be made when required.

Police Eavesdrop

IN the prison at Greenwich, Conn., U.S.A., microphones are fitted to a number of cells with a view to ascertaining the value of the police authorities being able to hear the conversations of the inmates. It is thought that this arrangement will enable confessions to be obtained and other valuable disclosures to be conveyed to the authorities unknown to the convicts.

Automatic Store

IN a store at Memphis, Tennessee, a customer selects her goods automatically. On entering the store she is given an individual key and selects goods by turning her key in a slot beside each article. On arrival at the end of the store the key is surrendered to a cashier who places the key in another slot and this brings all the selected goods on a conveyor belt for charging purposes. Communication between the assistants who replace the goods and the cashier is maintained by an inter-communication system.

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Indian Engineers Study Television

A PARTY of Indian radio and electrical engineers are in this country studying radio and television theory and practice at the National Radio and Television Service company's headquarters. They have passed their B.Sc. and other honorary degrees, and are all students at the Bombay Technical Institute of Maxagaon, Bombay.

McMurdo Silver Receivers

IT has now been decided to produce three preliminary models of the well-known American receivers in this country, prices being fixed at 48, 68 and 78 guineas. The sets are to be known respectively as the Homeric, the Olympic and the Georgic,

and consist of a 15-valve chassis covering six wavebands from 9.4 up to 2,150 metres. The chassis is available separately at 30 guineas.

Marconiphone Public Address

AT the recent State Opening of Parliament Marconiphone carried out some elaborate public address work. The first operated at the foot of the grand staircase and notified Ambassadors and Judges that their cars were waiting, and the other was controlled by the police, using a microphone on an island site adjoining Lambeth Bridge, and operating five speakers. The co-operation with the police greatly speeded up the departure of all personalities taking part in this public function.

"Two-and-a-Half Octaves More"

THIS is the title of a neat little booklet just issued by Ferranti, explaining a new development in radio receiver technique. It is claimed that by this new process the latest Ferranti receivers give reproduction which includes 1½ octaves more music at the top and bottom ends of the piano scale as compared with the ordinary type of receiver. A copy of the publication will be sent to any reader who writes direct to Messrs. Ferranti, at Moston, Manchester 10.

Songs You Might Never Have Heard

AFTER the second broadcast of this programme 15,544 postcards were received, and the "City of a Million Dreams" came first with 5,404 votes, "Snow Bird" second with 3,828 votes, and "I'm Sending You Back My Engagement Ring" third with 2,002 votes.

Radio Communicators

A NEW type of inter-room communicator is announced in America, operating at radio-frequency instead of at low-frequency as in other systems. The signal is then carried from one point to another over the normal telephone wiring, and by using different frequencies two or more conversations can be carried over one line without interference.

Testing Gramophone Needles

TO ensure highest fidelity on radio-gramophones a needle manufacturer is now employing a shadowgraph method of testing. The needle point is cast as a very large shadow on a screen and thus imperfections are easily found.

ROUND the WORLD of WIRELESS (Continued)

Jack Hylton Visits His Native Town

THE town of Stalybridge made big plans for the return recently of one of its local boys who "made good." The "boy" was Jack Hylton, who, thirty years ago, earned his first pennies in his native town by playing on an old piano in a public house. He returned with the band he has taken all over the world to give a free show at the local theatre in aid of holidays for the town's poor children. He played on the same piano on which he earned his first pennies. There was a civic reception by the Mayor and Corporation to welcome him back, and his father and mother took part. One of the illustrations on this page shows Jack Hylton being greeted by the Mayor of Stalybridge.

Short-wave Station for Singapore

ACCORDING to a recent report, the erection at Singapore of a modern short-wave station is being proceeded with. The new station, which will probably be on the air by next March, is to broadcast on a wavelength of 31.48 metres in the daytime, and on 49.9 metres at night. A radio service is to be provided for the whole of Malaya.

Caught by Radio

THREE London youths were recently accused at Southend of taking a car away from a Southend car park without the owner's consent. It was stated that ten minutes after the car had been reported missing it was stopped on the arterial road by a Metropolitan Police car which had received a wireless message.

Interchange of Announcers

ARRANGEMENTS have now been made for the temporary interchange of B.B.C. announcers between London and the various Regions, starting this month, when Mr. R. MacDermot will be transferred to the North Region, his place in London being taken by Mr. J. B. Selby of the Manchester staff.



The Mayor of Stalybridge, Alderman Walker, greeting Jack Hylton on his arrival at the local theatre during his recent visit to the town.

In January, 1938, the senior announcer, Mr. A. S. Hibberd, will be transferred to the Scottish Region, and in February Mr. F. Phillips to the Northern Ireland Region, their places in London being taken respectively by Mr. A. H. Thomson of the

INTERESTING and TOPICAL NEWS and NOTES

Edinburgh staff and Mr. T. W. Chalmers of the Belfast staff. These transfers will be of approximately one month's duration in each case.



Josephine and Earl Leach, the famous American and International dance impressionists, who are appearing in cabaret at the Embassy Club, London. They have recently appeared in the television programme.

New Appointment

WE are informed that the Institute of Public Address Engineers, of 83, Cannon Street, London, E.C.4, has appointed a new Secretary, Mr. C. S. Grace, B.Sc., F.I.C., and all inquiries concerning membership and matters pertaining to the Institute should be addressed to him at 22, Spencer Road, Chiswick, London, W.4.

Two Canadian High-power Stations

TWO 50-kilowatt long-wave stations are now under construction, one near Toronto, and the other near Montreal. These stations will be followed later by a similar transmitter for the Prairies,

and one for the Maritime service. A powerful short-wave transmitter of 50 kW, to enable Canada to participate in world broadcasting, is also under consideration by the Canadian Broadcasting Corporation.

Unknown Radio Artists

CARROLL LEVIS is at present searching for the "discoveries" that he will bring to the microphone in the second of his series of three programmes of new and unknown artists from all parts of the British Isles, to be broadcast on the Regional wavelength on November 10th.

Concert from Falmouth

ON November 12th, from the Princess Gardens Pavilion, Falmouth, another popular concert will be broadcast by the Falmouth Town Band, and Bernard Fishwick (baritone). The band, conducted by T. G. Moore, is composed mostly of shipyard workers. This broadcast will be given in the Western programme.

Theatre Organ and Robert Easton

MANY listeners wrote appreciative letters to the B.B.C. when some weeks ago Robert Easton, bass, broadcast a programme during which Reginald Foot accompanied him at the B.B.C. Theatre Organ. There were requests for another broadcast on similar lines, and this has now been arranged. It will take place on the National wavelength on the evening of November 12th.

Armistice Day Broadcast

ARMISTICE DAY services will be held all over the country on November 11th. Many schools, no doubt, will hear the broadcast from the Cenotaph in the morning, and during the afternoon listeners will hear an account of how Armistice Day is held in "Our Village." A visit will be paid to the War Memorial and the Village Hall, and listeners will hear something of what various villagers have to say about war and peace.

Music from the Movies

PETER YORKE has now completed his orchestral arrangements for the next production of "Music from the Movies," to be broadcast by Louis Levy and his Symphony on the National wavelength on November 12th. The numbers will include selections from the films "On the Avenue" and "Firefly," and the songs "Sunset in Vienna" from the film of the same name, and "Never in a Million Years," from the film "Wake Up and Live."

SOLVE THIS!

PROBLEM No. 269.

No reception could be obtained from Howard's battery-operated receiver unless a high capacity condenser was connected between the P terminal of the parallel-fed L.F. transformer and the grid of the output valve. What was the fault? Three books will be awarded for the first three correct solutions opened. Solutions should be addressed to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 269 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, November 15th, 1937.

Solution to Problem No. 268.

The lack of signals below 20 metres was due to the fact that the pentagrid valve would not oscillate below this wavelength.

The following three readers successfully solved Problem No. 267, and are accordingly being forwarded to them: B. W. Hammond, Harfreys Farm, Goleston, Gt. Yarmouth; L. H. Keates, 17, Stoney Hill, Park Row, Bristol; J. Emery, Sewell, Harpenden Road, St. Albans.

Frequency Changing in the Superhet

A Discussion of the Various Circuits in Present Use is Given in this Article - By W. A. FLINT

THE most popular receiver in use today is undoubtedly the superhet, and its rise to fame is due to its great sensitivity and selectivity. Before considering in detail the various types of frequency changing circuit, it is as well to understand the working of the circuit as a whole.

If two sets of alternating current of similar frequency are fed into a circuit, the resultant current will likewise be alternating, and its strength will be dependent on the phase relationship of the incoming

percentage separation between two given stations to be materially increased.

Essential Conditions

The conditions required in a frequency changer are:—

- (1) that a locally-generated source of constant oscillations shall be produced.
- (2) that the "local" oscillations shall be "mixed" with the incoming H.F. signals to produce beats;
- (3) that these beats shall remain constant whatever the frequency of the incoming signal, i.e., there shall be no frequency drift.

It is the problem of producing the local oscillations which has always presented difficulties in the design of superheterodyne receivers.

In the early days, two valves were generally used for frequency changing, and external coupling was therefore necessary. One valve was used as an oscillator, and the other operated as the mixer to produce the requisite beats at the desired intermediate

signals. When the signals are of different frequency, however, the resultant alternating current will not be of constant amplitude, but, at regular intervals, peaks, which are known as beats, will be formed, the current falling to its lowest value between the beats.

In the case of a wireless receiver, the incoming H.F. currents are mixed with a source of local oscillations to produce beats. These are then rectified and amplified to operate a loudspeaker in the normal manner.

The beats between the carrier wave of the incoming signal and the local oscillations are not produced at an audible frequency, but at some relatively low radio frequency, usually at 110 kc/s or 465 kc/s. This is achieved by arranging the oscillator circuit so that the oscillations generated are always a constant frequency above or below the incoming signal. For instance, when the incoming signal has a frequency of 877 kc/s (342.1 metres) the local oscillations which are generated have a frequency of 987 kc/s (when using an intermediate frequency of 110 kc/s). When the frequency of the incoming signal is increased to 1,149 kc/s (261.1 metres), then the local oscillations assume a frequency of 1,259 kc/s, so that, no matter what the frequency of the incoming signal, the beats produced are of constant frequency. This constant frequency is in turn applied to a series of tuned circuits (I.F. transformers), resonating at that frequency, after which amplification the signals are detected in the customary manner and amplified at the relatively low audio frequency.

The obvious advantage of the method is, of course, that the tuning of the I.F. circuits remains fixed, and can be made very sharp, so that high and selective amplification is obtainable in a simple manner, while the use of a low frequency enables the

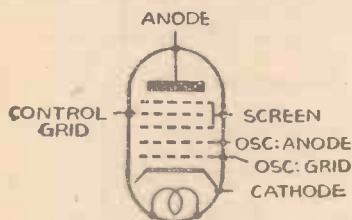


Fig. 1.—Arrangement of electrodes in a pentagrid valve.

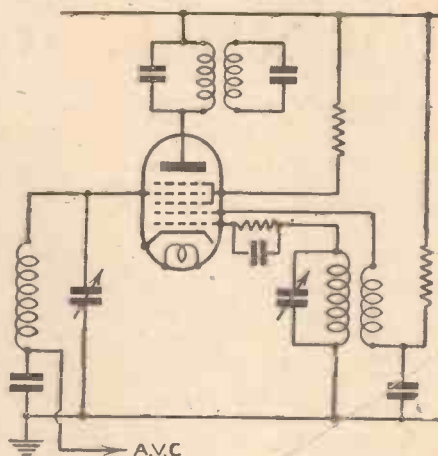


Fig. 2.—Circuit for a pentagrid valve.

The pentagrid, the heptode, the hexode and the octode valves all arrived close on one another. They have, with the exception of the hexode, retained their popularity and are still widely used to-day. In the case of the hexode, it has gone out of general use because, due to the oscillator section deriving its electrons from the virtual cathode of the second space charge, A.V.C. cannot be applied as oscillation would cease.

In each case the mixing occurs within the valve itself, and the valves actually comprise a three-electrode oscillator and an H.F. pentode, V.M.H.F. pentode or screen-grid section. The latter acts as the first detector, and may or may not be A.V.C. controlled. Each section functions independently, and all have the common feature of a second space charge in which a second control grid operates to form the I.F. beats without external coupling or rectification.

The Pentagrid Valve

In Fig. 1 is shown the construction of a pentagrid valve, this being a typical example of its class. The normal space charge occurs between the cathode and the oscillator grid, and there is a constant stream of electrons. The second space charge formed between the control grid and the screen is constantly varying, and the valve is so designed that the mutual conductance of the grid in this second space charge is varied by the variation of the

(Continued overleaf)

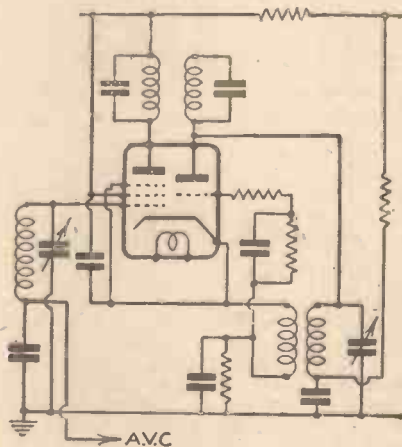


Fig. 3.—Circuit for a triode pentode.

frequency. Separate tuning condensers were used, and the obvious disadvantage of this system was that there were two settings of the oscillator tuning condenser for each station received by the mixer valve—one above, and the other below the frequency of the received station, and separated from it by the intermediate frequency. This system is little used nowadays and, where it is, improvements in coil and circuit design allow of the use of ganged condensers.

The first single valve used to combine the operations of frequency changing was the H.F. pentode and two circuits, known respectively as cathode injection, and anode injection, were evolved. The former was generally used with A.C. mains valves, but the circuit is so little used to-day as to merit but passing mention. It was, however, a pioneer and a step in the right direction.

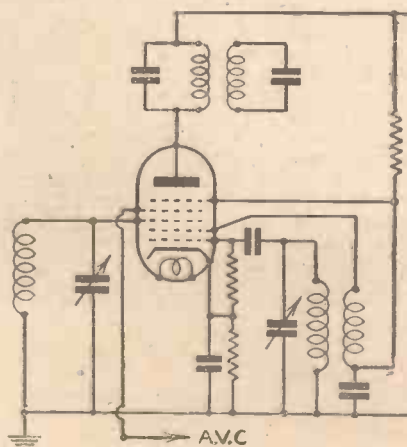


Fig. 5.—Circuit for the Hivac Harries all-stage valve.

FREQUENCY CHANGING IN THE SUPERHET

(Continued from previous page)

oscillator grid, thus giving an electronic coupling within the valve itself between the two circuits.

We will consider in detail the operation of the pentagrid as being a typical example of this class of valve. The chief advantages are negligible radiation from the aerial of the locally generated oscillations, the elimination of direct coupling between the signal and oscillator circuits, which prevents unwanted interaction between them and simplifies the circuit, the reduction of undesired responses due to oscillator harmonics, and to non-linear signal grid characteristic, the ability to control the valve by A.V.C., and the fact that only one valve is necessary for the complete operation. A typical circuit is shown in Fig. 2.

When the oscillator grid is negative, the mutual conductance of the signal grid is reduced, and when it is made positive, the mutual conductance increases linearly. Thus the amplification of the signal applied to the signal grid is alternatively increased and decreased at the frequency of the local oscillation on the oscillator grid. This results in the production of sum and difference frequencies in the anode. The tuned circuit in the anode behaves as a high impedance to the I.F. frequency, and a low impedance to all other frequencies, and thus the desired frequency is selected. The screen-grid screens the oscillator section of the valve from the modulator section, and also the signal-grid from the anode, and, by increasing the anode impedance, reduces the damping on the tuned circuit in the anode to a negligible quantity. The usual oscillator voltage is about 6 volts, but it is not very critical, and variations of plus or minus 25 per cent. will not affect the successful operation of the valve.

The conversion conductance (which is the ratio between the I.F. current in the anode and the H.F. voltage applied to the signal grid, and is the measure of efficiency of a frequency changer) of this class of valve is

very high, and a stage gain of 200 times is easily obtainable without instability or distortion.

The octode valve introduced in 1934, relies on the principle of electron coupling, and has a cathode and two grids to act as a triode oscillator to produce the heterodyne frequency, a screen between the oscillator and mixer portions, which also serves to accelerate the electron stream, a control grid, and, differing from the pentagrid and heptode valves, a suppressor grid. The circuit and operation of the valve is much the same as described above, the A.V.C. may be applied to the H.F. pentode portion as this has V.M. characteristics.

The Triode Pentode

Another very popular frequency changer in present use is the triode pentode, the circuit of which is given in Fig. 3. It will be noticed that the cathode injection circuit is used and, owing to the complete absence of any electronic coupling between the two sections of the valve, the oscillator frequency is independent of the operating conditions of the frequency changer section. Otherwise its operation is identical with that of the pentagrid described above.

With these advances resulting in the two

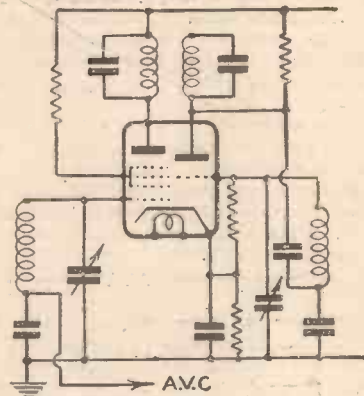


Fig. 4.—Circuit for a triode hexode.

processes being carried out in one valve, it seemed that nothing better could be evolved, and it was not until the prominence given to all-wave receivers in 1936 showed that on low wavelengths, and consequently very high-frequencies, the conversion gain dropped and reception at these frequencies became almost impossible. A new valve was then introduced—the triode hexode, the circuit of which is given in Fig. 4. It will be seen that the whole operation of a normal frequency changing valve is reversed, for the H.F. signals are now applied to the first grid of the valve, and the third grid, situated between the two grids of the screen, becomes the oscillator grid. The voltage transferred via the space charge from the input grid to the oscillator grid is negligible, and the fact that the latter grid is part of a triode amplifier makes this space charge coupling of even lesser importance. The result of this is that degenerative effects between the two sections of the valve are avoided even at very low wavelengths, while the triode section has a high value of mutual conductance, allowing it to maintain a satisfactory oscillator voltage at very high frequencies. The triode hexode gives a practically linear response at all frequencies, and shows remarkable freedom from pulling, etc.

The New All-stage Valve

Another valve has recently been introduced and deserves mention here. This is the Hivac Harries all-stage valve, a frequency changing circuit for which is shown in Fig. 5.

A false cathode is produced in the neighbourhood of the control grid and is modulated by the oscillations produced by the oscillator grid and anode. No screening grid is used between the signal frequency and oscillator sections, as this has been found to be inadequate at very high frequencies. Instead, an automatic capacity bridge balance is produced within the valve itself which is found to operate more satisfactorily than screening, and there are no troubles as regards failure of oscillation on ultra-short wavelengths.

G.E.C. 14-WATT AMPLIFIER

THE General Electric Company announces the release of a De Luxe amplifier designed for microphone, gramophone, or radio amplification. The accompanying illustration shows the chassis model, in which four valves are employed for the amplifier section with the addition of a full-wave rectifier in the mains section. The circuit which is incorporated consists of a three-stage L.F. amplifier with a push-pull output stage, the valves utilised being M.H.41's for the first two stages and a pair of P.X.25's in push-pull (Class A) for the output stage. The couplings are designed to provide a level response and high quality, the first stage being straightforward resistance-capacity coupling and the second a resistance-coupled transformer arrangement. When fully loaded the output from the push-pull stage is rated at 14 watts and it is claimed that the response curve is linear from 50 to 10,000 cycles (plus or minus 1.5 db). The first valve is intended primarily for additional amplification when a microphone is employed and the overall gain with all stages in circuit is 90 db. With the first stage eliminated, such as when using the amplifier on gramophone or radio (for which purpose the inputs for this type of apparatus are fed to the second stage) the gain is 28.9 db.

There are three controls, consisting of an input selector switch, a mains switch and a volume control, and an input and output transformer are both fitted as standard. The input circuits are separated, pairs of terminals being provided for mike, gramophone, and radio, and the appropriate input is selected by means of a three-position switch. The microphone transformer is designed to match the G.E.C. moving-coil microphone, for which no energising current is required. The output transformer is of the multi-ratio type, offering correct matching for any normal loudspeaker grouping, either low-impedance or high-impedance speakers.

The amplifier is available in five different models, all of which are designed for use on A.C. mains (200-250 volts, 40-80 cycles). The first model, BCS.2214, comprises the chassis with valves, and costs £22 10s. complete, whilst the second is identical except for a metal cover which may be locked over the chassis to prevent unauthorised use. This model, reference

BCS.2214/5, costs £24. A panel model is available, in which the chassis is secured to a metal frame assembly for permanent installation, and it costs £25—list number, BCS. 2214/1589. A transportable model, housed in an oak carrying case, type BCS. 2214/1588, costs £26 10s., and the remaining model includes a turntable and pick-up in a sturdy oak cabinet, and costs £34.



This is the chassis model 14-watt amplifier referred to above.

Practical Television

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CATHODE-RAY TUBE SCREENS

THE approved series of terms and definitions for cathode-ray tubes which was issued some time ago deprecated the use of fluorescent screen as applied to this particular device, giving preference to the simple term "screen." It was defined as a specially prepared surface, which becomes luminescent under the stimulus of the electron beam at the point of impact. Now the screen of any tube used for television picture reconstitution is a most important item, and the problems associated with it have been both intricate and varied. First of all, it must not be too thick, otherwise a very considerable loss of picture brilliance will occur. The extent of this, even with modern tubes, can be gauged by comparing the brightness of the picture observed when looking at the front of the tube, and when watching the same picture in reverse from the back. Indeed, it was this difference of brilliance that led to one suggestion for magnifying the picture from the back of the tube instead of from the front, because of the additional brightness achieved in this way.

Screen Binding

The screen must be perfectly even over the whole of its face. Differences in thickness will show up as a picture with uneven illumination, while traces of impurity will cause luminescence of colours differing from the main one. One of the earlier screen troubles was associated with pieces flaking off during use and when the tube was mounted vertically the pieces found their way into the electrode system and either blocked the anode aperture or ruined the cathode emission. The degree of afterglow, that is the persistence of screen luminosity after the stimulus has been reduced or removed, is dependent upon the particular type of work which the cathode ray tube is called upon to undertake.

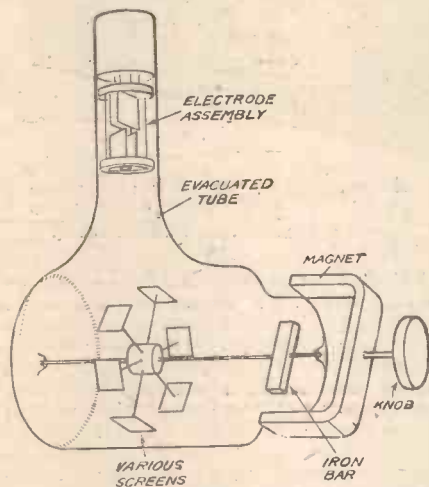
There are several ways in which the fluorescent powder is bound to the inside of the tube face, and two of the simplest binding agents for this purpose are sodium water glass and potassium water glass. This is run over the tube end in the form of a thin liquid and the powder is sprayed over evenly while the water glass is still wet. The process is a specialised and intricate one for all trace of impurities must be kept away, otherwise the screen, and in consequence the finished tube, will be ruined.

Television Requirements

Speaking in general terms, for television reception where picture reconstitution is observed by those looking in, the requirements of what may be regarded as a good screen are first of all that the degree of brightness shall be sufficient to give pictures of adequate contrast in a room which has a measure of either natural or artificial light. Viewing in complete darkness is definitely an unpopular feature in these times. There should be a sufficient degree of afterglow present to diminish traces of flicker in the brightest parts of the picture to a level

which can be tolerated over long periods of watching. On the other hand, the measure of afterglow must under no circumstances bring about a more important objection, namely, any blurred movement in the reconstituted picture. From black to peak white the excitation response over the whole screen must be reasonably linear, while the colour must be in conformity with modern standards.

The last named feature is associated with the chemical constitution of the powder employed for the screen. Green or greenish-yellow coloured screens, while possessing good brilliance, are not popular, for the pictures seem unnatural. A bluish white or cream to sepia seem the most favoured colours at the moment. The former screen is made up from a combination of zinc



The ingenious Baird device to show the differing luminescing colours for cathode-ray tube screens.

silicate and cadmium tungstate, while the latter is zinc sulphide and cadmium sulphide.

Demonstrating Screen Features

That screens can be made up so as to exhibit luminescence at any colour of the visible spectrum as well as the popular black and white is important in many respects, for cases have arisen when a receiver is required to give pictures toning with a room's predominant colour scheme. An interesting model was exhibited recently by Baird's, which showed these colour effects very clearly. The principle is portrayed simply in the accompanying illustration. Two cylindrical tubes are welded together to give the shape shown. In one end of these tubes is accommodated an electrode system to generate the electrons, and accelerate them forward in the usual manner with an associated power-pack unit. At the end of this neck is a form of drum consisting of eight spokes, at the ends of which are small rectangular sections on the front surface of which is sprayed the screen material. The drum is made to

rotate by having at one end a bar of iron—the bar and drum being, of course, inside the evacuated glass envelope—while outside the tube is a U-shaped permanent magnet. By rotating a knob on the outside of the cabinet housing the equipment, the magnet turns, and in consequence the drum. This brings each small screen-area in turn into the field of the electron beam, and the screen was observed to luminesce at its own particular colour. The range of colours shown was violet, indigo, blue, green, yellow, orange, red and white, and it was possible to examine closely the degree of brightness associated with each particular colour. The device has proved most useful for demonstrating many of the features associated with cathode-ray tube working. Both the predominating colour of the luminous radiation from the screen under the electron impact, together with screen luminous efficiency, could be seen.

TELEVIEWS

In Support

IN drawing attention in these columns recently to the work which has been undertaken by the Germans in transmitting television signals over ordinary telephone cables, we suggested that this may be the prelude to the distribution of television programmes by wire to subscribers, so as to make home television reception as widespread as sound reception. This view was quite unexpectedly supported by Sir George Lee when delivering his presidential address to the Institution of Electrical Engineers. He said that the technical problems involved in the transmission of television signals over land lines for long distances are very difficult, but he thought the popularising of television would inevitably lead to the linking together by land lines of all the main centres of the country. Continuing, he said, "I would even go further, and suggest that the distribution of television programmes by wire to subscribers may well be the means of so simplifying and cheapening the cost of television broadcast reception as finally to make entertainment by television in the home as widespread as sound broadcast reception is to-day." These remarks coming from such an authority as the engineer-in-chief of the G.P.O. must surely foreshadow developments of a very far-reaching character, based no doubt on laboratory research, details of which have not yet been made public.

Misplaced Fear

ONCE again the question of the opposition of theatre managers to the televising of artistes has come to the forefront, mainly on account of the B.B.C. proposal to televise music-hall shows from the St. George's Hall. The same type of opposition arose when sound broadcasting was being developed, and although it may tend to hinder, it will in no way arrest television's progress. Even if television receivers make big advances over those in use to-day so that the pictures seen are far superior, surely there will be a big difference between sitting at home to see and hear an artist some miles away, and feeling the mass excitement of a music-hall or theatre when the same person appears on the stage. Television must, and will, eventually take its place as an additional entertainment for the public both in the home and cinema (or theatre), but managers would be foolish to bar its progress.

Operating the A.C. All-wave "Corona" 4



A rear view of the receiver. The mains leads are not shown as they may be connected in various ways as mentioned last week.

Completing the Construction of this Receiver, and the Method of Carrying Out the Preliminary Adjustments

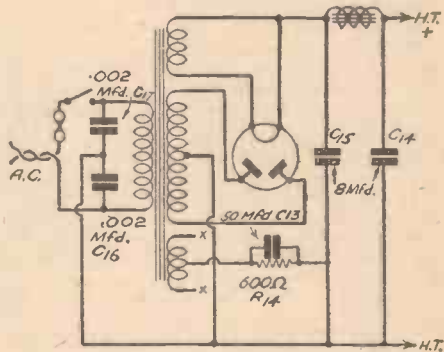
firmly in contact with the screening braid and it should be soldered. The screening material should be scraped gently in order to obtain a clear surface, but care should be taken not to break the fine strands from which it is made up. A really hot iron should then be used and if the work is clean and the merest trace of soldering flux applied, a neat joint should be made without damaging the internal insulated sleeving.

Operating Notes

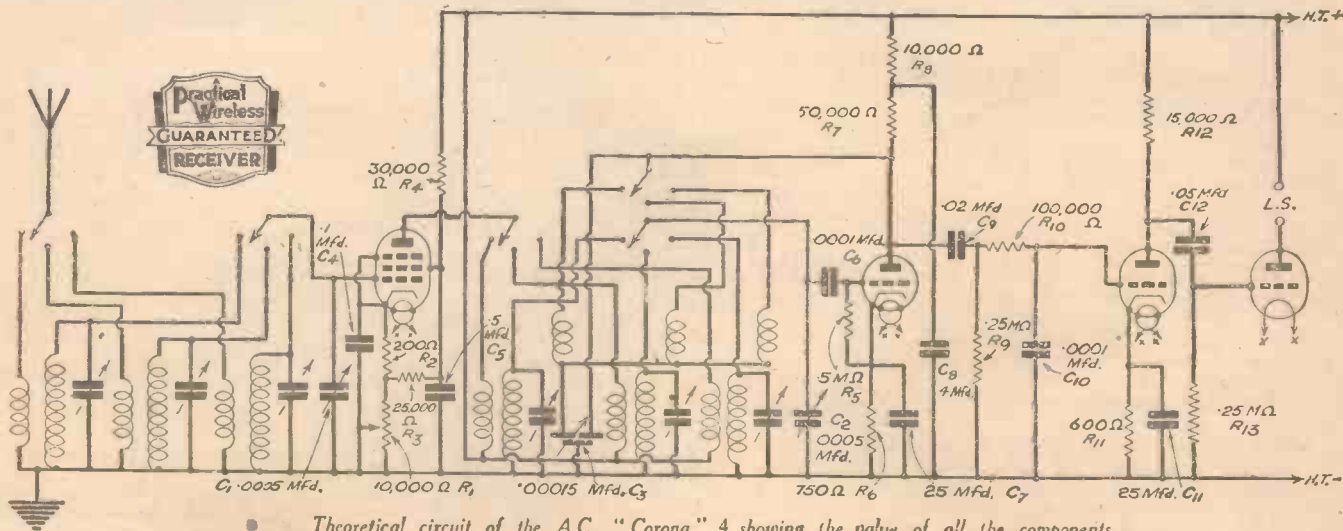
Before connecting the mains supply a very careful check should be made to avoid damage to valves or components due to a mistaken connection. When all is in order the mains leads should be joined to the appropriate mains sockets according to the voltage of the mains supply being used, and the aerial and earth leads connected to the appropriate sockets on the rear chassis runner. Do not be tempted to use a full size aerial in order to obtain maximum results. Not only will such an aerial introduce difficulties from a selectivity point of view, but on the short wavebands

THE main constructional details were given last week and there are very few points left which need description. It will be noted in the list of parts that a two-foot length of screened lead is specified. This should be cut and employed for screening the aerial lead and also the lead to the cap of V1. An important point arises in connection with these leads, and that is to avoid loss due to the proximity of the earthed metal screening. The lead from the aerial terminal to terminal P on the first coil should be of very thin wire—not the thick insulated material which is employed for the remainder of the wiring.

A similar fine gauge should be used for the anode lead, and to prevent the metal screening from coming into contact with the internal lead and thereby producing a short circuit the ends should be cut carefully to leave the insulated sleeving projecting, and it may also prove worth while to bind the ends with ordinary cotton or thread—or alternatively a thin strip of insulating tape may be cut and wrapped over it. The two screening cables are then earthed and this is carried out by wrapping a length of bare copper wire round the screening braid and connecting it to earth. This earth bonding will not prove effective unless it is



This is the mains section.

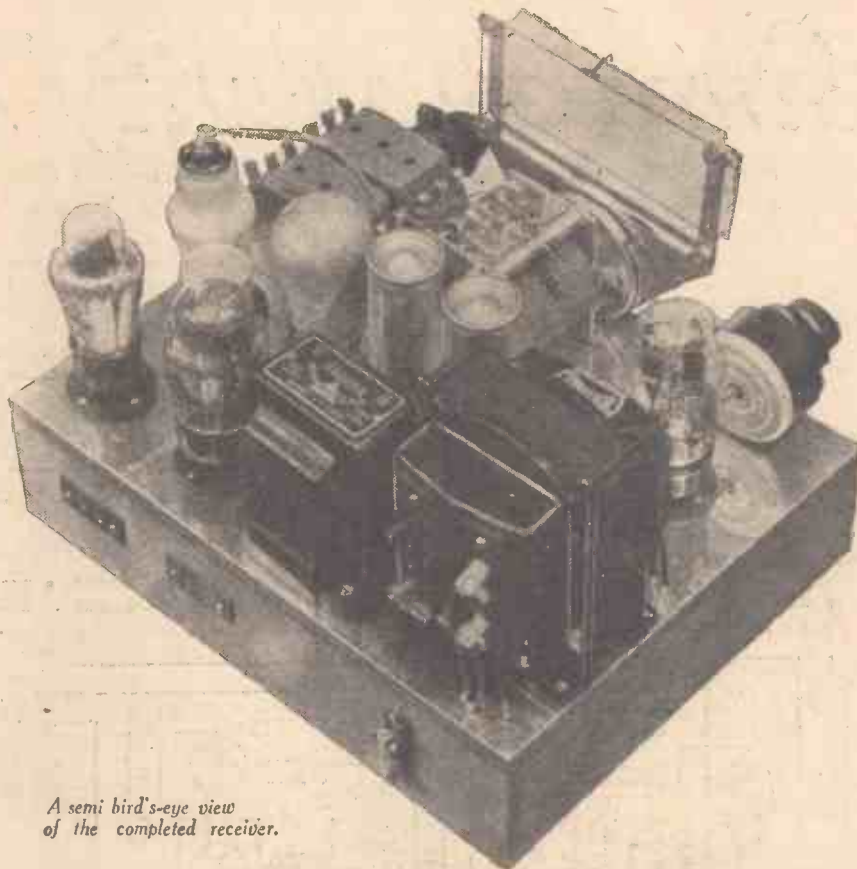


Theoretical circuit of the A.C. "Corona" 4 showing the value of all the components.

it may even prove detrimental and prevent signals from being obtained satisfactorily. Individual circumstances will govern the best type of aerial, and although a compromise will have to be adopted to obtain maximum results on the broadcast and the short wavebands, it will in the majority of cases be found that a short aerial will improve the performance on broadcast bands by providing sharper tuning and yet without reducing the number of stations which may be heard. It will therefore prove worth while to experiment, when the receiver has been found to work satisfactorily, to find the best type of aerial to employ. A vertical wire running up the side of the house, spaced from the wall by at least one foot, and not exceeding about 15ft. in length, should prove all that is necessary.

Trimming

Before switching on and testing the receiver, the trimmers on the gang condenser should be unscrewed to the limits, and if desired they may be removed entirely. If this is done, however, care should be taken to prevent the small flexible plate of the trimmer from coming into contact with any part of the condenser as it will short-circuit in so doing. If they are unscrewed to the minimum capacity they should not affect tuning, and the ganging or lining-up of the two coils is then carried out on the trimmers fitted to the coils. The dial should, of course, be temporarily locked to the condenser spindle, with the pointer at the extreme left of the dial and the condenser vanes fully opened. Turn the pointer to the name of your local station, switch on, and advance the left-hand control (volume) to a position where signals are heard. The lower knob (reaction) should be turned to the minimum position. The volume control may have to be turned full on before the station is heard, and the tuning knob may also have to be moved a short distance before the station is tuned in. Therefore, for the time being the station names should be ignored. Now adjust the two trimmers marked "2" on the top of the coil units, obtaining maximum volume, and readjusting the tuning knob to bring the pointer as near to the station name as possible. When best results are obtained the condenser drive may be unlocked, and the condenser vanes held carefully, whilst the



A semi bird's-eye view of the completed receiver.

pointer is adjusted to register accurately the station you have received. It should then be found that the dial is accurate for all the remaining stations on the medium waveband. Reaction may, of course, be employed to increase signal strength in the usual way. Now turn to the long waves and adjust the trimmers marked "3," and it should be found that the long-wave station names will be accurately registered by the pointer.

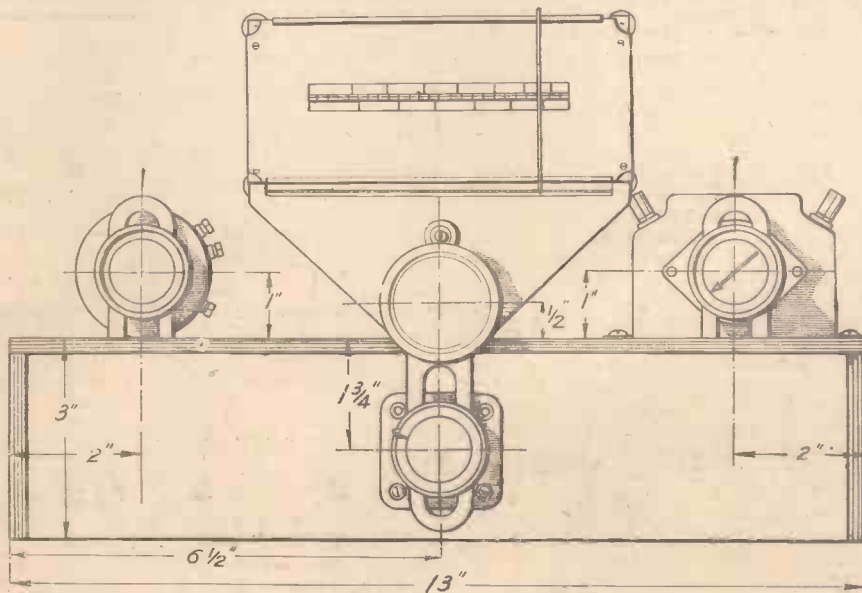
Short-wave Adjustments

On the short waves the trimmers marked "1" are to be adjusted, and a little more care may be needed here in order to provide an accurate setting, as the short waves will be found to tune very sharply. It should be

noted that the condenser drive which is specified is of the automatic two-speed type, the first portion of its travel being at high ratio, and a reverse movement effecting a much greater reduction. This will be found of the utmost assistance in locating the short-wave stations, as the moment a station is heard a slight movement of the control knob in the opposite direction will enable the exact setting to be found without difficulty. This type of drive is to be preferred to the two-knob two-ratio type, as the large control which is provided, together with the automatic reduction brought into play when the direction of rotation is reversed provides a quicker and more certain way of finding the weak short-wave stations which may be picked up.

LIST OF COMPONENTS

- Two all-wave coils, type Triogen with 2-gang spindle (Wearite).
- One 2-gang condenser, .0005 mfd., bar type (Polar).
- One Micro-horizontal drive (Polar).
- Fourteen fixed condensers: Two .0001 mfd.; two .002 mfd.; .02 mfd.; .05 mfd.; .1 mfd.; .5 mfd.; type tubular; two 25 mfd.; type 3016; 50 mfd.; type 3004; 4 mfd.; type F2921; two 8 mfd.; type F2920 (Dubilier).
- Thirteen fixed resistances: .5 meg.; two .25 meg.; 100,000 ohms, type F₁; 50,000 ohms; 30,000 ohms; 25,000 ohms; 15,000 ohms; 10,000 ohms; 750 ohms; 600 ohms; 200 ohms; type F1; 600 ohms; type F2 (Dubilier).
- One volume control, 10,000 ohms, type CP158 (Varley).
- One reaction condenser .00015 mfd.; type differential (Polar).
- One L.F. choke, type DP11 (Variev).
- One mains transformer, type 803 (Heayberd).
- One Q.M.B. switch, type S80 (Bulgin).
- One fuse-holder and 1 amp. fuse (Bulgin).
- Two socket strips L.S., A.E. (Clix).
- Three component brackets (B.T.S.).
- Five valveholders: one 7-pin, two 5-pin, two 4-pin, type V1 and V2 without terminals (Clix).
- One Plymax chassis, 13in. x 10in. x 3in. (Peto-Scott).
- Two-ft. metal screened lead (Ward and Goldstone).
- Five valves: MVS/Pen. (7-pin met.), 41MHL (met.), 41 MLF, 4XP, 506BU (Cossor).
- One P.M. speaker, type Stentorian Senior (W.B.).



The panel layout of the A.C. All-wave "Corona" 4.

Simple "Quality" Circuits

The Experimenters Give Details of a Few Circuits for Both Battery and A.C. Receivers. These are Designed for Simplicity Combined with Good "Quality" Reception of Local Stations

OUR article a few weeks ago on the subject of "Quality Battery Receivers" aroused a good deal of interest, judging by the letters we have received concerning it. Contrary to all our expectations, the majority of our correspondents were in agreement with our remarks, that real "quality" reproduction cannot be obtained with a battery set in normal conditions. Nevertheless, several readers explained that they were not super-critical with regard to the "quality" question, although they do insist on good reproduction. (By the way, what is reproduction if "quality" is not perfect?)

It is evident, therefore, that there are many who would be prepared to sacrifice

would be present whether using a gang condenser or two separate controls. Before giving this point full consideration you will probably disagree, but the difficulty of avoiding cut-off in two tuned circuits at the

by The Experimenters

same time is not a small one, especially at certain settings of the condensers.

Tuning

By eliminating one tuned circuit, a possible source of trouble is dismissed. The

almost any type, of the approximate values shown. The first valve can be any H.F. pentode, whilst a detector or L.F. valve is suitable as detector, with two high-efficiency triodes or output tetrodes in the push-pull stage. The output will not be as high as we have previously postulated for "quality," but if you try the arrangement we believe that you will be satisfied with results. If you must use a battery for H.T., see that it is of the super-capacity type; it is better to use an eliminator, H.T. accumulator or Milnes unit.

Three-R.C.C. Amplifier

Those who use a 4-volt accumulator (for charging a Milnes unit, for example) and those who have provision for keeping an accumulator charged, can use a still more simple circuit by using a 3-valve resistance-capacity-coupled L.F. amplifier in place of the push-pull stage shown. A circuit for this is shown in Fig. 2. Here again you will recognise an old favourite, but one that still has many uses for the "quality fan." The first valve is of the ordinary L.F. type, and is followed by a high-efficiency power triode and by a PX.4 output valve. This valve will not give its theoretical maximum undistorted output for two reasons; it will not receive the full H.T. voltage of 250; and the input to its grid circuit will be insufficient fully to load it. At the same time, an output of considerably more than 1 watt is obtainable if an H.T. unit giving 150 volts at about 60 mA is given.

The beauty of this L.F. amplifier is that it can be made very cheaply. No special precautions need be taken to avoid L.F. oscillation and instability, and construction is particularly straight-forward. Remember, however, that it cannot be satisfactory unless there is a generous H.T. supply and unless the 4-volt accumulator has an ampere-hour capacity of about 60 and a normal output of not

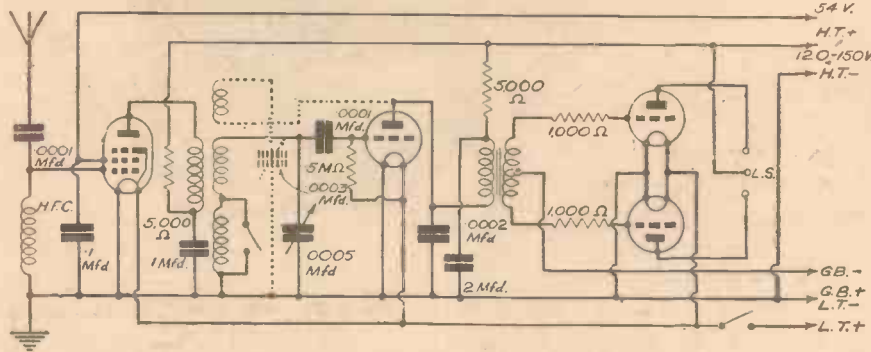


Fig. 1.—A three-stage four-valve "quality" set which is simple to make and use.

long range in order to have the best possible reception of local stations; but cost must be given serious consideration. We have, consequently, spent a good deal of time recently in attempts to see just how simple a "quality" battery set can be made. Do not think that by simplicity we mean a skimping of the specification with the sole idea of reducing costs; simplification is valuable in "quality" sets of an unpretentious kind if the many pitfalls are to be avoided.

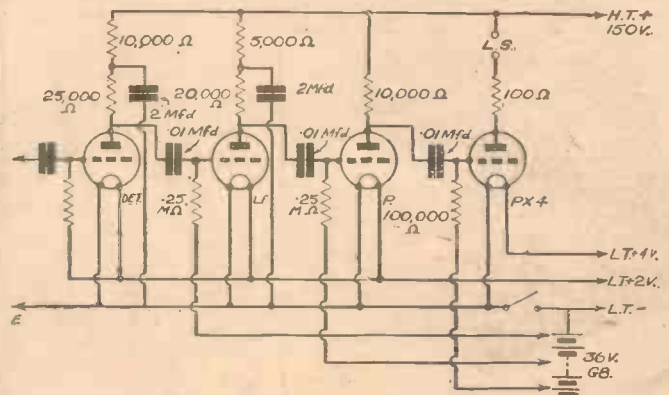
Four-valve Battery Set

Of the circuits that we have used we are best pleased with that shown in Fig. 1. How simple it is! An untuned H.F. pentode feeds into a power-grid detector through a tuned H.F. transformer, and the detector is followed by a transformer-coupled push-pull stage. Some of you will probably remark that the use of an aperiodic aerial circuit is a retrograde step. Perhaps it is in some respects, but it avoids many complications and is very satisfactory when the receiver is used within about 30 miles of the "local" medium-wave transmitter. Of course, there must be a great sacrifice of selectivity but that can generally be afforded if the listener is content to have local-station reception only.

The only advantage of the H.F. stage is that it provides a slight degree of H.F. amplification, so that the input to the detector is high enough to enable that valve to operate efficiently. If the aerial circuit were tuned there would be the difficulty of matching the two tuning circuits. This

tuned transformer can be an efficient one, and might be iron cored. It will tune sufficiently sharply to prevent interference with the local transmitter, except in really awkward situations, whilst tuning will be much too flat to cause any "sideband cutting." The tuned circuit is also damped to a certain extent by the power-grid-type

Fig. 2—A form of three-valve R.C.C. amplifier that can be used satisfactorily when a 4-volt accumulator is available for the L.T. supply.



detector. For push-pull we show a circuit similar to one we have discussed before.

Those who might occasionally wish to "reach out" would prefer to add the reaction connections shown by broken lines; for normal "quality" reception the reaction condenser should be turned to its minimum-capacity position.

As for the components, they can be of

less than 2 amps.; this precludes the use of the mass-plate type cell that is now very popular with ordinary 2-volt valves.

The Speaker

At this point we might be excused for again making reference to the loudspeaker. You cannot obtain "quality" with the

(Continued on page 238)



SHERLOCK HOLMES SAYS . . .

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A fuse may have gone in the lighting circuit; the door-bell may have ceased to function; the radio, perhaps, is not up to standard; the vacuum cleaner, usually so reliable, has definitely "given up the ghost," faults . . . faults . . . faults . . . all equally perplexing . . . but they're all the same to the Pifco Rotameter . . . just another job, in fact. This precision-built instrument reduces electrical fault-finding to a mere bagatelle; saves hours of wasted time, money too; yet its price is only a modest 42s. Has it occurred to you how useful this Rotameter could be in your own home, workshop or garage?



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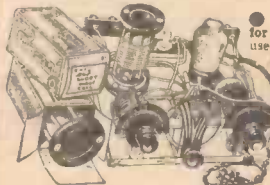
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SIMPLE "QUALITY" CIRCUITS

(Continued from page 236)

best receiver that can be produced if the speaker is a poor one. Buy the best permanent-magnet type that you can afford, unless you have a D.C. mains supply, when a certain economy in first cost can be secured by using an energised speaker. But that should be a good one, of generous proportions. Also remember that the unit should be mounted on a large baffle of stout ply-board, or in a large cabinet. It is worth while to experiment with the position of the baffle, but a corner "site" is usually best, the speaker being mounted with its centre about 7ft. from the floor with the baffle inclined so that the speaker "points" to the ears of the listeners.

For A.C. Operation

If you are one of those people who have an A.C. supply, and if you have no objection to a mains-operated set, your quest for "quality" need not involve very much trouble. You can use an output stage of ample power in a simple and efficient circuit. Fig. 3 shows our idea of a simple receiver of this kind. You will see that it is similar in principle to the battery-operated set represented by Fig. 1. There is the same H.F. stage, except that we have indicated a variable-mu pentode with variable-conductance control in the form of a cathode potentiometer. A triode valve is used in the detector circuit, but it is used as a diode. This is followed by a phase-reversing valve feeding into two triodes in push-pull. In this instance, resistance-capacity coupling is used for the push-pull stage, because this eliminates possible "quality" losses due to the more-usual iron-core p.p. transformer.

Valves and H.T.

Suitable valves for the four stages are: VMP.4G, MH.4, ML.4, and PX.4, although similar valves in other makes can be employed. The component values marked

on the circuit apply to the valves listed, and the whole set is intended for use with a power-supply unit having an H.T. output of about 330 volts at 120 mA; the U.12 rectifier would be suitable if fed from a 350-0-350-volt transformer. This H.T. is correct for the output valves, and allows for a voltage drop of about 50 across the primary of the speaker transformer.

The circuit will provide extremely good reproduction (that word again) and a maximum undistorted output of about 6 watts. Construction can be simple, but it is important that care be taken to ensure adequate insulation in view of the

should be of 2 watts, and the 5,000-ohm resistor in the H.T. negative line should be rated at 2 watts.

Increased Selectivity

If it is wished to make the set more selective than it is in its present form, the aerial circuit may be tuned, a two-gang condenser being used for the two circuits. In that event it would be wise to connect a 5,000-ohm variable non-inductive resistor across the aerial circuit, so that this can be damped for purely "quality" reception. The resistance can be full-out, or dis-

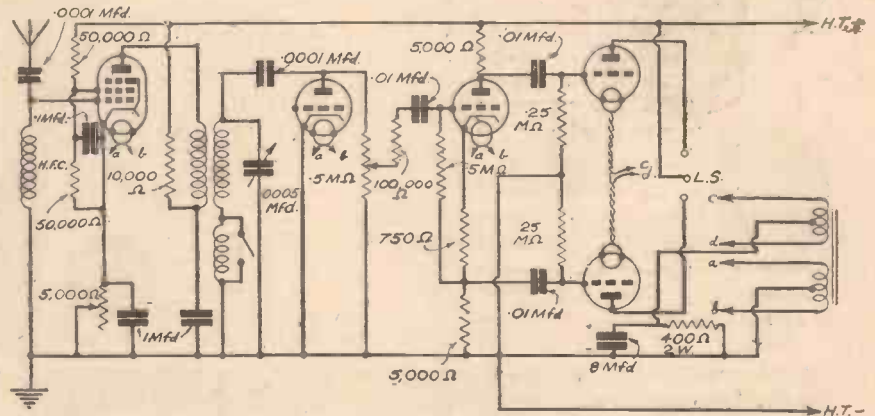


Fig. 3.—This mains operated five-valver is similar in general form to the circuit shown in Fig. 1, but resistance-capacity coupling is used for push-pull.

comparatively high voltage being handled.

Values of the principal components are shown on the diagram. All resistors except those otherwise marked may be of 1-watt rating, but the anode resistors for the first and third valves should be rated at 2 watts; the bias resistor for the two output valves

connected when additional selectivity is required for the reception of other than local transmissions. Reaction could be added to the diode circuit, but this will rarely be required. If it is used, the reaction condenser should be turned to zero except when listening to more distant stations.

NATIONAL (261.1

m. and 1,500 m.)

Wednesday,

November 10th.

—Symphony Concert from the Queen's Hall, London.

Thursday, November 11th.—Cenotaph Service, and Festival of Remembrance from the Albert Hall.

Friday, November 12th.—Concert party programme.

Saturday, November 13th.—Massed Band Concert from Alexandra Palace.

REGIONAL (342.1 m.)

Wednesday, November 10th.—Band Concert.

Thursday, November 11th.—Cenotaph Service.

Friday, November 12th.—Safety in Industry, a round-table discussion.

Saturday, November 13th.—Death of a First Mate, a play by Jack Inglis from the novel by Charles Barry.

WEST OF ENGLAND (285.7 m.)

Wednesday, November 10th.—Inter-Varsity Debate, from the Victoria Rooms, Bristol.

Thursday, November 11th.—Cenotaph Service.

Friday, November 12th.—Great British Organ Music—3, Later Georgian Period (1760-1800), from St. Mary's, Taunton.

Saturday, November 13th.—Les Dames Blanches, a radio road-house.

Important Broadcasts of the Week

WELSH (373.1 m.)

Wednesday, November 10th.—The Bard at Work, a literary discussion.

Thursday, November 11th.—Cenotaph Service.

Friday, November 12th.—Orchestral Concert.

Saturday, November 13th.—Samson (Handel) choral programme from the Central Hall, Liverpool.

TELEVISION THE LORD MAYOR'S SHOW

Close-up views of the Lord Mayor, Sir Harry E. A. Twyford, and his predecessor, Sir George T. Broadbridge, will be televised as the Lord Mayor's Show wheels into Northumberland Avenue on the return journey from the Law Courts on November 9th. The mobile television unit, stationed at the west end of Northumberland Avenue; will use three cameras: a close-up camera at pavement level, one on the roof of the scanning-van to give an overhead view, and a third to give extended views down Northumberland Avenue as the procession winds its way towards the Victoria Embankment. The whole of the procession will be televised and there will be a special television commentary by Mr. Frederick Grisewood.

NORTHERN

(449.1 m.)

Wednesday,

November 10th.

—Variety programmes from the New Theatre, Crewe, and the Palace Theatre, Blackpool.

Thursday, November 11th.—Cenotaph Service.

Friday, November 12th.—Concert from the Town Hall, Huddersfield.

Saturday, November 13th.—"La Bohème," Act 1, from the Empire Theatre, Liverpool.

SCOTTISH (391.1 m.)

Wednesday, November 10th.—Scottish Golfers—Andrew Kirkcaldy; programme devised by A. H. Symon, from the Royal and Ancient Golf Club of St. Andrews.

Thursday, November 11th.—Cenotaph Service.

Friday, November 12th.—Night Out, a series of outside broadcasts chosen and directed by a Listener.

Saturday, November 13th.—Choral and orchestral concert from St. Andrew's Hall, Glasgow.

NORTHERN IRELAND (307.1 m.)

Wednesday, November 10th.—Students' Songs: choral programme.

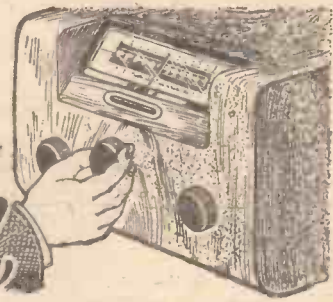
Thursday, November 11th.—Cenotaph Service.

Friday, November 12th.—Orchestral Concert.

Saturday, November 13th.—Military Band concert.



On Your Wavelength



By *Thermion*

Car Radio

THIS country has always suffered from too much government. It is said that a community gets the Government it deserves, although what the listening public has done to deserve the present Government as far as wireless is concerned I don't know. It is despotic rather than democratic. I suppose it will remain so, unless the god Demos stalks abroad the land of broadcasting. I always feel that any monopoly which does not allow for effective opposition is bad, and the listener is in the position of having to like it or lump it. If he doesn't like the programmes he can do nothing about it. I think it is true to say that 99.9 per cent. of listeners dislike our Sunday programmes in spite of their changed form. It is a distinction without a difference. The mixture as before in water of different colour. The same old dreary and weary music with a few bright patches thrown in to keep the critics quiet. Take the case of a motorist who was fined £2 and had his licence endorsed for not driving with due care and attention because it was stated "he had been fiddling with his wireless set while driving." The Chairman of the Magistrates and a solicitor stated that if they had their way radio sets would not be allowed in cars. Why? If we are going to argue on those lines we ought not to permit gushing and alluring damsels to sit by the side of a driver, because his attention may be distracted. We should obliterate all roadside scenery for the same reason, and certainly we ought to remove 99 per cent. of the silly signs which are deliberately affixed by the roadside and on the road to distract the motorist's attention in order to make him careful. Isn't life a complete paradox? If the distraction of attention is to be made the subject of a charge, life will shortly become impossible. Surely, if radio keeps a man's wits

alive whilst driving it is in the interests of safety? But, as with wireless programmes and listeners, the poor motorist has no effective means of answering back. The law is largely administered by those who know little about it, in just the same way as a few lofty individuals who imagine they are poised between heaven and earth and do not belong to the sphere of common mortals decide our radio fare for us. What an excellent idea it would be if they were all lined up in Hyde Park so that the public could see the type of individual responsible for our radio programmes? We should all go home and smash our sets to smithereens and feel that we have been led by the nose.

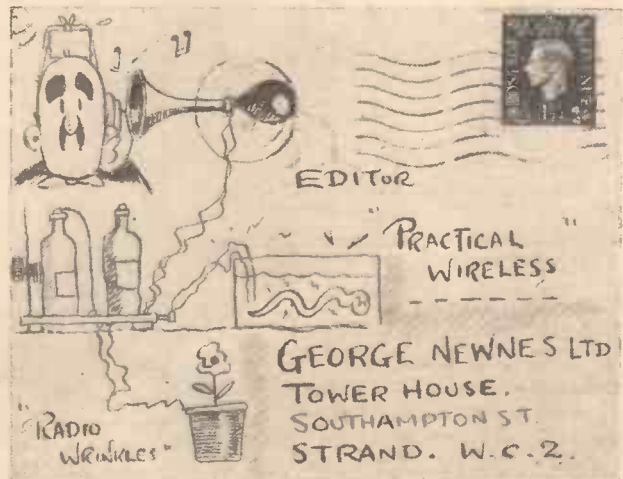
A Nice Job

LEARN from the General Electric Company that one of their employees is to make a 50,000-mile tour of the world by air, land and sea with an all-wave radio set as his sole companion. He will be listening-in to remote countries and isolated regions for eight months, and will cover about 1,500 miles a week. This employee will test reception under all conditions, and as a result of his experiences will issue a report so that the company may give even better after-service sales in any part of the world. The tour will embrace Gambia, Sierra Leone, Gold Coast, Nigeria, French Cameroon, Sudan, South Africa, Rhodesia, Kenya, Tanganyika, Bombay, Calcutta and Rangoon, and flights will include trips from Burma to the Straits Settlements and from Malaya to China, from where he will travel to Australia and New Zealand, and thence via Panama back to his regular job at

Coventry. This is the sort of job which would suit me down to the ground. Perhaps the Editor will one day allow me to snoop around the world listening to readers' reactions to my weekly screed.

"Confiscated by the State"

SEE that a Bill is being introduced into the House of Lords which proposes that in cases of dangerous driving or manslaughter the offender's car will be confiscated by the State. Now as this appears to be a period of extreme oppression and persecution of motorists, I do not see why we radio fans should be left out in the cold. I therefore suggest that our worthy and esoteric House of Lords should frame another Bill rendering it possible for the State to confiscate any radio set which on the evidence of two neighbours gives annoyance to those neighbours. The set should also be confiscated if it is more than five years old; if it has not the approval of the PRACTICAL AND AMATEUR WIRELESS technical staff; if it has more valves than there are rooms in the house; if it has fewer valves than there are rooms in the house; and if it can be proved that an individual is operating on a one or two-valve set and he could afford a three or four.



My friends over the borrrrrder will rrrrrrrresent this rrrrrrrrestriction on their harrrrrrrdy rrrrrrrrace, but I am assured that there are many in Binny

Scitland who are still operating crystal sets and are residing in houses with specially thin walls, so that the next door neighbour can listen in to the programme by the expedient of one earphone being pressed hard against the aforesaid thin wall, which latter acts as a most effective baffle. After all, there are not many liberties left in this free country of ours, and I do not see why listeners should not be permitted to join in the general fun. Remember, it is illegal to buy a couple of yards of flex on a Sunday unless you want it for a cycle dynamo. The law lays down regulations for the fitting of stop lights on cars, but according to a recent Appeal Court decision no notice should be taken of them. You must waggle your arm like a raving lunatic out of the window. This is much more confusing than the positive red of a stop light, and so the law prefers it. One other thing. I suggest that anyone caught listening to the B.B.C. Sunday programmes should not only have his set confiscated but also his car, his house, his ox, his ass, and anything that is his. He should also be imprisoned for life, and then be boiled in oil, and his corpse à la meunière thrown to the hounds. Let's all go mad!

Wrinkles

"TO view with hollow eye and wrinkled brow an age of poverty," wrote the bard. Our Wrinkles experts have developed wrinkled brows, as a result of some of the queer contraptions submitted to them. Now and again their task is leavened and the wrinkles effaced by a humorous contribution from some wag with a puckish mind. I reproduce on page 239 an envelope which recently came through the post. Notice the ingenuity, the flower pot earth, the improvised accumulators, and the ice block on the listener's head. I have sent this reader a book as a reward for the trouble he has taken. By the way, I shall be glad to award a book prize each week to the sender of the most humorous sketch or joke I receive. My judgment final, of course. Address your letters to "Joke, Thermion."

How Long Should a Set Last?

IN view of the wide claims which are made for commercial receivers, I was interested to read the report of a case in which a man was summoned for non-payment under a hire - purchase agreement. The defendant said that he had the set for four months, and then the plaintiffs had it back. The judge remarked: "He has had his set for a little over four months and you say



Notes from the Nest Bench

The 12-Watt Amplifier

SEVERAL readers have written to ask whether the 12-watt amplifier described in a recent issue can be used satisfactorily in conjunction with an H.F. unit for radio reception. The H.F. and detector stages of a modern all-wave receiver such as the All-World Ace are quite suitable for addition to this amplifier. If the theoretical diagram of the amplifier is studied it will be noted that a grid condenser is not used in the grid circuit of the first valve, and therefore connection must be made to the output end of the L.F. grid coupling condenser in the radio unit and not to the detector anode. One of the P.U. or one of the microphone terminals on the amplifier should be used for the lead to the coupling condenser. This method of connection should be used when maximum volume is desired, but if the combination is to be used in the home, better quality can be obtained by connecting the coupling condenser of the radio set to the grid socket of the second valve of the amplifier. There is one precaution which must be taken when this addition is made—the lead joining the radio unit to the amplifier must be effectively screened, otherwise hum is likely to be experienced.

The Vitesse

WE have now had the opportunity of testing a fair number of Vitesse receivers built by readers. In most cases poor reception has been due to I.F. instability or to incorrect adjustment of the trimmer condensers on the coil unit and the I.F. transformers. Constructors who are still having trouble with this receiver should, first of all, ascertain that the leads to the I.F. transformers are as short as possible. If it is found that reducing the length of these leads does not provide stability the lead from the first transformer to the grid of V₃ should be screened. There is a large number of trimmers, all of which have to be correctly adjusted, and therefore this work should be carefully effected. As the dial is marked in wavelengths, however, adjustment is not very difficult even without an oscillator—it is only necessary to adjust the I.F. transformer and oscillator coil (in back section) trimmers until the correct wavelength settings are obtained at both ends of the scale and then adjust the trimmers of the other coils for maximum volume.

WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA

5/- or 5/6 by post from

George Newnes, Ltd., Tower House, Southampton St., Strand, London, W.C.2.

that the depreciation in value is half. It seems to be rather a lot." On this argument a commercial set is worth nothing at the end of the year, and if you keep it longer than that you will have to pay someone to take it away. The moral is to make a set so that it will last for five years.

A Colonial Impression

A COLONIAL reader writes to me and, among other things, says: "Reception of the short-wave stations is over a distance from, say, 5,000 to 10,000 miles; and in spite of this great distance, the sets do not reveal that indifferent reproduction so many British designers appear to believe is inherent in the superhet circuit; anyway, this weakness does not exist in the good American sets we know out here, and we are therefore reluctantly forced to the conclusion that British designers who hold these views are not as competent as the American designer. Of course, they will all hasten to deny such an uncomplimentary statement; their denial, however, will not convince us, because we are prepared to prove that reproduction both on the broadcast and the short-wave bands compares in every way with some of the best British sets out here.

"The American 6-8-valve commercial superhet can be purchased from £22 10s.—this is an all-wave instrument obtainable on very easy terms and carrying with it a substantial guarantee.

"Not the least important factor is that the American valves are standardised. Go to any 'Dorp' in this vast country, ask, for example, for a '24' valve; it does not matter by whom it is manufactured, it will operate under the '24' characteristics in any American set. But let a British valve require replacement, you are practically confined to one make, and ten to one such a valve is only obtainable from agents that are days away, or hundreds of miles away.

"Then, too, for instance, a British screen-grid valve out here costs from 18s. to 21s. retail. An American counterpart can be obtained for a price around 6s. Why? Superior workmanship you will say. Maybe it is so, but the superior complex exists only in the minds of those who haven't had any or little experience with American valves. Believe me, they are good, even if workmanship should be superior in British valves. The average person cares not a rap what is inside them so long as they function in a receiver well and give entire satisfaction."

Now, English manufacturers, what about it!

A PAGE OF PRACTICAL HINTS

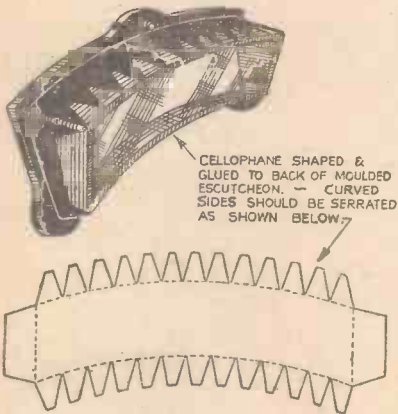
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Hint for Excluding Dust

WITH some tuning scale assemblies, owing to the need for a slight clearance between the moving pointer and the back face of the escutcheon moulding,

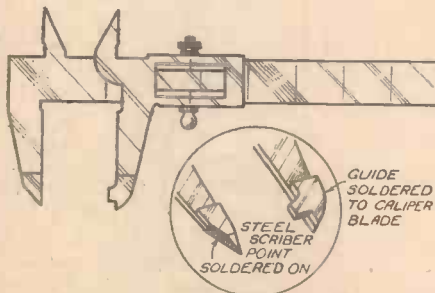


A method of excluding dust from an escutcheon.

dust will easily find its way into the interior of the set. This can be prevented quite simply by covering the escutcheon moulding with Cellophane. This is cut to shape and where the moulding is of the curved pattern, the Cellophane is serrated as shown in the sketch. It is then fixed to the moulding with glue.—R. L. GRAPER (Chelmsford).

A Useful Marking Gauge

THE accompanying illustration shows a useful marking gauge made from a sliding caliper-gauge which is obtainable for



A useful marking tool contrived from a cheap caliper gauge.

6d. from any of the cheap stores. After cleaning the lower jaws, tin them, and then break off two pieces of hack-saw blade. Well clean one side of each piece, sweat them on to the extremities of the jaws, and then grind or file them to the shape shown in the illustration. This tool will be found particularly useful for scribing lines parallel to the edges of a metal chassis.—H. COLLINGWOOD (Handsworth).

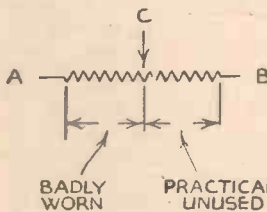
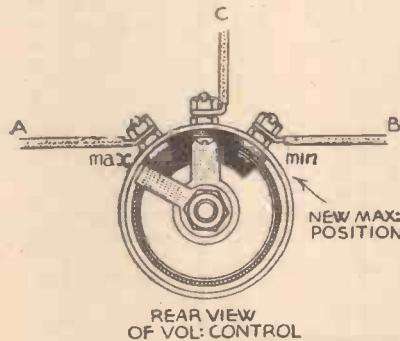
THAT DODGE OF YOURS!

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

A Volume Control Improvement

THE following dodge has proved itself valuable to me when servicing a receiver suffering from a faulty volume control, which crackles and distorts at the maximum position. I have noticed that very few receivers utilise the full movement of a variable volume control; in fact most of them use about half of the windings and leave the other half nearly unused.

From the accompanying sketch it will be seen that by reversing leads A and B the full or maximum volume position will also be reversed, and then the practically unused



Improving a volume control by reversing the leads.

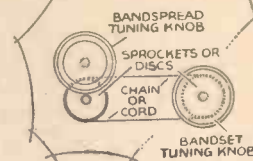
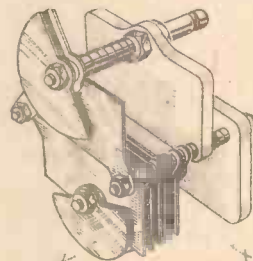
section of the volume control windings comes into play, and gives the component a new lease of life, where it would normally have to be replaced.—V. DIEDERICHES (Castle Donington).

NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

3/6, or 4/- by post from GEORGE NEWNES, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Improved Bandspread Condenser

HERE is an idea designed to cut the stray capacity of the combined "bandset" and "bandspread" condensers to a minimum. By eliminating the wiring

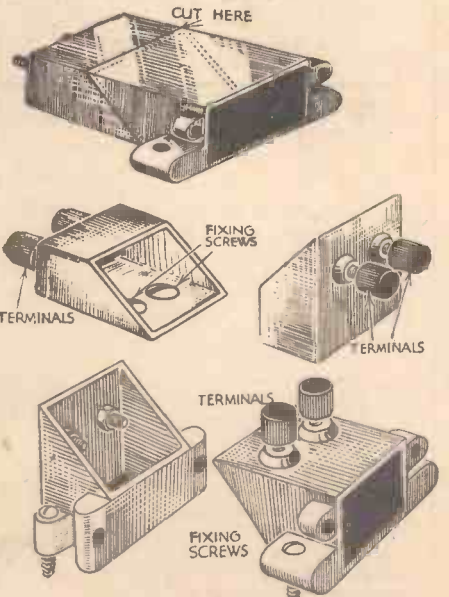


A combined "bandset" and "bandspread" condenser, and method of driving.

between the two components it does away with the extra two fixed plate supporting spindles on the bandspread condenser. The sketch explains matters clearly. Of course, the proximity of the two tuning spindles presents a problem, but this can be easily remedied.—A. LEMAY (London, S.W.1).

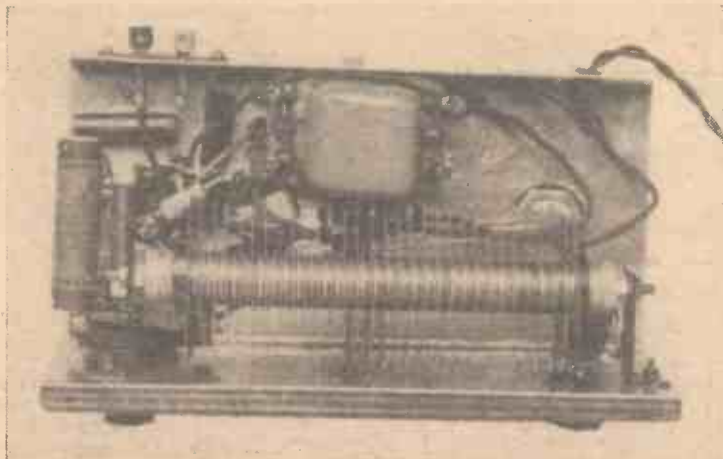
Universal Terminal Mounts

THE accompanying sketches show how handy terminal mounts can be made from the bakelite cases of disused mansbridge condensers. With the condensers still intact, cut through the cases diagonally with a hacksaw. Drill the required holes for terminals, and fixing screws, then place the various parts in boiling water long enough to enable the interior of each part to be removed. The edges can be trimmed with a file.—H. NEWMAY (Steyping).



Various types of terminal mount made from bakelite cases of disused condensers.

AN A.C.-D.C. REFLEX

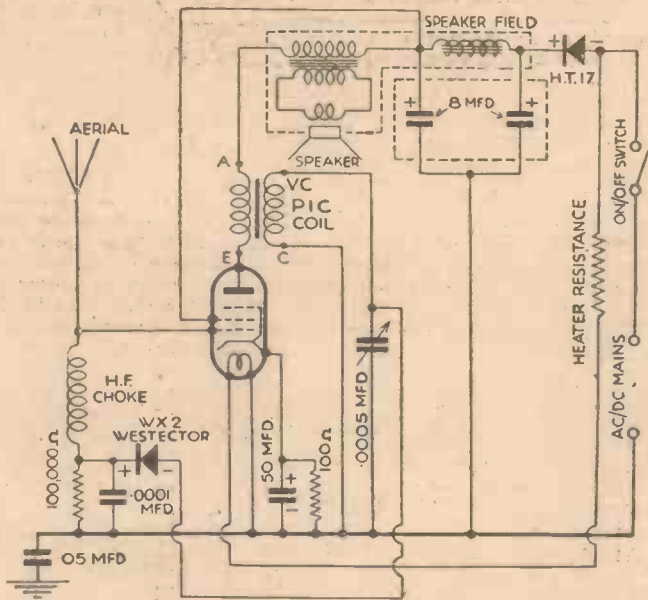


View of the underside of the chassis showing the arrangement of the rectifier.

THE usual type of portable is weighty on account of the batteries which have to be carried, and a fair number of valves has to be used in order to provide good signal strength. The receiver now to be described overcomes this difficulty by utilising a high-power mains valve with a metal rectifier to take the place of a further valve and it may be used with any form of mains supply—simply

through the output transformer and the primary of the H.F. transformer.

The received signal is fed direct to the grid of the valve and amplified. The amplified voltage is built up across the primary of the H.F. transformer, the secondary of which is tuned and is connected to a W.X.2 Westector acting as a detector. The detected signal is then fed back to the grid of the valve via an H.F. choke, where it is again amplified, and used to actuate the speaker in the normal manner.



Theoretical circuit of this one-valve reflex receiver.

by plugging in to the nearest mains socket. It is thus cheap to build, and the expense of replacing batteries from time to time is avoided. In spite of the compact design, standard mains equipment is provided, together with a standard loudspeaker, which is of the energised field type. The tuning range covers the normal medium and long broadcast bands.

The receiver may be operated from any A.C. or D.C. supply from 200 to 250 volts. The power supply is obtained through an H.T.17 Westinghouse Metal Rectifier. On D.C. the rectifier acts as a small series resistance, while on A.C. the rectifier feeds into the reservoir condenser, which also smooths the pulsating currents. Further smoothing is obtained by means of the speaker field and an 8 mfd. condenser. On 200-volt mains the 8 mfd. reservoir

pass through the chassis.

The top cap of the valve is the grid connection, the lead to which is screened in order to avoid hum pick-up.

Pins 1 and 2 of the valveholder are blank, and pin 2 has accordingly been utilised to anchor wires from the choke, aerial and grid of the valve. There is, of course, no connection between this pin and the valve itself through the valve leg.

The connections to the speaker, viewed from the back with the transformer at the bottom, are as follows:—

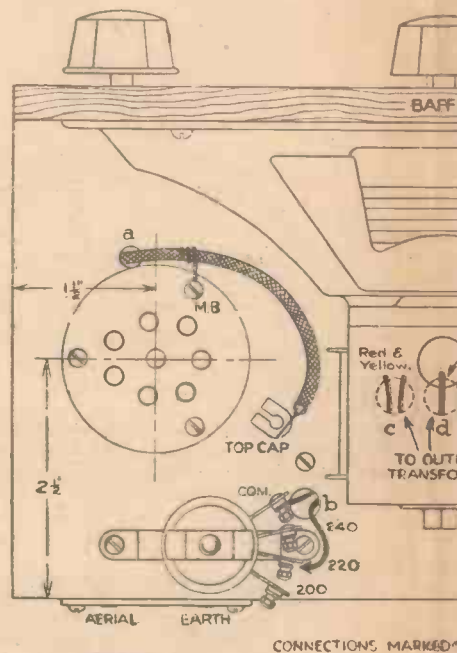
Left-hand tag (yellow and black wires): Screen of valve, and one section of 8+8 mfd. condenser.

Centre tag (yellow wire): Terminal "A" of coil.

Right-hand tag (black wire): Positive of

How to Build a Simple Main
Taken on Holiday or Carried
Order to Provide Loudspeakers
the Use of

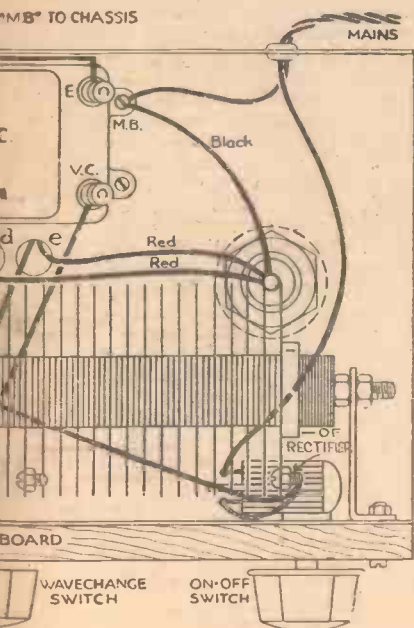
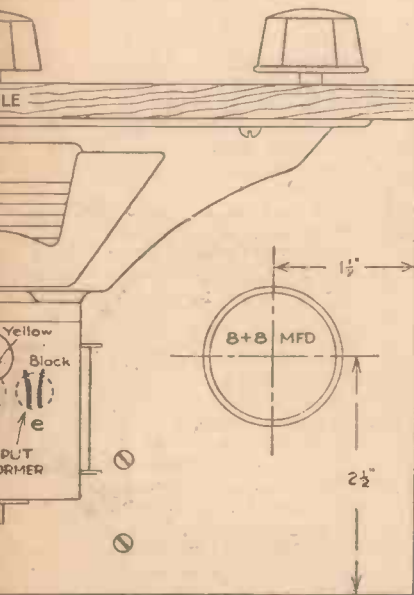
ABOVE AND BELOW CHASSIS



ONE-VALVE PORTABLE

Receiver which May be moved from Place to Place in your Entertainment Without Batteries

CHASSIS WIRING DIAGRAMS



rectifier, and one section of 8+8 mfd. condenser.

When the wiring is complete, the set is ready for operation—there are no adjustments to be made, nor ganging to be carried out.

Quick Tests

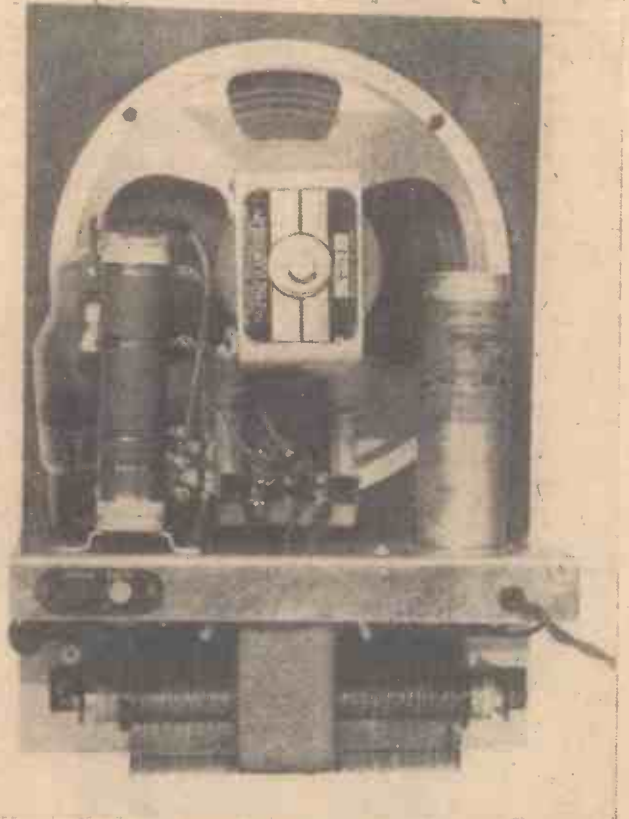
The following approximate voltage and current readings should be obtained—

- Positive of rectifier 275 volts.
- Anode of valve 175 volts 44mA.
- Screen of valve 185 volts.
- Cathode of valve 4.5 volts.
- Chassis is negative in each case.

General Considerations

The reproduction of the receiver is above the average. There is ample volume for an ordinary room, and the response is crisp with predominant medium and upper frequencies. Those who prefer a mellower tone may obtain it by connecting an 0.005 or 0.01 condenser across the output transformer primary. The condenser must not be connected from the anode to earth.

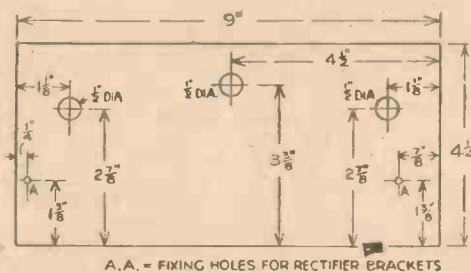
A rear view of the completed receiver.



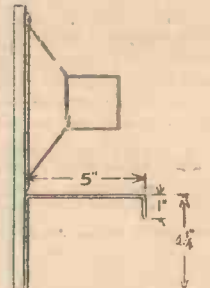
An advantage of the circuit is that it provides a form of volume expansion.

An efficient aerial and earth is essential in order to enable good signal strength to be obtained, and to reduce hum. The set will work on an indoor aerial, however, provided it is not situated at a distance greater than 20 miles from the station.

(Continued on page 252)



Drilling dimensions for the front of the chassis of the receiver are shown on the left; and on the right the principal dimensions of the chassis and panel assembly.



LIST OF COMPONENTS

1 Westinghouse metal rectifier, style H.T.17 ..	17	6
1 Westinghouse Westector, style W.X.2 ..	5	0
1 Wearite H.F. transformer—style P.I.C. ..	7	6
1 7-pin valveholder—Bulgin type VH.14 ..	0	6
1 .0001 mfd. condenser—Bulgin type P.C.301 ..	0	4 1/2
1 .05 mfd. condenser—Bulgin type P.C.105 ..	0	9
1 .50 mfd. dry electrolytic condenser—Bulgin type E.C.3 ..	1	9
1 Mains resistance—Bulgin type M.R.44 ..	3	6
1 .0005 mfd. bakelite dielectric tuning condenser, Polar ..	2	6
1 8+8 mfd. dry electrolytic condenser, Bulgin E.C.8 ..	7	6
1 On-off switch—Bulgin type S.91 ..	1	9
1 A-E terminal strip—Bulgin P.51 ..	0	4 1/2
1 100 ohm resistance—Bulgin type A.R.100 ..	1	0
1 100,000 ohm 1-watt resistance—Bulgin H.W.25 ..	0	6
1 2,000 ohm energised loudspeaker with pentode output transformer, Magnavox type No. 164 ..	27	6
1 Marconi N.31 pentode output valve ..	13	6
Wire, sleeving, aluminium for chassis, etc. ..	1	0

NEW PILOT MODEL U.535

INCLUDED in the wide range of receivers and radiograms manufactured by Pilot Radio is a low-priced A.C. mains superhet embodying a 5-valve 3-band circuit, type U.535. The accompanying illustration shows the general outward appearance of this receiver which, it will be noted, incorporates the novel Pilot

Test Report and Details of the Pilot 12½-guinea 5-valve All-wave Superhet

finish and tone of the cabinet is of a type which will harmonise with any modern furnishing scheme.



This is model U.535 reviewed on this page.

selectively-illuminated dial. The cabinet is substantially constructed and, in addition to its attractive appearance, it is designed to avoid many of the difficulties of reproduction by utilising substantial thicknesses of timber at all points and thus gives no troubles due to resonances, even when the output valve is fully loaded. The general

The circuit employed is of the standard superhet design, with the latest Octal valves. These include a frequency changer, I.F. pentode, double diode-triode, output pentode, and full-wave rectifier. A two-circuit tuner is employed on the H.F. side, with two I.F. transformers, thus providing high selectivity. The output from the mains section is fed through a field winding on the speaker, giving good smoothing and a hum-free supply to the receiver, whilst the four dial lights are illuminated from the heater circuit in the usual way.

General Features

The receiver is assembled in the standard Pilot manner, with a four-pin plug (American type) for connection to the speaker field and input transformer, and with clips for connecting aerial and earth. A flexible lead is used for the aerial connection and a clip is riveted to the chassis for the earth connection. Extension speaker sockets are provided, with a jack for gramophone connection. The panel controls consist of a combined on/off switch and volume control on the left, main tuning top centre, tone control bottom centre and wave-change switch on the right. The tuning control is of the two-speed type, which in its normal

position provided a reduction gear of 12½ to 1, but which may be pulled out and then gives a reduction of 95 to 1. This is of the greatest value when tuning on the short wavebands. The dial is divided centrally and at the top carries the medium and long-wave station names and wave-lengths, whilst the whole of the lower section is devoted to the short waves. The wavebands covered are from 16 to 53, 183 to 560, and 760 to 2,150 metres. The speaker is of the 8in. high-fidelity type.

Test Report

The receiver was tested on our standard aerial and was fully up to the Pilot standard. The A.V.C. action was very definite and worked admirably on all stations which were usually difficult to receive. The tone control gives a very full control over the reproduction, and is of the greatest value when receiving very long-distance stations, as it reduces the general background noise. The volume control is smooth and noiseless in action and the wavechange switch works faultlessly. The two-speed drive is very effective in use and smooth in action. The majority of the stations marked on the dial could be obtained and the selectivity was of a very high order. On the medium and long wavebands all of the European stations could be heard at good volume, and even with a small aerial there was ample material for entertainment purposes in daylight. After dark it is difficult to decide which station to listen to as there are so many available at good strength.

On the short waves the Americans were clearly heard during an early evening test and during daylight many of the stations, such as Tokio, Prague, Vatican City and Huizen were heard at good volume, whilst Radio-Colonial and Havana were also heard during the period of test. No doubt all of the other short-wave stations marked on the dial could be heard during a prolonged test, and the short-wave performance may be classed as really high for a receiver of this type. The mains consumption is approximately 55 watts so that the receiver is very economical to maintain. The output is rated at 4 watts.

A QUESTION OF DEFLECTION

ALTHOUGH the original schemes theoretically proposed for the use of cathode-ray tubes to give television picture reconstitution suggested scanning carried out by magnetic means, it is only of comparative recent date that this form of working has achieved a degree of popularity. The advantages associated with this method of working have been detailed in these pages, but so far there has been little mathematical data published in connection with the circuits and design of equipment for deflection purposes. This is due partly to the fact that since the deflecting coils and magnet yokes are arranged external to the tube, large air gaps and magnetic leakage flux paths are caused which become difficult to evaluate exactly. Certain principles have been established, however, which set designers and home constructors must follow if the best results are to be achieved. First of all, in order to be certain that no defocusing

effect will become evident in the electron beam the deflecting coils have to be placed in positions determined by the makers only after considerable research and experiment. To prevent the beam of electrons from fouling any part of the interior glass walls of the tube before reaching the screen, the deflecting coils, both line and frame, have to be placed as far as possible from the electrode assembly in the cap end of the tube. Careful positioning is essential to avoid any degree of magnetic coupling between the pair of line coils and the frame yoke.

BOOKS RECEIVED

“Radio Progress” and “Radio Service Manual”

THESE two publications, issued by A. F. Bulgin and Co., Ltd., are full of useful information for the experimenter and home constructor. “Radio Progress, No. 3,” which is the third in the Bulgin annual series of this title, contains 40 well-

illustrated pages. Full explanatory and constructional details are given of various pieces of apparatus, including a 12-valve All-wave A.C. Superhet, a Paraphase Amplifier (14-16 watts output), a Universal Mains All-wave Seven, a Four-band A.C. Four, a 5-valve receiver using the Bulgin Vibrator for H.T. supply; 5-range Coil Units, and a Pocket Amplifier. There is also an article on the construction of a Vibrator H.T. Battery Eliminator with an output of 50 mA at 150 volts from a 6-volt accumulator input, which is also suitable for use with car radio. Theoretical circuit diagrams, wiring diagrams, and photographic illustrations of all the apparatus described, are included in the book.

“The Radio Service Manual” should appeal strongly to servicemen and experimenters, who will find the book packed from cover to cover with practical information on the subjects of fault-finding, the uses and construction of servicing apparatus, and methods of building extensions, relays and other accessory items. Every stage in a modern receiver is illustrated by a pictorial diagram, and there are also several circuit diagrams. Both publications are priced at 1s. 0d. each.

THE AMERICAN VIEWPOINT

MR. DAVID SARNOFF, head of the Radio Corporation of America, returned recently to his home country after a visit to England where he had an opportunity of studying radio and television. In a statement dealing with B.B.C. television he remarked that fewer than 1,000 high-definition television receivers had been sold in this country, and that Radiolympia only served to dispose of 100 sets. It is difficult to understand how a foreigner, on what was essentially a flying visit to England, could acquire information of this character when the Government's Television Advisory Committee are not in a position to specify the number sold. The R.C.A. president has either been completely misinformed or is talking with his tongue in his cheek in an endeavour to justify the attitude of the Americans towards the commercialisation of television in the United States. British television is well ahead of America, and excuses cannot alter this fact. As soon as the B.B.C. obtain more money from the Government there will be increased programme hours and this, coupled with better programme material, will rapidly increase the present rate of progress. It is to be hoped that those responsible for the development of British television will read, mark, learn and inwardly digest the recent outspoken comments of "Thermion." His trenchant remarks were most opportune, and had the merit of destructive reasoning being flavoured with constructive sauce. It is a matter for regret that so few critics have "Thermion's" courage to make helpful suggestions for the improvement of a new industry.

A Standard Comparison

PROBABLY the most important major problem to settle prior to the initiation of any high definition television service is that of the picture standard to be radiated, coupled with the electrical nature of the signal itself. It is, therefore, very strange that English and American practice should differ so widely, when it is remembered that the Emitron camera is really a development of the Iconoscope first shown practically in America. As a result of careful investigation carried out in this country, American engineers are admitting quite frankly that unless changes are made in the type of signal now being employed in many of the experimental American transmissions then the U.S. receivers will be difficult to service, more expensive, and give a performance inferior to their British prototypes. This will not be on the score of picture definition, for the picture discussion is 441 in America against the 405 here. Lack of synchronism, and insufficient contrast, are the two main items where the American sets are likely to be inferior, and this is due partly to the difference in the radiated signal. First of all, the B.B.C. radiate a picture which has positive modulation, whereas America at the moment shows a preference for negative modulation. The contrast range from black to white is definite between the 30 per cent. carrier which represents zero picture modulation and 100 per cent. carrier corresponding to peak white. With this form of positive modulation the bottom bend of the valve characteristic curves is in the region of the synchronising pulses, and the varying amplitudes of the picture modulation are preserved without distortion, since they

take place on the straight portion of the valve's characteristic.

An Advantage

AGAIN, in America a preference is shown for a radiated carrier wave which, through the omission of the D.C. component, has no definite level corresponding to black. For the best results there is no question but that the absolute brightness of the scene scanned must be incorporated in the radiated picture signal. The alternating component gives the range of tone values between the extremes of the picture televised, but this is not enough for the proper pictorial effects. Imagine an outside scene taken without sunlight—

the mean brightness level will be a certain quantity, and the range of tone values between two figures dependent upon the nature of the objects in the scene. A burst of sunshine will not alter the tone value range, but will quite definitely increase the mean brightness of the picture, and unless this latter factor—that is, the D.C. component, as it is now called—is radiated the change of brightness level will not be noticed in the received picture. Fortunately, with the B.B.C. picture signal any changes in the D.C. level are by special methods included, thus making the mean carrier amplitude correspond with average picture brightness. The best receivers are so designed that they respond to this, so that after setting the brightness control at the beginning of the programme it is generally unnecessary to make any further change unless the transmission alters.

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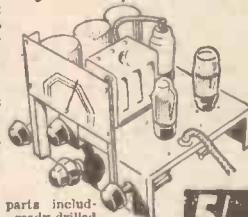
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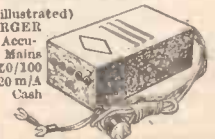
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The Amateur Set Designer

Further Notes on H.F. Couplings are Given in this Tenth Article of the Series

(Continued from page 206, November 6th issue)

FIG. 47 illustrates the choke-capacity coupled tuned-grid system. The chief merits of this arrangement lie in the facts that the tuning condenser has one side earthed and that, as far as the mains receiver is concerned, L forms a very low impedance shunt for any hum currents. The success of this H.F. coupling system will be very dependent upon the efficiency of the H.F. choke which is connected in series with the anode circuit. The requirement is that the latter should present a consistently high impedance throughout the whole range of H.F. values covered by the receiver. Any pronounced resonant peaks or absorption troughs in the choke's characteristic may lead to ganging vagaries. If ever an occasion demanded a really good H.F. choke it is here.

In Fig. 48 a simple modification of Fig. 45 is given. It will be observed that a tapped tuned-anode circuit is in use, only part of the tuning coil being directly in series with the anode circuit of the valve. The use of the tapping leads to two results: (1) The effective load presented to the valve is now less than the dynamic resistance of the tuned circuit and (2) The damping effect of the valve impedance upon the tuned circuit is now reduced. The latter

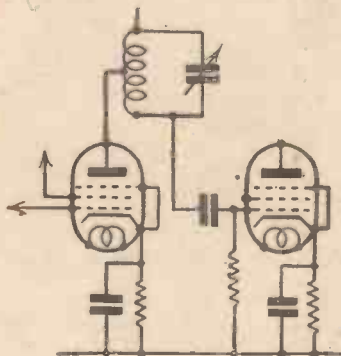


Fig. 48.—A tapped tuned-anode circuit which may be compared with Fig. 45 published last week.

result will give a considerable improvement where selectivity is concerned.

The tapped tuned-anode circuit is really acting as an auto coupled H.F. transformer with untuned primary, and as it is much more satisfactory and the more common practice of to-day to use an H.F. transformer with separate primary and secondary windings, we will at once proceed to consider this better alternative.

The basic circuit is shown in Fig. 49. Undoubtedly this inductively coupled, tuned secondary H.F. transformer is the best intervalve coupling for the T.R.F. receiver. It should perhaps be mentioned here that the transformer with tuned primary as well as tuned secondary is rather out of the question for the T.R.F. receiver, although

it comes into its own in the superhet receiver, as we shall consider later.

The H.F. transformer of Fig. 49 has got several advantages over alternative

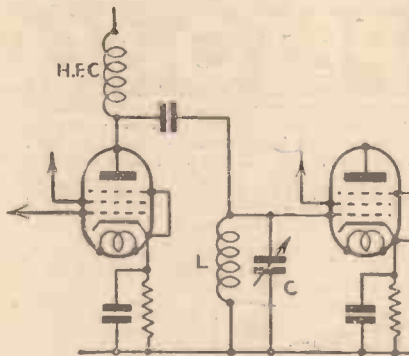


Fig. 47.—Tuned-grid coupling is shown here.

forms of coupling. It lends itself excellently to ganged condenser tuning. The tuned LC circuit gives us more or less a free hand in design in the sense that both the effective load on the valve and the damping of the latter upon the tuned circuit can be controlled by suitable choice of the mutual inductance value between the primary and secondary. As we have already seen, there is some confliction between the requirements of stage gain on the one hand and selectivity upon the other. With the H.F. transformer the tuned circuit can be constructed with full regard to circuit efficiency, and the degree of coupling between primary and secondary can be made the key to solve the question of compromising with the valve impedance. Very roughly (because there could not be 100 per cent flux linkage between primary and secondary), the effective load in the anode circuit will be R_d/T^2 where R_d is the dynamic resistance of the tuned circuit, and T is the ratio of secondary to primary turns. The damping effect of the valve will be approximately equivalent to that of shunting the tuned circuit with a resistance of T^2R_a , where R_a is the valve impedance.

Another advantage of the H.F. transformer is represented by the fact that it

gives no risk of hum voltage transfer in a mains receiver.

Against it may possibly be counted the necessity of having to have primary as well as secondary wave-range switching.

It will be understood that for any given H.F. valve, and any given value of secondary dynamic resistance, there is actually an optimum value for the mutual inductance between the windings.

Variable-mu

The non-variable-mu types of S.G. and H.F. pentode valves have been largely superseded for H.F. amplification by the variable-mu types, although the non-variable-mu H.F. pentode still figures prominently as a detector.

The non-variable-mu valve has a comparatively rapid cut off at the lower end of the anode-current/grid-volts characteristic. As a consequence, rectification is very liable to occur unless the H.F. signal input is severely limited in value. Now, rectification in an H.F. stage gives rise to most undesirable effects. One of these is "cross modulation." If an H.F. stage is tuned to a wanted signal, but oscillations of an unwanted signal are also present in its tuned circuits, the rectification process may lead to the unwanted signal modulating the wanted signal oscillations. Once this happens the unwanted signal will work its way through the receiver "sitting on top of the wanted signal," so to speak, and what is unfortunately the case, no amount of H.F. circuit selectivity after the cross-modulating valve will remove the interference.

The variable-mu valve has an anode-current/grid-volts characteristic which tails off very gradually with increasing negative grid potential. The slow change of slope minimises risk of curvature rectification, and the variable-mu valve gives the freedom from cross modulation which is essential on modern standards.

The use of variable-mu valves is necessary for A.V.C. operation, but also makes the incorporation of a manually operated H.F. volume control a convenient matter. H.F. volume control with a non-variable-mu valve is rather a problem. Control by grid bias is not satisfactory because the cut-off is too sharp, and cross modulation tendencies are bad enough without any

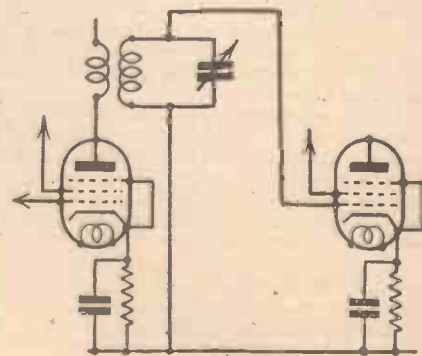


Fig. 49.—This is the direct fed transformer coupling.

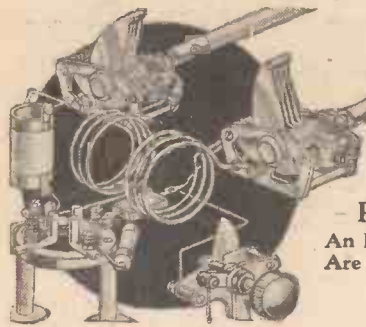
deliberate trespassing upon the lower bend of the curve. Control by screen volts has the disadvantage that reduction of voltage increases the characteristic's curvature, and gives greater risk of cross modulation. With the variable-mu valve, however, volume control by variation of grid bias is entirely satisfactory.

(To be continued)

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Short Wave Section

REFLECTOR AERIAL SYSTEMS

An Explanation of the Special Short-wave Aerials Which Are of the Greatest Advantage in Increasing Signal Strength in a Given Direction.

By W. J. DELANEY

THE reflector or beam aerial is of the greatest use to the transmitter, and those readers who are on the air will no doubt have experimented with this type of aerial and have found its advantages in obtaining maximum radiation in a given direction with the minimum of power in the aerial. But it is not only for transmitting that this type of aerial proves its worth. The user of a receiver—either for broadcast or for the short wavelengths—will very often find that the erection of a reflector aerial system will enable signals to be received at greater strength than otherwise, and also may result in a reduction of outside interference, or, in other words, a greater signal-to-noise ratio. It must be mentioned here, however, that the directional properties of this type of aerial are not so marked on the medium waves, although experiments at my particular location show that there is definitely an increase in signal strength when a reflector is employed. More of this will be dealt with later.

Principles of the Reflector

The principles upon which the reflector aerial is designed are really quite simple, and in the crudest form a reflector consists merely of a duplicate aerial erected in such a position that the aerial proper is situated in a line between the reflector and the station which it is desired to receive. Fig. 1 shows this in a plan view, where the aerial and reflector are indicated as vertical wires or rods. In the most advanced form, a reflector may consist of a number of wires or rods arranged in various patterns round the aerial, and the particular type of aerial to use will depend upon the wavelength upon which the signal is radiated, the location at which it is being received, and the amount of interference which is to be cut out. Thus, for the reception of television, for instance, maximum signal strength would be required on the television wavelength, and provided that there is no interference-producing apparatus in the vicinity a single reflector will suffice. In this connection also, it is important that the receiving aerial shall be polarised, or erected so that it is in the same plane as the transmitting aerial. For the present television transmissions, for instance, a vertical

transmitting aerial is employed, and consequently the receiving aerial must also be in a vertical plane and the reflector or reflectors must be vertically arranged behind it.

Various Assemblies

Thus we see that the first consideration in erecting a reflector aerial is to ascertain the direction from which the signal is arriving at the receiving location, and then to ascertain the source of any interference which may exist. If the latter is spread over a wide region, the reflector may have to be extended so that the aerial is inside

vision signals, it may be made a permanency.

The first consideration is to erect the aerial and this may be of the single type or a dipole. The latter is, of course, a wire or rod having a total length which is one half of the wavelength being received. It is not restricted to that wavelength, however, and acts quite efficiently over a wide band, maximum signal strength being obtained at harmonics of the wavelength as has already been explained in other articles in these pages. The dipole may be split into two sections, each one quarter of a wavelength, and a twin feeder taken from the

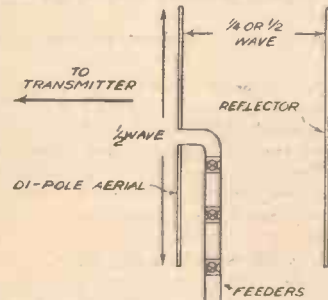


Fig. 3.—Leading proportions for a simple reflector aerial system.



Fig. 2.—This illustration shows a commercial beam or reflector transmitting aerial and clearly indicates the method of assembly.

centre point. The reflector will, however, not be split but will be a continuous wire or rod half a wavelength long as in the case of the first type of aerial. Should it be necessary to erect more than one reflector, then each must be identical in length and the only difficult point to arrive at is the spacing between reflector or reflectors and the aerial, and also between individual reflectors.

Reflector Spacing

The transmitter is favoured in designing his reflector aerial as he can arrange for listeners to measure field strengths over different distances and in different directions and find the best arrangement for his particular situation. The listener is not so fortunate, although if a suitable signal-strength measuring apparatus is to hand, he can rig up different arrays and ascertain the improvement on a given station—always taking into account, of course, the fact that a distant station may fade, and that signal strength may vary from day to day, especially on the shorter wavelengths. In the case

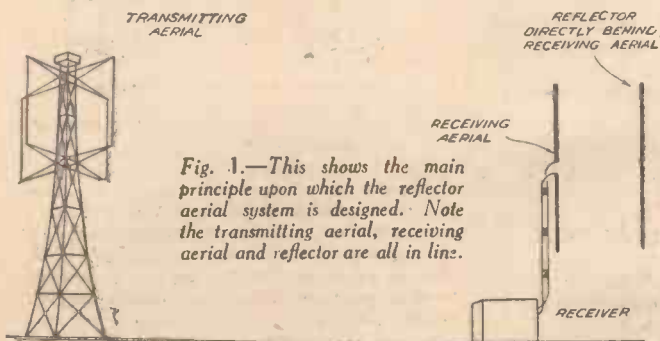


Fig. 1.—This shows the main principle upon which the reflector aerial system is designed. Note the transmitting aerial, receiving aerial and reflector are all in line.

it—except for a space in the direction of the transmitter. This indicates that for general purposes, the aerial array will have to be mounted on some form of rotatable table so that it may be directed to the required transmitter, although if it is to be used only for the tele-

of the television signals, however, a fixed station is available for experimental purposes. For measuring the signal strength, the simplest arrangement is to include an ordinary millimeter in the detector stage and to note the needle deflection when the station is tuned in. Alternatively, the new Bulgin Neon signal strength indicator may be connected to the output valve and used for the purpose. In most cases it will be found that the reflector will give best results on a receiving aerial when it is arranged as far behind the aerial as the length of the aerial. Thus, if the aerial is 5ft. in length, a 5ft. reflector would be arranged 5ft. to the rear of the

(Continued on next page.)

SHORT-WAVE SECTION

(Continued from previous page.)

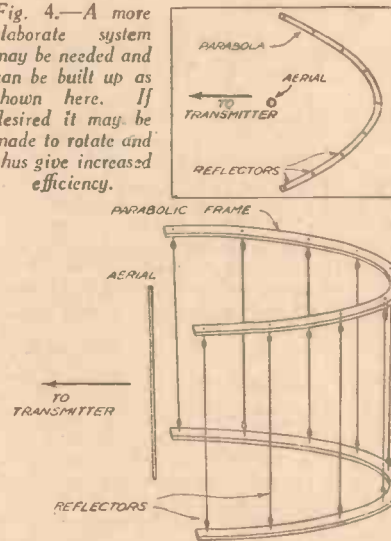
aerial. In some cases it should be only one quarter of the wavelength behind—that is, a dipole aerial 5ft. in length would need a 5ft. reflector arranged 1ft. 3in. behind the aerial. If a number of reflectors are to be used they may be mounted on a light wooden framework and the positions first planned with the framework on the ground. Tests indicate that the parabola is the best form of multi-reflector, and the shape must be very carefully plotted before the supporting wooden strips are fitted together. Tests on the television signals in my case show that the parabola gives no increase over a single reflector, but there is a remarkable reduction in the background noise which is received when a parabola is employed. Furthermore, using an aerial for this particular signal made from copper tubing, and with reflectors made from tubing and also from ordinary 7/22 copper wire, there is no noticeable difference, and the wire is lighter and cheaper.

Broadcast Band Experiments

On the ordinary broadcast band experiments were conducted with the "No-

Mast" aerials, and it was found that the North Regional station could be received at nearly twice the normal volume when a

Fig. 4.—A more elaborate system may be needed and can be built up as shown here. If desired it may be made to rotate and thus give increased efficiency.



second No-mast aerial was erected about 10ft. from the receiving aerial—actually each aerial being supported on a separate chimney stack. The reflector was not, of course, connected to the receiver or allowed to come into contact with the aerial, and the signal faded as soon as the additional aerial was lowered. The effect is enhanced in my particular case owing to the fact that there is a very high bank or rise in the ground at the bottom of the garden and this obviously acts as a considerable screen—the ground at the top of the bank being above the level of the roof.

Reports from readers show that the reflector is definitely worth while on the short waves, and we should be glad to receive details from readers who have carried out experiments with this type of aerial and, if possible, measurements of the aerial, reflector(s) and distances which have been employed in the separation.

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Leaves from a Short-wave Log

U.S.A. Broadcasters Seek New Channels

WIXAL, Boston (Mass.), W9XF Chicago (Ill.), and W2XAD, Schenectady (N.Y.), have applied to the Federal Communications Commission for the temporary use of four channels so far reserved by the U.S.A. Government for the establishment of a Pan-American short-wave broadcasting service. The frequencies desired are: 9.55 mc/s (31.41 m.); 11.73 mc/s (25.58 m.); 15.13 mc/s (19.83 m.) and 21.5 mc/s (13.95 m.), the first and the last of these being those on which W2XAD wishes to carry out experimental transmission. All four channels are also wanted by WIXAL (Boston) and W9XF (Chicago). W2XAD has also filed an application for authority to increase its power to 100 kilowatts, and W9XF is also asking permission to use 50 kilowatts.

Yua, Belgrade Regularly Logged

On almost any evening it is now possible to pick up programmes from Belgrade (Yugoslavia) through the 1.5 kW short-wave station working on 49.18 m. (6.1 mc/s). The daily schedule is as follows: G.M.T. 07.10, gramophone records; 13.15-14.30, news and concert; 19.15-23.30, news, vocal and instrumental concert. The call is: *Orde Radio Beograd* (phon.: *Bay-owe-grad*), and the interval signal a musical box rendering of an old Serbian folk-song. Announcements are made in several European languages by a woman.

Another Mystery Station?

Has any reader picked up a transmission recently from Bucarest on about 31 m.? The address given by the announcer is: *Institut d'Electricité, Victor Emanuelstrasse, Bucarest (Romania)*, but no call-letters have been heard.

Proposed New Brazilian High-power Station

It is stated that a new short-wave station is to be erected in the immediate vicinity of

Rio de Janeiro (Brazil) for the sole purpose of broadcasting Roman Catholic sacred services and radio entertainments. One report mentions that the studio still style itself: *Radio Vera Cruz* (?).

Monte Video on the Air

Many listeners report the reception of strong signals from CXA4, Monte Video (Uruguay), operating on 48.98 m. (6.125 mc/s). The station relays its main programmes from the CX6 medium-wave transmitter in the capital from G.M.T. 13.00-17.00, and again from 19.00-03.00. The call would appear to be *Estacion Oficial de Monte Video* (phon.: *Montay Vee-day-owe*).

The Javanese Stations Heard in Europe

The recent relay by the B.B.C. of a Javanese concert from the Netherlands East Indies prompted the writer to search for the various short-wave channels on which the programme was broadcast. The following stations were logged: PLQ (Bandoeng), 28.09 m. (10.68 mc/s); YDC, Batavia, 19.8 m. (15.15 mc/s); PLP, Bandoeng, 27.27 m. (11 mc/s); PMN, Bandoeng, 29.24 m. (10.26 mc/s); PMH, Bandoeng, 44.64 m. (6.72 mc/s); PLV,

Bandoeng, 31.86 m. (9.415 mc/s), and PLG Bandoeng, on 18.8 m. (15.96 mc/s).

Warsaw on Two Wavelengths

For its special transmissions in the English language to the U.S.A., Warsaw uses for its late broadcasts 26.01 m. (11.535 mc/s), in addition to the regular channel of 22 m. (13.653 mc/s).

Try for China on 30 m. Band

Readers have reported the reception of war news bulletins in the English language from Nanking through XGOX, now working on 30.61 m. (9.8 mc/s).

Nationalist Stations in Spain

The short-wave transmitters at the disposal of the Spanish "Franco," or Nationalist Government, have been increased in number. Those operating daily are: Radio Castilla (Burgos) on 48 m. (6.25 mc/s); Falange Española No. 1 (Valladolid), 42.83 m. (7.006 mc/s); Radio Requete (Durango) on 42.26 m. (7.099 mc/s) and 41.5 m. (7.21 mc/s); Radio Jaca (Jaca), 41.8 m. (7.177 mc/s); Radio Requete (San Sebastian), 41.65 m. (7.203 mc/s); Radio Nacional, Salamanca, 41.5 m. (7.229 mc/s); Frente de Madrid (Madrid) on the same channel; Radio Requete (Toledo), 41.4 m. (7.24 mc/s) and Radio Club de Tenerife, EDR3, el Tablero, Las Palmas (Canary Isles) on 28.93 m. (10.345 mc/s), which relays the Salamanca (Radio Nacional) broadcasts.

Stand by for Canada

Canada's two new 50-kilowatt short-wave broadcasting stations, CBL, in the vicinity of Toronto, and CBF, at Montreal, were expected to be sufficiently completed to permit tests on November 1. With another station to be installed in the Prairie provinces and one on the Eastern Coast (Maritime Provinces), a complete link up of the Canadian Broadcasting Corporation chain will be achieved.

Listen for South African Tests

On 8.9 mc/s (33.71 m.) the new 22 kW transmitter at Klipheuveel (Cape Province, Union of South Africa) has been carrying out transmitting tests occasionally between G.M.T. 17.30-22.30. The broadcasts have been clearly picked up in the British Isles.

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RADIO CLUBS & SOCIETIES

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

Perth Radio Club

THE above club is making fine progress but we are very much handicapped by the lack of mains supply in our present club-rooms. However, we hope very soon to move into more suitable club-rooms. One of the club members gave a very interesting series of lectures on the "Power Supply in Modern Mains Receivers." The club was very fortunate in being able to test the 1938 W.B. Senior Speaker through the courtesy of Messrs. Whiteley Electrical Radio Co. The members were very much impressed by its very fine performance. On Monday, October 18th, two of the members demonstrated their S.W. receivers, one a 4-valve straight receiver, and the other an 0-v-1. Their respective merits and demerits formed the discussion which followed. The club will welcome new members, and enthusiasts in the district are invited to get in touch with the Sec.: Mr. R. Adams, 2, Croft Park, Craigie, Perth.

The Croydon Radio Society

NO one of the Croydon Radio Society misses a member's lecture if he can help it, and such an occasion was Tuesday, October 26th, in St. Peter's Hall, Ledbury Road, South Croydon. The lecturer was the hon. secretary, Mr. L. F. Marshall, speaking and demonstrating on: "Making Electrical Measurements." He first dealt with five effects of an electric current, namely, the physiological, electrostatic, chemical, magnetic and heating. After giving typical and varied examples of each, he went on to remind members of the meaning of resistance, currents and volts, including rather necessary definition.

Very interesting, also, was his description of commercial measuring instruments. There was, for instance, the hot wire ammeter, using the thermal effect of electricity. Then there was the moving coil ammeter, very sensitive, had a uniform scale, but could only be used on D.C. Other types and their uses included moving iron instruments, and Mr. Marshall even found time for mention of the use of the Westinghouse metal rectifier in instruments. The loudspeaker night is on Tuesday, November 16th, and PRACTICAL AND AMATEUR WIRELESS readers are particularly invited to bring their loudspeakers, or at least themselves, to make a very interesting evening. Hon. Publicity Sec.: E. L. Cumbers, "Maycourt," Campden Road, S. Croydon.

The Faraday Radio Society

THE above-named society has commenced its winter session and meets every Tuesday and Wednesday, at 7.45 p.m. at the Nelson L.C.C. School, Trafalgar Street, London, S.E.17.

In addition to the usual club activities, arrangements have been made with the Marconi Co., for a course of lectures concerning "Marconi's Life and Work," and embracing the whole history of radio during the past fifty years. The lectures are illustrated by means of lantern slides and original photographs, together with representative examples of Marconi's early

apparatus. Morse practice is available for both beginners and experienced operators. A hearty invitation is given to potential new members. For full particulars write to J. Payton, Hon. Secretary, at the above address.

Bradford Short-wave Club

ON Friday, October 29th, Mr. F. B. English, Radio G6AZ, lectured to the club on "Aerials." He dealt with the subject very capably, and the club were very much impressed by him.

At 8.30 p.m. on Friday, November 12th, we are holding a club social and supper, and a number of friendly amateurs from Leeds will be present. Anyone who wishes to come will be very welcome, and members of other clubs are included in this invitation. Supper will be charged for at 1s. 3d. per head. S. Fischer, Hon. Sec., "Edenbank," 10, Highfield Avenue, Idle, Bradford, Yorks.

The Exeter and District Wireless Society

AT the meeting of this society held on Monday, October 25th, Mr. R. C. Lawes, A.M.I.E.E., took as his subject for a lecture, "Direction Finding."

The latest types of apparatus were described in detail, and the lecture was made more interesting by the fact that during the last few months, Mr. Lawes has installed on ocean-going racing yachts various types of direction finders.

Mr. Lawes mentioned that he found it quite practical to navigate any sea-going craft by using radio alone, and he instanced a crossing from Fastnet Rock to the Scilly Islands, a distance of approximately 200 miles. On this particular leg of the yacht race, no stellar observations were obtained owing to thick weather, but the lighthouse on Round Island in the Scilly Islands was found with ease.

At the next meeting the lecture will be given by Mr. F. Rumball, who takes for his subject "Radio Apparatus on Moving Vehicles." Meetings are held each Monday at 3, Dix's Field, Exeter, and those interested should get in touch with the secretary, Mr. W. Ching, 9, Sivell Place, Heavitree, Exeter.

Wellingborough and District Radio and Television Society

THE fortnightly meeting of the above society was held at The Exchange Hotel, Wellingborough, on Wednesday evening, October 27th, when a lecture entitled "Television and the Cathode-ray Tube" was given by Mr. Bettridge, of Messrs. Marconiphone.

Television, said the speaker, was not quite such a new science as most people thought, and as long as 30 years ago, a mechanical system was being experimented with. Mr. Bettridge then went on to describe in detail the operation and present-day application of the cathode-ray tube in television receivers.

The president of the society, Mr. A. E. Fletcher, was in the chair, supported by the hon. sec., Mr. L. F. Parker (G5LP), and a fair attendance of members.

Edgware Short-wave Society

THE above society has held a series of very interesting meetings during October. We have also arranged a programme of field days for the winter months, at which visitors will be welcome. It is being arranged for a special 40-metre section to be active on these, and transmitting members in the locality will be searched for, if they let us know if they will be on the air on these various field days. The club meetings are well attended,

morse practice is progressing well, and members are proving quite good at speed tests. We wish to record our thanks to PRACTICAL AND AMATEUR WIRELESS for all the help it has given us since the society's beginning, and for the way it has encouraged the club spirit among its readers. Also, I wish to thank the various clubs, at home and abroad, that have written to me wishing us luck. Full particulars of membership and meetings can be obtained by writing to the hon. sec., George Yale, 40, Raeburn Road, Edgware.

Portsmouth and District Wireless and Television Society

LOUDSPEAKERS was the subject dealt with at the meeting of the above society held at their Hudson Road headquarters on Wednesday, October 27th.

A lecture and demonstration was arranged by one of the members, which included a test of a W.B. Stentorian speaker, kindly loaned by the manufacturers, and a unit of unique construction designed with the object of providing greater frequency range and output in the upper register.

Various types of reproducing equipment showing the evolution of the loudspeaker were available for inspection.

It was also announced that the G.P.O. had granted the application of the society for a full radiating licence.—Hon. Sec., F. L. MOORE, 78, Laburnum Grove, Portsmouth.

International Short-wave Club (Guernsey Chapter)

AT the weekly meeting of this club, held on Tuesday, October 19th, at 4, Well Road, the president, Mr. J. Dowding (G8DO), was in the chair, supported by the full committee and a good attendance of members.

After being shown over the president's transmitter room and studio, the members were entertained by Mr. T. de Putron (G8MF), who demonstrated his Halli-crafters Super Sky rider communications receiver. A new G.E.C. all-wave instrument, kindly submitted for test by a well-known local radio dealer, was next on the agenda. Among other activities, the club indulges in technical instruction, and morse code classes, under the direction of G8DO, are a popular feature.

All information concerning the club's programme may be obtained from the secretary, Mr. F. S. LE PAVOUX (2BTP), 8, Upper Canichers, Guernsey, C.I.

Swindon and District Short-wave Society

THE annual general meeting of this society was held on October 28th. The secretary reviewed the past year's activities and stated that it was a very successful year. The chairman, Mr. E. W. Mortimer (2BMM), congratulated the members on the sound financial position. The following officers were elected for the new financial year: Chairman, Mr. E. W. Mortimer; hon. sec., W. C. Barnes; treasurer, J. Rose; vice-chairman, P. Bailey. The president is W. W. Wakefield, Esq., M.P. vice-presidents, R. A. Hiscocks (G6LM) and E. Howell (G2HN). Arrangements are well in hand for the "Q.R.K." trophy contest, and a very active season is promised. Messrs. Whiteley have loaned one of their popular Senior model Stentorian loud-speakers for test purposes. New members are welcomed, and all communications should be addressed to the hon. sec., W. C. Barnes (2BWR), 7, Surrey Road, Swindon.

A New 40-Page Booklet—Free



This booklet gives particulars of the many opportunities open to trained men engaged in the Radio industry. It also gives full information about the specialized instruction offered by the I.C.S. This instruction includes American broadcasting as well as British wireless practice, and provides ambitious men with a thoroughly sound training.

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I.C.S. Courses do not cost more than those of other reputable schools teaching by correspondence; indeed, in some cases they cost less. An important consideration lies in the fact that all I.C.S. instruction books and special textbooks are supplied without extra charge. The students of many postal concerns have to buy the books required, that often involving an additional expenditure of several pounds.

SEND FOR OUR "RADIO" BOOKLET
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Kingsway, London, W.C.2.

THE BRITISH LONG-DISTANCE LISTENERS' CLUB

Cutting Out Interference

PROBABLY one of the greatest problems of the present-day listener is that of curing interference. Unfortunately the term "interference" may cover a multitude of different types of noise, and extends from the overlapping of two or more stations to the noises introduced (either through the aerial or through the mains) from various types of electrical equipment. To tackle inter-

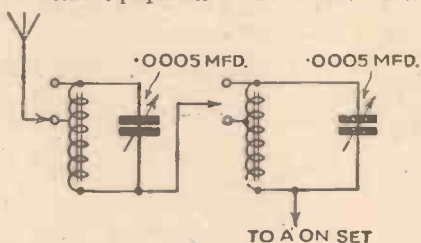


Fig. 1.—An effective double-wave-trap.

ference problems the first step is to find out what is causing the trouble, and in many cases this is a simple matter. For instance, if a receiver is being used close to a main B.B.C. station it may be found that with the receiver in use this station forms a background over quite a wide range of the tuning scale. The remedy in this case is to rearrange the aerial system so that it is at right angles, or as nearly so as possible, to the direction in which the local transmitter is situated. Where this cannot be done, or the receiver is of the very simple type, a wave-trap can be employed. In its simplest form this consists of a tuned circuit joined between the aerial and the receiver, but where the interference is very severe, or in a superhet where it introduces second-channel whistles, a more comprehensive arrangement might be found desirable. In such a case the scheme depicted in Fig. 1 may be found of the utmost value. This is a double wave-trap, utilising two modern iron-cored medium waveband coils, each tuned by a .0005 mfd. condenser and provided with tapings. The method of connecting it is shown in the diagram, and it will be found very successful in practice.

Adjustable Filters

Sometimes, whistles of varying pitch may be received on various stations, due to the actual carrier waves of the transmitters mixing before reaching the receiver, or from some cause inside the receiver, and although the former trouble has been much reduced of late, it still persists in some cases. Unfortunately, the only way to remove this is to cut off the frequency

response of the receiver at a point coinciding with the whistle. It will generally be found with the modern station separation which is permitted, that the whistle occurs at a frequency of about 9,000 cycles per second, and thus a 9,000 cycle filter will eliminate the whistle. It will also eliminate all musical frequencies at this frequency, however, and therefore to preserve good quality of reproduction it is essential that any filter which is used shall peak at that frequency.

Fig. 2 shows a comprehensive filter built to fulfil this purpose, and the three special chokes which are needed will have to be very carefully made or purchased from a reliable manufacturer. The details are clearly set out in the circuit, from which it will be seen that when not needed—such as when receiving the local station—the

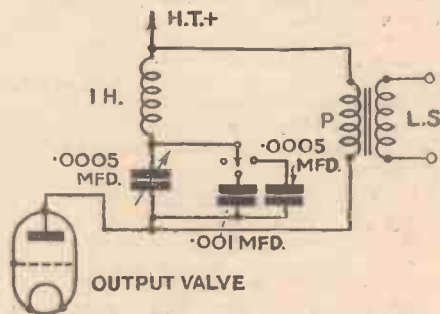


Fig. 3.—A simpler tuned filter arrangement.

filter may be eliminated by means of a simple switch.

A Simpler Arrangement

Where it is desired to fit a simpler circuit the arrangement of Fig. 3 may be adopted, and it will be seen that the variable condenser (which may be of the bakelite dielectric type) will enable the frequency response of the filter to be adjusted over a fairly wide range, and this type of filter

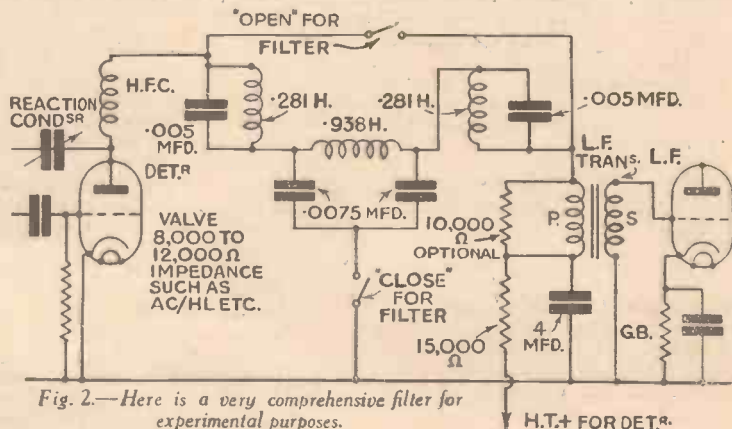


Fig. 2.—Here is a very comprehensive filter for experimental purposes.

is under control to reduce any desired type of whistle. Unfortunately, it does not peak so sharply as the Fig. 2 arrangement, and musical quality will suffer. If any members have experimented with other forms of interference preventer, we shall be glad to pass on to other members of the B.L.D.L.C. the results of their experiments.

LETTERS FROM READERS

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

Inter-room Communication

SIR,—I beg to submit a slight improvement on Mr. Westerhouse's recently-described system of inter-room communication by means of an extension loudspeaker. I think the accompanying sketch is self-explanatory. A single button on the extension speaker connects it *via* a relay to the "pick up" terminals of the set, and also switches on "L.T." When the relay is at rest, the speaker is connected to "Output" in the ordinary way. The relay consists of three sets of contacts, as shown. At the "set" end, the corresponding contacts may be arranged to be directly operated by a button, or another relay may be used. My relay is improvised from parts of an old bell, and the contacts at the main speaker are directly operated by the button. Operation consists of pressing the button and speaking, and then releasing the button and waiting for the reply.—C. J. D. FOREMAN (Ashford).

Mains-operated Valve Tester

SIR,—As a regular reader of PRACTICAL AND AMATEUR WIRELESS, I am eagerly awaiting the details of the A.C. mains-operated valve tester which was mentioned a few weeks ago. Might I suggest that the design be kept as simple as possible? An emission test obtained by causing the valve under test to act as an A.C. rectifier, together with a cathode insulation test capable of being made whilst the valve is at working temperature, would meet the needs of the majority of amateurs, more detailed tests being well left to our friends, the professional service engineers.

I hope to make up the A.C. version of the "Corona 4," but the old "Hall-Mark 4" is going so well that the difficulty is to find a convincing enough excuse for replacing it.

Best wishes for the continued success of PRACTICAL AND AMATEUR WIRELESS.—S. C. DUFFETT (Weymouth).

SIR,—As a regular yearly subscriber since the paper began, I should like to endorse the suggestion already made by several readers that you publish a constructional article on a mains-operated valve tester.

I should also like to see an article fully describing the use of the T.V.4 or similar cathode-ray tube as a balance indicator for mains-operated capacity or resistance bridges.—MAJOR A. HILTON-JOHNSON (Sandhurst, Berks).

From Prize-winners in Our Radiolympia Competition

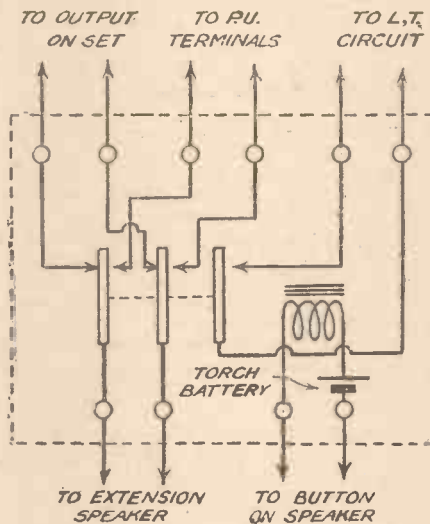
SIR,—I beg to acknowledge receipt of the W.B. Stentorian Senior Loudspeaker which I won in the recent Radiolympia Competition.

It is a very fine instrument and justifies

in every way the claims made for it by the manufacturers.

Wishing PRACTICAL AND AMATEUR WIRELESS every success.—HERBERT A. SMITH (Stanley, Perthshire).

SIR,—I received the "Stentorian" speaker in perfect condition, from the Whiteley Electrical Radio Co., Ltd., and I would like to take this opportunity to thank you for it. I am sure that the readers



Circuit diagram of Mr. C. J. D. Foreman's system of inter-room communication.

of PRACTICAL AND AMATEUR WIRELESS appreciate the very sporting way that you presented the extra loudspeakers, to cope with the runners-up in your recent competition. Once more, many thanks!—L. J. TEARNEY (Dartford, Kent).

Strange Phenomena

SIR,—Some time ago a rather strange occurrence happened with an accumulator charger of mine, which I thought might interest other readers. When I am not in England, my home is Portugal. I live about four miles outside Oporto; the voltage at our home is 220 50P. The charger is a Philips with a half-wave valve rectifier—I think it is argon filled as it glows mauve-orange. I plugged in the mains plug and joined up the accumulator, the valve glowed, showing that the accumulator was charging. When I put my hand near the rectifier, the glow vanished but the filament remained alight. On removing the hand the glow reappeared; but when I turned the mains plug round, one's hand made no difference. I took the charger to where I work, in the town of Oporto (the voltage is 110 50P). Would you believe it, but exactly the opposite happened here: unless I held my hand near the valve it refused to function! If someone can explain this, I shall be

much obliged.—ROY G. TAIT (Mundesley). [Here is an interesting problem, which other readers may like to try to solve. No prizes are offered but we shall welcome suggestions.—Ed.]

A Reader's Thanks

SIR,—I am pleased to say that I received the book forwarded to me for being successful in Problem No. 266. Many thanks for same. It is a most interesting and helpful book which, in my opinion, no wireless enthusiast should be without.

I have been a constant reader of PRACTICAL AND AMATEUR WIRELESS for over two years now and take a good deal of interest in the weekly problems, many of which I have solved correctly.—F. WALSH (Manchester).

Logged on Our Three-valve Bandspread Short-waver

SIR,—I read with very great interest the various station short-wave logs which appear each week in your excellent journal, and I enclose herewith a list of 20-metre 'phone stations I have heard on your 3-valve bandspread short-waver, published in PRACTICAL AND AMATEUR WIRELESS, September 5th, 1936.

The following stations were heard during September and October: ON4SS, ON4TN, ON4RR, F300, F3NF, F3LR, PAOFB, PAOMV, SP1DC, SP1CA, OZ5U, OZ5BW, ZB1H, ZB1L, LA1G, LA5N, VK2XU, VK4JU, VK2VB, ZU2LM, TF3P, ES5V, HB9AY, HB9CH, VE1DR, VE1AW, VO6Q, VO6M, CO6OM, NY2AE, VS2AK, FA4AI, CN8AL, CN8AM, CN8AN, VU2CQ, CT1AA, CT1AY, SU1KG, SU1SM, W9LVG, W8ANO, W8RED, W4TJ, W2IXY, and W1BLO.

Also, reports have been sent to the following who have returned their QSL cards:—

SU1SG, ON4LO, ON4UT, VE9HS, OZ3U, LA6N, HA4A, PAOMZ, SM5SI, W1IED, W2DH, W6GCT, and W8JOE.

Thanking you for such an excellent circuit and wishing your paper every success.—RONALD ROBBINS (Henley-on-Thames).

CUT THIS OUT EACH WEEK.

Do you know

—THAT care has to be taken in the design of a frequency-changer for use on 10 metres and below.

—THAT standard superhet circuit arrangements may not be found suitable for the ultra-short wavelengths.

—THAT the anode by-pass condenser normally used in a detector stage may be omitted on the short waves.

—THAT two or more loudspeakers may be used to improve the balance of reproduction, but they must be connected in phase.

—THAT when using such reproducing systems, a special tone filter is desirable to pass the high notes or upper frequencies to the speaker which gives the better high note response.

—THAT earth tubes or plates should be of copper or other low resistance metal.

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

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

ELECTRADIX

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RELAYS. For tiny currents from light cells or for radio circuit. Moving Coil pivoted, work on 50 microamps. Half usual price, 60/- Also max. iron telephone type high or low res. coils, 8/6. 25-way Auto Selector 6-ring relays 10/-. Heavier contact relays for Transmitters, American 7/6. Sounder type 15/-. Creed polarised 2-way 30/- Ship magnetic 16/-.
MIKE A.C. Mains Amplifiers of famous make, complete with rectifier valves 305 and AC 84 brand, new and ready for use. 11ma free, sound-recorder quality, (level response, in steel case, 8" x 8" x 7"). List 4/12, but for sale at the price of a kit. **60/-**
 Battery 1 valve model in oak case, 25/-

NEW J.E.D. Outfit, 6-watt Amplifier and Transverse Mike on Stand, fine 3-stage unused set, bargain, £13/10/0. Larger set by Ardenite, fine job, 20 watts pure output, A.C. mains, £18.
DEAF AIDS. Equal to ten guinea sets. Midgott carpiece, lapel mike etc., 42/-. Popular set with watch carpiece, 18/6. Brown's Aural Box, scientific sound amplifier for severe cases, £4. For total cases bone conduction is the only possible way to receive radio by the Osipsonne no bigger than an earpiece, 20/-.

DIX-MIPANTA VEST POCKET TESTER. A wonderfully versatile moving-iron multirange meter for service on A.C. or D.C. jobs. No projecting terminals. THREE ranges of volts: 0-7.5, 0-150, 0-3000. Used for MILLIAMMETS reads 121 ma. and 75 ma. In black bakelite case. Measures only 2 1/2 in. by 2 1/2 in., with pair of test leads and plugs. Leaflet "N" gives full information. **19/6**



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Electric HIGH set has ball bearing centre gear box and gearless traverse rod. Ret. with Tracking Gear, Pick-up and Tone-arm fitted diamond, **37/6**. For gramophones requiring rear only, less Pick-up and Tone-arm: 25/- is 21/6. Diamond Cutter Needles, 8/- all pick-ups, 7/6. Blank Discs, 14/- dozen. Complete Acoustic Sets do Luxe, 15/-; No. 2, 13/6. Junior type, 5/6 each complete.



STEEL CABINETS for Transmitters, Amplifiers or Televisors. One size, 24 in. x 42 in. high. Welded steel frame, sheet steel sides, hinged front door with grille. Worth 25. Few at 57/6 each.

ABARGAIN IN DYNAMOS. Type "C." Our latest for Bungalow, Yacht, or Cell Charging, 140 watt. Enclosed Dynamo, 19.50 v. 18 amp. Ball Bearings, Vee Pulley, 25/-.

Marine Type Switchboard with Ammeter, maximum Auto Cutout Mains Switch and Fuse, Field Regulator, 25/-.
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 PRACTICAL AND AMATEUR WIRELESS.
 13/11/37.

BELLING-LEE VALVE-HOLDER

We have received the following letter from Messrs. Belling & Lee, concerning the high-voltage valveholder which was reviewed last week:—

WARNING.

"SIR,
 "We recently sent you a sample of our new high voltage valveholder, stating that it was suitable for 11,000 volt peaks from sockets to chassis. A doubt has arisen as to whether this is strictly true under all the conditions likely to exist in a television receiver, such as moisture before the set warms up and dust attracted electrostatically. Our original calculations and tests were on new mouldings under favourable conditions, when the air gaps and creepage paths are probably adequate against breakdown, though in common with many other television components, these distances are considerably less than B.S.S.415 recommendations.

"A television engineer has now called our attention to the fact that whilst our design does not 'flash over,' it does exhibit corona which can be seen round the sockets if tested in the dark at 11,000 volts. This may in time lead to 'tracking,' and breakdown of the bakelite, and may also lead to damage of rubber in the set by ozone.

"Careful tests are now being carried out in our own and other laboratories to ascertain the seriousness of this corona and at what voltage it starts and what change in design is needed.

"In the meantime, we have hastened to send this letter to all designers to warn them to carry out thorough tests before incorporating this valveholder in 11,000 volt positions in their sets. Incidentally, we hear that exactly the same phenomenon is sometimes occurring in practice with other television insulators, such as C.R.O. tube bases!"

AN A.C.-D.C. ONE-VALVE REFLEX PORTABLE

(Continued from page 243.)

Remember that the chassis is alive, and be careful not to touch it when the set is switched on. If severe hum is experienced on A.C. mains, reverse the mains plug.

In the case of D.C. mains, if signals are not heard after switching on, it indicates that the set is not receiving H.T., and the mains plug must be reversed. It is essential where the receiver is used on D.C. mains to insert a small condenser (a value of .002 mfd. is suitable) in the aerial lead. It should be joined between the aerial socket and pin 2 of the valveholder, the existing wire, of course, being removed. This is necessary in case the mains plug is inserted the wrong way round, in which case, without the condenser in the aerial lead, the Westector would be damaged. The same remarks would apply should the aerial be earthed.

It will be noted that an H.F. choke is shown in the diagrams and is not included in the List of Components. This com-

REPLIES IN BRIEF

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

A. G. S. (Edinburgh). We do not favour the frequency-changing method indicated in your sketch. It would probably be preferable to use a standard electron-coupled oscillator.

J. G. R. (East Horsley). Any good printer would run you off cards to your own requirements, or you could find a firm who specialises in this type of work by writing to the Radio Society of Great Britain.

N. S. (Mansfield). The receiver in question utilises 6-pin coils and these are to be preferred. You could, of course, use 4-pin components, but they are not so flexible.

E. H. M. (Bournemouth). It is not possible to offer an explanation of the peculiar behaviour without a diagram of the circuit you used.

R. H. P. B. (N. 16). The speaker you mention should work satisfactorily, although you may find that a modern component will provide better results. Temporarily, however, there is no reason why you should not retain your present speaker.

E. M. (Manchester, 15). The set was not designed by us and we cannot therefore suggest modifications. Write to the paper which published the design.

A. W. (Everton, Liverpool). We suggest you write to the makers of your receiver and they may be able to supply you with a blueprint or other details. We do not publish blueprints of commercial receivers.

H. A. T. (Brighton). We are not familiar with the component number you mention, nor with the circuit of the receiver. We suggest you write direct to Philco regarding the replacement. The address is Wadsworth Road, Perivale.

F. E. B. (Rochester). It would appear that the insulation has broken down, but there may be some other more obscure cause for the trouble and a careful examination is indicated.

D. A. C. D. (Buckland). The H.T. applied to the output valve will be excessive, and a further resistance should be included in the H.T. positive main lead. This will necessitate a further reduction in the decoupling resistance values for the early stages. Alternatively, you can use a higher resistance smoothing choke.

D. L. (Devonport). The distortion is no doubt due to the fact that the valves in the second set are overloaded. Use a 1 to 1 transformer to couple the two, and a volume control will have to be employed.

O. A. D. (N.W. 11). The Morse codelets given in several of our publications, but we do not publish a book which gives details from which you could practise telegraphy, etc. Learn the Morse code and then obtain practice at speed by sending to a friend and getting him to send to you through a small buzzer or oscillator circuit.

ponent is home-made and is constructed from a small bobbin of ebonite or other insulating material having a half-inch centre. Round this is wound about 500 turns of any fine-gauge wire—neither the number of turns nor the gauge are critical, but to accommodate the wire in a convenient space something about 36-gauge enamelled will be found desirable.

When mounting the receiver in a cabinet, care should be taken to provide adequate ventilation for the heat dissipated by the heater resistance and valve. It is also a good plan to mount the cabinet on short legs (1 in. long will be sufficient) and to drill a series of holes in the bottom of the cabinet underneath the rectifier. The rectifier itself is not delivering its full rated output, and in the normal course of events should not get warm at all. This extra ventilation at the bottom is just an extra precaution.

There are few components, and all of them combine cheapness, compactness and reliability, so that there is really nothing to go wrong. It is cheap and simple to build, and simple to operate.

NEW PUSH PULL TRANSFORMERS

- DP 49 Parallel Feed Input Ratio 1 : 5
- DP 46 Output Ratios 20 : 1 and 40 : 1
- DP 47 " " 25 : 1 and 50 : 1
- DP 48 " " 34 : 1 and 68 : 1

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Impressions on the Wax

Parlophone

TWO remarkable records are released by the Parlophone Company this month, both of which come under the heading of their historical series. The first, *Parlophone PO 69*, introduces famous voices of the past. On one side is "Don Giovanni" (Champagne Aria), sung in Italian by Francesco D'Andrade, with orchestral accompaniment, and on the reverse is "The Barber of Seville" (Slander Song), sung in Italian by Adama Didur. Both of these were acoustically recorded in 1908.

The other record, *Parlophone PO 60*, introduces famous instrumentalists of the past. Featured on the disc are the "Norwegian Bridal March," played by Edvard Grieg; and "The Two Larks," played by Theodor Leschetizky. These were electrically transferred from a Welte music roll.

Richard Tauber has chosen two popular melodies for his latest record, *Parlophone RO 20346*. They are "One Night of Love" and that evergreen favourite "Love's Old Sweet Song," both of which he sings in English.

Herbert E. Groh, the popular tenor, appears in the classic series with two songs in German—"To-day is the Day" and "Wine Waltz"—on *Parlophone 2340*.

Popular Artists

VICTOR SILVESTER and his Orchestra have made a new Paul Jones record on *Parlophone E 11399*. It is in two parts and introduces a number of old favourites played in strict dance tempo with no vocals.

Harry Roy and his Orchestra have recorded a medley of popular tunes on *Parlophone F 915* and *F 932* under the heading of "Harry Roy Stage Show." It is in four parts and was recorded at their actual performance at the Garrick Theatre, Southport.

Leslie A. Hutchinson, better known as "Hutch," has made three new records this month. First we have "Singing for You" and "Paris is not the Same," on *Parlophone F 915*, followed by "That Old Feeling" and "Whiskers in the Dark," on *Parlophone F 916*, and finally "Stardust on the Moon" and "Good Night to You All" on *Parlophone F 917*. The last tune was used by "Hutch" as his signing off tune during his recent broadcast.

Harold Ramsey, at the Wurlitzer organ, has recorded a medley of famous marches on both sides of *Parlophone F 925*, and Patricia Rossborough, the popular syncopated pianist, has made a "Gangway" selection and "Going Greek" selection on *Parlophone F 926*.

Decca

THERE are several records published this month of unusual interest in their permanent music series. Of these, the first recorded performance of

the "Dohnanyi Symphonische Minueten," one of the first works by the famous Hungarian composer, appears on *Decca X 190-X 191*. It is presented by Sir Henry Wood and the Queen's Hall Orchestra, with George Stratton as leader. The Dohnanyi is full of fine tunes and is a miniature symphony in four short movements of roughly equal length.

I cordially recommend the Ambrose version of two of the best tunes from the Leslie Henson show "Going Greek," on *Decca F 6483*. "A Little Co-operation from You" will, I think, be a lasting "hit," and perhaps provide a family song for Christmas. I also like the quickstep on *Decca F 4684*, "Oh, They're Tough"—a most amusing number.

The Street Singer (Arthur Tracy) has recorded that popular tune "Shako Hands with a Millionaire," coupled with "Let Us Be Sweethearts Over Again," on *Decca F 6495*, and Lilli Palmer makes her first Decca record with "Sunset in Vienna," and "We'll Never Run Short of Love," on *Decca F 6500*. Both these tunes are taken from her new film "Vienna Sunset," which will be generally shown shortly.

Brunswick

CONNIE BOSWELL makes a welcome return on *Brunswick 02474* with "Yours and Mine" and "That Old Feeling."

Teddy Grace is the outstanding singer of Mal Hallet's Orchestra, and she presents her first two solos, "Dispossessed by You" and "Rock it for Me" on *Brunswick 02475*, with rhythm and clarinet providing a background that is excellent for dancing.

Judy Gurland, the fourteen-years-old youngster introduced on *Brunswick* last year, is one of the biggest hits in the new film "Broadway Melody of 1938." She has recorded the hit tune of the film, "Everybody Sing," on *Brunswick 02478*. On the reverse she sings "All God's Chillun Got Rhythm," a swing tune from the film "A Day at the Races."

Rex

THE popular Lancashire comedienne, Gracie Fields, has made a first-rate recording of two very popular tunes of the moment—"The Greatest Mistake of My Life" and "It Looks Like Rain in Cherry Blossom Lane," on *Rex 9140*.

"A Sailor's Life," a naval fantasia on *Rex 9145*, is a splendid souvenir of the Brass Band Festival, held at Alexandra Palace, London, in September of this year. Three famous bands take part, conducted by Denis Wright, who is one of the leaders of the brass-band movement.

Reginald Dixon, Blackpool's versatile organist, records "Dixon Hits No. 16," on *Rex 9148*, and Morton Downey, the popular American artist, has recorded "You Needn't Have Kept It a Secret" and "Good Night to You All," on *Rex 9144*.

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1937 Crystal Receiver	9.1.37	PW71		
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One-Valve: Blueprint, 1s.				
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Leader Three (SG, D, Pow)	22.5.37	PW35		
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F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35	PW49		
Genet Midget (D, 2LF (Trans))	June '35	PM1		
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51		
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53		
Battery All-Wave Three (D, 2 LF (RC))		PW55		
The Monitor (HF Pen, D, Pen)		PW61		
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62		
The Centaur Three (SG, D, P)	14.8.37	PW64		
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	29.8.36	PW66		
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69		
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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)		PW40		
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	20.9.36	PW67		
All-Wave "Corona" 4 (HF Pen, D, LF, Pow.)	9.10.37	PW70		
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D.C. Ace (SG, D, Pen)		PW25		
A.C. Three (SG, D, Pen)		PW29		
A.C. Leader (HF Pen, D, Pow)	7.4.34	PW35C		
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B		
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A		
Armada Mains Three (HF Pen, D, Pen)		PW38		
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50		
"All-Wave" A.C. Three (D, 2LF (RC))	17.8.35	PW54		
A.C. 1936 Sonotone (HF Pen, H.F. Pen, Westector, Pen)		PW56		
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70		
All-World Ace (HF Pen, D, Pen)	28.8.37	PW80		
Four-valve: Blueprints, 1s. each				
A.C. Fury Four (SG, SG, D, Pen)		PW20		
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D		
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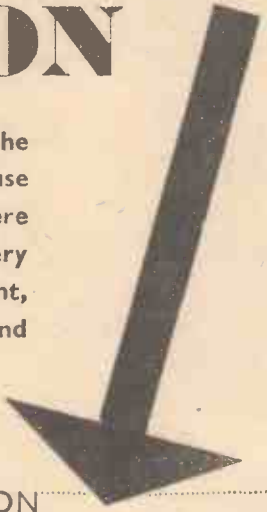
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Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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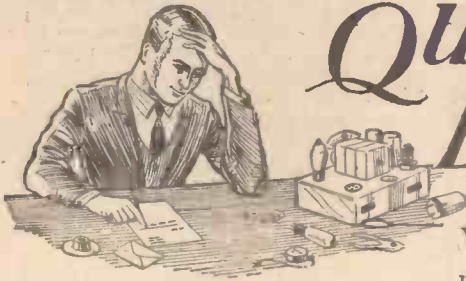
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IN THE DECEMBER

AIR STORIES



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QUERIES and ENQUIRIES

let me have the back numbers, which I will pay for."—A. G. C. (Northwood).

WE are not clear as to the exact type of instrument you require. It is possible to fit a microphone to any musical instrument and feed the output from the microphone through a standard valve amplifier in order to amplify the sound. Alternatively a stringed instrument may have the bridge carrying the strings in contact with the diaphragm of a microphone or gramophone pick-up to provide amplification. A more up-to-date idea is to fit small electro-magnets near the strings and to feed the output from these to an amplifier. Another instrument, and the one to which you may refer, utilises the oscillation produced by valves as the medium for producing a sound from the loudspeaker, and by varying the pitch of the oscillation, you alter the tone of the note produced. A reacting detector valve

Component Colour Codes

"I have been given a number of odd components by a wireless enthusiast and I cannot identify several of them. For instance, there are two electrolytic condensers, with no names but with coloured leads from the lower end. Two are red and one black. Is it possible to tell what these are? Also, a mains transformer which has no marking, but all the leads are different colours. Is there any publication which will explain to me what each of these is, and how I can identify other parts which I have got?"—I. U. A. (Newhaven).

UNFORTUNATELY, although there is now in existence a standard of colour codes for components and wires, certain manufacturers have adopted schemes of their own in the past and it is thus difficult to say for certain just what various colours may mean. An electrolytic condenser of the type you mention, for instance, may be a double component, the two red leads being the positive connections and the black the common negative. The values cannot be identified from the leads. Similarly, although there is a standard for identifying transformer leads yours may not conform to the standard and the best plan is to have it put on test by a good dealer who has instruments which would enable the output voltages and currents to be measured.

Home Recording Blanks

"In your issue of October 16th you state in connection with home recording, that record blanks can easily be obtained. I find difficulty, however, in finding a firm that deals in them. If you would be good enough to suggest a likely address I should be greatly obliged."—H. A. C. (Stamford).

THERE are two main types of record blank for home-recording processes—the aluminium and the plastic. The former may be obtained from Electradix Radios of 218, Upper Thames Street, E.C.4. The latter is available in several different patterns, some of which have to be treated after recording, either with a liquid or by heat treatment. The simplest for you will no doubt be the Simplat process, blanks for which may be obtained from the V.G. Manufacturing Co., Ltd., Gorst Road, London, N.W.10.

Musical Instruments

"Did you give in any of your back numbers instructions for making a musical instrument with valves, probably two years ago? I should be very grateful if you could

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

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

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

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

followed by an L.F. amplifier may be employed, with a metal rod connected to the grid terminal of the detector valve. By placing the hand near the rod the note will be varied and tunes may be played. This is the fundamental principle of the Theremin instrument.

Getting America

"Can you tell me which of your blueprint receivers will fetch in America and the amateurs at fair strength through headphones, and yet be cheap to build?"—G. W. (Northampton).

IT is impossible to guarantee that any particular receiver will produce good signals from America under all conditions. A simple single valve set may give you all the volume you require on 'phones from America one evening, and then perhaps for two or three evenings you may not hear a sound of the American stations. The

Perfect S.W. Three, blueprint, P.W. 64, may, however, be taken as a really good all-round short-waver and should give you reliable results under normal conditions, and as it utilises standard plug-in coils you can use any size of coil to receive on the wavebands you desire. This is about the best receiver we can recommend in your particular case, as it is cheap to build and economical to maintain. If you do not need three valves you can omit the output valve and connect the 'phones in the anode circuit of the second valve.

Ganging Accessories

"I am in rather a difficulty in ganging my superhet receiver. This is a commercial model and has been badly upset due to a non-technical person endeavouring to trim it. I should like to know what apparatus will be required in order to gang it correctly."—F. Y. (York).

ALTHOUGH a simple milliammeter could be included in the anode circuit of one of the valves to give an indication of the signal strength, and thereby the accuracy of the ganging, this would not be a simple process. You would need an oscillator in order to inject the intermediate frequency into the I.F. stages whilst ganging the I.F. transformers, and the oscillator section of the ganged condenser also has to be adjusted to provide this frequency. We do not know what adjustments have been upset, and consequently cannot tell you exactly what apparatus you should use.

Screened Leads

"I should like to ask some queries with regard to the screening of leads such as is often recommended in modern receivers. Take, for instance, the screening of an anode lead. Surely, the aim of the designer is to pass on energy from the anode to the next stage? If a screen is placed round the wire and the screen is earthed, it appears to me that most of the energy fed to the anode lead will leak through the screen to earth as this is of lower resistance than the H.F. transformer or choke joined in the anode lead. Perhaps you will explain where I am wrong, or where the design is wrong."—G. F. W. (S.W.1).

UP to a point, your ideas are right. But you must remember that the screening has not to be applied indiscriminately. In the case of an anode lead, for instance, the actual lead from anode to anode component is of small gauge, and is generally surrounded by some insulating material before the screening cable is applied. Thus, there is a wide space between lead and screen, and this provides adequate capacity to prevent leakage of the signals. If, of course, a thick wire is used and the screen is very close some leakage will occur.

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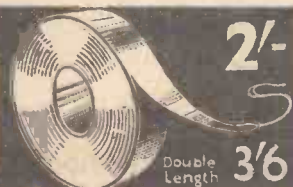
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Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplifications, neutralizations, superhet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

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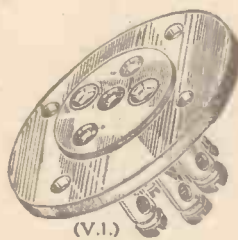
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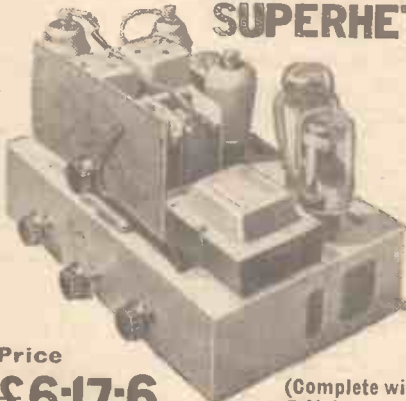
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Price

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(Complete with B.V.A. valves)

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9-VALVE FOUR-WAVE SUPERHET DE LUXE



14 GNS.

(Complete with 9 B.V.A. valves)

4 wavebands 12.8-33, 29-50, 180-550, 800-2,000 metres. Illuminated dial with principal station names.

Controls.—A feature of the receiver is the number of independent controls fitted, making it extremely interesting to operate. These include: sensitivity control (varying bias on R/F stage), or Q.A.V.C. with manual muting control for inter-station noise suppression. 5-position wave-change and gramophone switch. Progressive variable tone control operative on radio and gram. Circuit in Brief.—Aerial input to pre-selector circuit, radio frequency amplifier, latest type triode-hexode frequency changer, 2 band-pass I.F.T. coupled I.F. amplifiers, double diode detector, triode L.F. amplifier separate triode phase-changer capacity coupled to 2 large pentodes in push-pull. Heavy 16-gauge steel chassis. Finest components and workmanship throughout. Harries tetrolides in place of output pentodes if desired.

STANDARD MODEL 12 GNS. As above, but with triode push-pull output, and fewer controls fitted.

All McCarthy receivers supplied complete with valves, knobs, pilot lamps, leads, mains cable and plug. 12 months' guarantee.

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THE NEW OSRAM "INTERNATIONAL" RANGE OF VALVES

POINTS OF TECHNICAL IMPORTANCE

POINT 1.

★ THE "INTERNATIONAL" OCTAL BASE



Diagram showing self-locating feature of "International" Octal Base.

The "International" Octal base is self-locating in its socket by means of a moulded key on the base. This fits into a key-way in the socket and makes the insertion of a valve into a receiver simplicity itself—besides being "fool-proof."

It is impossible to make wrong contacts which might damage the valve, and the self-locating feature is of the greatest assistance where a valve must be fitted in an inaccessible corner of the receiver and with the sense of touch only as guidance.

In addition to the moulded key, the "International" Octal base is fitted with solid pins arranged on the circumference of a circle, the number of pins varying from five to eight, according to the type of valve.

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The "International" Octal self-locating base spells:

SIMPLICITY, SAFETY AND STANDARDISATION

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November 20th, 1937.

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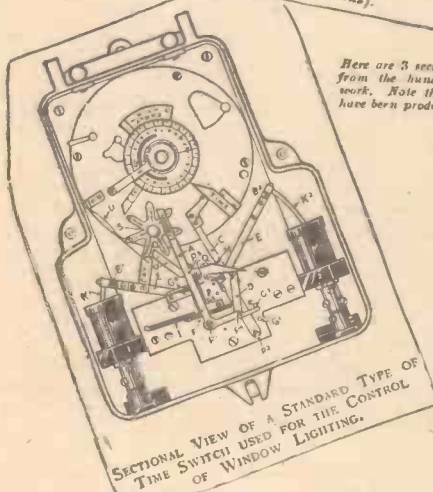
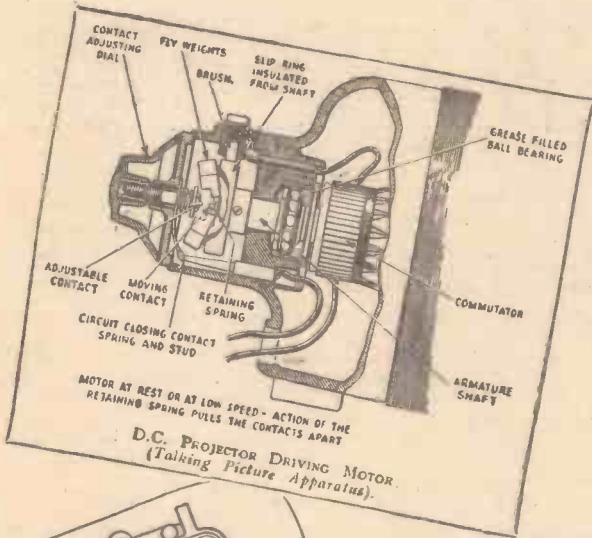
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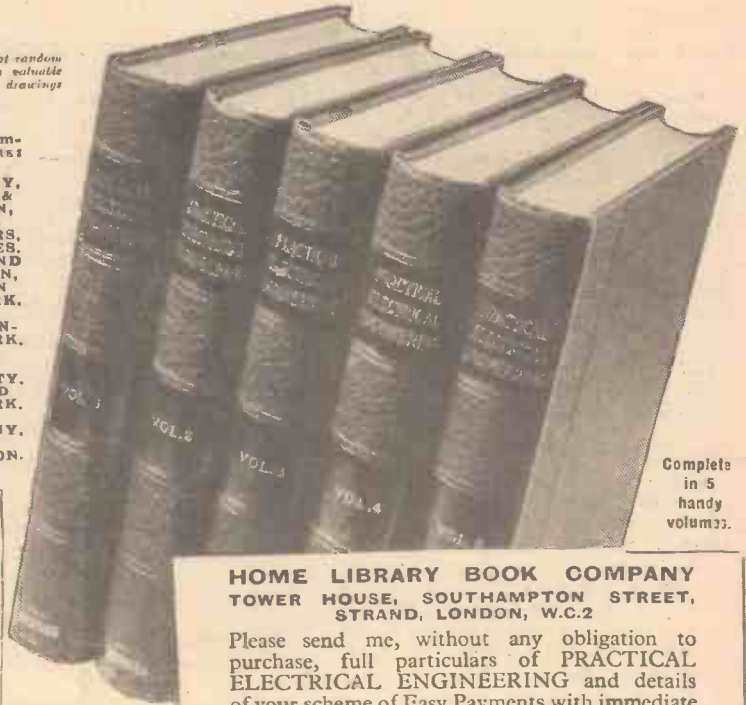
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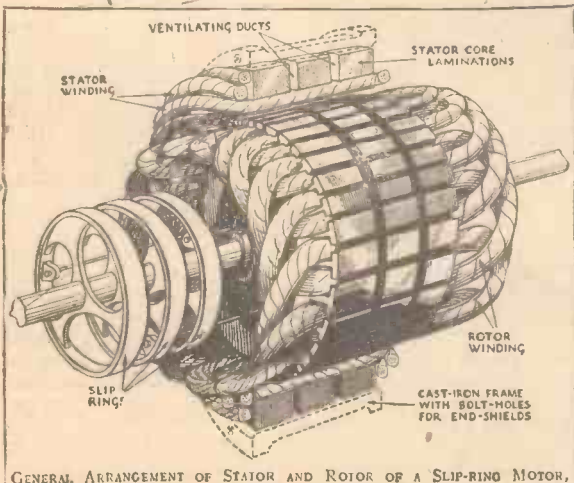
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RECORD REALISM—See page 269



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh. Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

VOL. XI. No. 270. November 20th, 1937.

ROUND *the* WORLD of WIRELESS

Car Radio Experiments

ALTHOUGH many modern cars are fitted with a radio receiver operated from the car accumulator, there are still many motorists whose cars have no such fitment and who are interested in experiments in fitting such a set. There are several different methods of incorporating wireless apparatus, and there is a wide field for experiment with regard to the various voltage supplies, the type of circuit, and the aerial. In this issue we give some interesting details by a correspondent who has spent a considerable amount of time with battery-operated apparatus and the details there given will assist others who are interested in this type of equipment. In addition, of course, the use of the vibrator type of H.T. supply will also offer scope for tests, not only with a view to obtaining a smoothed output of the required voltage, but also in the direction of eliminating interference and hum. The aerial, too, provides an interesting field of experiment, so that maximum pick-up may be obtained and fading counteracted, whilst the interference from the car electrical equipment should be kept at a minimum.

Television at Sea

IN conjunction with the Cunard-White Star Line, the Marconiphone Company recently carried out tests at sea on the *Britannic*, as a result of which good picture reception from the Alexandra Palace was found possible almost as far away as the coast of France. Good picture reception was obtained off the Nore Lightship and thirty miles south of Hastings—where the measured field strength was 100 micro-volts.

Electrical Interference

THE severe interference which has been experienced recently on the medium-wave band in certain parts of South Essex has now been traced to the machinery being employed in the Purfleet-Dartford tunnel. It is stated that the interference is at its worst on 400 metres and is being experienced at Brentwood, Southend, and Loughton, as well as in the direct vicinity of the source of operations.

Philips Broadcast

TONIGHT, Wednesday the 17th, a special broadcast will take place on 31.28 metres from the Philips experimental

station at Hilversum, from 6 p.m. to 8.30 p.m., in celebration of the tenth birthday of the station. Artists taking part will include Florence Desmond, Haver and Lee, Danny Malone, Greta Keller, Canadian Bachelors and their Hill-billy Band, and Carroll Gibbons and the full Savoy Orpheans Orchestra, who will conclude the programme with a half-hour of dance music.

Television by Wire

FURTHER experiments in Germany have shown that the radiation of television along existing wires may lead to some important developments. The frequencies dealt with are being improved upon, and apart from the linking of stations, there is the possibility of providing domestic television over the existing telephone wire system.

Police Radio

DETAILS are now available concerning the pocket radio apparatus used by the Brighton police. The receiver is a two-valver operated by batteries and connected to a single earphone. The total weight is under two pounds, and a bell is mounted on the earphone to provide warning when a message is to be received. The range is from six to seven miles.

Children's Variety

REGIONAL listeners who tune in to the Children's Hour on November 25th will hear a special programme by North Regional children, including poems and a story written by children.

Origin of Names

STUDENTS of history will be interested in a series of weekly talks to be given from Northern Ireland commencing on November 26th, by Michael O'Brien, M.A., Ph.D., Lecturer in Celtic at Queen's University. These talks will show that although Latin, Norse, Norman, French and other languages have influenced Ulster place names, the Celtic influence is the strongest.

Adapting Accumulator Cases

THE Exide Company from time to time receive interesting details of the use to which discarded accumulators are put, and amongst these is the value of the glass containers of the larger types of cell. These have been used for aquaria and similar purposes, and the latest item comes from the Bihar College of Engineering, Patna, where a large case has been fitted with a 100-watt lamp, two-thirds filled with water, over which a layer of paraffin is poured. This forms a perfect insect trap—the average depth of the mass of flies caught in a single night being 4½ in. in a case measuring approximately 7½ in. square.

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"Organestra"

ON November 19th a novel programme is to be broadcast on the Regional wavelength, in which the B.B.C. Theatre Organ, played by Reginald Foort, will combine with the B.B.C. Variety Orchestra under Charles Shadwell, and the title of the show will be "Organestra."

New Weekly Talks Series

COMMENCING on November 19th a series of five weekly talks on Britain's most important industry (coal mining) will be given on Friday evenings. The first is called "The Mineral and the Man," and the subsequent series will be "The Past (1750-1914)"; "The Present (1914-1937)"; "Miner Underground"; and finally, "Miner at Home."

ROUND the WORLD of WIRELESS (Continued)

Change of Address

WE are informed that owing to increased business Norman Rose Electrical, Ltd., have taken larger premises at Waveband House, 43, Lamb's Conduit Street, W.C.1. From this central position the firm will be able to render greater service to their factors handling Norman Service material. Their telephone number remains the same—Temple Bar 4175.

Miniature Railway at Droitwich

THE giant aerials of Droitwich, England's national broadcasting transmitter; may now be viewed from a miniature railway which owns the fine model locomotive seen in the accompanying illustration.

The two Stourbridge enthusiasts who have perfected it demonstrated that their amazing engine pulls up to thirty passengers at over 30 m.p.h. They say they have built it specially for their Droitwich railway, and it has taken them twelve months at a cost of six hundred pounds. The remarkable engine is coal-fired, and is true in every detail to its "Atlantic" class prototype.

The Melody is There

DORIS ARNOLD, the only woman producer in the B.B.C. Variety Department, has already won many "fans" for her series of programmes "The Melody is There." She is trying to show listeners who do not usually like dance music that, played in a "straight" way, it often has charming melody. The next broadcast will take place on November 16th on the National wavelength, with Margaret Eaves and John Duncan as the singers and music by the Arthur Dulay quintet.

Stolen Avometers

THE Automatic Coil Winder and Electrical Equipment Co., Ltd., inform us that the following instruments were recently stolen from a representative's car in Islington:—

- Universal "Avometer" No. 66-5454.
- D.C. "Avometer" No. 6594.
- Universal "Avominor" No. U.23257-46.
- D.C. "Avominor" No. 41931-46.
- "Avo" Oscillator No. 3150.
- "Avodapter" } No record of serial
- "Avocoupler" } Nos.
- "Avo" Exposure Meter No. 14015-107.
- Smethurst High-Light Meter No. H. 1012-67.
- "Avo" Light Meter, for measuring candle-power No. H.1020-37.
- 1—"P" Type Zeva Iron No. H.16.
- 1—"P.O." Type Zeva Iron No. G.109.

We understand that with the many thousands of instruments the firm have supplied to the trade, many are stolen from time to time, and they have a black list upon which are recorded the serial numbers of such instruments, most of which are sent back for repair in due course. On receipt of these, original purchasers are advised, and in most cases the firm are

INTERESTING and TOPICAL NEWS and NOTES

able to return the apparatus to the rightful owners. We feel sure that readers will appreciate that this system may be of great help to them in the event of their losing any "Avo" Products.

Sybil Thorndike. He has also stage managed in Canada and America.

In addition to his duties as stage manager of Television, Mr. Crier devises and produces the "Television Follies," which are a regular programme feature at Alexandra Palace. He has also recently written several shows for sound broadcasting, notably the fantasy "The Princess of Paraphernalia."



Commencing a run on the miniature railway at Droitwich.

Money's Worth Series

THE seventh discussion in the series entitled "How to Get your Money's Worth," to be broadcast from the Midland Regional on November 26th, will be between Margot Smith (for the housewife) and P. G. R. Whalley, the head of the central buying department of a multiple store. It will give several useful shopping points on the buying of furniture and furnishings.

"Moon Melodies"

THIS is the title of a programme by Jan Berenska and his Orchestra to be broadcast from the Pump Room, Leamington Spa, on November 22nd. It will open with a selection from Romberg's "New Moon," and will include Reginald King's "Moonlight Reverie."

New Appointment

WE have been notified that Mr. Gordon Crier, Studio Manager in the Television Department, will be transferred as a Producer to the B.B.C. Variety Department early in the New Year.

Mr. Crier was appointed to the Television Department in February this year. Before joining the Corporation he had been stage manager for Dennis Neilson Terry and Sir Barry Jackson; stage director for Emile Littler in pantomime, and for Dame

Musical Comedy Melodies

MARTYN C. WEBSTER will, on November 24th, present a programme of melodies from the latest musical comedies. The instrumental music, to be played by the Revue Orchestra, has been specially arranged by Reginald Burston. The soloists—three well-known Midland broadcasting artists—will be Marjorie Westbury, John Bentley and Warwick Vaughan.

Variety from Peterborough

JENNY HOWARD will top the bill on November 24th in a programme of theatre variety from the Empire, Peterborough—an independent theatre which serves a large area in the East Midlands, and has often provided some good broadcasting.

Television at Elstree Film Studios

CHARLES LAUGHTON, Elsa Lanchester, John Lodge, Diana Churchill, Betty Balfour and other stars will be introduced to viewers in the inaugural television transmission from the studios of the Associated British Picture Corporation at Elstree on the afternoon of November 23rd. Distinguished directors will also face the cameras, including Erich Pommer, Paul Stein, Herbert Brennan and Albert de Courville.

SOLVE THIS!

PROBLEM No. 270.

York's battery home-constructed receiver would not work when it was first switched on. Tests indicated that the voltage at the detector anode was zero. Further tests showed that the H.T. battery voltage was in order and that there was continuity between the detector anode and the H.T.+ socket of the battery. What was the fault? Three books will be awarded for the first three correct solutions opened. Solutions should be addressed to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 270 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, November 22nd, 1937.

Solution to Problem No. 269.

The primary winding of the parallel-fed transformer was defective.

The following three readers successfully solved Problem No. 269, and books are accordingly being forwarded to them: E. Fisher, 33, Freeth St., Oldbury Nr. Birmingham; A. W. Gray, 16, Lascelles Rd., Leytonstone, E.11; B. Tilling, 10, Keynsham Gardens, Eltham, S.E.9.

Tuning and Reaction-control Experiments

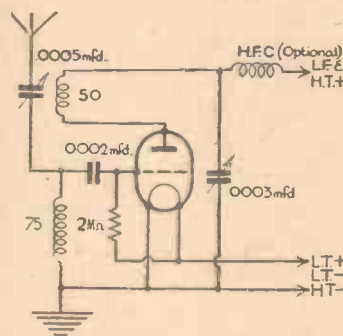
Some Early Circuit Arrangements Described : Series Tuning : Coils in Parallel : Tapped Coils : "Sense" of Reaction-winding Connections : The Original Reinartz Circuit
By FRANK PRESTON

SYSTEMS of tuning and of applying reaction have become so stereotyped during recent years that many of the newer constructors probably do not realise that there are many possible variations. As an example, look at Fig. 1; here you have a skeleton circuit for a regenerative detector valve, or detector valve with reaction, if you prefer it that way. There is a standard two-range (medium and long-wave) coil, with a .0005 mfd. variable condenser in parallel with it for tuning purposes; the aerial is joined to a tapping on the coil through a fixed condenser;

always considered great success. With a single valve (less efficient than those obtainable nowadays) I was able to receive U.S.A. medium-wave transmissions, by staying up until the early hours of the morning, and I received every one of the B.B.C. stations then in operation. In addition, there were several amateurs that could be brought in, whilst Brussels and the French P.T.T. transmissions were well within range. And then there was Barcelona, and a few other pioneer stations whose names I have long-since forgotten.

But do not misunderstand me. I do not

Fig. 3.—In this circuit there is series tuning and throttle-control reaction.



sponge-like effect in "mopping-up" the etheric waves. At the same time, a circuit such as this is worth trying, especially by those who are comparatively new to radio experimental work.

Series Tuning Condenser

As will be seen from Fig. 2, tuning is carried out by means of a variable condenser connected in series with the tuning coil, no parallel condenser being used. This is conducive to greater efficiency, since the inductance-capacity ratio is greatly increased. That is because the coil used must have an inductance value about 50 per cent. greater than that required with a parallel tuning condenser. In the days of plug-in coils we used a number 75 for this circuit, whereas a 35 or 50 coil was required with the parallel-condenser connections. The numbers, incidentally, applied to the number of turns on the honeycomb or basket-type plug-in coils.

Variometer Reaction

Now examine the reaction circuit, which is quite different from that you see to-day. A variometer is simply connected between the plate of the detector and the 'phones or L.F. circuit. It should be explained that a variometer consists of two coils in series arranged so that one can be moved in relation to the other. As a result, the total inductance can be varied between the difference in inductances of the two coils

(Continued on next page)

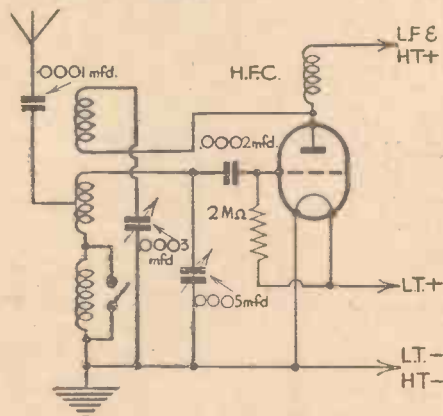


Fig. 1.—The type of tuning and reaction circuits generally used in a present-day Det.-L.F. receiver.

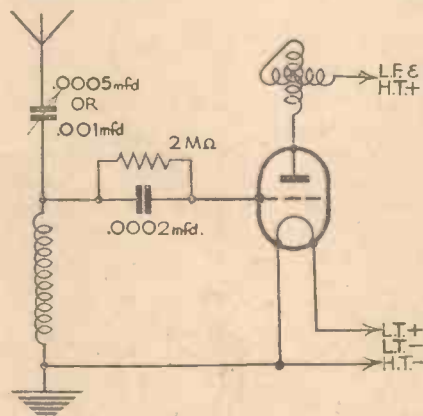


Fig. 2.—Here is quite a different arrangement that used to be popular. Tuning condenser is in series with the coil, and a variometer is used in the reaction circuit.

reaction is applied by means of a winding placed close to the tuned winding, and is controlled by means of a second variable condenser connected between one end of the reaction winding and earth.

Convenient and Conventional

That is, to-day, a perfectly standard arrangement that works tolerably well. It is convenient, and it is conventional, so it is good enough for most people. But now look at the circuit in Fig. 2. This is for a similar basic circuit, but it appears vastly different. Twelve to fifteen years ago this arrangement was considered very highly efficient. And it was; even now, it is probably far more efficient than many of the more conventional circuits that are widely used. Still, nobody uses it. Why? The main reason is that few constructors know that such a circuit is workable, but another reason is that it is suitable only for use on the medium waves; it might, however, be modified for short-wave use.

Pioneer Days

From 1922 to 1924 I employed this and similar circuits with what I have

say that if you employ the same circuit to-day you will obtain similar results. Conditions are vastly different; greater selectivity is required, electrical interference is far more prevalent, and the vastly greater number of receivers in use has a greater

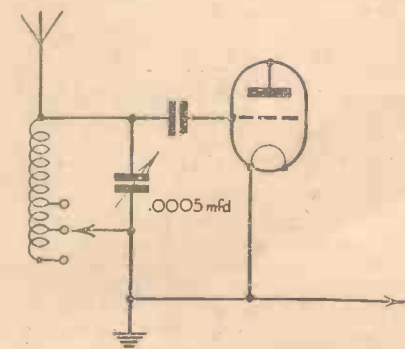


Fig. 4.—When a tapped coil was used there were "dead-end" losses in the portion of the winding not in use.

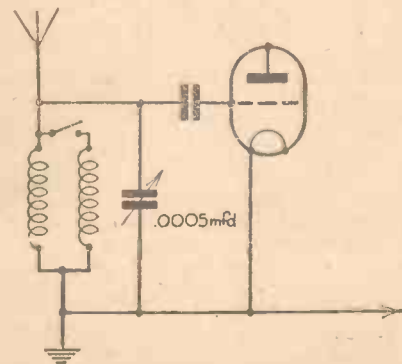


Fig. 5.—One method of overcoming "dead-end" losses on medium waves is to arrange for two windings to be in parallel. A refinement was to use series-parallel switching for long and medium waves.

TUNING AND REACTION-CONTROL EXPERIMENTS

(Continued from previous page)

and the sum of the inductances (in theory—practice does not quite agree).

The variometer has little capacity, and if it is tuned to the wavelength of the received signal, it acts as an almost complete barrier to the signal frequency. This means that H.F. currents in the plate circuit cannot leak away; instead, they "jump" across the capacity between the plate and grid and pass through the valve again. Consequently, we get the effect of reaction or feed-back.

If you have a few old plug-in coils and a variometer you will find it interesting to revive this old circuit. If not, you can try the arrangement in Fig. 3, which is similar. In this case there are two plug-in coils mounted about 1 in. apart, and reaction is "throttle-controlled" by means of the .0003 mfd. condenser shown. When using the variometer for reaction, oscillation sets in when the anode circuit is brought into resonance with the grid circuit. When using two plug-in coils, oscillation starts as the capacity of the .0003 mfd. condenser is reduced.

Should you wish to reproduce this old circuit and have no plug-in coils, you can easily place two windings of 26-gauge d.c.c. or enamelled wire on a 2 in. diameter cardboard tube, using the number of turns indicated, and placing the windings about 1/4 in. apart. Run both windings in the same direction, and connect the ends in the same "sense" as indicated in the diagram. You might well find that this circuit is more satisfactory than the more standard arrangement that you are probably using now. In any case, you will find a good deal of interest in making the experiment. For both of the old circuits referred to it is best to use a valve of the small-power type, but other types can be employed.

Coils in Parallel

Generally speaking, present-day tuning coils are far from efficient, although for most modern circuits no great benefits would accrue from the use of coils of higher efficiency. At the same time, you might care to experiment with a coil idea that achieved a fair measure of popularity in the early days of broadcasting. It was then not unusual to employ tapped coils in conjunction with a parallel tuning condenser, as shown in Fig. 4. Efficiency was sacrificed, although the advantage of using a single coil instead of two or three plug-in coils was obtained. The trouble was that a portion of the coil was out of use most of the time; this gave rise to what were known as "dead-end" losses.

One solution of the problem was to employ a coil like that shown in Fig. 5. There are two windings, as there are on the present-day medium and long-wave coil, but these are arranged so that the long-wave winding can be used alone, or so that both windings can be placed in parallel for medium-wave reception. Thus, there are no dead-end losses on medium waves, and what small losses there are on long waves are of little importance. The long-wave winding has about 25 per cent. more turns than is the case with the type of coil used to-day, and the medium-wave coil having about 20 per cent. more turns than on the normal broadcast coil. Both windings are arranged end-to-end on a former, or one might be wound on a former placed inside the former carrying the second winding.

An alternative to the method of connection shown in Fig. 5, was to use a switch for connecting the two windings in series for the long waves and in parallel for

medium waves. Theoretically, at least, that is an ideal system. However, you can easily try both methods if you wish.

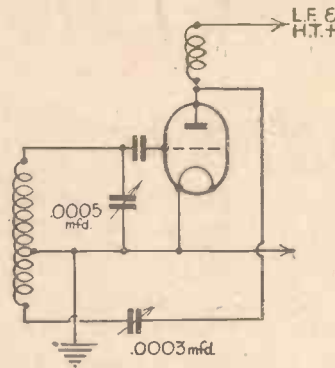


Fig. 7.—The original Reinartz circuit, which shows the correct "sense" of the tuning—and reaction—coil connections.

Reaction "Sense"

Probably nearly every reader knows that with any type of coil reaction can be obtained only when the connections to the tuning and reaction winding are in the correct "sense." In other words, if the leads to one of the coils are transposed, reaction cannot be obtained. This is simply because for reaction to occur, H.F. currents

must pass back from the reaction or anode circuit into the grid circuit. This happens due to the linking of the magnetic fields round the two windings. If you are rather lazy concerning the technical side of this matter you need not worry, since it is not important for present purposes.

How to Tell

The matter can easily be understood by referring to Fig. 6. Here you see two windings; both are in the same direction, and both are assumed to be placed fairly close together. If the top of the first winding is connected to the grid of the valve, the bottom of the second winding must be connected to the anode. Another way of explaining this is by saying that the opposite ends of the two windings must be connected to the points of high potential. In this respect, high potential refers to H.F. and not to any battery voltage.

In Fig. 6 are shown a few alternative correct methods of connection, all of which agree with the condition set out. If the connections to either winding in any of the examples shown were reversed, reaction could not be obtained. In the same way, if the direction of any one winding were reversed, reaction would be impossible. On the other hand, if both direction of winding and method of connection of any one winding were reversed, reaction would be obtainable.

Reinartz Circuit

As this matter is of importance, especially to those who make their own coils, or who have to use coils whose connections are not known, it is justifiable to give another method of recognising the correct "sense." Fig. 7 shows the original Reinartz circuit, where use was made of a single tapped coil for aerial tuning and reaction. Clearly all turns are in the same direction, and it can be seen that the two outer ends of the complete winding are points of high potential. This circuit is identical in principle to that shown in Fig. 1, although in Fig. 1 the reaction condenser is placed between one end of the reaction

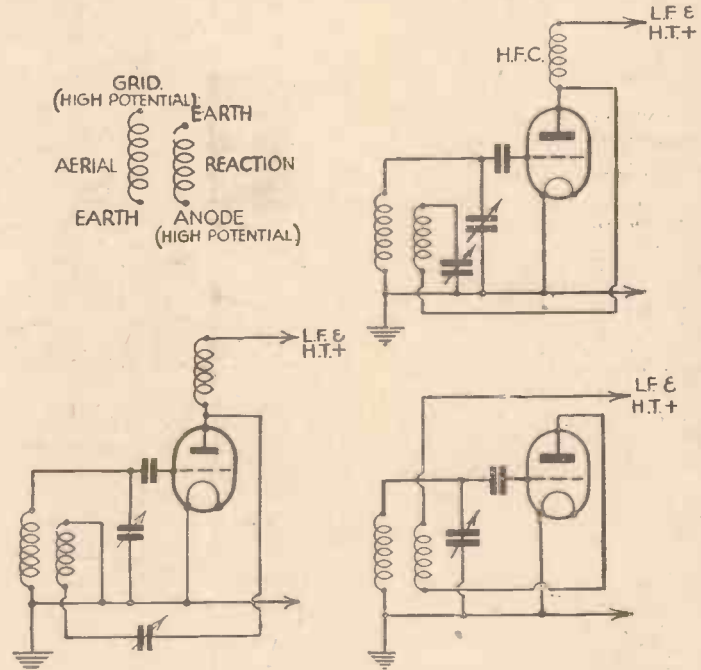


Fig. 6.—Assuming that both tuning and reaction windings run in the same direction, proper connections are shown here for a few simple circuit arrangements.

winding and earth, instead of between the other end and plate. The reaction-condenser position shown in Fig. 1 is generally to be preferred, because the moving vanes of the reaction condenser can be at earth potential. This means that hand-capacity effects are less likely to be troublesome.

With regard to the connections shown in Fig. 6, it should be mentioned that coils wound with the reaction winding over the tuned winding would not be as efficient as they should be. This is because of the capacity between the earthed and high-potential points. For coils wound in that manner, it would be better to reverse the direction and connections of one winding.

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Signal Generators and Wavemeters

The Construction and Operation of Some Useful Oscillator Units is Dealt With in this Article
By A. W. MANN

THE general trend nowadays is towards the direct calibration of short-wave receiver dials. Because of this practice, the experimental beginner is apt to regard wavemeters and signal generators as obsolete pieces of laboratory apparatus.

type should be along the lines adopted in one-valve receiver construction, care being exercised to avoid cramping of components, and all leads made as short and direct as possible.

In the interests of efficiency and stability, an oscillator should be totally screened, and if it is also intended for use as a frequency monitor, it should be built on the all-in principle, with both oscillator unit and batteries totally enclosed in a metal box.

The Oscillator Principle

Fig. 2 shows a variation of the oscillator principle. Here two separate and distinct methods of modulating the

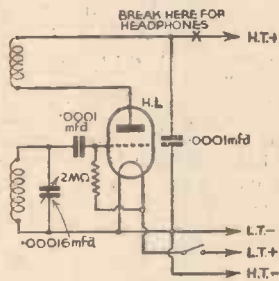


Fig. 1.—Theoretical circuit diagram of a simple signal generator.

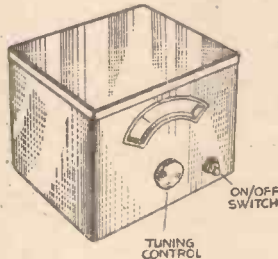


Fig. 3.—A suitable form of wavemeter screening box.

Such, however, is not the case, and a calibrated wavemeter will prove to be one of the most useful pieces of apparatus in the workshop, and will fully justify the comparatively small outlay and time devoted to its construction and calibration.

Its uses are many. For example, it may be used to calibrate directly the tuning dials of new experimental or permanent receivers, to check the accuracy of existing calibrations, to obtain a definite idea as to the tuning ranges of home-made coils when used in conjunction with various tuning capacities, and as a constant signal source when aligning multi-stage receivers

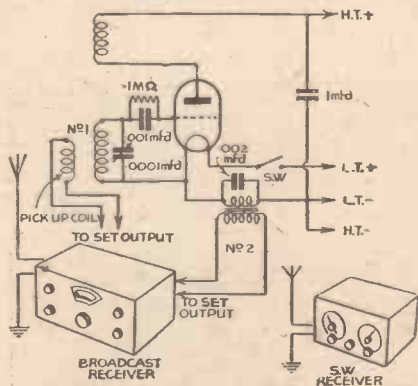


Fig. 2.—Circuit diagram showing a variation of the oscillator principle.

incorporating gang control. There are, of course, many other uses to which a simple oscillator may be put as the need arises.

Fig. 1 shows in theoretical form, the most simple type of signal generator or wavemeter, and which is in fact a modification of the standard one-valve receiving circuit. A fixed condenser is used to create feedback, instead of a variable condenser, and the aerial input and headphone output respectively are omitted.

The layout of a signal generator of this

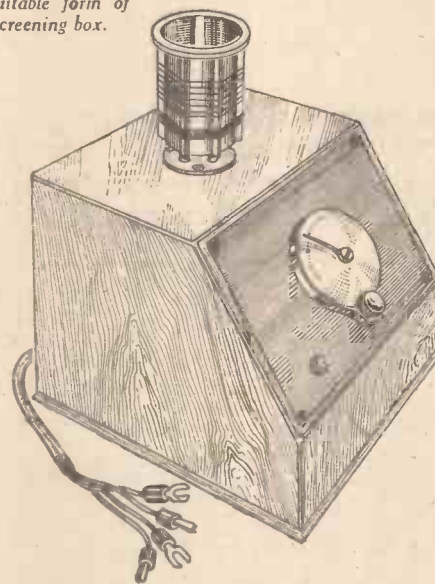


Fig. 5.—Another form of oscillator in a wooden cabinet with inclined front.

oscillator signal with speech or music are shown.

In arrangement No. 1 (Fig. 2) a small pick-up coil is coupled to the output terminals of a broadcast receiver and inductively coupled to the grid coil of the oscillator. The number of turns must be determined by experiment.

The arrangement No. 2 (Fig. 2) is an alternative and somewhat better method, because its adoption enables a much more powerful modulated signal to be obtained. A standard 3½ to 1 or 5 to 1 L.F. transformer will be most suitable. The .002 mfd. fixed condenser shown is important

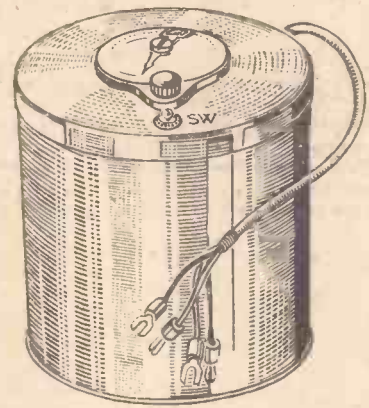


Fig. 4.—A wavemeter housed in a circular casing.

in the interests of oscillation, and should not be omitted.

It is at times an advantage when adjusting short-wave receiving apparatus to have a constant signal available.

If the receiver used as the modulation medium is fitted with a volume control, tests under the conditions associated with varying signal strengths may be duplicated.

Screening Boxes

Fig. 3 shows in detail a metal screening box of a type suitable to wavemeter requirements. In connection with metal screening boxes, especially wavemeter screening boxes, it is important to note that flimsy construction should be avoided.

A stout gauge front panel and a well-fitting lid are necessary in the interests of reasonably constant calibration. The screening box shown in Fig. 3 is a most suitable form in which to build frequency monitoring apparatus.

A handy wavemeter can be built at low cost in a circular tin canister as shown in Fig. 4. This should be about four and a half to five inches diameter, and the tuning condenser, coil base, grid condenser, leak and valveholder, etc., should be mounted on the inside of the lid, a slot being cut in the canister side and lid flange to allow cable to be withdrawn with the unit. The batteries, of course, would be contained in a separate box, and precautions should be taken to avoid the battery cable being cut by the tin by binding with a few layers of insulation tape.

Fig. 5 shows another oscillator arrangement, which consists of a wooden cabinet lined with tin or copper foil. The valveholder, grid condenser and all other com-

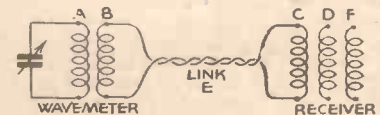


Fig. 7.—Circuit diagram showing the connecting link between wavemeter and receiver.

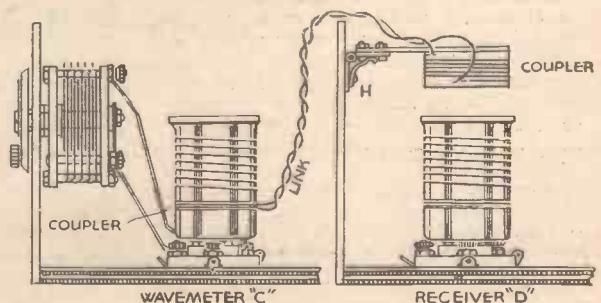


Fig. 6.—Showing an absorption-type wavemeter connected to a receiver.

SIGNAL GENERATORS AND WAVEMETERS

(Continued from previous page)

ponents, are mounted on one side of the cabinet and wired up with grid and reaction leads passing through the top to the coil base.

This arrangement greatly facilitates coil changing, but in foil-lining the inside, care should be taken to assure that the foil on all sides is bonded and making good electrical contact. This can be achieved by means of brass strips fitted into the corners and screwed in place. With reference to the bottom, four contact strips of spring brass bearing up against the sides will complete the bonding.

Absorption-type Wavemeter

The absorption-type wavemeter is not so much in favour nowadays, due in some measure to changes in plug-in coil design and vertical mounting, as against the old horizontal style. A soundly constructed absorption meter, can, however, be calibrated with a fair degree of accuracy, and coupled without difficulty to modern coils by the link method.

In Fig. 6, an absorption-type wavemeter is shown at C, the tuning coil having one tuned winding and one, two or three-turn untuned winding, i.e., coupler winding. A standard 4-pin plug-in coil with grid and reaction windings is shown at D.

Directly above the top of the coil former a coupling coil of the same number of turns as that of the wavemeter is mounted on a hinged arm, which must be provided with a definite stop so that it can be swung into position to check wavelength, and

swung out of position to change coils. The stop is necessary in order to assure the same degree of coupling, and thus maintain calibration.

The wavemeter and receiver coupling coil are connected via a length of twin flex, which may be of any length, and thus

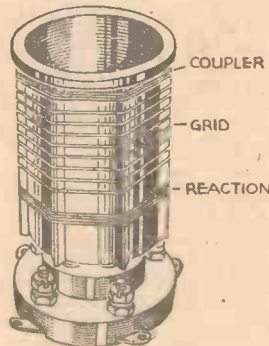


Fig. 8.—A home-made aerial coil for capacity coupling.

Coil Construction

Fig. 8 shows how home-made coils for capacity coupling to the aerial may be wound on standard six-pin formers, the extra winding being a three-turn wavemeter coupler.

The same principle can be applied to aperiodic tuning coils of home construction, but as an extra coupling winding is necessary, 9-pin formers made from valve bases would be required, one pin being unused.

Fig. 9 shows the American type 4-pin

coil in which the reaction winding is located above the grid coil winding. In this and similar instances, a two or three-turn coupler can be wound on the actual coil-mounting base.

When using the link coupled method, it should be remembered that, within limits, the greater the distance between link and wavemeter tuned winding, also link and grid winding of the receiver coil, the greater the accuracy of calibration, due to the sharper tuning of the absorption circuit. The disposition and relative positions of coupler to grid winding are, therefore, a matter for individual experiment.

The construction, calibration and operation of an absorption wavemeter on the above lines will provide the beginner with a grounding in the fundamentals of frequency measurement and calibration.

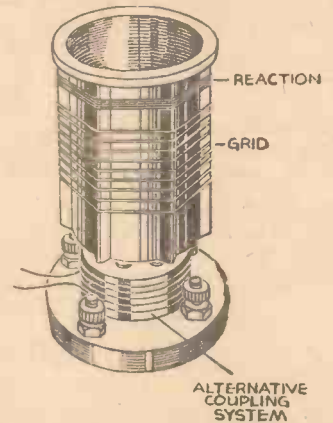


Fig. 9.—An American type 4-pin coil.

PROGRAMME NOTES

The Hawaiian Islanders

ON November 26th the Hawaiian Islanders will be heard by Midland listeners. For about eighteen months they broadcast regularly, and lately they have been doing a stage act. They consist of four brothers under the direction of one of the family, Peter Hodgkinson, who also composes. He wrote the descriptive number "Tiger Shark." The vocalist with the combination is Harry Hartland, who was a student at the Birmingham and Midland Institute, and has had a good deal of experience in opera and concert party work.

Western Club Room

CATERING for tourists and summer visitors is one of the most widespread industries in the West Country, and on November 22nd, in Western Club Room, a discussion on "How Does the West Receive its Guests?" will take the form of an inquiry into the general policy adopted by those most directly concerned with their reception and entertainment. Major J. A. Garton, the High Sheriff of Somerset, will preside.

Fire Brigade Band

THE Birmingham Fire Brigade Band, the only band in the country consisting entirely of firemen, will give a popular programme on November 25th, conducted by Station Officer R. Ward. In the interludes, Horace Lowe, a native of Derby, who has broadcast in the States, will sing a group of solos.

B.B.C. Ballroom from Bristol

THERE will be dancing to music by Reginald Williams and his "Futurists" Dance Band in B.B.C. Ballroom from the Western Regional on November 23rd. Reginald Williams was at one time a violinist in the Bristol Amateur Orchestra,

and then became leading violinist in a pit orchestra. He was pianist in a Midland recording and broadcasting dance orchestra prior to forming his present "Futurists" Dance Band, whose engagements take them all over the West of England and the Midlands.

Bright's Bristol Quintet

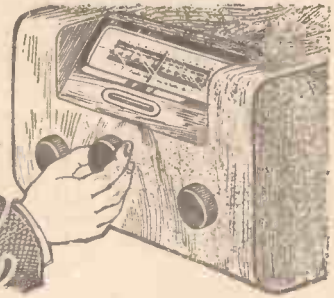
THIS popular quintet, led by Joan Allen, will make their last appearance on the air on November 23rd. The combination is being disbanded; it was formed five years ago and has broadcast frequently.



Some of the dolls used in the Technicolour film "Philips Broadcast, 1938." Our illustration shows the setting for the dances to the rhythm of "Harbour Lights," played by Ambrose and his Orchestra.



On Your Wavelength



By Thermion

The Club Movement

THE virility of home construction is aptly demonstrated by the number of clubs which you see in the PRACTICAL AND AMATEUR WIRELESS Directory of Wireless Clubs. Even so, there ought to be more. I suppose many of them fall by the wayside for want of organisation, for lack of an energetic secretary, and usually because of some internal dispute. Now anyone can form a wireless club, and it is in the formation that the success or otherwise of the club depends. Those clubs which fail do so because some vainglorious individuals think that in mooring a club they are the proprietors of it. They want to be king pin. They promptly appoint themselves secretary and treasurer, and generally conduct the business of the club as if the members are there as vassals to be ordered about by them. When a club is mooted a chairman and secretary should be elected *pro tem.*, and after a meeting is called, the officers should be elected by vote—being proposed and seconded in the constitutional way. The fact that so many clubs have existed for so long without complaint shows that in the majority of cases all is well and that ordinary club procedure is borne out. Now and again, however, you strike the exception. Suppose, for example, an unbusinesslike individual decides that he will start a club, extract the subscriptions from members and use the money in any way he thinks fit. Suppose, in fact, he decides to run a club journal, rent an expensive club-room, purchase a typewriter and office equipment, and generally run up a big bill. In such a case each member of the club is individually and severally liable for the debts, so it is very important that no expenditure is made on the club's behalf without the sanction of the committee. The club notepaper should bear a line stating that no order on the club is valid without the signature of the

secretary and also the treasurer. Many clubs have been started in the past, under flamboyant titles, from accommodation addresses, and once you have paid your subscription you hear no more of it. Your letters are not answered, and are usually returned marked "Gone Away." So when you join a newly formed club, ascertain its *modus operandi* before you pay your subscription. Make sure that the club is properly run, and that at least two auditors are appointed from the membership to audit the accounts every six months. Club life is a fine thing when it works smoothly. If any member endeavours to use it for his own advancement, or for his own purposes, it is bound to fail. Not so long ago I heard of a club, the members of which paid a small annual fee to headquarters, the headquarters in this case being a small private dwelling—the home, in fact, of the secretary. The members were supplied with a small membership card and a few sheets of notepaper. Apparently the only other advantage of membership was that members could ask any number of questions free of charge—a service which is freely performed without any annual subscription by the technical press, the B.B.C., the Post Office, and scores of other bodies. Of course, you were expected to purchase notepaper when your small stock ran out. If a badge was issued, you were expected to buy that. There were no rules, no agenda, the Committee was self-appointed, and included among them some friends of the organiser. It really amazes me that anyone can pay a subscription to a club without first inquiring as to what its programme is. When only a small subscription is asked under circumstances such as these, you should remember that an ambitious programme cannot be carried out for a small fee. If the club is a local one, the matter is different, but if the club has pretensions to be one drawing its membership from all over the country

and it is founded by someone who is not well-known in radio circles, you should leave it alone. Are we certain that anyone is so philanthropically inclined as to want to start a club of this character just for the love of the thing? You will very often find that after a time such a club will appeal to you for subscriptions to provide somebody or other with a wireless set, or proposes to start a club magazine, but asks for the subscriptions in advance. Under no circumstances should you send them the money. If any of my readers have been approached in this way by any club, perhaps they will be good enough to get into touch with me and give the details. Such clubs usually send out glowing reports to the Press, and sometimes they get them published—but not in PRACTICAL AND AMATEUR WIRELESS. Local clubs we are always glad to support, but we make the most stringent inquiries over new clubs which draw their membership from all over the country before we publish their notices.

As a matter of fact, there is no room for any other clubs in this country, except local clubs, and we can do with more of those. I repeat that if any of my readers have been approached or are approached in the future to join such clubs as I have referred to, I hope they will immediately get in touch with me.

In my opinion the offices of secretary and treasurer should not be combined.

Songs You Might Never Have Heard

I AM informed by the B.B.C. that 11,940 postcard votes were received from listeners in all parts of the country following the third programme of "Songs You Might Never Have Heard." Three songs broadcast for the first time top the poll as follows:—

	Votes
Bells at Evening	2,199
Viennese Romance	1,999
The House with the Little Green Tiles	1,989

Listeners will have a further opportunity of voting for the song they like best after the fourth broadcast in this series, on November 18th, on the National wavelength. This programme will consist of hitherto un-

known songs, chosen by a committee of listeners. None of the songs, although accepted by publishers, has ever been made available to the public.

A Notable Birthday Party

PROBABLY the first short-wave broadcasting station to give a regular programme service to distant countries, and the first station to relay a B.B.C. programme on short waves to the Empire, is 10 years old this year. This is PCJ, the experimental station at Hilversum, and to celebrate the event it will put on an all-star programme on Nov. 16th and 17th. Many famous radio, stage and screen artistes will contribute to the programme, and it is hoped that the spirit of conviviality will be effectively captured for the benefit of listeners throughout the world. Edward Starpz will be the host, Carroll Gibbons and His Savoy Orpheans Orchestra, and Florence Desmond, the impressionist, will be in the programme. The latter will impersonate many of the well-known Hollywood artistes. Haver and Lee will wise-crack, and guarantee to keep the fun fast without making anyone furious. Danny Malone with his Irish ballads, Greta Keller, the Three Canadian Bachelors and their Hilly-Billy Band, and Miss De la Mar will also deliver items. The programme will extend for two hours, to be followed by Carroll Gibbons with a further half an hour's dance music. PCJ, my readers may like to make a note, transmits on 31.28 metres (9.5 megacycles) from 6 to 8.30 p.m. on Tuesday, November 16th, and at the same time on Wednesday, November 17th.

All-in Licences for Dealers

YOU know that a motor-car dealer is entitled to trade plates for the payment of one licence fee, and for purposes of his business he is enabled to attach these plates to any unlicensed car. A similar arrangement has been suggested to the Postmaster-General for wireless dealers, but the P.M.G. regrets that he cannot comply with the suggestion to allow one comprehensive licence to cover a trader's own sets, premises, and motor-cars. Dealers, however, have decided to continue to press for such an arrangement.

"Quality" Reproduction

HOW do you judge the "quality" of the reproduction given by your loudspeaker? I generally find that I can make fairly accurate comparisons by listening carefully to different kinds of music and also to speech. But you have to be patient



Record Three

WE have been handed several Record Three receivers for test recently with the complaint that no reception could be obtained. On most of these, voltage tests indicated that voltage was not being applied to the anode of the detector valve. This would tend to indicate a break in the 15,000 ohm anode resistance or in the primary winding of the L.F. transformer. Continuity tests proved, in every case, that these components were in order, however, and the lack of voltage was due to a short circuit from detector anode to the metallised surface of the chassis through the reaction condenser. The reaction condenser itself was not defective, but had been wired wrongly—the lead from the reaction winding of the coil unit was connected to the moving vane terminal of the condenser instead of to the fixed vane terminal. The moving vanes are in contact with the spindle, and as this is locked to the supporting bracket a direct connection to the metallised surface of the chassis is provided.

Volume Control

ANOTHER trouble experienced with this receiver is ineffective volume control. This is due to the spindle of the volume control potentiometer being in contact with the supporting bracket, thereby earthing the centre tap of the control. Insulating washers are supplied with the specified potentiometer and these should be used to keep the spindle clear from the bracket. If a non-specified control is used, or if the insulating washers are not available, the metallising underneath the supporting bracket should be removed. If there is any doubt concerning the correct wiring of the reaction condenser the same procedure may be adopted in connection with this component.

Electrolytic Condensers

A READER wrote to us recently concerning his speaker energising equipment—he complained that his mains fuse blew every time he switched the equipment on. We checked his diagram and found that he was using a series connected metal rectifier, with a 4 mfd. electrolytic condenser between each end of this rectifier and the return mains lead. This, of course, explained his trouble. A high capacity condenser should not be connected on the mains side of the rectifier—the only condenser necessary is the one on the field winding side. The connection of an electrolytic on the mains side would cause the fuse to blow—electrolytics must not be connected across raw A.C.

and wait until one of the local stations "puts out" symphony, brass band, singing and choral music before you can be quite sure. It is also important to make tests with the volume control set to various positions.

I was very pleased the other evening after constructing a new quality set. A friend had called round to see me and we were sitting by the fire smoking while listening to an orchestral concert. During an interval we had both remained silent until the announcer came before the microphone. As he spoke, my friend looked up and said (to me) "Pardon," thinking that I had spoken.

On another occasion I remember my next-door neighbour remarking on my new piano. I hadn't got a piano, but remembered that there had been a very good recital broadcast on the previous evening and that I had turned the volume control full on. The incident was repeated more recently after I had bought a number of records of Chopin music. Yes, I believe that I have made a set that gives reproduction approaching very near to the original.

Radio Ballroom

IT appears that a considerable amount of controversy has arisen over the new idea of a B.B.C. ballroom. Firstly, many people are anxious to attend what is, after all, only a myth. The ballroom does not exist, and the background noises of the dancers and so on are taken from gramophone records. Secondly, people who are really interested in dance music complain that the lack of vocals and the general restriction placed upon the bands give an air which is not found in the ordinary public ballroom. Thirdly, the tempo of the majority of tunes is not correct according to standards laid down by those who should know their subject. Why do my readers think of this delicate problem? Do you dance to the music which is broadcast under this title, or do you feel that you would prefer to hear the ordinary type of dance music as it used to be radiated—that is, with the vocals and other incidentals such as novelty numbers, etc.? Perhaps you would drop me a line regarding your views on the subject, or if you are writing about something else you might include your ideas concerning this new broadcast by the B.B.C.

50 Tested Wireless Circuits

By F. J. CAMM

(Editor of "Practical and Amateur Wireless")

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The Amateur Set Designer

Problems to be Considered when Planning a Superhet are Discussed in This the Eleventh Article of the Series.

Continued from page 246, November 13th, issue.

ONCE the decision is made to employ the superhet principle in the projected receiver, the amateur must work on his design plans with the object not only of deciding how he is going to get the desired sensitivity and adjacent channel selectivity, but also how he is going to ward off the particular selectivity troubles that are peculiar to superhet operation.

Nothing is worse than a superhet receiver which is a "box of whistles" and since the matter is so important we will briefly run over the ways in which interference can be caused, apart from adjacent channel interference.

Second-channel Interference

When a wanted signal is being normally handled by a superhet receiver the difference between the signal carrier frequency and the oscillator frequency is equal to the frequency to which the I.F. amplifying stages are tuned. Suppose the I.F. value is 100 kc/s (to take a figure easy to handle) and that the receiver is tuned to the setting which makes the oscillator frequency 1,000 kc/s. Then the signal-frequency circuit, or circuits, will be tuned to 900 kc/s. If a signal comes along at 900 kc/s the frequency changing process will convert it to 100 kc/s, the latter frequency being applied to, and given maximum response by, the I.F. amplifier. But there is obviously another signal frequency which will lead to frequency conversion to 100 kc/s and this "second channel" frequency is 1,100 kc/s. Should a signal arrive at 1,100 kc/s and succeed in producing any appreciable voltage at the modulated grid of the frequency changer valve, it will be converted to 100 kc/s, which the I.F. amplifier will accept just as readily as a 100 kc/s input developed from a 900 kc/s signal. The danger of second-channel interference arises as a consequence of this fact. The I.F. amplifier can give no discrimination at all between 100 kc/s developed from one signal frequency and 100 kc/s developed from another, and whatever is done about the matter must be done in front of the frequency changer. The signal-frequency circuits are, naturally, tuned to the wanted signal frequency and are, therefore, out of tune to the second-channel frequency, so it should be obvious what the main line of attack upon the problem must be. Adequate signal-frequency circuit selectivity is what is required.

If the residual oscillations due to the (out of tune) second-channel signal are reduced to negligible amplitude by the selectivity of the signal-frequency circuits, then there will be no trouble. In this connection it should be noted, to avoid any possibility of confusion, that cutting down a second-channel input is quite a different proposition to cutting down an adjacent-channel input. As far as adjacent channel

selectivity is concerned the designer will place his reliance chiefly upon the I.F. stages.

Second-channel frequency rejection, involving special input coupling arrangements represents a refinement, but such systems demand very detailed study, and are hardly likely to appeal to the average amateur designer. With these special input systems the wanted and the second-channel frequencies are treated differently by the input circuits, the second-channel oscillations meeting opposed couplings.

Assuming that a receiver is prone to give second-channel trouble, and using the figures quoted above, if there is no signal on 900 kc/s, but there is a 1,100 kc/s signal which produces appreciable input in the receiver, then, when the latter is tuned to 900 kc/s, the 1,100 kc/s signal will be heard (an "image" signal, some would call it). If there is a signal on, or near, 900 kc/s as well as one on, or near, 1,100 kc/s, then the I.F. amplifier will have two I.F. signal

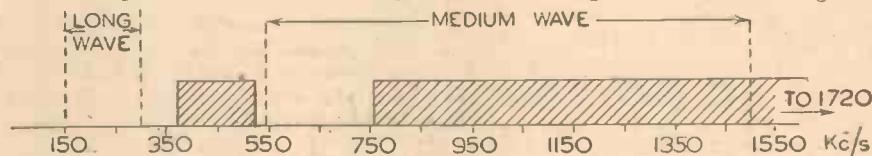


Fig. 50.—Diagram illustrating second-channel bands with 110 kc/s I.F. (shaded).

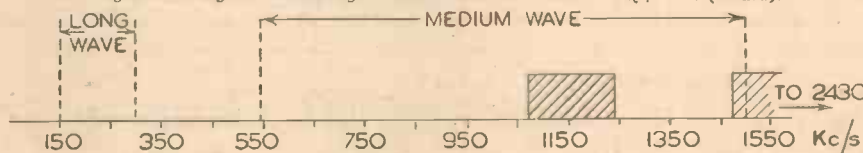


Fig. 51.—Second-channel bands with 465 kc/s I.F. (shaded).

inputs simultaneously, and the beats between these will cause a whistle.

Oscillator Harmonics

If the oscillator generates pronounced harmonics, the harmonic oscillations can beat with unwanted signal oscillations to make a "difference frequency" equal to the I.F. value, giving unwanted I.F. inputs and, of course, leading to whistles. It is, therefore, going to be important to take every care that the harmonic content of the locally generated oscillations is kept to negligible proportions.

I.F. Harmonics

The output from the I.F. amplifier is in the form of strongly amplified H.F. oscillations (at a carrier frequency equal to the I.F. value) and feed-back to the input circuits through stray couplings is quite possible. It is not so much the fundamental I.F. that matters here as the harmonics of the I.F., and I.F. harmonics fed back to the input circuits can beat with unwanted signal oscillations and cause whistles.

Good screening and care over spacing of components is obviously called for; also the operating of the I.F. stages in such a way that they work linearly, and do not themselves generate harmonics. The latter point does not, however, provide a complete cure, as one might at first think is the case, because there is one place where I.F. harmonics must necessarily be created, and that is at the detector. This implies that care must be taken to avoid stray couplings from the detector output circuit back to the input circuits and, what is perhaps the most important point of all, to prevent I.F. oscillations getting into the L.F. section of the receiver. Normally the L.F. and output stages of a receiver are not constructed with a view to provision of H.F. screening, and once H.F. gets into the output stage of a receiver quite considerable trouble can be caused. Thus, some form of I.F. filter is going to be an important feature at the detector-L.F. junction of the superhet.

The foregoing by no means exhausts the whistle possibilities of a superhet receiver. Beats between two signal oscillations, and further harmonic beat possibilities, is to mention two cases that can arise, but the designer will be working along correct lines if he regards the conditions outlined below as representing the ideal, and gets as close to them as is possible or convenient. The whole matter, of course, boils down to taking every possible care to see that the I.F. amplifier receives no input other than that produced by the combination of wanted signal and oscillator fundamental.

Ideal conditions for the prevention of whistles are: signal-frequency circuits designed for adequate selectivity; oscillator working without harmonic genera-

tion; no non-linearity in the actions of frequency changer and I.F. amplifier; no high-frequency input to the first L.F. valve; exact ganging adjustments; and good screening.

Choice of Intermediate Frequency

This is a matter which must be decided upon before any considerable move can be made with the details of a superhet design.

The I.F. values used in the majority of receivers come either between the medium and long-wave broadcast bands, or else below the long-wave broadcast frequencies. The amateur who is going to purchase I.F. transformers has a choice which must necessarily be limited by the values for which the marketed coils are designed. On the whole it would appear that the amateur will most probably make his final choice between either 110 kc/s or 465 kc/s, and there is something to be said for each of these two alternatives.

110 kc/s is a value which is very favourable to the construction of I.F. stages of high

(Continued on next page.)

THE AMATEUR SET DESIGNER

(Continued from previous page)

stage gain. 465 kc/s on the other hand, eases the work of the designer from the point of view of minimising second-channel troubles.

The greater frequency difference between the wanted signal and the second-channel signal, the less stringent are the selectivity requirements for the signal-frequency circuits. The difference between wanted and second-channel frequencies is equal to twice the I.F. value, so it follows that the higher the I.F. the less is the selectivity necessary in the signal-frequency circuits.

With 465 kc/s I.F. in use it is possible to restrict the number of tuned signal-frequency circuits to one, but this would never be satisfactory with 110 kc/s except under abnormally favourable reception conditions. This statement regarding 465 kc/s should not be regarded as a recommendation to use one signal-frequency circuit only, although the fact that it can be done is useful to know if strict economy, consistent with high circuit efficiency, is to be a strong feature of the design.

There is more to be said with regard to the relative merits of 110 kc/s and 465 kc/s from the point of view of second-channel interference. Since a second-channel frequency is above the frequency to which the signal-frequency circuits are tuned by twice the I.F. value, it follows that appropriate to any given signal-frequency tuning range there is a certain second-channel frequency range. It is very interesting to examine the differences in this connection between the cases of 110 kc/s I.F. and 465 kc/s I.F., respectively.

Taking a medium-wave range of 200 to 550 metres (1,500 to 545 kc/s) and a long-wave range of 1,000 to 2,000 metres (300 kc/s to 150 kc/s), the second-channel ranges are:—

For 110 kc/s I.F.,	For 465 kc/s I.F.,
1,720 to 760 kc/s,	2,430 to 1,475 kc/s,
520 to 370 kc/s.	1,230 to 1,080 kc/s.

Figs. 50 and 51 show very clearly the difference between the two cases. With 110 kc/s I.F., one second-channel band comes between the two broadcast bands, while the other occupies a large section of the medium-wave broadcast band.

With 465 kc/s I.F., one second-channel band comes entirely in the medium-wave broadcast band, but only a small portion of the other second-channel band comes into the medium-wave broadcast range, the greater part of it coming above the medium-wave broadcast frequencies.

If a receiver is to be used in any locality on the coast where shipping wireless telegraphy transmissions are at high field strength, the question as to what the receiver is going to do with frequencies between the medium-wave and long-wave broadcast ranges is one that deserves consideration.

600 metres (500 kc/s), 800 metres (375 kc/s) and certain waves between these two are "danger spots" from the point of view of the possibility of morse interference because considerable wireless telegraphy traffic passes on these waves.

Fig. 50 shows that with 110 kc/s I.F., one of the second-channel frequency bands embraces these busy telegraphy waves.

465 kc/s I.F. (See Fig. 51) gives no second-channel frequencies between the medium and long-wave broadcast bands, but it should be noted that 465 kc/s is itself a frequency that comes sufficiently close to two shipping waves, 600 metres (500 kc/s) and 705 metres (425 kc/s), to make it possible, in certain localities, for morse interference to arise due to direct I.F. reception. If such trouble is at all likely it will be advisable to incorporate an aerial I.F. rejector into the design.

High Stage Gain

To counteract any idea of undue emphasis upon the merits of 465 kc/s that the foregoing may suggest, we would repeat the statement made at the commencement, namely, that the use of 110 kc/s is very favourable to high stage gain. Despite the undoubted advantages of 465 kc/s

where second-channel problems are concerned, it must not be overlooked by the amateur designer that 110 kc/s will be satisfactory, provided that the signal-frequency circuit arrangements are suitable. If the designer is prepared to go to the necessary expense and complications in this connection then an I.F. value of 110 kc/s well deserves consideration.

Is a Signal-frequency Amplifying Stage Necessary?

The sensitivity and adjacent-channel selectivity of a superhet receiver are very greatly dependent upon the I.F. amplifier. Since there are many superhets in existence without signal-frequency H.F. amplifying stages it follows that H.F. amplification in front of the frequency changer cannot be a strict necessity. At the same time there are considerable benefits to be obtained from a signal-frequency H.F. stage, and the issue is really that of incorporating it in the receiver design, unless requirements of cost or simplicity prohibit its use.

The importance of the selectivity of the signal-frequency circuit has already been emphasised, and it will be appreciated that a tuned H.F. stage in front of the frequency changer will assist greatly towards making this selectivity adequate. The ratio of signal to background noise is an important matter, too, and it will be found that some tuned H.F. amplification in front of the frequency changer will improve this ratio.

High stage gain should not be expected of a signal-frequency amplifying stage and, as a matter of fact, is definitely to be avoided. Overloading of the frequency changer will lead to unwanted harmonics, and such overloading may occur if the signal-frequency valve stage is given too much gain.

With an I.F. of 110 kc/s the use of a signal-frequency valve is to be strongly recommended, and it should be noted that with a pair of coupled circuits feeding the first valve, there would normally be the comfortable total of three tuned circuits in front of the frequency changer.

(To be continued)

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

Wednesday, November
17th.—Symphony

Concert from the Queen's Hall, London.

Thursday, November 18th.—Songs You
Might Never Have Heard.

Friday, November 19th.—Design for Lis-
tening, an experiment in entertainment.

Saturday, November 20th.—Music Hall
programme.

REGIONAL (342.1 m.)

Wednesday, November 17th.—A running
commentary on the second half of the
International Association Football
Match, England v. Wales, from Ayre-
some Park, Middlesbrough.

Thursday, November 18th.—Visit of the
King of the Belgians to Colchester to
inspect the Inniskilling Dragoons.

Friday, November 19th.—Variety from the
Empire Theatre, Peterborough.

Saturday, November 20th.—The Trial
of Mary Queen of Scots, feature pro-
gramme.

MIDLAND (296.2 m.)

Wednesday, November 17th.—Twenty-one
Days at Sea, a comedy.

Thursday, November 18th.—Legends of
the Hills, feature programme.

Important Broadcasts of the Week

Friday, November 19th.—How to Get
Your Money's Worth, a discussion.

Saturday, November 20th.—Choral and
instrumental programme.

NORTHERN (449.1 m.)

Wednesday, November 17th.—A running
commentary on the second half of the
International Association Football Match,
England v. Wales, from Ayresome Park,
Middlesbrough.

Thursday, November 18th.—Concert from
Victoria Hall, Halifax.

Friday, November 19th.—Westward from
Liverpool, feature programme.

Saturday, November 20th.—Dance Band
programme.

WELSH (373.1 m.)

Wednesday, November 17th.—Choral pro-
gramme, from the Pavilion Theatre, Rhyl.

Thursday, November 18th.—Famous Con-
troversies: Disestablishment of the
Church, a discussion.

Friday, November 19th.—Faust, an adapta-
tion for the microphone of the world-
famous story.

Saturday, November
20th.—Dance Band
programme.

WEST OF ENGLAND (285.7 m.)

Wednesday, November 17th.—Western
Cabaret, from the Royal Bath Hotel
Ballroom, Bournemouth.

Thursday, November 18th.—Military Band
Concert.

Friday, November 19th.—Music of other
countries—3, Italy: Orchestral concert.

Saturday, November 20th.—Design for
Listening, an experiment in entertainment.

SCOTTISH (391.1 m.)

Wednesday, November 17th.—Variety from
the Empress Playhouse, Glasgow.

Thursday, November 18th.—Orchestral Con-
cert, from the Usher Hall, Edinburgh.

Friday, November 19th.—Scottish Dance
Music.

Saturday, November 20th.—Scottish Radio
Cartoon, The News of the Day.

NORTHERN IRELAND (307.1 m.)

Wednesday, November 17th.—Vocal recital.

Thursday, November 18th.—Stop Dancing,
a programme of very light music.

Friday, November 19th.—Organ recital from
the Ritz Cinema, Belfast.

Saturday, November 20th.—Then Face to
Face, a play by J. S. N. Sewell.

Practical Television

November 20th, 1937. Vol. 3. No. 75.

Misplaced Modesty

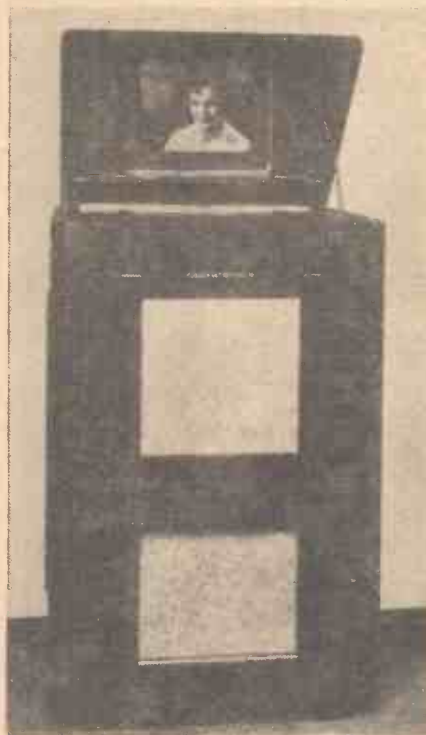
NOVEMBER 2 was the first birthday of the official opening of the B.B.C. television station at Alexandra Palace. Prior to that date transmissions had taken place, but these were regarded as experimental, and it was not until after the ceremony had been performed twice—first in the Baird studios, and then in the E.M.I. section—on the day in question that the world's first public service of high-definition television was regarded as being launched for the benefit of viewers. Since that day considerable progress has been made, both in the technical improvement of the radiated pictures and in the manner of presentation of the programme itself. Those who have the opportunity of looking in with a fair degree of regularity have been impressed with the improvements, and yet the B.B.C., with misplaced modesty, did nothing to celebrate this birthday. It is difficult to see any reason for this lack of action, for it is admitted quite freely that in the field of television Britain leads the world, a factor of which we should feel justifiably proud. The maintenance of a world supremacy was just glossed over, the B.B.C. comment being to the effect that they were not anxious to crow about past achievements.

In any case, it is felt in many quarters that as a result of the year's work the Television Advisory Committee will issue a statement that is sure to have a profound bearing on the future development of television in this country. First of all, there is the important question of finance, since lack of funds is handicapping the B.B.C. very materially. The nature of the programmes could be improved with more money to spend, while the outside broadcast or mobile section could expand, and give a wider variety of material. Another particularly important question which has to be answered concerns the technical characteristics of the radiated signal. An undertaking was given that this would not be altered for two years, but now that half this period has passed, manufacturers who are already engaged on their plans for new television receiver models are anxious to know if the standard of line definition, ratio of picture modulation to synchronising, picture ratio and method of modulation are to remain unchanged for any longer period than this. It is incumbent on those in authority to come to an early decision in this matter, for it will have a vital bearing on makers' policies, as well as exerting a big influence on the prices of sets, coupled with the size of the reconstituted picture in various types of set.

On Similar Lines

THE development of television receivers in Germany for use in the home has followed on very similar lines to that in this country. Ample evidence of this was shown at the last Berlin Radio Exhibition, where the section devoted to television was organised on very big lines. Both direct and indirect picture viewing was featured, but preference seemed to be directed more towards the latter. For relatively large-

size pictures there seems no doubt that viewing in an inclined mirror lends itself to a more compact design owing to cathode-ray tube length, provided the mirror itself is of the right design. To overcome multiple images due to light reflections in the mirror, surface silvering must be adopted, or, alternatively, the thickness of the mirror reduced to a very small value. An example of German receiver practice is illustrated, the set having been made by Fernseh A. G. This incorporates a 12in. diameter cathode-ray tube, giving a picture approximately 9in. wide by 7½in. high. This set is for television only, and the television controls are brought out to a



A German television receiver recently exhibited, in which indirect viewing is employed and a picture definition of 441 lines is utilised.

narrow inclined panel in the middle of the set. It was significant that at the Berlin show no mechanically reconstituted picture receiver was shown, for at the moment the Germans place their faith in cathode-ray tube working. Another receiver item which attracted attention in Germany recently was a small portable set. The C.R. tube employed had a screen diameter of 4in., giving a picture approximately 2½in. by 2½in. viewed indirectly in a mirror. This was designed primarily for monitoring television transmissions while carrying out surveys over a service area. The cabinet was only 24in. high, 14in. wide and 10in. deep, so that transport was easy, while the sound was conveyed by headphones. Admirably adapted for their own particular purpose, sets of this nature make no pre-

tence to being suitable for home entertainment purposes.

An Official Investigation

THE television set user who resides near a main traffic road is well aware of the ruinous effects to the picture produced by the ignition systems of motor cars, but so far no official steps have been taken to remove the trouble at its source. A demonstration given recently at the British Electrical and Allied Industries Research Association's laboratories may, however, be instrumental in improving matters. Officials from the Post Office, B.B.C., Society of Motor Manufacturers, Ministry of Transport and the Home Office were present, and saw quite clearly how reception was marred when a motor car was started up about forty feet away from the set. By rearranging the ignition components on the engine chassis a marked improvement in reception was brought about, since the interference was reduced in magnitude. Better results still were observed, however, when the ignition leads themselves had suppressors fitted. Electrical interference is to be the subject matter of legislation in the near future, and it is hoped that the results of these tests will prove that the service of television will be assisted materially if attention is given to these problems.

Signal Storage

ONE of the very marked advantages of the Iconoscope type of electronic scanner is associated with its principle of storage. When analysing the picture into its constituent parts for transmission, the photo-electric cathode or mosaic, as it is generally termed, has the moving beam of electrons operating on each element for only a very small fraction of the total picture scan time. This enables the minute photo-electric elements to build up a relatively large condenser charge with reference to the back plate before being converted into the picture signal. This factor has led to several other schemes being developed, all of which aim at embodying this storage effect in some form or another. In one of the more recent proposals the scene to be analysed is focused initially on to a sensitive and uniform photo-electric cathode surface positioned at one end of a form of cathode-ray tube. The resultant electron image produced is then moved forward from this surface, and made to traverse a "line" anode instead of the more usual minute aperture. The anode takes the form of a series of small conductors each electrically isolated from its immediate neighbour, but forming as a whole a number of tiny condensers in association with a signal plate located at the back. These condensers will, of course, acquire individual charges proportional to the variations of light and shade in any one complete line of the initial electron picture. If now a beam of electrons from another section of the tube is propelled to and fro over the line anode, the electrons lost by each condenser element due to the picture charging action are restored from the moving beam. This produces the line element picture signal, and it is seen that the scheme has the important advantage of increasing the time during which a picture element in the line scan can build up its own condenser charge, prior to being converted into the constituent television signal.

Making Provision

DEFINITE news concerning a provincial television service is still not available, but it would appear that the B.B.C. have the matter well in hand in their plans

PRACTICAL TELEVISION

(Continued from previous page)

for new studio designs. Both at Birmingham and Glasgow the architects engaged on preparing designs for new studio blocks are planning to enable television equipment to be installed with the minimum of interference with the aural broadcast arrangements. The important question to be decided before anything definite can be done, however, centres round the system to be used when the new television stations are authorised. Will it be identical to that now employed at Alexandra Palace or will experience bring about any major modifications to the equipment scheduled for this purpose? It would be fatal to bring into service any plant that would necessitate special receiver designs for the provinces with an entirely different form for the London area. Only by a market extension of one type of set can the prices be reduced, and no doubt this will have marked bearing on any decisions that are arrived at in this connection.

A Permanent Collection

NOW that the Science Museum television exhibition has finished and set a record for attendance that will be hard to beat, it is anticipated that the present small section devoted to permanent television exhibits in the main building will be very materially extended. Much of the apparatus and equipment shown during the three and a half months that the exhibition was open is of historical character, and would serve

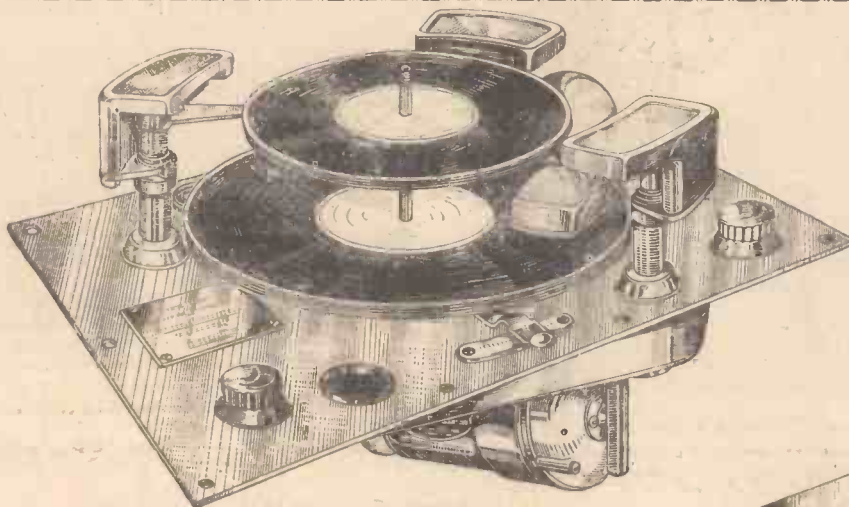


Billy Houston, assisted by Sally McBride, being televised in a recent broadcast from the Alexandra Palace.

to show the public how the science has changed and developed from the crude theoretical suggestions of the last century to the advanced designs which we know to-day. The television science, in view of

its present-day importance, merits a section at least comparable with that devoted to radio, and it is hoped that accommodation will be found in the near future to allow this to take place.

TWO USEFUL DEVELOPMENTS



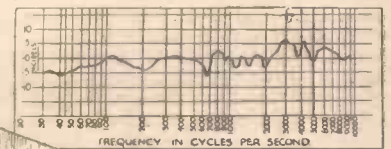
The Garrard type R.C.1A automatic record changer

AN automatic record changer is not a luxury, but an essential accessory for those listeners who desire to reproduce operas, and other musical works which are recorded on more than one disc. A complete entertainment of half an hour or so may be obtained without the gramophone being touched, by using a changer such as that illustrated above. This will play eight mixed 10in. or 12in. records with complete reliability, and it may be mounted in any existing radiogram, as it is a completely self-contained unit consisting of motor, changing mechanism and gramophone pick-up. It is available for A.C. or A.C./D.C. operation (£10 and £10 17s. 6d., respectively), and it should be noted that

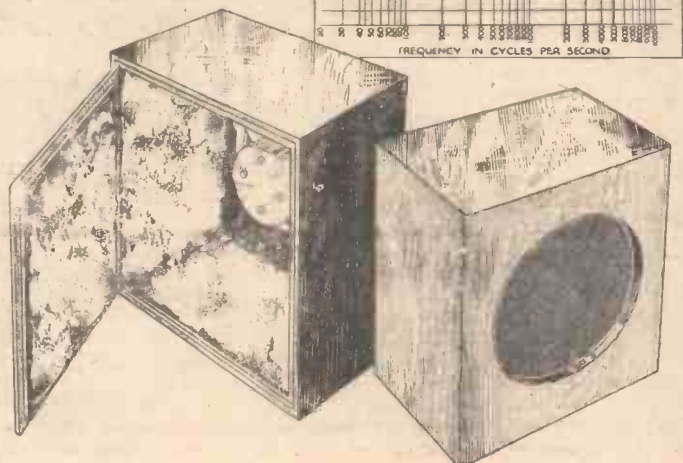
this changer automatically switches off the electric supply as soon as the last record has been played. It is a Garrard product, and incorporates the usual refinements, such as a reject and repeat control, and speed regulator.

W.B. Fidelity Speaker

The other accessory illustrated is a new speaker designed by the makers of the W.B. speaker to provide the highest quality for domestic purposes. This unit is known as the "Planoflex" and it will be seen from the illustration that the moving-coil speaker is enclosed in a wooden cabinet which is lined with flock. The response curve is claimed to be flat from 30 cycles to 15 kilocycles, and, accordingly, it should only be used with a receiver designed to provide such a high quality output. The price of this unit is £5 5s.



The new W.B. Planoflex loud-speaker and its response curve. Note how the flock is packed round the interior of the cabinet.



RECORD REALISM

The Gramophone Side of Radio is Often Unappreciated and in this Article Some Hints on Improving Reproduction are Given - - - - By W. J. DELANEY

THE majority of listeners now incorporate gramophone record reproduction in their radio equipment, but it appears from reports received from readers and from other sources, that the

results on the ordinary type of apparatus. A volume control must, therefore, be employed, and although the majority of good modern pick-ups incorporate a volume control, it is not essential to obtain such a unit, as a control may easily be added to the circuit with which it is employed. The control is connected as shown in Fig. 1, and it will be seen from this that the arm of the control will be the lead which is connected to a change-over switch if one is fitted.

scratch or surface noise. Whilst a scratch filter can be fitted to eliminate this, the design must be very carefully chosen, as it will filter also the musical frequencies in the same range and spoil the reproduction of those instruments which rely upon the higher frequencies or harmonics. A bass booster is quite simple to construct and will assist in giving balance to the reproduction, although, again, the design is delicate and will depend to a very large extent upon the type of pick-up which is employed.

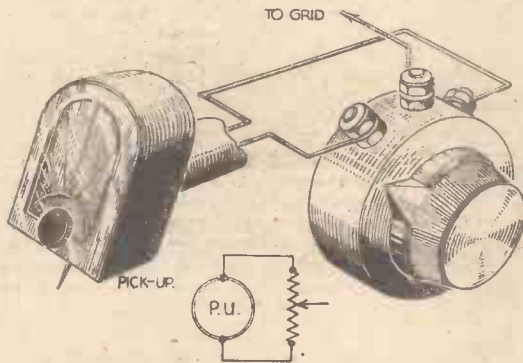


Fig. 1.—If a volume control is not fitted to the pick-up, one may be connected as shown here.

usual procedure is simply to connect a gramophone pick-up and treat the apparatus as an ordinary gramophone. Whilst, with a good radio receiver and good modern records, the results thus obtained will be very good, it is not often realised that with a little care the reproduction may be vastly improved, and in addition, it is possible to double the life of the records and to add considerably to the pleasure which they give. The customary method of using the pick-up is to plug it into the grid circuit of the detector or an L.F. stage, and thus the low-frequency side of the receiver is employed as the gramophone record amplifier. Assuming that this has been built to sound principles, it will give very good results on either radio or records, but unfortunately the requirements for perfect reproduction from a gramophone record are not identical to those required for good radio results, and thus if you are anxious to improve record reproduction, a special record amplifier should be built. As the record is a mechanical reproducing means, it is also obvious that it will have to be treated with care, and there are several details which must be attended to in this respect. Thus, for record realism there are two separate lines upon which to work—the electrical and the mechanical.

Circuit Designs

A good modern pick-up will deliver an output sufficient to enable adequate volume for domestic purposes to be obtained from two L.F. stages, and if a mains valve of the small power type is used in conjunction with such a pick-up a push-pull stage may be fully loaded. Therefore, the number of stages to use in a separate amplifier will be quite small and the expense will not be great if you consider building such a separate unit. If you use the pick-up with a standard battery-operated broadcast receiver, and connect the pick-up to the detector stage, the ordinary small pentode may easily be overloaded, and this is one of the causes of failure to obtain good

The sound which is recorded on the record is not of the same nature as the music which is broadcast by the B.B.C. and thus if the record is reproduced through a standard circuit there are two facts which may be noted. Firstly, the bass is lacking, and secondly, the higher frequencies

Contrast Expansion

Finally, on the electrical side we must consider the latest idea known as contrast expansion. This is the restoration of the contrast between loud and soft passages, which have to be upset in the recording studio due to various things. Obviously, where a climax is reached in a military band selection, the over-all volume would be such that, had the amplification level been kept constant so that the weak solo instruments were well reproduced, the amplifier would be overloaded at the climax. Alternatively, if the level was such that the climax was handled without overloading, a weak solo instrument would not be heard above the noise level. With radio reproduction the degree of contrast is not constant. Thus, when a studio broadcast is being given the engineer will adjust things according to the type of orchestra or band, and the studio acoustics. When a land-line transmission takes place a different compensation is employed, and thus a radio contrast expanded is not the success which it might appear on the surface. With gramophone records, however, the general balance appears more constant, and it is possible to build an expansion circuit which may be left untouched for all of the usual types of record. Obviously, when a special record—such as those of the massed bands at the Aldershot Tattoo—is being used, an adjustment of the degree of expansion may be tried. As an addition to the circuits which I have already given for this type of amplification we now reproduce a circuit recommended by the General Electric Company, and which gives very good results with a B.T.H. pick-up (Senior model) and H.M.V.

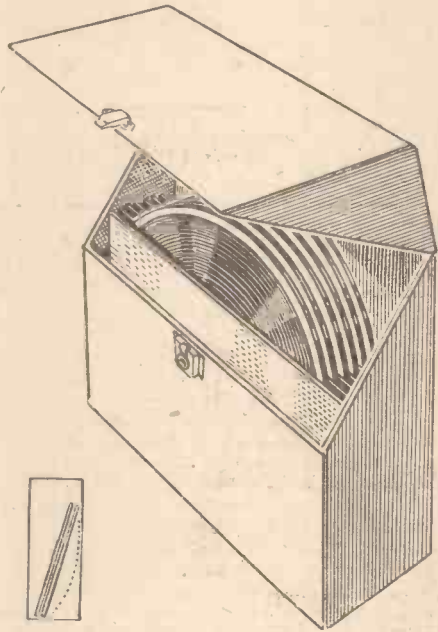
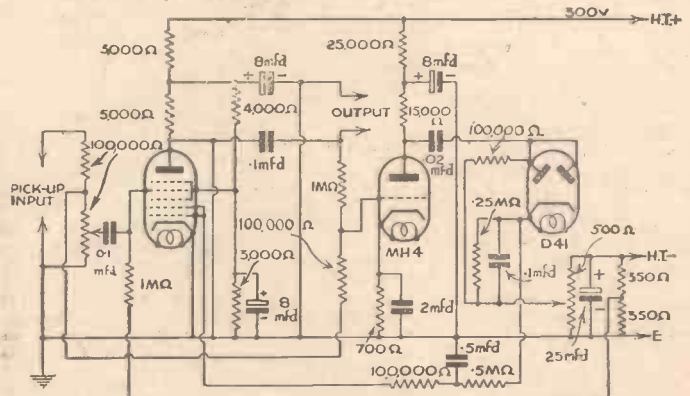


Fig. 2.—(Above) shows how records may be warped due to storage on edge, unless packed tightly, and Fig. 3 (right) a record contrast expansion circuit recommended by Osram.



are generally marred by the sound produced by the needle travelling over the record—a sound generally referred to as needle

records. With Parlophone and Columbia discs the top is a little too shrill, but I (Continued on page 279)

Final Operating Notes for the A.C. ALL-WAVE "CORONA" 4

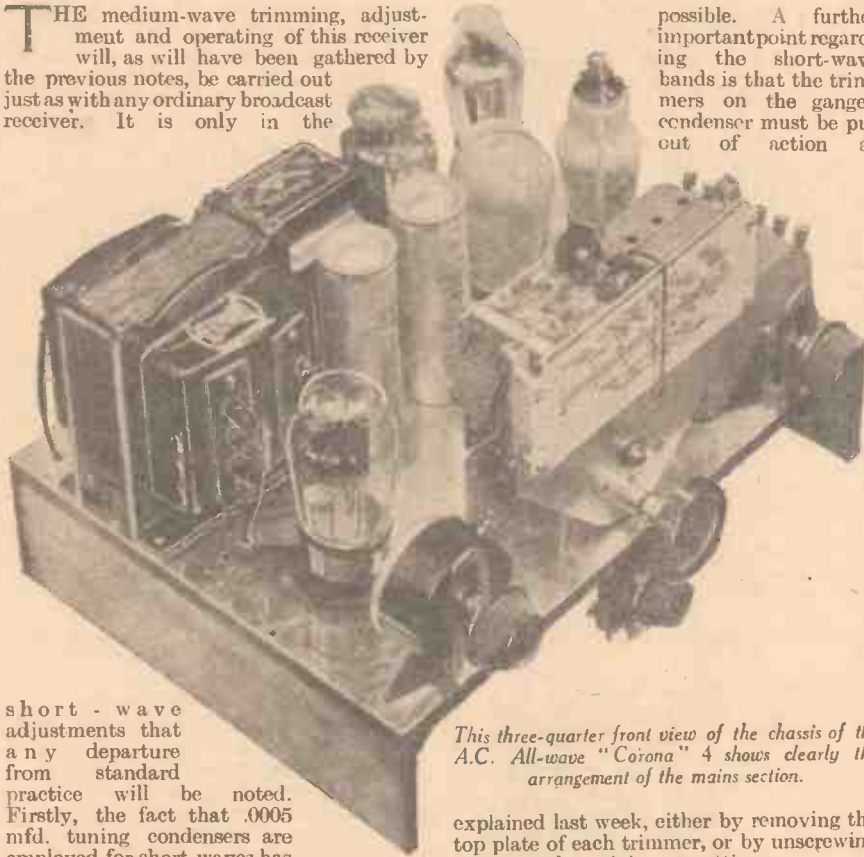
In This Article We Give Details for Carrying Out the Final Trimming of the Receiver and How to Obtain Maximum Results

THE medium-wave trimming, adjustment and operating of this receiver will, as will have been gathered by the previous notes, be carried out just as with any ordinary broadcast receiver. It is only in the

possible. A further important point regarding the short-wave bands is that the trimmers on the ganged condenser must be put out of action as

Havana, Prague, and Vatican City. The 25-metre band will provide good signals from Radio-Colonial, Pittsburgh, Daventry, and Caracas, whilst the next band—the 30-metre, will provide about eight stations at good volume at some time or another. These are Rome, Sydney, Schenectady, Daventry, Budapest, Madrid, Huizen, and Moscow.

It is important to remember that definite times should be set aside for listening on the various bands. Thus, during daylight and in the early hours of the evening the 19-metre band will prove most satisfactory, whilst as it becomes darker, the higher wavelengths will come into action, and the lower ones will probably disappear. In the early hours of the morning the 48-metre band will be the most productive of signals.



This three-quarter front view of the chassis of the A.C. All-wave "Corona" 4 shows clearly the arrangement of the mains section.

short-wave adjustments that any departure from standard practice will be noted. Firstly, the fact that .0005 mfd. tuning condensers are employed for short waves has caused doubts to arise in the minds of some new readers who are under the impression that a very low capacity is essential for short-wave tuning. This is not so, and the coils used in the Corona, together with all other modern all-wave coils, are designed for use with a large-capacity tuning condenser. It is obvious, however, that a very much wider tuning range will be covered, and this may lead to a few difficulties. Firstly, the wiring between the condenser, the coils and the valve grids must be made in as short and as direct a manner as possible. Every inch of additional wiring here will raise the minimum wavelength to which the short-wave coils will tune. It is also necessary to use a thick wire for connecting purposes at these points in order to reduce losses due to H.F. resistance. As the design was carried out by us, the wiring should be found quite efficient, and therefore no departure from our published design should be anticipated, unless you are anxious to obtain an improved performance on the short waves without regard to the symmetry of the panel layout.

Modified Wiring

In that case, it would be permissible to place the ganged condenser right up close to the tuning coil, even going to the extent of raising the coils on a block of wood so that the leads from the coil terminals to the condenser may be shortened as much as

explained last week, either by removing the top plate of each trimmer, or by unscrewing them to the minimum setting.

When tuning on the short waves, you will probably find at the first test that the only thing which can be heard is morse or code signalling. It is very unlikely, unless you have handled an all-wave receiver before, that any broadcast stations will be found at the first attempt. These stations are grouped in distinct bands, and they will be found on what are called the 19, 25, 30, and 48-metre wavebands. This means that with the dial specified, and with wiring efficiently carried out the stations will group and will be found more or less as indicated in the following notes. It must be emphasised, however, that no definite guarantee can be given that they will occur exactly at the points mentioned, owing to the effects of the stray capacities on the short waves as already mentioned. They will, however, serve as a guide. The 19-metre band will occur right at the bottom of the scale; whilst the 48-metre band will be found at the top of the dial, or at the right-hand end of the scale.

Stations to be Heard

At these two points the main stations which you should succeed in hearing are as follows: on the 19-metre band, Schenectady, Daventry, Vatican City, and Tokio, in that order commencing at the beginning of the scale. On the 48-metre band, the stations in order of wavelength which are most easily heard are Wayne, Chicago, Daventry,

IMPORTANT NOTE

SOME readers have raised queries regarding the voltages applied to the first valves in this receiver, assuming that as the output valve is rated at 250 volts maximum, this voltage will be applied to the H.F. valve in view of the absence of a series resistance. If the current is calculated, however, it will be found that the rectifier does not deliver 250 volts, but slightly in excess of 230 volts, and the special series choke which is employed will drop this to approximately 200 volts. Thus the first valve receives its rated maximum, whilst the output valve is slightly under-run. This does, however, provide better results than a low-rated power valve, and the use of the low voltage avoids the expense which would be incurred in using a 350-volt-type rectifier and mains transformer in order to provide 250 volts for the output stage.

LIST OF COMPONENTS

- Two all-wave coils, type Triogen with 2-gang spindle (Wearite).
- One 2-gang condenser, .0005 mfd., bar type (Polar).
- One Micro-horizontal drive (Polar).
- Fourteen fixed condensers: Two .0001 mfd.; two .002 mfd.; .02 mfd.; .05 mfd.; .1 mfd.; .5 mfd., type tubular; two 25 mfd., type 3016; 50 mfd., type 3004; 4 mfd., type F2921; two 8 mfd.; type F2920 (Dubilier).
- Thirteen fixed resistances: .5 meg.; two .25 meg.; 100,000 ohms, type F₂; 50,000 ohms; 30,000 ohms; 25,000 ohms; 15,000 ohms; 10,000 ohms; 750 ohms; 600 ohms; 200 ohms; type F₁; 600 ohms, type F₂ (Dubilier).
- One volume control, 10,000 ohms, type CP158 (Varley).
- One reaction condenser .00015 mfd.; type differential (Polar).
- One L.F. choke, type DP11 (Varley).
- One mains transformer, type 803 (Hayberd).
- One Q.M.B. switch, type S80 (Bulgin).
- One fuse-holder and 1-amp. fuse (Bulgin).
- Two socket strips L.S., A.E. (Clix).
- Three component brackets (B.T.S.).
- Five valveholders: one 7-pin, two 5-pin, two 4-pin, type V1 and V2 without terminals (Clix).
- One Plymax chassis, 13in. x 10in. x 3in. (Peto-Scott).
- Two-ft. metal screened lead (Ward and Goldstone).
- Five valves: MVS/Pen. (7-pin met.), 41MHL (met.), 41 MLE, 4XP, 506BU (Cossor).
- One P.M. speaker, type Stentorian Senior (W.B.).

A PAGE OF PRACTICAL HINTS

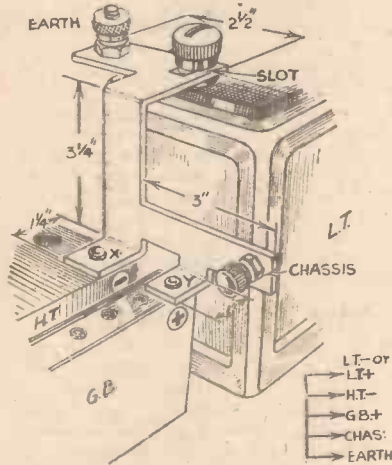
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Battery Bonding Device

WHEN in the process of a "hook-up" I hit upon the idea of a common bonding bar to facilitate testing, and the accompanying sketch illustrates one such

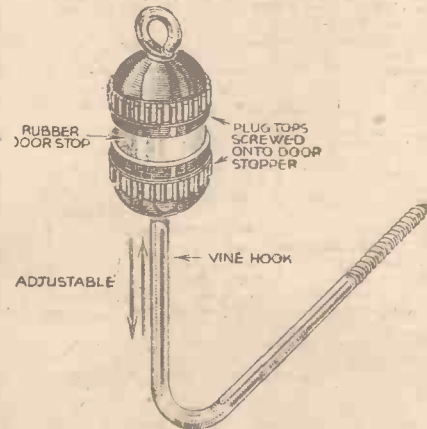


A battery bonding device to facilitate testing.

fitment. The metal employed was aluminium, this being easier to work, although brass would be equally suitable; the measurements given are, of course, optional, and can be altered to suit requirements. Care should be taken when bending the strip—cut from sheet aluminium—to see that cracking does not occur, and it is advisable to cut the slot and drill the holes prior to this operation. The two wander-plug shanks "X" and "Y" were sweated into the holes provided, and sharp edges removed with a file.—S. E. RAYMONDE (Chiswick).

A Stand-off Aerial Insulator

BY utilising a 10in. vine hook, two 5-amp plug tops, and a rubber door-stop 1 1/2 in. by 1 in. dia. I was able to construct a very efficient and durable stand-off insulator for use in aerial erection. The rubber door-stop forms the insulating



A durable stand-off aerial insulator.

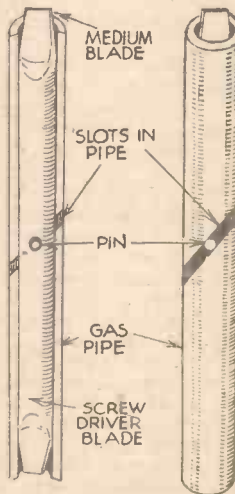
THAT DODGE OF YOURS!

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

medium, and the assembly is arranged as follows: The plug tops are forcibly screwed on to each end of the door-stop, and the whole is worked along the 1/2 in. vine hook. It will be found that the binding action of the rubber permits adjustment to be made without any possibility of slip, and any angle may be obtained by bending the rod in a vice, and finally, the plug rims keep the wire in position. The finished insulator is shown in the accompanying sketch and no doubt the idea of using door-stops will provide further suggestions.—E. W. TAYLOR (Bermondsey).

A Stubborn Screw Remover

SCREWS that cannot be loosened with an ordinary screwdriver will easily become loosened with the aid of the special tool shown in the accompanying sketch. I use it for small and medium-size screws which are often the most difficult to work loose as the slot presents very little purchase. It is well known that a tapping effect on a screw will loosen it, when any amount of torsional strain will fail. This principle I have adopted in my special screwdriver, which is double ended, and a sliding fit inside a piece of gaspipe. A diagonal slot filed about half way around the pipe fits over a pin driven in the driver tool. The gas pipe is a little shorter than the driver so that when one end is being used to remove a screw the other end is below the end of the pipe.

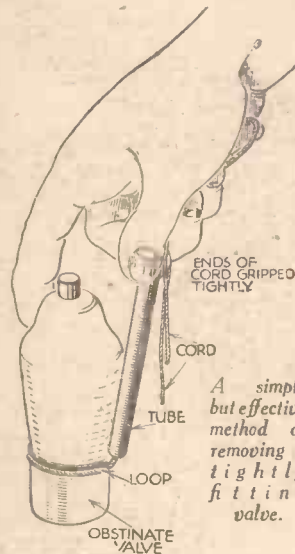


A novel tool for removing stubborn screws.

To use: the driver is put in the screw slot and the pipe turned until the top blade is below the end. Then, gripping the pipe firmly in one hand, the top end of the pipe is lightly tapped with a hammer. The effect of this is to quickly jerk the screw to the left and a few taps will loosen any stubborn screw.—H. MOORE (Leeds).

Removing Obstinate Valves

MODERN multi-element valves, with their smaller size and increased number of pins are often extremely difficult to remove from the set with the fingers,



A simple but effective method of removing a tightly fitting valve.

particularly if the chassis is crowded, and the valves packed closely between components. Removing the valves with the fingers on some car-radio sets, and American midgets, is almost impossible.

The simple tool, shown in the accompanying sketch, enables valves in cramped positions to be readily removed. It consists of a short ebonite tube, through which is looped a length of stout, fine cord. The diagram shows the tool in use; the finger keeps the valve upright, while the steady pull on the tool gently removes the valve from its sockets.—F. J. GOUGH (Ellesmere).

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CAR FOR THE EX

Some Practical Hints on the Construction and Receiver for the Car are Given in



Fig. 1.—A view of the completed chassis, with the speaker removed.

THERE are probably many readers who are interested in car radio, but the amount of information available on the subject appears to be very small.

As the result of a large number of experiments over several years I have been able to accumulate a fair amount of practical experience on the problems involved, and the following details should be of interest to prospective experimenters.

In the first place, all my sets have been battery-operated, and were built with components already at hand.

Tests have been made in various places, and a few details of these are given later.

Incidentally, my first experiments were made three years ago with a portable set in London, Essex and North and South Wales, the set being used in the car.

The Aerial

The first essential is an aerial, and I have always obtained best results with a wire over the car roof (which is in accordance with modern practice) using a rigid rod, mounted on insulators, about 3in. above the roof. A length of 1/4in. brass rod makes an excellent aerial, and the necessary insulators can be devised from bakelite fittings, which are obtainable from any cheap stores.

The next most efficient aerial is one arranged in the roof of the car, and failing one of the special aerials sold for the purpose, a sheet of perforated zinc makes a fairly good substitute.

This, of course, is fixed between the inner and outer roof coverings, and is a job calling for patience, unless you happen to be an upholsterer. A length of wire should, of course, be soldered to the zinc for a lead in.

An alternative method of arranging the aerial is to fit one below the car, and my experiments have shown that a wire lying on the ground is easily best. This is not a practical proposition when the car is travelling, so you will have to keep

it as low as possible. The best plan is to fasten brackets from the back and front axles, extending downwards 4 or 5ins., and suspend the wire from these with an insulator at each end.

A coiled spring should be fitted to one end to keep a tension on the wire. A sagging aerial that waves about will be worse than useless when on the road. A mat aerial under each running-board can also be used, but I have never had such good results with this, as with one of the other types. My running-boards are of metal, but wooden ones may give better results.

The Power Supply

As before-mentioned, I have always

PERFORATED ZINC GRILL OVER SPEAKER

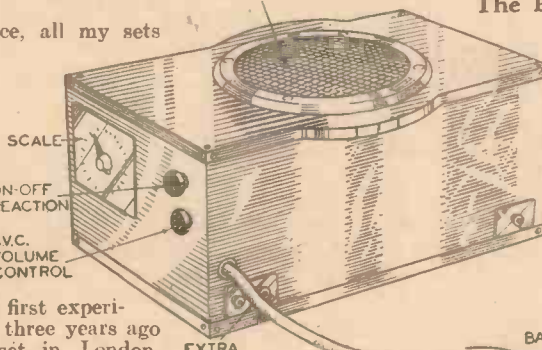


Fig. 2.—General view of the receiver in its case.

used batteries for the power, the car battery for L.T., one wire to earth, and one to the first bus-bar, giving 2 volts. This has no detrimental effect, the current drain being very small. The H.T. battery is mounted in any convenient spot, the tool box being a suitable place, and only two H.T. tappings are needed. Grid bias is automatic, no battery being required. My batteries are wired to a valve-holder under the dashboard, and the set leads to an old 4-pin valve base, this method making it easier to remove the set when required for any experiments to be carried out.

The Circuit

To begin with, the aerial pick-up is very small, necessitating plenty of H.F. amplification, and I have found that two, preferably tuned, stages of H.F. are needed for good results, but for simplicity the first stage can be aperiodic, a 100,000 ohm resistance being used in place of the aerial coil. This gives quite a useful degree of amplification.

A detector is, of course, a necessity, and an ordinary grid detector with reaction will

suit; this can be arranged to provide a simple form of A.V.C. which, though not absolutely essential, is nevertheless desirable.

A powerful L.F. stage is also needed, and there is a choice of several types, L.F. and power, L.F. and pentode, Class B, and

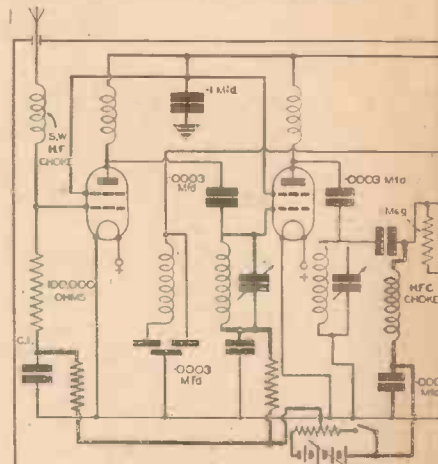


Fig. 3.—Theoretical circuit diagram. (Note: H.T. short-circuit C)

Q.P.P. Not having a Class B valve or a Q.P.P. valve handy I used L.F. and power, resistance and transformer coupled respectively.

The constructor must make his own choice; Q.P.P. or Class B, of course, giving greater volume.

Simplicity of controls is also desirable, and ganged tuning is necessary; dispensing with long waves also assists in this direction. Some form of volume control is needed, and in my case the reaction control is made to do this; but more about this later on.

This leaves three essential controls,

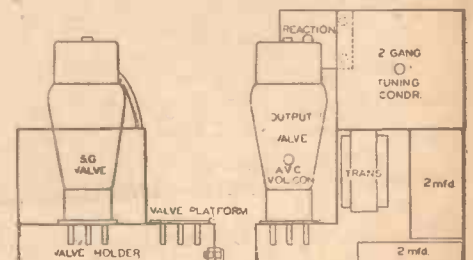


Fig. 4.—End views of the chassis.

RADIO PERIMENTER

Operation of an Inexpensive and Efficient
this Article by A. L. JACKSON

tuning, volume, and on-off switch; wave-change can be ganged to the on-off switch. The speaker must be of small dimensions, and may be incorporated in the set, or used separately. My experience is that it makes the whole job more compact to include the speaker in the set.

latest pleased me sufficiently to be put into a metal box.

In this set no screening cans are used for the coils, as the form of chassis used renders this unnecessary. A glance at Fig. 2, shows the shape of the chassis, which is of stout sheet iron, bent into a box form with a ledge at one edge. Fig. 5 shows the layout of the components, all of which are inside the chassis, only the tuning condenser being on top. The reaction control and on-off switch are mounted on a panel at one end, or on the case itself.

Four valve-holders are fixed on the ledge, and the other one on to a bracket at one end of the chassis.

The speaker, shown in position in the drawings, is actually mounted on the lid

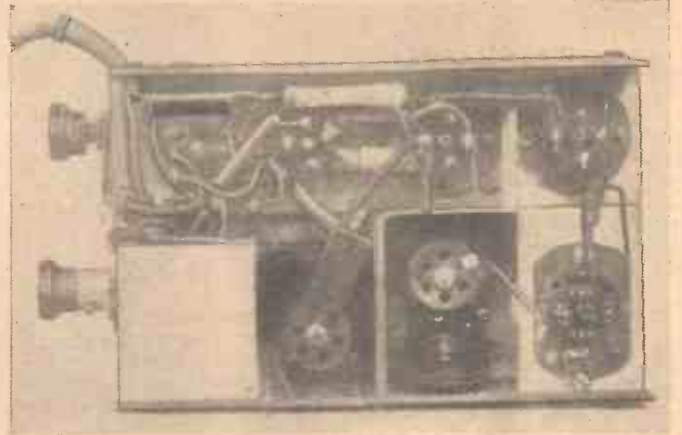


Fig. 7.—An underside view of the chassis, showing the arrangement of the components.

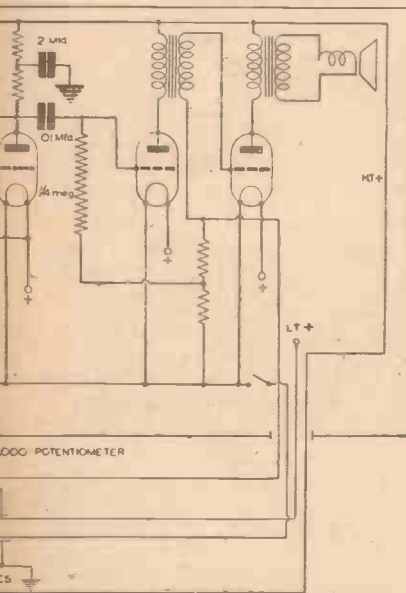
off switch to this. Fig. 6 shows how this is done; the switch itself was taken from an old volume control, and the fixed vanes of the condenser are cut off slightly to allow sufficient free movement to operate the switch, before they mesh with the fixed ones to cause oscillation.

If you wish for a volume control to operate from zero up to oscillation, the free movement of the reaction vanes can be utilised to operate a variable resistance between aerial and earth. A small resistance can be fixed to the condenser with one end to the aerial and the other left free, an arm of springy brass being fastened to the condenser spindle, arranged to traverse this before reaction commences. The reaction spindle, incidentally, is already earthed.

If you incorporate A.V.C. then the volume control will necessitate a third control knob. The A.V.C. system suggested is illustrated by thick black lines in the theoretical circuit diagram, Fig. 3.

Results

First tests were made in London with 12ft. of wire thrown on to the ground as an aerial, and about 80 volts H.T. In South London, although some places were better than others, volume everywhere tried was very good. Quality was not too good when the volume was pushed up owing to the run down H.T., which was originally 120 volts. Using an eliminator in the



A.V.C. is not used, omit thick black lines and and C2.)

I have had very good results from the circuit shown in Fig. 3, which will be seen to consist of aperiodic H.F., tuned H.F., tuned detector, R.C., L.F. transformer coupled power stage. Results of tests with this circuit are given later.

The Set

Having decided upon a suitable circuit, the building of a compact set has its own special problems. During the last two years I have made and tried six or seven car-radio sets before evolving one which satisfied me. Various forms of construction were employed and, while each one was tried out, only the

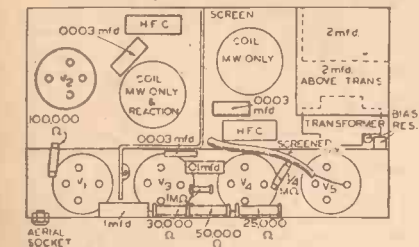


Fig. 5.—Sub-chassis layout of components.

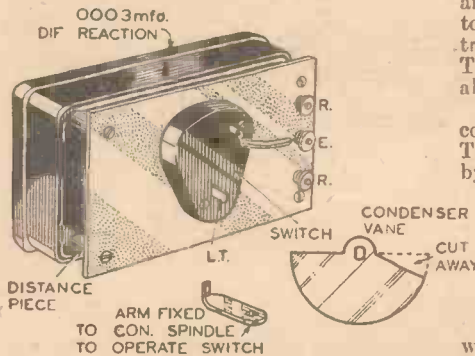


Fig. 6.—The reaction condenser, and details of switch.

of the box, and drops into the space left when the lid is on; two flexible wires connect it to the set.

Several screened leads are used, and these are shown in the drawings, the other wires being omitted for clarity.

Constructional Details

A few hints about the actual construction itself. As a car-radio is subjected to constant vibration and jolting only the very best work should be put into it. All connections should be soldered, as nuts have an uncanny habit of becoming loose after a time; use spring washers where you cannot solder. Wiring is best done with well covered flexible wire, and all earthed points should be soldered to the chassis.

Spirits of salts must not be used for soldering owing to its corrosive nature; Baker's Fluid is preferable, and it is equally suitable for iron or brass.

Valve-holders can also cause a lot of trouble in a car-radio set if they do not grip properly, so make sure of them.

Now with reference to reaction, this will be seen to be controlled by a differential condenser, and I have also ganged the on-

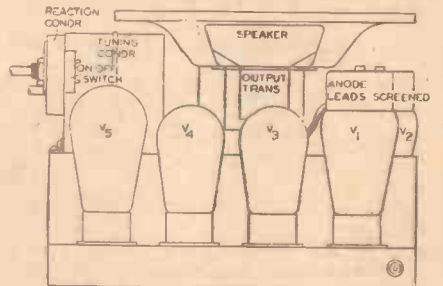


Fig. 8.—Side view of the chassis, showing the horizontal disposition of the speaker.

garage and getting 120 volts gave greater volume and much better quality.

The next test was on a trip from London to Herne Bay, in Kent. After leaving London results were much better, and London Regional and National, and Fécamp, were excellent, Midland Regional and West Regional were also good, though tuning was a bit sharp and reaction had

(Continued on next page)

CAR RADIO FOR THE EXPERIMENTER

(Continued from previous page)

to be used. Several other stations could be heard in daylight with the car stationary, but were not too good with the noise of the engine.

The results at Pitsea, Essex, were about the same, but as it was tested after dark, more stations were heard at better strength, and at least six good programmes were obtained.

The next tests were carried out between London and Bristol.

London Regional and National were good all the way down, and West Regional and Midland Regional also came in strongly. Fécamp, of course, gradually grew less, and although it was still received near Bristol, it was not strong enough for car-radio. At Bristol, London Regional, good; West Regional, excellent, and Midland Regional, good. The West National was also received at good strength.

Several German and French stations came in well after dark, somewhere between the West National and London Regional.

Time did not permit me to fix a roof aerial over the car, and on the Bristol trip the wire was put out through the wind-screen, over the car roof, and tied to the rear bumper—an aerial raised on insulators would, of course, be better still.

Unwanted Noises

A word about disturbance from the ignition and electrical devices. Suppressors on the plugs and lead to the distributor will be needed, together with by-pass condensers. These can be bought in sets with instructions, so it is unnecessary for me to go into the matter here.

Cars passing by can also cause interference to your set. As these disturbances are picked up by the aerial, the more efficient the latter the louder these noises are. To minimise these noises I have found that an ultra-short wave H.F. choke between the aerial and set minimises the trouble considerably.

With regard to ignition interference, this, of course, can be cured at its source by means of resistances and condensers, but a little thought will show that this interference can only enter the set by two ways, viz.—the aerial, and the battery leads.

The set itself is enclosed in a sheet steel box and is earthed to the chassis (See Fig. 1) thus screening it from outside interference.

As car ignition is really a miniature spark transmitter having a very short wavelength we can stop this entering the set via the battery leads by inserting S.W. H.F. chokes in each battery lead with suitable condensers to earth. These should be enclosed in an earthed metal box, and are shown in Fig. 1.

In conclusion, if you are fitting the aerial over the car roof, a length of chromium plated curtain rail will make a nice looking job, and it can be obtained in any convenient length.

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Impressions on the Wax

THE famous composer of "In Town To-night" fame—Eric Coates—adds to his reputation as one of our best writers of light orchestral music with his new suite "Springtime," consisting of a pastorale (Fresh Morning), romance (Noonday Song) and valse (Dance in the Twilight). The suite is played by the Light Symphony Orchestra, conducted by the composer on *H.M.V. C 2926-7*.

America's leading light orchestra, the Boston Promenade Orchestra, gives a good account of the Bridal Cortège from "Le Coq d'Or" and the Overture, to "The Secret of Suzanne" on *H.M.V. B 8633*, while Richard Crean, whom many readers will remember as conductor at the London Palladium, conducts his own newly formed orchestra in two favourite waltzes—"Songe d'Automne" and "Valse Septembre" on *H.M.V. B 8633*.

The New Mayfair Orchestra, under Clifford Greenwood, play a bright selection from the new Gaiety show "Going Greek" on *H.M.V. BD 456*, and the Hungarian Boys' Band from Budapest, now appearing at the London Palladium in "London Rhapsody," play "Waltz of the Gipsies" and "Czardas" on *H.M.V. BD 459*. It is amazing to think that these lads achieve such a fine effect, since not one of them can read a note of music.

Vocal

RICHARD CROOKS continues his recordings of Foster's plantation melodies with "Old Black Joe" and "Massa's in de Cold, Cold Ground" on *H.M.V. DA 1583*, and Herbert Janssen (baritone) forsakes opera for lieder in two songs by Richard Strauss—"Traum durch die Dämmerung" and "Die Nacht" on *H.M.V. DA 1581*.

That greatest of Spiritual singers Paul Robeson gives three "new" ones, "Dere's a Man Goin' Roun' Taking Names," "Work all de Summer," and "Didn't My Lord Deliver Daniel?" on *H.M.V. B 8637*, while Peter Dawson sings two breezy songs of the sea, "Full Sail" and "Sea Winds," on *H.M.V. B 8627*.

Dan Donovan sings two ditties in Irish vein, "I'll Marry ye When Me Garden Grows" and "The Daughter of Mother Machree" on *H.M.V. BD 445*. Jean Sablon (tenor) makes his first record for H.M.V. with two film songs, "Can I Forget You?" and "Afraid to Dream" on *H.M.V. B 8635*.

Last but not least is Max Miller, the "Cheeky Chappie," in two of his latest hits "I Never Thought She'd Do That to Me" and "Let's All Have a Charabanc Ride," on *H.M.V. BD 458*.

Dancing Time

THE H.M.V. company offer a fine selection of dance and swing music this month, of which the following are but a few. "Can I Forget You?" and "The Folks Who Live on the Hill" on *H.M.V. BD 5270*; "The First Time I Saw You" coupled with "Gone With the Wind" on *H.M.V. BD 5279*, and "Whispers in the Dark" and "Stop, You're Breaking

my Heart" on *H.M.V. BD 5277* are all recorded by Roy Fox and his Orchestra. Jack Harris with his popular West End band has recorded "No More You" and "Goodnight to you All" on *H.M.V. BD 5271*, also "The Sheep were in the Meadow," from the new Leslie Henson show "Going Greek," coupled with the popular hill-billy "They're Tough, Mighty Tough in the West" on *H.M.V. BD 5272*. Henry Jacques and his Correct Dance Tempo Orchestra offer this month "The First Time I Saw You" and "In the Mountains of the Moon" on *H.M.V. BD 5276*. There are also titles recorded by Bert Shefter and his Rhythm Octet, Guy Lombardo, Eddie Duchin, George Hamilton and Hal Kemp.

For Swing enthusiasts Benny Goodman and His Orchestra have recorded "Afraid to Dream" and "Roll 'em" on *H.M.V. B 8631*. The Quintette of the Hot Club of France have recorded "Exactly Like You" coupled with "In a Sentimental Mood" on *H.M.V. B 8629*.

Vocalion

BENNY CARTER and His Orchestra, with Coleman Hawkins as the guest star, have recorded "I Ain't Got Nobody" and "Mighty Like the Blues" on *Vocalion S 110*. Coleman Hawkins plays a splendid tenor sax solo in the last number.

Four old tunes in distinctive modern style have been revived by Artie Shaw and his Orchestra. They are "Night and Day" and "Blue Skies" on *Vocalion S 111*, and "Someday, Sweetheart" coupled with "I Surrender, Dear" on *Vocalion S 114*. "Trumpet in Spades" is the title of Duke Ellington's latest recording which is on one side of *Vocalion S 113*. This title has been specially written by Ellington as a jazz concerto for his star trumpet player, Rex Stewart. Ben Pollack and his Orchestra, on the reverse side, offer a new rendering of an old-time favourite, "Jintown Blues."

A Decca Album

THIS month the Decca Company have produced an album containing seven records (fourteen titles) of "Jam Music" which they are selling at 17s. 6d., together with a special leaflet. Names of a number of famous bands who specialise in this type of music appear on the labels. For those readers who may be a bit hazy on this type of music, it consists entirely of improvised music without manuscript paper, played by a small band of men whose styles blend so well that they can, at a moment's notice, make their performance more swifty and more conducive to dancing than many orchestrated swing performances.

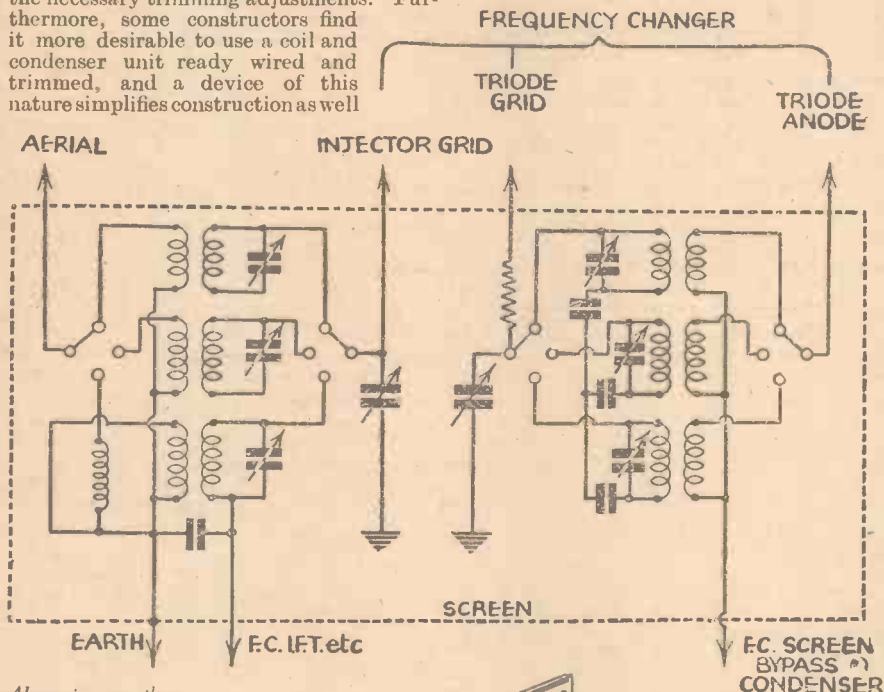
Parlophone

BENNETT and Williams, the phonofiddle comedians, who have also made a number of successful broadcasts, have recorded one of their humorous sketches—"Silly, Isn't It?" on *Parlophone F 930*, and Ivor Morton and Dave Kaye, the well-known pianists, have recorded another "Tin Pan Alley Medley" on *Parlophone F 911*.

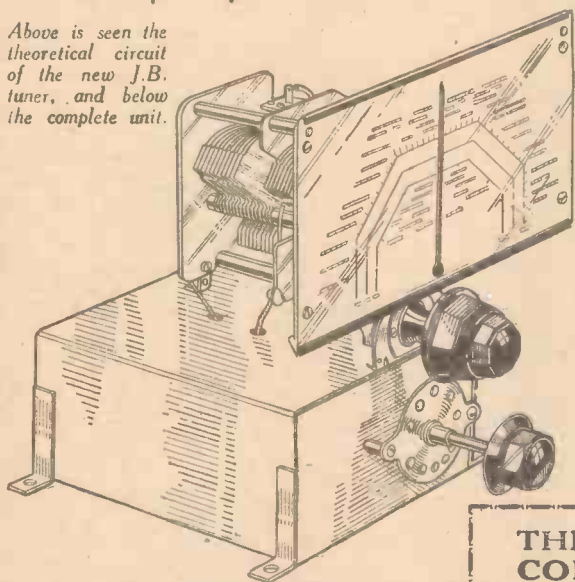
NEW J.B. ALL-WAVE TUNER

ALTHOUGH a number of all-wave tuning coil units are now available for the home constructor, many amateurs find some difficulty in making the necessary trimming adjustments. Furthermore, some constructors find it more desirable to use a coil and condenser unit ready wired and trimmed, and a device of this nature simplifies construction as well

and the entire unit is trimmed and adjusted before sale so that the final adjustment of a receiver is rendered extremely simple and will consist merely of the



Above is seen the theoretical circuit of the new J.B. tuner, and below the complete unit.



adjustment of the trimmers on the I.F. transformers, and slight balancing for stray capacities introduced by the wiring. The makers supply a circuit and blueprint for building an A.C. five-valve (including rectifier) receiver incorporating this unit, and it is stated that a design for a battery model is in course of preparation. An important point about a unit of this type is that the station-name dial which is fitted, together with the accurate lining-up of the circuits, provides the home-constructor with the nucleus of a really good receiver. The price of the model illustrated is 55s.

as removing the need for trimming. Messrs. Jackson Bros., who have previously supplied tuning units of this type, have now produced a new tuner in which the short waves, as well as the normal medium and long-wave tuning bands, are included and this is known as the Lina-core all-wave tuner. A general impression of the unit may be gathered from the accompanying sketch, and the circuit incorporated in the device is also reproduced. It will be seen that it is intended for use with a superhet type of circuit employing a triode-pentode frequency changer stage. The ranges covered are from 16.5 to 51 metres, from 200 to 550 metres and from 800 to 2,000 metres. A station-calibrated dial is fitted to the condenser

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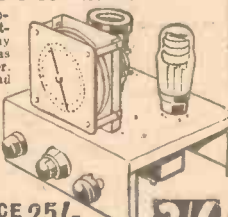
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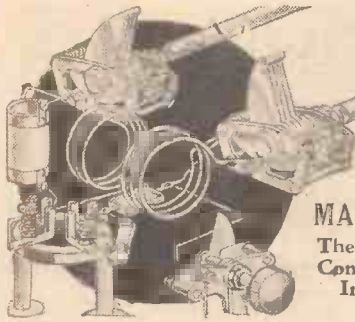
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Short Wave Section

MAKING A PENTAGRID FREQUENCY CHANGER

The "Experimenters" Describe the Alterations Required to Convert the Autodyne Unit Dealt With a Fortnight Ago Into a More Efficient Superhet Frequency Changer

TWO weeks ago we gave details of construction for the first part of the unit-type receiver that we shall describe in full in the course of this series of articles. You will remember that the original unit employed a pentagrid valve, although only the H.F. pentode portion of this was used for the initial unit.

If you have built that unit you should have found it very satisfactory, but when using it as a converter you will probably have noticed one undesirable feature: the same station can be received at two positions on the tuning scale. This is not a fault, and is not peculiar to the unit in question! It is always present in an autodyne frequency changer having only one tuning circuit.

One I.F.—Two Tuning Positions

The reason for the peculiarity is easy to appreciate if you have a slight knowledge of superhet principles. In the superhet you produce an oscillation at a frequency differing from that of the signal picked up by the aerial, and then amplify the resulting "beat" frequency, known as the intermediate frequency. That beat note or beat frequency is the difference between the frequency of the signal and that of the so-called local oscillations produced by an oscillating valve. In the present case the oscillator also serves as the first detector. Consequently, it must be tuned to a frequency or wavelength differing from that of the received signal by the I.F. It is obvious that you can produce the I.F. by tuning the oscillator to either a higher or lower frequency than that of the signal. This means that any particular transmission can be tuned in by setting the tuning condenser to a position giving either a higher

or lower frequency than that of the signal.

In the majority of instances, it is found that reception is better when the receiver is tuned to a frequency higher than that of the signal; in other words, when it is tuned to a lower wavelength. There is another

by The Experimenters

objection to the autodyne system, which is that if two stations are separated by twice the intermediate frequency, interference between them will be heard when the auto-

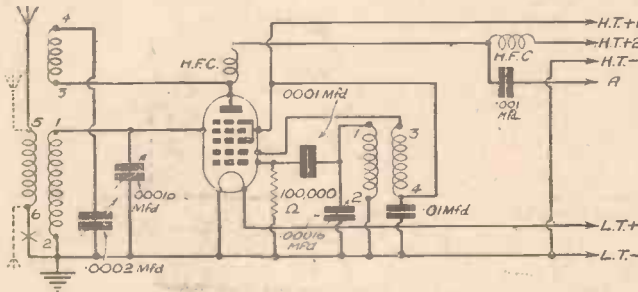


Fig. 1.—This is the modified circuit of the frequency-changer unit. The valve is now used as a pentagrid.

dyne frequency-changer is tuned to a position midway between them.

By employing two valves, or one "double" valve, these difficulties may be removed. That is, by having a first detector that is tuned independently of the oscillator. In that case the aerial circuit—which feeds the first detector—is tuned to the signal frequency, while the oscillator is tuned to a higher fre-

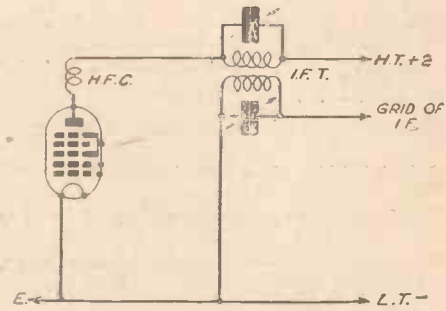


Fig. 4.—Connections for an I.F. transformer to replace the choke-capacity coupling.

quency. The difference between the two frequencies depends upon the intermediate frequency employed. Nowadays this is generally 465 kc/s (corresponding to about 650 metres).

Simple Alterations

A complete circuit for the pentagrid frequency-changer is given in Fig. 1, and this should be compared with the circuit employed for the original unit. The only important difference is that the oscillator grid and oscillator anode are now used, and are connected to another tuning coil and tuning condenser. A grid leak and condenser are used for the triode oscillator, and a normal S.G.-type H.F. choke replaces the 'phones. The previous grid leak is not used, but the .0001 mfd. grid condenser is transferred to the oscillator circuit.

All connections for the new components are shown in Fig. 2, where the original connections, most of which are retained, of course, are indicated by broken lines. Fig. 3 shows the positions of the new parts, and it can be seen that the six-pin coil-holder and .00016-mfd. tuning condenser are so placed as to balance up with the similar parts used in the original unit. Battery connections are exactly as before, and the unit can be connected to an H.F.-Det.-L.F. receiver in precisely the same manner as that previously described.

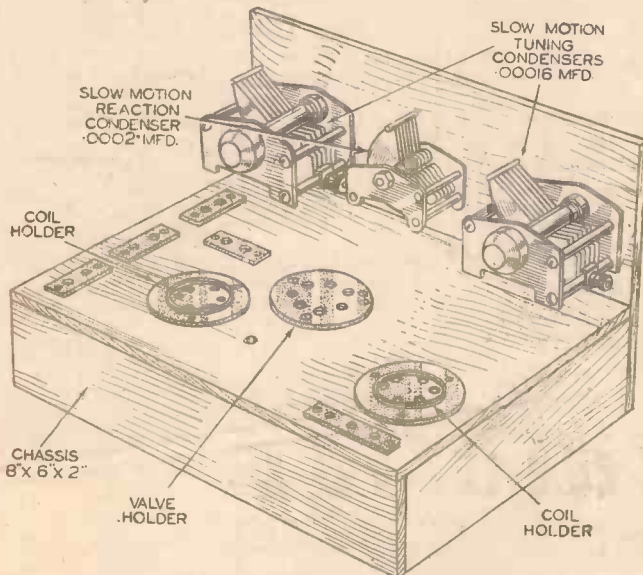


Fig. 3.—Here you see the positions of the new parts on the chassis.

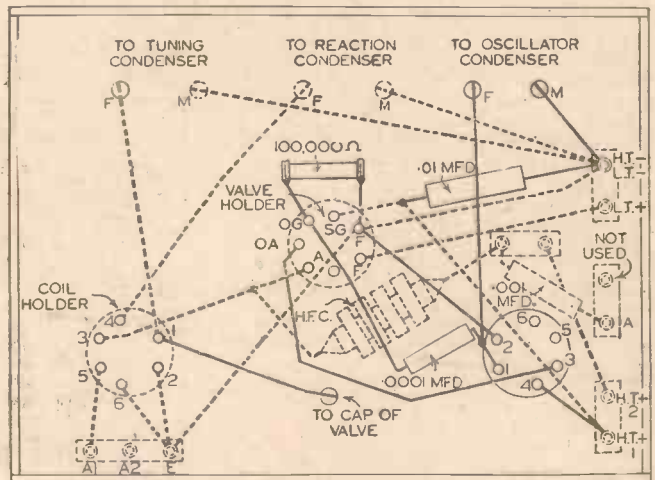


Fig. 2.—New wiring is shown in full lines, the original wiring that is unaltered being in broken lines.

SHORT-WAVE SECTION

(Continued from previous page)

be known to many of our readers a brief description will probably be of interest.

At first sight, it might be mistaken for an unusual superhet arrangement, since the first valve is an electron-coupled oscillator. This is followed by a triode detector with reaction and by a transformer-coupled output pentode. The circuit can, in fact, be used as an autodyne superhet, but our correspondent finds that it operates most satisfactorily as a "straight." The electron-coupling arrangement of the first valve provides a certain amount of reaction, but self-oscillation can be prevented by suitable adjustment of the screening-grid potentiometer. The degree of reaction obtained serves to increase the sensitivity of the H.F. valve and to counteract any flatness of tuning in the aerial circuit.

Mr. Dakers found that he could get down

to about 15 metres, and thought that the set might operate right down to 10 metres or less if an ultra-short-wave choke were inserted in the anode circuit of the first valve at the point marked X. But on connecting the additional choke it was found that the detector could not be made to oscillate. Why? Frankly, we have not been able to give an answer with which we are completely satisfied, nor has anyone else to whom we have put the problem. We have made a suggestion, but we shall not publish it at the moment.

No Prizes Offered

Instead, we leave the problem to you and look forward to some of you giving us a satisfactory explanation. The choke used is not defective, and is not screened. Put on your thinking caps, and give us your views.

About the circuit our correspondent

writes: "The regeneration in the first stage definitely does improve selectivity. I do not use an aperiodic aerial coupling, yet I can separate Bound Brook and Daventry on the 17 mc/s band." The only real trouble appears to be in connection with a certain amount of inter-action, although additional screening is to be tried in an attempt to overcome this minor fault.

If any other readers have had any experience with a circuit of this nature we should be glad to hear of their results. We should also appreciate any hints that they would like to pass along to Mr. Dakers. Of course, we know that the circuit is not unique, but it is unusual, and we have not experimented with it ourselves as yet.

Thanks to all the other readers who have recently sent us such interesting letters. 73's.

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LEAVES FROM A SHORT-WAVE LOG

Chile Facilitates Identification

BY their call the Chilean stations indicate the channel on which they broadcast. As an example, the Santiago short-wave station on 25.64 m. gives out the call-sign CB1170, the figures showing that the transmitter is working on 11.7 mc/s; it relays CB89, a medium-wave station in the same city operating on 890 kc/s or 337.1 m. If all short-wave stations adopted this method, it would be an easier matter for the listener to identify the transmitters.

Other Chilean Stations

CB960, on 31.25 m. (9.6 mc/s), *Radio Pilote*, works daily from G.M.T. 16.30-19.00, and from 02.30-04.00. Address: Casilla Postal, 1342, Santiago, Chile. CB615, *Radio Servicio*, at Santiago, operates on 48.74 m. (6.15 mc/s) during the winter, and on 24.39 m. (12.3 mc/s) in summer. Address: Casilla Postal, 761, Santiago (Chile). CB119 (1109?), situated at Valdivia, was recently logged on 24.98 m. (12.01 mc/s), thus apparently demonstrating that it is not on its right channel.

International D'Xers' Programme

HP5A, Panama City (Republic of Panama), on 25.64 m. (11.7 mc/s), *La Voz de Panama*, announces that a special transmission destined to the I.D.A. will be given on December 2 from G.M.T. 04.00-05.00. Details of the items broadcast are supplied in both English and Spanish, and a double-toned gong is used as interval signal. Reports should be sent to: Radiodifusora HP5A, Sociedad Publica de Radio (S.A.), Panama City (Republic of Panama).

Acknowledgements by Microphone

Should you pick up a transmission from VP3MR, Georgetown (British Guiana), on 49.42 m. (6.07 mc/s), don't write to the station for a "veri." The studio always acknowledges all reports of reception in a special broadcast taking place every Sunday between G.M.T. 00.45-01.15, and does not reply by post.

RECORD REALISM
(Continued from page 269)

overcame this in my case by using a separate pick-up for these two makes of disc. The output from this amplifier is fed into a two-stage unit employing a D.O.26 in the output stage feeding a twin loudspeaker with a frequency filter, and gives remarkable results.

Mechanical Details

On what we have termed the mechanical side there are many small points which are often overlooked. The mere fact of wrong storage of records will result in bad reproduction, as the records may become slightly warped and thus will give a rise and fall in the reproduction—generally referred to as a "wow." Absolute flatness is essential, and I prefer to store records flat—one on top of the other, although this means more trouble when sorting them out. If they are stood upright, they should be packed into a storage rack or kept in an album so that they do not rest at an angle, as during very hot weather or in a room where the temperature changes considerably they will be liable to sag in the centre or otherwise go out of truth. Incidentally, if you have a treasured disc which has become distorted in this way, it may be restored to its original condition by placing it between sheets of glass in a warm place, but do not heat it.

Such details as the position of the needle, and the angle of the needle, will be taken care of by mounting the pick-up according to the maker's instructions and, therefore, these should be very carefully carried out. Do not be tempted to add additional weight to a pick-up to improve volume, as although this does act in some cases, it will increase the wear and tear on the sound grooves and shorten the life of the disc. Use good needles, and if you prefer the "permanent" type—that is, one which may be used for playing a number of records—do not remove it from the pick-up until it is finished with,

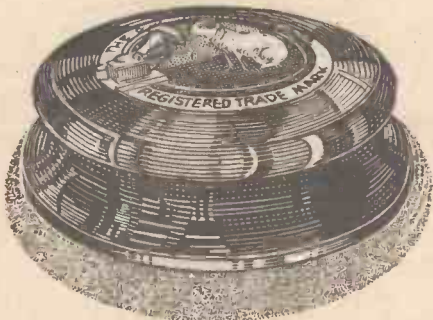
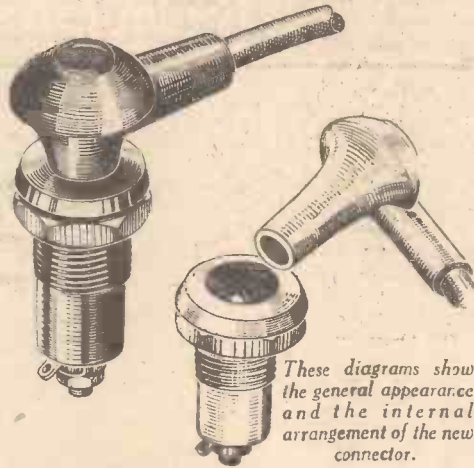


Fig. 4.—This accessory is most valuable in prolonging record life.

as any attempt to replace it will result in damage to a record due to the fact that the needle wears away in a certain manner and the worn edge may be the means of cutting the groove if placed in a suitable position. Remember that dust is an enemy of the record and although the needle appears to clean the dust out of the groove, the piled up dust and grit which forms will result in damage to the groove and increased surface noise. Use the recommended felt pad to keep the records clean, and always brush them with this before playing, even although they may have been stored in a cupboard. There will be very fine particles of steel from the needle after a playing and these are removed by means of the felt pad.

BELLING-LEE CONNECTOR

AN interesting new plug-and-socket connector has been produced by Messrs. Belling and Lee for use in television and other high-voltage apparatus. As may be seen from the accompanying illustration adequate insulation is provided, together with means for attaching a standard cable-type connecting lead up to 9 mm. and which is thus rendered safe for use on supplies up to 6,000 volts. It is obtainable in two forms, either with the flex connector "live" or with the chassis section "live." It is substantially moulded in bakelite and the chassis section is of the one-hole fixing type permitting of quick assembly with adequate insulation. It will be found invaluable in the building of a modern television set, and will permit of a separate H.T. lead or for any other purpose where a high-voltage lead has to be employed and risks have to be avoided. The price is 4s. 6d. in either type.



These diagrams show the general appearance and the internal arrangement of the new connector.

High-voltage Valveholder

SIR.—Further to our warning letter of October 27th on the question of corona discharge with our high-voltage valveholder, we now have the following report to give you.

When tested with D.C. plus superimposed A.C., corona became visible in a dark room at 10,750 volts peak. This voltage consisted of 5,375 volts D.C., plus 5,375 volts peak A.C.

When tested on 50 cycle A.C., with no D.C., corona first occurred at 7,300 volts peak.

In view of the above tests and the fact that corona in time leads to "tracking," we now feel that this valveholder should be used only for medium voltages unless mounted on insulation pillars, and we are immediately proceeding with an improved design to deal with the 11,000 volt cases.

We must apologise for having fallen into the same error as so many television component designers of not thoroughly investigating the question of corona.—**BELLING AND LEE LTD.**

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A.C. mains Superheterodyne. With variable selectivity, and tone control. Specification: 6 Tuned bandpass (H.F. and I.F.) circuits. Wavering 200-2,000 metres. K.B. "Fototune" dial, pick-up sockets, moving coil speaker, output 3 watts. Walnut Cabinet. Overall dimensions 18 1/2" high, 15 1/2" wide, 11 1/2" deep. Amazing Value.

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Efficient circuit utilises H.P. Amplifier, detector and output Pentode Valves. K.B. "Fototune" dial (Not illuminated). Wavering 200-2,000 metres. Highflux Moving Coil speaker. Wonderful volume and selectivity. Provision for Pick-up. Less batteries. Housed in Walnut Cabinet. Overall dimensions: 17 1/2" high, 13 1/2" wide and 9 1/2" deep.

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EST. 1924.

THE BRITISH LONG-DISTANCE LISTENERS' CLUB

Philately and Q.S.L. Cards

AN interesting problem has been put forward by a reader who is interested in both Philately and Q.S.L. card collecting. His point is how to preserve both items, as the foreign stamps are of most value when left on the cards, and the best side of the card is on the reverse to that which carries the stamp. When the cards are pinned up on the walls the stamps are hidden, and if the cards are filed away in a stamp col-



Here is a commercial clock-face or aeroplane dial.

lection, the picturesque card inscriptions are lost. This is somewhat of a problem, but surely, the best way out is to remove the stamps from the cards. Provided that they show the postal cancellation the value is still there as they have obviously been used, and there are only a few isolated cases where a special message is used in the cancellation machine which must be retained, and in that case it is a matter of making up one's mind which is the more important—the stamp or the card. We believe that certain amateurs are prepared to send the card in an envelope so that the stamp can be kept, and in certain cases, if you mention that you are a stamp collector, no doubt you will find a kindred spirit at the other end of the line and an exchange of stamps may result.

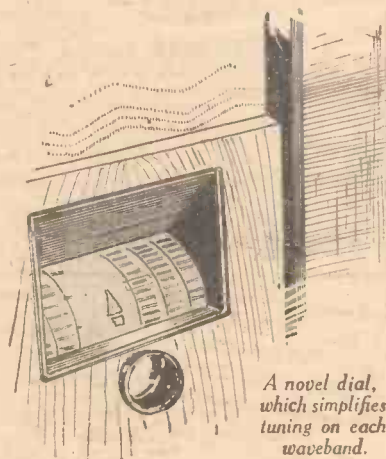
The Best Dial

A debate held recently at a branch club dealt with the type of dial which should be used for modern receivers, and some interesting facts emerged as a result of the discussion. Whilst one member prefers the old-fashioned dial with a small escutcheon through which only a very small part of the scale is seen, the majority, it would appear, prefer the full-vision type of scale. There are many special arrangements which can be employed in this important part of a modern receiver, although, of course, the tendency in commercial apparatus is now to dispense entirely with the dial and use the automatic push-button, or dialling type of tuner. Manufacturers have, in the past, experimented to produce dials which will have an appeal on the grounds either of

novelty or ease of tuning, and these have included many patterns, from the full clock-face or aeroplane arrangement, to the self-changing scale for separate wavelengths. One disadvantage of the single dial, no matter how large or of what shape, is the confusion which exists due to the large number of markings which it carries. The dial which changes, and only exposes a small portion according to the waveband in use, overcomes this, and also removes any ambiguity concerning the range to which the set is tuned. The home constructor can make any particular type of dial and thus suit his individual requirements, but it should be borne in mind that it is now possible, with modern components, to purchase a dial ready calibrated with the names of the most important stations such as may be received on the usual type of receiver.

Variable Selectivity

A member in Brighton wishes to know whether he can modify his existing commercial receiver, which is used by the members of his family, to improve its performance. We are, of course, opposed to the modification of commercial receivers, but an important point should be borne in mind in connection with the superhet type of receiver in which selectivity is found to be so high that quality suffers on the local stations, or where it is desired to improve selectivity and yet obtain good quality on the locals. The ordinary type of I.F. transformer may be modified in such cases



A novel dial, which simplifies tuning on each waveband.

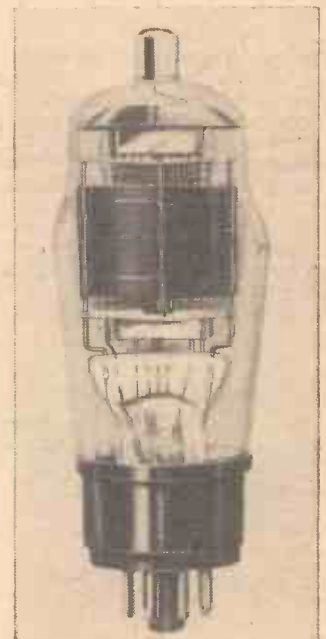
by adding a tertiary winding. The number of turns to use will depend upon particular circumstances, such as the design of the transformers and the type of circuit with which they are employed. The winding in most cases should consist of 10 turns or so wound over the primary winding, and wound in the same direction as the primary. A thin layer of paper or Empire tape should first be wrapped round to provide insulation and separation. One end of this additional layer should then be joined to the lower end of the secondary winding, the end which is usually joined to earth or the A.V.C. line. A single-pole change-over switch should then be mounted as close to the transformer

as possible, operating it by means of an extension handle if necessary, and the A.V.C. line or the earth line should then be connected to the arm of the switch, and to the two remaining contacts the end of the secondary and the end of the tertiary winding should be joined. The switch will then enable the selectivity to be modified, and in some cases it may even be possible to open the primary and secondary windings to provide a higher degree of selectivity than was originally given, as the additional winding will assist in providing the flat tuning desired for quality reception.

The modified transformer should be joined in the anode circuit of the frequency-changer stage, and should thus be the first I.F. transformer in the set, and if necessary the trimming condenser across the secondary should be disconnected at the "earth" end and joined to the case or otherwise connected direct to earth.

HIVAC ALL-STAGE VALVE

THE development of the special Hivac valve which is designed for use in any stage of a receiver will go a long way to simplifying receiver design. This particular valve is of the multi-grid "critical distance" (Harries) type, designed for mains operation, and is of such a nature that it may be used as a frequency-changer, detector or even an output power valve. The heater is of the 15 volt .3 amp type and there are, in addition to the heater-cathode assembly, five grids and an anode. The valve may be fed from a transformer in an



This is the illustration of the Hivac all-stage valve, which was used to illustrate an article in *Osram International Valves* in our Nov. 6th issue.

A.C. receiver or with the usual series-fed heater arrangement in an A.C./D.C. set, and it may be controlled from a standard A.V.C. circuit. A separate grid is employed for the A.V.C., and this provides a much-improved anti-fading action, whilst a more linear degree of amplification is obtained than when using a standard type of valve. Full details, with a suitable circuit, may be obtained from the High Vacuum Valve Company, and the price of the valve is 13s. 6d.

BRIGHTON POLICE RADIO

Some Details of the Equipment Used by the Police Force at Brighton, and the Use to Which it has Already Been Put

VARIOUS authorities throughout the country have experimented with pocket radio apparatus for the police and for the fire brigades, and at certain places some remarkable results have been achieved. The Brighton Police force were probably the first in this country to install the apparatus as part of the regular equipment of constables on duty, and the results already obtained—in spite of the fact that the apparatus is not yet perfected—shows that there is likely to be a very much wider application of this type of apparatus in the future. Unfortunately, experiments in London and other large towns have not been so successful, principally owing to the tremendous amount of interference which is experienced from the various electrical machinery, cars and other apparatus which are in use, and also owing to the screening of the many high metal-skeleton buildings.



A constable using the earphone.

Results Obtained

At Brighton, the apparatus which is employed is in two sections, both of which may be seen in the upper illustration on this page, and the receiver and batteries are contained in the larger unit, whilst the other incorporates an earphone and an alarm bell. The two are connected by a cable which enables the two sections to be placed in pockets in the constable's tunic, with the connecting cable passing across the chest. The calling-up device is probably the most important feature of the set, as by means of this the chief constable at headquarters can cause the bell in the constable's pocket to ring, and thus warn him that a message is to be broadcast. When the constables hear the bell, the earphone is removed and held to the ear, at the same time pressing a lever which enables the message to be heard and the alarm circuit to be disconnected.

To ensure reliability, the principal police telephone boxes are used as a storage point for accumulators, and should the receiver be given excessive use, the constable may call at the nearest box and obtain a replacement accumulator. Several interesting events are recorded at the Brighton

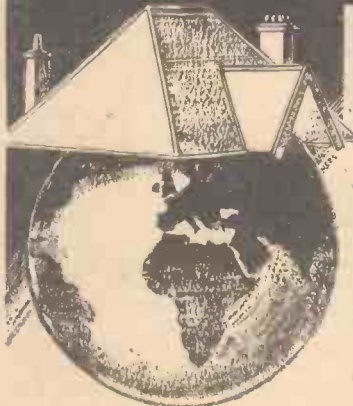
headquarters to prove the value of the equipment. On one occasion a householder found a man in his study at 12.45 a.m. He telephoned to the police from a police telephone box. At 1.5 a.m. a wireless message giving a brief description of the man was transmitted and at 1.15 a.m. he was arrested, and at the Quarter Sessions on the same day he was sentenced to three years' penal servitude.



The complete apparatus is made up in two small units and weighs less than two pounds.

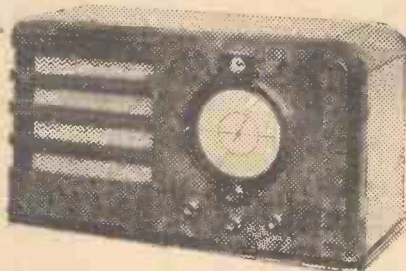
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Be your home ever so humble you can be entertained by the best opera singers—military and dance bands—drama and light music—football news and sports commentaries and variety programmes brought under your roof from all parts of the world if you possess a PILOT All-wave radio.

Now that the dark evenings are with us the need for cheerful and inexpensive home entertainment is causing thousands to SEE, HEAR AND BUY PILOT, the "All-wave receivers" which give "All-world Listening."



PILOT MODEL U.475. A De Luxe 7-valve All-wave Superhet, for A.C. mains. Covers 4 wavebands, giving "All-world listening" on 16-52, 48-150, 175-550, and 750-2,000 metres. Electronic tuning beacon. Compass dial illuminates to show the waveband in use. A "World getter."

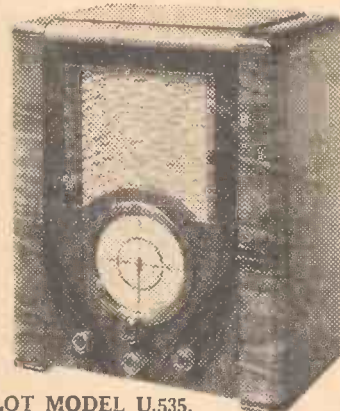
17 GNS.

PILOT MODEL B.344. A battery-operated 4-valve All-wave Superhet. Price without batteries, **11½ GNS.**

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PILOT MODEL U.535.

See complete "Test" report on page 244 of last week's issue.

A 5-valve All-wave Superhet. For A.C. mains. 3 Wavebands covering 16 to 2,150 metres. This Pilot gives you "All-world listening," and is wonderful value for **12½ GNS.** money.

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

More Prizewinners' Thanks

SIR,—I have received my loudspeaker, which I won in your recent competition, and wish to thank you for same. I have been a reader of PRACTICAL WIRELESS since the first issue, and wish your good paper every success.—Geo. Renton (Penicuik, Midlothian).

SIR,—This is to acknowledge receipt on November 4th of the Stentorian loudspeaker awarded me in the recent PRACTICAL AND AMATEUR WIRELESS competition.

I have much pleasure in thanking you for the excellent and most generous award, which even now has gained the reputation of the finest piece of radio apparatus in a home largely composed of radio apparatus. May I also express my appreciation of your paper to which I wish all prosperity.—WALTER R. TAYLOR (Aberdeen).

SIR,—I should like to express my appreciation of the prize that you awarded me in your recent competition. It is a fine loudspeaker, and I was really in need of it.

Also thanks for the articles which have just commenced concerning the construction of a superhet. With the fine articles now appearing I look forward to each issue of PRACTICAL AND AMATEUR WIRELESS.—J. F. HITCHCOCK (Fetcham, Surrey).

SIR,—I take pleasure in informing you that I have just received from the makers the Stentorian speaker which I won in your Radiolympia competition. It is, indeed, a splendid prize, and I wish to thank you very much for it.

May I also take this opportunity to thank you for such an instructive and up-to-date magazine.—JOHN WANN (Leuchars, Fife).

A 20-metre Log from Newbury

SIR,—I hope that the following 20-metre log may be of interest to you:—

Heard on 'phone on Saturday, October 30th (times in G.M.T.):—16.46 G.M.T., PK4DG, R5; 17.32 to 18.50, ZS3F (S.W. Africa), R5 to R4; 18.00, FB8AH (Madagascar), R5; 21.36, LU5AN, R6; VO6D, R7; 22.00, HH5PA, R6; 22.17, CE3AI, R5; 22.23, CE3CO, R6; 22.32, CO8JB, R5; 22.35, PY1EA, R4. Also heard:—HB9AB, 9CH, SP1DC, FA8GT, FT4AM, SUIRK, VE1EI, 2AA, 3ABD, WINW, 10M, ZB1L, PY5AQ, G2ZO, all at R4.8.

On 'phone on Sunday, October 31st:—07.43, CE3AC, R5; 07.50, VK2QR, R3, Q5; 08.16, VK3WA, R5; 08.38, VE4AW, R3-4; 08.50, KA1ME, R2, Q4; 09.2, W7EKA, R3-4, Q5; 17.24, KA1ME, R5; 17.50, ZB1H, R5; 18.58, PY1FR, R4-5; 21.52, CO2RA, R6; 22.02, VP6TR, R6; 22.08, HH2B, R5, Q5; 22.11, ZP2AC (Paraguay), R6-7, with an F; 22.26, HK3JA, R5; 22.29, CO2EG, R5, Q5. Also heard:—W4BAY, 4DRP, 8BRA,

8GUY, 8QDU, 9JIL, 9TAK, 9RUW, 9JIE, 4EHG; (evening) WIISC, 2CDL, 3CHD; VE1DX, 3QZ, PAOBE, OWF, SM7YA, OH5NR, OE6DK.

Other unusual calls heard since October 1st were:—VS2AK, LY1X, VO6JQ, ES5D, K6KMB, TI2FG, VQCRE (R4-5, Q5, 17.20, October 23rd), and 7 VK'S, HC1FG, 2 LU's, 3 PY'S, OA4AI, etc.

I think that the most remarkable fact regarding conditions on the two days noted above is not so much abnormal signal strength as the numbers heard, and the appearance of several little-heard countries, like ZS3, FB8, HH, OH, and ZP, which is, I think, together with CP, YS, XU and J, one of the rarest of them all. Doubtless my own will be corroborated by other readers' experiences.

My receiver is an o-H.F. pen. det.-triode L.F., 'phones, or with additional pentode O.P. and M/c speaker, aerial 50ft. in roof.—N. J. RUTTER (Newbury, Berks).

Our Short-wave Receiver: A 10-metre Log

SIR,—I am writing to express my appreciation of your paper. I have been a regular reader now for just over a year and have never yet failed to find something of interest. I started to make wireless sets when I was thirteen, and since then have made ten sets, many of which came from the pages of your paper. Nearly a year ago I built your "Simplest One-valver," but like most of my other sets it failed to work at first. This I may add was through no fault of the set which, when I did get it to go, worked marvellously. After that I made two more short-wavers, one of which was described by the "Experimenters," and then I made the set which I have now, an o-v-1 with 'phones. I have had it going for about three weeks, and only three days ago decided to try ten metres. Here is my 10-metre log for the two days. W1—APS, CAO, BQK, ABO, KEP, BGK; W2—JQX, DAG, JCY, JKQ, HPZ, HJ; W3—GSV, QRX; W4—FIT, GB, EV; W6MLX; W8—LGO, JYY, W9XA.

My aerial is a 50ft. inverted "L" aerial, about 30ft. high, but is rather screened by roofs. I am only fourteen, but soon intend to get an A.A. licence, and then the full licence.—W. B. PENNINGTON (Loughborough).

Heard on 20 metres

SIR,—I have been a reader of your paper for some time now, but have not noticed a log from my district.

To give a list of all the individual stations I have logged would take up quite a large amount of your valuable paper, and so below is a list of countries in which I have heard amateur stations. All were heard on 20 metres.

Algeria, Argentine, Austria, Azores, Belgium, Bolivia, Brazil, British Honduras, Canada, Colombia, Chile, Denmark.

Dominican Rep., Egypt, Estonia, France, Great Britain, Cuba, Greece, Hungary, Holland, Hayti, Ireland, Italy, Lithuania, Morocco, Norway, Newfoundland, Portugal, Panama, S. Africa, Spain, Switzerland, Sweden, U.S.A., and Venezuela.

This makes a total of 36 countries, and if broadcast stations were included the total would be raised considerably. The receiver I am using is an o-v-1, on 'phones, and the aerial is a 33ft. Windam pointing almost due North and South. Wishing your paper every success.—S. MAY, jun. (Stockport).

Battery Set Quality

SIR,—I am very glad to see from a recent issue that you propose going further into the above subject, as I feel sure there are many besides your correspondents who aim at quality from a few stations rather than that given by average commercial sets.

Since you ask for opinions, I suggest quite a modest set, with, say, H.F. pentode, diode detector and push-pull output. In this neighbourhood it seems that band-pass tuning would be necessary owing to the difficulty of cutting out the local station. There should be no reaction, and volume control can be by means of a differential condenser in the aerial.—FREDERIC LEWIS (Birmingham).

An Ultra-S-W Log from Gloucester

SIR,—As I have not seen an ultra-short-wave log from this district, I enclose mine and I hope it will be of interest to other readers. The receiver is an 0-v-1, and the aerial is a 66ft. sloping aerial pointing W. and E.

The 28 mc/s band is very variable here. So far I have heard all W district stations on 'phones, including W6AM, W6ITH, W6NRX, W6NF, W6OZH, W6NLS, W6ANR, W6JJU, W6JFO, W5NMF, W5JCX, W5ZA, W5EHM, W5ERX, W5FDE, W5FGG, W7MC, W7EMP and VU2CQ. On 31.6 mc/s I have heard several of the U.S.A. broadcasting stations, who, unfortunately, QRM each other. I have logged W3XEY and W8XKA. Transmissions from W2XEN and W2XIJ (police stations) have been heard at R8. These are best heard about 18.00 G.M.T.—A. ROZIER (Gloucester).

CUT THIS OUT EACH WEEK.

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- THAT screening is not complete in a component unless every side of the component is covered by an earthed metal surface.
- THAT interaction can occur through the proximity of leads, even although they run at right-angles.
- THAT the idea of using twisted flex for A.C. mains leads in the heater supply is to avoid hum.
- THAT hum can be induced in an A.C. receiver due to induction between speaker leads and mains leads in the wall.
- THAT the interference from morse stations on a wavelength corresponding to the I.F. of a superhet may be avoided by using an I.F. filter across the aerial circuit.

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

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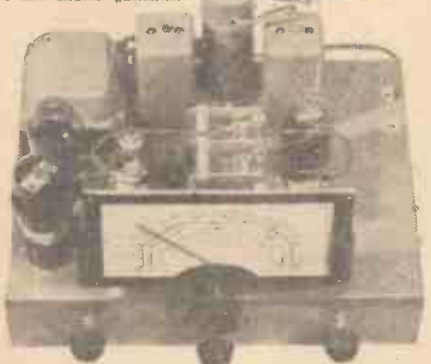
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RADIO CLUBS & SOCIETIES

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

Bradford Short-wave Club

ON Friday, November 19th, before members of the above club, a demonstration will be given by Messrs. Lissen. This will commence at 8 p.m., and, as is usual with all special evenings, anyone interested is invited.

It appears that several intending visitors have had difficulty in locating the club premises at Bradford Moor Council Schools. The school is situated at the junction of Leeds Road and Killinghall Road, and the entrance used is that in Killinghall Road.

Persons requiring information about the club should write to the secretary, S. Fischer, Edenbank, 10, Highfield Avenue, Idle, Bradford, Yorks.

The Croydon Radio Society

YET another member lectured for the Croydon Radio Society's meeting on Tuesday, November 2nd, in St. Peter's Hall, Ledbury Road, S. Croydon. The vice-chairman, Mr. G. A. Hoskins, was in the chair, and introduced the chairman, Mr. W. J. Bird, whose topic was "Sound-film Reproduction." He recalled the projection apparatus in a cinema for a sound-film, describing the sound head with the exciter lamp, and thus passing on to consideration of the selenium cell which, of course, changed the light impulses into sound.

The society imagined, thought Mr. Bird, that the amplifier would have a beautifully straight response curve, but he was sorry to disappoint the purists. In practice, he explained, the response curve had to be adjusted to suit the acoustic properties of the particular hall. Indeed, he spent much time in dealing with various correction circuits, and summing up a typical curve, first came the bass boost, then voice frequency filter, and top cut beginning at 7,000 cycles with drop of three or four decibels at 9,000 cycles.—Hon. Pub. Secretary: E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

Exeter and District Wireless Society

AT a recent meeting of the above society, Mr. F. S. Rumball dealt with "Radio on Moving Vehicles." He demonstrated various makes of car radio, and also showed how the many sources of interference could be overlooked. Many new vibrators were demonstrated, and also various aerial systems in use for radio installations on cars, etc.

Will members please note that the visit to the Exeter City Power Station has been altered from November 29th to November 30th.

At the last meeting of the society a lecture was given by Mr. D. R. Barber, B.Sc., F.R.A.S. The title of the lecture was "The Ionosphere."

Mr. Barber exhibited numerous slides and took his audience through the various layers, pointing out the peculiarities of each layer. A remarkable fact proved that in the ozonosphere the temperature is always 30 degrees centigrade, i.e., hotter than the earth's surface. The two layers, which are 60 miles and 150 miles above

the earth's surface, are more or less produced by the action of ultra-violet rays.

The next part of his lecture dealt with polarization, and here again it was shown that in the northern hemisphere the left-hand wave was about five times as strong as the right-hand one, whereas in the southern hemisphere the reverse was the case.

Methods were shown in the calculation of the heights of various layers and how radio echoes are recorded. On some slides it was clearly shown how one radio signal produced three and five separate echoes. The lecturer went on to say that the lower layers were discovered two years ago and they only existed in the summer, and it is these layers, which are designated D.1 and D.2, which affect ultra-short-wave radio work.

Meetings are held each Monday at 3, Dix's Field, Exeter, at 8 p.m., and those interested should get in touch with the secretary, Mr. W. Ching, 9, Sivell Place, Heavitree, Exeter.

Southall Radio Society

ONE of the biggest attractions of the season was the visit of Mr. P. G. A. H. Voigt, who came on October 26th to demonstrate his famous domestic type speaker. The attendance of 60 was very favourably impressed, both by the lecture and the speaker. Demonstrations of various types of record were given, and Mr. Voigt explained the development of the speaker design.

On November 2nd a discussion entitled "The Future of Television" was opened by Mr. Senior; others taking part included Mr. H. F. Reeve, Mr. J. J. Maling, and Mr. H. C. Spencer. The last named speaker then gave a description of the Farnsworth and Emitron cameras, comparing the various advantages of the two instruments.

Programmes for December can now be obtained from the secretary.

The headquarters of the club are at the Southall Library, Osterley Park Road, Southall, and meetings are held each Tuesday at 8.15 p.m. Visitors are always welcome. Hon. Sec., H. F. Reeve, 26, Green Drive, Southall.

Brentwood Amateur Radio Society

THE above society has now started its winter session, and a full programme has been arranged. This will include the formation of a Technical Section. The following lectures have also been arranged:

Friday, November 19th, "Transformers," by Mr. C. V. Jarvis.

Friday, December 3rd, "Valves," by Mr. Nixon, of the General Electrical Company.

Friday, December 17th. Open evening for the purpose of comparing members' short-wave receivers.

Friday, December 31st, "Direction Finding," by Mr. C. V. Jarvis.

Interested readers are invited to communicate with the Hon. Sec., Mr. N. K. Read (2BNK), "Netherton," Herington Grove, Hutton Mount, Brentwood, Essex.

Glasgow Short-wave Radio Society

THE weekly meeting of the above society was held on Thursday evening, November 4th, when the lecturer was Sergt. J. Cooper, of the Glasgow Police (Radio Dept.), by kind permission of Lieut. E. W. Eagers, A.M.I.E.E.

He gave a clear and lucid account of the work of his department in the detection of crime and of the great work which is being done by the police cars and Q vans. He had on view the two standard police car receivers which are being used by them,

(Continued on page 285)

RADIO CLUBS AND SOCIETIES

(Continued from previous page)

and also numerous accessories which they have developed.

On the invitation of Lieut. E. W. Eagers, the members paid a visit to the police department, and were shown the whole system: first the large wall-map showing the position of the police cars in the respective areas at that particular time, and also the area covered by the transmitter.

A series of lectures for beginners has been drawn up and will be conducted by Alex Chaplin, M.A., B.Sc., our president. A constructors' group has also been formed and is making good progress in the building of a short-wave receiver. The Morse group is also attracting new members.

The society is rapidly increasing its numbers and applications for membership should be addressed to the Hon. Secretary, James Neilson, 14, Bolivar Terrace, Glasgow, S.2.

The Radio Society of Northern Ireland

THE general monthly meeting of the above society was held on Wednesday, November 3rd, in the Y.M.C.A. (Belfast) club rooms. After routine business it was announced that the services of a professional operator had been secured for the benefit of all members. Full particulars may be had from the Hon. Sec., Mr. C. Taylor (2AOB), 2, York Crescent, Shore Road, Belfast.

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REPLIES IN BRIEF

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

J. H. H. (Hford). We regret that there is no blueprint available for the receiver in question.

J. P. W. (Co. Cork). Without details of the existing coil we cannot advise definitely, but from your brief particulars we think it preferable to the suggested new coil. Low-resistance phones will be more robust, but must be used in conjunction with a transformer. Generally speaking, the higher the resistance the greater the sensitivity.

G. S. (Macclesfield). We regret that we cannot recommend individual commercial receivers, as there are so many factors which depend upon individual preferences. Your local dealer should be able to show you a selection and you could obtain one on approval in order to hear results in your own home. We cannot supply a map of the type indicated.

F. R. (Chingford). Messrs. Peto-Scott can supply the kit together with a cabinet to suit.

E. S. (Erdington). A battery eliminator could be used but some difficulty might be experienced in the initial trials and more decoupling may have to be added. This will depend upon the design of the eliminator.

R. J. (Llanharan). The back numbers you refer to are obtainable from this office price 4d. each.

W. S. O. (Bryncock). Messrs. Pye can supply the replacement and your local Pye agent will obtain it for you.

J. H. W. (Gillingham). We suggest you try Sinclair Speakers of Alma Grove, Copenhagen Street, London, N.1, or the L.S. Repair Service, 5, Balham Grove, London, S.W.12.

W. R. (Sligo). You would have to build a set of the type indicated, as there is not a commercial model

answering to the specification. We cannot recommend the design of a set for television as you are at present out of the service area of the Alexandra Palace.

T. W. (Falkirk). The tapping point depends upon several factors, and the main details have already been covered.

M. T. (Drogheda). We cannot select a particular blueprint in order to use up old parts which you may have in stock. We have not used any of the parts listed in one of our sets.

C. H. M. (N.W.1). We cannot give you the details, but standard components and valves could be used.

L. D. (Carlou). The trouble is obviously some form of L.F. instability, but without a diagram of the arrangement we cannot advise definitely.

D. J. W. (Wellington). "Everyman's Wireless Book," or the "Wireless Constructor's Encyclopaedia" should be the most suitable book for your purposes.

J. L. (Woodford). Do not cut the wire—make the aerial and lead-in continuous. We cannot give connections for the coil which is obviously one of the old patterns not now suitable for modern conditions.

J. F. (Killybegs). We do not recommend the addition of a Class B stage. You could convert the present stage to Class B but we do not think it would be advantageous.

J. W. (South Shields). We regret that we cannot advise a blueprint for your particular case.

A. W. (Liverpool, 5). Write to the makers—who will be the only people who can supply a blueprint of their particular set.

H. B. (Carlisle). We regret that the issues in question are now out of print.

F. D. G. (Thorne). It is obvious that the current being passed is excessive and we, therefore, suggest an output filter circuit to protect the windings. Check the H.T. and G.B. you are using.

R. W. P. (Davertry). You could obtain a special transformer to operate the rectifier from Messrs. Healyberd, or, alternatively, obtain a modern rectifier for the transformer you now possess. The rectifier should be of the type designed to operate from 350 volts H.T., and this is a standard type.

is priced at 10½ guineas. Other noteworthy models in the range are two universal all-wave receivers priced at 10½ and 11½ guineas respectively. The former is housed in a polished moulded cabinet, and the latter model in a walnut cabinet. There is also an all-wave superhet, with high-fidelity and automatic variable selectivity, and an 8-stage 5-valve all-wave radiogram, an instrument of outstanding design and performance; it is priced at 23 guineas.

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ANY readers will be interested to know that the Premier Supply Stores, who have catered for the needs of the amateur since the early days of broadcasting, have extended their factory premises in order to cope with the increasing demand for up-to-date components. In a well-illustrated 90-page catalogue, recently issued by this go-ahead firm, a comprehensive range of high-class components is listed, together with a complete range of public address apparatus and equipment. Every kind of small component the constructor is likely to require is included in this catalogue, together with various types of cabinets for radiograms, receivers, and loudspeakers. Also included in the catalogue is a very comprehensive valve section giving various tables of "Triad" valves and their operating data.

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The Long-Range Express Three (SG, D, Pen) .. 24.4.37 PW2

Selectone Battery Three (D, 2 LF (Trans)) .. — PW10

Sixty Shilling Three (D, 2 LF (RC & Trans)) .. — PW34A

Leader Three (SG, D, Pow) .. 22.5.37 PW35

Summit Three (HF Pen, D, Pen) .. 8.8.34 PW37

All Pentode Three (HF Pen, D, Pen) .. 20.5.37 PW39

Hall-mark Three (SG, D, Pow) .. 12.6.37 PW41

Hall-mark Cadet (D, LF, Pen (RC)) .. 20.8.35 PW48

F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three) .. 19.4.35 PW49

Genet Midget (D, 2LF (Trans)) .. June '35 PM1

Cameo Midget Three (D, 2 LF (Trans)) .. 8.6.35 PW51

1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) .. 17.8.35 PW53

Battery All-Wave Three (D, 2 LF (RC)) .. — PW55

The Monitor (HF Pen, D, Pen) .. — PW61

The Tutor Three (HF Pen, D, Pen) .. 21.3.36 PW62

The Centaur Three (SG, D, P) .. 14.8.37 PW64

The Gladiator All-Wave Three (HF Pen, D (Pen), Pen) .. 29.8.36 PW66

F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) .. 31.10.36 PW69

The "Colt" All-Wave Three (D, 2 LF (RC & Trans)) .. 5.12.36 PW72

Four-valve: Blueprints, 1s. each.
Sonotone Four (SG, D, LF, P) .. 1.5.37 PW4

Fury Four (SG, D, Pen) .. 8.5.37 PW11

Beta Universal Four (SG, D, LF, Cl. B) .. — PW17

Nucleon Class B Four (SG, D (SG), LF, Cl. B) .. 6.1.34 PW34B

Fury Four Super (SG, SG, D, Pen) .. — PW34C

Battery Hall-Mark 4 (HF Pen, D, Push-Pull) .. — PW46

F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) .. 26.9.36 PW67

All-Wave "Corona" 4 (HF Pen, D, LF, Pow.) .. 9.10.37 PW79

Mains Operated.

Two-valve: Blueprints, 1s. each.
A. C. Twin (D (Pen), Pen) .. — PW18

A.C.-D.C. Two (SG, Pow) .. — PW31

Selectone A.C. Radiogram Two (D, Pow) .. — PW19

Three-valve: Blueprints, 1s. each.
Double-Diode-Triode Three (HF Pen, DDT, Pen) .. — PW23

D.C. Ace (SG, D, Pen) .. — PW25

A.C. Three (SG, D, Pen) .. — PW29

A.C. Leader (HF Pen, D, Pow) .. 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) .. — PW39

F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) .. 11.5.35 PW50

"All-Wave" A.C. Three (D, 2LF (RC)) .. 17.8.35 PW54

A.C. 1936 Sonotone (HF Pen, H.F. Pen, Westector, Pen) .. — PW56

Mains Record All-Wave 3 (HF Pen, D, Pen) .. 5.12.36 PW70

All-World Ace (HF Pen, D, Pen) .. 28.8.37 PW80

Four-valve: Blueprints, 1s. each.
A.C. Fury Four (SG, SG, D, Pen) .. — PW20

A.C. Fury Four Super (SG, SG, D, Pen) .. — PW34D

A.C. Hall-Mark (HF Pen, D, Push-Pull) .. 24.7.37 PW45

Universal Hall-Mark (HF Pen, D, Push-Pull) .. 9.2.35 PW47

SUPERHETS.

Battery Sets: Blueprints, 1s. each.
£5 Superhet (Three-valve) .. 5.6.37 PW40

F. J. Camm's 2-valve Superhet .. 13.7.35 PW52

F. J. Camm's £4 Superhet .. — PW58

F. J. Camm's "Vitesse" All-Wave (5-valver) .. 27.2.37 PW75

Mains Sets: Blueprints, 1s. each.
A.C. £5 Superhet (Three-valve) .. — PW43

D.C. £5 Superhet (Three-valve) .. 1.12.34 PW42

Universal £5 Superhet (Three-valve) .. — PW44

F. J. Camm's A.C. £4 Superhet 4 .. 31.7.37 PW59

F. J. Camm's Universal £4 Superhet 4 .. — PW60

"Qualitone" Universal Four .. 16.1.37 PW73

SHORT-WAVE SETS.

Two-valve: Blueprint, 1s.
Midget Short-wave Two (D; Pen) .. — PW38A

Three-valve: Blueprints, 1s. each.
Experimenter's Short-Wave Three (SG, D, Pow) .. — PW30A

The Prefect 3 (D, 2LF (RC and Trans)) .. 7.8.37 PW63

The Bandsread S.W. Three (HF Pen, D (Pen), Pen) .. 20.8.36 PW68

"Tele-Cant" S.W.3 (SG, D (SG), Pen) .. 30.1.37 PW74

F. J. Camm's Oracle All-wave Three (HF, Det, Pen) .. 28.8.37 PW78

PORTABLES.

Three-valve: Blueprints, 1s. each.
F. J. Camm's E.I.F. Three-valve Portable (HF Pen, D, Pen) .. — PW65

Parvo Flyweight Midget Portable (SG, D, Pen) .. 19.6.37 PW77

Four-valve: Blueprint, 1s.
Featherweight Portable Four (SG, D, LF, Cl.B) .. 15.5.37 PW12

MISCELLANEOUS.

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

AMATEUR WIRELESS AND WIRELESS MAGAZINE
CRYSTAL SETS.
Blueprints, 6d. each.
Four-station Crystal Set .. 12.12.36 AW427

1934 Crystal Set .. — AW444

150-mile Crystal Set .. — AW450

STRAIGHT SETS. Battery Operated.

One-valve: Blueprints, 1s. each.
B.B.C. Special One-valver .. — AW387

Twenty-station Loudspeaker One-valver (Class B) .. — AW449

Two-valve: Blueprints, 1s. each.
Melody Ranger Two (D, Trans) .. — AW388

Full-volume Two (SG det., Pen) .. — AW392

B.B.C. National Two with Lucerne Coil (D, Trans) .. — AW377A

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Lucerne Minor (D, Pen) .. — AW426

A Modern Two-valver .. — WM100

Three-valve: Blueprints, 1s. each.
Class B Three (D, Trans, Class B) .. — AW385

New Britain's Favourite Three (D, Trans, Class B) .. 15.7.33 AW394

Home-built Coil Three (SG, D, Trans) .. — AW404

Fan and Family Three (D, Trans, Class B) .. 25.11.33 AW410

£5 5s. S.G.3 (SG, D, Trans) .. 2.12.33 AW412

1934 Ether Searcher; Baseboard Model (SG, D, Pen) .. — AW417

1934 Ether Searcher; Chassis Model (SG, D, Pen) .. — AW410

Lucerne Ranger (SG, D, Trans) .. — AW422

Cosor Melody Maker with Lucerne Coils .. — AW423

Mullard Master Three with Lucerne Coils .. — AW424

£5 5s. Three: De Luxe Version (SG, D, Trans) .. 10.5.34 AW435

Lucerne Straight Three (D, RC, Trans) .. — AW437

All-Britain Three (HF Pen, D, Pen) .. — AW448

"Wireless League" Three (HF Pen, D, Pen) .. 3.11.34 AW451

Transportable Three (SG, D, Pen) .. — WM271

£6 6s. Radiogram (D, RC, Trans) .. — WM318

Simple-tune Three (SG, D, Pen) .. June '33 WM327

Economy-Pentode Three (SG, D, Pen) .. Oct. '33 WM337

"W.M." 1934 Standard Three (SG, D, Pen) .. — WM351

£3 3s. Three (SG, D, Trans) .. Mar. '34 WM354

Iron-core Band-pass Three (SG, D, QP21) .. — WM362

1935 £6 6s. Battery Three (SG, D, Pen) .. — WM371

PTP Three (Pen, D, Pen) .. June '35 WM389

Certainty Three (SG, D, Pen) .. — WM393

Minute Three (SG, D, Trans) .. Oct. '35 WM400

All-wave Winning Three (SG, D, Pen) .. Dec. '35 WM396

Four-valve: Blueprints, 1s. 6d. each.
65s. Four (SG, D, RC, Trans) .. — AW370

"A.W." Ideal Four (2 SG, D, Pen) .. 16.9.33 AW402

2HF Four (2 SG, D, Pen) .. — AW421

Crusader's A.V.C.4 (2 HF, D, QP21) .. 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 (SG, SG, D, Pen) .. Mar. '35 WM384

The Auto Straight Four (HF Pen, HF Pen, DDT, Pen) .. April '36 WM404

Five-valve: Blueprints, 1s. 6d. each.
Super-quality Five (2HF, D, RC, Trans) .. May '33 WM320

Class B Quadradyne (2 SG, D, LF, Class B) .. Dec. '33 WM344

New Class-B Five (2 SG, D, LF, Class B) .. Nov. '33 WM340

Mains Operated.

Two-valve: Blueprints, 1s. each.
Consolect's Two (D, Pen) A.C. .. — AW403

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

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Unicorn A.C.-D.C. Two (D, Pen) .. — WM394

Three-valve: Blueprints, 1s. each.
Home-Lover's New All-electric Three (SG, D, Trans) A.C. .. — AW383

S.G. Three (SG, D, Pen) A.C. .. — AW399

A.C. Triodyne (SG, D, Pen) A.C. .. 19.8.33 AW399

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Mantovani A.C. Three (HF Pen, D, Pen) .. — WM374

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Harris Jubilee Radiogram (HF Pen, D, LF, P) .. May '35 WM386

SUPERHETS.

Battery Sets: Blueprints, 1s. 6d. each.
Modern Super Senior .. — WM875

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The Request All-Waver .. June '36 WM407

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Heptode Super Three A.C. .. May '34 WM359

"W.M." Radiogram Super A.C. .. — WM366

1935 A.C. Stenode .. Apr. '35 WM385

PORTABLES.

Four-valve: Blueprints, 1s. 6d. each.
Midget Class B Portable (SG, D, LF, Class B) .. 20.5.33 AW339

Holiday Portable (SG, D, LF, Class B) .. 1.7.33 AW303

Family Portable (HF, D, RC, Trans) .. 22.9.34 AW447

Two H.F. Portable (2 SG, D, QP21) .. June '34 WM363

Tyers Portable (SG, D, 2 Trans) .. — WM367

SHORT-WAVE SETS—Battery Operated.

One-valve: Blueprints, 1s. each.
S.W. One-valve converter (Price 6d.) .. — AW329

S.W. One-valve for America .. 23.1.37 AW423

Rome Short-Waver .. — AW452

Two-valve: Blueprints, 1s. each.
Ultra-short Battery Two (SG det., Pen) .. Feb. '36 WM402

Home-made Coil Two (D, Pen) .. — AW440

Three-valve: Blueprints, 1s. each.
World-ranger Short-wave 3 (D, RC, Trans) .. — AW355

Experimenter's 5-metre Set (D, Trans, Super-regen) .. 30.6.34 AW438

Experimenter's Short-wave (SG, D, Pen) .. — AW437

The Carrier Short-waver (SG, D, P) .. Jan. 19, '35 AW403

The Carrier Short-waver (SG, D, P) .. July '35 WM390

Four-valve: Blueprints, 1s. 6d. each.
A.W. Short-wave World-beater (HF Pen, D, RC, Trans) .. — AW436

Empire Short-Waver (SG, D, RC, Trans) .. — WM313

Standard Four-valver Short-waver (SG, D, LF, P) .. Mar. '35 WM383

Superhet: Blueprint, 1s. 6d. .. Nov. '35 WM397

Mains Operated.

Two-valve: Blueprints, 1s. each.
Two-valve Mains short-waver (D, Pen) A.C. .. — AW453W

"W.M." Band-spread Short-waver (D, Pen) A.C.-D.C. .. — WM368

"W.M." Long-wave Converter .. — WM380

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Four-valve: Blueprint, 1s. 6d.
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MISCELLANEOUS.

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Listeners' 5-watt A.C. Amplifier (1/6) .. — WM392

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New Style Short-Wave Adapter (1/-) .. June '35 WM388

Trickle Charger (6d.) .. Jan. 5, '35 AW462

Short-Wave Adapter (1/-) .. Dec. 1, '34 AW456

Superhet Converter (1/-) .. Dec. 1, '34 AW457

B.L.D.L.C. Short-wave Converter (1/-) .. May '36 WM405

Wilson Tone Master (1/-) .. June '36 WM406

The W.M. A.C. Short-Wave Converter (1/-) .. — WM403



QUERIES and ENQUIRIES

Stepping Down A.C. Mains

"I have a commercial receiver operated by a mains section rated at 120 volts A.C. I have now moved to a house where the mains are 250 volts. Could I step down the voltage to 120, and if so could you give me winding details of a transformer which would be suitable for my purpose?"—W. W. (Gillingham).

It is quite possible to step down the mains and this is a common practice. Unfortunately, however, it is necessary to use a transformer designed to deliver an output wattage suitable for the receiver and therefore we cannot give you winding details of a suitable component without knowing the load of your set. A suitable component could be obtained ready made from Messrs. Heayberd, and you should write to them, giving them details of the receiver, when they will supply a suitable transformer.

All-wave Experiments

"I am thinking of building up a 5-valve all-wave set on the lines of the diagram enclosed. I thought of combining modern iron-core dual-range broadcast coils with home-made coils to cover from about 5 metres to 100 so as to get in the television programmes. I have a multi-contact switch which will appear to do the necessary switching and should be glad of your comments regarding my proposed layout."—F. T. (Chelmsford).

We are afraid your set will not be very successful on the ultra-short wavelengths. Apart from the fact that tuning would be exceedingly difficult with a .0005 mfd. tuning condenser, the long leads to switch and tuning condenser from the 5-metre coil would, no doubt, result in such an increase as to prevent this coil from tuning below 10 or 12 metres. You will see, on careful examination, that there will be nearly as much wire in the connections as is used on the tuning coil. A better plan for a set of this type would be to build two separate detector stages, one for the ultra-short and short wavelengths and the other for the broadcast bands, and to select the required stage by means of a plug and socket connector, feeding the L.F. stages.

Lift Interference

"I am using a mains set at a London address, and on each side of the house are buildings with lifts. The interference from these completely blots out any programmes and is so loud that the set has to be turned off. A battery set is unaffected, and thus I assume the interference comes

via the mains. Another mains set has been tried with the same results. I therefore propose to make a powerful battery set to be operated with an eliminator. Please will you let me know whether I will get any interference with an eliminator?"—J. C. H. (Dartmouth).

If the interference comes to your house via the mains you will no doubt experience just as much trouble when using a battery eliminator. The users of the lifts should fit suitable suppressors which will remove the trouble, and if you speak to them they will no doubt take steps to cure the annoyance. We would remind you that it is proposed to pass a law making it illegal to use interfering apparatus of this type without suitable suppressing devices. As the mains filters, etc., which you have

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender. Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

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

tried have proved inadequate, you should mention the fact to the owners and if nothing is done, obtain a form from your local post office, in order that a suitable complaint may be made to the postal authorities.

Receiving America

"I am interested in two commercial receivers, an 8 valve with 6 watt output and a 10 valve with 14 watt output. Will you please advise whether either of these sets are capable of getting and holding various American stations? Will they be expensive to operate, with electricity at 1d. per unit? I have no knowledge of wireless affairs but I must have a good set. What does 6 and 14 watt output mean?"—S. T. W. (Upper Portslade).

The 10 valve receiver referred to would probably be more efficient on the short waveband, but we have not made

direct comparisons and therefore cannot advise definitely. It is impossible to guarantee that any set will pick up and hold the Americans, as you will have no doubt noticed that even the B.B.C. have sometimes to abandon a relay of America due to atmospheric conditions. Both of the receivers you mention should pick up America under normal conditions, but whether you can hold them always will depend upon many factors. The volume of sound given by a receiver is measured in watts and thus the 14 watt receiver will deliver a signal more than twice the volume of the 6 watt output set, although the maximum volume will only be obtained when the output stage is fully loaded and this may not occur on many stations.

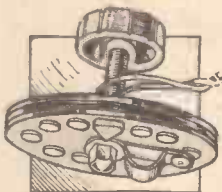
Carbon for Microphone

"I should be glad to know where I can obtain carbon granules for microphones and under what conditions or manner of sale. I have tried all the shops in this vicinity in vain."—B. B. (Eddington).

You can obtain granules from Electradix Radios, whose advertisement appears in this issue. They are sold in glass tubes and each contains approximately enough for making four of the smaller button types of mike. The granules are graded, Grade No. 1 costing 8d., No. 2 1s., and No. 3—which is the finest—1s. 6d. per tube. In addition this firm can supply solid carbon suitable for backing the transverse-current type of instrument, together with carbon diaphragms.

Wire-wound Volume Control

"I have found in my junk box an old volume control which appears to consist of a large hank of wire tapped at various points and with the tappings joined to studs. These are selected by a moving arm, and I am wondering whether this could be used in a modern circuit or whether it is unsuitable for modern conditions as it is not now on the market."—Y. C. S. (Devonport).



This shows the construction of the W.B. volume control.

The resistance included in circuit, when using a control of the type mentioned, will jump in stages as the control knob is operated. Consequently, there will not be a gradual increase such as is obtained with the modern type of control. In certain circuits this will not prove of great importance, and therefore it will depend upon what circuit you intend to use in conjunction with the control. We would point out that there are still components of this type on the market, and one is illustrated above. This is the W.B. control designed for use in conjunction with their remote-control for a speaker.

The coupon on page 285 must be attached to every query.

TO MAKE YOUR SET REALLY SELECTIVE

A PIX can be fitted to any set—battery or mains. Just disconnect your aerial from the set and join it to one end of the PIX—connect the other end to the Aerial terminal. By opening the PIX you can cut out interfering stations and get the one you want.

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Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aeriels, Class B amplifications, neutralizations, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free, 71d. including catalogue.

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CRYSTAL SETS—Burne-Jones Complete, Guaranteed, 5s. 6d. Ditto, double circuit, 8s. Sensitive permanent detectors, 1s. 6d. Crystal Detectors, complete, 1s. Crystals with silver cat's whisker, 6d. Postage 11d.—Post Radio, 2, Copenhagen Street, London, N.1.

SHORT WAVE on a crystal set. Full building instruction and crystal 1/2 post paid.—Radio-mail, Tanworth-in-Arden, Warwickshire.

Vauxhall Polar Midget condensers, 2-gang, 6s. 8d. 3-gang, 8s. 9d.; 4-gang, 13s. 6d. Polar full vision horizontal drives, 5s.

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Vauxhall T.C.C. electrolytic condensers, 8 mfd. and 4 mfd. 500 volt, 2s. 6d.; 50 mfd. 50 volt, 1s. 6d.

Vauxhall Iron-cored coils, 3-gang, on base, with circuit, 17s. J.B. drives with station-named scale, 5s. 6d.

Vauxhall Magnavox and Rola P.M. speakers, 7in. cone, 16s. 6d.; 10in. cone, 22s. Energised models, 2,500 field coils, 7in., 12s. 6d.; 10in., 17s. 6d.

Vauxhall UPLIFTERS, 169a, Strand, W.C.2. Temple Bar 9338. Send postcard for free list. Post paid, 2s. 6d. and over, or C.O.D.

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All transmitting gear in stock, Halliart receiver. Satisfaction or money refunded guarantee.
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NEW 2-VALVE S.W. KIT, 13 to 86 metres without coil changing. Complete Kit and Circuit, 19/6. VALVES GIVEN FREE!

DE LUXE MODEL, 14 to 150 Metres, complete Kit and Circuit, 4 Coils and all parts, 25/- VALVES GIVEN FREE. 3-VALVE S.W. KIT, S.G. Det. and Pen., 42/- VALVES GIVEN FREE!

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Orders for the above Kits must be accompanied by 1s. as part payment of postage.

LISSEN SET OF 3 IRON-CORED BAND-PASS COILS, complete with Switching and Circuit, list price 37s. 6d., Our Price 8s. 11d.

LISSEN SET OF 2 IRON-CORED COILS for Aerial and H.F. complete with Switching and Circuit, list price 25s., Our Price 6s. 3d.

LISSEN GENERAL-PURPOSE IRON-CORED COILS, complete with Reaction, suitable for Aerial and H.F. without Switch, list price 8s. 6d., our price 3s. 3d. All the above Coils are fully screened.

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Holborn 4631.

DIRECT CURRENT UNITS, 200/240 volts, will operate up to 6 valves. Makers: Eeko, G.E.C., Climax, Philips, etc., 7s. 6d. each, postage 9d.—Universal Radio, 221, City Rd., London, E.C.1.

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

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BUY VALVES DIRECT—Fully guaranteed. 2-volt, H2, L2, 2s. 3d.; Power, 3s.; Screen-grids, 4s. 9d.; Pentodes, 5s. 6d. Mains, General Purpose, 4s. 6d.; Power, 6s.; Screen-grids and Pentodes, 6s. 6d.; Rectifiers, 4s. 6d. Over 150 types available—Battery, A.C. and A.C./D.C. Mains, and American. Postage 3d. one valve, 4d. two, 6d. three and over. Cash with order.—Luminous Electric Appliances, Ltd. (Dept. 9), Phoenix Works, Tyburn Road, Birmingham.

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The equivalent of thirteen testing instruments in one. Measures Current, Voltage and Resistance with ease and accuracy. In handsome case with leads, interchangeable crocodile clips and testing prods.

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RADIO BARGAINS

25 ONLY FOR SALE.—3-valve kits with valves and diagram, 12/6; 3-valve S/G kits with valves and diagram, 20/- Orders executed in rotation. 1 dozen assorted condensers and resistances (your own sizes), 3/-, post free. Mains transformers, 250-0-250, 4-vofts, 2 a. 4 v. 3 a., C.T. 80 m.a., 5/-, post free.—Universal Radio Co., 221, City Road, London, E.C.1.

A LCO eliminators and chargers. 4 H.T. taps, 18/- Standard outputs. With charger 25/- Charger, 7/6. Year's guarantee. Details free.—P. & D. Radio, 1, Gooding Road, N.7.

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EXPERIMENTERS' OPPORTUNITY.—Parcels containing Wireless components, 40/- value for 5/6. Carriage 1s.—Taylors, Radio House, Macaulay Street, Huddersfield.

RADIO TURNED RADIOGRAM. Electric motors, 25/-. Pick-ups, 9/6. Heads, 4/3. Pedestal Anexagrams, £5/5-. Tablegrams, £4/4-. Portables A.C./mains, £3/10-. Battery, £2/10/-. Automatic record-changers, £6. Acoustic gramophones. Portables, pedestals, spring motors, turntables, tonearms, sound-boxes, horns, cabinets, fittings, springs, wheels, musical instruments. Cheapest. Unique assortment. List Free. Gilt alarm clocks, 8/6. Approval—"Regentam," 120, Old Street, London, E.C.1. Telephone: CLE. 5770. Est. 84 years.

*Cried a wireless enthusiast from Brighton,
"This constructional fact you can bite on;
When doing your wiring
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And much better, too—
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See that **FLUXITE** is always by you—in the house—garage—workshop—wherever speedy soldering is needed. Used for 30 years in government works and by leading engineers and manufacturers. Of Ironmongers—in tins, 4d., 8d., 1/4 and 2/8.

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High Efficiency plus Economy!

5-VALVE ALL-WAVE SUPERHET



Price **£6:17:6**

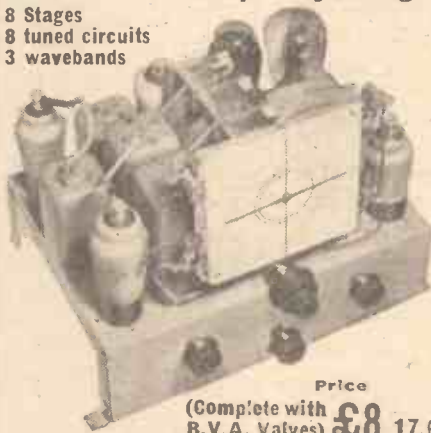
(Complete with B.V.A. valves)

This moderately-priced 7-stage 5-valve all-wave receiver utilizes a remarkably efficient superheterodyne circuit which provides exceptional sensitivity on all three wavebands—18-50, 200-550, 1,000-2,000 metres.

Circuit includes: Latest type triode-hexode frequency changer, vari-mu pentode I.F. amplifier, double diode-triode operating as diode detector and I.F. amplifier, and providing full A.M.C. High-slope 3 watts output pentode. Wave-change and gain switch. As illustrated, but with new type dial with principal station names.

6-valve all-wave Superhet with Radio Frequency Stage

8 Stages
8 tuned circuits
3 wavebands



Price **£8.17.6**
(Complete with B.V.A. Valves)

Performance (made possible by use of multi-electrode valves) equal to that of many receivers employing 8 valves or more. Brief specification includes: Large "Airplane" dial, with different coloured lights automatically switched on for each wave-range. Micro-vernier 2-speed drive. 4-point wave-change and gain phone switch. Volume control and variable tone control also operative on gramophone. Reinforced heavy-gauge steel chassis. Covers 19-2,000 metres.

Circuit comprises: Presselector circuit, radio frequency amplifier (operative on all 3 wavebands), triode-hexode frequency changer, double band-pass I.F.T. coupled I.F. amplifier, double diode-triode detector and L.F. amplifier. D.A.V.C. applied to 3 preceding valves. 3-watt pentode output.

All McCarthy receivers supplied complete with valves, knobs, pilot lamps, leads, mains cable and plug. 12 months' guarantee.

Deferred terms on application, or through our city agents, London Radio Supply Co., 11, Oat Lane, E.C.2. Demonstrations Daily.

Cash with order on 7 days' approval. Also write for illustrated catalogue of complete range of all McCarthy receivers.

McCARTHY RADIO LTD.
44a, Westbourne Grove, London, W.2

Telephone: Bayswater 3201/2.

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out at
night!



*Its music comes out of your radio—but how?
Does it come out recognisable as a saxophone
(because that's what it really is)? To make sure
it always sounds like one you'd better get an Exide.*

DX28



Exide

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'Still keep going when the rest have stopped'

EXIDE 'HYCAP' BATTERY (High Capacity L.T. Battery)

For modern multi-valve sets—lasts longer on one charge. For small sets use the Exide 'D' Type. Both have the Exide Charge Indicator. Your dealer will tell you which to use. For High Tension use Drydex.

From reputable dealers and Exide Service Stations. Exide Service Stations give service on every make of battery. Exide Batteries, Exide Works, Clifton Junction, near Manchester. Also at London, Manchester, Birmingham, Bristol, Glasgow, Dublin and Belfast.

SOME SUPERHET REFINEMENTS—See page 308.

Practical and Amateur Wireless

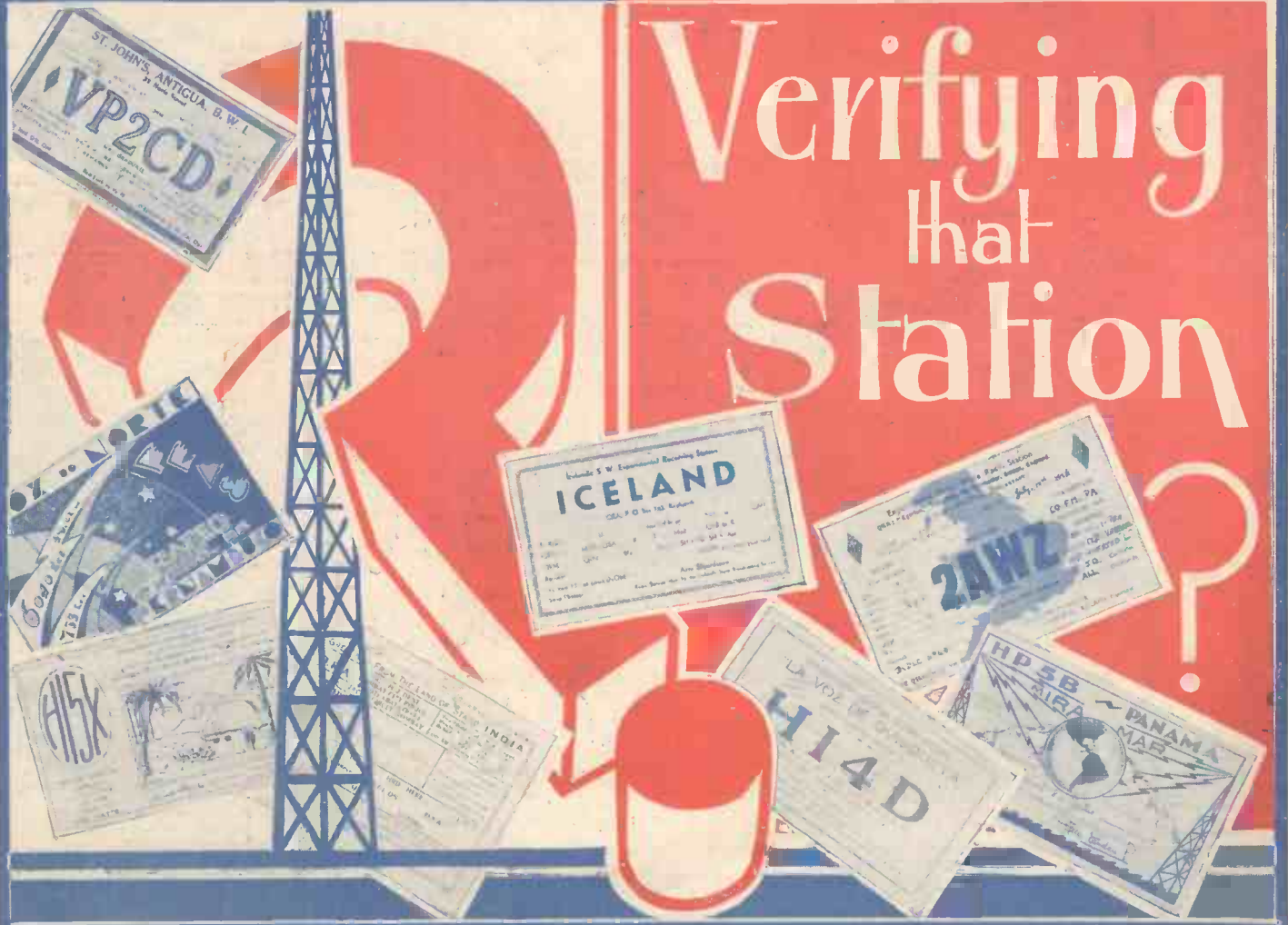
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EVERY
WEDNESDAY

Edited by F.J. CAMM

a GEORGE
NEWNES
Publication

Vol. 11. No. 271.
November 27th, 1937.

AND PRACTICAL TELEVISION



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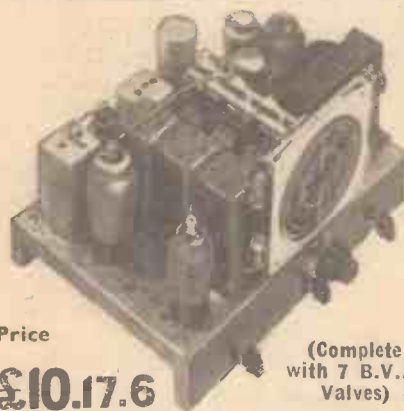
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7-VALVE ALL-WAVE SUPERHET (With R.F. Stage)

9-VALVE FOUR-WAVE SUPERHET DE LUXE

5-VALVE ALL-WAVE SUPERHET



Price

£10.17.6

(Complete with 7 B.V.A. Valves)

Available for delivery 14 days. New 7-valve 4-waveband superhet for A.C. mains, with highly sensitive long-range circuit arrangements. Circuit Details.—Aerial input to high-gain R.F. amplifier. Triode-hexode frequency changer coupled by air-cored high efficiency I.F. transformer to I.F. amplifier. Diode detector with delayed A.V.C. I.F. amplifier and 4-watt output pentode. Sockets provided for ext. speaker and gram pick-up. 4-position wave-change and gram switch. Vol. control and variable tone control operate on radio and gram.

Wave ranges: 13-38, 38-94, 200-555, 750-2,000.



Price **14 GNS**

(Complete with 9 B.V.A. valves)

4 wavebands: 12.8-33, 29-53, 100-550, 800-2,000 metres. Illuminated dial with principal station names.

Controls.—A feature of the receiver is the number of independent controls fitted, making it extremely interesting to operate. These include: Sensitivity control (varying bias on R.F. stage), or Q.A.V.C. with manual muting control for inter-station noise suppression. 5-position wave-change and gramophone switch. Progressive variable tone control operative on radio and gram.

Circuit in Brief.—Aerial input to pre-selector circuit, radio frequency amplifier, latest type triode-hexode frequency changer, 2 band-pass I.F.T. coupled I.F. amplifiers, double diode detector, triode I.F. amplifier, separate triode phasing capacity coupled to 2 large pentodes in push-pull. Heavy 16-gauge steel chassis. Finest components and workmanship throughout. Harries 2 tubes in place of output pentodes if desired.

STANDARD MODEL 12 GNS. As above, but with triode push-pull output, and fewer controls fitted.



Price

£6.17.6

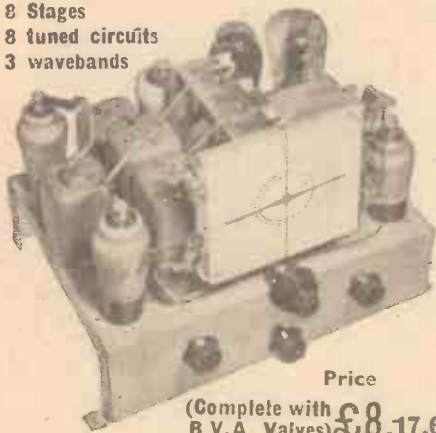
(Complete with B.V.A. Valves)

This moderately-priced 7-stage 5-valve all-wave receiver utilizes a remarkably efficient superheterodyne circuit which provides exceptional sensitivity on all three wavebands—16-50, 200-550, 1,000-2,000 metres.

Circuit includes: Latest type triode-hexode frequency changer, vari-mu pentode I.F. amplifier, double diode-triode operating as diode detector and I.F. amplifier, and providing full A.V.C. High-slope 3-watt output pentode. Wave-change and gram switch. Illuminated "Airplane" dial with principal station names.

6-VALVE ALL-WAVE SUPERHET (With R.F. Stage)

8 Stages
8 tuned circuits
3 wavebands



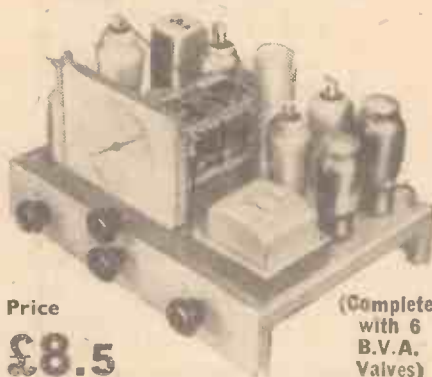
Price

(Complete with 6 B.V.A. Valves) **£8.17.6**

Performance (made possible by use of multi-electrode valves) equal to that of many receivers employing 8 valves or more. Brief specification includes: Large "Airplane" dial, with different coloured lights automatically switched on for each wave-range. Micro-vernier 2-speed drive. 4-point wave-change and gramophone switch. Volume control and variable tone control also operative on gramophone. Reinforced heavy-gauge steel chassis. Covers 16-2,000 metres.

Circuit comprises: Pre-selector circuit, radio frequency amplifier (operative on all 3 wavebands), triode-hexode frequency changer, double band-pass I.F.T. coupled I.F. amplifier, double diode-triode detector and I.F. amplifier. D.A.V.C. applied to 3 preceding valves. 3-watt pentode output.

ALL-MAINS ALL-WAVE SIX (With R.F. Stage)



Price

£8.5

(Complete with 6 B.V.A. Valves)

"De Luxe" 6-valve receiver, with 8-valve performance (specially recommended for tropical and foreign reception conditions). Built on special cadmium-plated 16-gauge steel chassis. Varley iron-cored I.F. coils. Lit.-wound tuning coils. 3 wave-ranges—16.5-2,000 metres. Illuminated "Airplane" dial with principal station names.

Circuit comprises: Pre-selector radio frequency amplifier (operative on all wavebands), triode-hexode frequency changer, double band-pass coupled I.F. amplifier, double diode detector, D.A.V.C. applied to 3 preceding valves, I.F. amplifier and pentode output. Variable tone control and volume control operate on radio and gramophone.

BATTERY ALL-WAVE SUPERHET



Price

£7.10

(Complete with 6 B.V.A. Valves)

The only receiver of its type now on the British market. Results on all 3 wavebands equal to mains receivers of equivalent type. Latest technical developments incorporated in circuit. Latest types valves, transformers, tuning coils, switches, etc.

Specification in brief: Radio frequency amplifier; first detector with separate triode oscillator, I.F. amplifier, double diode detector, I.F. amplifier, low consumption pentode output. D.A.V.C. Volume control and tone control both operative on gramophone. Illuminated dial with station names. Wave-ranges: 16-52, 200-550, 900-2,000 metres.

All McCarthy receivers supplied complete with valves, knobs, pilot lamps, leads, mains cable and plug. 12 months' guarantee.


Write for comprehensive catalogue with illustrations, full particulars and circuit diagrams

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Portable Amplifier Design See page 291.



Practical

and Amateur

Wireless



Edited by **F. J. CAMM**

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh. Sch.,
B.Sc., A.M.I.E.E., Frank Preston.

VOL. XI. No. 271. November 27th, 1937.

ROUND *the* WORLD of WIRELESS

What is Quality?

THE most elusive factor in radio receiver design is the type of reproduction which is to be obtained—generally referred to as the “quality” of reproduction. Unfortunately, no two listeners seem to be decided as to what is meant by the term. Whilst one requires reproduction which is “rich,” or in other words deep and full-toned, another prefers a high-pitched tone without the full or deep bass. To many designers the straight resistance-capacity coupled amplifier is considered the only worth-while arrangement, but other experts will prove that the introduction of the coupling condenser or the resistance in the grid circuit prevents perfect quality from being obtained. The makers of high-quality L.F. transformers can show that the reproduction, when properly used, is as near a straight line as can be obtained with modern methods. But no matter what coupling is employed, the loudspeaker and the method of including this may upset all the results which have been obtained by careful design of the amplifying section. Individual choice regarding the type of loudspeaker will also govern the quality of reproduction, whilst the mere fact of listening to a certain combination of receiver and speaker will result in the listener forming an opinion concerning the output which will be biased, due to the fact that he becomes used to the results and, by contrast, other combinations sound so different that they are usually classed as inferior. By hearing a standard equipment, such as that installed at the Science Museum, one can gauge just what type of quality is radiated by the B.B.C., and thus gain a more definite opinion regarding the results obtained on one’s own apparatus.

Advance Christmas Programmes

PRELIMINARY details concerning B.B.C. Christmas programmes are slowly coming to hand. A pantomime, “The Magic Lamp of Al-ad-addin,” produced by Harry S. Pepper is to be included and will be heard on December 23rd and during the afternoon of Christmas Day. There will also be the customary Christmas Party—a two-hour feature of the Christmas Day festivities.

A Queer Tale

ON November 28th an interesting short story will be read from the Midland station by J. D. Beresford. It is a mixture

of fantasy and satirical fable, and is supposed to be told by a traveller who arrives at a town of houses which are lighted and furnished uniformly but have no inhabitants.

I.F. Interference

THE problem as to what intermediate frequency to employ in superhet receivers is not easy of solution. In America the R.M.A. is attempting to have a special band set aside as an I.F. band to assist in designing superhets which will not suffer

building and new technical equipment is to be installed. Station WLW is to be modernised and an improvement in radiation is confidently anticipated.

Poste de Radio, Belgrade

THE Directors of the Belgrade short-wave station wish to thank all English listeners who have sent reports of reception from that station and state that it has been found impossible to write to everyone. They convey their thanks for letters received, and welcome reports regarding the quality of the transmission and suggestions regarding programme material. For the benefit of those who have not yet logged this station, the wavelength is 49.18 metres and the power 1 kW.

For South Africans

IT is announced that the Government of South Africa has decided to erect a special station to receive programmes from various distant countries for subsequent relay so that listeners in that country will be able to hear programmes from Europe and America without the use of elaborate receivers.

Royal Purchaser

ANOTHER name has been added to the long list of distinguished personages who are using McMichael receivers. During this month, a Model 367 Lightweight Portable made by this firm was purchased by King Boris of Bulgaria.

German Price Reductions

A STEP has been taken in Germany towards the general reduction in the price of radio receivers, and the Price Commissioner has ordered a narrowing down of the retailer’s discount from 39 to 36 per cent. The funds which accumulate on the special discount are to be used for broadcast purposes under the auspices of the Ministry of Propaganda.

Public Address Contact

THE Christmas season brings many important events in its train, one of the most popular London items being the great Circus at Olympia. This year Messrs. Tannoy have again secured the contract for fitting the necessary equipment, and as the arena will be larger this year three times as many speakers are to be employed.

BIG XMAS

NUMBER

NEXT WEEK!

Packed with Seasonal Features.

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TO-DAY

from interference due to stations working on a frequency corresponding to that employed as the I.F. in superhets. It is proposed to standardise 455 kc/s as the I.F., and to protect a band from 450 to 460 kc/s as an “I.F. protection band.”

U.S.A. Programme Expansion

A WIDE extension of the programmes from WLW and WSAI is announced by the Crosley Corporation, scheduled to commence from December 1st or shortly after. Three new studios and a number of offices are to be constructed in addition to a new artists’ lounge at the main Crosley

ROUND the WORLD of WIRELESS (Continued)

Bryan Michie to Leave B.B.C.

AFTER the end of January listeners will miss the well-known voice of Bryan Michie, the B.B.C. compère and radio artiste, when he leaves Broadcasting House to take up stage work with Jack Hylton. Bryan went to Savoy Hill in 1929 as "effects" producer, and his cheery voice is now one of the best known on the radio.

A Novel Broadcast

RADIO dance music has been much in the news lately especially since the inception of John Watt's idea of splitting it into three different types of presentation. A novelty for many British listeners whose sets are not capable of picking up foreign stations with any great strength will be introduced on November 22nd, when Willie Lewis's famous Dance Orchestra will be heard from Chez Florence in Paris.

A Steel Works Play

"DOMINO," a new radio play by R. P. Hughes, will bring to Northern listeners on November 26th a thrilling and somewhat grim drama, the action of which is set in a steel works. The author is a Sheffield man, who is himself employed at a steel works. He has made powerful use of an imaginary tragedy at a large works, and his play will, it is believed, show a good grasp of radio-dramatic technique.

New B.B.C. Appointments

THE following appointments, which were recently announced, are to take effect on the retirement on March 31st, 1938, of the Deputy Director-General, Vice-Admiral Sir Charles Carpendale, C.B. :—

Mr. C. G. Graves, M.C., Controller of Programmes, to be Deputy Director-General;

Mr. B. E. Nicolls, Controller of Administration, to be Controller of Programmes;

Mr. T. L. Lochhead, C.B.E., C.A., Chief Accountant, to be Controller of Administration.

Mr. Graves joined the B.B.C. in 1926. He was Assistant Director of Programmes from 1929 to 1932, when he was made Director of the newly-formed Empire Service. This post he held until he became Controller of Programmes in the autumn of 1935.

Mr. Nicolls joined the B.B.C. in 1924 as Manchester Station Director. He was transferred to London in 1925, where for two years he was engaged on programme work as Station Director. From 1927 to 1933 he was General Editor of Publications, and he became Controller of Administration in the Autumn of 1935. Mr. Lochhead has been Chief Accountant of the B.B.C. since 1925.

For Music Lovers

ON December 11th, in the Regional programme, Louis Kentner will play Liszt's "Spanish Rhapsody," arranged by Busoni, with the B.B.C. Orchestra, conducted by Constant Lambert. The programme will also include the Overture to

INTERESTING and TOPICAL NEWS and NOTES

"King Lear" by Balakirev; "In a Summer Garden," by Delius; and Glazounov's "Stenka Razin."

A Haunted House in Yorkshire

J. FAIRFAX-BLAKEBOROUGH, who is known to listeners for his broadcast talks on sporting subjects, will come to the

owing to a troublesome ghost. Eventually, the old house was demolished.

Variety from Derby

MANTOVANI and his Tipica Orchestra will be the principal turn in a Variety bill from the Grand Theatre, Derby, on December 1st.

Licence Figures

THE total number of licences in force at the end of October was 8,372,000, including 48,000 free licences for the blind.

Concert Party Broadcast

NORTHERN listeners will hear a broadcast from the show of Billy Manders and his "Quaintesques" from Leslie's Pavilion, Rusholme, on December 1st. "Leslie's" is a well-known home of concert-party entertainment. Many famous music-hall and musical-comedy players appeared there in their early days.

"Tales of Hoffmann"

OFFENBACH'S opera, *Tales of Hoffmann*, will be broadcast by the Royal Carl Rosa Opera Company from the Pavilion Theatre, Bourne-mouth, in the Western programme on December 4th.

Music of Other Countries

FRANCE has been chosen as the fourth country in the series "Music of Other Countries" on November 23rd, when songs by many of the best-known composers—including Debussy, Fauré, Franck-Chausson and Duparc sung by Esther Coleman (contralto). This broadcast will be given in the Western programme.

Theatres of Variety

IN the feature "Theatres of Variety," on December 1st, a programme will be broadcast from the stage of the Hippodrome, Boscombe. The artists will include: Elsie Carlisle (the popular radio star with her two pianists), Edwin Lawrence, the Three Admirals, and the Boscombe Hippodrome Orchestra.

Burgundian Folk Songs

THE University of Dijon Choir last year gave an outstanding broadcast of the Folk Songs of Burgundy. The choir has consented to give a similar concert for the benefit of British listeners on November 22nd. The dukedom of Burgundy was at one time, as many listeners know, a more powerful domain than that ruled by the King of France. Burgundy possesses many outstanding characteristics; its people are musical, and its folk lore and songs are rich and varied.

Popular Dance Music

"AN Hour to Play," on November 20th, will give Brian Lawrence and his Orchestra the opportunity of presenting to listeners 60 minutes of entertaining dance music—a programme of popular melodies old and new. The Three Ginx will sing.



Tuning in on an Ekco Model AW88 All-wave A.C. Superhet with spin-wheel tuning, built-in controls, and Television Sound. In a walnut finished moulded cabinet, the price of this receiver is 12½ guineas.

Northern microphone on November 26th, to tell a thrilling North Yorkshire story in the "Haunted Houses" series. The scene of the tale will be Angrove Hall, near Great Ayton, which for years stood unoccupied

—will be sung by Esther Coleman (contralto). This broadcast will be given in the Western programme.

SOLVE THIS!

PROBLEM No. 271.

Martin decided to supply the filaments of his battery-type valves from the D.C. mains. He was advised to connect the valve filaments in series and to fit a dropping resistance between the L.T. + lead and the D.C. mains + lead. Results obtained were quite satisfactory except for slight hum, but when he substituted an economy pentode for the L.F. triode in the output stage signals became very weak. Why was this? Three books will be awarded for the first three correct solutions opened. Solutions should be addressed to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 271 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, November 29th, 1937.

Solution to Problem No. 270.

There was an internal short-circuit in the bypass condenser connected between the anode of the detector valve and the H.T. — line.

The following three readers successfully solved Problem No. 269, and books are accordingly being forwarded to them: P. G. Redgment, Faraway, Brundall, Norwich; T. A. Thomas, Penywern, Wern Las, Rhos, Wrexham; G. H. Dakers, 59, Grand Parade, Brighton.

Portable Amplifier Considerations

Constructional Details and Chassis Layout of a Portable Unit for 5 to 8 Watts Undistorted Output, are Discussed in This Article By L. ORMOND SPARKS

THE design and construction of portable amplifiers calls for more consideration than the average constructor realises; in fact, it does not follow that the builder of a large stationary or "rack" amplifier will make an equally successful job of a more compact, portable type.

While the requirements might be very similar, there are several outstanding

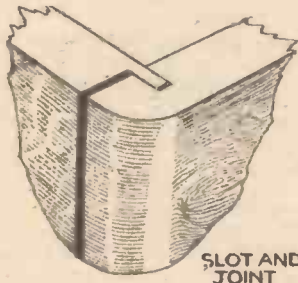


Fig. 1.—A simple slot and tongue joint.

essentials which have to be considered when dealing with portable equipment, and these can be classified under the following headings.

Weight and Strength

These, of course, relate chiefly to the constructional work, but as the selection of the components has to be made with the thought of the ultimate weight ever before the designer, it will be appreciated that the circuit characteristics are also affected.

It is essential, therefore, that the size, weight and number of components is given careful consideration before any actual work is commenced.

One might be tempted, for example, through reasons of cost, weight or size, to use a smoothing choke of lower inductance or current-carrying capacity than is advisable; the selection of the smoothing and decoupling condensers might also suffer, while in other cases a smaller speaker might be fitted, which could not hope to handle the output available, thus directly affecting one of the foremost requirements—quality of reproduction. I would advise all constructors to be on the *safe side*, as a portable amplifier is not a thing with which to take chances.

Constructional Details

If a portable amplifier is intended for serious work, by which I mean plenty of use under all conditions, the whole job must be strongly made. The case must be well constructed, and well protected at points most likely to be struck during transport; the carrying handle, speaker and chassis *bolted, not screwed*, to the woodwork and, finally, protection from weather has to be considered.

The timber for the case should be at least $\frac{3}{8}$ in. thick, the edges being joined together by dove-tail or slot-and-tongue joints as shown in Figs. 1 and 2. To provide additional rigidity and strength, it is also advisable to use the corner fillets—Fig. 3—which should be glued in position. All outside edges and corners—particularly the

corners—should be rounded off, as this not only makes a cleaner looking job of the case but it also reduces the risk of damage from knocks and jolts, Fig. 4.

The corners can be protected by fitting the metal corner pieces which can be

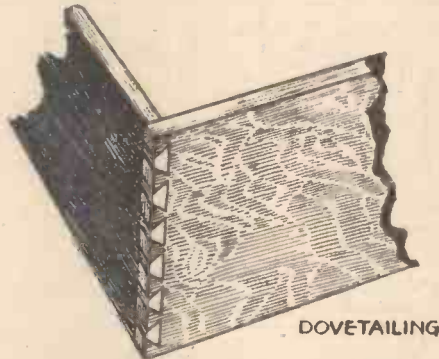


Fig. 2.—A stronger joint—the dove-tail.

obtained from any ironmongery stores—while the hinges for the door or lid should be of the "lift-off" variety (Fig. 5) to

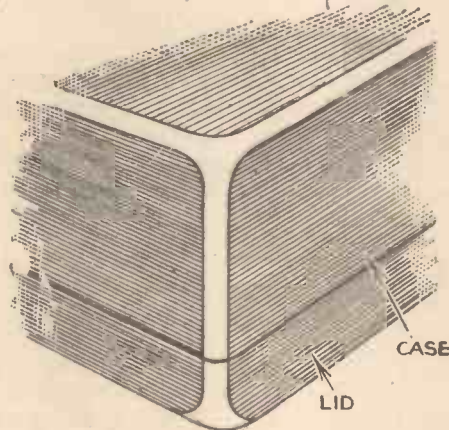


Fig. 4.—Appearance is enhanced and damage avoided by rounding off the corners as shown here.

allow easy separation of the lid and case. This is really essential, as I will explain later. As regards the speaker opening,

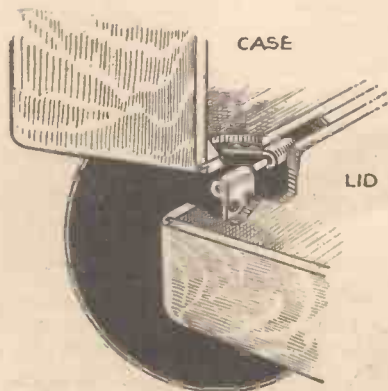


Fig. 5.—How to make a detachable lid.

don't make the very easy mistake of placing it in the dead centre of the case; apart from sound projection reasons, it is necessary to keep the speaker out of centre, otherwise the chassis—which is usually fitted into the lid—will foul it when the complete case is closed. For the same reason, the chassis

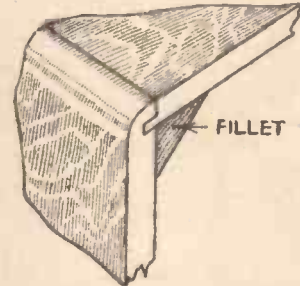


Fig. 3.—This type of joint is very often used commercially.

should be fitted tight up against the bottom inside edge of the lid, and fastened in position by neat bolts passing through the woodwork.

Circuit Details

Hard-and-fast rules cannot be laid down regarding the circuit as so much depends on the requirements. However, as such an amplifier is usually required for microphone and pick-up work, it is advisable to design for an undistorted output of, say, 5 to 8 watts with sufficient amplification from the preceding stages to allow an input equivalent to that of an average microphone fully to load the final valves.

The same amount of amplification will not, of course, be required for use with a pick-up, therefore the circuit should be so arranged that the microphone feeds into the first valve and the P.U. the second stage.

A.C./D.C. or A.C. Only

An amplifier designed for operation off A.C. allows more latitude as regards output, but, bearing in mind weight limitations, and the fact that the outfit might have to be used in D.C. districts, it is usual to make use of "Universal" circuit arrangements, thus allowing the amplifier to be used on A.C. or D.C. supplies without alteration.

A typical circuit is shown in Fig. 6. It is designed for operation with Tungstram valves, and from experience I can vouch for its efficiency and reliability, providing that good components are employed and the specified values adhered to.

It will be noticed that a permanent magnet speaker is used. With such circuits—and with the high efficiency now obtainable with a modern P.M. speaker—it is becoming increasingly more popular to use a P.M. in preference to the energised type. With an A.C. amplifier, it is only a question of selecting a suitable rectifier and transformer to provide sufficient spare current to energise a speaker, but with D.C. arrangements, where the maximum H.T. is limited, it becomes rather more difficult; in fact, the only satisfactory arrangement is to use

(Continued on next page)

PORTABLE AMPLIFIER CONSIDERATIONS

(Continued from previous page)

and not the case (Fig. 7). The reason for this will be apparent if a moment's consideration is given to operating require-

ment to control the output of tone once the gear is fixed in position.

With the chassis in the lid, and the lid removable from the case, it is quite an easy matter to place the speaker and microphone just where they are required and then locate the chassis at the point most convenient for control purposes. When assembling the chassis, use bolts in preference to screws, and don't rely on terminals to hold connecting wires. It is far better—and safer—to solder all connections.

The connections between microphone and chassis, speaker and chassis should be made with twin "cab-type" cable. Ordinary twin flex can cause a lot of trouble.

Now as regards size of case, one has to select a happy medium between a midget affair and a large, ungainly box, always bearing in mind that it has to be carried at some time or another.

One can make the mistake of making it too small; if the components are too cramped, trouble is likely to be experienced. Similarly, if the case is too small, the projection and tone qualities of the speaker will suffer.

On the other hand, it would be equally absurd to make a bulky, heavy case, therefore, I would suggest that the following dimensions are taken—for a circuit of the type shown—as being most satisfactory. The overall measurements are 18 by 17 by 10 inches, the lid being 3in. deep, thus

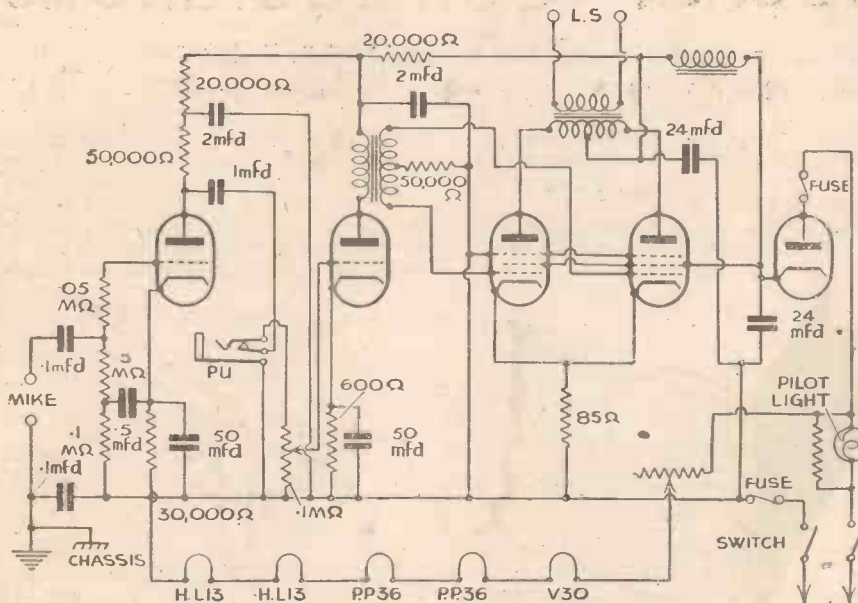


Fig. 6.—Circuit suitable for an efficient portable amplifier.

a separate rectifying valve for the speaker field current.

As one can never tell how far the speaker will have to be placed from the amplifier, the P.M. speaker—in spite of its additional weight—does present a more satisfactory method, as it removes all question of H.T. flowing through long leads to and from the field.

Layout of Chassis and Case

Many constructors make use of metal for the chassis; the idea from the point of view of strength and shielding is very good, but with A.C./D.C. circuits it is possible to get some nasty shocks if one is using the gear on floors having the slightest trace of dampness.

After several experiences, I decided to try a wooden chassis and, to get a neat and serviceable finish, I covered it with Rexine material. The result has proved most satisfactory in all respects.

The case is also best covered with the same material; during transport there is less likelihood of its appearance being spoiled by knocks and careless handling.

Mention has been made about the necessity of fixing the chassis in the lid

ments. Invariably, conditions necessitate the speaker being placed in a position remote from the microphone, therefore, unless the chassis is separate from the speaker section, it becomes a very difficult

making the case 7in. in depth, all dimensions being taken on the outside. The centre of the speaker opening—if a 9in. cone is used—should be 6½in. from the top of the case.

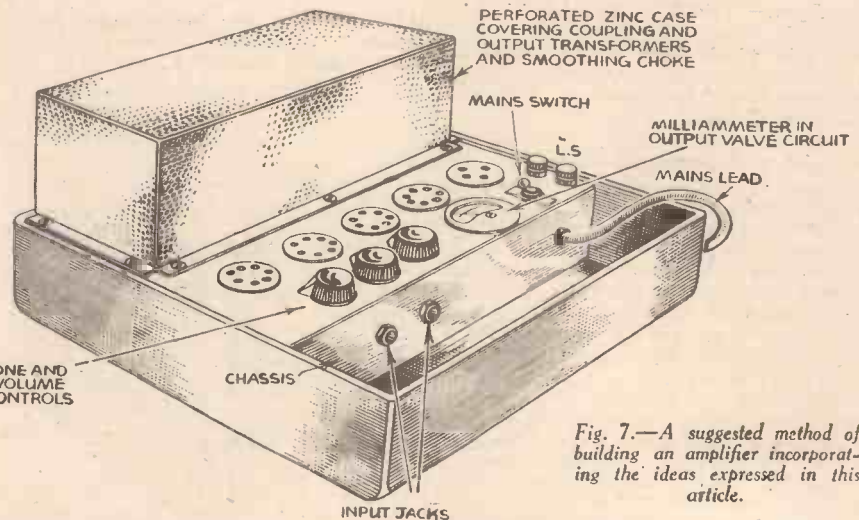


Fig. 7.—A suggested method of building an amplifier incorporating the ideas expressed in this article.

PLAYER'S FOR CHRISTMAS

GAILY decorated Christmas packings are again a feature which the manufacturers of the famous Player's Navy Cut Cigarettes offer to smokers for the coming Christmas season.

Printed with an appropriate greeting, these packings of Player's Navy Cut Cigarettes supply the happiest of all solutions to the gift problem, and having address space they can be dropped straight into the post with just the addition of recipient's name and address. They contain "Medium" or "Mild" blend, plain or cork-tipped as preferred.

The famous "Medium" blends are available in tins of 150 for 7/3, 100 for 4/10, 50 for 2/6, and in card boxes of 100 for 4/8, 50 for 2/5, 200 (packed in four 50's) 9/8, and 25 for 1/3. The "Mild" blend which are so popular to-day, are supplied in card boxes, 25 for 1/3, 50 for 2/5, and 100 for 4/8. Only the 50 size, however, is available in the Xmas outer carton.

For smokers who prefer the ordinary 20's packets there are postal cartons containing five packets of 20 for 4/9½.

Player's "Weights" in Christmas cartons containing four packets of 15 for 2/- are an inexpensive, yet always welcome gift. Player's "Gold Leaf" decorated tins of 50 for 2/11 are just right where a higher grade cigarette is required.

Specially blended for sensitive throats, Player's Cork Tipped "Bachelor" Cigar-

ettes, in flat tins of 50 for 2/6, always make an acceptable gift. Then there are those generous size Player's No. 3 Virginias in flat pocket tins of 50 for 3/4, for smokers who appreciate a cigarette of extra quality.

Player's "Whiffs"—those delightful little cigars with the real Havana flavour—cost 10d. for five, while a more ample smoke is available in Player's "La Doncella" Cigars, which sell in packets of 5 for 2/6 or in boxes of 25 and 50.

Nor has the pipe smoker been forgotten. Player's "Medium" Navy Cut Tobacco in ½-lb. tins at 4/4 is always a favourite at Christmas time. Equally popular are "Airman" Mixture in ½-lb. tins 3/4, "No Name" in ½-lb. tins 5/-, and the "Digger" range of all Empire Tobaccos at 2/8 per ½-lb. tin.

The Amateur Set Designer

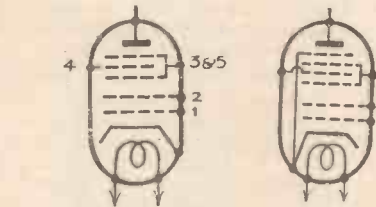
Frequency Changing and the I.F. Stages are Amongst the Subjects Dealt With in this Twelfth Article of the Series

(Continued from page 266, November 20th issue)

THE process which is essential to the superheterodyne system is that of frequency changing, and the progress which has been made in superhet design during recent years has been quite largely attributable to improvements in frequency-changing technique.

For the creation of the required intermediate frequency it is necessary that there shall be oscillations locally generated in the receiver. Then follow two alterna-

tives: (1) To superimpose the local upon the signal oscillations, and rectify the combined oscillations, or (2) to apply the signal and the locally generated oscillations to two separate grids of one of the special "frequency changer" valves which, by a process of "electron mixing," will develop the intermediate frequency without rectification being part of the process.



Figs. 52 and 54.—Theoretical symbols for the heptode and the octode.

The first alternative represents what was the common practice up to the time that the "heptode (pentagrid) valve came into use, and the necessity for rectification was responsible for the term "first detector" which is still so often (although incorrectly) applied to the modern frequency changer valve.

The modern frequency changer valves give definite benefits over the earlier "first detector" arrangements. Cross-modulation and other selectivity troubles are lessened, and the valves are suitable for the application of A.V.C.

In view of the present widespread use of heptodes, octodes and triode-hexodes, we will do no more in connection with the earlier methods of frequency changing than to remind our readers that the H.F. pentode with cathode injection of the local oscillations was one of the most useful devices, particularly when the oscillations were generated by a triode oscillator. As a matter of fact, the H.F. pentode and the triode form such a useful pair that the triode-pentode valves came into being, these valves combining pentode and triode in the one bulb.

The Heptode
It is important that the amateur designer should have a clear idea of the functions of the various electrodes contained in a frequency-changer valve, and we will briefly

run over the action of the modern frequency changer, taking the heptode in illustration.

Fig. 52 schematically indicates the internal electrode grouping of an indirectly-heated mains heptode. Of the total number of electrodes five are of grid construction, two of these (3 and 5) being screening grids which are internally, connected together. The electrodes marked 1 and 2 form, with the cathode, a triode oscillator with electrode 1 as the oscillator grid and electrode 2 as the oscillator anode. Grid 4, screen 5, and the outer anode form what is really a tetrode arrangement, but to describe the heptode as containing two valves in one bulb, one valve a triode and the other tetrode, would be misleading. A triode-pentode valve does definitely consist of two valves in one bulb, and either could be employed, if one so wished, independently of the other, apart from the common heating. But a heptode must be regarded as one frequency changer valve. The point is that although oscillations can be generated by the electrode 2, electrode 1 and cathode

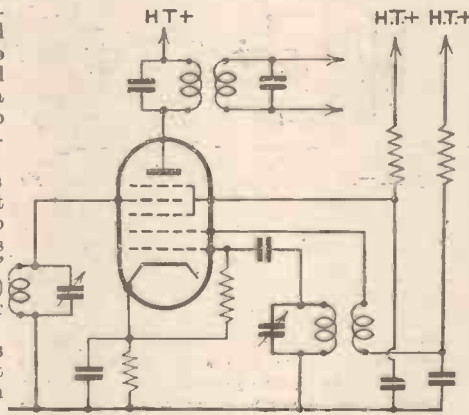


Fig. 53.—Standard circuit for use with the heptode.

group (Fig. 52), without reference to the rest of the assembly, the tetrode section's behaviour is very much dependent upon the oscillator section.

To use the heptode as a frequency changer, the oscillator anode and oscillator grid are connected up in the normal manner for a triode oscillator. The signal input circuit will be connected between the signal grid (electrode 4 of Fig. 52) and cathode (ignoring any bias resistance or A.V.C. complications for the moment). The common screen terminal will be connected to a suitable positive H.T. point, while the outer anode will be connected to H.T. positive, via the primary winding of the first I.F. transformer.

The tetrode section of the valve acts as an H.F. amplifier, but inspection of Fig.

52 should make it clear that the signal grid does not have entire control of the electron stream to the outer anode.

Electrons passing through electrode 4 must necessarily have first come out through electrode 2, which is, of course, the oscillator anode, and the potential of the latter will very greatly influence the number of electrons that can pass through and become available for the tetrode section of the valve. The oscillator anode potential is not steady, but rising and falling at the local oscillation frequency. This brings us to electrode 1, the oscillator grid, for it is the oscillating potential on this grid which is actually responsible for the oscillator anode fluctuations.

From the foregoing remarks it will be understood that both the signal grid and the oscillator grid have a control on the electrons reaching the outer anode. Actually, the current fluctuations in the outer anode circuit are dependent upon the product

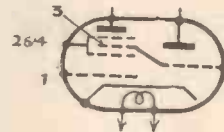


Fig. 55.—Theoretical symbol for a triode-hexode.

of the signal and the oscillator grid voltages. This has a vitally important result (although the proof is too involved for the scope of this article); the outer anode current fluctuation contains a component which has a frequency equal to the difference between the signal and local oscillation frequencies. This, of course, is the required intermediate frequency value, and the I.F. transformer will accept and respond to the "difference frequency."

The tetrode section of the valve is constructed to have a variable-mu characteristic, so the valve is adaptable for automatic control of the signal-grid bias.

The basic circuit arrangements of the heptode are quite simple, and whatever complications there will be in practice will be concerned with the wave-range switching, oscillator tracking, and A.V.C. Fig. 53 shows the basic circuit arrangements omitting switching, padding condensers, and A.V.C. connections. It will be observed that the outer anode, linked screens and signal grid are connected up just as one would with the corresponding terminals of a screen-grid valve. The oscillator anode and oscillator grid are treated in the normal way for a triode oscillator.

Conversion Conductance

In connection with the practical operation of a heptode there are some important points to note. We not only want the locally generated oscillations to keep at a steady amplitude and to be free of harmonics, but there is an additional complication that we have not previously considered; there is, for any frequency changer valve, a certain optimum amplitude

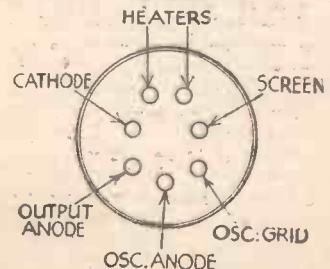


Fig. 56.—Pin connections for the heptode, octode, and triode-hexode.

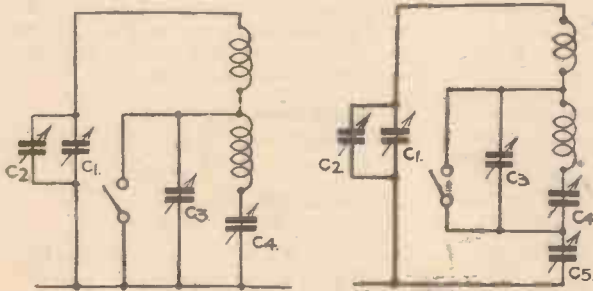
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THE AMATEUR SET DESIGNER
(Continued from previous page)

for the local oscillations, this amplitude giving the maximum conversion conductance.

Conversion conductance is the ratio of the output signal current component (at intermediate frequency) to the input signal voltage (at signal frequency), and is obviously a ratio of importance.

The above statements regarding the conditions required at the frequency changer stage may, at first sight, appear to raise great difficulties for the average amateur designer who, as far as H.F. current and voltage values are concerned, is generally in the position of having to work in the dark to a great extent.



Figs. 57 and 58.—Showing standard methods of arranging the oscillator coil.

The way to meet the difficulty is, first, to take full advantage of the information supplied by the valve manufacturer as regards correct operating voltages, bias value, grid condenser and leak values, etc., and secondly (assuming that an oscillating coil assembly is purchased), to use an oscillator coil specifically designed for the type of frequency changer that is to be used. Fortunately, although there is an optimum amplitude for the local oscillations, the value is not to be regarded as highly critical, but it makes it necessary to choose a suitable oscillator coil assembly, and the coil manufacturer's specification should be studied with this point in view.

The Octode

The amplifying section of the heptode frequency changer is, as we have seen, of variable- μ tetrode type. If a suppressor grid is added to make the amplifying section be of variable- μ pentode character, the whole valve is called an octode (see Fig. 54).

The frequency conversion process of an octode is similar to that of a heptode, the main difference between the two valves being that the anode impedance (modulator section) of the octode is higher than that of the heptode. This implies, of course, that from the point of view of the selectivity of the first I.F. stage, the octode will give the lesser damping.

The Triode-Hexode

Heptodes and octodes are widely used, and for medium and long-wave reception they are very successful types of frequency changer. For short-wave reception, however, they have disadvantages, and in a short-wave or "all-wave" receiver, the triode-hexode is to be preferred.

Common sense will indicate that although it is necessary for the output anode current fluctuations to be a function of both signal and oscillator voltages, it is very undesirable that there should be any direct interaction between oscillator and signal-frequency circuits. Interaction between oscillator anode and signal grid of the heptode or the octode is kept sufficiently

low, as far as medium-wave and long-wave reception is concerned, by the screening arrangements; nevertheless, when the oscillator frequencies get very high (as in short-wave reception) trouble is liable to occur, resulting in the conversion conductance falling badly.

The triode-hexode frequency changer consists of a triode oscillator, and a variable- μ hexode with a common cathode. The oscillator grid is internally connected to one of the grid electrodes of the hexode section (see Fig. 55). The hexode anode current fluctuation is under the control of both signal-grid (electrode and) oscillator-grid voltages, since the latter is internally connected to electrode 3 of the hexode, and as a result the frequency conversion comes

about in a manner corresponding to that of the heptode. The partial separation of oscillator and amplifier, however, gives considerable advantages for short-wave reception. The triode section is designed to maintain satisfactorily strong oscillations, even on the short waves, and undesirable interaction between oscillator and signal circuits is very much less than the heptode or octode.

Although requirements imposed by short-wave reception have been responsible for the introduction of the triode-hexode, it must not be regarded as being essentially a short-wave valve. It is, as a matter of fact, a very suitable type of valve for an "all-wave" receiver. The basic circuit connections of the triode-hexode correspond to those of the heptode or octode.

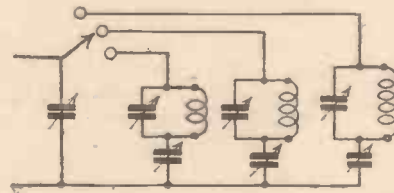


Fig. 59.—An all-wave assembly with separate circuits for each waveband.

7-pin Valveholder Connections

British heptodes, octodes and triode-hexodes with seven-pin bases have a standard pin arrangement. The valve cap provides the signal-grid connection, and the remaining points (for a mains valve) are as shown in Fig. 56. This diagram shows the valveholder connections viewed from above. In the case of a directly-heated battery valve, the metal coating is connected to the point marked cathode in Fig. 56.

Oscillator Tracking

If the normal system of ganged condenser tuning is to be employed, the designer must give very close attention to the matter of oscillator tracking. In this connection it must be noted that the manufacturers of any particular oscillator coil assembly have designed the latter with reference to a certain particular I.F. valve, for use with a certain type of frequency changer, and for use with particular tracking arrangements.

Broadly, the available oscillator coils can be classified as being in two groups: (1) Those intended for tuning by "shaped plate" oscillator-tuning condensers, and (2) those intended for use with ordinary

tuning condensers and, therefore, requiring padding condensers on all wavebands.

In either case the amateur set designer should carefully note the coil-makers' instruction regarding the tracking and follow these instructions closely.

Figs. 57; 58 and 59 illustrate typical oscillator coil arrangements, omitting the reaction windings.

Fig. 57 shows a MW/LW tuned oscillator circuit employing "shaped plate" condenser tuning. In such a case it is generally necessary to employ padding on the L.W. band. C1 is the tuning condenser, C2 the M.W. trimmer, C3 the L.W. trimmer, and C4 the L.W. padder.

Fig 58 applies to a case with ordinary condenser tuning, C1 is the tuning condenser, C2 the M.W. trimmer, C3 the L.W. trimmer, C4 the L.W. padder, and C5 the M.W. padder.

Fig 59 is appropriate to an "all-wave" receiver using completely separate coil assemblies for each waveband, and also employing ordinary condenser tuning. It will be noted that each coil has its own trimmer and padder.

The I.F. Stages

As the I.F. stages are tuned to constant frequency, irrespective of the signal frequency that is being received, we can have not only high efficiency of operation but simplicity of arrangements as well.

It is customary to use H.F. transformer coupling in the I.F. stages, and there is every advantage to be gained by having both primary and secondary tuned (see Fig. 60).

The degree of coupling between the primary and secondary of an I.F. transformer will have considerable bearing upon the adjacent channel selectivity and the degree of fidelity in the reproduction of the receiver. I.F. transformers are available which provide pre-set means of adjusting the coupling, and these are useful in so far as they enable the amateur, if he finds it necessary, to make correcting adjustments when he reaches the interesting stage of first putting the receiver through its paces.

This matter of adjusting I.F. coupling raises again the question of incorporating variable selectivity in the receiver design. There are two facts which indicate that the I.F. amplifier section of a superhet is the only satisfactory place for variable selectivity control: (1) The tuning is fixed, so there will be no complications introduced by a wide range of H.F. frequencies having to be handled, and (2) intervalve coupling in the I.F. amplifier is normally of mutual inductance type, and this form of coupling is particularly suitable for selectivity control by coupling variation. The point of the latter statement is that if the two tuned

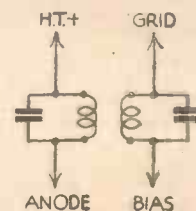
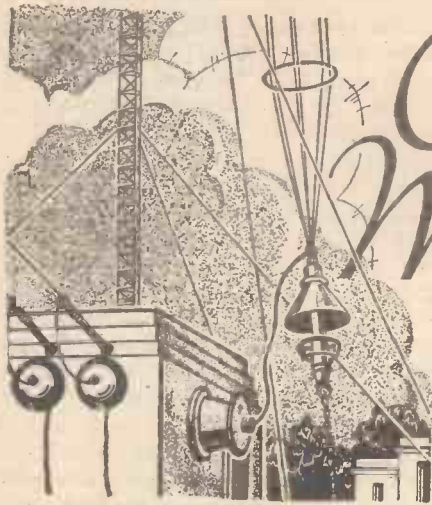


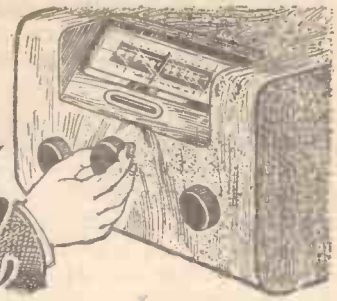
Fig. 60.—Theoretical representation of an I.F. transformer.

circuits of an H.F. transformer are accurately tuned (and if capacity coupling between windings is negligible) then variation of the mutual inductance value will give a changing resonance curve, but the latter will keep symmetrical about the I.F. This does not apply to other forms of coupling, with which the response curve does not spread out symmetrically with increase of coupling.

(To be continued)



On Your Wavelength



By Thermion

Misleading Tables of Wavelengths
WHY is it that nearly all of the lists of short-wave stations differ in the important matter of the wavelengths of the stations? I notice that they all seek to give an atmosphere of extreme accuracy by giving the wavelength to the first decimal place and

published wavelength (amateur or professional broadcasts) so that I can take some steps to put a stop to the menace.

The Sunday Programme Committee
MR. H. BRAMWELL, of Rochdale, in response to my request for jokes sends the appended illustration of his idea of the committee which decides our Sunday programmes. This reader's idea coincides with mine, and if the sketch is not a scale drawing of the members of the Committee it is nice to think that this is what they ought to look like. I have sent this reader a book for his trouble. My offer to

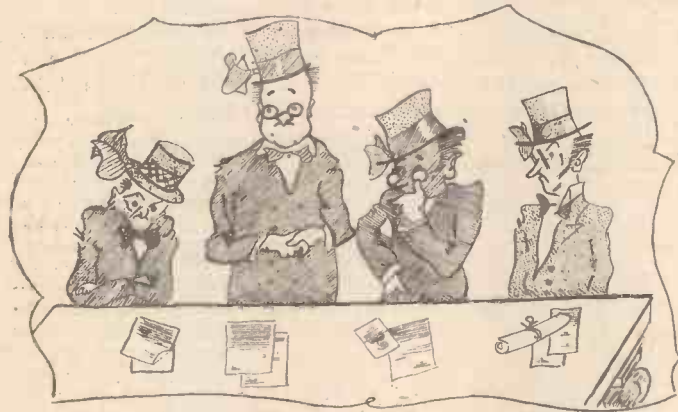
Poldhu Wireless Station from which the first wireless signal across the Atlantic was transmitted in December, 1901, and to commemorate the research work done there by many pioneers including the late Marchese Marconi. The Memorial is, of course, not yet completed. The inauguration will take place within a week or two.

Two More Stories

MR. R. MORGAN, of Llanelly, passes along a couple of jokes. He says that he works in a radio shop, and a customer walked in and asked for an aerial. He was offered a 75ft. length, but insisted upon the full 100ft. permitted by the P.M.G. "To take the strain off the valves as the signals were very weak." Here is another: A customer purchased a kit of parts in [the] summer for a three-valve set. He got it going, kept it for six weeks, and then went in for an S.G. and pentode two-valver. Results were not good, and Mr. Morgan went up to examine the set. Upon inspecting the aerial, which was sagging away and not very high, the customer informed him that the aerial had sagged owing to the extra valve of the previous set. My reader assures me that both of these stories are true. Now you tell one!

The Cigarette Card Myth

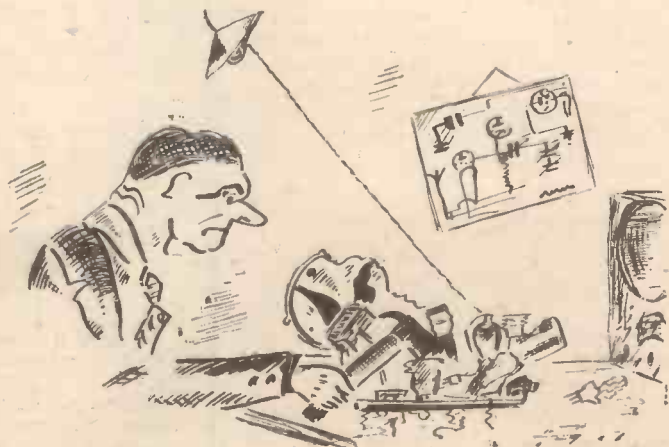
MOST of us have encountered in our youth the absurd story that if you collect about a million



An exclusive glimpse of the Committee planning a jolly little programme for Sunday.

in some cases to two decimal places, and yet we all know that they seldom radiate programmes on such accurate wavelengths. The whole position with short-wave transmission is most unsatisfactory and there is no reason for the disparity in these published lists. It seems to me that some standardisation committee or some international broadcasting body should investigate this matter with a view to obtaining reasonable standardisation. Some of the stations are wildly out on their wavelengths, and quite often cause serious interference and jamming. A stop should be put to it at once. Some of the smaller short-wave stations seem to imagine that they are outside the bounds of any form of control and seem to do and say what they like on the air. I am compiling a list of the chief offenders, and should be grateful to any reader who could draw my attention to any station which does not transmit on its

award books is still open. **The Marconi "Memorial"**
SEVERAL of my readers have noted an illustration in a morning newspaper bearing the caption: "The Memorial which has been erected to the memory of Marchese Marconi on the Cliff at Poldhu, Cornwall." I am asked by Marconi's Wireless Telegraph Company, Ltd., to point out that the description in this caption is not strictly accurate. In fact, the Memorial is to mark the site of the



The man who didn't use a P. & A. W. blueprint.

cigarette cards you will get a grand piano, or a motor-car, or a house, or something equally attractive. This yarn is about as old as the chain letter menace, and I thought that it was dead. Yet I read the other day of a defendant who had defaulted in payment of a hire-purchase arrangement and told the judge that he had the wireless set on hire-purchase which he was to pay for by means of cigarette coupons. Apparently he had been told that 150 of them were worth a pound!

Does the Dealer Listen-in?

I OFTEN wonder whether dealers ever listen in. If they do, how do they appease their conscience by selling such trash? I saw a window full of sets from four guineas upwards the other day, so I walked into the shop as an intending purchaser and asked the dealer to let me hear some of the receivers on his aerial. Not one of these receivers would satisfy the least critical listener. The quality was poor, the selectivity was conspicuous by its absence, and they were really local-station receivers only. An inspection of the woiks showed that they were a few bits of tin and wire and the cheapest possible foreign valves.

The Overseas Market

I HAVE received another lengthy letter from an overseas reader who thinks that the American alone is out to supply the overseas market. He complains that he gets all of the British periodicals but none of them, with the exclusion of PRACTICAL AND AMATEUR WIRELESS, devotes any space to overseas readers. He says that a British representative will be quite satisfied with what he can gather from the agent who handles his wares, but in nine cases out of ten such an agent knows nothing of the technical side or the conditions prevailing and therefore is unable to tell the representative exactly what is wanted. He says that the British manufacturer and the British designer have so far earned little credit from the colonials because they allow foreign countries to step in and capture the market. Short-wave enthusiasts exist overseas in their thousands, and a high percentage of them use American circuits but employ British short-wave components. He complains of the difficulty of obtaining components abroad especially for sets intended for home construction. It is too costly to order the parts from England.

I can assure this reader that British manufacturers are not blind to the possibilities of the overseas market any more than publishers are. There are other considerations, however, not



Notes from the Test Bench

Localising Faults

THE solutions which were submitted for one of our recent problems indicated that many of our readers do not realise the importance of localising defective components in a receiver which has developed a fault. The problem in question related to a noisy receiver. It was stated that the crackling noises experienced ceased when the primary winding of the intervalve H.F. transformer was short-circuited. Most of the solutions submitted indicated that the fault was in the winding of the H.F. transformer. Readers who trace faults by localisation will readily realise that although the fault might be in the transformer, it could also be in any component in the H.F. stage or stages preceding this transformer, or even in the aerial-earth system. By short-circuiting the primary of the transformer the components between the transformer and the aerial, and the aerial-earth system itself were isolated, and noises arising from a defect in this part of the receiver could not be transferred to the detector valve and speaker.

Short-circuit Tests

THE short-circuit method of testing mentioned in this problem is very useful for determining in which section of a receiver noises, such as hum and crackling, originate. If the noise ceases when a wire is connected across the secondary winding of the L.F. transformer preceding the output valve, it will indicate that the noise does not originate in the output stage. The test can be continued from stage to stage, working towards the aerial. If, in the above-mentioned case, the noise does not cease when the grid leak of the detector valve is short-circuited it will indicate that the fault lies between the detector and the speaker. On the other hand, if the noise ceases when this test is made, the fault will lie in the stages preceding the detector. Although an experienced tester can use a wire for the short-circuiting test, the beginner is advised to use a high-capacity condenser in order to avoid the possibility of damage due to wrong connection.

the least of which is that in some overseas markets American goods are preferred, not because of inherent merit, but simply because they adopt methods of trading which the British manufacturer will not adopt, and I am glad he does not adopt. I am not one of those who believe that America is able to produce better goods than we do. I do think that a large amount of their successful selling methods is based on ballyhoo, and it is hardly flattering to overseas customers to have to admit that the American set is successful; it is because the customers more easily fall for the charms of American ballyhoo than they do for the straightforward, honest trading methods and honest claims of the English manufacturer, who does not believe in overstating the case nor in making wild claims about his receivers. A market which can only be held by bluffing the public and by using questionable methods in order to gain the overseas dealers' support is not worth seeking. Sooner or later the overseas market will require reliable receivers made by firms with a settled marketing policy and then the British market will come into its own.

Club Journals

THE Ilford and District Radio Society have sent me a copy of their little Bulletin which they are producing to set on permanent record the doings of the club. It is a modest effort, but I wish that more clubs were sufficiently enthusiastic to produce their own journal. It helps to tie the members together, provides some fun, and enables those who are not gifted with the power of oratory to write results of their experiments instead of expressing them in the form of a lecture.

Information on Stations

I AM told that Philco Radio's research department is now collecting information along a new line. It has sent to every one of its 5,000 dealers a return reply card on which is to be written the call-letters of the sixteen most popular radio stations received in each dealer's area.

As these cards are returned with the required information they are carefully studied and the stations listed by areas. With this material as a background, expert technicians are sent into each area with sets to be tested for accuracy of dial calibrations and perfection of reception of programmes broadcast by the stations most popular in that section.

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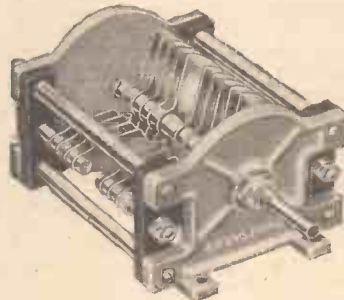
Armstrong Company has published a new illustrated catalogue, fully describing model 3BE/8, together with many other chassis of equal interest. A copy will gladly be sent on application. It is called 'Armstrong Technical Catalogue No. 12'.

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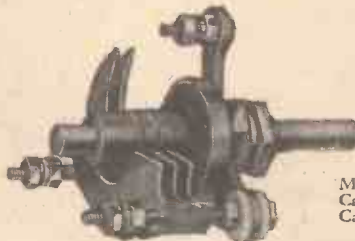
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Verifying That Station

THE most interesting feature of short-wave work to many amateurs is the collection of QSL cards. For the benefit of new readers, these are printed cards which are sent out by a transmitter in reply to a report of reception of his signals. On our cover this week we show a few of the cards which are sent out, but these give no idea of the interesting pictorial effects which are obtained on the cards. If a separate room or a section of a room is devoted to the "radio lab.," the appearance is greatly enhanced if the wall is papered with these cards, and many amateurs find the collection and grouping of the cards as interesting as the carrying out of radio experiments. In addition to the collection of the cards the proof of long-distance reception which they give is also an indication of the efficiency of the receiver and a reward for the many hours of patient listening which the recipient has carried out.

To prepare a collection of these cards the first essential is a good long-distance receiver, and each listener will have his own preferences regarding this. Obviously, the smaller the receiver and the larger the collection of cards, the greater is the value of the combination. Naturally, one would expect a 9 or 10-valve superhet. to have greater distance-getting properties than a simple two-valver, and yet the collection of cards held by some users of small apparatus such as this is really amazing.

Country Identifications

Before a card can be obtained it is necessary to write to the transmitter, and this is a simple matter where the address is given out at the beginning or at the end of the transmission. This does not always occur, however, and then the listener has to ascertain the address if he wishes to send a report. From time to time we give, in our Short-wave Log and in other parts of these pages, addresses of new stations or notices of removal or change of postal address. These should be carefully cut out and filed, the best plan being to keep them in order of country. The call letters allotted to each country are quite distinct and are governed by a special body. They are as follows:—

Some Important Details Regarding Station Call-signs, and the Method of Obtaining QSL Cards

These references give the countries only, but the exact address should be ascertained where possible, by reference to the various publications such as the *Radio Amateur Call Book*, etc. Where it is not possible to find the exact address it is often permissible to send the report to the station, c/o the postal authorities in the country concerned, provided it is not a very large country, such as America. Alternatively, if you already have the address of a transmitter (amateur) in the country you could write to him and ask him to oblige you by forwarding your report.

Verifications

Unfortunately, every transmitter does not respond by sending a card in receipt of the report of reception, and thus one must be prepared to be disappointed in a good many cases. Our own British Long Distance Listeners' Club at one time undertook the despatch of reports of reception to stations for members, but this service had to be discontinued on account of the lack of co-operation shown by some transmitters. Another point which must be borne in mind is that reports will not be received by return of post. A very large mail is handled by some transmitters and thus they find it difficult to reply at once, and reports are dealt with in rotation which, in some cases, may mean months before you hear from the station. Obviously, a reply will only be sent if you have forwarded to the transmitter a really valuable report of reception, and it is in this respect that the majority of listeners fail to give satisfaction and consequently fail to receive a card. Make quite certain that your report gives every possible detail which will assist the transmitter in judging the efficiency of his transmitter and aerial equipment, and on no account fail to give full details regarding the weather which exists at the time of reception.

Language Difficulties

The question of understanding the language in the case of certain foreign

countries is often overcome by the transmitter, who gives his call sign (especially in the case of a broadcasting station) in several languages. Where the transmitter is an amateur, however, some hints might be worth while with regard to understanding the call, although if the address cannot be gathered it is not of much interest unless you merely wish to record all of the stations you have heard from time to time. After a time it will be found a simple matter to identify the country by the accent or particular letters which are pronounced in a definite way. For instance, the Spanish stations will often be heard to announce in their call sign the letter Koo, which is equivalent to our letter "Q." EAQ will, therefore, be pronounced "Ee, Ah, Koo." The letter "J" in German becomes "Yot," and so on. A glimpse through some foreign text books is often worth while if you intend to take up serious long-distance listening, although it is possible to obtain quite a good collection of cards without the slightest knowledge of any foreign language.

Interval Signals

Then again there are some interesting types of signal used by foreign stations to identify either the country of origin or the station which is transmitting, and these may be collected with a view to adding to the interest of long-distance listening, as they give a definite indication and thus avoid the necessity of waiting for a call sign. The familiar and well-known Kookaburra-bird (Laughing Jackass) of Australia is a good landmark on the short-wave band on Sunday mornings, and at other times if you are lucky enough to be able to pick up Australia then. This interval signal, taken from a gramophone record, is used by Sydney. Blows on an anvil, musical chimes, bells and many similar items are adopted in other cases, but it would take up too much space to give a full list of all of the signals which are employed. A carefully-kept book of call-signs and other material relative to this subject will be found of the greatest value, whilst the special verification sheets, which are sold by us for the use of members of the B.L.D.L.C. will also be found of value in simplifying the reporting of signals.

(Continued on page 300)

AC	China	GM	Scotland	OZ	Denmark	VQ8	Ascension, St. Helena
ACA	Tibet	HA	Hungary	PA	Netherlands	VR	British Guiana, Mauritius
AR	Syria	HB	Switzerland	PJ	Curacao	V82, V83	Malaya
CE	Chile	HC	Ecuador	PK	Neth. Indies	V85	Saravak
CM	Cuba	HH	Haiti	PY	Brazil	V80	Hongkong
CO	Cuba	HI	Dominican Repub.	PZ	Surinam	V87	Ceylon
OP	Bolivia	HJ, HK	Colombian Rep.	SM	Sweden	V88	Malaya
OR4	Cape Verde	HL	Saint Helena	SP	Poland	VU	India
CB5	Port. Guinea	HP	Panama	ST	Sudan	W	United States
CB6	Angola	HR	Honduras	SU	Egypt	X	Mexico
CB7	Mozambique	HS	Siam	SV	Greece	XU	China
CB8	Port. India	HZ	Hedjaz	TA	Turkey	YA	Afghanistan
CR9	Macao	I	Italy & Colonies	TG	Iceland	YI	Iraq
CR10	Timor	J	Japan	TH	Guatemala	YJ	New Hebrides
CT1	Portugal	K4	Porto Rico, Virgin Islands	TI	Costa Rica	YL	Latvia
CT2	Azores	K6	Canal Zone	TS	Saar	YM	Danzig
CT3	Madeira	K6	Guam, Hawaii, Samoa (U.S.)	U, UE, UK, UX	U.S.S.R.	YN	Nicaragua
CX	Uruguay	K7	Alaska	VE	Mauritius	YP	Roumania
D	Germany	KA	Philippine Islands	VK	Canada	YS	Salvador
EA	Spain	LA	Norway	VO	Australia	YT, YU	Jugoslavia
EI	Irish Free State	LU	Argentina	VQ	Newfoundland	ZV	Venezuela
EL	Liberia	LX	Luxembourg	VP1	Zanzibar	ZA	Albania
EP, EQ	Persia	LY	Lithuania	VP2	Antigua, Fiji Islands	ZB1	Malta
ES	Estonia	LZ	Bulgaria	VP3	Gilbert & Ellice Islands	ZC1	Transjordan
ET	Abyssinia	MX	Manchukuo	VP4	British Honduras, Trinidad	ZG6	Palestine
EZ	Saar	NX	Greenland	VP5	Cayman Islands, Jamaica	ZD	Nigeria
F3, F8	Algeria, France, Martinique, Morocco, Tahiti	NY	Canal Zone	VP6	Barbados	ZE1	Southern Rhodesia
F4	Tunis	OA	Peru	VP7	Bahamas	ZK1	Cook Islands
F8M	Morocco	OB	Sarawak	VP9	Bermuda	ZK2	Niue
F8S	Madagascar, Reunion	OE	Austria	VQ1	Fanning Island	ZL	New Zealand
FI	Fr. Indo-China	OH	Finland	VQ2	Northern Rhodesia	ZM	Samoa (British)
G	Great Britain	OK	Czechoslovakia	VQ3	Tanganyika	ZP	Paraguay
GI	Northern Ireland	OM	Guam	VQ4	Kenya	ZS, ZT, ZU	Union of South Africa
		ON	Belgium, Bel. Congo	VQ5	Uganda		

Practical Television

November 27th, 1937. Vol. 3. No. 76.

Projection Receivers

THE use of a small-sized cathode-ray tube giving a brilliant detailed picture on the front screen, and capable of projecting this picture on to a screen remote from the tube itself, has been put into practice by both European and American companies for some time now. At the Radio Exhibition this year both Phillips and H.M.V. had sets operating on this principle, although the exhibits were withdrawn from the main demonstration theatre two days after Radiolympia opened. So far, sets of this character are not generally available to the public, while the cost is high when compared to their more familiar standard cathode-ray tube prototypes. During the course of the recent Berlin Exhibition projection receivers in various forms were shown to visitors, but as there is as yet no public television service of the type furnished by the B.B.C., the sets in question are not purchased by potential viewers. One of the receivers, made by the Fernseh A.G., is shown in the accompanying illustration, Fig. 1.

For Large Pictures

TO meet the case of large pictures required when the viewing audience are assembled in a hall as distinct from a fair-sized room in the home, several models have been designed by Fernseh A.G. One of these is shown in Fig. 1, and the projection lens in this case is placed at the front of a top compartment integral with the cabinet proper. The actual dimensions of the cabinet are 42ins. high and 27ins. wide, and in consequence does not obstruct the view when arranged for front projection in a hall. Either front or back projection can be undertaken, depending on the nature of the screen used; and vision receiver, time base generator, power pack and anode volts unit, together with the tube itself, are all accommodated in the cabinet shown. Three different-sized pictures were featured during the course of the show, these being 47ins. by 40ins., 69ins. by 59ins., and 81ins. by 67ins. In each case the degree of definition conformed to the new German standard of 441 lines interlaced to give 50 frames 25 pictures per second. The results were most promising, and indicated quite clearly that high-definition television pictures reconstituted by the projection tube method provide yet another form of viewing which will be applied commercially at some future date.

At Last!

IT is now revealed that the Treasury have requested the Television Advisory Committee, under the chairmanship of Lord Selsdon, to undertake an inquiry into the B.B.C.'s demands for more money to develop the television service. Up to September 30th the amount spent on equipping and running the station at Alexandra Palace was £458,000, and for next year the sum of money said to be required by the B.B.C. has varied between the limits of a quarter of a million and one million pounds. The original allocation proved fantastically inadequate, and it is hoped that the committee's report will be

completed early next year. Not only questions of finance need investigation but the problems associated with the picture standards and how soon the demands of the provinces for a television service can be acceded to. In any case, the move which has now been made will be welcomed by those radio manufacturers who are now in the throes of next season's production plans, as any expansion of the service will enable them to increase their output and so reduce the price of the receiving sets.

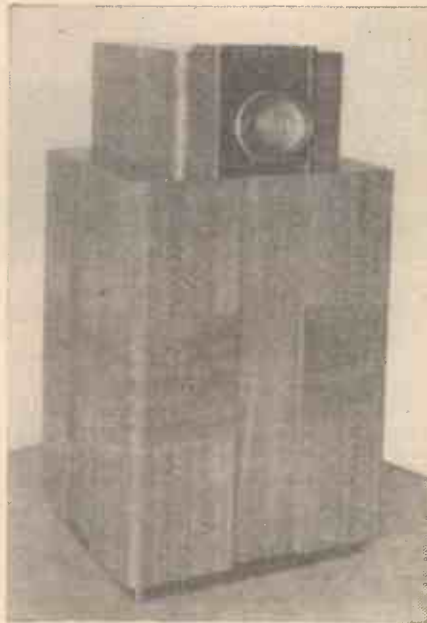


Fig. 1.—For large pictures in a small hall this type of projection television receiver can be employed.

A High Standard

THE recent efforts of the mobile television unit has shown the viewing public very clearly that items of topical interest raise the standard of the television programme very materially. During Armistice week, the televising of the Lord Mayor's Show and the Cenotaph service were high lights among a wealth of good programme material. Whereas the ordinary listener was nonplussed at hearing the two minutes' silence disturbed, and wondered what had happened, the hundreds of parties grouped round television receivers over the service area saw every detail of the incident reproduced on their screens with a clarity that was astounding. In every case when the outside broadcast mobile unit has been brought into action the home screen seems to take on an atmosphere of reality that does not always exist with straight studio items. Furthermore, if any emphasis were needed to show how good were the camera results with the two outside broadcasts mentioned, a comparison could be made when the news reels were televised later. Due to the inherent characteristics of the camera itself, which are not yet adapted to sudden light changes, flares across the picture tended to mar the results shown,

whereas when the cameras were working direct on the scene giving transmissions, no such effect marred the pictures observed. It seems certain that a second mobile unit will be required at an early date if the sustained interest of events happening daily in and around London is to be dovetailed successfully into the studio programmes now provided.

Upsetting the Tone Range

TO secure the best possible reproduced television picture, the tone values must range from absolute black to full white through all the intermediary shading which gives the pleasant pictorial half-tone values which should be present. Various factors influence this important item, a point which can be proved very readily by the possessor of a modern cathode-ray tube receiving set. For example, if the gain control is increased so that the cathode-ray tube is over-modulated, then not only will there be a loss of detail in the high lights but the half-tones will be absent, giving a harsh picture unpleasant to look at. To preserve an adequate tone range the degree of brightness of the deepest black portion of the picture has to be considered. Naturally, the level of brightness at which the screen is made to operate will depend on several points, among which can be mentioned the size of the room in which viewing is being undertaken, the number of people in the audience, coupled with the distance of the person farthest from the set and whether there is any form of natural or artificial illumination present in the room. Direct illumination of the screen from any external source

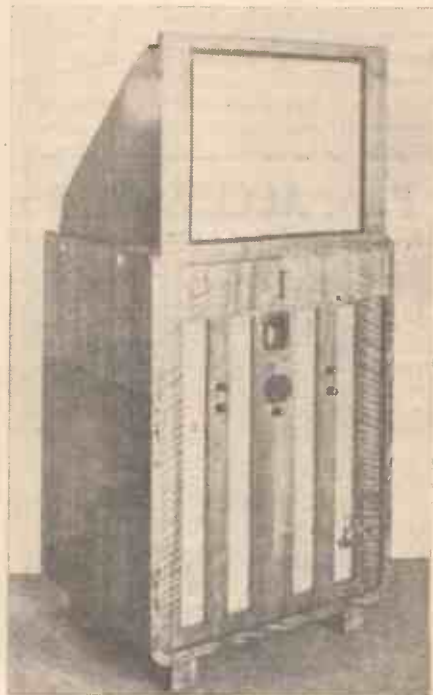


Fig. 2.—One form of Fernseh A.G. projection tube television receiver suitable for home use.

must be avoided, but even then the tone range may be unsatisfactory. This can arise from light being reflected from the brightest portions of the picture on to what should be the black or dark portions. Inside the glass envelope of a cathode-ray tube will often be found a coating, and unless precautions are taken to make this non-reflecting then the picture will be

(Continued on next page)

PRACTICAL TELEVISION

(Continued from previous page)

partially ruined. This point has been given careful consideration by the leading cathode-ray tube manufacturers to ensure that internal reflections are reduced to a negligible quantity. In a darkened room a tone range as high as 100 to 1 has been observed, but with a measure of local lighting this is probably halved. This measure of contrast is adequate for most purposes, however, although there are some viewers who exhibit a taste for an over-contrasted picture instead of the more faithful tone rendering which should be a replica in light miniature of the scene in the studio itself.

An Unavoidable Loss

WHEN we speak of the B.B.C. television signal having a picture definition of 405 lines we are strictly correct, but too often it is overlooked that the picture observed on the receiver is not composed of this total number of lines. At the end of the odd and even frames of the interlaced picture a certain percentage of the lines is suppressed for synchronising and other control purposes. Every picture is seen to have a black masking or framing, and although the height and the width of the rectangular section within the black borders may be increased by operating the appropriate time-base generator controls, so that the picture proper just fills the cut-out mask provided with the set, the number of lines in the picture itself is nearer 350 than the 405 into which the whole area of scan is subdivided. This loss is inevitable owing to the fact that a certain proportion of the scanning time is allocated to the synchronising pulses, which act in conjunction with the time-base generator, to keep the image steady. To allow the picture proper to have a full 405-line definition would mean that the frequency

band of the radiated signal would have to be extended to accommodate the rectangular shaped pulses at the end of each line and at the end of each frame. Vision modulation between 30 per cent. and 100 per cent. carrier is, therefore, suppressed during these synchronising periods, and one result is the black edging to the receiver picture. Even in the days of low-definition television the picture was "robbed" of part of its line scan time in order to provide the 375

in those days the synchronising and vision modulation were not segregated to separate and distinct parts of the full carrier modulation range. Again, the D.C. component was missing, with the result that the "black level" wandered, and the set user had to adjust his brilliance control in an effort to simulate the average lighting conditions present in the transmitting studio. Although, therefore, the present signal does not give a picture with the



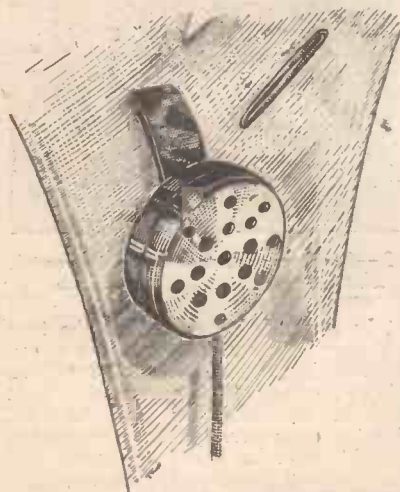
Patients at the Southend General Hospital saw the Armistice service by television; the set was generously lent by the manufacturers. Many of the patients who witnessed the ceremony had seen service overseas. The illustration shows some of the patients and nurses watching the televised Armistice service.

cycles frequency which constituted the line pulse, but in this case there was no frame-synchronising pulse in the same sense as we know it to-day. Furthermore,

full number of lines available for picture reconstitution, the nature of the signal is infinitely superior to that which occurred in low-definition days.

P. A. ACCESSORIES

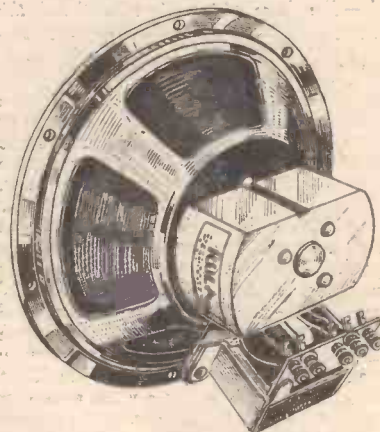
FOR the experimenter who is anxious to carry out small public-address work, the two accessories illustrated herewith will be found very useful. The first is a microphone intended, as the illustration shows, for mounting on the lapel of the announcer's coat. The actual size is 1½ in. diameter by only ½ in. deep and it weighs



The Sound Sales £2. lapel microphone.

approximately 1 oz. It is a Sound Sales product, and the sensitivity is so high that the wearer may turn his head right round and still talk in a natural voice without loss of pick-up. The standard transverse-current

type, and ideal for use as extension points round a small hall. The cone is of the 8½ in. type with a 2-ohm speech coil. It will handle 8 watts and has a very high flux density. The weight of the speaker is 6½ lbs. and the cost is 52s. If desired it may be obtained with a special Universal transformer, in which case an additional charge of 7s. 6d. is made.



This is the Rola loudspeaker.

principle is adopted in the design and it may be energised by a 4-volt battery from which it will consume only 50 mA. The impedance is very low—actually about 200 ohms—and thus quite a long connecting line may be used without difficulty. The price of this component is £2.

The second item is the Rola model F.1050 loudspeaker, of the permanent-magnet

VERIFYING THAT STATION

(Continued from page 298)

It should hardly be necessary to point out that the wavelength upon which the signal is heard should be mentioned, and, as in many cases this will not be mentioned by the transmitter, the receiver should be accurately calibrated. This may be done by using known stations as marking-points, or by making up a wavemeter or similar calibrating instrument and having this accurately calibrated at a good service depot. Finally, when sending verifications remember that the inclusion of an International Reply Coupon will cover postal expenses and often result in a reply being sent which would otherwise not be forthcoming. These coupons are obtainable from any post office, and cost 6d. and 3d. each. Do not send stamped, addressed envelopes abroad, as the post offices in foreign countries will not recognise English stamps, and thus a surcharge may be placed upon the reply, or the transmitter will not avail himself of the addressed envelope and may not reply to the report.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

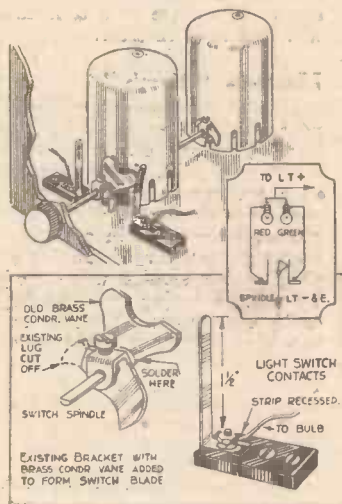
THE HALF-GUINEA PAGE

THAT DODGE OF YOURS!

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

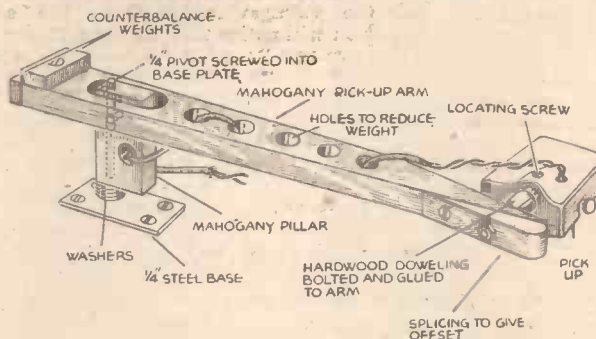
Dial Light Colour-change Switch

WHERE dual-range coils of the type shown in sketch are in use, a change-over switching device can easily be added to switch the dial light from red to green, on turning the wave-change spindle from



A simple switch for dial-light colour-changing.

to the desired needle angle, and a hole drilled in the dowel for the locating grub screw which is finally screwed home. The method of assembly of the complete arm is clearly shown in the sketch. The following settings are obtainable:—



A novel method of constructing a pick-up arm.

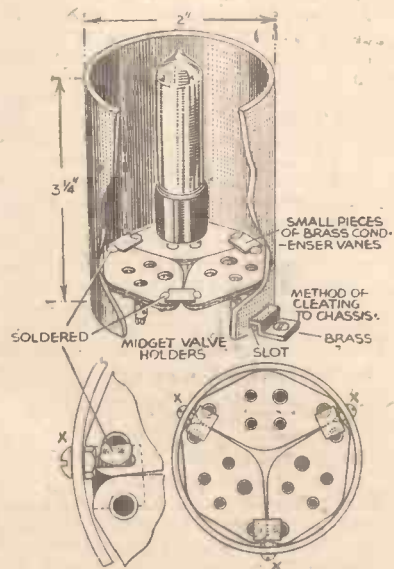
- Needle angle, 65 deg.
- Needle point to centre of back pivot, 9 1/4 in.
- Offset, 3 3/4 in.
- Overlap, 0.50 in.
- Weight on record, 5 to 5 1/2 ozs.
- Maximum tracking error anywhere on a 12 in. record, 2 1/2 deg.
- Reproduction with Universal needles is as good as any balanced armature pick-up.
- E. R. J. ROBBINS (Hounslow).

A Compact Valve Assembly

WHEN building a midget receiver recently, I hit upon the idea illustrated in the accompanying sketches, and by so mounting the valves I attained compactness, and a greater degree of efficiency, by reason of the very much larger coil permissible in this design.

The valve-holders, which are of a very well known make, fitted together perfectly for the job, but a little difficulty was experienced at first with soldering the small brass pieces to the fixing hole rivets. The best method for doing this is to tin the respective surfaces to be soldered, then turning one valve-holder face downwards, with the brass piece in the position illustrated, the application of the soldering-iron will be facilitated, and the next valve-holder may then be positioned and likewise treated until, finally, the three mounted holders form an individual unit which may be inserted in the bakelite former, or utilised according to personal requirements. Three 6BA screws "X" secure the whole assembly to the former, and a surprisingly robust assembly results. If this unit is to be

mounted on to a chassis, a number of holes must be drilled in the chassis to permit wiring the sockets, but in my case I used a different method owing to the rather unusual design of receiver; the brass cleats let into slots at the base of the former prove an admirable way of mounting the unit. The coil may be wound before or after assembly providing due care is taken in the later case with regard to the winding turns, if light gauge wire is being used. — J. S. WEMING (Southend-on-Sea).



A compact valve assembly for use in a midget receiver.

NOW READY!

WIRELESS COILS, CHOKES AND TRANSFORMERS, AND HOW TO MAKE THEM.

2/6, or 2/10 by post from Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

medium to long. One of the existing stopping brackets is converted into a switch blade by soldering to it a shaped piece of sheet brass (in the writer's case an old brass condenser vane was utilised), the left-hand projecting lug of the bracket being cut away, as shown dotted in sketch. Next, two springy brass strips are fixed to ebonite bases, as shown, to form the switch contacts, and these are screwed to the baseboard, one on each side of the wave-change switch spindle, the converted bracket being fixed to its normal position on the spindle.

A wire is taken from each contact strip to its respective lamp, and the two remaining points of the lamps to L.T.+, as shown in the inset circuit diagram.

The set screws fixing the contact strips to their ebonite bases should be countersunk on the underside if the baseboard is metalised. The lug piece was cut away from the bracket as it was found to foul the left-hand contact. The second bracket, fixed to the back coil, was quite sufficient to give the necessary stopping positions for the coil switching. — R. L. GRAPER (Chelmsford).

A Home-made Pick-up Arm

THE accompanying sketch gives details of a pick-up arm I have constructed, and which is giving excellent results. The tone-arm type pick-up used is a No. 11 H.M.V., but any type of pick-up head can be fitted to such an arm. The doweling at the front end of the arm is 3/8 in. diameter, and is a "push-fit" in the pick-up head. The head is then placed in position, twisted

DESPITE the fact that we have written a good deal on the question of battery-operated "quality" receivers during the past few months, we find that readers are still asking for more. It is quite evident from our post-bag—which readers have swelled very considerably during the past few weeks—that there is a considerable amount of interest in this "quality" question.

For example, Mr. Savegar, of Battle, Sussex, writes at the end of a long and interesting letter: "I can't say that I agree with all your views (about this matter), especially about two watts minimum, but then I use my set in a very small room. Anyway, it was good to see somebody come out into the open and talk sense." This same reader also remarks that PRACTICAL AND AMATEUR WIRELESS has never been more interesting than it is now, and concludes with the hope "... may the flute never be confused with the fiddle, and may the Halls of Queens and

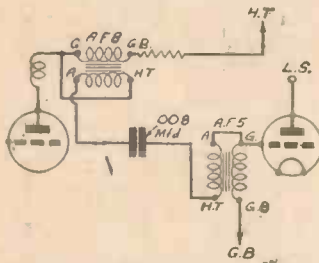


Fig. 1.—The novel "quality" coupling used by Mr. Savegar.

Wigmore relive in our homes—with a little of your kindly help."

A "Blind Spot"

He tells us a good deal about reception conditions in his part of the country, describing them as very bad indeed. London Regional, the "local" station, is unreliable and subject to serious bouts of fading, especially after 9 p.m. Mr. Savegar has come to the conclusion, after a good deal of experiment, that two H.F. stages are essential for reliable reception. We wonder if he has tried the £5 Superhet or the £4 Superhet, because we feel certain that he will find either of these preferable to a two-H.F. "straight."

His present receiver is very satisfactory and consists of two H.F. stages, followed by tuned-grid coupling, leaky-grid detection, "with a spot of fixed reaction" to keep tuning sharp, and power output. Total H.T. current consumption is 20 mA at 150 volts. This reader, in company with a number of others, is very pleased with the form of L.F. coupling that was described in the old "Amateur Wireless" some time ago. The circuit for this is shown in Fig. 1, where it will be seen that two L.F. transformers are used in an unusual combination.

Double-transformer Coupling

The first is an A.F.8 and the second an A.F.5 (both Ferranti), there being a .008-mfd. fixed condenser between them. By the way, if you wish to try this and have not a .008-mfd. component handy, you can use a .005-mfd. in parallel with a .002-mfd. and a .001-mfd. or a .01-mfd. in series with a .03-mfd. The only difficulty with the circuit is that the anode current

The "Experimenters" Solve

AND ANSWER A NUMBER OF More "Quality" Circuits: H.F. Interference: Medium

to the valve preceding the transformer combination must take a very low H.T. current because the secondary winding of the A.F.8 is in series with the anode and H.T.+. If you use an HL-type valve with a 50,000-ohm decoupling resistance the conditions will be satisfied.

Mr. Clarke, of Reading, sends us the circuit of his "quality" receiver, and this is shown in Fig. 2. You will see that he uses an output circuit of the type just described, although the rest of the circuit is different. A screen-grid valve is used for H.F. and is followed by a double-diode triode and an L.F. stage. Apparently he does not find any difficulty in employing three L.F. stages. He describes his circuit as a "hybrid," since it has been developed by piecing together odds and ends of various circuits described in these pages at different times. He employs two .0005-mfd. condensers for tuning, and makes the remark that the valves should not be of the "steep-slope" variety; he actually uses the following combination: P.M.12, P.M.T.D.2, P.M.2 and P.M.202. H.T. current consumption is 17 mA when using 120 volts H.T., or about 20 mA with the voltages indicated in the circuit. You will notice that all those readers who have sent "quality" circuits find it worth while to use a fairly heavy H.T. current; most of them have emphasised our recommendation to use the largest-capacity H.T. battery, or an accumulator, eliminator or Milnes unit as an alternative.

Four Valves—Five Pounds

Mr. W. D. Davies, of Godre'raig, Swansea, takes up our challenge concerning the production of a "quality" set for £5, and includes with his circuit, reproduced in Fig. 3, a complete list of parts with their prices. The total, including valves, is £5 10s. 8d. We cannot very well publish the full list, but we should mention that the coils used are Formo, the first L.F. coupling component being a parallel-fed transformer which is very inexpensive. The valves are variable-mu H.F., two type H.L. and an Osram P.2 in the output stage. Speaker is a "Stentorian" S.37,

and the set is fed from an eliminator with a total output of 150 volts, 30 mA.

The circuit in itself does not appear to have any special "quality" characteristics, but the user assures us that it gives very pleasing reproduction (that word again; can you suggest an alternative?). In any case, we are sure that many readers will find it of interest.

by The Exp

Mattress "Earth"

Mr. Peter Redgmont, of Brondall, near Norwich, expresses particular interest in the difficulties experienced by N.K.B., which we referred to a few weeks ago. He explains that he is similarly placed due to his set being used in a room well above ground level. In his case, the earthing trouble was overcome by using a spring mattress for the earth connection. That is not a new idea, but there might be some who have not previously heard of it. Mention is also made of having used a form of counterpoise, consisting of a second "aerial" running round the picture moulding, along with an outside aerial.

The set is a short-waver, and the main trouble when using a buried earth with long lead is that hand-capacity makes accurate tuning very difficult. As an alternative to any actual earth connection, he found that reception was not impaired by dispensing with the earth lead and using a metal chassis.

A Problem for You

But Mr. Redgmont has another difficulty, and he would like some suggestions as to how it can be overcome. His aerial runs across an orchard outside the house, and there is an electric-supply lead on each side of it, although some feet away.



Fig. 4

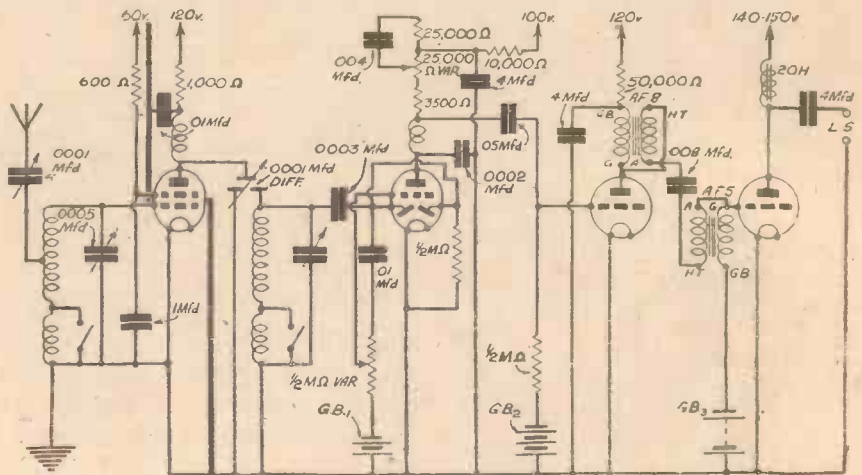


Fig. 2.—The "quality" receiver used by Mr. Clarke, of Reading, with an interesting double-diode-triode stage.

Important Broadcasts of the Week

NATIONAL (261.1 m.-and 1,500 m.)
 Wednesday, November 24th.—Symphony Concert from the Queen's Hall, London.
 Thursday, November 25th.—Orchestral programme.
 Friday, November 26th.—Concert Party programme.
 Saturday, November 27th.—Athletics: Oxford v. Cambridge; commentaries on some of the events, from Iffley Road Track, Oxford.

REGIONAL (342.1 m.)
 Wednesday, November 24th.—Bells over London, feature programme.
 Thursday, November 25th.—Darts: A commentary on a "local Derby," The Hanbury Arms v. The Caledonian Arms, from The Hanbury Arms, Islington.
 Friday, November 26th.—Concert from the Ulster Hall, Belfast.
 Saturday, November 27th.—Voluntary Social Service—Whither? a discussion.

MIDLAND (296.2 m.)
 Wednesday, November 24th.—Melodies from the Comedies: Orchestral concert.
 Thursday, November 25th.—The Dream of Gerontius: Orchestral and choral programme, from Hereford Cathedral.
 Friday, November 26th.—How to Get Your Money's Worth—7, a discussion on everyday shopping-points for ordinary people.
 Saturday, November 27th.—Massed Bands Concert from De Montfort Hall, Leicester.

WEST OF ENGLAND (285.7 m.)
 Wednesday, November 24th.—Organ recital from the Colston Hall, Bristol.
 Thursday, November 25th.—Variety from the Palace Theatre, Bath.
 Friday, November 26th.—Great British Organ Music—4 (1780-1820): Organ recital from Bath Abbey.
 Saturday, November 27th.—A talk by West of England Regional Director.

NORTHERN (449.1 m.)
 Wednesday, November 24th.—Variety from the Victoria Theatre, Burnley.
 Thursday, November 25th.—Hadrian's Wall: From Caesar to the National Trust, an historical survey.
 Friday, November 26th.—Domino, a radio play by R. P. Hughes.

Saturday, November 27th.—Orchestral concert from the Milton Hall, Manchester.

WELSH (373.1 m.)
 Wednesday, November 24th.—Band concert.
 Thursday, November 25th.—A Festival of Praise: choral programme from the Mission Hall, Neath.
 Friday, November 26th.—The House Under the Water (Francis Brett Young), a tale of the Elan Valley.
 Saturday, November 27th.—Voluntary Social Service—Whither? a discussion.

SCOTTISH (391.1 m.)
 Wednesday, November 24th.—Variety from the Pavilion Theatre, Glasgow.
 Thursday, November 25th.—Orchestral and choral programme.
 Friday, November 26th.—The Proper Place, a play from the novel of the same title by O. Douglas.
 Saturday, November 27th.—Variety programme.

NORTHERN IRELAND (307.1 m.)
 Wednesday, November 24th.—Choral and instrumental concert from the Town Hall, Coleraine.
 Thursday, November 25th.—The Round Table, a comedy by Lennox Robinson.
 Friday, November 26th.—Concert from the Ulster Hall, Belfast.
 Saturday, November 27th.—Jamie and Rabbie run the B.B.C.

TELEVISION AT ELSTREE

THE transmissions from Elstree Film Studios, which will continue twice daily until November 26th, will show actual film making at the studios and include visits to the Elstree "lot" and "museum." Following the inaugural reception, viewers will see flashes from "Blackmail," the first British "talkie," which was made at Elstree in 1929. A sequence from "Piccadilly," a ten-year-old "silent" classic, will also be televised. In the evening Herbert Brennan will be seen on the set directing "The Housemaster," with Otto Kruger as the star.

To maintain Good Reception

To trace faults it is essential to have an accurate meter. The AvoMinor enables you to service your set efficiently and speedily. With either of these accurate combination meters you can track down trouble quickly and make every test to valves, circuits, components, batteries and power units. Each model of the AvoMinor covers a wide field of measurement and provides testing facilities unrivalled by any other meters near their prices.

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A smaller brother of the Universal Avometer. Gives 22 ranges of readings (A.C. and D.C.) in current, voltage and resistance. Sin. scale. Total resistance, 200,000 ohms. Complete with instruction book, leads, interchangeable testing prods and crocodile clips. Price **£5.10.0** Leather Case, 10/-.



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THE SUM TOTAL OF A GOOD CIGARETTE



REGD. TRADE MARK. PLAYER'S NAVY CUT CIGARETTES 'MEDIUM' OR 'MILD' 10 FOR 6p 20 FOR 11p

FLASHES ROUND THE GLOBE

French Listeners Hear Martinique

A REPORT from Paris states that a reception of signals from FZF6, Fort de France, Martinique, is frequently possible in the Paris area. The wavelength of this station is 30.98 m. (9.685 mc/s). Transmissions are daily between G.M.T. 23.30-01.45, and announcements are made by a man and a woman in French/Spanish and English/German respectively. For "veris" write to Monsieur Edouard Boullanger, Radio Martinique, Boite Postale, 136, Fort de France, Martinique, West Indies.

A Call from Lobito

The Portuguese West African station, CR6AA, at Lobito, (Angola), has increased its power to just under 2 kilowatts, and during the winter months is solely using the wavelength of 41.8 m. (7.177 mc/s), the shorter channel of 20.8 m. (14.435 mc/s) having been temporarily adopted for the summer. Broadcasts are carried out every Wednesday and Saturday from G.M.T. 20.45-22.00. Reception reports should be addressed to: Estação Radiodifusora, CR6AA, Caixa Postal, 118, Lobito, Angola, Portuguese West Africa.

Broadcasts from Down Under

The schedule for the Sydney, Melbourne and Perth short-wave broadcasting stations during November is now fixed as follows: VK2ME, Sydney (N.S.W.), 31.28 m. (9.59 mc/s), on Sundays only, G.M.T. 06.00-08.00, 09.30-13.30, 14.00-16.00; VK3ME, Melbourne (Victoria), 31.54 m. (9.51 mc/s), on weekdays only, G.M.T. 09.00-12.00; VK6ME, Perth, 31.28 m. (9.59 mc/s), on weekdays only, G.M.T. 11.00-13.00.

Warsaw's Late News Bulletins

The daily news bulletins in Polish and English, broadcast from Warsaw simultaneously through SPW, 22 m. (13.635 mc/s), and SPD, 26.01 m. (11.535 mc/s), are given on weekdays from G.M.T. 23.00-01.00, and on Sundays from 23.00 to midnight (24.00 hours). The station opens with a morse signal (W), the interval signal consisting of a musical box rendering of a military song: *First Brigade*. The broadcast concludes with the Polish National Anthem and a good night greeting in several languages.

Three Interesting Ship Stations

The U.S.A. Schooner *Effie Morrissey* (call-sign W10XDA), which is now cruising off the coast of Greenland, transmits nightly from G.M.T. 23.30-01.00 on 23.33 m. (12.86 mc/s).

The U.S.S.R. Ice-breaker *Krassin* (UNZM) is reported to be working on the following channels: 72.46 m. (4.14 mc/s); 48.54 m. (6.18 mc/s); 48.31 m. (6.21 mc/s); and 33.99 m. (8.825 mc/s).

According to the I.D.A., HO2U is the call of an amateur who has installed a transmitter on a ship now on a world tour. Messages are sent out daily on 21.22 m. (14.151 mc/s) between G.M.T. 08.00-14.00. Reception reports should be addressed to HO2U, Box, 181, El Carrito, California (U.S.A.). They will be duly acknowledged on the return of the ship to its home port.

PETO-SCOTT EVERYTHING ALL-WAVE

CASH—C.O.D.—H.P. You knew in 1919 . . . you know TO-DAY, that you may order from PETO-SCOTT in the knowledge that you will receive BRAND-NEW GOODS, backed by a GUARANTEE of SATISFACTION.

HOME BROADCASTING & CROONER'S OUTFIT

A Wonderful Amplifying System for Home Broadcasting, Dance Band Crooners and all P.A. Work.

LIST VALUE OUR PRICE £8:10

Or £1 down and 11 monthly payments of 15/9.



Excellent response at all frequencies. 6-7 watts undistorted push-pull output. Model A.C.67 4-v. Amplifier. Transverse current type Carbon Microphone with separate transformer. Field Energised Moving-coil Speaker (1,250 ohms), and transformer. 25" microphone flex. 30' 4-way speaker lead (exactly as illustrated). For A.C. Mains 200-250 volts, 40-100 cycles.

PORTABLE CROONER'S OUTFIT

As above, but with chromium-plated telescopic microphone stand and dividable 2-piece leatherette-covered case for speaker and amplifier. A.C. Mains, 200/250 volts, 40/100 cycles. £10/19/8, or 30/- down and 11 monthly payments 21/.

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1-valve ALL-WAVE KIT

Save 11/- buy a Complete Kit!



• Wavelengths 19-82, 200-550, 900-2,000 metres. • A unique All-Wave single-valver combining simplicity of assembly with extraordinary efficiency and low cost. • The ideal kit for the beginner in all-wave construction. • Ready assembled tuning unit incorporates all windings and switching and needs only six simple connections for incorporation.

KIT "A" comprises complete kit or parts for building, including ready-drilled steel panel and chassis, drawings and instructions, less valves and cabinet. List value, £2:9:10. Our Price £1:9:6. Or 2/8 down and 11 monthly payments of 2/9. KIT "B" with valve, £2/13/8, or 3/- down.

2/6 DOWN

2-valve L.F. Amplifier Kit

(Battery Operated). Audio Amplifier Kit, for connecting to the 1-valve All-Wave Kit (above) to boost up signal strength and to enable speaker to be used instead of headphones. KIT "A" comprises all parts including drawings and instructions less valves. List Value 14/9. Peto-Scott's Price, Cash or C.O.D. 15/-.

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Peto-Scott HIGH FIDELITY MOVING COIL SPEAKERS



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SHARP TUNING

When It Is Required and Methods of Ensuring It. Advantages and Disadvantages of Super-selectivity are Explained and One or Two Unusual Methods of Sharpening Tuning are Described

By FRANK PRESTON

THE selectivity question is not always fully understood. Some constructors think that the sharper the tuning is made the better must be reception. It is true enough that if tuning can be sharpened to a sufficient extent, interference from unwanted stations can be prevented—but even this applies only in certain cases. For example, suppose you have an H.F.-det. circuit of the general form indicated in

to be an obsolete tuning system comprising separate condensers.

Accurate Trimming

The point just taken is probably an exaggeration, although it might conceivably arise in certain circumstances. Because of that the principles are worth bearing in mind. The example also indicates the importance of making both tuning

circuits as much alike as possible, both mechanically and electrically. It also shows the need for careful checking of con-

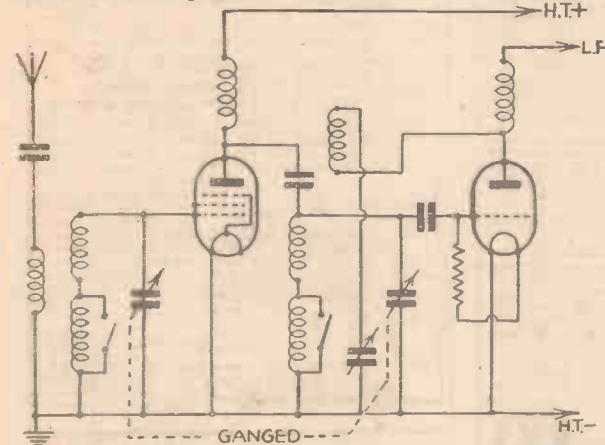


Fig. 1, that both coils are iron-cored and of highly-efficient design, and that tuning is carried out by means of a gang condenser. It would at first be anticipated that interference could not be present in any circumstances, excepting only if the stations themselves were operating on almost similar wavelengths. But suppose that the tuning circuits were not quite balanced—that longer leads are taken to one of the coils, or that there is a fairly high capacity to earth from some of the coil or condenser connections. It is conceivable that in such circumstances serious interference might be experienced, or that signal strength from all stations might be considerably less than it should be.

Unmatched Circuits

This is simply because, if the aerial tuning circuit were tuned to one station, the interval tuner might resonate with the signals from another transmitter. Signals would be picked up by the aerial and amplified by the first valve. But another set of signals might be picked up by the unscreened wiring of the second tuning circuit. In consequence, a certain proportion of the signal energy from both stations might be passed on to the detector. That means that interference would be experienced. Of course, it can be argued that if the coils were matched, any "out-of-balance" of the two tuning circuits could be made up by adjustment of the trimmers on the gang condenser. Up to a point this is true, but perfectly accurate adjustment of the trimmers can usually be obtained only at one point on the tuning scale; at others a certain compromise must be made. This explains why some constructors who are "all out" for efficiency still employ what is sometimes considered

two circuits and differences in inductance, due perhaps to long and indirect leads, could be compensated for only by varying the coil inductances. This can rarely be done, although a form of permeability adjustment is occasionally provided.

A well-known objection to extremely sharp tuning is that quality of reproduction generally suffers. The reason is that the tuning circuits respond to only the centre portion of the waveband occupied by any particular broadcast signal—generally 9 kilocycles. Thus, if the tuner accepts only the centre 5 kilocycles the higher musical frequencies are cut off or seriously reduced in strength.

Fig. 2.—A simple method of providing reaction for both tuned-grid and aerial circuits.

Sometimes it is possible to compensate for this loss fairly well by using a form of tone control in the L.F. circuits, but that depends, upon the nature of the tuner. Should the response be very definitely confined to a narrow band, tone correction might not be completely satisfactory, but if the response gradually diminishes on each side of the most sensitive tuning point, tone correction will probably give reception that could not well be recognised from that obtained when using a tuner of less selective pattern.

Having made the foregoing remarks as a warning against the use of tuning circuits that are too sharp, it is possible to describe methods of increasing selectivity. Armed with a knowledge of the pitfalls that may arise, the constructor can safely experiment with a view to making his receiver ultra-selective. It should be interjected that we are dealing here with "straight" circuits of the simpler type; when a superhet is under consideration different questions arise and the selectivity problem rarely exists in serious form.

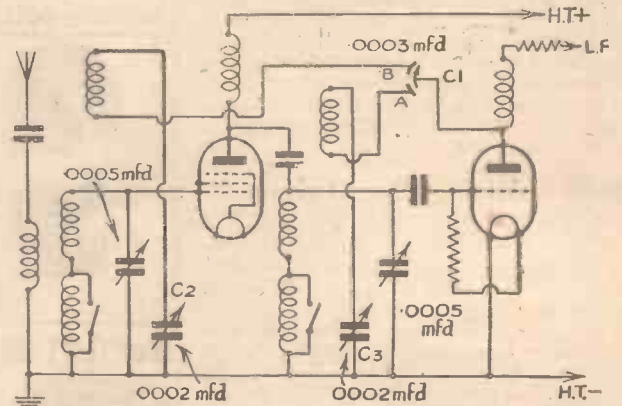
Negative Resistance

Expressed very bluntly, lack of selectivity is due to high-frequency resistance in the tuning circuits, or to damping of the circuits by unwanted capacity. And the easiest method of reducing the resistance in a tuning circuit is by applying what is sometimes called negative resistance, but more commonly—reaction. If you apply reaction to a coil you reduce its effective resistance and make it tune more sharply. It is not always easy to prove this because reaction also gives increased range and volume, but it can be taken as a fact.

In the early days of broadcasting it was by no means unusual to employ double reaction. The simplest method was to place the aerial coil in the left-hand socket of a three-coil holder (plug-in coils were generally used, then), the reaction coil in the centre socket, and the tuned anode or tuned grid coil in the right-hand socket. By moving the two outside coils you could then regulate the amount of reaction applied to the two tuning circuits. One objection to this system was that any oscillation that was caused was radiated by the aerial in the form of interference.

Using Double Reaction

However, it is sometimes possible to make use of a similar system to-day. It might not always prove completely satisfactory, because the complete receiver might be made unstable, especially if the H.F. valve is not well screened. Those readers who propose to give the idea a trial will find all the information required in Fig. 2. Here it can be seen that the general form of circuit is similar to that in Fig. 1, except that there is a reaction winding on the aerial coil as well as on that



in the tuned-grid circuit. A .0003-mfd. differential capacitor is used for "distributing" the feed-back from the detector anode to the two reaction windings, whilst two ordinary reaction condensers of .0002-mfd. capacity, are connected between the reaction windings and earth.

Reaction can be applied to the detector grid circuit only by moving the moving

vanes of the differential condenser until they are fully in mesh with the fixed plates marked A, or reaction can be applied to the aerial circuit only by turning the knob of the differential as far as it will go in the opposite direction. Reaction on the two circuits can then be controlled and "balanced" by operating the two .0002-mfd. condensers separately. The lead from the differential condenser to the reaction winding on the first core should be properly screened by using braided wiring of which the braid is earthed.

Reaction Control

In nearly every instance it will be found that only a very small amount of reaction can successfully be applied to the aerial circuit without causing oscillation or making the first valve unstable. It will also be found that it is rarely necessary to alter the reaction coupling in the aerial circuit. For that reason, the reaction condenser marked C.2 can be a pre-set adjusted to its minimum capacity. Since the minimum capacity of even a .0002-mfd. pre-set is fairly high, it will be found better to use a .0001-mfd. component or, alternatively, a small air-spaced semi-variable condenser of the type used for trimming and the l'ke.

It should be understood that the main object of the second reaction circuit is to sharpen tuning and not actually to give additional reaction. The arrangement is not necessarily recommended for general use, but simply for interesting experiment; it is generally of greatest value in a short-wave receiver.

Electron Coupling

Another arrangement that has certain advantages in a short-wave set of the H.F. type is that where electron coupling is used, two small short-wave high-frequency chokes of low resistance being included in the filament leads of the first valve, and a tapped aerial coil being employed. In the normal course of events the H.F. pentode would oscillate with these connections—in fact, the circuit is used for oscillator wave-meters—so some form of control must be included to prevent oscillation. The simplest of these is a potentiometer to control the screening-grid voltage, as is shown on page 308. The potentiometer must always be set so that the S.G. voltage is too low to permit of the valve bursting into self-oscillation; the setting can be found only by trial.

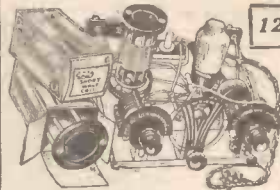
Both methods of increasing selectivity that have been described do often improve sensitivity to a fair degree by reducing the losses in the first tuning circuit, but that is a secondary consideration as far as this article is concerned. The first method is most easily applicable, and is, in fact, the only one that is suitable for a broadcast set. The aerial coil will generally have an unused reaction winding, but if it is not so fitted a winding consisting of about 40 turns (on a 1½ in. former) can easily be added by placing 10 turns over the medium-wave winding and 30 over the long-wave portion. Use any thin enamelled wire that is available, and if the former is of different diameter from that taken as an example, modify the number of turns in proportion.

Beginners should note that the purpose of this article was to deal with a few unusual methods of sharpening tuning, and not with the simpler ones that have been explained in these pages many times before. The circuits given are intended more for use by experimenters and more experienced constructors; the beginner will find them rather tricky.

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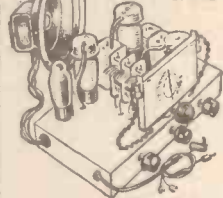
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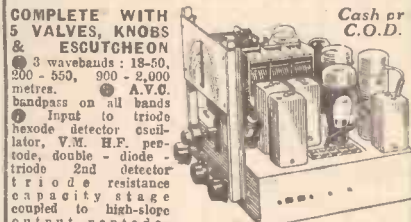


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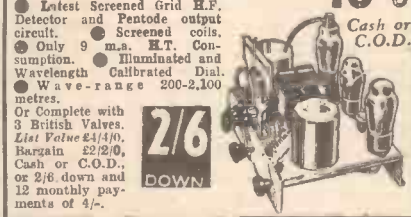
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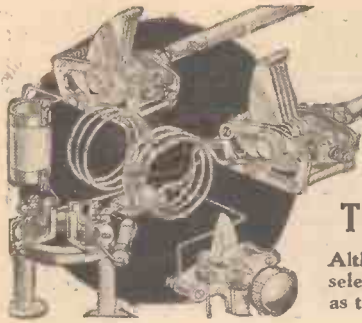
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1924



Short Wave Section

TWO SUPERHET REFINEMENTS

Although well-known, H.F. regeneration and variable-selectivity I.F. components are not so frequently used as they should be. Suggestions for incorporating them are given in this article by

W. J. DELANEY

MANY listeners are now using short-wave superhet receivers, and these may be made to function to 10 metres and even lower. Where a comprehensive type of receiver has been built—for instance, on the lines of the communications type of receiver recently described in this section, there are many incidental refinements which, whilst not essential, will greatly increase the overall efficiency of this type of circuit. The incorporation

Variable I.F. Coupling

The I.F. transformer consists of two windings—the primary and the secondary, and in the component as produced commercially these are coupled to provide a square-peak or band-pass effect. Consequently, the selectivity is normally fixed. Components are available, however, where the coupling between the two coils is adjustable, either by means of a panel control or through some other device. Best results are, of course, obtainable when the transformers are of the type having a powder-iron core, but with this arrangement the coils are not easily moved for coupling purposes. If you have made your own air-core transformer, it is not

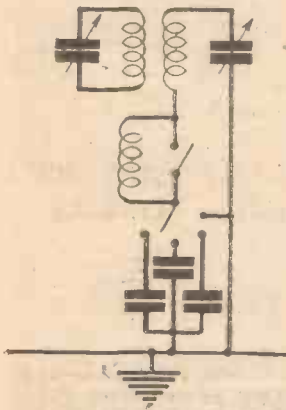


Fig. 1.—A good method of combining variable selectivity with a degree of tone control in the I.F. circuit.

of automatic-volume control circuits is not, in my opinion, a refinement, and may in many cases result in a definite loss of efficiency as it will not respond to high-speed fading, and often reduces the sensitivity of the frequency-changing stage. Variable selectivity, on the other hand, is a definite advantage as it will enable the receiver to be adjusted so that items such as standard broadcasts from high-powered broadcasting stations may be received at high quality, whilst enabling the set to be adjusted when a code signal is being received on the amateur band, without a background from other code stations. There are several different methods of adding variable selectivity, but the simplest is the fitting of a special I.F. transformer.

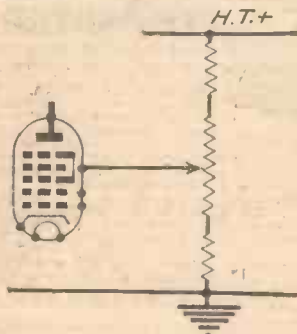


Fig. 2.—The gain of an H.F. or I.F. stage may be controlled by using a regeneration control of this type.

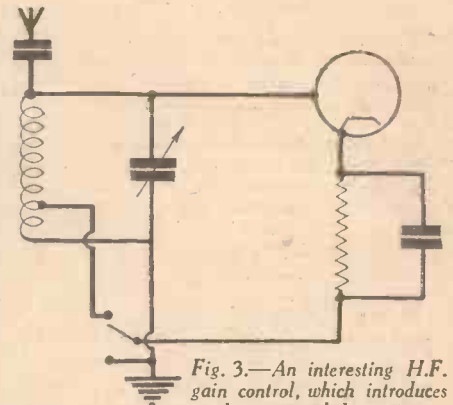


Fig. 3.—An interesting H.F. gain control, which introduces electron coupled reaction.

condenser will have to be found by trial, as they will depend upon the remainder of the circuit design and the characteristics of the low-frequency section.

H.F. Regeneration

When interference is particularly bad it is often an advantage to be able to modify the gain of the H.F. and frequency-changing stages, and in the ordinary way this may be carried out by controlling the voltage on the screen of the valve or valves used in these positions. A simple potentiometer control to the H.T. supply will answer the purpose, and if a suitable noiseless control is used the effects are quite good. A scheme which lends itself particularly well to the home-made type of receiver, where plug-in coils are used for tuning, is to employ an electron-coupled oscillator for the first detector, and to connect the cathode circuit to a change-over switch. This idea does not seem to be very well known, although it is incorporated in at least one popular commercial receiver. The aerial coil will, of course, have to be of the type having a tapping at the lower end for use as an electron-coupling coil, although if ordinary coils are in use a tapping may be made for the purpose. The distance from the "earthed" end will, again, have to be found by experiment, as it depends upon the valve and other factors, such as H.T., screen voltage, etc. To avoid too much experimental work, the screen potential may be obtained through a potentiometer, mounted either on the panel or as a pre-set control at the rear or side of the chassis. This will provide two adjustments—the screen volt-

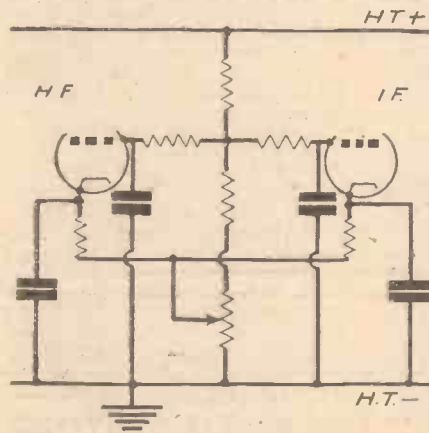


Fig. 4.—Controlling the gain by varying bias on H.F. and I.F. stages together.

a difficult matter to arrange that one of the coils should be mounted on a spindle projecting through the screening can and brought out to the panel so that a control of its position may be made. The only drawback to this scheme is that an additional panel control will be required, and if the set is of the communications type the panel will already be fairly well loaded. The alternative scheme is to fit a transformer of the type having a third winding, and Messrs. Raymart and Varley both produce a component of this nature. In its simplest form this will provide only two degrees of selectivity, the highest selectivity being set by the spacing of the two coils, and the lowest—or quality setting—being controlled by the coupling existing between the third winding and the primary. However, by including fixed condensers of various capacities in series with the secondary winding, it is possible to obtain even wider results, owing to the fact that the higher frequencies will be by-passed and thus whistles and similar interference troubles may be removed to enable a code signal more easily to be read. The diagram, Fig. 1, will make the arrangement quite clear, but the capacities of the

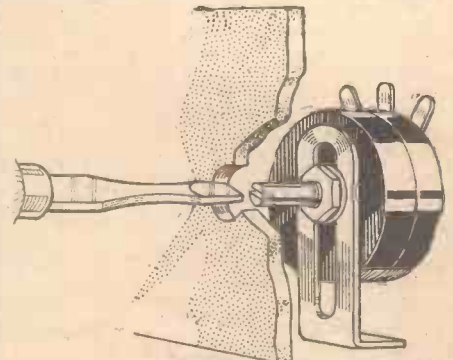


Fig. 5.—To avoid too many panel controls certain components may be mounted and adjusted as shown here.

age, and consequently the gain, without the cathode reaction winding, and the degree of regeneration when the latter is connected in circuit. Figs. 2 and 3 should make the arrangement clear.

(Continued on next page)

SHORT-WAVE SECTION

(Continued from previous page)

I.F. Gain Control

Where the number of controls is not an important point in the final design, it is also possible to arrange for the gain of the I.F. stage or stages to be controlled by a panel-mounted potentiometer. This may consist of a bias control connected to each I.F. stage, and if suitably decoupled it may also be joined to the H.F. signal amplifier provided that a similar type of valve is employed. This adjustment works very well indeed in conjunction with the

first detector or H.F. regeneration control, and a compromise between the two will often enable a signal to be obtained which is otherwise so badly interfered with that it cannot be read. The incorporation of so many controls on the panel does, however, tend to offset the advantages gained, and if the receiver is of the "domestic" type—that is, one which is used by other members of the family, the confusion arising from these additional controls may result in the receiver not being used as much as it should be. This disadvantage may be overcome by mounting the "additional" controls—that is, the potentiometers for

regeneration, gain, etc.—on a sub-panel in such a manner that the spindles are about a quarter of an inch behind the main panel. A $\frac{1}{8}$ hole should then be drilled in the panel immediately in front of the spindle, and a hacksaw cut made across the spindle. (Some manufacturers now supply potentiometers with a ready-slotted spindle.) Adjustments to these controls may then be made by means of a screwdriver or similar tool from the front, and they may be left in a normal condition so that the receiver may be used by the remainder of the family or by listeners who are not so critical or do not need the fine adjustments.

Leaves from a Short-wave Log

The South African Broadcasts

ZTJ, the short-wave station of the African Broadcasting Corporation is now using two channels, namely, 49.2 m. (6.097 mc/s) for the night transmissions, and 31.22 m. (9.61 mc/s) for the day programmes. Standard Time is 2 hours in advance of G.M.T., and occasionally you may hear a time signal relayed from the Cape Town "Big Ben." The greater part of the programmes is provided by the Johannesburg studio.

Schenectady's Foreign News Bulletins

The General Electric Company's stations W2XAD and W2XAF, at Schenectady (N.Y.) are offering a ten-minute news bulletin daily (excepting Saturdays and Sundays) for the benefit of listeners abroad. These are timed for broadcast at G.M.T. 22.00 simultaneously on both channels, i.e., through W2XAD, on 19.56 m. (15.33 mc/s), and W2XAF, 31.48 m. (9.53 mc/s).

Guatemala's Daily Programmes

TGWA, the new R.C.A. station opened at Guatemala City on October 12 last, and operating on 16.87 m. (17.8 mc/s) with a power of 10 kilowatts, would appear to be working nightly. Although the schedule has not yet been announced the studio transmits from G.M.T. 23.00-01.30 daily. The wavelength is only a temporary one for the purpose of ascertaining whether it is favourable for its purpose, and the station may also use 9.685, 11.76 and 15.17 mc/s.

Cartagena is an Easy Catch

Radio Cartagena (HJ1ABP) fluctuating between 31.22 m. (9.61 mc/s) and 31.25 m. (9.6 mc/s) may be heard nightly from roughly G.M.T. 22.00. The programme opens with Sousa's rousing march *El Capitan*. Although consisting of bells, the interval signal may assist identification in view of the fact that three chimes are struck, the last one on a higher note than the preceding ones. A special broadcast in English destined to listeners in the United States is made every Sunday between G.M.T. 03.00-04.00.

And a Chilean Neighbour

On 31.25 m. (9.6 mc/s) CB960, Santiago (Chile) may sometimes be logged although the channel is at present a somewhat congested one. The best time to make the search is after midnight. The station usually starts the transmission with the melody *Babes in Toyland*, and closes down after the final good-night call at about G.M.T. 01.30 with Gershwin's *Rhapsody in Blue*.

The City of Perpetual Spring

If you hear this slogan followed by the sound of four deep-toned bells on 51.72 m. (5.8 mc/s) you may log the broadcast as emanating from YV5RC, Caracas (Venezuela). The call may be given by either a man or woman announcer in both Spanish and English, namely *Radiodifusora YV5RC* or *Radio Caracas en Venezolana*, and reference is made to the Venezuelan Capital as the City of Perpetual Spring. Broadcasts: Daily from G.M.T. 15.45-02.45; the programme being extended on Saturdays to 03.15. A news bulletin in English is given out nightly between G.M.T. 23.00-23.30. The station closes down with the playing of the I.B.C. March, a very popular South American theme song.

Also News from Panama

HP5A, Panama City (Republic of Panama) on 25.64 m. (11.7 mc/s) has seen its power materially increased with the result that its broadcasts have been captured by many listeners in the British Isles during the past week or so. The studio is on the air from G.M.T. 22.00-03.30. A news bulletin in the English language is a feature of the programme at G.M.T. 23.30. The interval signal consists of a two-toned gong, and the announcer, after giving the call-sign in both Spanish and English, usually adds to it the slogan: *La Voz de Panama*. The call is put out every 15 minutes as is the custom with U.S.A. stations.

New Transmitters in San Salvador

The National Broadcasting Corporation of San Salvador (Central America) is carrying out tests on three different channels, viz., 38.02 m. (7.89 mc/s); 31.51 m. (9.52 mc/s), and 25.62 m. (11.71 mc/s). For these three wavelengths the calls are respectively, YSD, YSH and YSM. Transmissions have been heard on this side of the Atlantic between G.M.T. 17.30-18.00. Make a note of any special announcement which may be made regarding the future.

Special Short-wave Broadcasts

SIR,—I am writing to inform you that special programmes, dedicated to the International Short-Wave Club on the occasion of its ninth birthday, will be broadcast from Stations HAS3 and HAT4, Budapest, Hungary, on Sunday, November 28th, 1937.

Times of the broadcasts are as follows:
On HAS3—15.37 mc/s, 19.52 metres, from 14.00 to 15.00 G.M.T.

On HAT4—9.12 mc/s, 32.88 metres, from 00.00 to 01.00 G.M.T.

Reports of reception are welcomed, and may be sent to International Short-Wave Club, 100, Adams Gardens Estate, London; S.E.16.—GEO. W. KING, Official Programme Arranger (Liverpool).

NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

2nd Edition

By F. J. CAMM

Price 3/6 or 4/- by post from the Publishing Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

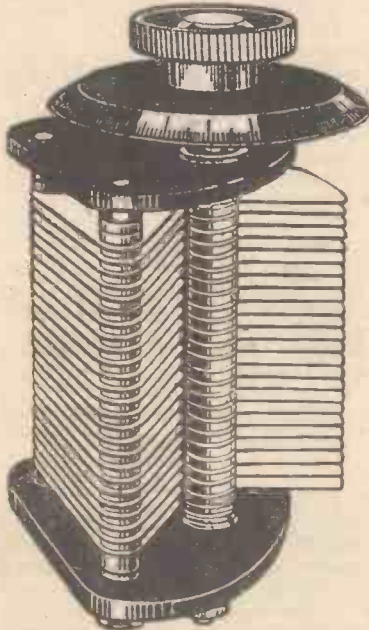


This Ekco conveyer acts as a mechanical messenger, carrying supplies around the factory and tipping them automatically at pre-selected benches.

THE BRITISH LONG-DISTANCE LISTENERS' CLUB

Using Old Components

A PROBLEM which confronts many members, as well as other radio enthusiasts, is what to do with old components which have been displaced by modern units and which have been relegated to the "junk" box. Many amateurs simply throw the old part in the dust-bin, whilst others seem unable to part with even the scrappiest piece of apparatus and keep a box which in time becomes so full of odd bits and pieces that it is difficult to find what to do with them. A member wrote to us a short time ago concerning



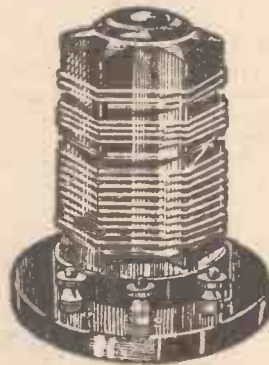
A typical old condenser which may be dismantled for use in making-up an experimental component.

short-wave condensers. He was trying to make up a short-wave set, and owing to financial difficulties arising from a long spell of illness he was unable to afford to buy a good tuning condenser. He apparently had dozens of old condensers and asked how to utilise the bits and pieces in the construction of a good short-wave component. This is not a simple proposition, but it can be done. The accompanying illustration shows one of the very early types of condenser, in which the end plates were constructed from some moulded material and the condenser vanes were simply threaded on a length of screwed rod with spacing washers separating them. To convert a component of this type into a good short-wave condenser the whole thing should be taken to pieces, and all the spacing washers placed together, with the vanes also kept separate. As the condenser may have been standing about for a long time it will need thoroughly cleaning, and therefore this is the first task. Chemical cleaning is to be preferred, but is not essential, although the small spacing washers will be found difficult to clean in any other way. Place a small quantity of *dilute* hydrochloric acid in an earthenware vessel, and have ready a deep

wooden box containing a large quantity of ordinary sawdust. Take all of the washers and brass or copper parts and drop them into the acid, swilling the liquid and parts round and round for a few minutes. Do not leave them too long, and keep them moving to dislodge pieces of dirt, etc. A glance will show when they are cleaned, and the acid should then be poured off into another vessel and the metal parts dropped into the sawdust, which will absorb the trace of liquid left and dry the parts quickly. Alternatively, they may be shaken in a cloth, but all traces of acid must be removed.

Reassembly

Aluminium vanes should merely be polished with a dry cloth and no acid or other cleaning agent should be used. The parts should now be reassembled, using two spacing washers between each plate to provide larger separation, and obviously only a few plates will be required—according to the total capacity needed. In place of the original end-plates new supports should be made from high-quality ebonite or bakelite, or, if you can manage to drill holes in glass, you can make glass supports, using the old end-plates as drilling jigs. If ebonite or bakelite is employed, cut away as much of the material as possible



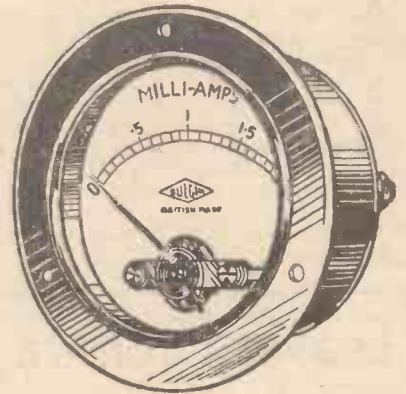
A popular type of 3-range short-wave coil.

whilst leaving sufficient to give adequate strength to the assembly, and then carefully run a layer of solder along each supporting rod and over the washers and plates to reduce the overall H.F. resistance. A pig-tail of the insulated type should be attached to the lower washer on the centre spindle for connection to the moving vanes, and the method of supporting this will depend upon the general construction. You can, of course, retain a ball-bearing if one was used in the original model, or a one-hole fixing bush or other device.

Plug-in Coils or Switching?

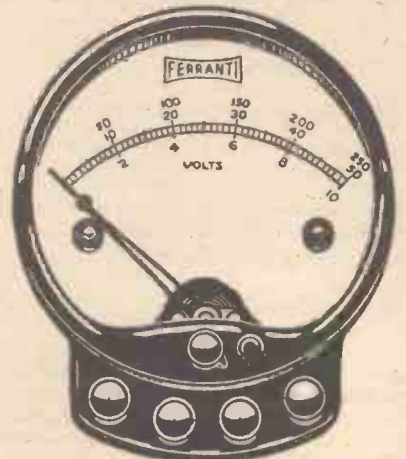
A difficulty which arises when designing a short-wave receiver is whether to use plug-in coils for various wavebands, or a single coil with wave-change switching. The former arrangement is definitely the most efficient, but has the disadvantage that a stock of coils has to be kept, and when it is desired to change them quickly, the cabinet has to be opened, and a suitable coil plugged-in in place of those in use. To many keen experimenters this disad-

vantage is offset by the increased efficiency, and the most suitable alternative is to make a small coil covering, say, three of



A good panel-mounting low-range milliammeter may be used for a tuning indicator.

the bands which would be covered by the separate coils, and using a switch for wavechanging. This will not introduce such large losses as a coil covering more than three bands, and the design of such a coil is not difficult. Where, however, the utmost efficiency is required in a short-wave receiver there is definitely nothing to beat the separate coil arrangement, and by using one of the modern full-vision scales it is also possible to calibrate a separate scale for each coil, changing this at the same time as the coils so that a direct reading will be obtained. No doubt every member will be able to find room in the cabinet or near it for a rack (similar to an ordinary egg rack) into which the coils may be placed in strict order, with a small holder above them for the scale, and the latter may drop into a slot fixed to the standard scale with a registration hole or some other device to ensure that it is always placed in the same position.



A multi-range meter from the Ferranti range, which may be used as the basis for an all-purpose test-meter.

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LETTERS FROM READERS

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

Battery-operated versus All-mains Sets

SIR,—It is both strange and amusing that numbers of listeners still believe that mains-operated sets and radiograms are far and away superior to battery equipment. The other day I had occasion to buy a second-hand battery set for someone, and I was amazed at the ignorance displayed by salesmen of these fascinating and ubiquitous models. Several sets gave poor reproduction, and I was astonished when the salesman remarked: "Well, but that is very good for a battery set!" This is typical of the attitude of too many salesmen, who ought to know better.

Personally, I prefer a good battery set for radio and for the reproduction of records, every time. This is no idle statement, and here I would say that I am out for quality exclusively. Mains-operated sets take the palm for cheapness of operation and power—but here, in my opinion, with the exception of a few very expensive contrivances, their qualifications end. Battery sets, built by constructors who have faith in their job, can hold the field for quality of reproduction, although the renewals of batteries admittedly is a snag.

As an organist, I am keen on the reproduction of classical church organ recordings, and after several years have found that a good Class A battery equipment gives a realism I have failed to experience with any but the most expensive mains radiograms. I have electric mains at home, and have compared many mains sets with their battery competitors, and I willingly put up with the small inconvenience of batteries for a really enjoyable and untiring evening.

Would that more "quality fans" could forget for a moment the claims made on paper by some technicians, and just—*listen*.—E. R. J. ROBBINS (Hounslow).

Heard on a One-Valver

SIR,—Recently I had a mishap with my two-valver which necessitated my using a one-valve detector and I was surprised to find just as many stations rolling in. I enclose my log on the o-v-o, taken between September 27th and October 30th.

K6OQE, K6NZQ, VK3KX, VK3VE, VK3XU, VK3JO, VK3ZL, VK3ZZ, VK3EX, VK2XU, LU4AW, HK3JO, HK4AH, HK1Z, PY1FR, PY5AQ, HC1FG, YV5AA, NY2AE, TI2FG, CO2EG, K4ENY, K4DBH, HH5PA, W6GCT, W6AM, W6AL, W6LLQ, W6CQI, W6FGC, W7FQK, W5BVH, VS2AK, CN8AM, CN8MB, CN8AJ, CN8MV, ZE1JA (Southern Rhodesia), J2OA (Japan), and KA1ME.

I have cards from K6OQE, K6NZQ, and VS2AK. The one-valve circuit is a straight one, using a triode detector. I have now heard sixty-six countries since last December, and I have finally come to rest with the simple o-v-o. Wishing all the best to your fine paper.—P. YEATES (Bedford).

Amateur Station G5BM

SIR,—It may interest some readers to know that station G5BM (10 watts) is operated by Mr. F. Watts, of Cheltenham, and is licensed for all bands. Phone and C.W. and I.C.W. is used, regular transmissions on 5 metres on Sundays 11 a.m. to 1 p.m. Listeners' reports on 5-metre signals are welcomed. Three reports have been received from Czechoslovakia on 5 metres, giving 5BM R7, R7, and R4. The aerial used for 5 metres at this station is a dipole, supported by a 57ft. mast. The TX is a pair of T20s in push-pull, class B modulated.—W. C. BARNES (Swindon, Wilts.).

[We were interested in the photograph you enclosed of Mr. Watts' station, but, unfortunately, it was not sufficiently clear for publication.—ED.]

A 20-metre Log from Plymouth

SIR,—I enclose a log of 20-metre stations received here on October 29th to 31st inclusive, and hope it will be of interest to other DX'ers.

I am only fifteen, and have a two-valve (D. and L.F.) home-made set with home-made plug-in coils. My antenna is 24ft. in length, beamed on America.

Stations received are: W2XAD, JZ, J, W2XE, W3XAL, W8XK, DJE, DJL, PCJ, HASS, and GSI.

CUT THIS OUT EACH WEEK.

Do you know

—THAT if transformer and R.C. coupling is employed in a single receiver, the R.C. coupling should preferably be placed first.

—THAT the grid bias battery should be replaced periodically as it becomes discharged even if not used, due to chemical action.

—THAT a thermal-delay switch is not needed in an A.C. receiver fitted with an indirectly-heated rectifying valve.

—THAT when wire-end components are used in a receiver it is often advisable to anchor one end to a screw (insulated) in order to prevent movement of the component.

—THAT decoupling condensers should be of the non-inductive type.

—THAT reaction may be controlled by a variable resistance in several different ways.

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

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

Amateur stations: W1s (16), W2s (11), W3s (7); W4s (3), W5s (3), W6s (1), W8s (6), W9s (4), also fifty-five G stations and VE2GK (Labrador), HH5PA (Haiti), SMFC (Sweden), LA1C (Norway), ON4SS, PAZOPA, PAZMQ, PAZAD, OZ5BW, FEKW, FE3DI, and FEDL. Thanking you warmly for so much useful information and hours of enjoyment from PRACTICAL AND AMATEUR WIRELESS.—ERIC G. LOYNES (Plymouth, Devon).

More Prizewinners' Thanks

SIR,—I duly received the Stentorian loudspeaker awarded me as a prizewinner in your Radiolympia competition. Please accept my best thanks. I find your magazine very helpful and interesting.—JAMES LITTLE (Kilmarnock).

SIR,—I have duly received the W.B. Stentorian speaker won in the Radiolympia Competition, and would ask you to accept my best thanks for such an excellent prize.

The speaker certainly exceeded my expectations, and may I be allowed to congratulate you on your choice of the prize and for your generous decision in increasing your original offer. Wishing PRACTICAL AND AMATEUR WIRELESS every success.—L. BURMAN (Lofthouse, Yorks).

SIR,—May I express my thanks for the fine book you sent me for being successful in solving a recent problem. It is a very interesting and helpful work, and in my case will be constantly referred to.

Also, may I thank you for the many fine articles which appear in your paper. They have taught me all I know about wireless. Wishing PRACTICAL AND AMATEUR WIRELESS many more years of success.—A. W. GRAY (Leytonstone).

SIR,—I have safely received the Stentorian speaker awarded to me in your competition, and I must say what a big improvement it is over my own, which will have to take a back seat now. Also, may I take this opportunity of thanking you for the knowledge I have gained from your valued paper from time to time.—G. H. GRESSWELL (Bradford, Yorkshire).

"Phantom Circuit"

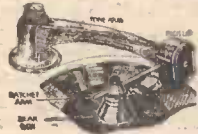
SIR,—I am afraid that "The Experimenters," in their article on page 236 of PRACTICAL AND AMATEUR WIRELESS dated November 13th, have gone a little astray. In Fig. 2, they show the circuit of an amplifier using two-volt and four-volt valves.

To supply the "juice" the authors recommend the use of a four-volt accumulator, but show only one switch to break the filament circuit. Therefore, when this is "off" I can see nothing to prevent the flow of current from "4v.+" to the filament of the last valve; then, after passing through this and the other filaments (which would be in series with that of the last valve), the current can flow back to "L.T.+2v." This completes a "phantom" circuit, which, it seems, could be avoided only by using a double-pole switch to break both positive and negative L.T. leads.—C. C. MARKHAM (Bury St. Edmunds).

[The above letter was shown to "The Experimenters" who blushed with shame and have voluntarily worn sackcloth and ashes for two days. They agree with our correspondent's remarks, and wish to thank him for writing. They also thank W. F. Kirk, of Hove, Sussex, who wrote to point out the same slip.—Ed.]

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STEEL CABINETS for Transmitters, Amplifiers or Televisors. One size, 2 1/2 in. x 4 1/2 in. high. Welded steel frame, sheet steel sides, hinged front door with grille. Worth 25. Few at 57/8 each.

SCHOOL CINE PROJECTOR 35 mm sheet enclosed for L.C.C. Cost £70 as new, bargain. 12-ft. picture, £12. Soundheads £4. PARCELS of experimental odd coils, magnets, wire, chokes, condensers, switches, terminals, etc., post free, 10lb, 7/-; 7lb, 5/-; 1,000 other Bargains in large Illustrated Sale List "N"

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REPLIES IN BRIEF

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

G. C. (N.7).—The choke is that recommended by the makers who will no doubt be able to supply a larger choke if your filament circuit requires a higher current.

L. J. R. (Windsor). The plug-in coils would be preferable as they would enable the range to be modified easily.

C. H. R. (Llandudno).—Blueprints cost 1s. each and we have several which may be classed as "straight threes." You should study the list given in this issue and decide upon the valve combination you require, and the type of tuning, i.e., all-wave or standard broadcast.

A. J. Q. (Birmingham, 21).—The device you mention was not described in these pages. We cannot advise modifications or alterations to commercial receivers.

H. J. N. (Southampton).—We have published several articles on the subject. Probably a separate short-wave aerial—a vertical wire about 10 or 15 feet in length, in conjunction with your present aerial will prove adequate.

P.E.H. (W.3).—The same H.T. will be consumed, whether the set is used for gram. or radio. The switch merely cuts out the H.F. stage or stages, and a similar result may be obtained by detuning. We will bear your request in mind concerning the range of all-wave tuners.

L. B. (W.2).—We regret that as we have no details of the parts used in the commercial receiver we are unable to recommend a blueprint in which to incorporate them.

K. M. (Bradford).—A standard Class B driver transformer is employed, the ratio usually being about 1 to 1. The L. F. transformer is a Bulgin Senator, ratio 1 to 1.

E. G. W. (Manchester, 10).—An article on the subject was given in our issue dated March 20th, 1937. The aluminium blank is not so permanent as the other type. The latter are played as an ordinary record after processing, and will last practically as long.

A. S. (E.11).—We regret that we are unable to recommend a blueprint for a receiver in which you could incorporate the parts mentioned in your letter.

G. W. (Stamford Hill).—There are several coils which would come under your description and we therefore suggest you write direct to the makers, Messrs. Colvern, Ltd., Mawneys Road, Ilford, for details of the type number and connections.

C. P. (London).—If your mains are A.C. you can obtain a mains transformer to step up the mains to the voltage required for your eliminator. Messrs. Healyberd can supply this component.

L. J. S. (Perak).—The receiver may be out of trim on the particular waveband mentioned, or the coils for that band may be faulty. We suggest you have it examined by a good service man who could test the alignment of the circuits.

C. A. H. (Grimby).—Without details of the receiver we cannot advise definitely. It would appear, however, that the coils may be faulty, and such fault would be covered on the medium waves as that part of the coil is short-circuited.

E. T. B. (Swansea).—We cannot give full details in a reply but suggest you send to H.M. Stationery Office for details of the Act or alternatively obtain "The Electrician's Pocket Book" which contains many of the particulars.

An Ideal Book for the Beginner! Everyman's Wireless Book

By F. J. CAMM

3/6, or 4/- by post from George Newnes, Ltd., Tower House, Southampton St., Strand, London, W.C.2.

Philco Rolls-Royce Radio

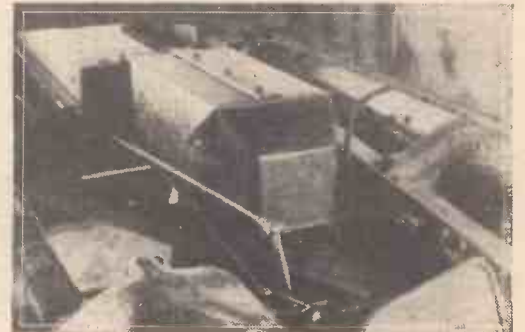
ALTHOUGH it is possible to make up or purchase a radio receiver for installation in a car, the actual installation can be carried out in many different ways. The most important point

may be seen in the lower illustration. The speaker, which is obviously provided primarily for the passengers is generally tucked away beneath the dashboard or in a spare glove-box, but in this particular car a very neat walnut-cabinet was made to fit in between the space left between two occasional seats, and the front of the cabinet is provided with a grille. The matt finish harmonises with the remainder of the car furnishing, and the equipment is finished off with a special chromium control head with knobs or controls in the same finish mounted above the speaker grille. The upper illustration shows the final result, and it will be no doubt interesting to the many car-owners who are anxious to install car radio and who find the problem of disposing of the different sections a difficult one in certain types of car. The suppliers claim that this particular example is one of the neatest installations that they have carried out to date, and they are certainly to be congratulated upon the way they have



The speaker and control head mounted between the occasional seats.

is that the apparatus should be inconspicuous yet at the same time fully accessible, although for the average constructor it is rather difficult to modify the interior layout or design of the car in order to accommodate the apparatus. As an instance of the efficient way in which such installation may be carried out we give herewith two illustrations showing the way in which a Philco car radio has been incorporated in the Sedan cabriolet of the Phantom 11 Rolls-Royce, which was recently delivered to the Duchess of Marlborough.



The receiver installed in the car chassis.

The receiver chassis is housed in a metal container beneath the car chassis, mid section on the off side, in an all-metal weatherproof box, the front of which is detachable to give access to the set for adjustment, servicing, etc. This

overcome the usual difficulties. Even if the car you are using does not incorporate the occasional seats, the idea of using the speaker cabinet may no doubt be useful.

RADIO CLUBS & SOCIETIES

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

WIRRAL AMATEUR TRANSMITTING AND SHORT-WAVE CLUB

EACH transmitting amateur present at the last meeting of the club on Nov. 10th was called upon to give a five-minute talk on a branch of amateur transmitting experiments. Call-signs were drawn from a list and subjects for discussion from another. Matters discussed ranged from aerial coupling systems to power supplies. Details of a forthcoming club receiving contest were announced. Meetings are held on the second and last Wednesdays in each month at Beechcroft Settlement, Whiststone-lane, Birkenhead. Hon. Sec., W. Rogers, 12, Meadowside, Wallasey, Cheshire.

GOLDERS GREEN AND HENDON RADIO SCIENTIFIC SOCIETY

THE following fixtures in connection with the above club might interest many readers. Tickets are essential, and may be obtained from the address below, providing a stamped and addressed envelope is sent. Lectures begin at 8.30 p.m.

Nov. 25th: The Radio Society of Great Britain's film, showing various well-known amateur transmitting stations.

Dec. 9th: An outline of electron optics by S. Rodda, Esq., B.Sc.

Dec. 21st: A visit to the Odeon Cinema, Swiss Cottage. Attend the full programme, inspect the sound and vision apparatus, and also the new electric organ; 8.30 p.m.

Jan. 8th, 1938: Visit to the General Electric Research Laboratories, Wembley.

Jan. 13th, 1938: Quality Reproduction, demonstrating Hartley Turner Apparatus, by P. K. Turner, Esq., B.Sc.—H. A. Scarlett, 60, Pattison Road, Hampstead, N.W.2.

CROYDON RADIO SOCIETY

SOME Stepping Stones in Loudspeaker Progress, "Onlooker's Account of Experiments in a Firm's Technical Department," was the intriguing title for the Croydon Radio Society's meeting in St. Peter's Hall, S. Croydon, on Tuesday, November 9th. The lecturer was Mr. G. S. Taylor, of the Whiteley Electrical Co., Ltd., and his story started in 1927 with the moving-coil loudspeaker. This soon led him to a very thorough discussion on permanent magnets, and various types were passed round for members' examination. Coups were similarly treated, and the description of their method of manufacture from paper pulp was most fascinating.

An up-to-date loudspeaker practice, the making of the nickel-iron alloy magnet, was, of course, interesting, as was, of course, the construction of the Micro-lode multiple-tapped transformer used in W.B. loudspeakers. On Tuesday, December 7th, Mr. Garry Allighan will give a talk entitled, "Searchlight on the B.B.C." Hon. Publicity Sec.: E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

TOTTENHAM SHORT-WAVE CLUB

THE above club held three very successful Visitors' Evenings on the 11th, 12th, and 13th of November, and the large number of young persons applying for membership was very gratifying. Thanks are due to Messrs. Lissens, Ltd. for sending their Mr. Cholot to demonstrate the Lissen H1 Q, and also the Lissen Receiver No. 8,114. Although the aerial system was not of the best, reception was remarkable, and the demonstration was voted by all present a complete success. Thanks are also due to PRACTICAL AND AMATEUR WIRELESS for their kind co-operation, Messrs. Stratton and Co., and The Whiteley Manufacturing Co. for the loan of a Stentorian Speaker. Considerable interest was shown in the apparatus made by club members.

Anyone desiring further information about this club should communicate with the secretary, Edwin Jones, 40, Walmer Terrace, Palmers Green, N.13.

THE LIVERPOOL S.W. RADIO AND TRANSMITTING CLUB

THIS club now holds its meetings at 18, Embleton St., Upper Parliament St., each Monday evening at 8 p.m. A junk sale will be held on Monday, November 29th. All interested persons are requested to call at the club rooms, or write to the hon secretary, G. E. Cunliffe, 368, Stanley Road, Bootle, Liverpool, 20.

SWINDON AND DISTRICT SHORT-WAVE SOCIETY

THE competition for the Swindon and District Short-wave Society's QEK Trophy took place on November 11th. The Trophy was kindly presented for competition by the Chairman, Mr. E. W. Mortimer (2BMM). It is given for the best all-round home-constructed short-wave receiver, points being given for bandspread, layouts, sensitivity, etc. The winner

was W. C. Barnes (2BWR), with a receiver consisting of S.G. valve as detector, and pentode output.

The second prize was won by G. Rose (2CTG) using H.F. Pen. as detector, and power output.

The third prize was taken by D. T. Boffin (2CVA), of Faringdon, Berks, with a four-valve receiver S.G. buffer amplifier, detector, and two L.F. stages.

There was also a contest for the junior members, the first prize being given by the Chairman.

The winner was W. Clarke, with an o-v-1 receiver, the second place being taken by I. L. Davis, also with an o-v-1 receiver. The judging was carried out by R. A. Hiscocks (G6LM), of Chippenham, who congratulated the members upon the high standard reached. It has been arranged to visit the local Automatic Telephone Exchange; also to hold a demonstration of loudspeakers, and for G6LM to give a lecture on "Transmitters." A social has been planned for Christmas week, for the members, their wives and friends.

Hon. Sec., W. C. Barnes, 7, Surrey Road, Swindon.

ENFIELD RADIO SOCIETY

FORMED quite recently, the above society is already making good progress. The organisation of the society has been thoroughly worked out, and members are looking forward to an instructive winter session. Meetings are held weekly on Mondays, and a full programme of this session is being arranged, including lectures and practical work. Already there have been many applications for membership, but there is still plenty of room for new members. Applications should be sent to the Secretary, L. A. Fenn, 47, Cecil Avenue, Enfield.

EDGWARE SHORT-WAVE SOCIETY

THE above society are giving radio sets to blind people in Edgware for Christmas, and would be glad of any more sets that can be presented. The Hon. Sec. is Mr. G. Yale, 40, Raeburn Road, Edgware. Meetings are held on Sundays, at 11 a.m., and on Wednesdays at 8 p.m.

INTERNATIONAL SHORT-WAVE CLUB

ALTHOUGH the International Short-wave Club was nine years old in October, we are celebrating our birthday in December. As in previous years, we are arranging a number of special programmes from short-wave stations, and awarding prizes to the persons sending in the best reports on each programme. Instead of giving one or two grand prizes for reports on the entire group of programmes, as in previous celebrations, we are making it easier for everyone by offering one prize for each programme. We are giving a beautiful twelve-inch, eighteen colour, washable world globe, with short-wave stations marked on it, to the person sending in the best report on each programme. The only regulation is that the reporter in each case must live at least 500 miles away from the station.

We hope to have a large group of programmes and stations arranged for and published in the December issue of "International Short-wave Radio." At the present time we have only a few, mostly from United States stations, but others will come in very soon. The following transmissions have already been arranged:—

December 1st, 1937: 9.30 to 10.00 p.m. E.S.T. HP5A, Panama, 11.70 mc/s.

December 8th, 1937: 6.15 to 7.15 p.m. E.S.T. 2R03, Rome, 9.64 mc/s.

December 12th, 1937: 1.30 to 2.00 a.m. E.S.T. W8XAL, Cincinnati, 6.06 mc/s.

December 20th, 1937: 4.00 to 4.30 p.m. E.S.T. W2XAD, Schenectady, 15.33 mc/s.

December 20th, 1937: 4.00 to 4.30 p.m. E.S.T. W2XAF, Schenectady, 9.53 mc/s.

December 20th, 1937: 11.00 to 11.30 p.m. E.S.T. W2XAF, Schenectady, 9.53 mc/s.

All reports should be addressed to the International Short-wave Club, Birthday Programme Dept., East Liverpool, Ohio, U.S.A.

SOUTHALL RADIO SOCIETY

AT the meeting of the above society held on November 9th, Mr. Douglas Walters (G5CV) demonstrated his Hammarlund Super Pro receiver to an audience of about fifty, which, it was pleasing to see, included several visitors introduced to the society via PRACTICAL AND AMATEUR WIRELESS. It is unfortunate that some of the senior members are too tied by business to attend meetings regularly, as the average attendance of 48 is rather disappointing to the hard-working members of the committee. It is emphasised that readers of this paper are especially welcome to attend any of our meetings, which are held every Tuesday evening at 8.15 p.m., at the Southall Library, Osterley Park Road, Southall. Hon. Sec., H. F. Reeve, 26, Green Drive, Southall.

MID-CORNWALL SHORT-WAVE AND TELEVISION CLUB

A MEETING of the above club was held on Monday, November 8th, 1937, in the clubroom, and there was a good attendance. A member demonstrated a modern all-wave commercial superhet, and also four different makes of converters; afterwards, their merits compared with the ordinary adapter were discussed. The transmitter was also on view in its nearly-completed form, and 2CUL hopes to get it finished before the next meeting. Anyone interested in the above club should apply for particulars of membership to the Secretary, L. Phillips, "Roseveanen," 5, Graham Avenue, St. Austell.

WEYMOUTH AND DISTRICT SHORT-WAVE CLUB

THIS club has been granted a transmitting licence, the call allotted being G8WQ.—Hon. Sec., W. Bartlett, 159A, Franchesi Street, Weymouth.

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Leader Three (SG, D, Pow) ..	22.5.37	PW35	
Summit Three (HF Pen, D, Pen) ..	8.8.34	PW37	
All Pentode Three (HF Pen, D, Pen) ..	29.5.37	PW39	
Hall-mark Three (SG, D, Pow) ..	12.6.37	PW41	
Hall-mark Cadet (D, LF, Pen (RC)) ..	16.3.35	PW43	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three) ..	13.4.35	PW49	
Geant Midget (D, 2LF (Trans)) ..	June '35	PM1	
Cameo Midget Three (D, 2 LF (Trans)) ..	8.6.35	PW51	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) ..	17.8.35	PW53	
Battery All-Wave Three (D, 2 LF (RC)) ..		PW55	
The Monitor (HF Pen, D, Pen) ..		PW61	
The Tutor Three (HF Pen, D, Pen) ..	21.3.36	PW62	
The Centaur Three (SG, D, P) ..	14.8.37	PW64	
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen) ..	29.8.36	PW66	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) ..	31.10.36	PW69	
The "Gold" All-Wave Three (D, 2 LF (RC & Trans)) ..	5.12.36	PW72	
Four-valve : Blueprints, 1s. each.			
Sonotone Four (SG, D, LF, P) ..	1.5.37	PW4	
Fury Four (SG, D, Pen) ..	8.5.37	PW11	
Beta Universal Four (SG, D, LF, G, B) ..		PW17	
Nucleon Class B Four (SG, D (SG), LF, Cl. B) ..	6.1.34	PW34B	
Fury Four Super (SG, SG, D, Pen) ..		PW34C	
Battery Hall-Mark 4 (HF Pen, D, Push-Pull) ..		PW46	
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P) ..	26.9.36	PW67	
All-Wave "Corona" 4 (HF Pen, D, LF, Pow.) ..	9.10.37	PW70	
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A.C. D.C. Two (SG, Pow) ..		PW31	
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Double-Diode-Triode Three (HF Pen, DDT, Pen) ..		PW23	
D.C. Acc (SG, D, Pen) ..		PW25	
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A.C. Leader (HF Pen, D, Pow) ..	7.4.34	PW35C	
D.C. Premier (HF Pen, D, Pen) ..	31.3.34	PW35B	
Ubique (HF Pen, D (Pen), Pen) ..	28.7.34	PW36A	
Armada Mains Three (HF Pen, D, Pen) ..		PW38	
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) ..	11.5.35	PW50	
"All-Wave" A.C. Three (D, 2LF (RC)) ..	17.8.35	PW54	
A.C. 1936 Sonotone (HF Pen, H.F. Pen, Westector, Pen) ..		PW53	
Mains Record All-Wave 3 (HF Pen, D, Pen) ..	5.12.36	PW70	
All-World Ace (HF Pen, D, Pen) ..	28.8.37	PW30	
Four-valve : Blueprints, 1s. each.			
A.C. Fury Four (SG, SG, D, Pen) ..		PW20	
A.C. Fury Four Super (SG, SG, D, Pen) ..		PW34D	
A.C. Hall-Mark (HF Pen, D, Push-Pull) ..	24.7.37	PW45	
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Battery Sets : Blueprints, 1s. each.			
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F. J. Camm's 2-valve Superhet ..	13.7.35	PW52	
F. J. Camm's £4 Superhet ..		PW53	
F. J. Camm's "Vitess" All-Wave (5-valver) ..	27.2.37	PW75	
Mains Sets : Blueprints, 1s. each.			
A.C. £5 Superhet (Three-valve) ..		PW43	
D.C. £5 Superhet (Three-valve) ..	1.12.34	PW42	
Universal £5 Superhet (Three-valve) ..		PW44	
F. J. Camm's A.C. £4 Superhet 4 ..	31.7.37	PW50	
F. J. Camm's Universal £4 Superhet 4 ..		PW60	
"Quatone" Universal Four ..	13.1.37	PW73	
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PORTABLES.		MISCELLANEOUS.	
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		Twenty-station Loudspeaker One-valver (Class B) ..	AW449
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		Melody Ranger Two (D, Trans) ..	AW388
		Full-volume Two (SG det., Pen) ..	AW392
		B.B.C. National Two with Lucerne Coll (D, Trans) ..	AW377A
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		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 Gs. Radiogram (D, RC, Trans) ..	WM318
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		"W.M." 1934 Standard Three (SG, D, Pen) ..	WM351
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		PTP Three (Pen, D, Pen) ..	June '35 WM389
		Certainty Three (SG, D, Pen) ..	WM393
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		All-wave Winning Three (SG, D, Pen) ..	Dec. '35 WM396
		Four-valve : Blueprints, 1s. 6d. each.	
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World-ranger Short-wave 3 (D, RC, Trans) ..		AW355
Experimenter's 5-metre Set (D, Trans, Super-region) ..	30.6.34	AW438
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De-Luxe Concert A.C. Electrogram ..	Mar. '36	WM403
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Trickle Charger (6d.) ..	Jan. 5, '35	AW462
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Wilson Tone Master (1/-) ..	June '36	WM406
The W.M. A.C. Short-wave Converter (1/-) ..		WM408



QUERIES and ENQUIRIES

equipment you must obtain a post office licence. A transmitter of this type must not be connected to an outside aerial, owing to the flatness of tuning and lack of frequency control.

Choice of L.F. Transformer

"I am thinking of making up your Corona receiver, but in order to reduce expense I should like to utilise the L.F. transformer which I have by me and which was taken from a commercial receiver. Will this prove as suitable as the one

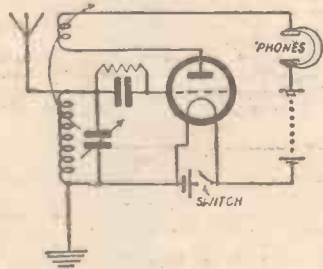
you could give me your reasons when making a decision."—O. T. N. (Falkirk).

WHEN a wire is doubled back upon itself, unless the spacing is carefully chosen, the currents induced in the various sections of the wire will interact and cancel out. Thus, an aerial which is doubled-back upon itself may easily be very much less efficient than a single straight wire of very much shorter length. In your case you do not give the spacing which can be obtained and we cannot therefore give definite details. In some cases a wire which is twisted and turned to get it into a small space may prove efficient owing to the fact that each section of it becomes more or less directional to a certain station and thus balances out the loss of efficiency of the system. You should, therefore, make tests in your special case to find which type of aerial will give you the best results. We prefer the short direct wire, making this one with the lead-in to avoid joints.

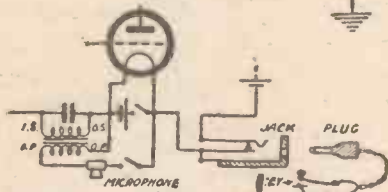
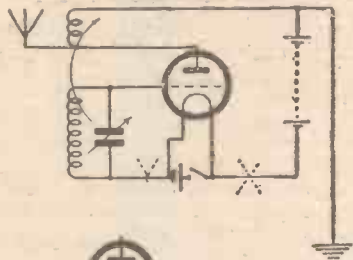
Simplest Transmitter

"I am going to take up transmitting, but am anxious to start right from the beginning so that every detail may be clearly understood. What is the simplest possible transmitter I can build in order to make the acquaintance of this side of radio? Is it possible to buy the apparatus?"—G. Y. F. (Newark).

THE simplest transmitter consists simply of a one-valve circuit very similar to a single valve receiver. The attached diagrams show the one-valve receiver, and for comparison a code transmitter and a speech



A simple detector stage.



Modifications required for a simple transmitter, and method of arranging for mike and key plug-in connections.

transmitter. It will be noted in the latter case that a transformer has to be included between the microphone and the circuit in order to match the impedances, and a standard component may be used. All other components are quite standard, but before carrying out any experiments with this

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

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

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

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

specified, or do you advise me to buy the special component you mention?"—C. J. S. (E.11).

THE component which we specified for this receiver is a high-class transformer designed to provide very good quality of reproduction. Whilst your transformer may be quite suitable and will work satisfactorily in the receiver, we can only state that if you wish to obtain the same results as we obtained you should use the transformer we employed. If expense is a consideration at the moment you could, of course, fit your present transformer, and then if you are not satisfied with reproduction could obtain the specified component at a later date and make the necessary substitution.

Aerial Efficiency

"I am going to put an aerial in my loft, but have a rather small space at my disposal. It would appear that the longest straight run I can get is about 10ft., whilst by running a wire backwards and forwards I could get over 50ft. of aerial installed. Which would be the better plan—to use the short wire or the doubled length? Perhaps

Amplifier Blueprints

"Have you blueprints of amplifiers, and if so, how much do they cost? I only require a small one, not more than 6 watts."—R. P. (Fulham, S.W.6).

YOU say you only require a small amplifier and give a rating of 6 watts. To many listeners this would be a large output, remembering that the standard mains output valve will not deliver much more than 2 watts. An ordinary battery valve will not give as much as 1.5 watts, and therefore an amplifier of the type you require would have to be mains operated. You do not say whether you need mains or battery apparatus, and therefore we cannot advise you definitely. The Listener's 5-watt Amplifier (for A.C. operation), blueprint WM.392, should answer your purposes if you can use the A.C. mains supply. Failing this we cannot recommend a battery amplifier to give you the output you require.

All-wave Tuning

"I am considering building the Simplest One-valve Short-waver, and I am wondering if I can cover all wavelengths using six-pin plug-in coils, with a .00015 mfd. tuning condenser. Should I use a low-capacity reaction condenser with a .00015 mfd. tuning condenser?"—R. W. D. (N.W.11).

IF you wish to use the receiver for all-wave tuning (by which we mean to include the medium and long-wave broadcast bands), then you should include a small fixed condenser in parallel with the tuning condenser on the two higher wavebands. The alternative is to use a .0005 mfd. tuning condenser with a fixed condenser in series for the short-wave tuning, but the results in either case are merely a compromise and the preferable arrangement is to use separate condensers for tuning, or to use a .0005 mfd. condenser with a very good slow-motion drive.

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

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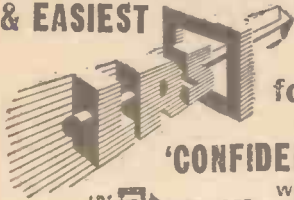
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