

LISTENING TO THE AMATEURS—See Page 735.

Practical and Amateur Wireless

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WEDNESDAY

Edited by F.J. CAMM

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Publication

Vol. 9, No. 233,
March 6th, 1937.

AND PRACTICAL TELEVISION

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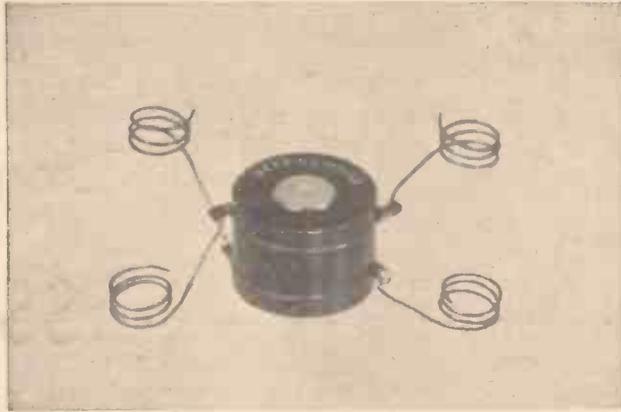
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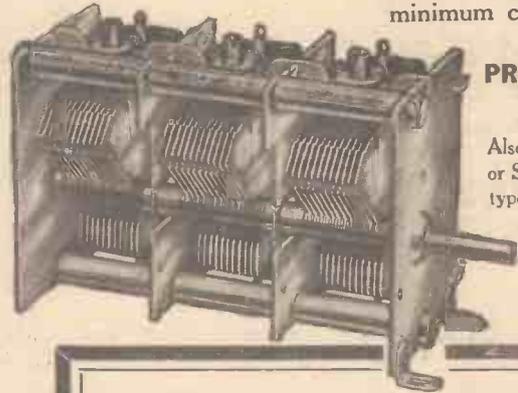
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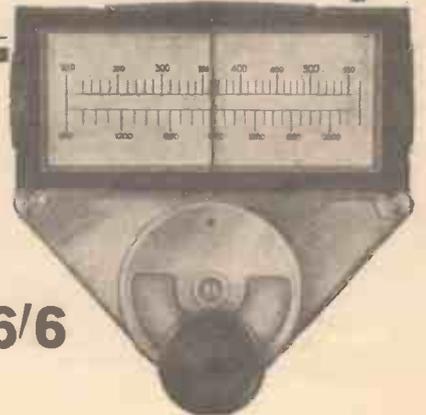
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THE EXPERIMENTER'S EQUIPMENT

See Page 719.



Practical and Amateur Wireless

Edited by F. J. CAMM

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

VOL. IX. No. 233. March 6th, 1937.

ROUND *the* WORLD of WIRELESS

The "Vitesse"

WE have already received hundreds of letters of congratulation from readers who are building our latest all-wave battery receiver. It is obvious that there is a demand for a receiver of this type, and as we have already explained, the battery user has in the past been precluded from making the same excursions into the realms of short-wave listening as have been available to the all-mains listener. It should not be necessary to point out that short-wave listening offers many difficulties, not the least of which is the delicacy of tuning which is required. But this is easily mastered after the receiver has been in use for two or three hours. We do not propose to go into figures showing how dozens of stations can be incorporated in the space occupied by only two on the medium-wave band, but it will be found that at certain points on the short-wave tuning scale six or seven stations will be tuned in and out—all separated from one another—in the space which, on the medium waves, will perhaps only cover two stations such as the London National and Fécamp. The hour at which you listen is also an important point when covering a large band of short-wave stations such as will be heard on the "Vitesse," but these details are fully covered in the article on page 729. We hope to receive some interesting logs and details from constructors, which will be published in due course. If you have not yet started to build this receiver and did not obtain last week's issue with the Free Blueprint, you should place an order with your newsagent without delay.

Japan's Daily Transmissions

WHILST on the subject of short-wave stations we may mention that having brought into operation its new 50 kw. transmitter, JZI, on 31.46 m. (9.535 mc/s), the Japanese Broadcasting Corporation has initiated a daily programme destined to European listeners. This takes place between G.M.T. 19.30-20.30, and is simultaneously transmitted through the 20 kW. station, JVP, on 39.95 m. (7.51 mc/s). The call is given out in Japanese, German, French, Spanish, and in English. The last-named reads: *This is the Japanese Broadcasting Corporation, Tokio, in the*

Land of the Rising Sun. The station closes down with a fanfare of trumpets and the Japanese National Anthem.

A Flying Doctor

IN Australia one doctor carries out his visits by air. He makes long journeys into the bush to visit those who are otherwise out of reach of medical assistance, and amateur radio has on many occasions proved of great value in calling for such assistance. Recently transmitter VK3TU relayed an urgent call for help which resulted in the flying doctor arriving the next day after a flight of close on 400 miles.

The historical story of the Channel is a rich and varied one, and it will be traced from the earliest days. Famous names in fact and fiction, including the Phœnician traders, Julius Cæsar, William the Conqueror, the Vikings, Philip of Spain's Armada, the *Mayflower* and many others, will take a place in the production. It is also hoped to draw on the works of Byron, Dickens, Thomas Hardy and many other writers, whilst music will also play an important part, including, of course, the popular sea chanties.

Television Exhibition

THE first public exhibition devoted solely to the development and modern attainments of television will be staged at the Science Museum at South Kensington early in June. It is anticipated that it will remain open for three months. All the principal British manufacturers interested in the development of television are co-operating with the R.M.A. and the B.B.C. to make the exhibition truly representative, and it is expected that it will do much towards spreading a wider appreciation and understanding of television as it is now available in the home of the listener. In addition to an illustration of the development of television equipment, demonstrations will be given of the B.B.C. programmes on modern receivers, and a local transmitter will be shown in operation so that the receivers can operate when no B.B.C. transmission is available.

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New Television Fields

THE search for new material for the television programmes recently led the B.B.C. to broadcast two acts from the current London Casino cabaret show. The London night-club and theatre fields provide, of course, a mine of talent upon which to draw, and a Marconiphone television receiver was installed in the foyer of the London Casino so that visitors could see the broadcast and note the high standard of entertainment which is provided by this new field.

The English Channel

ENGLAND'S "Guard and Wall" is the subject of a feature programme to be broadcast from the National on March 21st.

Henry Hall's Hobby

LIKE all popular people, Henry Hall has a hobby. But unlike the majority, Henry's hobby is closely connected with his work. He collects music! His collection embraces every song-hit published during the last thirty years, and although many of them were purchased in the ordinary way, some existed only on publishers' files and have had to be copied. Behind his office in Maida Vale there are bound volumes containing about 26,000 tunes which have been sung, hummed and whistled since the early years of the century. Quite a number of these copies have been picked up on secondhand-music stalls, and even music publishers have gone to Henry Hall for copies of music which they have been unable to obtain.

ROUND the WORLD of WIRELESS (Continued)

Old English

ONE of Galsworthy's most charming plays will, on March 7th (National), be heard over the microphone for the first time. Essentially a study in character rather than a play of action, it should prove particularly suitable for the purposes of radio drama. The scene is set principally in the boardroom and offices of a shipbuilding company in Liverpool, and the central figure of the drama, "Old Heythorp," the chairman of the company, is drawn on a truly heroic scale. A typical late Victorian, at once stubbornly wrong-headed and shrewdly good-hearted, he embodies within himself all the strength and weakness of an era that has for ever vanished. Many listeners will, no doubt, enjoy this intensely human comedy of commercial life.

Too American!

THE following story has been passed on to us by Pye Radio Ltd., concerning a recent experience of their service agent of Paignton, South Devon: A prospective purchaser insisted on hearing an American all-wave receiver before definitely deciding to purchase. A trans-Atlantic station was tuned in, but she declined to buy, giving as her reason that the set talked too much like an American. When the explanation was given that the set was actually manufactured in the United States, she said that probably accounted for it, and a decision was then made for the installation of a Pye T.10 receiver.

Popular Concert from Bath

THE Bath Pump Room Orchestra, conducted by Maurice Miles, will broadcast a popular concert from the Pavilion, Bath, on March 8th, in the Western programme.



Billie Bissett, whose band relays from the Mayfair Hotel are extremely popular.

Organ Recital

FRANK OLSEN, at the organ of the New Cinerama, Glasgow, will play on March 11th: Overture, "Light Cavalry," by Suppé; Selection of Leslie Stuart's Songs, arranged Olsen; Fox-trot, "I'll sing you a thousand Love Songs," by Warren; Selection, "Good-night, Vienna," by Pos-

INTERESTING and TOPICAL NEWS and NOTES

ford; "At the Balalaika," by Posford; and Selection, "Showboat," by Kern.

Variety Programme

VARIETY will be broadcast from the Prince's Theatre, Bristol, on March 12th, when listeners will hear Nina Mac McKinney, Jack Warman, and Steffani's 21 silver songsters.



This young lady is trying out the new "His Master's Voice" luxury instrument, the "H.M.V." All-world High Fidelity Concert Autoradiogram, Model 801, which has a ten-valve circuit, enabling short-wave programmes on wavelengths between 7-140 metres to be received from all parts of the world, besides dozens of European stations broadcasting on medium and long wavebands. The "H.M.V." Model 801 has a superb figured walnut cabinet and costs 80 guineas.

B.B.C. Scottish Orchestra

ON the afternoon of March 6th the B.B.C. Scottish Orchestra, conducted by Guy Warrack, will play the Overture, "Russlan and Ludmilla," by Glinka; Symphony No. 16 in G (the Oxford), by Haydn; Dances and Melodies from "Don Gil," by Braunfels; and "Slavonic Dances," by Dvorak.

America's Radio Tax

ALTHOUGH there is no licence fee for wireless users in America, the U.S. Government obtains money from listeners in an indirect manner by an excise tax of 5 per cent. on receivers, gramophones, and other domestic electrical equipment. Last year this revenue amounted to five million dollars.

"Midland Parliament"

AT its next session, on March 4th, "Midland Parliament" will discuss Time-Study and Speeding-Up in Industry,

including the effects of various systems upon output and as judged from the workers' point of view. The speakers will be Sir Charles Mander in the Chair, W. M. W. Thomas, managing director of a well-known motor firm, George Jones, secretary of the Midland Miners' Federation, and Andrew MacLaren, M.P. for the Burslem Division. It is hoped also to have a representative from some factory where one of the time-study systems is in operation.

Musical Comedy Programme

THE B.B.C. Welsh Orchestra, conducted by Idris Lewis, will give a Musical Comedy programme on March 10th.

Opera from Oxford

THE Royal Carl Rosa Opera Company, conducted by Charles Webber, will be heard on March 5th in a performance of Act I of Wagner's opera, "Tannhäuser," from the New Theatre, Oxford. John Myrddin will take the part of Tannhäuser, and Pauline Mander that of Venus.

Sonata Recital

ON March 7th Western Regional listeners will hear a sonata recital by Marie Hall (violin) and Pauline Baring. The work to be performed will be Sonata in E flat major by Strauss.

A Floating Service Station

A UNIQUE service station for wireless transmitting and receiving apparatus exists in Alaska. It is housed in a yacht off the coast, and is owned by a Seattle radio firm. In addition to servicing radio receivers possessed by the scattered population of this part of the world, it also undertakes repairs to the transmitting and receiving equipment installed on board various ships.

Variety from Blackpool

AN excerpt from the variety Bill will be broadcast from the Palace Theatre, Blackpool, on March 5th. Acts which listeners will hear include Harold Walden, Nell and Clare, and Mario Lorenzi.

SOLVE THIS!

Problem No. 233.

The 7/1 L.F. transformer in Horton's receiver was overloading the output pentode valve and causing distortion. How could the external wiring to the transformer be altered so as to provide a lower degree of amplification? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 233 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, March 8th, 1937.

Solution to Problem No. 232.

The capacity of the condenser feeding the A.V.C. anode of the D.D.T. valve was too high. The following three readers successfully solved Problem No. 231, and books are accordingly being forwarded to them: E. F. Churett, Merton, 15, Ringwood Rd., Parkstone, Dorset; Charles P. Forde, Mariette, Abbeylands, Navan, I.F.S.; S. Wort, Sunnyside, Robin Hood Lane, Walderslade, Chatham, Kent.

The Experimenter's Equipment

This Week the Experimenters Give Some Advice to a Young Experimenter Concerning the Kind of Meters and Test Gear Which He Will Require.

THE select circle of "Experimenters" has been augmented. A new and youthful recruit has joined us. When he first came into our midst he was inclined to be rather bumptious, but we are gradually effecting a cure and he will soon "fall into line." You see, he has taken a course in the theory of electricity and wireless at a university, and this has given him the idea that he knows all about radio experimental work. As a matter of fact, he is just about to start to learn something of a practical nature. He is very good at using high-sounding technical terms, but if the occasion arises when it becomes necessary to give a brief, accurate and reasonably adequate definition, he is lost for words.

But we are digressing. This new recruit isn't half as "dumb" as we try to make

can later build the more elaborate apparatus for himself, using the meters which he has.

The choice of meters is not easy, if a fair degree of accuracy is essential, and at the same time the available cash is strictly limited. A multi-purpose meter, such as the Avometer or Avo-Minor is extremely useful, but is fairly expensive when a type is required for both A.C. and D.C. These

by The Experimenters

combination instruments can be used for reading currents, voltages and resistances in several ranges, and are very convenient. But since our friend is unable to spend more than about £4, requires to measure both D.C. and A.C., and will sometimes wish to use two instruments at the same time, we suggest that he buys a good moving-coil milliammeter reading up to

10 mA, a moving-iron voltmeter with a full-scale reading of 5 volts, another moving-iron meter reading up to 250 volts, and a moving-iron milliammeter reading up to about 20 mA. The first of these will cost about 30s., whilst the other three will cost about 15s. each. Actually, the moving-iron milliammeter

will rarely be required and could be omitted from the list if desired. Cheaper instruments are available, but they would not be likely to be sufficiently accurate for other than simple receiver-test purposes.

Moving-Coil Milliammeter

The moving-coil milliammeter can be used for most D.C. current readings without modification, and can be used for

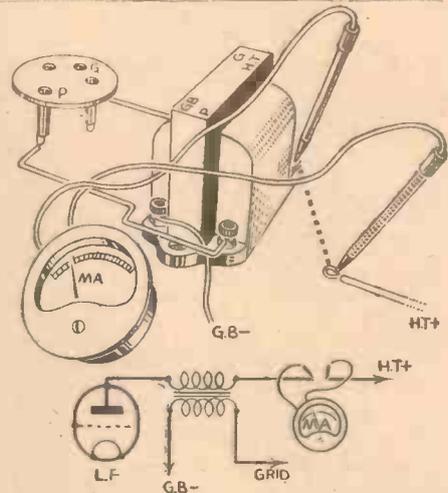


Fig. 2.—How a milliammeter is connected to read anode current.

higher ranges by adding shunt resistances, or for voltage measurement by the addition of series resistances. It can also be used for measuring resistances (with fair accuracy) in conjunction with a battery. Moving-iron meters can be used for measuring either A.C. or D.C., and can be obtained in types which are accurate to within plus or minus 5 per cent. at the approximate price mentioned above.

Rather than build the meters into a complete test panel, we suggest that he mounts them separately on small inclined panels, as shown in Fig. 1, fitting a length of red-and-black flex with test prods to the terminals. In order to measure milliamps up to the normal full-scale reading it is necessary simply to break the circuit under test and hold the test prods against the two sides of the break as indicated in Fig. 2, where the meter is shown connected to measure the anode current passed by an L.F. valve.

In order to double the scale reading a resistance equal to the resistance of the meter can be connected in parallel with it. This may be done most easily if a pair of terminals is fitted to the inclined panel, as shown in broken lines in Fig. 1. A 0-10 mA meter generally has an internal resistance of about 20 ohms, so a resistance of that value would be required. If it were desired to multiply the scale readings by three, the shunt resistance would need to have a value of one-half that of the meter, or 10 ohms. As it is not always easy to obtain resistances with values as low as these, except as expensive "precision" components, an alternative arrangement is to use a 25-ohm variable resistance of good quality instead. The correct settings for this can easily and accurately be obtained by connecting the meter in a circuit passing about 5 mA. Without making any other alterations, the shunt resistance should then be connected and adjusted until the reading of the meter is exactly half of the previous figure. Next connect the meter, with shunt, in another circuit passing about 10 mA (5 mA reading on the scale) and again set the variable resistance until the reading is halved, as before. The reason for using the half-scale deflection as a basis for adjustment is that at this point any slight inaccuracy of the meter is at a minimum.

Measuring Resistance

If the variable resistance were mounted on the meter panel it (Continued overleaf)

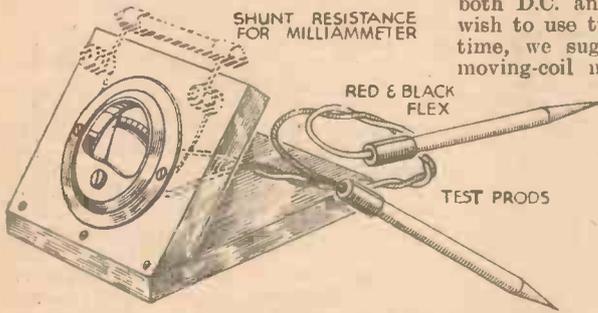


Fig. 1.—A convenient method of mounting the meters.

him believe, but we must cure him of his pedantry, especially since we others are more interested in practice than in theory, and always make a point of using highly-technical terms only when simpler language is incapable of giving a proper explanation. What we really intended to tell you in this "bulletin" is that our new friend has been seeking our advice regarding the type of test gear and equipment which he will require for his "den." During his course of training elaborate and costly meters have been at his disposal, and there have been complete pieces of apparatus for every test and measurement which it has been desired to make. Now, he has to "come down to earth," or else spend so much money on gear that there will be none left with which to carry on set construction—which is, after all, the most interesting part of experimental work.

Measurements Required

It is appreciated that meters will be required for the measurement of current, voltage, resistance at least. Bridges for measuring inductance and capacity would also be useful, as also would a modulated oscillator and a wavemeter. In the first place, however, we are recommending him to be satisfied with a few good meters; he

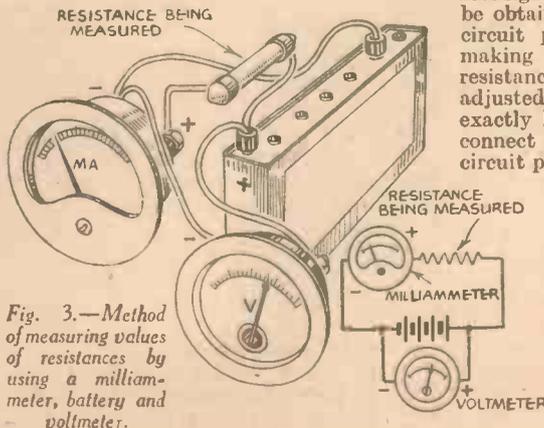


Fig. 3.—Method of measuring values of resistances by using a milliammeter, battery and voltmeter.

THE EXPERIMENTER'S EQUIPMENT

(Continued from previous page)

might be possible to draw lines to indicate the position of the knob pointer for doubled and trebled readings, but before reliance is placed on these settings, they should be checked a number of times to ensure that the actual resistance in circuit always corresponds to the setting of the pointer.

Resistance measurements can be taken by using a voltmeter in conjunction with the milliammeter, as shown in Fig. 3. It will be seen that the voltmeter is connected in parallel with a battery, this being in series with the resistance under test and the milliammeter. For resistances of 2,000 ohms and over the value can be ascertained by dividing the voltage indicated by the voltmeter by the current reading of the milliammeter. The result will be in thousands of ohms. As an example, if the voltage were 3 (when using a G.B. battery for convenience) and the current 1 mA., the value of the resistance would be 3,000 ohms. On the other hand, if the voltage were 50 and the current 4 mA., the value would be 12,500 ohms. From these examples it will be seen that a voltage of 1 to 3 can satisfactorily be used for resistances up to about 5,000 ohms, whilst higher voltages up to 100 or so are better when measuring higher resistances. A tapped H.T. battery is very convenient for the purpose, provided that the voltmeter does not pass more than about 10 mA.

Meter Resistance

A typical 5-volt moving-iron meter has a resistance of 60 ohms, and so passes nearly 90 mA. at full-scale deflection; in that case, the meter should be kept in circuit for a few seconds only, whilst it would be preferable to use an accumulator for providing the voltage. Alternatively, the current would be halved if the voltage were similarly reduced. Moving-iron meters for reading up to 250 volts can be obtained with a resistance of 6,500 ohms. Such a meter would pass nearly 40 mA. when the full voltage were used, but this could be cut down to 10 mA. by using a voltage of 60. These are points which must be borne in mind if a battery is not to be run down very quickly. Another method of keeping down the current passed by the meter is to double its scale reading, by connecting it in series with a resistance of value equal to that of the meter.

When dealing with resistances of less

than about 2,000 ohms, accuracy can be ensured only by subtracting from the calculated value the resistance of the milliammeter—20 ohms in the case under discussion. It will have been noticed that in many cases it is necessary to know the resistance of the meters used; in consequence, instruments should not be bought unless they are of specified resistance.

Capacity from a Milliammeter

It is not always known that condenser capacities can be found fairly easily by using simple meters of the types described in conjunction with a source of alternating current of known frequency. The latter can be the mains supply, and the required connections are those shown in Fig. 4. A 5,000-ohm, 10-watt variable resistance is con-

and readings taken from the two meters, the condenser capacity can be calculated from the formula:—

$$\text{Capacity (in mfd.)} = \frac{\text{Current (mA)}}{\text{Voltage} \times \text{Frequency} \times .0063}$$

In most cases, the frequency will be 50 cycles, and therefore, if the voltage were 160 and the current 5 mA., the capacity would be $\frac{5}{160 \times 50 \times .0063}$, or 1/10.08, which is almost exactly .1 mfd. If it were considered necessary to re-check the calculation, this could be done by working out the reactance of a condenser of .1 mfd. (formula: reactance (ohms) equals 1,000,000 over $2\pi fC$; where f is the frequency, π is 3.14, and C is the capacity in farads, or millions of microfarads) and dividing this into the voltage. The answer should be the same as the

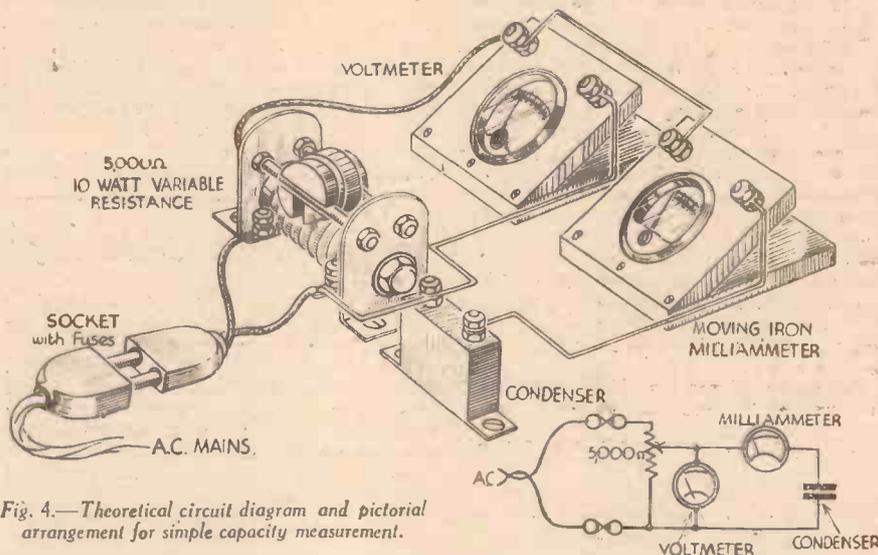


Fig. 4.—Theoretical circuit diagram and pictorial arrangement for simple capacity measurement.

nected across the mains supply (which should preferably be fed through a twin plug with two .25 to .5-amp. fuses) and the 250-volt meter is joined between the slider and one end of the resistance. The moving-iron milliammeter and condenser are then connected in series with each other and in parallel with the voltmeter. Before connecting the mains supply it is well to move the slider of the variable resistance to a low setting in order to avoid the possibility of passing more than 20 mA. through the milliammeter.

After the connections have been made

current reading on the milliammeter scale.

It should be explained that the method of capacity measurement just described is applicable to all except electrolytic condensers. These require to have a polarising voltage, and must therefore be treated differently. We will deal with that point in another "bulletin," when we give more details concerning the amateur's equipment.

And now we have exhausted the space allotted to us by the Editor, so we must say "So long."

Broadcasting Equipment in London Fire Station

A striking example of the practical application of modern electric amplifying equipment is provided by the loud-speaker announcing system manufactured by The General Electric Co., Ltd., which is being installed at the Heston and Isleworth Fire Station. Specially-designed loud-speakers are being installed to cover the engine house, the recreation room and the parade ground, so that an immediate message can be sent to all members of the Brigade for an urgent call.

The main microphone is in the control room, but a subsidiary microphone can be used on the parade ground for instructional purposes. A "priority call" device is included, however, so that even if the parade-ground microphone is being used it will be immediately cut out of circuit by the main microphone if a sudden summons has to be broadcast. In the same way, while a switching control normally enables a choice of any of the loudspeaker channels

ITEMS OF INTEREST

to be made, the "priority call" automatically switches all loudspeakers into circuit. Since the authorities required an equipment which would always be ready for use at a second's notice, the amplifier is operated direct from an accumulator bank which is auto-charged from the D.C. supply.

La Voz de Costa Rica

CAREFUL tuning in the early morning hours, namely, between G.M.T. 02.00-03.00, on most days will bring you the broadcasts of TI4NRH, Heredia, Costa Rica, a 150-watt operating on 31.02 m. (9.67 mc/s.). Announcements are frequently made in Spanish and English and occasionally in the French language. Programme is preceded by a bugle call, and closes down with a fanfare reminiscent of the *Last Post*.

Address for reports: Señor Amando Cespedes Marin, Apartado Postal, 40, Heredia, Costa Rica.

Dance Music

BILLY MERRIN and his Commanders will give a programme of dance music on March 13th from the Midland Regional. The vocalists will be Rita Williams and Eric Stanley.

Birmingham Fire Brigade Band

THE Birmingham Fire Brigade Band, which is the only one attached to a city fire brigade in this country, will revisit a Birmingham studio on March 7th; when it will give a popular programme conducted by Station Officer R. Ward. Fireman G. Fryer will be the solo saxophonist in Fould's Keltic Suite, and Firemen E. Jordan and W. Kane will give a xylophone duet, Barsotti's "Flotsam and Jetsam." The vocalist will be Edmond Letts, the Walsall baritone.

About Electrolytic Condensers

The Properties and Uses of these Components are Described in this Article

THE electrolytic condenser is one which enables large capacities to be obtained at comparatively small cost and with certain advantages, but also certain limitations. They are divided into three classes, viz., wet, semi-dry and dry.

A condenser of the ordinary type consists of two parallel conducting plates separated by a non-conductor of "dielectric," which may be air, mica, wax-impregnated or oil-impregnated paper, etc. In the air- and mica-dielectric type condensers, a flat laminated construction is usual as in Fig. 1, but where impregnated

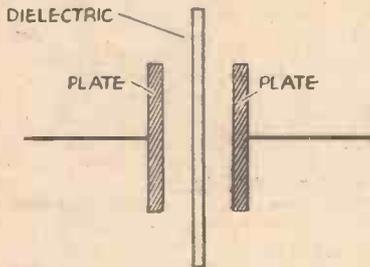


Fig. 1.—Flat laminated construction used for paper and mica condensers.

paper is employed, it is more usual for alternate strips of foil and paper to be rolled helically to form a cylindrical body. The condenser will pass A.C., and it does not matter which way round it is connected on D.C. supplies.

In the electrolytic condenser the dielectric instead of being a separate entity, takes the form of an electro-chemically formed thin layer of oxide on the surface of an aluminium foil which is itself one of the plates of the condenser (see Fig. 2). The place of the second condenser plate is taken by a conducting layer of electrolyte (usually held in some form of porous separator), to which connection is made by means of another metal plate (sometimes the actual aluminium case of the condenser). Under the influence of the impressed D.C. voltage, any flaws which may occur in the oxide film while the condenser is in service will be sealed by electrolysis. The two aluminium foils, separated by the electrolyte, are rolled together forming a cylindrical section, which is mounted in a suitable container. (See Figs. 3, 4 and 6.)

General Electrical Properties

The capacity of the condenser being inversely proportional to the separation distance of the two conducting plates, it becomes obvious that the capacity per unit area of foil must be unusually high in an electrolytic condenser, since the separation is simply the thickness of the oxide film. This is ultra-microscopic, the film being only a few molecules thick. Herein lies the main advantages of con-

densers of this type, the volume and price of a condenser of a given rating being much smaller than would be the case if a mica or paper dielectric were used.

There are, however, certain limitations which render this class of condenser unsuitable for certain work. Owing to the unidirectional conductivity property of the oxide dielectric film on the aluminium, an electrolytic condenser must, with certain few exceptions, have a D.C. polarising voltage applied. In other words, it must always be connected so that the aluminium foil on which the oxide is formed is the positive connection. When this foil is made positive and the other plate and electrolyte negative, the oxide acts as a very high resistance and the condenser action occurs. If, however, the polarity of the plates is reversed, the current-blocking action of the film is absent, and the assembly ceases to be a condenser. The film is not initially harmed by such a reversal of connections, but if the comparatively high reverse current is allowed to continue, overheating occurs, the oxide dissolves, and the condenser burns out. Electrolytic condensers cannot, therefore, be used on raw alternating current. They are designed for use as reservoir and voltage-doubling condensers for use with rectifiers and also in anode and grid bias decoupling circuits. They may also be used where a steady D.C. voltage has an A.C. ripple superimposed upon it.

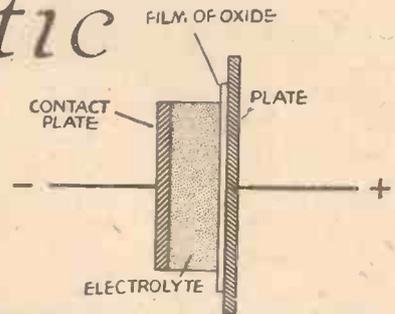


Fig. 2.—Internal construction of an electrolytic condenser.

Different Types of Electrolytic Condenser

The original type was the "wet" or "aqueous" condenser, in which the electrolyte is completely fluid, the assembly being sealed in a metal can with a vent to allow free escape of the gases generated by the electrolysis of the liquid. Condensers of this type will not easily break down and will act as surge limiters. They possess certain disadvantages, however, in that they are of rather poor general electrical characteristic, and comparatively large in size. They must also be mounted so that the vent is on top, above the level of the liquid.

The semi-dry condenser has an electrolyte of treacle-like consistency and must be mounted in a leak-proof container.

The dry type of condenser, which is by far the most popular, contains an electrolyte which is sufficiently dry to allow of mounting in card cartons, boxes and tubes as well as in metal cans. (Figs. 3, 4, and 6.) A maximum of compactness and cheapness, therefore, attained by its use. This type of condenser will not limit surges in the same way as the aqueous types, but they nevertheless possess considerable re-sealing

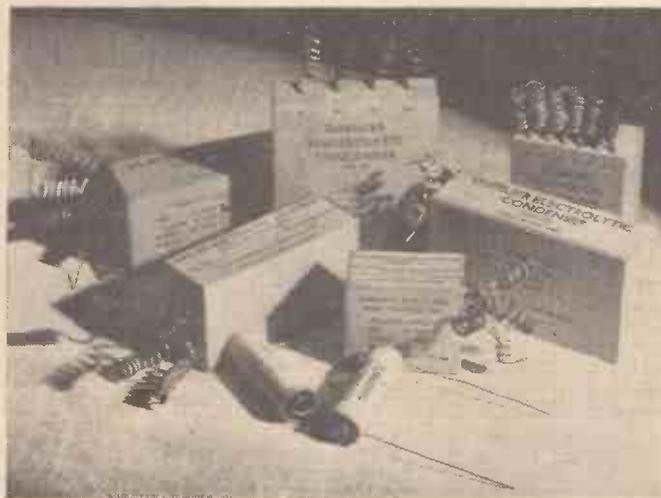


Fig. 3.—Group of manufacturers' type dry electrolytic condensers.



Fig. 4.—Reversible type dry electrolytic condenser (two condensers of 8 mfd. capacity each in the one container; case negative).

In normal use, a small leakage current of about 1/2 mA flows continuously through an electrolytic condenser, and the magnitude of this leakage depends upon the capacity of the condenser and the applied voltage.

The following summary of properties and permissible working conditions may be found useful:

powers, even complete breakdowns being refilled providing the breakdown spark has not been sufficiently powerful to dent the foil and cause it to penetrate the separator.

Ratings

The rating of an electrolytic condenser is usually given as a peak voltage. This

includes the maximum A.C. voltage ripple, and any surges which may be experienced by the condenser when the apparatus is first switched on, such, for example, as occurs with a rectifier in a mains radio receiver. A condenser rated at a maximum of 500V. D.C. working will not withstand surges over this figure, and if the steady D.C. voltage which will be applied when the radio receiver is in normal use, *i.e.*, after all the valves have warmed up, is 450 volts, then the A.C. ripple must not exceed 35V. R.M.S.

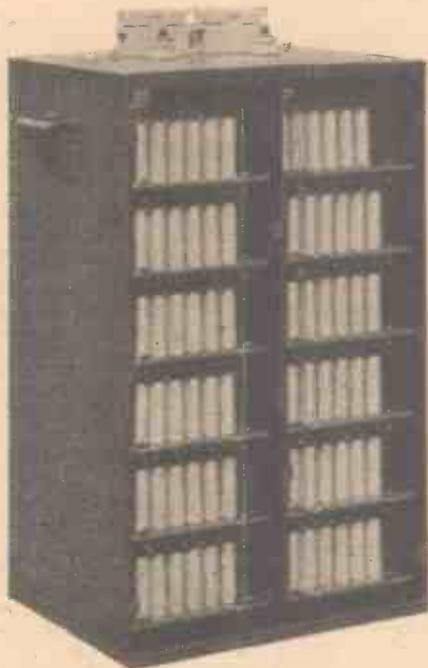


Fig. 5.—Group of wet electrolytic condensers used for filter purposes at a tramway depot.

Sometimes, both a working voltage and a surge voltage are specified. The working voltage must again include the peak of the A.C. ripple, but a further allowance must be made for any extra surges which may be applied over the working voltage when the set is first switched on, and this must not exceed the higher rated "surge voltage" figure given.

Amount of Ripple

Without going into technical and mathematical considerations, it may be said that the A.C. ripple applied to a normal dry electrolytic condenser should not in general be more than 10 per cent. (calculated as an R.M.S. voltage) of the D.C. polarising voltage. Thus, a condenser rated at 500 volts peak may not have applied to it more than 50 volts R.M.S. ripple, so that the permissible maximum D.C. voltage is 430 volts.

Polarity

With normal types of electrolytic condenser, the marked polarity must be strictly observed, for the reasons already given. For D.C. or universal mains radio receivers, however, where accidental reversal can occur due to the mains connector being put in the wrong way round, special reversible condensers are available (Fig. 4). These are, of course, more expensive and larger than the normal type, and, although they may be connected either way round, the D.C. polarising voltage is still necessary, and they are not suitable for use on raw A.C. In fact all the precautions regarding

ripple, peak voltage, and so on, must be strictly observed as before.

Working Temperature

Modern electrolytic condensers are made to withstand the temperature found in the average all-mains receiver, but they should not be mounted too near a valve, especially if it is of the output class, where the temperature rise is very great. In general, if the conditions regarding ripple and peak voltage are complied with, satisfactory working will be obtained up to about 50 degrees C. without impairing the useful life of the condenser. If higher temperatures are met with, the ripple voltage must be reduced. In any case a high temperature will increase the leakage current, and this in itself will tend to heat up the condenser still further and a cumulative effect will occur, resulting in the eventual burning out of the condenser.

Higher temperatures raise the capacity and the leakage; lower temperatures lower capacity and temperature. Unless of the aqueous type, freezing will not hurt an electrolytic condenser, but where it is intended for use under tropical conditions it is advisable to work the condenser well below its maximum rating, both as regards peak voltage and ripple.

Life

Providing an electrolytic condenser is properly used, it will have a very long and efficient use. It should be borne in mind, however, that an electrolytic condenser is not permanent like the paper or mica versions, but that its life ends when the electrolyte has been exhausted by the action of the leakage current which tends to increase as time goes on. When such exhaustion does occur, the capacity drops to zero, but this does not occur until after a period of many thousands of hours, far more than the usual life of a radio set. Where such condensers are being used by experimenters, it should be borne in mind that a slight change in capacity occurs while an electrolytic condenser is standing idle, and that there is also a gradual decay of the oxide dielectric film. Hence, if a condenser is put on load after idling, the leakage current may initially be high, say 10 mA or more, but the electrolyte re-forms the film under the action of the applied D.C. voltage, so that the leakage current falls off, and a current of less than 1 mA is reached after two or three minutes on load. The time taken to return to the normal load leakage depends on the length of time the condenser has been standing idle. After one week, it may be only two minutes, in fact hardly noticeable. But a period of six months idleness may result in the condenser taking as long as 15 minutes to reach normal leakage. In such cases it is advisable, therefore, to put the condenser on load for about half an hour before

using it, when it will then be in a satisfactory condition.

A slight drop in capacity occurs at the beginning of the load life of an electrolytic condenser. This is usually about 5 per cent. and the initial capacity is often slightly on the high side to allow for this drop, which mostly occurs during the first 500 hours use, after which a very gradual decrease in capacity is met with. It will be seen, therefore, that an electrolytic condenser may be compared in many respects with a dry battery, only the action is very much slower.

The amount of moisture in the air to be found in this country under all normal conditions is not sufficient to have any effect on an electrolytic condenser, but for tropical climates where abnormally high humidities occur it is advisable to use only those condensers which are mounted in metal containers.

High Frequency Uses

For normal dry type condensers, the effective capacity changes with the applied ripple voltage. The capacity at 50 cycles is decreased by 5 per cent. as the frequency is raised to 500 cycles per second, and by 15 per cent. as it is raised to 5,000 cycles.

Testing Electrolytic Condensers

A good condenser may be distinguished from a faulty one by testing for leakage current after the condenser has been allowed to re-form as previously described. The minimum leakage value for any condenser should be 0.1 mA and an 8 mfd. condenser rated for 500 volts peak D.C. working should have a leakage current of about 1 mA. Condensers may also be tested by bridge or impedance methods, in which case it should be noted that the capacity value obtained by bridge measure-



Fig. 6.—Two T.C.C. electrolytic condensers of the type shown in Fig. 4.

ment may be as much as 5 per cent. higher than that obtained by impedance. The tolerances normally permitted are +100 per cent. —10 per cent. on nominal rated capacity, but different tolerances are specified by different manufacturers.

Summing up, we find that an electrolytic condenser is more compact and much cheaper than a paper or mica condenser of corresponding capacity and that, provided its rating is not exceeded and proper precautions are observed as regards amount of ripple, temperature, etc., its life is very long, although it is not permanent. Its chief use lies in decoupling and filter circuits.

A PAGE OF PRACTICAL HINTS

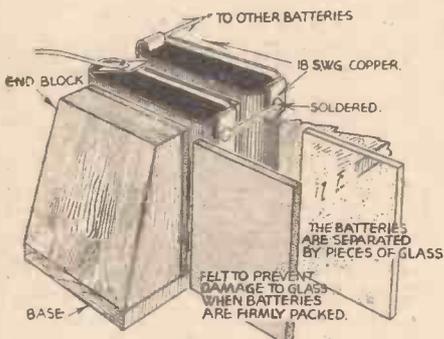
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

An Improved Unit H.T. Battery Assembly

I STILL employ the old method of building up one's H.T. supply from 4.5v. torch batteries, since I find it most convenient financially, and admirable for short-wave

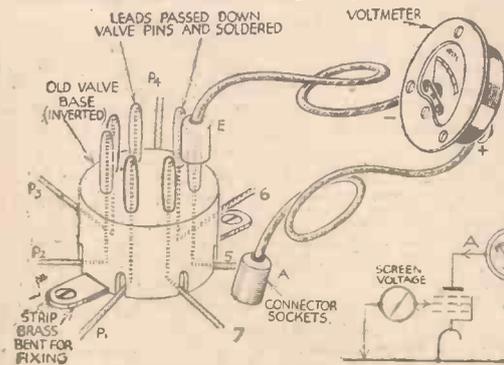


An improved method of assembling flash-lamp batteries for forming an H.T. unit.

work. I find, however, that the detrimental effect of accelerated corrosion caused through tightly packing the batteries without individually separating them called for a new method of assembly, and in employing the idea illustrated I have appreciably lengthened the normal life of my H.T. battery, since corrosion is retarded by the employment of the glass separators. I can recommend this simple improvement for the new life it gives to the battery, and also its portability.—N. J. E. SMYTHE (Liverpool).

A Simple Tester

ON my receiver, which employs an H.F. Pen, Det., L.F. Pen. circuit, I have often found whilst experimenting that time and again I have had to make plate and screen voltage tests. The accompanying sketch shows a method I have adopted to facilitate these intermediate tests. The "tapping block" I made by inverting an old 7-pin valve base, and connecting valve leads to pins, and connector sockets attached to voltmeter leads finished my tester.—A. T. BASSETT (Edgware).



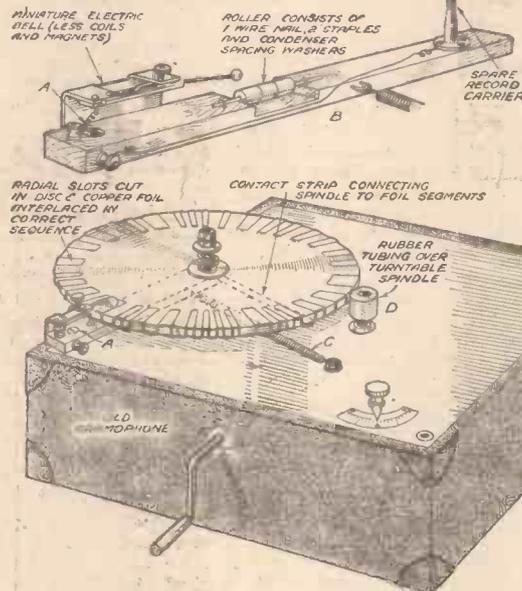
Details and circuit diagram of a simple tester.

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An Auto Morse Sender

IT is very difficult to carry out many "running tests" with a transmitter when using C.W. owing to the fact that the key requires operating.



A novel automatic morse sender for carrying out "running tests."

The device was first made for a friend of mine, a well-known transmitter, to allow a test call to be put out whilst the last call was being entered up in the log during contests. It worked so well that, whilst when I first made it the call was "TEST. TEST. TEST. DE. G6LM. G6LM. G6LM." it was soon made to call "TEST. TEST. TEST. DE. G6LM. G6LM. AUTO KEY," and many a time the reply has come back "pse dope on auto key O.M."

I have now made another one for my own use, and it allows me to try out various ideas on transmission, monitoring, etc., whilst not having to touch the key. It can be relied on to give good sending providing sufficient time is spent on accurately cutting the disc of three-ply wood. Its construction is very simple, and I think that the

accompanying sketches make the details quite clear. The copper foil which I use is off baseboards of old S.W. receivers, and is cut into strips about 1/4 in. wide. These are soldered together, as used, underneath the disc. The screw A is the pivot on which the arm B is fixed. A fairly heavy spring, C, keeps the edge of the disc tight against the rubber tube forced over the top of the turntable spindle D. The amount which can be put on to one of these discs (mine are about 8ins. in dia.) is entirely dependent on the speed at which it is allowed to revolve, and also the fineness of the slots in the disc, but providing the spaces are accurate, the governing of the speed of the turntable spindle will help a lot in getting a proper speed.—W. J. FORD (Swindon).

A Multiple Connector

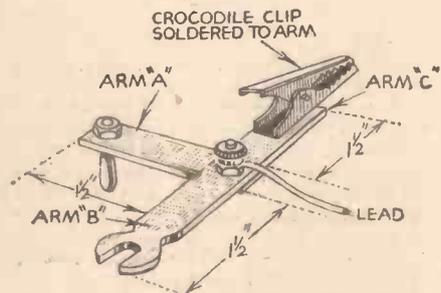
THIS simple device enables a component to be quickly connected to any form of connector without changing terminals.

The connector can be made from old pieces of brass strip. After completing all cutting and soldering, thread a washer and bolt (which are soldered together) through arms A, B and C, respectively, and finally screw on a milled nut, as illustrated. Each arm should be about 3/8 in. wide and 1 1/2 in. long.

Two of these connectors will be required, one for each lead.—G. THOMPSON (Birmingham).

Condenser Microphone

I recently tried to use a condenser microphone of well-known make, but experienced complete failure. Finally, I made a single-valve L.F. stage with a high-gain L.F. transformer output, and mounted this in a small metal box, with an Osram Midget valve, Type A.537, and the microphone was mounted in one side of the box. Results are now perfect.—W. WATTS (Hendon).



The simple multiple connector described by Mr. G. Thompson.

Constructional Details of "Amateur Wireless" Receivers

The Following Notes Give Information which is Often Asked For Concerning "Amateur Wireless" Designs for which the Associated Issues are Out Of Print

NOTHING is more annoying to the constructor, when, after carefully selecting a receiver design from our Blueprint List or after having a certain circuit recommended by a friend, he finds that while he can secure a copy of the blueprint it is not possible for a copy of the issue containing constructional details to be obtained, owing to all available supplies being out of print.

That such a state of affairs should exist, may seem to many very unsatisfactory, but,

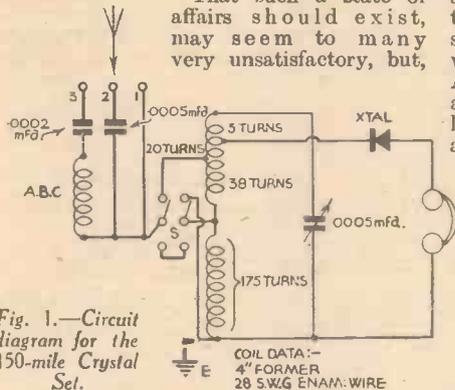


Fig. 1.—Circuit diagram for the 150-mile Crystal Set.

Unfortunately, it is one of those evils which cannot be avoided. Only a certain number of copies of any issue are printed, and many readers are wise enough to keep all copies, having the various volumes bound, or stowing the copies away in a safe place for future reference.

Many constructors are finding that it is becoming increasingly difficult to secure copies of back numbers, although quite a number of blueprints of the receivers are still available; therefore, it is proposed to deal, as often as may be necessary, with the vital constructional details of those receivers whose associated issues are out of print. To commence with, let us consider Crystal Receivers, the first being the 150-mile Crystal Set.

Coil Construction

The coil construction and circuit of this receiver is somewhat different from the usual run of crystal sets, therefore the following details are essential if it is to be built to the designer's specification.

The theoretical circuit is shown in Fig. 1, from which it will be seen that three tappings are required, apart from the two end connections.

The coil consists, in all, of 213 turns of 28 S.W.G. enamelled wire, the first tapping being taken at the 5th turn from the aerial end of the coil. The second tapping is at the 20th turn, and the third at the 38th, this forming the end of the medium-wave winding.

The long-wave section is straightforward, as it is formed with 175 turns of the same wire; in fact, it is really a continuation of the medium-wave winding, there being no need to break the wire.

Each end is made fast to the former by small bolts, or by threading it through a couple of small holes; the method is of no importance as long as it is secure. Care must be taken to see that the tappings are also quite firm, and that there is no chance of them coming loose. Fig. 3 shows one of the best ways of bringing out these leads.

The switch S is a "double-pole double-throw," and is used to change over the aerial connection from the medium-wave tapping to the long-wave tapping, at the same time shorting out the L.W. section when medium waves are being received. Any reliable make of switch can be used, as it does not matter whether it is rotary, lever or push-pull, as long as good contacts are made.

doubtful if it can now be obtained, it can be constructed quite easily. It consists of a simple bank wound coil, consisting of 200 turns of 34 S.W.G. wound in a slotted former 1/4 in. wide, the diameter of the former (Fig. 2) being 1 in.

It should be noted that one end of A.B.C. is connected to a separate aerial terminal via a .0002 condenser, and if any interference is experienced from M.W. stations when receiving an L.W. station, the aerial should be connected to this terminal. For M.W. reception, the better of the other two aerial connections should be used, i.e., according to the aerial arrangements in use. A.2 will give the most selective results.

The 1934 Crystal Set

This receiver (blueprint number A.W. 444) was described in the issues of *Amateur Wireless* of August 4th and September 22nd, 1934.

The complete circuit is shown in Fig. 4 and the coil constructional details are as set out below.

The coil former is a length of six-ribbed ebonite tube, the dimensions being 2 1/4 in. long by 3 1/2 in. in diameter.

Tappings are taken at the points indicated in the diagram, and an anti-break through choke, the same as for the previous set, is included in the aerial lead, a switch being connected in parallel to cut it out of circuit when medium waves are being received. The wire required for the coil is 22 S.W.G., and not 26 S.W.G., as mentioned in the list of parts.

The potentiometer has a resistance of 400 ohms and is of the baseboard mounting type; the tuning condenser is an Ormond type R 423, of .0005 mfd. capacity, while the dry battery is a Siemens type G.T.

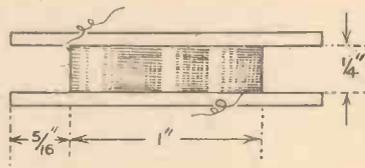


Fig. 2.—Former for the choke coil, A.B.C.

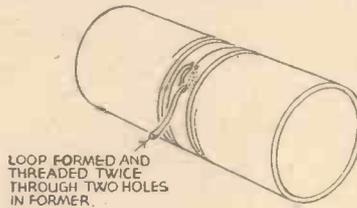
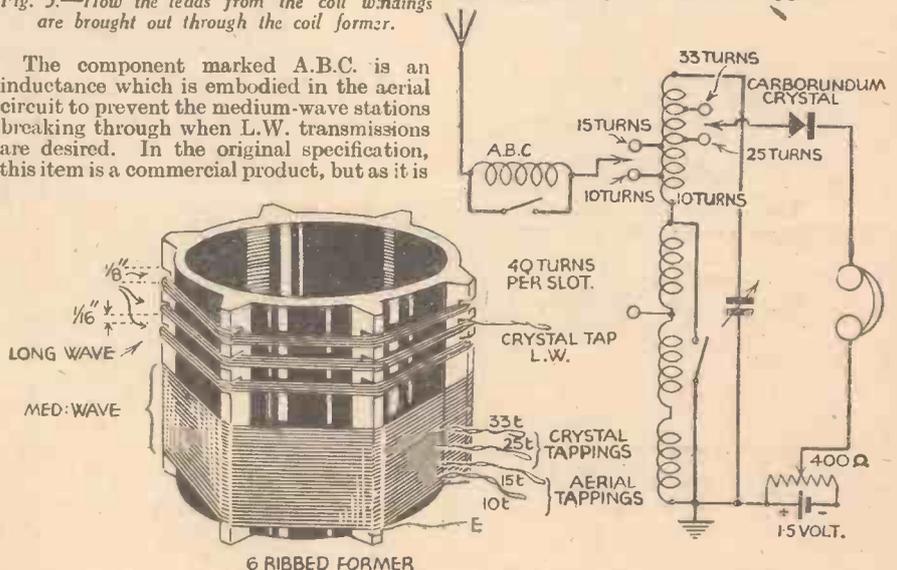


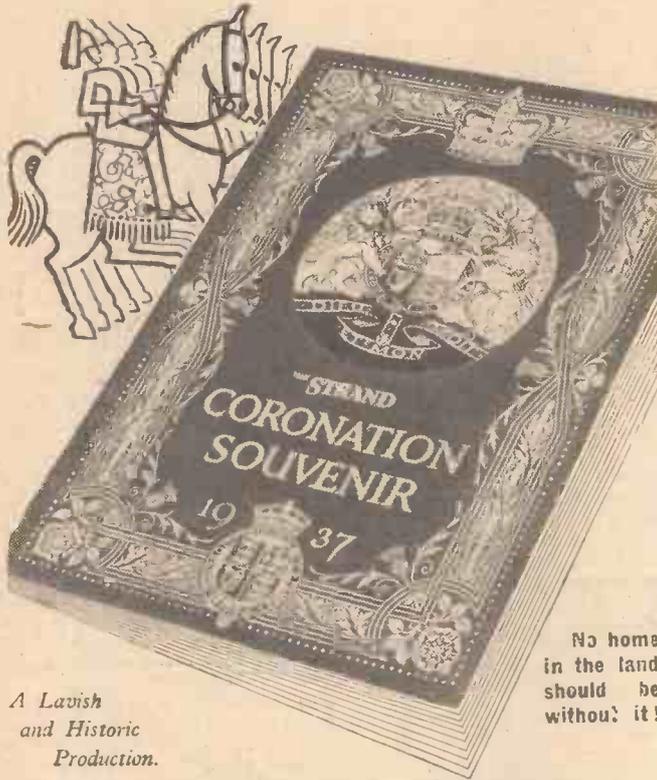
Fig. 3.—How the leads from the coil windings are brought out through the coil former.

The component marked A.B.C. is an inductance which is embodied in the aerial circuit to prevent the medium-wave stations breaking through when L.W. transmissions are desired. In the original specification, this item is a commercial product, but as it is



Figs. 4 and 5.—The finished coil, and theoretical circuit for the 1934 Crystal Set.

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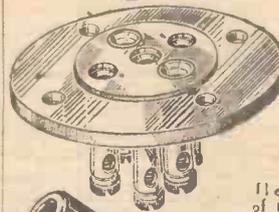
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A Single-valve All-waver

Constructional Details of a Simple Experimental Receiver are Given in this Article.

By J. R. S. THOM, B.Sc.

OWING to the ever-increasing popularity of all-wave receivers, the little set described below will perhaps be of interest to readers of PRACTICAL AND AMATEUR WIRELESS. It will be seen from the theoretical circuit, Fig. 1, that the set arrange-

putting 300 turns of 36-gauge enamelled wire into the two bottom slots (150 turns in each). A looped centre tapping should be taken

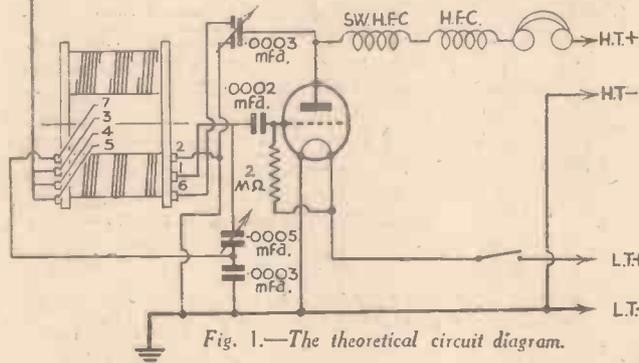


Fig. 1.—The theoretical circuit diagram.

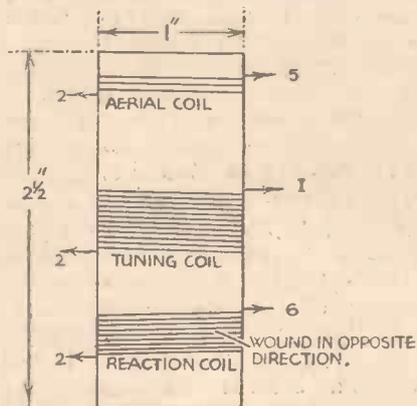
ment is quite conventional, except for the tuning unit, details of which are given so that this should present no difficulty.

The tuning unit consists of three coils wound on 1-in. diameter formers and covers long, medium and two short-wave ranges. Changing from one waveband to another is effected by rotating the unit through 90 deg.

Details of Medium and Long-wave Coil

To make the unit, commence by winding the medium and long-wave coil. The former used is 1-in. diameter and 2½-in. long, four separating spacers being fitted ¼-in. apart at the foot to take the long-wave and part of the reaction windings, as shown in Fig. 2.

The winding can be commenced by



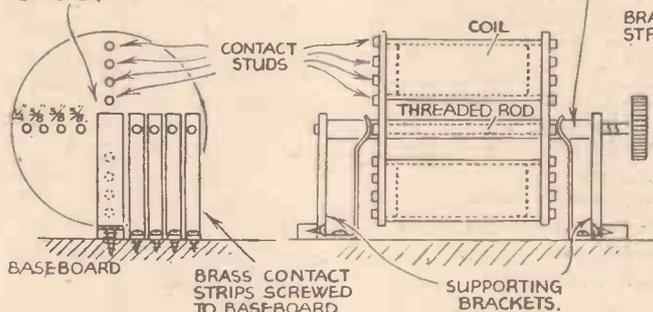
	TUNING	REACTION
COIL 1	7	6
COIL 2	12	9

AERIAL COIL — 3 TURNS.

Fig. 3.—Details of windings for the short-wave coils.

winding. Again 36-gauge enamelled wire is used, 90 turns being placed in the

SUPPORTING BRACKET.



Figs. 4 and 5.—End and side views of the complete coil assembly.

third slot, and the remaining 10 turns of the former next to the medium-wave winding.

The medium-wave winding consists of two single layer coils of 45 turns each. In this case 32-gauge enamelled wire is used, and the turns must go in the same direction as the long-wave winding.

The method of anchoring the wire is the same in each case, and consists of making two small holes in the former through which the wire is threaded from the outside through to the inside and back to the outside again.

When all the windings are complete the leads are connected to their appropriate studs by looping the ends of the leads and gripping them between two washers fitted under the terminal nuts.

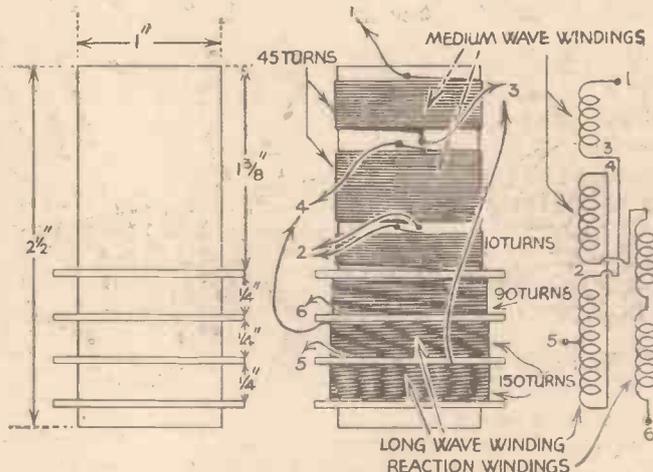


Fig. 2.—Details of coil former and windings for the medium- and long-wave coil.

after winding 150

The reaction turns can now be wound, and care must be taken to wind in the opposite direction to that followed by the long-wave

Short-wave Coils

The two short-wave coils should now be wound using in this case 20-gauge D.C.C. wire, although thicker wire may be used if desired. The actual number of turns will depend on the waveband to be covered, but as a guide the numbers in the table at the foot

of Fig. 3 might be tried out in the first instance.

The three coils having been made, the assembling of the unit can be proceeded with. First of all, cut two plywood discs, each 4ins. in diameter, and drill them for the studs, as shown in Fig. 4. Small

(Continued on page 740)

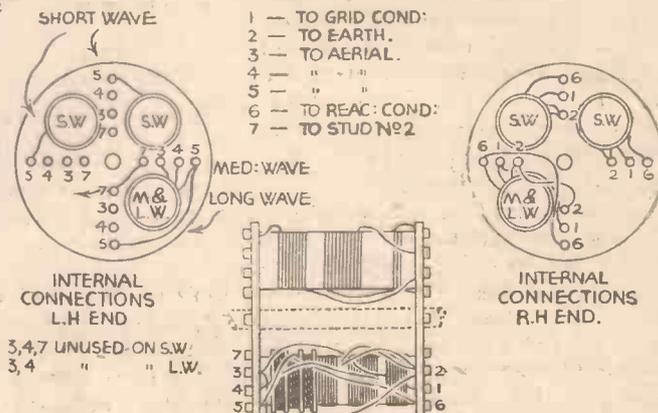


Fig. 6.—Showing the connections between the coils and contact studs.

On Your Wavelength

BY THERMION



A Cunning Move

CHIEFLY as a result of my repeated onslaughts on crooners and crooning I am glad to notice a national outcry against it. I understand that certain band leaders who always have their ears to the pavement of Fleet Street are heeding the warning, and now realise that song plugging can only be profitable for a time. We all know that they do not select their tunes according to the merit of the tune, but according to the digits on a cheque which the song publishers hand out to those band leaders who are partial to this form of bribery and corruption. These band leaders are now seeking to give the impression that they are dropping jazz and "hot" music by indulging in what they now call swing music—which is merely another name for it. So I warn the Als, Eds, Lews (most horrible sounding name of all), Bills, Jacks, and others who love to revel in the names associated with the gutter, that I am closely watching the situation, and they are not going to get away with that form of subterfuge. I shall not rest content until jazz or swing music is banished from this country. One of the few good things I can say about the Scottish race is that a group of Scottish schoolboys threatened to protest to the B.B.C. about it. The B.B.C. must be taught that it must not listen to the noisy minority of mental inepts who praise jazz. Because the costermonger likes fish and chips out of a newspaper, you do not expect to get it at the Savoy or the Ritz. The B.B.C. is supposed to be a dignified body. It has hundreds of staff who spend a great deal of time saluting one another, and indulging in other games of red tape. They must learn that intelligent people do not take the trouble to write and com-

plain, and that they are being misled by thinking that the only correspondence they receive is representative. It is only representative of the lower scale of listener, and I implore them to take heed of my remarks. Let them have jazz music for half an hour once a fortnight. I am quite certain that I am right on this point, for I have yet to meet someone who likes jazz music. It is true that I hear from a few readers who do, but I hear from hundreds who do not. The B.B.C. has no right at all to foist on the listening public something it does not want. It can easily check my statement by inviting listeners to fill in a coupon inserted in one of its publications. Here is a fair sample of the sort of letter I am receiving. : "Your correspondent of a fortnight ago will have (or, even, may have had) a threatening deputation of blacksmiths on his doorstep if he insults them by comparing them to a part of a jazz band. I went into a large store this morning to buy some solder; they put on a record called, I believe, 'Harlem'; I bought my solder elsewhere. The B.B.C. should very carefully screen their aerials when some dance bands are playing; a cheaper method would be to switch the microphone out altogether. My idea of some crooners is rather as if a microphone were put near a specially prepared jelly-fish electrically stimulated to vibrate at audio frequency in sympathy with some vile instrument (plus or minus about 10 cycles), but following it at a distance of $\frac{1}{2}$ to 1 second. Let them keep their jazz for the silk industry!"

Sunday Programmes

AND here another from an Overseas reader, H. W., of Risalpu, India : "I must write to congratulate you on your outburst on the Sunday programmes and the Victorian, sneaky way in which the 'ardent'

Christian sneaks from church to listen to radio that blabs dance piffle, then turns round and criticises others for listening to the wireless on Sundays. Down with old dodderers! Unseat the 'pious' hypocrites! Abolish the funeral dirges that represent the B.B.C.'s Sunday programmes. It fairly sickens me to listen to them. Of all the six transmissions of the Sunday Empire programmes I only listen to the 15-minute news bulletin. Then round the world on the short waves for a decent programme: Java! Holland! Germany! Japan! and Hong Kong! Anywhere but the B.B.C. Thanking you for an article which I read avidly as soon as it arrives. Long live Thermion and 'P. & A. W.'"

Television at H.P. Terms

SINCE the B.B.C. decided to transmit at least until the end of 1938 on the Marconi-E.M.I. system, manufacturers of television receivers immediately reduced the price of their sets, and some of them refunded to previous purchasers the difference in price. One or two companies have since offered their sets on hire purchase terms, which indicates that design has reached a stage where frequent changes will not be necessary. This proves the argument I raised some time ago that it was not practicable to design a television receiver which would work equally well on both systems. It should never have been started that way. Television has been the victim of a good deal of caprice on the part of the authorities and inventors, and I now hope that it will be left alone for a couple of years, so that radio entertainment can be perfected.

There can be no doubt at all that the public is sated with listening. It now demands vision as well as sound, and no further obstacles should be placed in the way of its attainment. At first manufacturers were afraid of television. They did all they could to oppose it, thinking that it would destroy the sales of wireless sets. You cannot stop progress any more than

Adjusting and Operating F.J. CAMM'S "VITESSE" All-Waver

Further Constructional Notes and the Method of Operating this Receiver

THE following notes have been prepared especially for the beginner and may be skipped by those who are familiar with receiver construction or who build a receiver from a theoretical circuit diagram. The blueprint is intended primarily for those who are not familiar with construction, and therefore there are a few points which might present difficulty to the beginner. Firstly, the battery lead which is marked H.T. +2, and which is shown extending from the hole numbered 5 across to the coil unit, passes, in the blueprint, close to the aerial socket, but must *not* come into contact with this socket. In a blueprint drawing, junction points are generally indicated by a large white dot, and although this lead is close to the socket it will be noted that there is no dot on it, and therefore it must not be joined to the aerial connecting lead. Lead No. 8 from the coil unit is joined to the end of this H.T. lead and the two are connected to condenser C6, not to C5. C10 and resistor R6 are connected together, and, as was explained last week, are anchored to a small ebonite block which is in turn bolted to the metal chassis. Take care not to allow the ends of these two components or their connecting leads to come into contact with the chassis.

Screening the Leads

The metal screening sleeving which is employed on some of the leads is ineffective unless it is joined to earth, and therefore it will be noted that short leads are connected to this sleeving at various points. Some constructors find it difficult to make this connection satisfactorily, but there is really nothing hard about it, provided a really hot soldering iron is employed. A length of tinned copper

wire should be wrapped round the sleeving for two or three turns, and a little Fluxite smeared over the point. Then, with a good blob of solder on

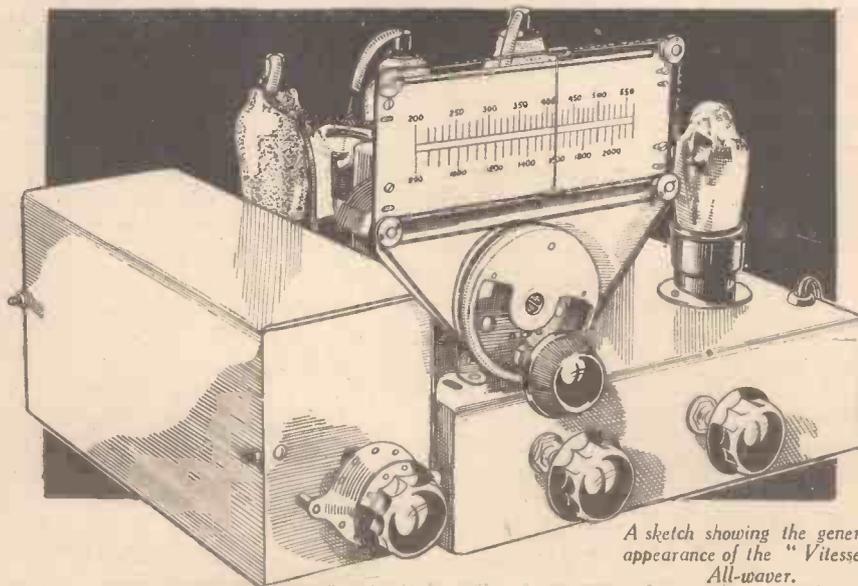
A BLUEPRINT FOR THIS RECEIVER — No. PW.75, MAY BE OBTAINED FROM THIS OFFICE — PRICE 1/-

the point of the iron, run round the turns of wire, and it will be found that the solder will run round it and firmly attach it to the sleeving which, of course, is already tinned for the purpose. If the iron is not hot enough the Fluxite will run down and make it difficult to get a sound joint while the insulation inside the sleeving will be burnt away. The screening of the lead from the centre tag of R8 is earthed by joining it to the thick wire seen in the centre

of the chassis connected to two earthing bolts (marked M.C.). Note also that the screened sleeving must be prevented from coming into contact with the bare ends of the wire which is carried inside the sleeving. If there is any doubt about this, wrap a few turns of thread round the end of it and over the internal wire.

The Gang Condenser

The three connections to the fixed sections of the gang condenser are shown in broken lines on the blueprint. This is to indicate that the leads in question pass underneath the condenser unit. They must be cut off short enough to enable them just to reach the connecting lug, and must not sag and touch the metal chassis. It is best to measure these and cut them off, attaching them to the condenser before bolting this down. The screened lead attached to the top cap of V1 is joined to the tag in the



A sketch showing the general appearance of the "Vitesse" All-waver.

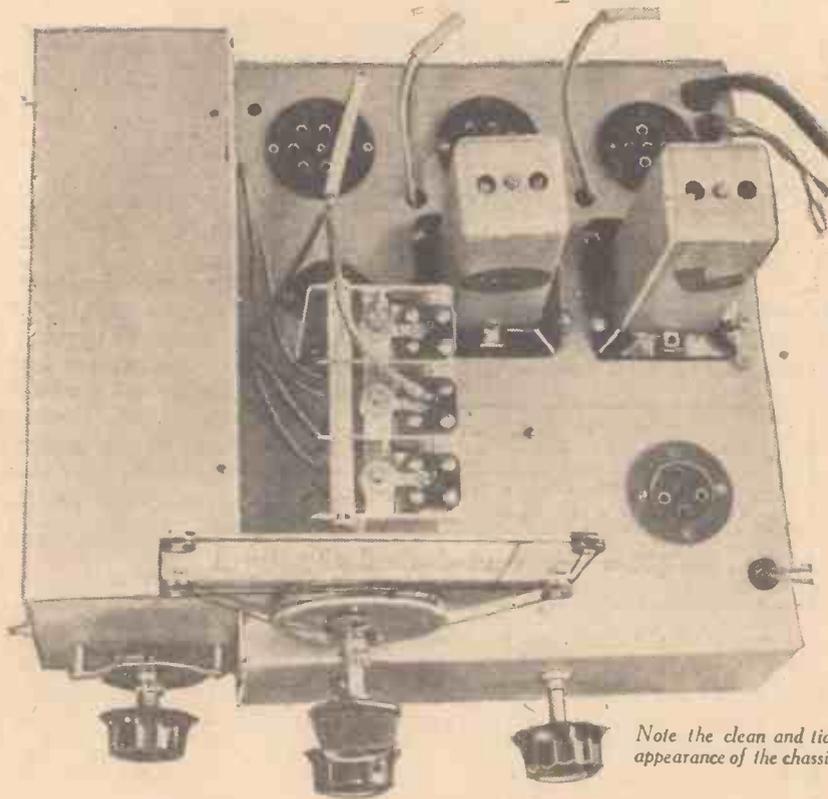
centre which is in contact with the centre section fixed vanes. Finally, make certain that the chassis is quite clean (scraping away the paint and any dirt which may be present) at the points where the ganged condenser and the earthing bolts are connected.

-- The Ideal Battery Set

into the maximum tapping. G.B.—1 should be inserted into the first socket on the battery (1.5 volts), but perhaps later when the H.T.

effects wave-changing and the knob is provided with four coloured spots to denote the appropriate ranges. The indication is given by the spot which is on top, and the colours and wave-ranges are as follow :—

Blue spot.—Long waves from 850 to 2,200 metres (approximately). Yellow spot.—Medium waves from 200 to 550 metres (approximately). Red



Note the clean and tidy appearance of the chassis.

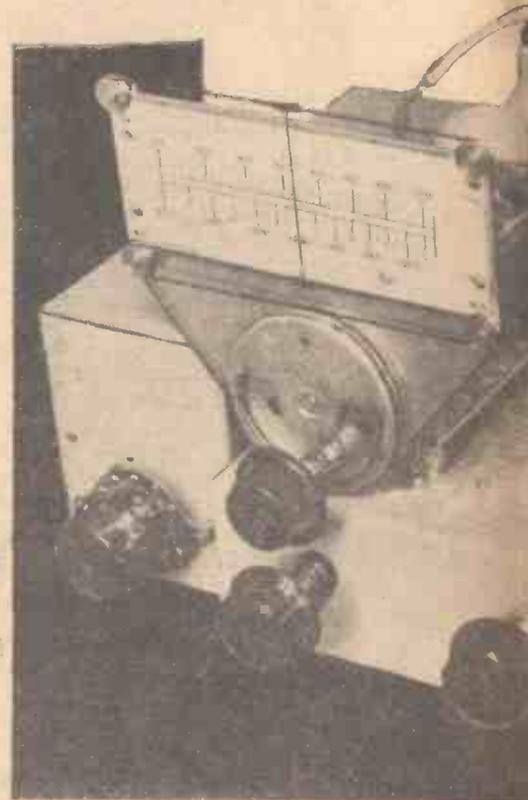
Adjusting the Receiver

Before making the preliminary adjustments, the three trimmers on the gang condenser should be unscrewed and the screws removed. Bend up the top plate of the trimmer at right angles and take out the mica insulating strip, as these trimmers are not required and must not be left in circuit due to the fact that they will affect the short-wave tuning range. The coil unit will be supplied ready trimmed and should not require any adjustment, but this point may be left until later. Similarly, the two I.F. transformers are sent out approximately correct, and only a very slight adjustment should be needed. Connect the battery leads in the following order. The H.T.—, L.T.— and G.B.+ leads should all be joined to the battery terminals or sockets bearing these markings. H.T.+1 should be inserted into the H.T. battery at some point between 48 and 72 volts (the best point being found later), H.T.+2 at a point between 60 and 84 volts, and H.T.+3

battery has become slightly run down it may be inserted into the G.B. positive socket together with the G.B. positive lead. G.B.—2 should be inserted at 4.5 or 6 volts. Attach the aerial and earth leads, and for a receiver of this type a medium size of aerial will be found best. Something about 40 or 50 feet in length and well insulated should prove satisfactory, and later on you can erect one of the special all-wave aerials if you so desire. Connect the two leads marked "To speaker" to the appropriate terminals on the back of the loudspeaker and you are ready to listen.

Trimming

The receiver is switched on (and off) by means of the combined volume control and on-off switch found in the centre of the lower three knobs on the receiver. The right-hand control affects the tone and enables this to be varied from "all top" to "no top," or in other words governs the high-note cut off. The left-hand knob



Here is the receiver ready for use.

LIST OF COMPONENTS

- Coil unit, Type AWS/B. B.T.S.
- Three-gang condenser, Bar Construction Type, .0005 mfd. Polar
- Slow-motion drive, type V.P. Horizontal. Polar
- Two I.F. transformers, type BP96. Varley
- Ten fixed condensers :—
 - Three .1 mfd. } (tubular) T.C.C.
 - Two .01 mfd. }
 - One .5 mfd. }
 - Four .0001 mfd., type M }
- Seven fixed resistors (½ watt type)
 - One 30,000 ohms } Bulgin
 - One 40,000 ohms }
 - One .1 meg. }
 - Two .25 meg. }
 - One .5 meg. }
 - One 1 meg. }
- Two variable potentiometers; 500,000 ohms (type VS.63); 50,000 ohms (type VC.60) Bulgin

et for the Constructor

spot.—Short waves from 18 to 53 metres (approximately). The green spot indicates that the receiver is switched for gramophone record reproduction. For preliminary tests, turn to the medium-wave band unless you are in close proximity to the long-wave B.B.C. station, when, of course, this station may be used as a test. Turn the volume control to maximum,

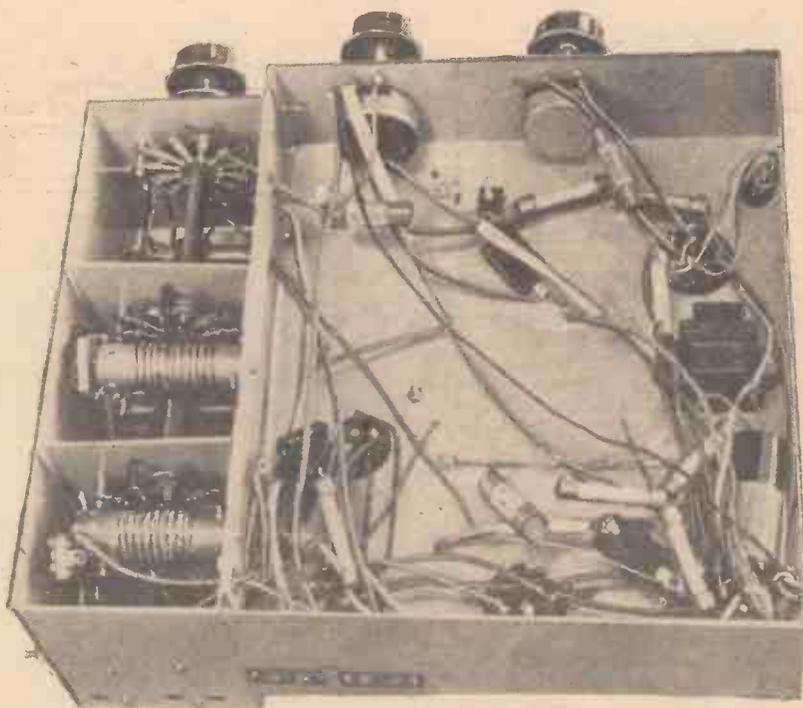
the switch operating after the first few degrees, and will be heard as well as felt in the finger tips. Turn the tuning control to a point on the dial

correct position if no adjustment is found necessary.

When correctly trimmed, no further adjustments should be required on the remaining wavebands, and it should then only be necessary to turn the wave-change switch to the desired range in order to cover the various



or incorporation in the cabinet,



Each coil section is individually screened to ensure maximum performance on all wavebands.

corresponding to the local station, and some signal should be heard, although at first it will not be at full volume. Now very carefully turn the trimming screws on top of the I.F. transformers, but note beforehand the position occupied by the screws and do not turn them two or three times in each direction. They should only need a partial turn, and if no improvement is effected, they should be set back to the position they first occupied. Hence the need for noting the position before carrying out the adjustment. All four trimmers will have to be adjusted, and as soon as any improvement in volume is effected, the volume control should be turned back so as to keep the signal at its weakest. By doing this you will more easily be able to discern the changes made by the trimmers and will thus be able to find the correct positions. When no further adjustment can be made, carefully adjust the three trimmers on the rear of the coil unit for maximum response, but again note the positions before you start to make any alteration so that you can return to the

bands for which the receiver is designed.

What You Can Hear

It is not advisable to give a list of the stations which can be heard, as conditions vary in different parts of the country and atmospheric conditions vary from night to night. It may be quite a simple matter to obtain American stations at full loud-speaker volume some nights, and yet at others they may be inaudible. You will remember how the B.B.C. have had to cancel their proposed relays on some nights due to conditions being unsuitable. However, under normal circumstances the G.E.C. station at Schenectady, W2XAD, on 19.56 metres, should be heard with the pointer about 1/4 in. along the dial. W8XK also generally makes a good signal slightly above this point, and as marker the German station at Zeesen may be found here. In some parts of the country the Empire transmitter at Daventry will also be heard about this point, and some care is necessary in separating the stations,

(Continued on page 740)

COMPONENTS

- One L.F. transformer, type LF12..... Bulgin
- Five chassis type valveholders: two 7-pin, two 5-pin, one 4-pin..... Clix
- Two socket strips, A.E. and P.U..... Belling-Lee
- Six-way battery cord 30in..... Belling-Lee
- One steel "Vitesse" chassis, ready drilled
- Three Midget plugs: GB+, GB-1, GB-2
Peto-Scott
Belling-Lee
- Five valves { 210PG; 210 Det; 210 VPT;
220HPT..... Cossor
HD22..... Osram
- Flex, connecting wire, 3ft. screened lead
Peto-Scott

ACCESSORIES

- One speaker, Stentorian Junior.
- One 120-volt HT battery.
- One 9-volt G.B. battery.
- One 2-volt accumulator.



By JACE

3,000 Square Miles of Television

AT the inauguration of the first official television service three months ago, Lord Selsdon said he would be unwilling to lay heavy odds against a Hindhead resident, 42 miles from London, viewing the Coronation. As he gave the initial range at about 20 miles, it may be of interest to consider the prospect of such a prophecy being realised.

A ring of television installations now encircles Alexandra Palace at distances varying upwards of 25 miles. Within this range consistently good reception has been fairly well established, but farther afield—governed largely by geographical conditions and, of course, transmission power—exceptionally good results are being obtained.

As a result, the G.E.C., for example, have already installed standard home sets in ten counties within an area embracing about a quarter of the population of the United Kingdom and covering more than 3,000 square miles. At each point reception is well up to standard.

Outside the 25-mile radius these installations include not only such places as Luton, Camberley, Dorking, and Woking, but towns nearly 40 miles away, such as Reading (Berks), East Grinstead (Sussex), Tunbridge Wells (Kent), and the environs of Southend-on-Sea (Essex). In these fringe towns alone the population is more than 300,000.

Noisy Volume Controls

AFTER considerable usage the volume control potentiometer fitted to most receivers becomes very noisy. The most satisfactory cure is replacement, but this is sometimes difficult, owing either to inaccessibility or to a new one being unobtainable. A very satisfactory way of minimising the noise is to connect as big a condenser as possible between the moving arm terminal, and the terminal at the "loud end" of the winding.

A Group-listening Organisation

ACCORDING to a recent announcement, in order to make continued provision for the organisation of Discussion Groups, in connection with B.B.C. talks, it has been decided to create a Group-listening organisation to undertake and develop the work hitherto carried on by the Corporation's Adult Education Advisory bodies. This new autonomous organisation will be based on the existing Area Councils for Group Listening, which will be linked by a Central Co-ordinating Committee. Principal J. H. Nicholson, who has played a prominent part in the development of the Wireless Discussion Group movement, and has been Chairman of the Adult Education Advisory Committee since its inception, has accepted the Corporation's invitation to be Chairman of the new Central Committee.

To this Group-listening organisation the

Corporation will make, until June, 1940, an annual grant of money, based on the Corporation's annual expenditure on this listening end work since it began in 1929. As June, 1940, approaches, the Corporation will be prepared to review the situation.

The Central Council for School Broadcasting has agreed that its secretary, Mr. A. C. Cameron, shall act also as Secretary and Chief Executive Officer of the Group-listening organisation. A full-time assistant for this work will be provided for Mr. Cameron. The first meeting of the Central Committee was held on February 19th.

ment" for very young children has nearly doubled its number of followers, and already, though it has been broadcast only for one term, there are over 1,600 schools listening to her "Music and Movement" for children aged from seven to nine years.

Other courses which started experimentally last term have secured a wide following. Over 2,000 schools are listening to Junior English, a course in which younger children have been encouraged, among other things, to mime and read poetry. "History in the Making," consisting of topical events dealt with in relation to their historical parallels, has been found to meet a need. Friday afternoon Feature Programmes, which have included radio trips for youngsters down coal mines and on herring trawlers, have met with enthusiastic response from children and teachers alike.

EVENING INTERLUDE



This charming listener enjoys her favourite melody, with the aid of her Corsor 5-valve A.C. superhet.

Included in the schedule for the spring term programmes, which opened during the week beginning January 18th, are play and poetry broadcasts, a further series of talks on understanding the home, Concert Lessons on the art of Schubert, and more special Feature Programmes, two of which are to deal with the Docks and with the Cotton Industry.

The Roving Reporter

THIS monthly broadcast, prepared by a team of Birmingham journalists, will be produced by Martyn Webster on March 12th. About half a dozen Midland people with unusual stories to tell will be interviewed by the Roving Reporter.

Philco—Authorised Components

AS a protective measure for all Philco wireless set owners, a decision was announced recently by Philco officials that all of their dealers must use nothing but authorised and approved Philco valves and parts in all sets sold and serviced. For several years Philco Research Laboratories have worked to perfect a valve which will give accurate reception and have a long life. The same laboratories have perfected shields, suppressors and condensers of the highest quality, and adapted to the special circuits found in the sets Philco manufactures. As a result of the specialised experimentation, Philco has produced a balanced set which is known to operate best with Philco approved valves and components. For this reason, Philco dealers are trained to use nothing but these units to ensure the set owner the most satisfactory results, and the longest life to each part.

Broadcasts the Schools Enjoy

THAT the B.B.C.'s Travel Talks for Schools are still very popular among Britain's radio-minded children is evident from figures for the Autumn Term, recently published.

3,120 schools listen regularly to these Travel Talks—exactly 1,000 more than at this time a year ago.

As regards other school broadcast courses, the choice of the schools has remained remarkably uniform, and past favourites, in nearly every case, retain their order of popularity. Nature Study, Regional Geography, British History and World History follow Travel Talks as popular favourites. Numbers of schools listening to these courses range from 2,572 in the case of Nature Study, to 2,255 in that of World History.

Miss Ann Driver's "Music and Move-

BRIEF RADIO BIOGRAPHIES.—1

By RUTH MASCHWITZ

Robb Wilton

Robb Wilton—Mr. Muddlecombe, J.P., in the Not-so-Common-Please series—showed evidence of his histrionic leanings at an early age when he gave performances with a puppet theatre in the back garden for the benefit of his playmates. Unfortunately the shows were usually interrupted by the neighbours who wanted to hang out their washing!

His parents apprenticed him to an engineer, but all his thoughts were on the stage, and in his spare time he organised a trio called the Mascots, which gave shows of the concert party type. When lucky they were paid for their services. However, it came to an untimely end after an engagement by a football club to give two entertainments. After the interval of the first show, the audience trooped out—it couldn't stand Robb's coon songs!

A short while after, Robb was offered a trial at a theatre in Liverpool. All went well till the middle of his song—a comedy number—when Robb's mind suddenly became a blank and he bolted into the wings. That put a stop to his career as a comedian for fourteen years! For a while he played in melodrama in "fit-ups" through England, Scotland, and Wales, and for three and a half years he was a member of a stock company. At the end of that time he began to play comedy parts and write his own material. The result was a three-year contract in variety at £7. Since then he has toured Australia, Canada, and America with his own acts, broadcast since the Savoy Hill days, and has appeared in numerous films.

Richard Goolden

Richard Goolden—of Mr. Penny fame—made his radio début as an amateur on Boat Race night at Oxford. Inebriated students, of which he was one, were supposed to burst into the studio and interrupt the programme. An old lady who was listening in, wrote a horrified protest of such unseemly behaviour. "Obviously," she said, "the undergraduates could be no gentlemen."

Richard was offered his first stage engagement at the age of 28, without any previous professional experience. A member of the O.U.D.S., Bernard Fagan was so impressed by his ability that when he started the Oxford Players, Richard was the first member of the company to be enrolled. He played every type of part, usually those of elderly men, so it was a complete change when he appeared in London, as a boy of eight, in "Riverside Nights."

He has acted in a diversity of shows, some of the more recent being, "The Country Wife," "Bees on the Boat Deck," and "The Dominant Sex."

Richard describes himself as a person to whom nothing ever happens. He went on to tell me that he had once been chased by a lion, and on another occasion had been present at a daring robbery in a café. The bandit had stood by him at the counter, only Richard happened to be reading a book at the time, and never even noticed that anything untoward was afoot!

His great hobby is travelling through Europe third class! Being a small man he tells me he finds it very comfortable sleeping in the luggage rack.

PETO-SCOTT

EVERYTHING RADIO—CASH C.O.D. or EASY TERMS

VITESSE ALL-WAVER KIT "A" CASH or C.O.D. £6:6:0 YOURS FOR 10/-

10/- deposit and 11 monthly payments of 11/6. Comprising complete Kit of Parts exactly as specified by Mr. F. J. Camm, including ready-drilled chassis but less valves, cabinet and speaker. Cash or C.O.D. Carriage Paid, £6. 6. 0 or Deposit 10/- and 11 monthly payments of 11/6.

KIT "B" as for Kit "A," but including set of 5 specified valves, less cabinet and speaker. Cash or C.O.D. Carriage Paid £8/15/9, or Deposit 15/- and 11 monthly payments of 16/3.

KIT "C" as for Kit "A," but with 5 specified valves and Peto-Scott De Luxe Cabinet as illustrated below, less speaker. Cash or C.O.D. Carriage Paid, £10/13/3, or Deposit 19/6 and 11 monthly payments of 19/6.

B.T.S. COIL UNIT B.T.S. Type AWS/B All Wave 4-Band Coil Unit as exclusively specified by Mr. F. J. Camm for his Vitesse receiver, complete with detachable Metal cover and ready trimmed. Cash or C.O.D. Carriage Paid £2/2/0, or Deposit 4/6 and 11 monthly payments of 3/9. **4/6 DOWN**

FINISHED RECEIVERS

PETO-SCOTT 5-VALVE ALL-WAVE (Battery Model)

The illustration on left shows the Peto-Scott All-Wave 4-Band 5-Valve Superhet receiver, built, trimmed and tested on all wavebands by Peto-Scott engineers. Instrument comprises B.T.S. Type AWS/B Tuner Unit and Intermediate and incorporates Q.P.P. output for quality reproduction and economy of H.T. consumption. British valves of guaranteed life are employed throughout, and it is supplied complete with Peto-Scott Super Q.P.P. Moving Coil speaker, less batteries. Cash or C.O.D. Carriage Paid £10/10/- or Deposit, 20/- and 13 monthly payments of 12/3.

PETO-SCOTT 5-VALVE ALL-WAVE (A.C. Model)

A.C. Mains Version—similar to above, but for A.C. Mains only, 200-250 volts, 40-100 cycles. Cash or C.O.D. Carriage Paid £12/12/- or Deposit, 20/- and 18 monthly payments of 15/-.



NEW 6-valve 8-stage ALL-WAVE CHASSIS

Overall Dimensions: 9" high; 14 1/2" wide; 11" deep.

4 WAVE BANDS 2.9-2,000 metres.



12 MONTHS GUARANTEE

WITH 6 BRITISH VALVES

● 4 Wavebands: 12.9-35, 35-81, 200-550, 900-2,000 metres ● Inter-station noise suppressor ● Bandpass input ● A.V.C. ● Independent Volume and Tone Controls ● Station and wavelength calibrated dial.

BRIEF SPECIFICATION: The last word in 6-valve all-wave circuits. High quality output ensures excellent reproduction. Highest grade British components. Circuit: Bandpass Input to Hexode-Triode, Frequency Changer valve as Detector Oscillator, Bandpass Intermediate Frequency Transformer coupled to Variable-Mu H.F. Pentode as I.F. amplifier. Double-Diode as second detector coupled to triode I.F. Amplifier, resistance-coupled to a power triode output valve giving 3½ watts output. Full vision dial and slow motion drive are fitted. Supplied complete with 6 British valves. For A.C. Mains only, 200-250 volts, 40/80 cycles. Cash or C.O.D. Carr. Paid £8/17/6, or 27/6 down and 11 monthly payments of 15/-.

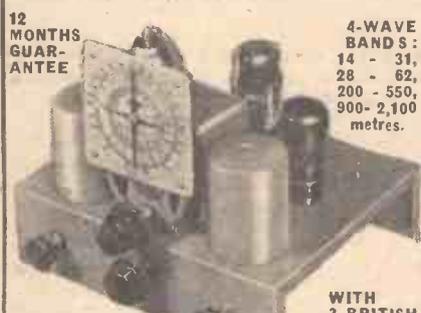
27/6 DOWN

● Order with confidence. Peto-Scott's 18 years' trading guarantees your satisfaction. ●

NEW 3-valve S.G. Det. Pen. ALL-WAVE BATTERY CHASSIS

12 MONTHS GUARANTEE

4-WAVE BANDS: 14 - 31, 28 - 62, 200 - 550, 900 - 2,100 metres.



WITH 3 BRITISH VALVES

Overall Dimensions: 9" high; 11 1/2" wide; 9" deep.

● Double ratio slow-motion drive, 8-1 and 100-1 reduction ● New rotary type low-capacity switch, with silver-plated contacts ● Air-plane colour-coded dial (stations and wavelengths).

BRIEF SPECIFICATION: For reception of a high order all day and every day, from all parts of the world. 3 British valves: Variable-Mu H.F. Pentode, High Efficiency Detector, and Harrier's High Efficiency distortionless output pentode. Variable selectivity by alternative aerial tappings. Stove enamelled pressed-steel chassis. Screened air-cored broadcast coils. Dual electrostatically screened short-wave coils. H.T. consumption approx. 12 m/A. Each chassis supplied complete with Screened Grid, Detector and Pentode output valves. Fully tested on all wavebands before dispatch. Cash or C.O.D. Carr. Pd. £3/19/6, or 5/- down and 11 monthly payments of 7/6.

5/- DOWN

HERE'S VALUE! H.T. for only 1d. A WEEK!

Peto-Scott Moving-Coil SPEAKERS!

List Value 32/6 Our Price 21/- Latest 1937 model permanent-magnet M.C. Speaker. High fidelity reproduction. Suitable for all outputs. 8" diameter cone. List Value 32/6. Our price, 21/-, Cash or C.O.D. Carr. Pd., or 2/8 down and 8 monthly payments, 2/8.

2/6 DOWN

Peto-Scott ELIMINATORS

UNRIVALLED VALUE! MODEL A.C.12. A.C. mains 200/250 volts, 50/100 cycles. Output: 120 volts at 12 m.a. 4 tappings. Cash or C.O.D. Carriage Paid, 30/-, or 2/8 down and 10 monthly payments, 3/- M.A. 10/30 ELIMINATOR WITH TRICKLE CHARGER. Westinghouse metal rectifier. Cash or C.O.D. Carriage Paid, £2/19/6. 5/- down and 11 monthly payments 5/6. Send for complete lists.



B.T.S. ANTI-NOISE AERIAL

Cuts Out Noise and Increases Efficiency on Every Waveband. Improves Every All-Wave Set.

90% of the trouble experienced in all-wave reception is STATIC NOISE which the B.T.S. Anti-Noise Aerial efficiently suppresses, improving reception on ALL wavebands. Outfit includes special set transformer, fitted with switch for reception on ALL WAVEBANDS. This EXTRA component improves both sensitivity and selectivity. Suitable for all sets, A.C. Battery and D.C. and ALL WAVEBANDS. Complete Outfit, ready for instant erection, 25/- Cash or C.O.D., or 2/8 down and 8 monthly payments of 3/3.



2/6 DOWN

All postal orders should be crossed and made payable to Peto-Scott Co. Ltd. All currency must be registered. **PETO-SCOTT Co. Ltd. 77 (Pr. W. 24), City Rd. London, E.C.1** Cltssold 9875-6-7. West End: 62 (Pr. W. 24), High Holborn, W.C. 1. Holborn 3248.

Practical Television

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The Middle Regions

AT the Royal Society the other day Mr. Watson Watt, superintendent of the Bawdsey research station of the Air Ministry, announced the discovery of three new electrified regions in the atmosphere; this being the result of observations spread over a year by the National Physical Laboratory. Even the non-technical layman has come to realise the significance of the more familiar Heaviside and Appleton layers, and appreciate how their presence some fifty to one hundred miles away has enabled radio signals to be reflected back to earth and so permit these signals to travel round the earth. These new electrified belts, however, are between five and forty miles above the earth's surface, and while they do not interfere with the longer waves used for sound broadcasting or commercial services, they are found to be capable of reflecting the ultra short-waves used for the television service. The indisputable proof of their presence has cleared up two mysteries associated with the B.B.C. television transmissions. One is the greatly increased distances over which the signals have travelled, at least double the estimated service range being now quite common, and the other the ghost or double images seen on the receiver screen. Up to the present it was very strongly suspected that the ghost images were brought about by faults in the transmitting equipment. Similar effects can be seen when reflections are present in the lines connecting the scanner with the modulating apparatus due to incorrect impedance termination of the lines, while if there is over correction in the amplifiers in order to compensate for any loss or attenuation in the top frequencies of the video signal, a double image will be caused. The careful experiments undertaken by Mr. Watson Watt and his colleagues, however, have exonerated the television transmitter.

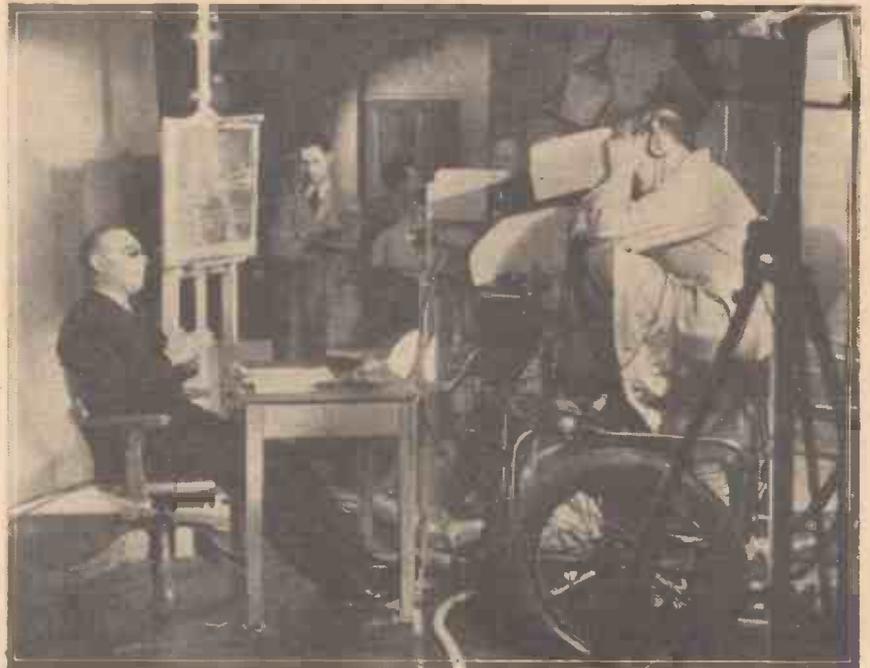
Use of "Echoes"

At the Royal Society meeting photographs were shown of radio impulses which had been projected vertically, with their "echoes," which indicated the distance they had travelled and therefore gave figures for calculating the height of the new layers. American research workers have discovered these layers also, but since the work of the British scientists was first, these new regions are undoubtedly British, and for want of a better name they are known at present as the Middle Regions, but no doubt they will be given a name before long which will associate them with their discoverers. Unfortunately, although the mysteries have been cleared up and the problems clarified, the solution has still to be found, but it is certain that science will find a remedy for the double pictures in the near future. The increased range of ultra short-wave transmitters, however, is a very vital factor, and will bring about a complete revision of the tentative plans drawn up for a chain of television stations to cover the whole area of the country.

A Good Customer

THE B.B.C. is still the biggest customer of television manufacturers, for apart from the transmitting equipment now being brought to its final condition prior to being taken over completely by the Corporation engineers, there is the important aspect of reception. Officials and engineers have had receiving sets installed in their homes and offices in order to compile necessary data concerning quality of reception, nature and effects of interference, percentage of breakdowns and last, but by no means least, make observations on the programme material incorporated in the radiated pictures. Now it is stated that a special studio is to be built at Broadcasting House as soon as the necessary extensions and measure of rebuilding

The German broadcasting company is, on the other hand, concerned with the programme side, and the position resembles the situation which came about in the early days of radio broadcasting. Until the Post Office finds it expedient to hand over to the broadcasting company complete service control of programmes and apparatus, the public will not be able to take full advantage of any signal facilities. Apart from their more spectacular efforts at outside television broadcasting, the Germans are definitely behind this country. The intermediate-film apparatus has given the best results for exterior work, their electron cameras being far less sensitive than those used by the B.B.C. For studio work they prefer spotlight scanning with multiplier type photo-electric cells for producing the actual picture signal. Although many demonstrations by line have been given with a definition of 375 lines, all the radio pictures are still confined to a dissection of 180 lines, which compares very unfavourably with work done elsewhere. Public televiewing facilities have now been reduced to less than half of those in use for the Olympic Games, owing to upkeep costs. Promises of improved and extended studio facilities have been made to the programme.



Mr. Hore-Belisha, the Minister of Transport, recently gave a talk in the television broadcast from Alexandra Palace, London. He discussed "Britain's National Roads," and is the first British Cabinet Minister to be televised. In the illustration, Mr. Hore-Belisha is seen seated in front of the television cameras.

are undertaken. This is to enable important public officials and star artists to be televised in the heart of London without the necessity of making the journey to Alexandra Palace. This will be a distinct advantage, and will add still more to the scope of the programme material.

In Germany

THE reports concerning television development in Germany are rather spasmodic in character. This may be the outcome of the division of work and responsibilities which operate in that country. The Post Office, with its wide experience and splendid laboratory facilities in Berlin, is solely responsible for all the technical equipment and improvements.

authorities, however, but their full use is dependent on the rapidity with which the technical authorities make progress with their electron cameras. It is felt that this work is being applied more particularly to military and air needs.

Railway Demonstration

SATURDAY, March 6th, will be "railway day" in television, for the camera is to be taken to Alexandra Palace station in the afternoon to show viewers the latest rolling stock used on the L.N.E.R. Viewers will be taken through the newest in sleeping cars and Post Office mail vans and will also witness a demonstration of railway signalling. Leslie Mitchell, who is conducting this outside broadcast, will give a commentary.

SHORT-WAVE SECTION.

(Continued from previous page)

national prefixes; it is reprinted and brought up to date at regular intervals.

Amateurs can be received on any short-wave receiver tuning to 20 and 40 metres, but it is often thought worth while to make a special set for the purpose, so that it can be used at the same time as the "family" set is in use for the reception of normal broadcast programmes. Besides, by making a separate set, maximum efficiency can be secured over the two particular bands.

Two-valve Circuit

A circuit for a suitable type of set is given in Fig. 1. This uses two valves as detector and L.F. amplifier, both valves being pentodes. The first is an H.F. pentode and the second a high-efficiency L.F. pentode. It will be seen that the arrangement is similar to that used in any other short-waver, although a two-range coil is shown, and this is tuned by a .0001-mfd. variable condenser. This condenser does not cover a very wide range of frequencies, but it simplifies tuning over the two bands in question, and maximum efficiency is ensured by using a coil

which requires only a small additional capacity for tuning purposes.

Two standard six-pin coils could be used instead if desired, the smaller one having eight grid turns, and the larger about 18 turns. On the other hand, it is more convenient to make one 18-turn coil, taking a tapping after the eighth turn. A Q.M.B. switch can then be connected between the tapping and the lower end, as shown. A method of winding the coil is shown in Fig. 2, where it can be seen that the separate aerial winding or primary is wound alongside the first few turns of the grid coil. This primary might consist of six turns of 30-gauge wire, the grid coil being wound with 22-gauge wire or Litz. A reaction winding, consisting of ten turns of 30-gauge, is placed about $\frac{1}{2}$ in. below the grid winding. All three windings are in the same direction, and the connections to the pins are shown in Fig. 3, these connections corresponding with those indicated in Fig. 1.

After winding the coil it is worth while experimenting with the best number of turns in order to bring the 20-metre and 40-metre bands in the centre of the tuning scale. If preferred, a single eight-turn coil could be used in conjunction with two tuning condensers working on the band-

spread system. That means that a .00015-mfd. condenser is connected in parallel with a smaller condenser having a maximum capacity of about 20 m.mfd. The required band is selected by means of the large condenser, the smaller one being used for actual tuning over that band. Incidentally, Eddystone make a band-spread outfit consisting of a "tank" condenser which can be set to one of ten positions, and a small tuning condenser which is fitted with a slow-motion drive, which is used for fine tuning.

Regardless of which system of tuning is employed, the tuning condenser should be fitted with a good slow-motion drive. A slow-motion reaction condenser is also preferable, and there are condensers on the market specially designed for use in this position of the circuit.

In Fig. 1 connections are given for a "doublet" aerial, but if a plain aerial-earth system is employed, the aerial should be joined to terminal 3, and terminals 4 and 6 should be joined together and to earth. The "doublet" is generally preferable when it can conveniently be erected. The remainder of the circuit does not call for explanation, for it is a simple modification of the standard Det.-L.F. arrangement.

Three New Stations to Log

○N the upper section of the short-wave band two Venezuelans have made their appearance; they are YVIRG, Maracaibo, 46.95 m. (6.39 mc/s), calling itself *Emisora Philco*, and of which the distinguishing signal is composed of six chimes, and YVIRV, Valera, on 47.17 m. (6.36 mc/s), which styles itself *Ondas del Tacarigua*. Address reception reports for YVIRG to Apartado Postal, 261, Maracaibo, Venezuela. At Quito, Ecuador, HC1PM, *La Voz del Palomar* has been heard on 42.4 m. (7.074 mc/s), at G.M.T. 01.00.

The Saigon Transmissions

A new station at Saigon (French Indo-China), which had been experimenting on 25.2 m. (11.905 mc/s), has now temporarily adopted 25.58 m. (11.73 mc/s), and tests daily on this channel between G.M.T. 10.30-14.30. The broadcasts conclude with a gramophone recording of the "Marche Lorraine," so much favoured by French studios. Tune in immediately below Radio-Colonial (Paris), TPA4, 25.6 m. (11.72 mc/s).

Czechoslovak Broadcasts

OLR, Podebrady continues to relay Prague programmes daily on various channels. Those most regularly used are 25.34 m. (11.84 mc/s) and 49.75 m. (6.03 mc/s), but 49.92 m. (6.01 mc/s), 49.84 and 49.87 m. (unofficial channels) are also being tested as to their possibilities. The call is put out both by a man and woman announcer, and occasionally during the broadcast, as well as at the close-down, five languages are heard, namely, Czech, Italian, German, English and French. Before the station signs off, the next times of transmission, as well as the wavelengths adopted, are very clearly stated.

A Distant Call from China

Sharing the same channel as ZBW3, Hong Kong, and FZR, Saigon—fortunately not working to a regular schedule—CQN, Macao (Portuguese China), broadcasts every Monday and Friday between G.M.T. 10.00-13.30 a weird programme, mainly composed of native music. Announcements are made in Portuguese, English, French and Chinese. Macao is situated at a spot about eighty

Leaves from a Short-wave Log

miles from Canton and forty miles from Hong Kong, and the station is run by the local administrator of Posts and Telegraphs,

South American theme song: the *I.B.C. March*. You will hear the call: *Radio-difusora YV2RC (Broadcasting Caracas) from the City of Perpetual Spring*. Transmissions are made daily from G.M.T. 22.00-02.00 or 03.00, and every Saturday night the programme features an orchestral concert with Venezuelan artists of repute. The time for the start of this part of the broadcast is G.M.T. 02.45. An English news bulletin is given out nightly at G.M.T. 23.00. Address, for reports of reception: Almacén



The first batch of new H.M.V. television receivers being checked before dispatch to dealers from "His Master's Voice" factories at Hayes, Middlesex, recently. These receivers are now priced at 60 guineas.

Senhor Joaquim P. Estrella de Oliveira, to whom all reception reports should be sent.

A Popular Venezuelan Station

YV2RC, Caracas, on 51.72 m. (5.8 mc/s), is without doubt the most popular and best-heard of the Venezuelan short-wavers. Rated at 1 kilowatt its signals are now picked up in most parts of the world. The interval signal consists of four bells, but the studio opens and closes with a well-known

Americano, Estaciones YVIRG y YV2RC, Apartado Postal, 2009, Caracas, Venezuela.

Johannesburg Moves Up

ZTJ, no longer in its experimental stage but now carrying out a regular schedule seems to have moved up to 49.25 m. (6.091 mc/s). Four broadcasts are made daily, viz., from G.M.T. 04.45-07.30, 08.15-12.00, 14.00-16.30, and from 19.00-20.00,

BRITISH LONG DISTANCE LISTENERS' CLUB

The Language of the Amateur

THE details which we published in our issue dated February 20th under the above heading have elicited the following remarks from Mr. Austin Forsyth (G6FO). Whilst we do not agree entirely with everything he says, we think his remarks are interesting, coming as they do from one who is actively engaged in the field of transmission. As will be seen, there is quite a mixture of references to be given in the case of the reception of a signal, and although the RST code referred to will greatly simplify matters, there still remains the individual interpretation of signal strength, degree of interference, etc. The essential parts of Mr. Forsyth's letter are as follows:—

"The QSA code (often abbreviated to 'W') is never used instead of the R code and actually has nothing to do with it. These two codes are used together to indicate two different features of the received signal; the R code gives the strength, and the QSA code its readability. For instance, it is easy to imagine conditions under which a weak signal is easily readable—due to absence of interference, etc.—while conversely a much stronger signal might be blotted out by a still more powerful one, when its readability would be low.

"In practice, something of this sort is always happening, so that it is essential to use the R and QSA codes together to give a true picture of what the signal sounds like at the receiving end. It may be reported QSA4 or W4, R7, or again W5, R4. Such a report gives the sending operator a definite idea of his signal at the receiver. The QSA or W code covers all readability features of the signal, including bad operating, though it is not invoked in this latter cause often enough!

"A further impression conveyed in the article in question is that the R code is more important for telephony working than for CW (Morse) signals. This again is not the case, as the strength of the signal is of equal interest to the sending operator whether he is on CW or 'phone.

"Therefore, the R strength is always given for both types of transmission.

"With regard to the T code, employed for indicating the quality of a CW signal, there is no question about it being 'often used.' It is always used, and is an essential part of the report in telegraphy working, as it tells the sending operator one of the things he wants to know!

"From the above, it follows that in both CW and 'phone working, the QSA ('W') and R codes are always used, while in CW the T code is also brought in, so that a complete report on a Morse signal might be W4, R6, T8.

"Actually, there is a fourth code, now not as much used as it should be but slowly coming in again, which was devised some years ago to indicate the quality of a telephony signal. This is the F code (F1-F9), which takes the place of T where a speech transmission is involved. A complete report on a telephony signal might thus be W5, R7, F7, meaning a fully readable, fairly strong signal with reasonably good speech quality.

"Recently, the need for standardisation and a generally recognised code embodying QSA, R and T has resulted in the new RST code. This is now almost universally

accepted, and before long a report like QSA4, R7, T8 will be sent as RST-478, by everyone using the amateur bands. The R refers to the readability, S is the strength pure and simple, and T the quality of the note. For telephony, RS only is used, verbal explanations following as regards quality and so on.

"The only difficulty in all these codes, which have been slowly evolved as circumstances have demanded, and in which the main idea is their suitability for universal acceptance, is the individual idea of what an R9 signal sounds like, as your contributor rightly remarks. However, in practice it is found that most experienced operators agree very closely on the R code, and listeners on the amateur bands, from hearing reports being exchanged, soon get a good idea of the comparative R values.

"Since the correct use of the various codes is obviously a very important matter

for everybody interested in the amateur bands, I hope this further explanation will help towards making them clear."

New W2XE Schedule

THE following is the new schedule of this popular American station:—
7.30 a.m. to 11 a.m., 21,520 kc/s, 13.94 metres.
11 a.m. to 1 p.m., 17,760 kc/s, 16.89 metres.
1 p.m. to 5 p.m., 15,270 kc/s, 19.646 metres.
5 p.m. to 10 p.m., 11,830 kc/s, 25.36 metres.
10 p.m. to 11 p.m., 6,120 kc/s, 49.02 metres.

All of the above times are Eastern Standard, not Greenwich, and at the same time W2XE announces that the power is being increased ten times, on a date to be announced later.

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● No Coil changing. Screened Triple Gang Coil Unit.
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Marine Type Switchboard with Ammeter, maximum and minimum Auto Cut-out Mains Switch and Fuses, Field Regulator, 25/-.

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TIME SWITCHES, CLOCKDRIVE. Switch on-off any time, 6 amps., 35/-; 10 amps., 40/-; 25amps., 55/-.

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New Government Hospital Surplus, 7" dia. bulb. Big solid Tungsten electrodes. Emission guaranteed. COST £5. SALE 10/-.

Packing, 2/6 extra.

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fee will be 25s. for the first week, and 2s. 6d. for each subsequent week up to a maximum period of four weeks. The price includes packing and carriage one way, and all applications must be made direct to the company at Cambridge Arterial Road, Enfield, Middlesex, enclosing a Trade card.

Ferranti Receivers

CHANGES in the reference numbers and prices of some of the new Ferranti receivers are now announced. Model 1337B is, in future, to be known as Model 1237B. The price reductions are in respect of models 637B, 637BR and 1337B, for which the new figures are, respectively, 6 guineas, 6 1/2 guineas and 12 1/2 guineas.

Gramophone Record Price Increase

THE manufacturers of Panachord, Regal-Zonophone and Rex records announce that, as from March 1st, the 1s. type records are increased in price to 1s. 3d. These records include many well-known broadcast artists and bands, and current lists may be obtained from the nearest local dealer.

Aerialite Aerials

A NUMBER of different types of aerial wire and equipment are now offered by Aerialite, Ltd. These include "Coilite," which now costs 12s. 6d., as well as the popular Aerialite 7-strand aerial wire, the new prices of which are 3s. per 100 ft., 2s. 3d. for 75 ft., 1s. 6d. for 50 ft., or 9d. for 25 ft. The 11-strand super aerial wire costs 3s. 6d. for a 100ft. coil, 2s. 6d. for 75ft., and 1s. 9d. for 50ft. In addition to these ordinary aerial wire systems, this company also markets the Trapeze aerial, the "Little Marvel" aerial, and the new "Radial" aerial, all of which are of the capacity-aerial type. These are designed for erection on the side of a building in order to dispense with the necessity for the standard aerial masts, and are thus ideal for flat-dwellers and others who have no garden facilities for the ordinary type of aerial system.

New Ever Ready Batteries

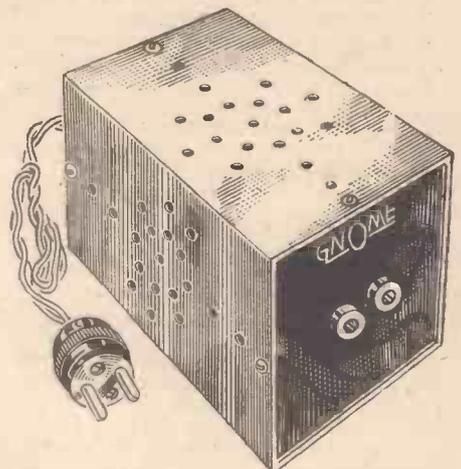
SOME new batteries are announced by the Ever Ready Company, and these include two new L.T. accumulators measuring 2 1/2 in. by 1 1/2 in. by 5 1/2 in., and 4 1/2 in. by 3 in. by 6 in. The first model is known as model J153 and costs 11s., whilst the second is model T284 and costs 12s. 6d. Two H.T. batteries complete the new range and these are designed for use in certain commercial receivers, although they may, of course, be used with any standard receiver where the dimensions are found suitable. The first is a 120-volt battery known as the 120-volt Long, and measures 11 1/2 in. long by 5 1/2 in. by 2 1/2 in. The price is 6s. The other battery is rated at 150 volts, tapped at every 1.5 volts up to 13.5 and then at every 13.5 volts. The price of this is 15s. 3d.

New G.E.C. Receivers

FOUR new receivers are announced in the G.E.C. range. One is a six-valve superhet for A.C. mains, the second a five-valve model of the transportable type for A.C. mains use, the third is an all-wave battery-operated receiver, and the fourth is an eight-valve Fidelity All-wave superhet for A.C. mains use. The prices range from 16 to 25 guineas, and we are arranging to try out one of these in the near future in order to provide our readers with a test report.

Suppression Kit

MESSRS. BELLING & LEE announce that they are prepared to supply a complete suppression equipment on hire for use during the Coronation period. This offer is made especially to dealers and service engineers who are fitting public-address equipment for large demonstrations, and who may find that local interference demands the use of some efficient form of suppressing device. The equipment will consist of an anti-interference aerial and a type 300 Set Lead Suppressor. The hire



The new "Gnome" charger. Its size may be gauged by comparison with the standard 5 amp. mains plug which is shown.

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268 PAGE

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THE IMPORTANCE OF THE DETECTOR STAGE

(Continued from last week's issue)

IN the second detector stage of a superhet, the Westector makes an admirable detector, for it is cheap, permanent, gives linear rectification, and, due to the fact that the intermediate frequency is very low, less damping and

Conclusions.

Since conditions vary for every set and every locality, a serious experimenter will decide upon the conditions under which his detector will have to work, and should be able to choose the correct

TABLE SHOWING THE COMPARISON BETWEEN VARIOUS RECTIFIERS

Type of Detector	Anode Volts	Damping	Selectivity	Sensitivity	Power Handling Capacity	Detector Distortion	General
Anode Bend	High	Very low	Good	Poor	Large	High on small inputs. Large signals low	Suitable for fairly large inputs. Bad reaction. Good selectivity and sensitivity
Leaky Grid	Low	Reasonable	Fair	Good	Small	High on large inputs	Not suitable for large inputs. Gives good output from reasonable stations. Good reaction. Very sensitive
Power Grid	High	Fair	Fair	Fair	Large	High on low inputs	Handles fairly large inputs, but not very sensitive. Not suitable for R.C. or parallel-feed coupling
Westector type W	—	High except on low frequencies	Poor except on low frequencies	Fair	Very large	Nil	Chief use in superhets where the frequency is low and large signal strengths are encountered
Westector type WX	—	Less than type W	Better than type W at radio frequencies	Fair	Very large	Nil	Suitable for straight sets provided sufficient H.F. amplification is available
Diode	—	Low	Good	Fairly good	Large	Very low	Suitable for straight sets and superhets, provided the H.F. voltage is large

better selectivity are obtained. A special Westector, type WX, which has a very low self-capacity, is available, however, for use in straight receivers and, where the H.F. amplification is sufficiently high, will work as well as a diode valve. Typical circuits for straight and superhet receivers were given in last week's issue.

The various methods of detection cannot be better summarised than by the accompanying tables.

system by the aid of the table. For example, in a locality remote from any station and with little H.F. amplification, the leaky-grid system would be preferable. In a superhet, or under conditions when the voltage applied to the detector will be high, a diode or a Westector would appear to offer the most satisfactory solution. Every system will work efficiently, however, provided the conditions referred to under the various descriptions are obtained.

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.

E. S. S. (Null). C3 and C4 are interchangeable as they are identical sections of the condenser. It makes very little difference as both terminals are earthed. It is more usual, of course, to earth the negative side.

D. R. W. (Stoke-on-Trent). We have already given the reasons for our reply. See our issue dated February 13th.

F. L. L. (Stapleford). The water will short-circuit signals, of course. An external aerial is employed, and the vessel rises to the surface to transmit and receive messages.

W. M. (Kirkcubbin). What is the voltage rating of the lamp? This is important, and also the resistance of the meter. Upon receipt of these further details we will try to solve the difficulty.

H. C. (Heathfield). We have devoted considerable space in the past to beginners, but we shall not overlook them. A new series will be given shortly. We have to cater for all classes of reader.

J. D. (Limerick). There should be no need to make any alteration, and you may have made some mistake to the wiring of the first coil. If the coils are faulty this could cause the trouble, so perhaps before going any further you could get the coils tested by the makers.

W. R. B. (Liverpool 19). The trouble is undoubtedly due to H. F. instability and you will have to cure this before you can accurately gang the circuits. Trim the

detector section first, and if you are using a wavelength calibrated dial, get this to read the correct wavelength.

L. H. (Woodbridge). We regret that we have no blueprints now available in which the coils you mention are employed.

J. W. (Greystones, Co. Wicklow). You could use the Colvern G1, G2 and G8 combination in the £5 Superhet three, but we have no blueprint of a receiver using the other coils you mention.

V. H. (Chilcompton). We do not supply components for our receivers, Messrs. Peto-Scott can supply the parts you need, the crystal costing 2s. 6d., and the switch 4s.

A. B. (Lower Edmonton). We cannot supply blueprints of commercial receivers, and we doubt whether the Marconi Company could now supply details of the receiver you refer to, as this is many years old. However, you could write to them for the information and they may be able to assist you.

W. D. (N. 18). Full details of the receiver will be found in our issue dated January 9th last. The back number costs 4d. by post.

J. V. (Bo'ness). There are several coils which answer to your description and the connections are all different. We suggest that you write to the makers and explain clearly the type of coil you have.

J. M. (Liverpool, 13). Any standard L.F. transformer may be used in place of the component, with a resistance-capacity (parallel-fed) coupling.

G. W. H. (Rotherham). There should be none of the trouble you mention which may be due to the cabinet or design. Perhaps you are listening at the wrong times, and you must remember that on the short wavelengths the time of listening is important.

R. S. (Donegal). The "Vitesse" receiver described in last week's issue would exactly answer your requirements.

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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).

Our Service to Readers

SIR,—I should like to convey my very grateful thanks for the most helpful and exhaustive answers to my wireless queries of last week. Considering the thousands of queries that you must receive, the way in which you so thoroughly assist your readers is indeed splendid, and it is a service of the utmost value to us all.

Allow me, then, to express my greatest appreciation.—R. COOMBS (Hayes, Middx.).

Car Radio: Interference Suppression

SIR,—I have been reading your very interesting articles on "Car Radio." I thought perhaps you would be interested in a problem I was up against for some time.

So long as the car was stationary, results were clear and good, but as soon as I got under way an appalling crackle developed which drowned all signals on every position on the dial. The set, by the way, is a Philips dual-wave model installed by myself. Two dipole aerials were fitted underneath the car, one on each side, 4in. from the ground. With the car stationary and the engine running, the ignition was dead silent, and I found it necessary to put only one suppressor in the H.T. lead.

I eventually traced the crackle as being due to H.F. in the front brake drums, and the cure is to scrape all the grease from the hubs which are then filled up with a special graphite grease obtainable for about one shilling per tin. Should the rear drums offend, drain the rear axle and fill up with graphite oil. Although I'm told that graphite is not good for a ball-race, I have so far had no ill effects, and the set continues to give splendid results.—R. F. RADCLIFF (Sunningdale).

S.W. Reception under Difficulties

SIR,—I recently built an adapter for myself, and have had quite a bit of bother to reduce hum and instability, but I have remedied the trouble at last. I have just been listening to W2XAD, and for fifteen minutes heard a gas company's programme, which I hope never to hear again. This was followed by fifteen minutes of a "Hometown" programme, which was not quite so bad; then followed a half-hour of Bach's music, a "Community" talk, and some good chapel organ music. My aerial is of the coiled type, and is pulled out to about 10ft. and zig-zagged across my small window. Fortunately, I am at the top of a 40ft. house, but that means that my earth lead is over 40ft. long, which gives some vile hand-capacity effects occasionally. At other times there isn't a trace of hand-capacity, so that my results, I suppose, are fairly good.—L. R. ARMSTRONG (Newcastle).

Heard on the 80-metre Band

SIR,—Although I have seen many interesting logs published in your pages, I have not yet seen one for 80 metres.

I therefore enclose my log of stations heard this year on that wavelength on 'phones: W1JND, W2HLX, W3EFS, VE1EI, ON4HS, ON4ZR, PAOOE, PAOWM, PAORO, PAOOF, F8NW, F8ME, HB9A, G2OV, G6LL, G6HB, G2ZP, G5CU, G6PA, G6MN and EI9D. The transatlantic stations were all heard on February 14th. The receiver used is a one-valve with a 35ft. outdoor antenna.—A. P. L. CASLING (Hale, Cheshire).

With the Amateurs

SIR,—I have not seen a log from this district in the past twelve months, so I enclose mine. These stations were logged during the past two weeks. One or two of them on 10 metres, and the remainder on 20 metres. I have been on the "Shorts" for the past twelve months; but until the beginning of this year I have not bothered about the amateurs. Now I am starting out on the 10 and 20-metre bands. My receivers are a three-valve short-waver and a two-valver, both sets being home built to my own design. I manage to get down to about 9 metres with the two-valver, with no alterations to the circuit. Most of the stations appended were brought in on the latter set. The three-valver I use for speaker and broadcast stations.

Amateur stations, mostly on 20 metres: W1COJ, W4DSY, W1ISD, W1AQM, W2IXY, W1JZA (10 m.), W3PC (10 m.), W1BLO, W2ASA, W2DX, W3FIH, W2XE (broadcast 13 m.), W3AIR, W1EQA, W2AKK, HB9AY, CTIAY, VE1GH, EI8G, EI9J, F8QD and SU1KG.—F. C. SMITH (Barry Dock).

Long-distance Reception

SIR,—I have received a verification card from W9XAZ; it gives some interesting information which I think may interest S.W.L.'s.

W9XAZ operates on a frequency of 26,000 kc/s, with 500 watts power. It is low level modulated, and has high-fidelity standards. The radiating system consists of a half-wave vertical antenna suspended above the roof of the Schroeder Hotel, at a height of 275ft. above the street. The station is owned and operated by *The Milwaukee Journal*, which also owns and operates Station WTMJ (620 kc/s).

I have a QSL card from W9BHT, Canton, Illinois, who says, "Thanks, O. M., for your 28 m.c. report on my 'phone. It is appreciated, and am glad to make it the eighth card for you. I use 800 watts with a diamond antenna."

W8JFC, another "ham" I reported on 28 mc/s, uses 100 watts, and his antenna uses four half-waves in phase.

W4FM, Jacksonville, Fla., requests reports, and VE1FW also. W8IWG sends a fine card. Station VE1IN belongs to the Bowdoin/Kent Island Expedition in the Bay of Fundy.—R. TOWLER (Bingley, Yorks).

ADJUSTING THE "VITESSE"

(Continued from page 731)

although the slow-motion drive will assist in this if correctly used. It must be turned very slowly and carefully, as tuning is exceedingly sharp. The well-known station at Rome should be heard just below the centre of the dial at a point corresponding roughly with the setting of the London Regional station. By tuning to the North Regional and then switching over to the short-wave range, the 40-metre amateur band should be heard, covering two degrees or so. The well-known Boundbrook station, W3XAL, on 49.18 metres, is almost at the top of the dial, a useful pointer being Athlone on the medium-wave band. Again, the German station at Zeeszen will be found very close to this American and will serve as a guide. Remember, however, that it is necessary to listen at certain definite hours for short-wave stations, and in general the lower half of the band will be heard best during daylight, whilst the upper part of the short-wave band offers the best reception during the hours of darkness.

A SINGLE-VALVE ALL-WAVER

(Continued from page 726)

wooden plugs to fit the inside of the formers should be screwed to the ends. When the coils have been placed in position a 3/16in. screwed rod should be threaded through the centre of the unit and the ends bolted up tight. Seven spring contacts should also be cut from a thin sheet of brass, each approximately 3 1/2in. long by 1/4in. wide. The contacts should be bent and mounted, as in Fig. 5, so as to press against the studs.

The unit should be mounted on two small brackets and the central brass rod allowed to come through the panel in order to mount the control knob. Fig. 6 shows the connections between the coil windings and contact studs.

This little set, which has proved very interesting, may provide the basis of many further experiments.

Do you know

- THAT gas discharge tubes such as are used in television time bases may be obtained with different gas fillings.
- THAT it is not essential to use this type of valve for the "triggered" voltage.
- THAT a hum-bucking coil may be incorporated in a pick-up to remove hum caused by an induction type motor.

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.

RADIO CLUBS AND SOCIETIES

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

Swansea Radio Club

THE above club was formed at a meeting held at the Y.M.C.A. on February 10th, 1937. Fourteen people were present, including six fully-licensed amateurs, and two A.A. licence holders, and there is a prospect of the membership increasing rapidly.

The President, Mr. E. Dell (G2UL), suggested that the first series of lectures should consist of talks by the more experienced fully-licensed members on various transmitter circuits.

Mr. Dell, assisted by the Secretary, will give a talk on Power Amplifiers and Frequency Amplifiers on March 10th. National Field Day will also be a subject of discussion in the very near future, and is keenly looked forward to. Meetings are to be held at the Swansea Y.M.C.A. at 7 p.m. on alternate Wednesdays, commencing February 24th, and all those interested will be welcomed. Full particulars will be gladly furnished by the Secretary, Mr. R. J. C. Davies, Messrs. Watson and Davies, Mansel Lane, Swansea.

The New Zealand DX R.A.

THE New Zealand DX (Radio Association) is a strictly amateur all-wave DX Society. It has active branches throughout New Zealand and representatives in all corners of the globe. The activities include such associated matters as the reduction of electrical interference, the elimination of "Faked" DXing, and arrangement of courtesy programmes.

Life membership costs 2s. 6d., or about 65 cents in American currency, including badge and certificate of membership. There are nearly 1,200 members in the Association.

The official organ is *Tune In*, a monthly printed publication of eight pages, containing a wealth of DX information.

The annual subscription for the Bulletin is 1s. (stamps accepted).

The official call book is *Radio Calls of the World*, published quarterly, price 1s., postage 1d. (25 cents.). It includes lists of all broadcast and short-wave stations of the world and gives operating schedules of all N.Z. and Australian broadcasting stations. Secretary and Publicity Officer, 37, Chancellor Street, Christchurch, N1, New Zealand.

Radio and Television Society

(Merchant Taylor's School, Northwood)

AFTER a most interesting debate on the commercial propositions of television, a demonstration was given of the photo-conductivity of selenium. A powerful mains amplifier for ultra-short waves is under construction, for use in conjunction with the Society's apparatus. At the next meeting there will be a demonstration of a Lissen Short-wave set.

Exeter and District Wireless Society

AT the last meeting of this Society Mr. T. D. Humphreys, A.M.I.E.E., gave an interesting and well-illustrated lecture on television. His lecture was divided into two portions, the first being the present position of television generally, and the second the technical aspect of

high-definition reception. The lecture was illustrated by a large number of slides.—Sec.: W. J. Ching, 9, Sivell Place, Heavitree, Exeter.

Golders Green and Hendon Radio Scientific Society

IN the course of a lecture by Mr. F. R. W. Strafford, of Messrs. Belling Lee, Ltd., before the above society, adequate earthing of the supply mains at many points was among the remedies suggested for the modern bugbear of electrical interference with broadcast reception. A convincing demonstration of the way to deal with small domestic motors, such as in a hair drier, was given. The Automatic Tuning of Radio Receivers is the subject of the next meeting, which will be addressed by Mr. E. Gardiner, B.Sc. Particulars can be obtained from the Hon. Sec., Mr. A. G. Griffiths, "Hornbeams," Priory Drive, Stannmore, Middx.

Brentwood Amateur Radio Society

AT the regular fortnightly meeting of this society, held on February 17th, members were given a very interesting demonstration of Lissen receivers and Hi-Q components by Mr. E. Chölot. After the demonstration, members tried out the various receivers for themselves and the excellent reception of a large number of DX stations greatly impressed them. This society has recently been granted a transmitting licence with the call sign G8HV. This station will soon be operating on the 40- and 20-metre wavebands.

All readers in the district who are interested in short-wave reception are invited to communicate with the Hon. Secretary, N. K. Read (2BNK), "Nether-ton," Herington Grove, Hutton Mount, Brentwood, Essex.

Radio, Physical and Television Society

AT a meeting of this society held at 72a, North End Road, West Kensington, on February 19th, the President, Dr. C. G. Lemon, A.M.I.R.E., made some interesting comparisons between members' own loudspeakers and a "W.B." model kindly lent by Messrs. Whiteley Electrical Radio Co., Ltd., priced at 42s. All the speakers were subjected to the most rigid tests by means of an oscillator, and on actual broadcast reception. The "W.B." speaker gave a good performance against several high-priced models, and reproduction was excellent over a wide range of frequencies. Hon. Sec., M. E. Arnold, 72a, North End Road, W.14.

Swindon and District Short-wave Society

THIS society still continues to progress. Mr. R. A. Hiscocks (G6LM) gave a lecture on February 18th, on "Short-wave Receiver Design," which was greatly appreciated by the members. Fast and slow morse classes are held, and also a QSL corner. The society's short-wave receiver is now available, and the society will have an A.A. transmitting licence by the time this appears in print. A visit is being arranged to the station of 6LM at Chippenham. Messrs. Whiteley Radio Co., the manufacturers of the well-known W.B. moving-coil speakers, have kindly loaned the society one of their senior models for test. The society would like to hear from other radio firms.—Hon. Sec., W. C. Barnes, 7, Surrey Road, Swindon.

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One-valve: Blueprint, 1s.			
All-wave Unipen (Pentode)		PW31A	
Two-valve: Blueprint, 1s.			
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B	
Three-valve: Blueprints, 1s. each.			
Selectone Battery Three (D, 2 LF (Trans))		PW10	
Sixty Shilling Three (D, 2LF (RC & Trans))		PW34A	
Leader Three (SG, D, Pow)		PW35	
Summit Three (HF Pen, D, Pen)	8.8.34	PW37	
All Pentode Three (HF Pen, D (Pen), Pen)	22.0.31	PW39	
Hall-Mark Three (SG, D, Pow)		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, 2 LF (Trans))	June '35	PM2	
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	17.8.35	PW53	
Battery All-Wave Three (D, 2 LF (RC))		PW55	
The Monitor (HF Pen, D, Pen)		PW61	
The Tutor Three (HF Pen, D, Pen)	21.3.30	PW62	
The Centaur Three (SG, D, P)		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))	5.12.30	PW72	
"Tele-Cent" S.W.3 (SG, D (SG), Pen)	30.1.37	PW74	
Four-valve: Blueprints, 1s. each.			
Fury Four (2 SG, D, Pen)		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	
Mains Operated.			
Two-valve: Blueprints, 1s. each.			
A.C. Twin (D (Pen), Pen)		PW18	
A.C.-D.C. Two (SG, Pow)	7.10.33	PW31	
Selectone A.C. Radiogram Two (D, Pow)		PW10	
Three-valve: Blueprints, 1s. each.			
Double-Diode-Triode Three (HF Pen, DDT, Pen)	10.6.33	PW23	
D.C. Arc (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)	18.8.34	PW38	
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50	
"All-Wave" A.C. Three (D, 2 LF (R.C.))	17.8.35	PW54	
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW56	
Four-valve: Blueprints, 1s. each.			
A.C. Fury Four (SG, SG, D, Pen)		PW20	
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D	
A.C. Hall-Mark (HF Pen, D, Push-Pull)		PW45	
Universal Hall-Mark (HF, Pen, D, Push-Pull)	9.2.35	PW47	
SUPERHETS.			
Battery Sets: Blueprints, 1s. each.			
55 Superhet (Three-Valve)		PW40	
F. J. Camm's 2-valve Superhet Two-Valve	13.7.35	PW52	
F. J. Camm's £4 Superhet		PW59	
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	PW75	
Mains Sets: Blueprints, 1s. each.			
A.C.-£3 Superhet (Three-valve)		PW43	
D.C. £3 Superhet (Three-valve)	1.12.34	PW42	
Universal £5 Superhet (Three-valve)		PW44	
F. J. Camm's A.C. £4 Superhet		PW59	
F. J. Camm's Universal £4 Superhet 4		PW60	
"Qualitone" Universal Four	16.1.37	PW73	
SHORT-WAVE SETS.			
Midget Short-Wave Two (D, Pen)	15.9.34	PW38A	

Three-valve: Blueprints, 1s. each.

Experimenter's Short-Wave Three (SG, D, Pow)		PW30A	
The Perfect 3 (B, 2 LF (RC and Trans))		PW63	
The Bandsread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36	PW68	
PORTABLES.			
Three-valve: Blueprint, 1s.			
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	16.5.36	PW65	
Four-valve: Blueprint, 1s.			
Featherweight Portable Four (SG, D, LF, Cl B)		PW12	
MISCELLANEOUS.			
S.W. Converter-Adapter (1 valve)		PW48A	
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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	
Big-power Melody Two with Lucerne Coil (SG Trans)		AW338A	
Lucerne Minor (D, Pen)		AW426	
A Modern Two-valver	July '36	WM409	
Three-valve: Blueprints, 1s. each.			
Class B Three (D, Trans, Class B)		AW336	
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)		AW419	
Lucerne Ranger (SG, D, Trans)		AW422	
Cossor 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, QP 21)	June '34	WM362	
1935 £6 6s. Battery Three (SG, D, Pen)		WM371	
PTP Three (Pen, D, Pen)	June '35	WM389	
Certainty Three (SG, D, Pen)	Sept. '35	WM393	
Minutube Three (SG, D, Trans)	Oct. '35	WM396	
All-wave Winning Three (SG, D, Pen)	Dec. '35	WM400	
Four-valve: Blueprints, 1s. 6d. each.			
65s. Four (SG, D, RC, Trans)		AW370	
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402	
2 H.F. Four (2 SG, D, Pen)		AW421	
Crusaders' A.V.C. 4 (2 HF, D, QP 21)	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	WM881	
The H.K. four (HF Pen, HF Pen, 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 (2 HF, D, RC, Trans)	May '33	WM329	
Class B Quadradyne (2 SG, D, LF, Class B)	Dec. '33	WM344	
New Class B Five (2SG, D, LF, Class B)	Nov. '33	WM340	
Mains Operated.			
Two-valve: Blueprints, 1s. each.			
Consoelectric Two (D, Pen) A.C.		AW403	
Economy A.C. Two (D, Trans) A.C.		WM286	
Unicorn A.C./D.C. Two (D, Pen)	Sept. '35	WM391	

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

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 " " Practical Mechanics ... 7d. " "
 " " Wireless Magazine ... 1/3 " "

The Index letters which precede the Blueprint Number indicate the periodical in which the description appears: thus PW refers to PRACTICAL WIRELESS, AW to Amateur Wireless, PM to Practical Mechanics, WM to Wireless Magazine. Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable), to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Three-valve: Blueprints, 1s. each.			
Home-Lover's New All-electric Three (SG, D, Trans) A.C.			AW383
S.G. Three (SG, D, Pen) A.C.			AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33		AW396
A.O. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34		AW430
Mantovani A.C. Three (HF Pen, D, Pen) A.C.			WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36		WM401
Four-valve: Blueprints, 1s. 6d. each.			
All-Metal Four (2 SG, D, Pen)	July '33		WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	May '35		WM386
SUPERHETS.			
Battery Sets: Blueprints, 1s. 6d. each.			
Modern Super Senior			WM375
Varsity Four	Oct. '35		WM385
The Request All-Waver	June '36		WM407
1935 Super Five Battery (Superhet)			WM379
Mains Sets: Blueprints, 1s. 6d. each.			
1934 A.C. Century Super A.C.			AW425
Heptode Super Three A.C.	May '34		WM359
"W.M." Radiogram Super A.C.			WM368
1935 A.C. Stenode	Apr. '34		WM385
PORTABLES.			
Four-valve: Blueprints, 1s. 6d. each.			
Midget Class B Portable (SG, D, LF, Class B)	20.5.33		AW380
Holiday Portable (SG, D, LF, Class B)	1.7.33		AW393
Family Portable (HF, D, RC, Trans)	22.9.34		AW447
TWO H.F. Portable (2 SG, D, QP21)	June '34		WM363
Tyers Portable (SG, D, 2 Trans)			WM367
SHORT-WAVE SETS—Battery Operated.			
One-valve: Blueprints, 1s. each.			
S.W. One-valve converter (Price 6d.)			AW320
S.W. One-valve for America	23.1.37		AW429
Rome Short-Waver			AW452
Two-valve: Blueprints, 1s. each.			
Ultra-short Battery Two (SG det. Pen)	Feb. '36		WM402
Home-made Coil Two (D, Pen)			AW440
Three-valve: Blueprints, 1s. each.			
World-ranger Short-wave 3 (D, RC, Trans)			AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34		AW438
Experimenter's Short-wave (SG, D, Pen)	Jan. '19, '35		AW403
The Carrier Short-waver (SG, D, P)	July '35		WM300
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		WM393
Superhet: Blueprint, 1s. 6d.			
Simplified Short-waver Super	Nov. '35		WM397
Mains Operated.			
Two-valve: Blueprints, 1s. each.			
Two-valve Mains short-waver (D, Pen) A.C.			AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.			WM363
"W.M." Long-wave Converter			WM380
Three-valve: Blueprint, 1s.			
Emigrator (SG, D, Pen) A.C.			WM352
Four-valve: Blueprint, 1s. 6d.			
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35		WM391
MISCELLANEOUS.			
Enthusiast's Power Amplifier (1/6)	June '35		WM387
Listener's 5-watt A.C. Amplifier (1/6)	Sept. '35		WM392
Radio Unit (2v.) for WM392 (1/-)	Nov. '35		WM393
Harris Electrogram (battery amplifier) (1/-)	Dec. '35		WM399
De-Luxe Concert A.C. Electrogram	Mar. '36		WM403
New Style Short-waver 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, '35		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/-)	July '36		WM408



QUERIES and ENQUIRIES

A Pocket Aerial

"I am very interested in the pocket aerial that was advertised in one of the back numbers of your paper. I have mislaid the advertisement, and I should be very grateful if you could send me particulars of the device."—P. W. (Sutton-by-Dover).

THE aerial was designed primarily for service engineers and others who require a temporary aerial for demonstration or test purposes. It is manufactured by Pye Radio and is enclosed in a small tube similar to a propelling pencil, and fitted with a clip for retaining in the pocket. The aerial is in the form of a springy-spiral of wire, attached to the inside of the tube at one end, and to the portion corresponding to the point of the pencil at the other. This is of metal, in the form of a standard wander plug, and is inserted into the aerial socket of a receiver. A total length of 16ft. is available when the aerial is stretched out. The price is 2s. 6d.

£4 Superhet 4

"I would like to add A.V.C. to this set. If you advise it, would you let me know how it should be arranged? Re improving the selectivity by bringing grid and cap leads of I.F. valve near to each other, how is this done? I tried it and blew the fuse twice, and the set was switched off. Am I right in presuming that the I.F. valve is the vari-mu H.F. pentode valve?"—W. W. C. (Lelx).

IN this particular receiver there is really insufficient H.F. amplification to enable an effective A.V.C. circuit to be fitted. You will have seen from the recent articles on A.V.C. that the degree of control is dependent upon the H.F. current, and where this is small, some additional voltage has to be employed. The most satisfactory way of including A.V.C. would be to replace the detector by a double-diode-triode, and as you know, we do not approve of modifications of such a comprehensive nature to our published circuits. To improve selectivity the best plan is to modify the positions of the secondary and primary of the I.F. transformers, and instructions for doing this have already been given. Bringing the leads together as mentioned by you only causes the I.F. valve to oscillate, and this is done to receive C.W. signals as explained last week in our short-wave section. The I.F. valve is the vari-mu pentode.

Fitting a Frame Aerial

"I have a 4-valve mains receiver (H.F. Det., L.F. and rectifier) for the long- and medium-wave bands, which is greatly encumbered by an external aerial and earth. Would it not be possible to fit an ordinary frame aerial, and, if so, how should I construct it, and how would it affect the reception? There are two aerial terminals on my set, aerial 1, and aerial 2, and an earth terminal. To what pair of terminals should I affix the frame aerial, and would an earth be necessary? Also, what internal altera-

tions would be necessary? I would be much obliged if you could tell me these things."—T. A. J. (S.W.7).

IN the ordinary way the frame aerial takes the place of the input tuned circuit. If your receiver is of fairly modern design a ganged tuning condenser will be fitted, and therefore the frame aerial would have to have an inductance identical with the coil now being used so that the ganged tuning condenser would still act in the correct manner. You would, of course, have to remove the present aerial coil. There would be some difficulty in building a suitable frame under these conditions,

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.

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

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

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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 you must also remember that the signals picked up by a frame will be very much weaker than those obtained on an outside aerial, although selectivity will be greatly improved. If you wind a frame and simply connect it to one of the aerial terminals on your set, you will find, no doubt, that the directional properties of the frame will be practically non-existent and that the results will be inferior to those obtained with a good indoor aerial such as a Pix. The latter would, of course, be much simpler to affix and we recommend this course, rather than the construction of a frame. An earth is not essential with a frame aerial but is often desirable. It will improve results if you retain the earth with the indoor aerial connection.

Step-down Mains Transformer

"I have lately obtained an American 8-valve superhet for A.C. mains of 110 volts. This set was run previously from 230 volts with a transformer. What kind of transformer do you advise me to use?"—J. H. (Llanfrechfa, Mon.).

A 2 to 1 step-down transformer is required, and special components of this type are now on the market. The transformer must, of course, be of a type suitable for carrying the current load of the set and thus when ordering it you must give the makers full details so that a suitable model may be supplied. The transformers

are rated by the wattage and a 50 watt model costs 16s., whilst a 1,000 watt model costs 90s. Full details may be obtained by writing to Messrs. Heayberd of 10, Finsbury Street, E.C.2.

A.V.C. and Load Resistance

"Your very interesting articles on A.V.C. give diagrams with arrow pointing to A.V.C., but they don't show where the other end of the line is to be connected. What is a load resistance? Perhaps you could explain these two points?"—E. C. B. (West Wickham).

THE object of A.V.C. is to control the amplification of H.F. or I.F. valves by varying the applied bias. This was explained in the article, which also showed how the bias voltage of a varying nature was obtained. Obviously, therefore, the arrow indicated that that point was connected to the valves which had to be controlled. In a superhet these may be the pre-H.F. amplifier, the frequency-changer, and the I.F. amplifiers, and all or one only of these may be controlled. The bias is applied to the lower end of the tuning coil or I.F. transformer secondaries, or direct to the grid *via* a grid-leak, in which case a fixed condenser must be inserted in the grid lead to avoid short-circuit. The load resistance is included in the output circuit of a valve or Westector in order to develop the signal voltage for subsequent amplification. In the case of a valve you can see that there is a fluctuating anode current present in the anode circuit, but you cannot apply a current to a following valve for amplification. You therefore include a resistance in the circuit and the current flowing through this results in a voltage drop across it, the value changing with current. Thus the changing potential at the end may be applied to the following valve.

Tuning Indicator

"I am building a short-wave set, detector stage followed by two-valve amplifier. Can you suggest any possible means of using a tuning indicator for distant reception?"—G. N. (Waterloo).

AS we explained in the article recently dealing with A.V.C., this arrangement is only applicable where A.V.C. is employed, as the variable bias controls the H.F. amplification and makes it difficult to discern the exact resonant point. In a simple detector stage there is no such variation to render it difficult to know when you are exactly tuned, and the signal strength will show when the exact resonant point is reached. You could, of course, include a milliammeter in the anode circuit to show the variation in current, but it is definitely not worth while in a circuit of the type mentioned by you.

Radio FZR (Saigon, Indo-China)

"Can you give me any details concerning this station which I recently received at good strength?"—F. R. (Ealing).

ONE of our readers recently received a verification letter from this station, and in the course of this they give the following details of their transmission. The power is about 10 watts in the aerial, and the wavelength is now 31.75 metres. Experimental transmissions are carried out on Wednesdays and Saturdays from 11.45 to 13.15 G.M.T., whilst for the remainder of the week experiments may also be carried out at the same times. On Sundays the times are from 03.00 to 05.00.

The Coupon on Cover iii must be attached to every query.

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

RECEIVERS, COMPONENTS AND ACCESSORIES
Surplus, Clearance or Secondhand, etc.

RADIOMART
SHORT-WAVE SPECIALISTS
Announce 1937
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, neutralization, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free 7½d., including catalogue.

1937 Short-wave Catalogue only (3 times enlarged) price 1½d., post free.

TELSEN screened dual range coils, switched, 2/11 each. Pair 5/3. Milliammeters, 25 ma. upwards, 5/9. Super, 6/9.

AMERICAN mains transformers 230v. fully shrouded, 350/350, 6.3v., 5v., 6/11. Majestic 250/250, 2.5v., 5v., 4/11.

HEAVY DUTY mains transformer worth 35/- 350/350, 150 ma., 4v. 2.5ACT, 4v. 6ACT, 12/6. KC/3, IF transformers, 3/11. Telsen Ace, 4/65. Telsen HF chokes, 1/11.

BBRITISH RADIOPHONE straight line wavelength scale, 2/11. Centralab pots., all sizes, 1/6; switched, 2/-.

UTILITY 2-gang unknob and dial, 3/11; 1,500-volt tubular condensers, all sizes, 6d.

ELECTROLYTIC 500-volt 8 mf., 1/5; 4 mf., 1/6; 4 x 4, 1/11; 8 x 8, 3/5; 25 mf. 25v., 1/-, etc.

SMOOTHING chokes, 20 hy. 120 ma., 3/11; 100 ma., 2/11; 40 ma., 1/11.

PUSHBACK Wire, Gyde, 6d., heavy. 9d. Resincore solder, 6ft. 6d. tubular glass fuses, 2d.

OLA 7in. PM speakers, 15/6; KB 1,500-ohm 7in. MC speakers, less transformers, 4/11.

SPECIAL OFFER Class B valve, driver transformer and valveholder, new, lot 5/-.

TRADERS' monster bargain parcels, value 24/10/-, for 10/-; also 5/- parcels.

FAMOUS Continental A.C. valves, 4/6; American Duotron, etc., all types, 3/6; battery from 2/3.

UTILITY 8/6, dirodic dials, 3/11; Radiophone, 0.00016 short-wave condensers, 3/6; series gap, twin, 3/9.

CERAMIC all brass microvariables, 15 mmd., 1/4; 40 mmd., 1/7; 100 mmd., 1/10; short-wave H.F.C., 9d.

CLEARANCE catalogue 1½d. Goods over 5/- post free. All enquirers must send stamp. Branches: 19, John Bright St., 44, Dale End. Mail Orders, 44, Holloway Head, Birmingham. Telephone, MID 3254.

BANKRUPT BARGAINS. List free. All new goods. Large stock. Decca 1937, 18 gn. A.C. radiograms, 12 gns. Vidor and Burndett 1937 midget battery portables, £3/17/6. Lotus 4v. A.C./D.C. midgets, £3; ditto table models, £3/15/0. All-wave battery 3v., M.C., 79/6. ECKO 15 gn. 12-volt car radio, £6/10/0. Ferguson, Truphonic and Pilot all-waves, battery and mains. Full stock at right prices. American, British A.C. and battery valves from 3/-. Write for your requirements.—Butlin, 6, Stanford Avenue, Brighton. Preston 4030.

ALCO ELIMINATORS AND CHARGERS.—4 H.T. taps, 120v./150v., 20 ma./30 ma., 13/- With 1 amp. charger, 25/-; charger alone, 7/8; 1 amp., 11/- Years' guarantee. Details free.—P. and D. Radio, 1, Gooding Road, N.7.

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, improved, type, 120 watts output, at £2/10/0. Send for our comprehensive list of speakers, resistances and other components. WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

ALL goods previously advertised are standard lines, still available. Post card for list free. VAUXHALL UTILITIES, 163a, Strand, W.C.2. Over Denny's the Booksellers, Temple Bar 9338.

PREMIER SUPPLY STORES

Offer the following Set Manufacturers' Brand New Surplus Goods at a Fraction of the Original Cost; all goods guaranteed perfect; carr. paid over 5/-; under 5/- postage 6d. extra. Orders under 5/- cannot be sent C.O.D.

ALL POST ORDERS TO JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5. 'Phone: Amherst 4723.

CALLERS, AS USUAL, TO 20-22, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2382). And 165 & 165a, FLEET ST., E.C.4 (Next door to Anderson's Hotel). Central 2833. New Branch: 50, HIGH ST., CLAPHAM, S.W.4 (Macaulay 2381).

Have you had our GIANT ILLUSTRATED CATALOGUE AND VALVE LIST? Send 4d. IN STAMPS FOR THIS BARGAIN LIST.

MAINS VALVES, famous Europa 4 v. A.C. types, 4/8 each, H.L., L. S.G. Var.-Mu-S.G., H.F. Pens., Var.-Mu-H.F. Pens. 1, 3 and 4-watt A.C. directly heated output Pentodes. Full-wave rectifiers, 250 v. 60 H.A. A.C./D.C. types. 20-volt. 15 amp. S.G., Var.-Mu-S.G., H. H.A., Power and Pen. Following types all 5/5 each. Full-wave rectifiers, 350 v. 120 m.a. and 500 v. 120 m.a. 2½ watt indirectly-heated Pentodes, Octodes, Frequency Changers.

BATTERY VALVES, 2 volts. H.F., L.F. 2/3. Power, Super-Power, 2/9. S.G., Var.-Mu-S.G. 4- or 6-pin Pentodes, H.F. Pens. V.-Mu-H.F. Pens., 5/-. Class B, 3/6.

AMERICAN VALVES. Genuine American HYTRON and TRIAD first-grade Valves. 3 months' guarantee. All types in stock, 5/5 each. 210 and 250 S.G. New Metal-Glass Valves, all types, 6/8 each. Genuine American DUOTRON Valves, all types, 3/6 each. Valve holders for all above types, 6d. each. Metal bases, 9d. each.

SHORT-WAVE COILS, 4- and 6-pin types, 13-26, 22-47, 41-94, 78-170 metres, 1/9 each, with circuit. Special set of 3 S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. Coil, 11-25, 10-43, 35-56 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/8.

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

SUPER CERAMIC CONDENSERS, S. L. P., .00016, .0001, 2/9 each: double-spaced, .00005, .00025, .00015, 3/- each. All brass with integral slow motion, .00015 tuning, 3/9; .00015 reaction; 2/9.

H.F. CHOKES, S.W. 10-200 metres, 9d.; S.W. screened, 1/6; standard screened 180-2,000 metres, 1/6.

3-WATT A.C. AMPLIFIER, 2-stage, for mike or pick-up. Complete kit of parts with 3 valves, 40/-.

7-WATT A.C./D.C. AMPLIFIER, 3-stage high-gain. push-pull output. Complete kit of parts with 5 specially matched valves, £4 4s.

ELECTROLYTICS. U.S.A. 4, 8 mfd. 350 v. peak, 1/9 each. Duplicator, 4 or 8 mfd. 500 v., 3/-; 50 mfd. 50 v., 1/9; 10 mfd. 50 v., 6d.; 25 mfd. 25 v., 1/-; T.O.C. 8 mfd. 650 v., 4/-; 15 mfd. 50 or 100 v., 1/-; 50 mfd. 12 v., 1/-; Paper Condensers. W.E., 250 v. working 4 mf., 2/-; 2 mf. 1/-; 1 mf. 6d.; 350 v. working 4 mf., 2/6; 2 mf., 1/6. Duplicator 500 v. working 4 mf., 4/-; 800 v. 6/-.

COSMOCORD PICK-UPS, with tonearm and volume control, 10/6 each. PICK-UP HEADS only, 4/6 each.

PREMIER MAINS TRANSFORMERS, wire-end type with screened primaries, tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. 4 a. C.T. and 4 v. 1 a. C.T. 8/6. 250-250 v. 60 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 8/6. 350-350 v. 120 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 10/6. Any of these transformers with engraved panel and N.P. terminals 1/6 extra. 600-600 v. 150 m.a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 17/6. SPECIAL OFFER PHILIPS MAINS TRANSFORMERS, 250-250 v. or 300-300 v. at 80 m.a. 4 v. 5 a., C.T.; 4 v. 1 a. Tapped Primary 100-250 volts, 6/11. 450-450 v. at 150 m.a. or 500-500 v. 100 m.a., 4 v. 4 a. C.T., 4 v. 4 a. and 4 v. 8 a. Screened Primary. Tapped input 100-250 v., 12/6. AUTO TRANSFORMERS, step up or down, 60 watts, 7/6; 100 watts, 10/-. SMOOTHING CHOKES, 25 m.a., 2/9; 40 m.a., 4/-; 60 m.a., 5/8; 150 m.a., 10/6. 2,500 ohms, 60 m.a. Speaker Replacement Chokes, 5/8.

MILLIAMETERS, moving-iron, flush 2½in., all ranges from 0-10 m.a., 5/8. Visual tuning, 6 or 12 m.a., 5/8. Moving-coil meters, 2½in. 0-1 m.a., 18/6; 2½in. 0-1 m.a., 22/8. Multipliers, 1/- each. Ammeters, 0-1, 3, 5, 10 or 20 a., 6/9. TELSEN Multi-meters, 30 and 300 m.a., 8, 15 and 240 v., 8/6 each. Reads A.C. and D.C.

TRANSFORMERS, latest type Telsen R.G.4 (list 12/6), 2/9. Lissen Hypernik Q.P.P. (list 12/6), 3/6.

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COILS.—Telsen iron core, W349 (Midget size), 4/-; type W478 (twin), 9/- pair; type W477 (triple), 16/- per set; type W476 (triple superhet, selector and oscillator), 16/- per set. Telsen short-wave coils, matched set of three, 4-pin bases, 12-26, 22-47, 41-94 metres, 5/- per set; Telsen dual range H.F. transformer and aerial coils; type W154, 3/- each; all ganged coils complete on base with switch; Telsen I.F. transformer coils, 110 kc/s, 5/-; Telsen dual range coils, with aerial series condenser incorporated, type W76, 4/-; Telsen aerial condensers, with shunting switch, 2/-; all Telsen components brand new, in sealed cartons.

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SOUTHERN RADIO.—Branches at 271-275, High Rd., Willesden Green, N.W.10; 46, Lisle St., London, W.C.2. All mail orders to 323, Euston Rd., London, N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). Phone: Euston 3775.

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ALL ABOUT DIAL LAMPS—See Page 749.

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Vol. 9. No. 234.
March 13th, 1937.

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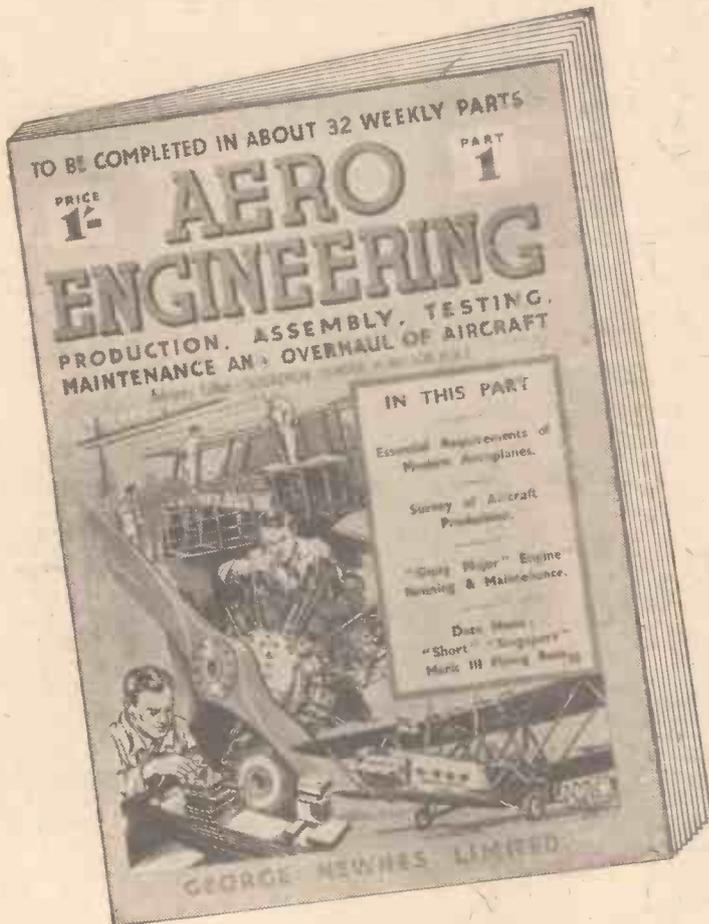


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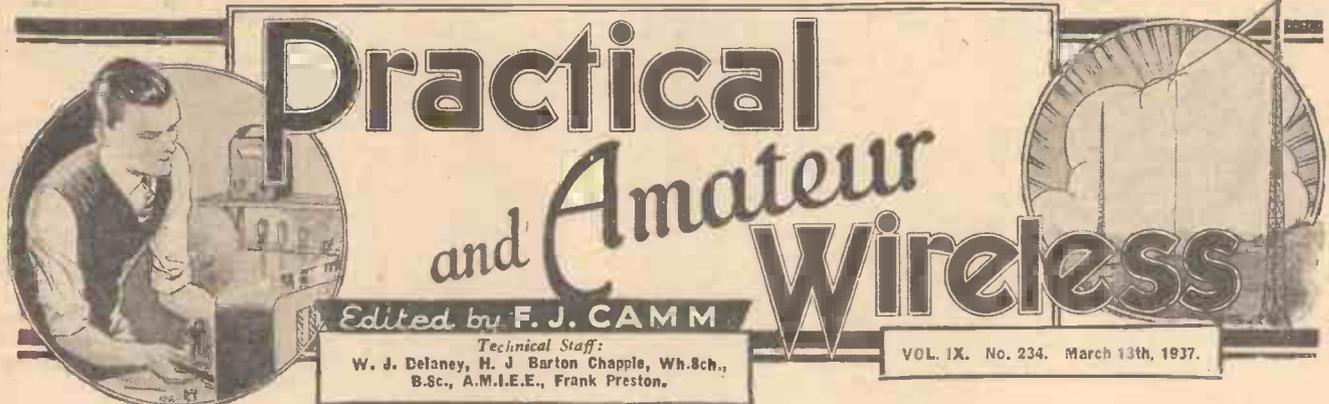
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LOW-FREQUENCY INSTABILITY

See Page 747



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. IX. No. 234. March 13th, 1937.

ROUND *the* WORLD of WIRELESS

For the Beginner

THERE are hundreds of amateurs throughout the country who have started their wireless receiver construction by building a four or five-valve receiver, and they may have made quite a success of the work. There is little doubt, however, that the ideal method of studying any subject is by starting at the bottom and working slowly through every stage. In wireless receiver construction, the crystal set is the first step, and many have made their first acquaintance with the hobby through this simple type of apparatus. We have already received hundreds of letters upon the subject of the 1937 Crystal Set described in January, and this appears to meet a long-felt requirement, especially among the younger readers of the paper. We have also described a suitable L.F. amplifier for addition to this receiver in order to obtain louder signals, and in this week's issue we show how the crystal detector may be dispensed with and a valve used in its place. A simple detector stage is capable of remarkable results when used properly, and the only difficulty which is usually encountered is on the score of selectivity. But that may easily be overcome by various means, and in future issues the addition of an H.F. stage and alternative tuning circuits will be discussed. In the meantime, the information given in this number will enable those who are keen to build a simple one-valver for the broadcast wavelengths to proceed with the task, and the design is both simple and cheap to build.

A Slogan Proved

THE electrical power to the whole of the electrical section of the Birmingham B.I.F. was interrupted for ten minutes on Friday, February 19th. The emergency lighting system of the Chloride Stand came into instantaneous operation and gave a practical demonstration of its efficacy to interested visitors who happened to be on the stand at that time.

An instance of intelligent anticipation was provided on the stand of Messrs. Gent and Co., Ltd., Clockmakers, when it was observed that, although more than sixty clocks in the building stopped with the exhibition's master clock, Messrs. Gent and Co.'s clock on their stand still kept going—it had been provided with Exide WH 10-volt

batteries for stand-by purposes. When current was restored all other mains-operated clocks had to be re-set; the clock on the Gent Stand faithfully upheld the Exide slogan "Still keeps going when the rest have stopped."

A Hundred Years Hence

INSTEAD of time ceasing, it will be put forward one hundred years in the evening television transmission on March 22nd. Olga Katzin (who is, incidentally, a well-

known literary personality under another name) will give a rhymed forecast of the domestic scene of the year 2037, and Pearl Binder will make lightning sketches of the glass clothes, compressed nourishment, and domestic servants, which will be in force by that time.

THIS ISSUE COMPLETES VOLUME IX

...

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known literary personality under another name) will give a rhymed forecast of the domestic scene of the year 2037, and Pearl Binder will make lightning sketches of the glass clothes, compressed nourishment, and domestic servants, which will be in force by that time.

New B.B.C. Facilities

IT is announced that the B.B.C. has decided to establish studio facilities in Nottingham. When convenient accommodation has been found, it will be wired so that programmes can from time to time be given from Nottingham.

April Fool's Day

TO the younger generation, the First of April holds unlimited possibilities, but there was a time when that particular day captured the heart and head of Merrie England, and also of every country in the western world. Felix Felton, whilst writing a programme for Shrove Tuesday, decided

New Marconi Station

THE Czechoslovak Telegraph Administration has placed a contract with Marconi's Wireless Telegraph Co., Ltd., for the supply of a high-power broadcasting station to be installed near Brno, where for many years a 32-kW. Marconi transmitter has been in operation. The wavelength of the new station will be chosen within the band of 300-554 metres, and a crystal drive and power of 100 kW. will be used. The frequency response of the equipment is of a high order and mounts to \pm two decibels over a band of 35 to 10,000 cycles per second.

The Solution of a Puzzle

ON a channel immediately above that of GSL, Daventry, a listener has logged what appeared to him as a French transmission of which no details so far have been officially published. This would seem to be a new short-wave station situated at Tunis (North Africa) which French "fans" dwelling on the Mediterranean seaboard are hearing daily. The station is said to be on the air between G.M.T. 11.30-13.00 and again from 17.30-18.30, giving the call: *Ici poste a ondes courtes de Tunis.*

From the Dominican Republic

HIX, Ciudad Trujillo, now 500 watts, which has at different times been working on 48.92 m. and 47.32 m., would now appear to have lodged itself in a higher portion of the waveband as it was recently found broadcasting on a channel in the immediate vicinity of HVJ, Vatican (Rome). There is little doubt about its identity as the call: *Atchee-ee-aykis, Ciudad Trujillo*, was clearly heard. The interval signal consists of four bells struck in two groups. On Tuesdays and Fridays this studio is on the air between G.M.T. 01.00 and 03.15, but on other days seems to close down towards G.M.T. 19.00.

ROUND the WORLD of WIRELESS (Continued)

Empire Service Tour

THE Director of the B.B.C. Empire Service, Mr. J. B. Clark, will begin, early in May, an Empire tour, lasting some months, in the course of which he will visit Australia, New Zealand and India, and a number of Colonies. The object of this tour is to study the reactions of overseas listeners to the B.B.C. Empire service and to investigate a number of problems which mutually affect the B.B.C. and other broadcasting organisations in the Empire.

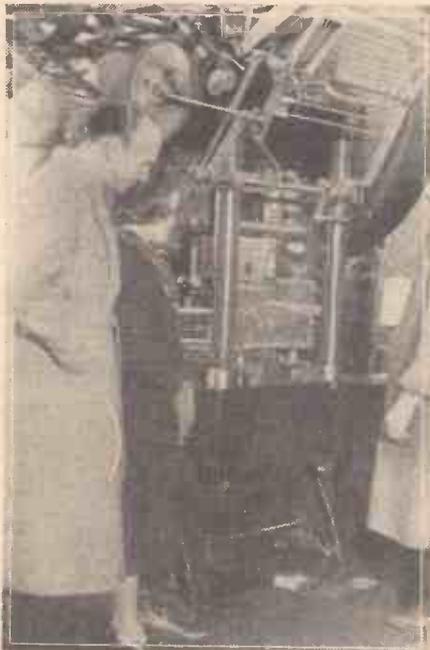
Philco and Coronation Day Broadcast

IN order to permit schoolchildren and other residents of the Perivale district to hear the broadcasts of the Coronation procession on May 12th, Philco Radio has arranged to install in front of its Works a public address system. Sufficient loudspeakers will be in use to enable hundreds of listeners to hear the full four-hour programme.

The B.B.C. is tentatively planning to broadcast a continuous commentary from the time the Coronation procession leaves the Palace until it returns. This and other interesting highlights of the day will be amplified by the Philco loudspeakers. Coronation Day will be a full-day holiday with pay at the Philco factory. The few men who will be needed to operate the public address system will receive some other day off with pay.

Theatre Variety

THE chief attraction in a variety bill from the Aston Hippodrome, which Midland listeners will hear on March 19th, will be Billy Merrin's stage act.



Roy Fox at the Pye Radio Works at Cambridge.

Concert from Torquay

ANOTHER of the popular concerts by the Torquay Municipal Orchestra will be broadcast from the Pavilion, Torquay, on March 16th, in the West programme. Doris Cowen (contralto) and Albert Voorsanger (violin) will be the soloists.

INTERESTING and TOPICAL NEWS and NOTES

Sociable Songs

PROGRAMMES by Harold Casey (baritone) and the B.B.C. Midland Singers have become a popular Midland feature, distinguished by intimate presentation and verve. They have included Sailors' Songs, Soldiers' Songs, Marching Songs, and now Sociable Songs. The accom-



GEORGE ELLIOTT, well-known guitarist, is here seen recording two numbers entitled "Red Heels" and "Answer Me" (H.M.V. BD5160) at the "His Master's Voice" studios.

panist for the programme to be broadcast on March 16th will be Leila Brittain.

Variety from Northampton

TROISE and his Mandoliers will be the chief turn in the variety bill at the New Theatre, Northampton, from which there will be a forty-five minutes' broadcast in the Midland programme on March 17th.

Roy Fox at Pye Radio Works

ROY FOX and his Band were appearing at the Theatre Cinema, Cambridge, recently, and during their stay, arrangements were made for a visit to the Pye Radio Works. Mr. Fox was impressed by the extensive plant necessary to produce radio receivers, and the accompanying illustration shows Mr. Fox and Mary Lee gazing at a large power press in the works.

Symphony Concert

SCHUBERT'S Symphony No. 7 in C is the chief work to be played by the City of Birmingham Orchestra at their Town Hall Concert on March 18th. The orchestra will be led by Alfred Cave and conducted by Leslie Heward.

Amateur Variety

MANY auditions have recently been given to variety artists, and a programme of successful amateur variety acts will be broadcast from the Western studios on March 13th.

Orchestral Music from Bristol

THE Grand Hotel Orchestra, directed by Adolphe Trotman, will broadcast from the Grand Hotel, Bristol, on March 15th. This orchestra, which has been for some years at the Grand Hotel, specialises

in light music, and the gypsy type of music, interspersed with piano solos by Adolphe Trotman.

Broadcast from Tennessee

INTERESTING programmes from abroad will include a feature from the mountain country of Tennessee, which National listeners will hear on March 13th. Many of the unsophisticated hill-folk of this region are fine natural musicians, and Felix Greene, the B.B.C.'s North American representative, will pay a special visit to a typical village in order to coax the shy inhabitants to sing folk-music and pastoral songs and tell stories in their local dialect.

Dance Cabaret

DANCE Cabaret will be broadcast from the Coliseum Ballroom, Bristol, on March 20th, when Western listeners will hear Reginald Williams and his Futurists Dance Band, and Kemble Kean.

Organ Recital

HAROLD STRINGER will broadcast an organ recital from the New Savoy Cinema, Exeter, on March 18th.

Birmingham Festival Choral Society

THE first part of the Birmingham Festival Choral Society's concert from the Birmingham Town Hall, where they are giving "Elijah" with the City of Birmingham Orchestra, will be broadcast on March 11th. The conductor will be Harold Gray, and the soloists, Emily Broughton, Ethel Davies, Charles Hedges, and Howard Fry.

SOLVE THIS!

Problem No. 234.

Franklin's A.C. receiver suddenly became unstable, and when tests were made it was found that the voltages across all the secondary windings of the mains transformer were high. What was the trouble? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 234 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, March 15th, 1937.

Solution to Problem No. 233.

The transformer could be parallel fed, connecting the coupling condenser to terminals H.T. and G.B., output valve grid to P, and G.B.—lead to G.
The following three readers successfully solved Problem No. 232, and books are accordingly being forwarded to them: J. Robertson, Aukengill, Wiek, Caithness; A. S. Hall, 66, Whitworth Crescent Bitterne Park, Southampton; G. Webster, 14, Birrid Crescent, Leeds, 4.

L.F. Instability and Distortion

Various Methods of Eliminating Low-frequency Feed-back, and Consequent Distortion, in Various Types of L.F. Circuits are Explained.

By FRANK PRESTON

It is often overlooked that reaction can occur in the low-frequency portion of the set. Nevertheless, such feed-back is not uncommon, and is often

valve is fully loaded (receiving as great a low-frequency grid voltage as it can "handle") any increase would merely lead to distortion or make it necessary to

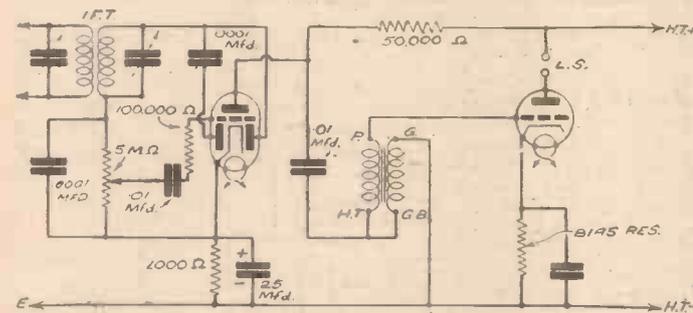


Fig. 1.—Double-diode triode, with resistance-capacity coupling between diode and triode sections, parallel feed transformer coupled to a super-power output valve.

responsible for certain forms of insidious distortion, which is likely to be ascribed to the detector or H.F. circuits.

L.F. reaction or feed-back in its worst form takes place when two transformers are used to couple together three valves, and when the transformers are so placed that their fields interlink. This particular cause of trouble is rarely noticed to-day, because it is unusual to employ two transformers; a more usual arrangement is to use resistance-capacity coupling between the detector and first L.F. stages, with either R.C. or transformer coupling between the two L.F. valves. This is particularly the case in a superhet having a double-diode triode valve for second detection and L.F., as shown in Fig. 1.

Even here, however, it is not wise to use a transformer having a high step-up ratio. This is because feed-back and instability (which is almost the same thing) are more likely to be in evidence when a very high degree of amplification is obtained. A transformer having a ratio of not more than 1:2 is generally to be preferred, whilst a 1:1 ratio is not too low when the output valve is a pentode. Incidentally, a 1:1.3 ratio is easily obtained from an ordinary low-priced 1:3 transformer by using the parallel-feed connections shown in Fig. 1. In this case the anode load for the triode portion of the double-purpose valve is a fixed resistance of 35,000 to 50,000 ohms, and the coupling condenser has a value of .01 mfd.

"Handling" Capacity

By using this system of coupling, not only is the step-up ratio reduced but there is less tendency towards instability. It might be argued that the small amount of intervalve step-up must result in loss of volume, but in practice this is not always the case. One reason is that volume is greater when the valves are not oscillating at low-frequency, due to the fact that they operate more efficiently. Another is that, provided that the output

reduce the input by means of the volume control.

When only one L.F. valve is used after the detector in the usual type of "straight" circuit, L.F. oscillation is not usually troublesome, but it might be if the valve is a pentode and operated in such con-

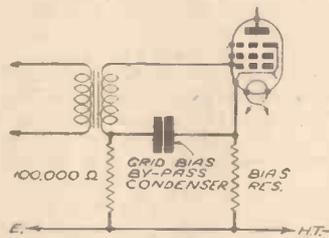


Fig. 3.—A simple and effective method of decoupling the grid circuit of a mains-type L.F. valve.

ditions that it is working "all out." The simplest method of overcoming the trouble would be to reduce efficiency by increasing the bias voltage to a figure higher than normal, by reducing the screening-grid voltage, or by using a transformer giving a lower step-up. Another simple method which often proves satisfactory, and which does not suffer from the disadvantage that it curtails signal strength, is to include a

Fig. 4 (left).—Choke-capacity speaker coupling with directly-heated output valve.

Fig. 5 (right).—A diode used in a "straight" set. Note the H.F. choke "stopper," and .0002 mfd. by-pass condenser.

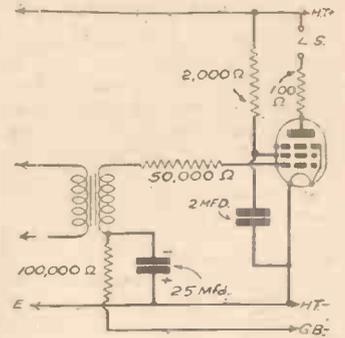
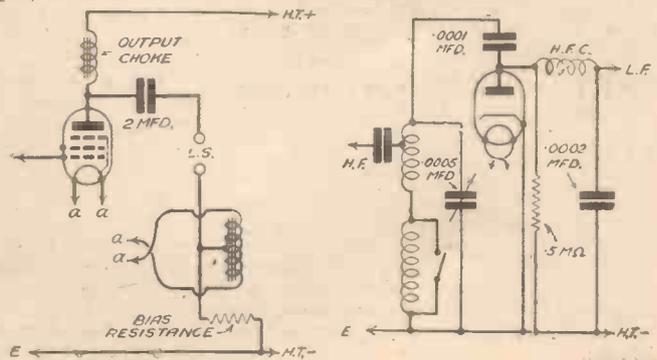


Fig. 2.—Showing four different methods of preventing L.F. oscillation.

fixed resistance in the grid-bias lead, as shown in Fig. 2. As can be seen, the resistance is by-passed, by a 25-mfd. electrolytic condenser. The resistance prevents direct coupling between the anode and grid circuits through the H.T. supply, G.B. battery and transformer secondary.

Grid and S.G. Decoupling

Another method is to decouple the screening grid, as also shown in Fig. 2, by inserting a 2,000-ohm resistance between the screening grid and H.T.+, and joining a 2-mfd. by-pass condenser between the screening grid and earth. Theoretically, it is essential to apply a lower voltage to the S.G. than to the anode, although this does not always work out in practice. Nevertheless, the refinement mentioned is worth while when instability is indicated by distortion in the form of a high-pitched whistle or "squeakiness" of reproduction; it is assumed that a resistance-capacitor circuit is included across the anode load in the case of a pentode.

Yet another method of overcoming the trouble is to insert a fixed resistance of about 50,000 ohms between the grid of the valve and the transformer secondary, as also shown. In the case of high-output mains pentodes and triodes an alternative or additional means of preventing oscillation is to connect a 100-ohm resistance in the anode circuit of the valve. It should be explained that it is not necessary to employ all of these methods of preventing L.F. feed-back, but it is sometimes necessary to try two or three of them in order to see which proves most effective.

When dealing with mains-operated receivers, the method of decoupling the grid circuit is as shown in Fig. 3. A 100,000-ohm fixed resistance is joined between the transformer secondary and earth, the bias decoupling condenser being connected between the upper ends of the two resistances, as shown, instead of in parallel with the bias resistance. If there is more than one L.F. valve—and this is the case on "gram" when the pick-up is connected

(Continued overleaf)

L.F. INSTABILITY AND DISTORTION
(Continued from previous page)

in the detector grid circuit—this form of decoupling is always to be recommended.

An additional method of preventing L.F. oscillation and consequent distortion, without reducing the output, is to connect the speaker on the choke-capacity system. This is shown in Fig. 4, where it is assumed that the output pentode is directly heated. Note that the "earth" side of the speaker is connected directly to the centre-tap of the filament winding, and not to earth, as is usual. If it were connected to earth, the bias resistance would be in series between the speaker and the valve filament, and this would "absorb" a certain amount of the output, especially if the value of this resistance were more than 200 ohms or so.

It has become increasingly popular to use a single valve for second detection, A.V.C. and power output. The type of valve suitable for use in this manner is the double-diode output pentode. It is obtainable only in mains types, but is very efficient. As it is designed to provide a high degree of amplification, however, it is important that it should be adequately decoupled. In nearly every case it is

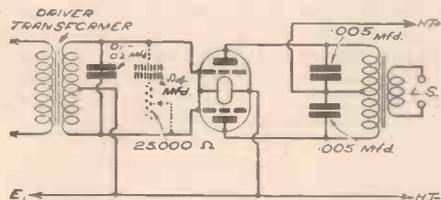


Fig. 7.—A peculiar form of distortion, sometimes noticed when using Class B amplification, can be prevented by connecting a condenser in parallel with the secondary of the driver transformer as shown here.

sufficient to include a 100,000-ohm fixed resistance in the grid circuit of the pentode section, and also to insert a 100-ohm resistance in the anode circuit, as mentioned above. A form of grid "stopper" is a practical necessity after any diode detector, but in some instances it is found better to replace the fixed resistance by a good H.F. choke, as shown in Fig. 5, connecting a .0002 mfd. by-pass condenser between the "grid" end of the choke and earth. An alternative use of the choke, which is more generally applicable, is shown in Fig. 6,

where a double-diode-triode valve is employed.

Class B Distortion

Class B amplification is not as widely used as it was a few years ago, although a number of manufacturers still make good use of the system. One reason for it being

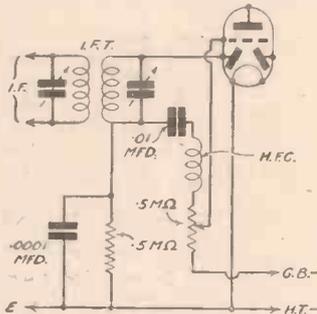


Fig. 6.—An H.F. choke used as grid "stopper" in a double-diode triode circuit.

dropped by constructors was that they found that they were unable to eliminate a certain amount of distortion. Actually, there is no reason why this should be the case if proper precautions are taken. This is proved by the fact that those commercial sets in which it is still employed are, without any notable exception, extremely satisfactory. The main trouble is that a peculiar form of instability—often accompanied by a very high-pitched whistle—is frequently present unless a fixed condenser is connected in parallel with the secondary winding of the driver transformer, as shown in Fig. 7. In addition to causing distortion, this instability also results in an excessive consumption of high-tension current. The by-pass condenser can be between .01 and .02 mfd., whilst a useful variable tone control is obtained by using a .04 mfd. condenser in series with a 25,000 ohm variable resistance (see Fig. 7, broken lines). The purpose of the variable resistance is to alter the effect of the condenser, and so to give more or less top-note cut-off. It is also important when using Class B that a .005 mfd. condenser should be connected between each end of the primary winding of the output transformer and the centre-tap.

"Balancing" Push-Pull Valves

Push-pull output is considered, for most practical purposes, to be distortion-free.

Nevertheless, distortion is sometimes caused due to the two valves having slightly different characteristics. A "balance" can be effected simply by including a "stopper" resistance in the grid circuit of each the resistances being of equal value, and about 20,000 ohms. Where pentodes are used in push-pull a further "balancing" effect can be obtained by carefully adjusting the screening-grid voltages. A simple method of doing this is to connect the two screening grids to the ends of a 5,000 to 10,000 ohm potentiometer of which the centre tapping is connected to H.T.+. This is shown in Fig. 8. In most cases it will be found that the slider requires to be set to its midway position in order to obtain best results, but in others it might have to be well away from the centre so that one valve receives a higher voltage than the other. The advantage of this system is that the optimum setting can be found while the set is in operation, and that the potentiometer serves as decoupling resistance for both valves.

The points dealt with above refer principally to a newly-constructed receiver, but there is another which applies only when the set has been in use for a considerable length of time. Thus it might

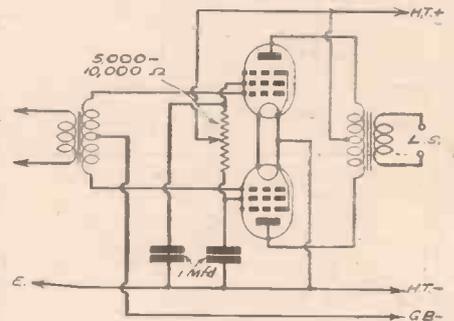


Fig. 8.—A simple method of "balancing" two pentodes used in push-pull.

be found that distortion occurs when the normal bias voltage is used, but is less noticeable if the voltage is reduced. Provided that the H.T. voltage is in order, this usually indicates that the L.F. valve has partly lost its emission and requires to be replaced. The same point applies to the detector valve if distortion occurs only when a pick-up is connected to it.

Extension Speakers

WHERE one or more extension speakers are permanently used in a definite room or rooms, it is a good idea to incorporate in each speaker a resistance appropriate to drop the volume to suit the room when the speaker in the receiver is working at normal volume level. Should an extension speaker have an impedance lower than that used in the receiver, a resistance can be used in a similar manner to prevent undue loss of volume from the main speaker when an extension is connected.

Good Television Reception in Fleet Street

MANY cases have come to our notice where television receivers are working satisfactorily, and reasonably free from interference, in locations where reception on the ordinary broadcast bands is impossible. A case in particular has come to our notice in Fleet Street, where almost perfect television reception is being obtained under conditions where reception on the broadcast is so mutilated by interference

ITEMS OF INTEREST

that it is only with difficulty that the station announcer's voice can be heard.

Metal-shielded Leads for Reducing Hum

IT is becoming more and more general to use metal-shielded wire for the detector grid lead in modern receivers in the interests of reducing hum. A commercially built receiver which we examined recently to trace the cause of a certain increase in hum was found to suffer from this metal covering becoming "unearthed," due to the small metal strip which gripped the metal sleeve becoming corroded. This is certainly a point to be borne in mind, as the usual method used of gripping metal-shielded wire is far more satisfactory. The metal-shielded pick-up leads in radiograms are often earthed by a metal saddle, and here again trouble is likely to arise. The great snag of earthing insulated sleeving is

that, owing to its open-work texture, the air has free access to the surfaces in contact, which is always liable to give rise to trouble. Soldering is undoubtedly the real solution.

Pick-up Needles

BETTER quality of reproduction is obtained by using a loud, or extra-loud needle in the pick-up with volume-control reduced, than using a soft needle with volume control advanced. Gramophone recording is inherently short on top, and the "louder" the needle, the greater will be the top note resistance. Admittedly there are less loud needles than medium or soft needles per box, but the increase in the brilliance of reproduction amply justifies the extra expenditure.

Broadcasts to Portuguese Colonies

CSW, the Lisbon National transmitter, which for some time was working on 31.41 m. (9.55 mc/s), has been trying out various channels for a series of tests made with the Portuguese overseas colonies. The station was last reported on roughly 50.3 m.

The Uses of Pilot and Dial Lamps

Although Seldom Given Much Attention, Light Indicators on Sets Need to be Watched for Several Reasons, as this Brief Survey Shows — By H. J. BARTON CHAPPLE, B.Sc.

ALTHOUGH one seldom sees a radio receiver to-day which is not fitted with a dial light, such lights have only been standard accessories on family sets for a comparatively few seasons. Actually, dial lights were introduced with the more general adoption of all-mains

and uncovered by shutters operated with the controls. The use of several lamps, however, is only permissible in sets operated from the mains, but for battery sets, and others, where economy is essential, it can usually be arranged that a single lamp shall illuminate the dial and all other indications, by means of shutters actuated by the controls and thus masking or revealing suitably worded tablets or windows on the scale.

Small flash-light bulbs are commonly used as fuses in battery sets, to obviate the risk of burned-out valve filaments in the event of accidental contact between the H.T. positive line and the low tension circuits. In most "universal" sets, the pilot lamp or lamps are wired in series with the filament or heater circuit of the valves, and thus serve as an indication that the valve heaters are intact and that the mains are "on," as well as for the illumination of the dial. Incidentally, a set having pilot lamps connected in this way will, of course, be inoperative should the lamp itself fail.

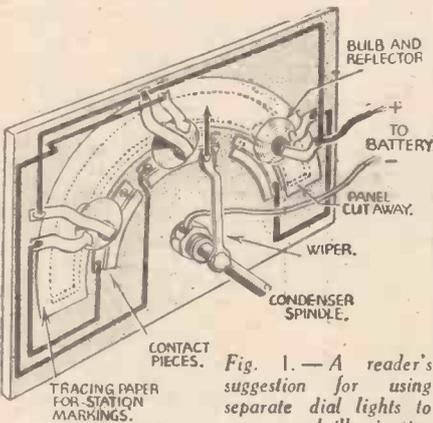


Fig. 1. — A reader's suggestion for using separate dial lights to ensure good illumination of the scale at all positions of the pointer.

receivers, and were only later applied to battery sets.

Obviously, and as its name implies, a dial light is intended primarily to illuminate the tuning dial. Usually a semi-transparent dial is fitted, with the light behind it, so that the tuning pointer, whether moving or stationary, stands out in bold relief. Other possible variants include again a semi-transparent scale, with an opaque shutter behind it and rotating with the tuning condenser, an aperture in the shutter permitting a beam of light, in the form of a spot or arrow, to fall upon the scale and thus to indicate the station or wavelength to which the set is tuned. A point to be kept in mind in this connection is that a dial light as such, is really required only when the set is being tuned. In the interest of economy in low-tension current, therefore, some battery sets are fitted with a switch or push-button, whereby the dial lamp is rendered incandescent only when it is desired to examine the dial for re-tuning, and so forth.

Unfortunately, this practice stultifies a secondary but very useful function of the dial lamp, namely, to serve as a pilot to warn the owner that the set is still switched on.

Other Uses

Other uses of pilot lamps are to indicate the position of wave-change switch and radio-gramophone switch, and the settings of other controls. This is sometimes done by the use of several lamps either switched on by the controls themselves or covered

Inspection Purposes

Before leaving the uses of pilot lamps a few words might be written about possible uses which are seldom, if ever, exploited.

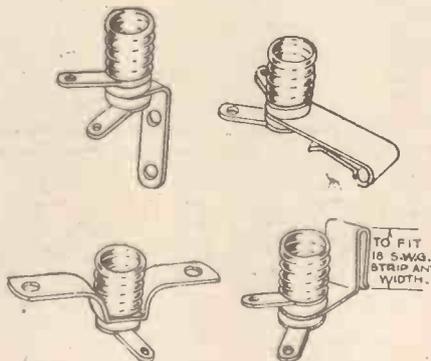


Fig. 2. — A few of the bulb holders which may be obtained from Messrs. Bulgin, and which will enable a lamp to be fitted to any receiver.

How many times does it occur that the innermost recesses of a set or a radiogram are so congested and obscure that it is impossible to examine them or to undertake any normal service work? And what is easier or cheaper than to arrange a permanent miniature lamp to illuminate these dark corners, or to provide a small movable inspection lamp of similar type? In the case of a battery set, the low-tension accumulator can be used as the supply for the inspection lamp, the connections being taken to the battery side of the on-off switch so that inspection can be done when the set is switched off. For mains sets it

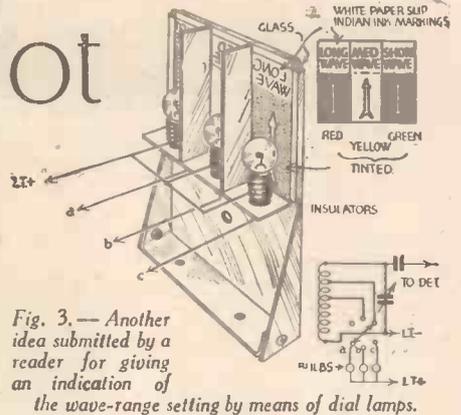


Fig. 3. — Another idea submitted by a reader for giving an indication of the wave-range setting by means of dial lamps.

would be best to use a flash-lamp battery for the interior inspection lamp, and not the low-tension circuit of the set, since it is especially important not to open up or to undertake any internal adjustment to a mains set while the receiver is switched on.

Many experimenters have quite a number of different units which they use in combination from time to time, each of which should be fitted with its own pilot lamp to avoid the risk of any one part being inadvertently left on circuit for lengthy periods. A recent visit to a particularly well-arranged amateur's laboratory revealed just such a scheme; the main power unit, a speaker energising unit, several alternative radio units, microphone and power amplifiers, etc., each having a small red-glazed window through which a pilot lamp glowed its warning so long as that particular unit was on circuit.

Ratings

Dealing first with battery sets, dial lights should, of course, be wired on the side of the on-off switch remote from the accumulator. With regard to the rating of the bulb, it is first of all necessary to point out that inexpensive flash-lamp bulbs should never be employed in any type of set, as they are rated only for intermittent service, and their life on continuous duty is usually very unsatisfactory, even if they are considerably under-run. Next, it should be noted that reliable lamps are available rated for 2-volt, 4-volt, and 6-volt circuits, and taking currents ranging from 0.06 ampere to 0.5 ampere in each range. Although only a 2-volt accumulator is used in battery sets, even the 2-volt 0.06 ampere rating lamp may be too great a drain on the battery from the point of view of economy, especially where the accumulator is already on the small side. Such a lamp is equivalent to adding an extra load equal to about half of an extra valve. It is not a bad plan, therefore, to fit two dial lamps in series, one as the dial lamp proper, and the other merely as a resistance to reduce the over-all consumption, but fitted with a push-button to short-circuit the resistance lamp and thus to give full illumination during tuning. The two lights running in series during normal running of the set will give just sufficient illumination to remind the listener that the set is still switched on.

Bulbs for A.C. Use

The 4-volt range of lamps is suitable for use with A.C. sets, but in the interest of lamp life, no bulb taking less than 0.2 ampere should be used in a mains set. Lamps of this rating, if not over-volted, will have a life of the order of 300 burning hours, but a 0.5 ampere lamp may be

(Continued on page 762)

Practical Television

March 13th, 1937. Vol. 3. No. 41

A Convergence?

ALTHOUGH those who look in at the present television programmes show a marked preference for studio or outside broadcast subjects, it is being freely expressed in some quarters that the television side of radio broadcasting and the films will show a definite convergence. This liaison between the broadcasting authorities and the makers of motion pictures will become manifest as the former brings about the expected improvements in its own technique. The large film companies have their chains of cinemas, and it is felt that ultimately they will have their own radio transmitters or, alternatively, an agreement with the radio authorities whereby television pictures will be received and shown on the cinema screen as part of their public entertainment. There is no doubt that the film, once cut and edited does represent a form of complete entertainment which is exempt from the vagaries of actors and actresses, and is available for use at any time that it may be required.

A Debatable Point

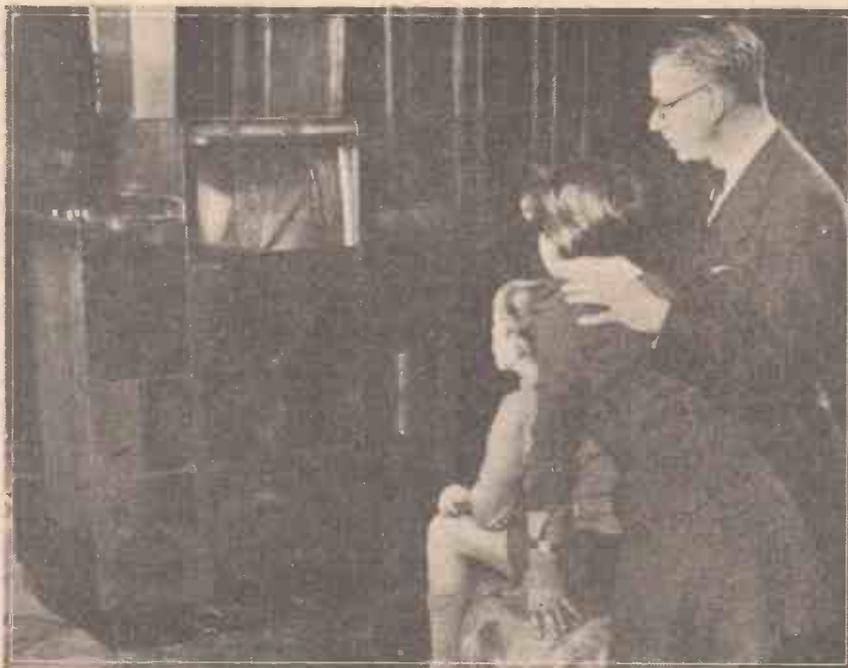
IN this country the maximum carrier modulation of the video signal corresponds with white in the picture, the range being from between 30 to 40 per cent. for black to 100 per cent. for white. In France, however, the reverse holds; that is to say, the signals are negative when compared with ours. The authorities responsible for the negative signal claim that its use enables the interference effects to be less distracting, while time-base generators are somewhat simpler to design and operate, and outside effects are less likely to have a marked effect on performance. It is also significant that the American R.M.A. have recommended to the Federal Communications Commission that a negative signal be used in any standard adopted by that country. If any export trade is to be desired it is certain that some universal standard will have to be adopted, but how soon the countries will co-operate to this end is a doubtful point. No doubt considerable experience with the various methods and standards will be obtained before any combined step is taken, and it will then be most interesting to find which country has developed the most perfect system.

Tube Data

MOST of the cathode-ray tubes now on the market are operated electrostatically for both beam deflection and focusing, and, in consequence, the terminating cap has anything up to twelve contacts to accommodate. In the case of the "Cathovisor" cathode-ray tube made by Baird Television, Ltd., however, the design is quite different, for the beam control over the screen is carried out electromagnetically. The cap, therefore, has only four contacts; two for the cathode, one for the anode, and the last for the modulator. The characteristics of the tube are very interesting, and show where the differences lie when compared with the more common types. The anode has a maximum positive voltage

of 6,500, while the static negative bias applied to the modulator is 110 volts. As far as modulation is concerned, the peak to peak volts between black and defocusing is 70, while the peak to peak volts between highlights and black is less than half this; that is, 30 volts. The figure of 3.5 milliwatts is given as the maximum input power to the screen for each sq. cm. of available area. Whereas the sensitivity of most tubes is expressed as the distance in millimetres moved by the spot on the screen per volt change on the deflecting plates, in the case of the electromagnetic tubes this is given in terms of millimetres per ampere turn in the externally-mounted deflecting coils. In the tube under review this is stated to be 2 millimetres per ampere turn with the line coils strapped in their correct position on the glass neck for normal operation in the finished receiver. Finally, the screen has a

Now, however, the time base is defined quite clearly as the trace of the spot of light on the screen of a cathode-ray tube, which spot of light moves with a predetermined velocity for the purpose of imparting a time scale. On the other hand, a time-base generator is the device for producing a potential varying in a definite and periodic manner and used to impress on the beam of a cathode-ray tube a time-scale deflection (usually linear with respect to time). It is the aim of all television receiver designers to see that spot movement is linear with respect to time, otherwise the received picture as seen on the tube acquires a form of distortion which in many cases destroys what otherwise would be a good picture. As far as the electrodes of a cathode-ray tube are concerned the loose and quite wrong expressions such as "gun" or "plate" have given way to anode, which is an electrode normally positive with respect to the cathode and whose primary function is the acceleration of the electrons forming the beam. The electrode termed the modulator is almost self-explanatory, being the grid or other device to which a varying potential is applied in order to produce a modulating action on the intensity of the beam. Focusing is classified under the three primary heads of gas, magnetic, and electro-static, while the expression



Mr. Henry Hall, with his son and daughter, enjoying a television programme received on a Marconiphone receiver (Model 701). This model has now been reduced to 80 guineas.

diameter of 38 cms. with a total tube length of 83 cms. These figures for the type 15WM1 tube should be compared with the table of other makes given on page 592 in our issue dated January 30th, 1937. At the moment these tubes are not available except as spares for the television receivers.

Television Terms

THE Glossary of Television Terms issued by the British Standards Institution provides the correct description of a time base. In cathode-ray tube work this expression is so often loosely used to designate the piece of apparatus responsible for generating the potentials, or currents, for bringing about the motion of the electron beam as a visible trace of some form on the screen.

"fluorescent screen" is very strongly deprecated and should be replaced by screen, a specially prepared surface which becomes luminescent under the stimulus of the electron beam at the point of impact. Afterglow is defined as the persistence of screen luminosity after the stimulus has been reduced or removed, and readers will know that according to the chemical composition of the screen powder so the duration of the afterglow can be regulated according to the particular needs of the cathode-ray tube. If books and journals will, as far as possible, adhere to these terms — a practice followed whenever possible in the columns of this journal — then a measure of the confusion which has existed hitherto in a fairly new applied science and industry will be removed.

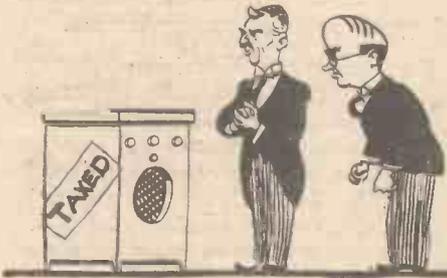


On Your Wavelength

By THERMION

A Tax on Wireless Sets

ROUND about this time, people will be talking of the first cuckoo, the first violet modestly blushing in the verdant woods, the birds building their nests in watercans and drainpipes, and the crocus spreading its petals to old King Sol. Other things, too, appear at this time, notably, suggestions to the Chancellor of the Exchequer as to how he can raise additional revenue. The people who make these suggestions are, of course, mainly interested from a patriotic point of view; they are not in the least concerned with the fact that they are already paying 5s. in the pound Income Tax. Oh, no! £1,500,000,000 has to be found for armaments, and they are so anxious to pay for them that they want to



A tax on sets!

suggest to the Chancellor of the Exchequer additional sources of taxation. It may just be that they wish to provide these additional sources to circumvent any increase in the Income Tax. There is a rumour going around that one of the new taxes will be placed on wireless sets in addition to the ordinary Listener's Licence. If you own a car, they argue, you have to have a licence for every car you own, in addition to the driving licence. It seems extremely likely that this tax will come off, or rather, be placed on!

Still, I suppose we must not

doubt that every listener in the country will be anxious to roll up with his extra 10s.—as the Cockney said, "I don't think!" This is the most heavily taxed country in the world. We pay more *per capita* than any other country, and it seems impossible to place on that extra straw which breaks the camel's back. Do you realise, dear reader, that if you are earning more than about £300 a year, you are working for three months in the year for the country free of charge; or put another way, you are keeping at least four people on the dole each week? I had often wondered how long it would be before the Chancellor turned his roaming optics on to wireless. With whisky at 12s. 6d. a bottle, and of a proof only slightly stronger than that of barley water, it was too much to expect that we should be allowed to enjoy wireless entertainment for 10s. a year. It will shortly become a revenue producer for the country instead of for the B.B.C. only. I expect as soon as the Unemployment Fund runs out of stock of the necessary quids the tax will be increased. In order to live we shall very shortly have to pay weekly visits to those avuncular persons associated with the three brass balls. I am not only warning you; I am being prophetic, and as you all know, I do not embark into the realm of vaticination without knowledge of the facts.

Mark my words, a wireless tax is coming!

Search for New Tunes

THE jazz composers have apparently used up that micron of grey matter which is all they need to control the silly movement of their arms in playing some comic instrument or wielding a baton in the pretence that they are conducting a band.

complain. We get good value for our 10s., and if additional revenue is desired I have no

They have used it up in an effort to find new tunes for the wagging bodies, males and females, who are really human puppets with a spiritual home in Bedlam. They are now committing the monstrous crime of converting the classics into jazz. We are now having operas in rhythm. I am sure that Wagner, Bizet, and Suppé, must have squirmed in their graves. I hope that living composers will make a clause in their wills forbidding their compositions to be played except according to the score.

Wireless Club for Llandudno

I HAVE received a joint letter from John W. Leech and Charles Ford, of Valhalla, Rhuddlan Avenue, Baynau Estate, Llandudno, and 2, Brookes Street, Llandudno. They wish to form a club in their district, and ask my co-operation in inviting other local readers to get into touch with them. They would also like to correspond with any other radio fan



They are jazzing the Classics, composers are turning in their graves

with a view to exchanging letters and news.

Television Modulation

MR. H. CHADWICK, of Oldham, referring to my recent paragraph about new ideas for television, sends me an idea for modulation which he has tried out. The apparatus consists of a piece of mirror glued on to a moving-iron loudspeaker diaphragm. The mirror is rectangular, and is treated so that its reflecting power diminishes as you move between opposite faces. A beam of light is allowed to fall on the mirror at an

angle of about 60 degrees to the normal and is received after reflection in a lens of long focal length. This focuses the beam on a small slit and then passes through a mirror drum in the usual way. When the loudspeaker receives signals, the mirror is depressed and a brighter portion of the beam is allowed to pass through the slit. The brightness of the emergent beam can be varied according to the signals received by the loudspeaker. Sounds ingenious, but I do not think it would work well.

Television "Relays"

THE GENERAL ELECTRIC COMPANY tell me that they have received many inquiries from hospitals about the possibility of relay systems of television throughout a building from one central receiver.

In the case of radio installations in hospitals, one receiver is provided with relay lines to earphones at the patients' bedsides or, in some cases (e.g., in convalescent wards), to a loudspeaker.

"Television distribution from a central point to a number of screens is quite feasible," said a G.E.C. technical expert. "It would be quite possible for a large hospital to have one screen in each ward operated from a central point. It would be necessary, however, to have a cathode-ray tube and loudspeaker for each reception point and a special mains unit to supply the necessary voltage.

"The only objection so far to the scheme is one of cost, but with the increasing demand for television it is likely that the price will shortly be within the reach of most big hospitals. Experimental work on this development is already being carried out in our laboratories.

"We have also received inquiries from owners of large blocks of luxury flats, and it is possible that in one new building extensions will be provided in every flat from a central point."

Broadcast Difficulties

I HAVE just seen an interesting account of broadcasting difficulties which were encountered during the recent Cincinnati floods. The Armeo Band Concert, which originates in the studios of the 500,000-watt station WLW, was performed recently under the following conditions. High water had flooded the boiler room of the Crosley plant, and there was no heat.

The city's electric power was cut off and engineers set up an emergency power generator outside Master Control. With lift service cut off and the front entrance blocked by water, Simon and his bandmen



Notes from the Test Bench

Transformer Current Rating

WE are often asked by constructors whether they can cut down the current delivered by their mains transformer. In most cases they state that the transformer is rated at 250 or 350 volts, 120 mA, and the set consumes only 60 mA. These queries are, of course, of the opinion that the transformer delivers 120 mA whatever the consumption of the valves, and think that the valves will be overloaded by the excessive current output. The 120 mA marked on the transformer is the maximum current that can be taken from it, however; the actual current delivered is governed by the consumption of the valves and any potentiometers which may be connected across the output circuit. For example, if the current taken by the valves and potentiometers is 60 mA, the current delivered by the transformer will be this value. It will therefore be realised that a 250 volt 120 mA transformer may safely be used to supply 60 mA—there may be a slight rise in voltage due to the low load.

Rectifiers

THE same reasoning applies to the rectifying valve: a 250 volt 120 mA valve rectifier may be used to supply 60 mA. In the case of rectifiers it is also permissible to use a rectifier rated at 350 volts, 120 mA for supplying valves taking only 250 volts at 60 mA. The actual voltage in the output circuit of the rectifier will be governed by the voltage applied to it from the mains transformer and, therefore, although the rectifier may be marked 500 volts at 120 mA, the voltage and current in its output circuit will not reach these figures unless the receiver valves consume 120 mA and the transformer supplies sufficient voltage to provide an output of 500 volts.

Fuse Rating

IT is customary to fit a fuse in the H.T.—lead of a battery receiver in order to safeguard the valve filaments if excessive voltage should be accidentally applied to them. If the fuse is to function effectively it must be of such a type that it will blow before the valves. If two of the valves take .1 amp., and the third one .2 amp., as is usually the case, the fuse should blow when a current exceeding .1 amp. is passed through it. It must, however, be able to pass the maximum H.T. current consumed by the valves. Most battery receivers consume between 10 and 20 mA, but the surge current when switching off often reaches 40 mA.

entered the studios through the Crosley factory and then began their trek up eight flights of stairs.

Some were unable to reach the studios because of high waters around their homes, so substitutes were found. Then rehearsal began. With a temperature of 20 degrees above zero and no heat in the studios, the bandmen wore heavy coats. Hip boots and hats were favoured as apparel, also.

Despite all the obstacles, however, the show went on. NBC had arranged a stand-by programme in New York just in case, but with the determination that has made Frank Simon's one of the outstanding bands in the country, the 50 musicians plugged away, using impromptu lights, arranged by WLW engineers.

Television Exhibition

A NUMBER of readers have written from the provinces asking for details of visiting hours at the Science Museum and the demonstrations of television which are to take place there. I therefore give the following details:—

The Science Museum is open free on weekdays from 10 a.m. to 6 p.m. and on Sundays from 2.30 to 6 p.m.; closed on Good Friday and Christmas Day. Free public lectures are given twice daily by the Guide Lecturers, at 12 noon and 3.0 p.m. (on Saturdays and Bank Holidays at 2.15 and 4.15 p.m.—no lectures on Sundays). Arrangements can also be made for free special lectures to School and other organised parties. Particulars can be obtained on application.

Parliament and Television

A FEW days ago the Postmaster-General was asked questions on the future control of television and also when stations were to be established elsewhere. One question was to ascertain whether the B.B.C. have a monopoly in respect of the use or rejection of any television transmission system which may be discovered in the future. The reply was to the effect that it was not intended that the B.B.C. should be responsible. The Television Advisory Committee under the chairmanship of Lord Selsdon was charged with the duty of advising the P.M.G. on this and other matters arising in connection with the development of the broadcast television service. When sufficient experience has been obtained of the working of the service from the London station at Alexandra Palace the committee will then consider the establishment of stations in other parts of the country and will make recommendations on the subject.

Concerning "A.W." Lucerne Coils

In this Article Information is Given Concerning "A.W." Home-made S.W. Coils, the "W.M." Economy A.C. Two, "W.M." 1934 Standard Three, "W.M." Emigrator, and the A.C. Shortwaver

THE A.W. Lucerne Dual Range Coils were first described in the issue of *Amateur Wireless* of January 27th, 1934, the object of the designers being to produce components which could be made by the home constructor at a very low cost, and without previous experience.

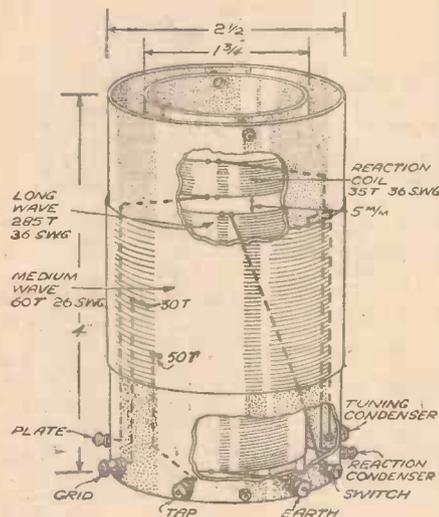


Fig. 1.—Principal constructional details of the Lucerne type coil.

The construction and characteristics were such that the coils were suitable for many circuits; in fact, quite a number of receivers were designed around them, and it is still possible to secure blueprints of many of them.

At the time of publication, the coils, ready wound and tested, or the kit of parts could be obtained from Ohmic Accessories, Peto-Scott, and Wearite, and we are given to understand that it is still possible for these firms to supply the items.

Constructional Details

The construction is shown in Fig. 1, where it will be seen that two formers are used, one fitting inside the other and kept in position by four fixing screws and distance pieces, the outer former being used to provide connecting points by the terminals shown.

The theoretical circuit is shown in Fig. 2, and it will simplify matters if both diagrams are studied when making and connecting the various windings. The tappings are provided to secure the highest degree of selectivity possible with a coil of this type, but it must be appreciated that, efficient as the coils are, they cannot be expected to compare with modern iron-cored types. For the reaction coil, the winding connected to the terminals "plate" and "reaction condenser," 35 turns of 36 S.W.G. enamelled wire is required, while for the long-wave section, i.e., the coil connected to the

"earthy" end of the medium-wave winding and the terminal "switch" and the "earth" terminal, 285 turns of the same wire is necessary.

The reaction and long-wave windings are wound on the inner former, there being a distance of 5 mm. or about 1/8 in. between them. It is advisable to note, at this point, that the actual position of the reaction coil in relation to the medium and long-wave windings is very important, if smooth and adequate reaction is to be obtained on both wave-bands.

The above remarks also govern the position of the L.W. winding to that of the M.W.; actually the top ends of both windings should be level with each other, otherwise there will be excessive or a loss of reaction on one wave-band.

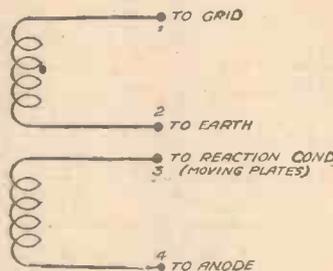


Fig. 3.—Connections of the S.W. coil shown in Fig. 4.

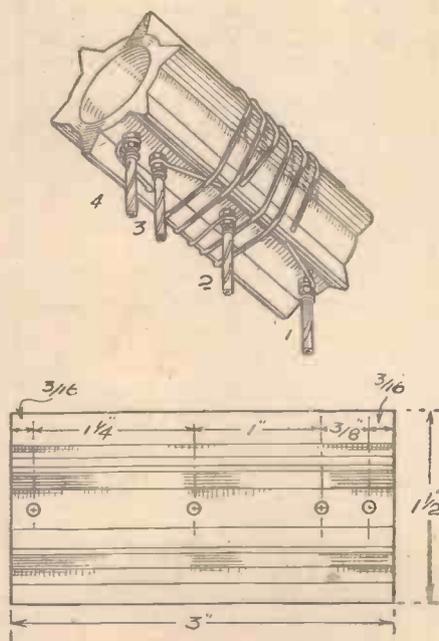


Fig. 4.—How the short-wave coil is wound, and drilling dimensions for the pins.

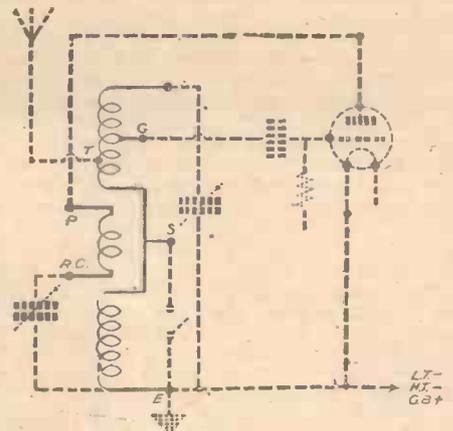


Fig. 2.—Theoretical arrangement of the Lucerne coil shown in Fig. 1.

The medium-wave grid coil consists of 60 turns of 26 S.W.G. enamelled wire, and tappings are taken at the 30th and 50th turns from the upper end. Note the connections to this coil; the commencement goes to the "tuning condenser" terminal; the first tap (30th turn) to "grid"; the second tap (50th turn) to "tap"; and the end of the coil to "switch" and the start of the L.W. winding.

Substituting the Wearite "Uni-gen" Coil

It is quite possible that some constructors may wish to fit a more modern coil or coils in some of the Lucerne designs, so we give below the equivalent connections, as it is impossible to deal with all makes of coils and every circuit separately.

"Uni-gen" Coil.	A.W. Lucerne Coil.
Terminal No. 1	Tuning Condenser Terminal
2	Switch
3	Earth
4	Tap
5	Earth
6	Reaction Condenser*
7	Grid Condenser
8	See footnote.

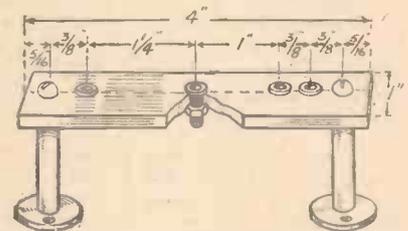


Fig. 5.—Coil-holder for the S.W. coil shown in Fig. 4.

The following blueprints of receivers using the Lucerne Coils are still available:—
 Four-station Crystal Set. No. A.W. 427
 B.B.C National Two. A.W. 377A
 Big Power Melody Two A.W. 338A
 Lucerne Minor. A.W. 426
 Lucerne Ranger (S.G.3 Valve) A.W. 422
 Cossor Melody Maker.* A.W. 423
 Mullard Master Three.* A.W. 424
 Lucerne Straight Three. A.W. 437

*Modified for-Lucerne Coils.
 (Continued overleaf)

* It will be necessary to modify the original reaction circuit, as one end of the reaction winding on the Uni-gen coil is connected to earth(3), so the other side of the reaction condenser must be connected to the plate of the detector valve, and not earth as with the Lucerne coil. If, by any chance, metal panels are in use, be sure that the spindle of the condenser is not connected to the plate, otherwise, the detector H.T. will be shorted. Regarding terminal No. 8, if so desired, a three-point wave change can be used, and the third contact connected to this terminal.

The A.W. Home-made S.W. Coils

These coils were first described in the issue of A.W. of July 7th, 1934, and they are so designed that a wave-range of 12 to 175 metres is covered with three coils.

Their construction is very simple, while their efficiency, if good quality formers are used, compares very favourably with some commercial products costing many times their price. The theoretical circuit is shown in Fig 3, and the constructional details in Fig. 4.

The bases or holders are shown in Fig 5, and it will be noted that the arrangement is such that very low inter-pin capacity is present.

Winding Details

The material required is: three pieces of ebonite tubing of the six-ribbed type, 3ins. long, and with a diameter of 1½ins.; twelve Clix valve pins, with three nuts on each pin; approximately 7ft. of 20 S.W.G. tinned copper wire, and 14ft. of 20 S.W.G. enamelled. The tinned copper wire is used for the two smallest coils, and the enamelled wire for the third or largest coil. The first coil covers a wave-band between 12 and 28.5 metres, and consists of three turns for the grid coil (connections 1 and 2), and three turns for the reaction (3 and 4), each turn being spaced ¼in.

The second coil, 19 to 59 metres, has 8 turns for the grid, and 5 turns for the reaction coil. The spacing being the same as for the other coil.

The largest coil covers the 55 to 175 metre range, and consists of 23 turns of enamelled wire for the grid, and 10 turns of the same wire for the reaction, but in this case the turns are wound on without any spacing.

The wave-range specified is with a tuning condenser of .00025 mfd. capacity, and a reaction condenser of the same value.

Before commencing the winding operations, drill the holes for the valve-pins, and fit the pins in position ready for anchoring the wire. It is always advisable to stretch the wire before winding, thus removing any kinks. If it is intended to solder the wire to the pins, be careful not to overheat the pins, which would cause them to become loose in the ebonite.

Coil Holder

All the dimensions are given in the diagram, and it is essential that the various points are marked accurately (the same applies to the coil formers), otherwise the pins will not engage with the sockets, which, by the way, are also obtained from Clix.

The supports, which keep the coil holder well clear of the baseboard, are made by Bulgin. These coils are used in many short-wavers, and it is still possible to obtain the blueprints mentioned below, from these offices.

- The Roma Short-waver (1 Valve) A.W.452
- The Home-made Coil Two (S.W.) A.W.440
- Short-Wave Adapter A.W.456
- Short-Wave Converter A.W.457

The A.W. Short-wave World-beater (A.W. 436)

This is a four-valve battery-operated receiver, employing one stage of tuned S.G. H.F. amplification, with super-power output valve, and ganged tuning.

It is a very efficient receiver, capable of giving most satisfactory results, as numerous reports have already proved, and it is ideal for the S.W. amateur who wants that extra punch and range.

As the issue is now out of print (the blueprint is, of course, still obtainable), we give below the list of specified components.

The Twenty-station Loudspeaker One-valver

The vital part of this circuit (blueprint number A.W.449) is the valve, and it should be noted that the receiver is designed round the Hivac D.B. 240 valve, therefore it is essential for that make and type to be used.

The only other components to be carefully chosen are the Class B input and output transformers. Use good ones, such as those made for example, by Wearite, Varley or Bulgin, as they govern the efficiency of the circuit to a great extent.

The coil can be any reliable make of dual range aerial coil with reaction winding. The other components are standard lines, and, as such, do not call for any comment.

Wireless Magazine Designs

There are still blueprints of several W.M. designs available, for which the associated issues are out of print, so we give the component specifications of those still suited to modern conditions.

The Economy A.C. Two (W.M 286)

This circuit, Fig. 6, is of the Det. and Pentode type, employing valve rectification, and it is ideal for local station reception and pick-up work.

LIST OF COMPONENTS FOR THE ECONOMY A.C. TWO.

- 1 H.F. Choke (Varley).
- 1 L.F. Choke (Heayberd), Type 752.
- Coil: Lotus Dual Range *
- Condensers, Fixed:
 - 1 .0001 mfd. (Dubilier), Type 670.
 - 1 .001 mfd. (Dubilier), Type 670.
 - 1 .1 mfd. plus .1 mfd., Type 1,000 volt, A.C. test (Peak or Dubilier).
 - 2 1.0 mfd., Type 1,500 volt, D.C. test (Peak or Dubilier).
 - 2 4 mfd., Type 1,500 volt, D.C. test (Peak or Dubilier).
- Condensers, Variable:
 - 1 Formo, .0005 mfd., with S.M. Dial.
 - 1 Polar Compax .0003 mfd.
 - 1 Polar Pre-set .0003 mfd. max.
- Panel: Ebonite, 9in. x 6in. (Peto-Scott).
- Valveholders:
 - 3 W.B. 5-pin type.
- Resistances:
 - 1 600 ohm.
 - 1 1,000 ohm.
 - 1 1 megohm grid leak.
- Valves:
 - 1 Mazda A.C./H.L.
 - 1 Mazda A.C./P.
 - 1 Mullard D.W.2.
- Switches:
 - 1 Bulgin, Type S88.
 - 1 Bulgin, Type S86.
 - 1 Three-point push-pull.
- Transformer:
 - 1 Ferranti OPM8.

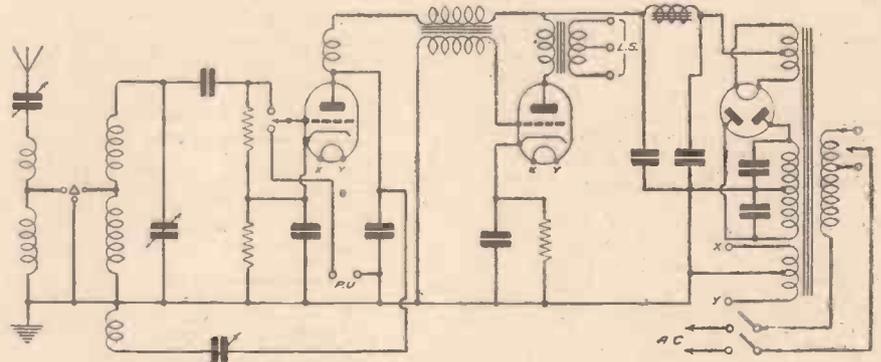


Fig. 6.—Theoretical circuit-diagram of the Economy A.C. Two.

LIST OF COMPONENTS FOR THE A.W. SHORT-WAVE WORLD-BEATER.

- Chassis. Peto-Scott. Aluminium 12in. x 6in. x 3in. Aluminium panel 12in. x 9in.
- Chokes. 2—Eddystone Type 948.
- Coils. 2 Sets—Eddystone 6L.B. (2), 6Y. (2), 6R. (2) and 6W. (2), with two bases, Type 964.
- Condensers:
 - 1 each tubular .0001, .0003 and .001 mfd.
 - 1 each 250 volt working, .02 mfd., .04 mfd.
 - 2 each 250 volt 2 mfd. (Dubilier or T.C.C.).
- Condensers, Variable:
 - 1 Two Gang .00016 mfd.
 - 1 Eddystone .00025 mfd. with S.M. drive, Type 957.
 - 1 Eddystone .0001 mfd., type 900.
- Dial: Polar Micro-drive Semi-circular.
- Valveholders:
 - 1 Clix 7-pin, chassis mounting.
 - 3 Clix 4-pin, Airsprung chassis mounting.
- Sockets:
 - 4 Belling-Lee sockets with wander plugs, marked Aerial, Earth, and P.U. (2).
- Resistances:
 - 1 each Eric or Dubilier 30,000-40,000, 60,000-100,000, and 2 megohm.
- Sundries:
 - 1 Aluminium screen (Peto-Scott), 4½in. x 4in.
 - 1 ft. brass strip, ½in. x ½in.
 - 1 piece 5-plywood 3in. x 2½in.
 - 2 Bulgin jacks, Type J.2.
 - 2 Bulgin Plugs, Type P15.
 - 1 J.B. Coupler, Type 2003.
 - 1 Insulated bush to take ½in. spindle.
 - 1 2in. length, ½in. rod.
 - 1 2in. metal mounting bracket.
 - 1 Bulgin toggle switch, Type S80T.
 - Wire, plugs, spade ends, etc.
- L.F. Transformer:
 - Varley 3½ : 1 ratio.
- Valves:
 - 1 Cossor 215 S.G.
 - 1 Cossor 210 H.F.
 - 1 Cossor 210 L.F.
 - 1 Cossor 220 P.

* As the specified coil is no longer available, a modern iron- or air-cored coil should be fitted, the connections of the Wearite Uni-gen, and the Varley B.P.50 being given in the following table:—

Connections for Alternative Coils.		
Lotus.	Uni-gen	Varley.
1	7	1
2	6	8
3	4	3
4	8	—
5	5 and 3	7 and 2
6	2	—

Wire No. 47 on blueprint must be taken to No. 1 on Uni-gen.

(To be continued)

AERO ENGINEERING

THE production of aeroplanes and aero engines requires a highly-specialised type of craftsmanship. The present rapid expansion of the industry, however, is drawing into its ranks many men who hitherto have been employed in other branches of engineering or associated trades. It is for such men that a new weekly part publication "Aero Engineering" has been produced. It is published by George Newnes, Ltd., and will be completed in about 32 parts: the price is 1s. a copy. The first number appears on March 10th.

This work is very well illustrated by drawings and photographs, whilst an interesting feature is the data sheets covering the most important types of plane.

The advisory editor is Sqn. Ldr. H. Nelson, M.B.E., A.M.I., Mar.E.

A PAGE OF PRACTICAL HINTS

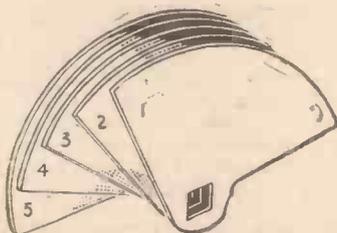
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Condenser Improvement

SHORT-WAVE enthusiasts are often troubled by fierce reaction, and in some cases when the reaction is advanced it ends up with a grunt, and searching is



Method of filing condenser vanes to obtain smoother reaction.

out of the question. Matters can be considerably improved by simply altering the shape and size of the moving vanes of the reaction condenser, thereby introducing a suitable taper to the point of entry of the moving vanes.

Smooth reaction will now become available on various coils. The writer removed the moving vanes from the spindle, and cut away portions as shown in the sketch, allowing each vane an advance of $\frac{1}{16}$ in. in a consecutive manner. The condenser now gives excellent reaction effects on the short waves down to 16 metres.—WM. TUCKER (Swansea).

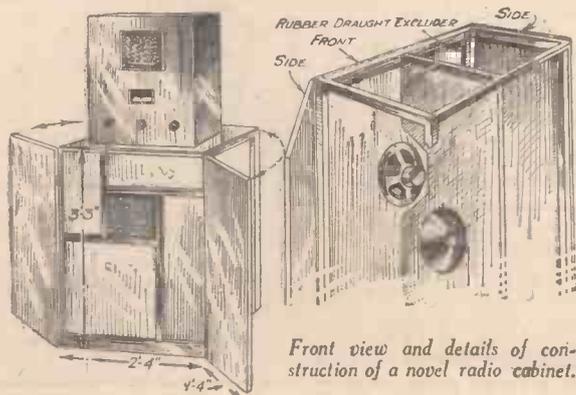
A Novel Cabinet

THE ideal medium of a huge baffle has its obvious drawbacks from the domestic point of view. Therefore, it must be a box or cabinet.

On account of resonance I have scrapped one or two radiogram cabinets.

However, I hit on the idea shown below, and as will be seen, the cabinet has the sides hinged at the front edges so that when opened out this cabinet becomes a plain baffle, having an area of about 3ft. 6in. by 5ft.

There is, however, an addition to this idea which might be of interest. I have mounted a baffle—and speaker—inside the cabinet.



Front view and details of construction of a novel radio cabinet.

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.

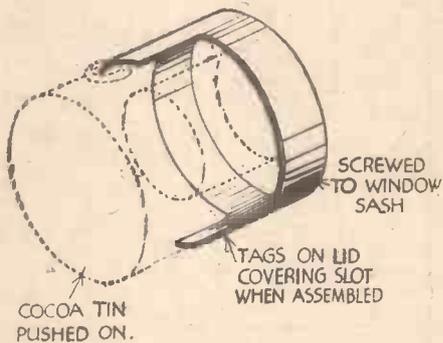
This baffle is the height and depth of the cabinet, and mounted centrally at right-angles to the front of the cabinet.

The "right-angled" speaker seems to "diffuse" the sound and the directional effect of the other speaker is not so pronounced.

I find that if the cabinet is well away from the wall I get a fine effect by twisting the top speaker about as a "vernier control" of the sound distribution.

Should anyone care to "experiment," the cabinet can be made up very cheaply.

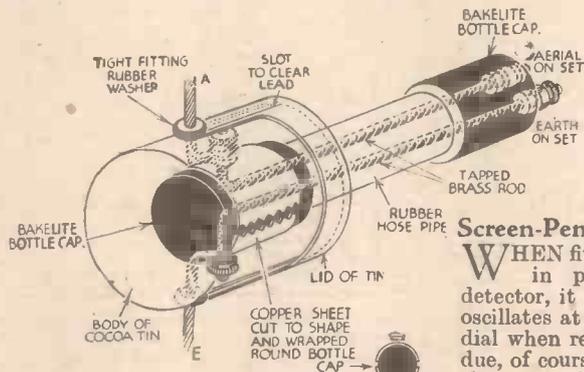
strips to shape, and after drilling holes in each piece for the shanks of the terminals, I clamped them round the bottle caps, and soldered brass rods to the



The shape of the tin cover for the lead-in tube.

terminal bases, passing the rods through the hose-pipe and screwing the terminals on through the cap at the end.

Having drilled a hole in the window-sash to take the hose, the bottle cap is placed over the end of hose and terminals screwed on, holding the whole job firmly together. An empty cocoa tin is used to keep the whole weatherproof.—C. A. WARD (Cricklewood).



A combined lead-in tube and lightning arrester.

The sides and top are of $\frac{1}{2}$ in. ply; the framework of 2in. by 1in. battens. The moulding in the front is ordinary lathes.

The top is a fixture. The gauze is of the gold string mesh type.—H. S. BASSETT (Llansamlet).

A Combined Lead-in Tube and Lightning Arrester

A LEAD-IN tube and lightning arrester, as shown in the accompanying sketch, made from a piece of rubber hose pipe, two bakelite bottle caps, some copper strips, terminals, and two tapped brass rods.

First, I cut the copper

Screen-Pentode Detectors

WHEN fitting a screen pentode detector in place of an ordinary diode detector, it will often be found that a set oscillates at the bottom of the short-wave dial when reaction is turned to minimum, due, of course, to the readiness with which this type of valve will oscillate. To avoid tampering with the actual reaction winding, which is probably housed in a can, a resistance may be placed in series with the coil (between anode and coil). Its value can, of course, only be found by experimenting, but 1,000 ohms is suggested as a starting point. A resistance of a composition type should be used as, generally speaking, wire-wound resistance is unsuitable.—C. QUENTON (N.19).

Series Dropping Resistance

WHEN designing a mains set some constructors prefer to use the trailer (series dropping) resistance to feed the screen in preference to a potentiometer. While the former method is in many ways desirable, great care should be taken to see that the required voltage drop is obtained, as many modern mains screen-grid valves take very little screen current. We came across a well-known type recently which, although of more than average efficiency, had a negligible screen current, and the use of a 5 megohms trailer resistance failed to make any measurable decrease of the screen voltage.—D. WATTS (Hendon).

FROM CRYSTAL

How to Convert a Crystal Receiver into a Receiver, with Especial Reference to Our

By W.

WE have already shown how to add a single L.F. amplifying stage to the 1937 Crystal Receiver described in our issue dated January 9th last. The combination then enables loud signals to be obtained, and in many cases a loudspeaker may be operated from the local-station programmes. Although this combination suffices in many cases, the range of reception is naturally limited, and the next stage in developing this receiver is to replace the crystal detector by a single valve. If you are graduating through the field of wireless set construction, this is the next natural step, and therefore the following notes will show just what differences

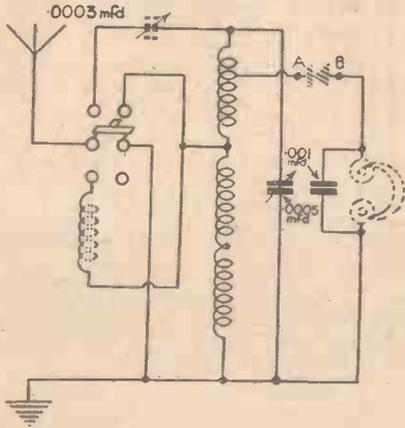


Fig. 1.—Theoretical circuit of the original crystal set, with the detector portion indicated separately. The points A and B are repeated in Fig. 2.

arise in a valve rectifier, whilst for those who have not constructed the crystal set, but who wish to make a single valver, the constructional notes will enable this to be done, the coil data being repeated for that purpose.

To enable the beginner to follow the differences, the crystal circuit is repeated (Fig. 1), but now the detector is shown in broken lines, and the two connections to it are marked A and B. Fig. 2 shows the connections to the detector valveholder in theoretical form, and the two points A

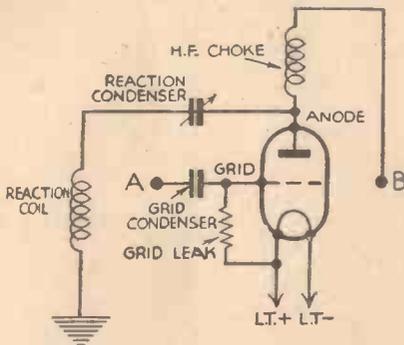


Fig. 2.—The new circuit, for the valve detector, and the reaction circuit. Points A and B show where this circuit is included in the original set as shown in Fig. 1.

and B are repeated, from which it is a simple matter to see just what differences are introduced.

Extra Components

It will now be seen that in addition to the valve we require several other parts, namely, a fixed condenser, a grid leak,

an H.F. choke, a reaction condenser, and a reaction winding for the coil unit. To mount these parts in the 1937 Crystal Set, the crystal detector and the mounting bracket to which it is fitted should be removed and a valveholder screwed in its place. The remaining parts are then affixed to the baseboard in the positions shown in Fig. 3, and a reaction coil wound on a former for insertion inside the existing coil. The reaction condenser must be mounted on the panel, and there is not a great deal of room for this on the crystal set, so to avoid difficulty it may be placed on the panel employed for the L.F. unit, if this has been constructed.

Dealing now with these details individually, the first part of the construction should consist of the reaction coil winding. This is wound on a piece of paxolin tubing 1½ in. diameter and 4 in. in length. The winding consists of approximately 45 turns of 22 D.C.C. wire and this should be placed in the centre of the tube, taking care to wind the coil in the same direction as the winding already on the tuning coil.

Mounting the Reaction Coil

This winding is now inserted inside the tuning coil, and the novelty of this type

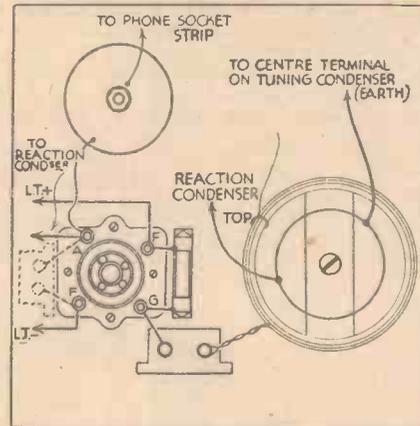


Fig. 3.—Practical wiring diagram, showing the additional connections. Note that the coil unit will have to be moved slightly to enable the valveholder to be accommodated.

of coil lies in the fact that the position of the winding may be adjusted to provide the best results on both wavebands. Accordingly, small wooden wedges are cut and the coil is first of all dropped right inside the tuning coil. When tested out, it may be raised slightly and the two wedges placed on each side to hold it (as shown in Fig. 4), and by experiment you will find the best position, after which the coil may be left undisturbed.

The H.F. choke is wound in exactly the same manner as the anti-breakthrough choke described in the first article. Two discs of three-ply wood 1½ in. in diameter are cut, with a similar disc 1 in. in diameter.

ADDITIONAL COMPONENTS REQUIRED

- 1 Reaction condenser, .0003 mfd.
- 1 4-pin valveholder
- 1 Fixed condenser, .0002 mfd.
- 1 Grid leak, 2 megohms
- 1 Paxolin former, 1½ in. by 4 in.
- Small quantity 22 D.C.C. wire
- H.F. Choke (See Text)

These are fixed together by passing a brass bolt through the centre (Fig. 5). The bobbin so formed is wound full of 28 D.C.C. wire, with the ends passed through holes drilled in one large cheek. A small bracket cut from brass may be fitted beneath a nut on one side of the bobbin so that it may be mounted on the baseboard.

Additional Wiring

All that now remains is to mount the valveholder, noting the relative positions of the sockets if you are not familiar with this component. If you have built the L.F. amplifier, the two filament terminals on the detector valveholder should be joined to the same two terminals on the valveholder in the amplifier, but if you have not yet made this addition to the crystal set, you will have to take the filament terminals out to a 2-volt accumulator, using flexible leads and appro-



priately marked spade tags. Similarly, if the amplifier is in use, it is only necessary to take a single H.T. lead from the 'phone terminal socket to the

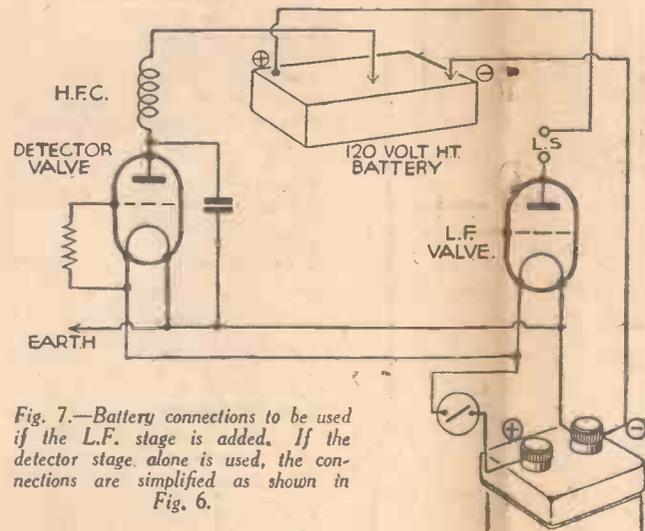


Fig. 7.—Battery connections to be used if the L.F. stage is added. If the detector stage alone is used, the connections are simplified as shown in Fig. 6.

TO VALVE

to a Single-valve
1937 Crystal Set
J. DELANEY

H.T. battery, but if the amplifier is not in use you will



Fig. 8.—The original 1937 crystal set.

in broken lines in Fig. 3, and the capacity of this condenser should be about .0002 mfd. For those who are anxious to experiment, various values (or a pre-set condenser) may be tried in this position, the maximum capacity generally being in the neighbourhood of .0005 mfd. A larger capacity will result in a cutting of the higher notes in the musical scale and will therefore spoil the quality.

Adjusting Reaction

The H.T. applied to the valve may be found critical. With a 60 or 66 volt H.T. battery the wander plug should be inserted for the preliminary tests at a point about 48 volts, and the local station tuned in. When located, there action condenser should be turned very slowly, and it should be found that signal strength will increase, and before the maximum movement of the condenser has been reached the set should go into oscillation, as denoted by a whistle or howl in the 'phones. If this does not take place, and the condenser may be turned to maximum, the H.T. plug should be inserted into a higher tapping point on the battery, and the process repeated, until a point is found where oscillation takes place gradually. If the voltage is too great, the set will burst into oscillation before signals have been built up to sufficient volume, and it will be difficult to tune in weak or distant stations.

The position of the reaction winding will also be found important in this part of the preliminary adjustment, and when a suitable H.T. voltage has been found the receiver should be switched to the long waves and the reaction control tested on a station in this part of the waveband. If reaction is unsatisfactory, the inner tube should be moved up and down, until a position is found where a smooth control is effected on both the medium and long waves, and the small wedges will enable the reaction coil to be held firmly in the final position.

Operating the Set

To use the receiver, the tuning is carried

have, in addition, to take a lead to the H.T. negative socket. This lead is joined to the filament terminal connected to the L.T.—terminal, and a switch should be inserted in the positive L.T. lead so that the set can be switched off. Diagrams for both arrangements are given in Figs. 6 and 7.

Modifications

It will be noted that the by-pass condenser is still connected across the 'phone terminals, but there is a possibility that it will be found more efficient if a smaller capacity is joined direct from the anode of the valvholder to the filament leg which is joined to the H.T. negative lead. This condenser is shown

out in the usual way by means of the slow-motion drive, and the pre-set aerial condenser is left in circuit or not, according to the local conditions. The same remarks apply as for the crystal set so far as concerns the aerial connection and the anti-break-through choke. When a station is heard, the reaction condenser is slowly turned, and a breathing sound will be heard in the

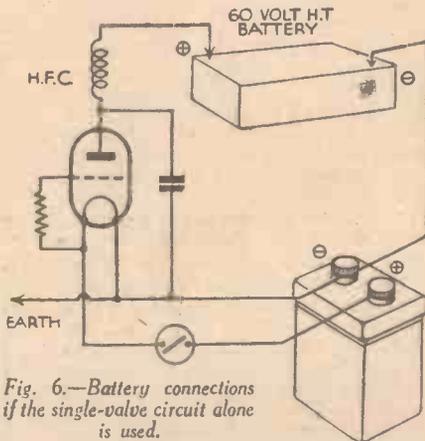


Fig. 6.—Battery connections if the single-valve circuit alone is used.

'phones (or loudspeaker) gradually growing in strength. If the condenser is turned still further there will be a sudden pop, and signals will become distorted or cease entirely.

Don't Oscillate

In this condition the oscillation generated will be radiated from the aerial and interference will be caused over a wide area, and it is contrary to the terms of your listening licence to operate the receiver in this condition. Therefore,

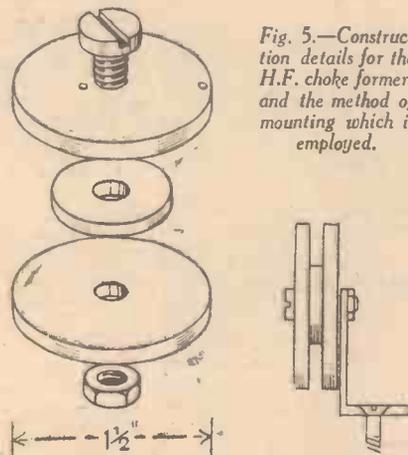


Fig. 5.—Construction details for the H.F. choke former, and the method of mounting which is employed.

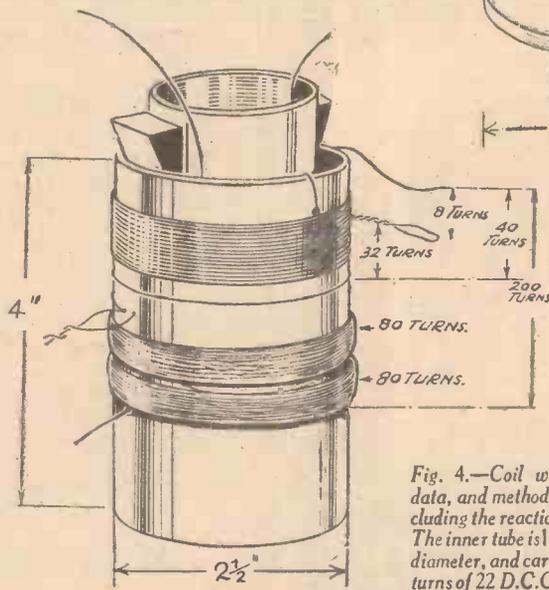


Fig. 4.—Coil winding data, and method of including the reaction coil. The inner tube is 1 1/2 in. in diameter, and carries 45 turns of 22 D.C.C. wire.

only turn the reaction condenser so far that signals are made sufficiently loud, and if distortion begins to set in, with a whistle in the background, stop the reaction adjustment. If signals are not then sufficiently loud you will know that that particular station is out of range of a simple receiver of this nature, and the only way to obtain a worth-while or louder signals will be to increase the degree of L.F. amplification or add an H.F. stage. This will be the subject of the next article in this series.

A Radiogram Refinement

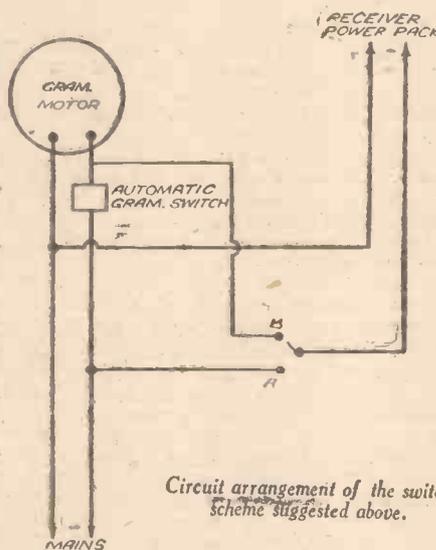
How to Connect an Automatic Gramophone Motor Switch

ALMOST all radiograms that can make any claim at all to modernity are provided with an automatic stop, which is all very well as far as it goes, inasmuch as it turns the motor off pending the changing of a record, but there is something peculiarly irritating in having to get up and switch the instrument off after the last record has been played. This is particularly irritating to those who have an extension speaker in their bedroom, and must necessarily go into the cold to switch off if they desire to undress to the strains of a gramophone record. There are doubtless many who are perfectly content with the ordinary arrangement, but investigations that the writer has made recently would show that there are many who would like an arrangement whereby the last record to be played will switch off the radiogram as a whole. It might be argued that such an arrangement as described below would be undesirable for fear that the automatic stop failed to work, but this criticism will not hold, as the racket made in the loudspeaker by a record rotating at the end of its run can scarcely be mistaken for the dead silence obtained when the instrument is switched off.

An Automatic Stop

It is a most simple matter to arrange for the ordinary automatic stop to switch off the set when desired, the only material

required being a yard or so of suitable insulated wire, and a two-way switch capable of handling a couple of amps at 250 volts. A two-way tumbler switch suggests itself as being particularly suitable for the purpose. Reference to the accompanying diagram will show that one supply lead to the receiver chassis is normal, while



the other lead goes to the mid-point of a two-way single point switch. When this is set to make contact with terminal "A," the chassis gets its supply from the mains in the ordinary way, and it is in this position the switch will be left until the last record is placed on the turntable, when the switch will be thrown into position "B," which will result in the receiver chassis being fed through the automatic gramophone motor switch. It is obvious that in this position when the automatic gramophone speed drops, the switch incorporated with it to the gramophone motor and receiver chassis will be switched off. Just one final word; it should be clearly understood that the lead from the switch terminal "B" goes on to the appropriate mains terminal of the motor itself, and not on to the two terminals usually provided for connection to the mains, as this will, of course, be on the mains side of the automatic switch instead of the remote side of it.

Switch Rating

All switches used in radiogram motor assemblies that the writer is aware of are perfectly capable of taking an extra .3 amps. (which is the current taken by the average wireless set) particularly when it is remembered that this extra load will only be imposed on those occasions when the additional switch is thrown into position "B." Readers will, however, no doubt, first satisfy themselves on this point, and should most certainly do so if their receiver chassis has a relatively high mains consumption, and takes materially over, say, 100 watts. Where the manufacturers of a radiogram give a total consumption, the wattage taken by the motor should be deducted before the above considerations.



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NEWNES : LONDON



IMPRESSIONS ON THE WAX

By
T. Onearm

New Parlophone Releases

RICHARD TAUBER heads the Parlophone list for this month with three records on which he sings, in English, arias and songs from his new film "Pagliacci." On the first, which is Parlophone RO 20329, he gives a fine rendering of "Pagliacci" (two-parts), on Parlophone RO 20330 he sings "On with the Motley," coupled with "Such a Game," and finally "Serenade," and "Sleep Song" on Parlophone RO 20331.

Gitta Alpar adds to her reputation this month with a record—Parlophone RO 332—on which she has recorded two songs from C. B. Cochran's Coronation revue, "Home and Beauty." They are "Sing Something in the Morning" and "No More."

Other well-known artists appearing in this list are Herbert E. Groh, the famous tenor, singing Handel's "Largo" (Ombra mai fu) and "Ave Maria" on Parlophone R 2308. Both of these are sung in Italian.

"Die Fledermaus," one of Joh. Strauss's famous waltzes, and "Danse Espagnol" is played by Edith Lorand and her Viennese Orchestra on Parlophone R 2310, and the Orchestra Mascotte feature the "Waltz of the Dolls" (after motifs from the ballet, "The Fairy Doll") and "Exultation" on Parlophone R 2312.

Radio Favourites

THOSE two radio favourites, Clapham and Dwyer, give an amusing interpretation of "Tennis" (two parts) on Parlophone F 717, and Jane Carr, the impressionist, also well-known over the radio, obliges with "The Singing Lesson" and "Sun Bathing" on Parlophone F 715.

Leslie A. Hutchinson, better known to readers as "Hutch," accompanies himself on the piano on Parlophone F 705. The songs he has chosen for his latest record are "Gone," from the film "Love on the Run" and "I'm delighted to see you again."

Organ Selections

HAROLD RAMSAY is at the Wurlitzer organ of the Regal Cinema, Kingston, on Parlophone F 723. On one side he plays a selection from "Pennies from Heaven," introducing such popular tunes as "Pennies from Heaven," "One, two, button your shoe," and "So do I," and on the reverse he plays a selection from "The Big Broadcast of 1937," introducing "Vote for Mr. Rhythm," "I'm talking through my heart," and "Here's love in your eyes." Harry Roy and his Orchestra make three new records this month, all equal in merit. They are "Lookin' Around Corners for you," and "There's that look in your eyes again," both from the film "Head over Heels"—Parlophone F 724, "When is a Kiss not a Kiss," and "You do the Darn'dest Things, Baby"—Parlophone F 698, and "There's Something in the air," coupled with "Swing for Sale"—Parlophone F 699.

Decca and Brunswick

IT is fitting that to Lew Stone should be entrusted the task of making a selection from the new production "On Your Toes," because he is the musical director of this London production. He introduces into this record—Decca K 855, a commanding array of tunes, such as "There's a small Hotel," "The Heart is quicker than the eye," "Quiet Night," "Slaughter on Tenth Avenue," "On Your Toes," "It's got to be Love," and "The Average Man."

Lys Gauty, the famous French cabaret star, who is to-day probably the greatest star in France, is making her first London appearance at the Ritz Hotel. For those who would like to hear her she has made a song selection on Brunswick O 2362, introducing a number of French songs she has helped to popularise in France.

A Wide Choice

A WIDE choice from a Beethoven Symphony to Folk Dances and swing music are included in the new release of "His Master's Voice Records."

What will strike most people as the most important of the orchestra records is a new set of Beethoven's Sixth Symphony ("Pastoral"), played by the Vienna Philharmonic Orchestra, conducted by Bruno Walter, on H.M.V. DB 3051-5.

Stowkowski conducts the Philadelphia Orchestra in the vivid performance of Stravinsky's "Fire Bird" ballet suite on H.M.V. DB 2882-4.

Peter Dawson has two straightforward ballads in the robust style—"Hybrias, the Cretan," and "I fear no Foe" on H.M.V. B 8513. Dawson seems to have discovered the secret of perpetual youth.

From the Films

THE latest films offer some very attractive songs. From "Champagne Waltz," Gladys Swarthout, the original artist in the film, sings "Could I be in Love" and "Paradise in Waltz Time" on H.M.V. DA 1542. Frances Day is characteristic in "I've got you under my skin" and "Easy to Love"—both by Cole Porter from the film "Born to Dance," on H.M.V. B 8526, and Connie Russell, the 16-year-old swing vocalist, has recorded "Swinging the Jinx Away," from the film "Born to Dance" and "One, two, button your shoe," from the film "Pennies from Heaven" on H.M.V. BD 403.

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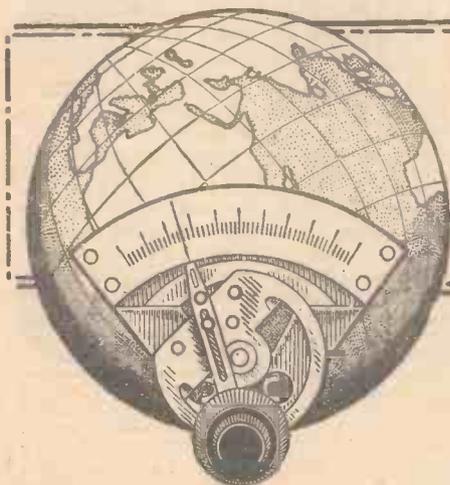


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SHORT WAVE SECTION

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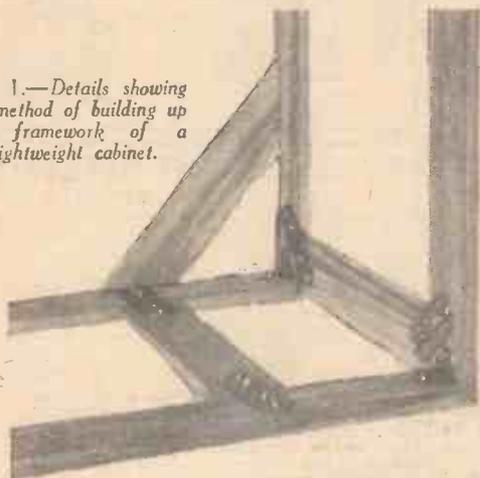
Technical Details and Constructional Problems Concerning S.W. Portables are Discussed in this Article - - By A. W. MANN

A NOTICEABLE feature of modern short-wave receiver design is compactness. Improvements in the design of individual components and a reduction in their physical dimensions, together with the use of efficient and effective screening, is largely responsible for the improved appearance and performance of present-day sets, and the comparatively large cabinets so familiar in the early days are no more.

Experimenters who are fortunate enough to have a number of midget type com-

ponents to hand are provided with a wider scope, so far as the design and construction of what may be termed ultra-compact short-wave receivers, are concerned. The majority, however, must remain satisfied with standard components, and plan accordingly.

Fig. 1.—Details showing the method of building up the framework of a lightweight cabinet.



ponents to hand are provided with a wider scope, so far as the design and construction of what may be termed ultra-compact short-wave receivers, are concerned. The majority, however, must remain satisfied with standard components, and plan accordingly.

Using Components on Hand

A most interesting all the year round field of experiment is open to all who care to participate, and who have a sufficient number of modern and suitable components to hand. I refer, of course, to the construction of portable short-wave receivers. Design problems can be studied during the winter, and constructional work carried out together with tests under home conditions, which will enable modifications, if found desirable, to be carried out.

Standard size components and valves will enforce definite limitations. Nevertheless, it is possible to design and build a suitable receiver, and yet keep the weight down to a reasonable figure.

We must, however, view the subject in the right perspective, and not regard it as simply a matter of building a set and fitting it into a small box, meanwhile hoping for

Technical Requirements

The technical requirements of selectivity, sensitivity, quality, and volume, are common to all receivers, so also is ease of operation. In the case of the portable, minimum weight is of equal importance, as the task of humping a heavy receiver about the country side is apt to damp one's enthusiasm. We have, for instance, two sources of dead weight to contend with, i.e., the H.T. battery and L.T. accumulator.

To design a portable receiver with a view to the inclusion of standard size H.T. and L.T. batteries is, on account of excessive weight, absolutely out of the question. It is, therefore, advisable to study the battery problem and find a solution before proceeding, once the type of circuit to be used is decided upon. One of the specially designed midget type H.T. batteries, and a non-spill type L.T. accumulator of the portable type are recommended.

The constructor is then assured as to voltage and current requirements being met, and at one and the same time reducing the weight and physical dimensions of the set to a minimum otherwise impossible.

In addition to current, voltage, and weights data, a definite idea as to the physical dimensions is of vital importance.

In the case of the L.T. accumulator, a compromise between amperage and size must be arrived at, not forgetting the total height, including the terminals. Manufacturers are always willing to supply such information.

Choosing a Circuit

Choice of circuit is a matter for individual consideration, but there is a comparatively wide range from which to choose.

For example, a single-valve regenerative detector; detector and L. F. stage, using a power valve or alternatively a low consumption pentode in the latter; a detector L.F. arrangement using a class B valve; a screen-grid valve as a detector, followed by a stage of L.F. amplification; or a more up-to-date circuit, incorporating H.F. and L.F. pentodes, etc. Whichever type of circuit is finally chosen will depend, to a certain extent, upon the components available. The most suitable type L.T. accumulator and H.T. battery should be decided upon, and their respective dimensions noted. There is, however, no need to purchase them straight away, and it is probable that the

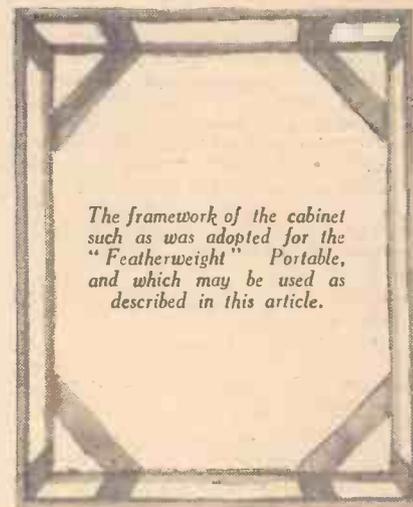
constructor will desire to use standard batteries on hand for the initial bench tests, yet rest assured that alterations to the carrying case will not be called for when midget batteries are to be used.

It is advisable to build up with cardboard or wood, models of the batteries, including total height to the top of terminals, exactly conforming to the dimensions quoted by the accumulator and H.T. battery manufacturers, remembering in the latter instance to allow for wander plugs, and in both instances to arrange for a reasonable amount of clearance. Such precautions are sometimes overlooked, and carrying-case modifications become necessary, or, worse still, a new one has to be made.

Having all the necessary components to hand, together with full size models of the L.T. and H.T. batteries to be purchased later, it is time to get out the drawing-board and a sheet of drawing-paper.

Baseboard or Chassis?

We may choose between two methods of construction, i.e., baseboard and chassis. Whilst the baseboard method is suitable, the writer favours the chassis method because it enables us to mount a number of components, as, for instance, decoupling condensers, and R.C.C. units or components underneath.



The framework of the cabinet such as was adopted for the "Featherweight" Portable, and which may be used as described in this article.

Only a very shallow chassis is necessary, and may be in the form of a shelf let into the sides or ends of the carrying case, the underside being lined with tinfoil. This idea is most suitable when the box-camera type carrying case is used.

Before deciding as to the type of carrying case, a few experiments in the form of

(Continued on the facing page)

SHORT-WAVE SECTION

(Continued from the opposite page)

layout and general arrangement must be undertaken. The chassis components can be laid out, due allowance being made for tuning, reaction and bandspread condensers, clearances, etc.

Carrying-case Dimensions

Having decided on a suitable layout which includes the batteries, and carefully measured the total height of the valves mounted in their holders plus depth of chassis, a definite idea as to the dimensions of the carrying case can be worked out.

The length and width can be marked direct on the drawing-paper, the chassis components marked round also with a sharp pencil, and the position of under-chassis components shown in dotted lines.

Taking into consideration that all components, including dimensional models of standard midget type batteries, have been arranged as desired, all clearances allowed, and the carrying-case dimensions arrived at in a practical manner, it is unlikely that serious errors will arise. In addition, such procedure enables various schemes to be tried out with a view to compactness and general efficiency.

To some constructors the methods of procedure outlined above may appear to be involved, but they are necessary if a satisfactory job is to result.

A portable short-wave set must be designed as a complete unit, and the case must be of comparatively light weight and reasonably small dimensions. It is not just a matter of making the layout to suit a carrying case, or cramping everything and sacrificing efficiency in order to use an existing case.

Testing the Set

The essential thing is, first and foremost, the set. Once having decided on a compact layout which can be housed in a reasonably small case, the experimenter can build the receiver, using a temporary panel, the actual chassis and layout, and thus run practical receiving tests. When these are satisfactory the construction of the carrying case can be proceeded with.

At one time comparatively large tuning dials were fitted to portable receiving apparatus as used by home constructors, who had no choice in the matter, as small ones were not available. Tuning condensers also were of large size, but nowadays several makes of midget tuning condensers and dials are available.

Thus it is possible to arrange a main tuning dial with a graduated scale, a reaction condenser, also a band-spreading condenser and on-off switch on a comparatively small panel, without undue cramping.

Carrying cases can be made out of plywood, or in the form of a strong but light frame covered with aeroplane fabric, the latter form of construction being originated by the Editor of this journal.

Generally, a two-valve straight circuit headphone set will meet portable short-wave requirements, if used in conjunction with a short aerial.

LEAVES FROM A SHORT-WAVE LOG

English News from Rome

The Italian programmes are broadcast on short waves through two channels—25.4 m. (11.81 mc/s) and 31.13 m. (9.63 mc/s), with a power of 25 kw. The former wavelength is used until G.M.T. 19.40, after which time the transmission is switched over to the lower frequency. Daily at G.M.T. 23.00 a broadcast is made for North American listeners; on weekdays you may listen to English news bulletins and talks at G.M.T. 14.30 and 18.20; at other times special transmissions are carried out in Arabic, Chinese, Hindustani, French, Spanish, Portuguese, German and other languages. Should you happen to tune in

one of these foreign broadcasts, which are usually accompanied by native music, wait for the call, as failing this information, in error, you might log more distant stations.

More Native Music from the Far East

ZHJ, Penang (Straits Settlements), operated by the Penang Wireless Club, provides a daily programme of news bulletins and music, except on Sundays, on 49.34 m. (6.08 mc/s), between G.M.T. 12.40-14.40. Although most announcements are in English, the broadcasts feature many items of native music, mostly of Malayan, Chinese and Indian origin. Somewhat higher up on the scale, on 49.92 m. (6.01 mc/s), ZHI, Singapore, of the Radio Service Co. of Malaya, Ltd., works on Mondays, Wednesdays and Thursdays from G.M.T. 23.00-01.30, and on Sundays from G.M.T. 03.40-05.00.

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.

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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 for courses unless we feel satisfied that success is not the prerogative of over 30 years proves that the outstanding brilliancy.



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TELEVISION AND SHORT-WAVE HANDBOOK

By F. J. CAMM

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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).

On our One-valve Short-waver

SIR,—I have been taking your paper since October of last year, and I find it very interesting and helpful. I built the one-valve short-wave set described in PRACTICAL AND AMATEUR WIRELESS of December 12th, and have recently had results which pleased me very much. Among the stations heard are WIXAL, W2XAF, W1XK, ORL, RNE, SM5SX (Stockholm Technical University), PRF5 (Rio De Janeiro), Tokio (JZI and JZJ), LKJ1, HJ1ABE and TFJ (Iceland). I do not use an earth, and the set is made almost entirely of second-hand components.—D. CHESSELL (Coves, I.O.W.).

W2UK

SIR,—In reply to Mr. R. L. Pluck, I sent a DX report to W2UK, Long Island, New York, three months ago, but received no reply. Sorry I cannot say anything about W4BYY and VE3CK.—Tom Brown (Heckmondwike, Yorks.).

Our High Fidelity Paraphase Amplifier

SIR,—I take the opportunity to congratulate you on your High Fidelity Paraphase Amplifier, described in your issue of PRACTICAL AND AMATEUR WIRELESS dated January 18th, 1936. I was fortunate enough to have constructed it, and was so impressed by the all-round performance that I feel I must express my entire satisfaction on the way the amplifier operated.—A. ALLEN (Sheffield.).

A Log from Lancashire

SIR,—I have not seen a log from this district so I submit mine. These are a few of the stations received recently. W6DL, T13MR, T13AV, SU5NK, SV1NK, VP9R, VP6TR, CE2DC, NY2AE, OA4N, HI1C, HI5X, HI7G, VO1Z, LU7AZ, XE3X, KA1AN, CO7CX, CO2KY, VE5TV, PY3AG, LU4AL, LU2EJ, HAF8M, AR8MO, and CO8SG. Since December 250 W amateurs, 8 CO amateurs, 25 VE amateurs, LU amateurs (600 in all). Rx 0 v-2.

Wishing your paper every success.—R. J. HUNTING (Ashton-under-Lyne).

Incorrect Reports

SIR,—As a short-wave listener for nearly four years and now an amateur transmitter, I should like to say a few words with regard to newcomers to short-wave work.

I have recently noticed letters from readers giving their logs of stations received on their newly obtained short-wave receivers. In many cases they make unintentional mistakes with regard to the location of the amateur transmitter they receive. For instance, Mr. F. O. Atkinson, of Hull, states that he received a Canadian amateur, ON4VC.

As every experienced short-wave listener should know, the Canadian prefix is VE, and ON4 is that of Belgium. The VC of ON4VC would probably be announced as Victoria, Canada, or something like that, and that is where the newcomer makes his mistake.

With reference to the letter of Mr. R. L. Pluck, of Tunbridge Wells, I personally shall be pleased to QSL useful reports from any S.W.L. who hears me on any band, without the need of a reply coupon. Please QSL direct.—W. O. STURMEY (G8KL) (Sedgley, Staffs.).

Good Reception on a Short-wave Two-valver

SIR,—In December last I saw your one-valve short-waver described, and immediately changed to this from my existing medium-wave set. In January I converted the set to a two-valver (transformer coupled) and the results have been very good. I think that the amateurs are too numerous to bother about logging, so I concentrated on the commercial stations. Here is my log:—

49 metres: HJ4ABE, RW59, COCO, CP5, W9XF, W2XE, COCD, and PRADO (excluding the lesser European stations).

40 m.: PSUI, ECNI (Barcelona), and JVP (Tokio).*

30 m.: COCH, PRF5, LKJ1, W2XAF,

CUT THIS OUT EACH WEEK.

Do you know

—THAT it is often found that with an induction motor, a hum-bucked pick-up is the only way of removing the hum.

—THAT when loose laminations in a transformer or choke cause trouble due to hum, care must be taken in tightening up the clamping bolts, or the threads will be stripped and the trouble aggravated.

—THAT to avoid the above difficulty, molten pitch or the filling from a faulty fixed condenser may be poured over the core.

—THAT a self-contained mains superhet can often cause trouble due to trimmers being moved by vibration from the speaker. Sealing them with pitch or paint will prevent this.

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

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

W1XK, VK3LR, VK2ME, VOR, HBL, CT1CT, EAQ, PMN, and JZI. 19 m.: HVJ, W8XK, TPA2, W1XAL, and W2XAD.

The aerial is a straight 60ft. wire about 15ft. high, and no earth. Incidentally, the set is built up with old parts except the coil (which is a home-made 6-pin type) and an Eddystone choke.—P. YEATES (Bedford).

Logged with the "Silver Souvenir"

SIR,—Two years ago, in March, 1935, I made an important decision for myself, which was to become the owner of your 1935 "Silver Souvenir." Since then I have never regretted doing so. Even though my log is not a large one, I have every reason to be pleased with it. It is as follows:—

About 50 broadcast short-wave stations on 16, 19, 25, 31, 48 and 49 metres, including, VP3MR, VK3ME, VK3LR, VUB, PLM, PLP, EAJ43, VQ7LO, COCO, COCD, COCQ, COCH, and W9XF; 108 British, French, Belgium, and Spanish amateurs on 40 m., and many commercials.

And now, I am sorry to say, I am disposing of the set, partly because I believe I can get a set that will do better still, and partly because if I keep it much longer, I will have to overhaul it very thoroughly, and renew the valves.

Instead of the "Silver Souvenir," I intend building your Tele-Cent Short-wave receiver. I like the circuit, and it will suit me admirably.

Congratulations on your wonderful paper. It is definitely the foremost of its kind.—G. PALMER DOUGLAS (Uppingham, Rutland).

THE USES OF PILOT [AND DIAL] LAMPS

(Continued from page 749)

expected to last for at least 1,000 burning hours. In order to ensure long life, some users employ 6-volt bulbs on the 4-volt A.C. low-tension supply; but although life certainly is prolonged, the illumination so obtained is not brilliant and is, in fact, somewhat depressing.

Turning now to direct current, and to universal sets, where the pilot lamp or lamps are wired in series with the valve filaments, the voltage ratings of the lamps are usually of little consequence. What does matter, however, is the current rating, which must be identical with that of the valve heaters—usually 0.2 ampere. Too low a current rating would cause a lamp to fail prematurely, and too high a rating will produce insufficient light. Other points in connection with direct current and universal sets are, first, that if provision is made for pilot lamps, then those lamps must be in position or else the set will not operate; and second, if the set fails to function and the pilot lamp is not illuminated, the fault may be one of three things—(a) pilot lamp fused; (b) valve heater or line resistance open-circuited; or (c) mains disconnected either through the blowing of a fuse, or because a switch or plug is not "on."

Finally, it must be suggested that, in view of the annoyance caused by failure of lamp bulbs, whether used as pilots or as fuses, it is an excellent plan to keep a spare of each size used ready for any emergency. They are best kept in miniature lamp-holders fitted just inside the cabinet, but, of course, not connected up, so that they can be unscrewed from their temporary quarters and fitted as replacements at a moment's notice.

RADIO CLUBS AND SOCIETIES

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

The Croydon Radio Society

MR. P. K. TURNER again visited the Croydon Radio Society on Tuesday, February 23rd, in St. Peter's Hall, S. Croydon. His account of the functioning of the Duode voice coil was distinctly fascinating, and he went on to discuss the new M.A. receiver. There were here several noteworthy features. One was the arrangement of the three tuned circuits, as well as the unique circuit for the frequency changer. Then, of course, the achievement of variable selectivity and tone compensation was discussed at length. Mr. Turner was particularly proud of the whistle filter, but the demonstration soon proved all he had said in theory. On Tuesday, March 16th, the Annual General Meeting for presentation of the balance sheet will be held, as well as the election of officers for next session. Light relief, however, will be afforded by a number of ten-minute talks by members. Hon. Pub. Sec.: E. L. Cumbers, Maycourt, Campden Rd., S. Croydon.

Portsmouth and District Wireless and Television Society

AT the last meeting of the above society Mr. A. Parsons gave a lecture on "Forthcoming Receiver Innovations." During the course of his talk, Mr. Parsons gave diagrams of automatic volume control with muting, automatic fine tuning, contrast expansion, and attenuation equalisation, all of which when incorporated in a receiver ensured more perfect reproduction. Thanks were given for gifts of apparatus, lino., etc., for the new clubroom from Messrs. Pestell and D'Arcy. Mr. Kentsbeer (G8JB) presented a 16 mm. ciné projector.—Harold Leigh (2BBG), 20, King St., Southsea.

The Cardiff and District Short-wave Club

AT a meeting of the above club held on February 18th, Mr. A. C. Williams (G5VX) gave a very interesting lecture on "Relay and Remote Control Working."

It is generally known amongst amateurs, especially those residing in South Wales, that G5VX is an authority on this type of working, and his demonstration was eagerly followed by all present. The remote control method of operating a transmitter is a very great asset to any licensed amateur, as the talk and practical demonstration showed.

Meetings of the above club are held weekly at the clubroom on Thursday nights at 8 p.m., and any reader of this paper interested in either short-wave receiving or transmitting, and residing in the area, is asked to get in touch with the secretary, Mr. H. H. Phillips, at 132, Clare Rd., Cardiff. The second Annual General Meeting of the Society will be held on March 18th, and the secretary would welcome anyone wishing to be present.

Southall Radio Society

AT the meeting of the Southall Radio Society, held on February 23rd, the speakers were Mr. J. T. Pinsent and Mr. J. J. Maling.

Mr. Pinsent took "Acoustics" as his subject. His long experience in film and recording work stood him in good stead and his descriptions of various methods of dealing with studios to give any necessary acoustic effect were received with great interest.

Mr. Maling, well known as an amateur transmitter, was seen in a new light at this meeting, as he gave a demonstration of acoustic effects with the aid of modern and not-so-modern reproducers. This unusual contrast caused considerable amusement!

Meetings are held each Tuesday at Southall Library, Osterley Park Road, Southall, at 8.15 p.m., and visitors are welcome. Hon. Secretary, Mr. H. F. Reeve, 26, Green Drive, Southall.

Short-wave Radio and Television Society

THE weekly meeting of this society, held at St. Paul's Hall, Norfolk Road, recently, was presided over by Mr. R. E. G. Copp.

A joint meeting was held with The Croydon Radio Society, who were the visitors,

the subject for the evening being a demonstration and talk on the Society's transmitter—G8GY. A start was made by putting the transmitter on the air, using telephony, with Mr. R. E. Dabbs (G2RD) operating. A change was made later to c.w., but unfortunately, owing to rather poor conditions on 7 mc. at the time, no contacts were made.

After the demonstration a very interesting description of the transmitter was given by Mr. F. Hoare (2B1V). The crystal oscillator was a type 47 valve link-coupled to a 210 used as PA. Heising modulation was used, the modulator valve being a PA20. Power to the transmitter was supplied by a 500-volt transformer with a type 83 mercury vapour valve as rectifier.

For particulars of future meetings write to the Hon. Sec., Mr. J. T. Webber, 308, Brigstock Road, Thornton Heath.

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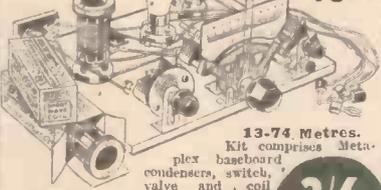
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A.C. BANDPASS S.G.4 LIST PRICE £8:8:0 BARGAIN £4:19:6



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Four-valve Class "B" BARGAIN Circuit with Screen Grid Detector, Class "B" Driver and Class "B" Output valves, 2 Screened coils, 2 Ganged Screened condensers, Pick-up sockets, Fuse bulb. Built on steel chassis with Class "B" Permanent Magnet Moving-Coil speaker. Wavelength and illuminated dial. Housed in vertical walnut-veneered cabinet, overall dimensions 30ins. high, 17ins. wide, 11ins. deep. Supplied complete with valves, less batteries. Fully tested before dispatch. Cash or O.O.D. £8/18/0 or 5/- down and 11 monthly payments of 7/- Carr. Paid.

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Vertical Console. 1 3 Valve BARGAIN Screened Grid circuit comprising Screened Grid Valve, Power Grid detector and super power output valves. Steel chassis. Illuminated full vision wavelength scale. Efficient screened coils, aerial selectivity sockets, Gramo sockets. Permanent Magnet Moving Coil Speaker, Housed in Vertical Walnut Veneered Console Cabinet, overall dimensions 20ins. high, 17ins. wide and 11ins. deep. Supplied complete with 3 valves but less batteries. Fully tested before dispatch. Cash or O.O.D. Carr. Paid, £2/19/6, or 5/- down and 11 monthly payments of 5/6.

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Said a wireless mechanic named White,

"In a leg of pork, 'crackling's' all right."

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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.

W. M. (Burnley). You should not radiate on the aerial mentioned and the efficiency will govern the degree of radiation. A licence is certainly necessary for the 5-metre transceiver.

R. G. R. (Hartlepool). Any ordinary sheet of aluminium may be cut for the panel—no special material being required. Messrs. Peto-Scott could supply a ready drilled panel, or you could obtain a sheet of heavy gauge aluminium from a local metal warehouse and drill it yourself. The coils must have been wrongly marked in view of the wide differences mentioned in your test.

H. H. O. (Kirkcaldy). You are not using an ideal valve for the circuit and this may be the trouble. This valve is a variable-mu H.F. pentode. It would be better to use an ordinary H.F. pentode, or an S.G. valve. The screen voltage may be found very critical.

M. G. L. (Tunbridge Wells). It will be quite in order to join the wire, but you should have had amp.

H. L. W. (Clapton, E.5). R. I. is Radio Instruments; Hellesnes is Hellesnes, Ltd., of Morden Road, S.W.19; and B.R.G. is British Radio Gramophone Co., Ltd., of Pilot House, Church Street, N.16. You can use any standard L.F. transformer in place of the R.I. component which is not now obtainable. The valves are still standard.

J. H. P. (Dunee). We regret that we have no blueprint or other details of a receiver which meets the requirements outlined in your letter.

F. W. R. (Dagenham). The coil is supplied by J. J. Eastick and Sons, of Bunhill Row. The price is 2s. 6d.

L. S. N. (Nyasaland). We regret that we have no blueprint or other details of a receiver to suit you, but neither can we recommend any individual commercial receiver in your particular case.

T. B. (St. Mellion). The H.F. stage is apparently unstable, due either to the wiring or to the voltages applied to the valve. Check both of these points.

E. H. (Greenhithe). To drop 16 volts at .14 amps. you need a resistance of just over 4 ohms. A variable rheostat of 6 ohms will be found suitable and easily obtained. We cannot give complete valve characteristics in the form of a reply.

A. McH. (Co. Cavan). You must know the current before you can calculate the wattage of the resistance. The wire will depend upon the resistance. The total anode current of the £4 Superhet 4 is approximately 20 mA.

L. H. (Woodbridge). The only receiver we have employing the coils in question is of rather old design. This was the All Pentode Three, PW 30.

K. H. (Clapton-on-Sea). Your query is not clear. The coil for the 1037 Crystal Set covers wavelengths above 180 metres. Are you confused between distance and wavelength?

H. A. P. (Acocks Green). The valves will require decoupling, and the maximum output from the eliminator should then be used.

W. J. W. (Rotherham). It is quite true that signals are obtainable under the conditions mentioned, but you will find that at each end of the scale signals are weaker. Maximum results will only be obtained throughout the scale when the correct I.F. is employed.

T. S. (Ghodasar). Any other crystal may be obtained and no values will have to be modified. We have no details of range of reception in your part of the world. A zepplin aerial would be desirable.

V. R. (Longton). We regret that we cannot recommend any particular set to use up your components.

A. N. P. (Netheravon). We cannot understand your query. Full details are given in the issue in question, and a full price list of the parts. Messrs. Peto-Scott's advertisement gives the price of cabinet and extras.

G. B. (Addiscombe). We cannot trace any reference to the particular component you refer to. Can you provide any further details to enable us to trace the article?

H. D. McN. (Dulwich). We do not think the procedure would be advisable, but we suggest you write to the Westinghouse Company and give them full details of your proposed procedure.

A. L. (Shoreham-by-Sea). We regret that there is no other receiver in which the parts in question could be employed.

L. McG. (Duckmanton). You will have to experiment to find the most suitable arrangement in your particular case. There are no definite rules which can be laid down in this connection.

F. L. (Droylsden). The receiver is not one of our designs, and you should write to the paper in which it was described for further details.

P. A. R. (Taunton). A licence will be required, and we suggest you obtain a copy of the book entitled "The Radio Control of Mechanisms" published by Percival Marshall and Co., Ltd.

W. S. (Hackney). We suggest you obtain "Everyman's Wireless Book" and the "Wireless Constructor's Encyclopedia" from your newsagent or direct from this office. Then, by following the various articles in our pages, and looking up doubtful points in these books, you will soon grasp the fundamental principles and be able to understand circuits, etc.

F. F. (Chirk). We cannot give the transformer details in the form of a reply. We publish the details from time to time in our pages, and suggest you obtain a copy of the Data Sheets.

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SHORT WAVE NEWS

The March issue of the B.S.W.L. "Review" is a Special Birthday Number—get your copy NOW, price 6d. from your bookstall. The "REVIEW" contains the finest list of Short-Wave and Ultra Short-Wave Broadcasters ever published; "Calling CQ Ten" (40 m. reception); News of the B.W. B.C. stations; Members' Amateur DX Edited by "Onda Corta"; notes on the newest series; list of the Spanish War stations, and everything of interest to the Short-Wave Listener. In case of difficulty in getting your copy, send 7d. to the BRITISH SHORT-WAVE LEAGUE, Ridgewell, Halstead, Essex. Particulars of Membership free on request.

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Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Marconi International Valves

A COMPLETE range of valves has been introduced by the Marconiphone Company for use in American and Conti-



The above illustrations show the new Marconi octal base and holder, and the high-efficiency valve W.63.

ental receivers, or for other receivers where it is desired to use the American type of valve of English manufacture. These valves are provided with an octal base and the heaters are rated at 6.3 volts. The characteristics are similar to the

Type	Description	Fil. Volts	Fil. Amps.	Max. Anode Volts	Max. Screen Volts	Price
X63	Heptode P.C.	6.3	0.3	250	100	15/-
W63	Var. Mu. H.F. Pen.	6.3	0.3	250	125	12/6d.
Z63	H.F. Pentode	6.3	0.3	250	125	12/6d.
H63	Triode	6.3	0.3	250	—	9/6d.
D63	Double Diode	6.3	0.3	—	—	5/6d.
DH63	Double Diode Triode	6.3	0.3	250	—	12/6d.
N63	Output Tetrode	6.3	0.7	250	250	13/6d.
N66	Output Tetrode	6.3	1.27	400	300	25/-
U50	Full-wave Rectifier	5	2.0	350	350- Max. Rectified current 120mA	10/6d.

American "G" range, and therefore are glass equivalents of the American all-metal valves. The medium slope of the valves allows generous clearances, giving an increased reliability and high degree of consistency. The heater voltage renders them ideal for use in car radio receivers, as well as standard A.C. sets, whilst the current rating enables them to be used for series connection in the A.C./D.C. type of apparatus.

The base, as may be seen from the accompanying illustrations, is self-locating, and it is impossible to make contact between sockets and pins until the valve is in the correct position.

Among the many novel features may be mentioned the N.66, which is a tetrode using the aligned grid technique described in America as the "Beam" valve. This gives pentode characteristics with the additional

advantage of very low screen current. In the case of the average pentode the screen current, which plays no useful part in providing output, is one quarter of the anode current. In the N.66 it is less than one-tenth of the anode current. A single valve, with 250 volts H.T. supply will give an output of 8 watts. A pair of these valves in Class A-B will give approximately 40 watts.

The complete range now available is as given in the table in column 1.

Drydex Changes

THE Chloride Company announce that the Drydex Super-Life Battery has changed its coat—the carton design having been altered to bring it into line with the design which has been used for so long for the Red Triangle type of Drydex battery. The accompanying illustration shows the new carton, and it will be seen that the "Super-Life" will be more easily recognised as one of the Drydex family. The carton is finished in three colours, white, green and black, and has a highly-glazed finish.

New Goodman Speaker

A NOVEL speaker has now been introduced by Goodmans Industries and the main feature is the large elliptical cone which is fitted. This has been developed to combine the advantages of the steep angle and the shallow angle cones, and it is exponentially shaped. The advantages of this design are claimed to be increased loading at the lower frequencies and a consequent larger output. It is stated that the output is extremely level and well maintained at both ends of the frequency band and sensitivity is increased without undesirable resonances. We hope to test one of these models in the near future and a test report will be published. The price is 46s. for the permanent-magnet model (with multi-ratio transformer), and 38s. for the energised type.

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One-valve : Blueprint, 1s.		
All-wave Unipen (Pentode) .. .	—	PW31A
Two-valve : Blueprint, 1s.		
Four-range Super Mag Two (D, Pen) .. .	11.8.31	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF Trans) .. .	—	PW10
Sixty Shilling Three (D, 2LF (RC & Trans)) .. .	—	PW31A
Leader Three (SG, D, Pow) .. .	—	PW35
Summit Three (HF Pen, D, Pen) .. .	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen) .. .	22.9.34	PW39
Hall-Mark Three (SG, D, Pow) .. .	—	PW41
Hall-Mark Cadet (D, 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
Genet Midget (D, 2 LF (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) .. .	—	PW64
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen) .. .	20.8.36	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.		
Fury Four (2 SG, D, Pen) .. .	—	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 "Linit" All-Wave Four (HF Pen, D, LF, P) .. .	26.9.36	PW67
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen) .. .	—	PW18
A.C.-D.C. Two (SG, Pow) .. .	7.10.33	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) .. .	18.8.34	PW33
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) .. .	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (R.C.)) .. .	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) .. .	—	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen) .. .	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen) .. .	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull) .. .	—	PW45
Universal Hall-Mark (HF, Pen, D, Push-Pull) .. .	9.2.35	PW47
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Battery Sets : Blueprints, 1s. each.		
£5 Superhet (Three-Valve) .. .	—	PW40
F. J. Camm's 2-valve Superhet .. .	13.7.36	PW52
F. J. Camm's £4 Superhet .. .	—	PW53
F. J. Camm's "Vitesse" All-Waver (5-valver) .. .	27.2.37	PW75
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve) .. .	—	PW43
D.C. £5 Superhet (Three-valve) .. .	1.12.34	PW42
Universal £5 Superhet (Three-valve) .. .	—	PW44
F. J. Camm's A.C. £4 Superhet 4 .. .	—	PW59
F. J. Camm's Universal £4 Superhet 4 .. .	—	PW63
"Qualitone" Universal Four .. .	16.1.37	PW73
SHORT-WAVE SETS.		
Two-valve : Blueprint, 1s.		
Midget Short-Wave Two (D, Pen) .. .	15.9.34	PW32A

Three-valve : Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow) .. .	—	PW30A
The Perfect 3 (D, 2 LF (RC and Trans)) .. .	—	PW63
The Bandspeed S.W. Three (HF Pen, D (Pen), Pen) .. .	29.8.36	PW68
"Tele-Cent" S.W.3 (SG, D (SG), Pen) .. .	30.1.37	PW74
PORTABLES.		
Three-valve : Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) .. .	16.5.36	PW65
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B) .. .	—	PW12
MISCELLANEOUS.		
S.W. Converter-Adapter (1 valve) .. .		
—	—	PW48A
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1934 Crystal Set .. .	—	AW444
150-mile Crystal Set .. .	—	AW450
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One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver .. .	—	AW387
Twenty station Loudspeaker .. .	—	AW440
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans) .. .	—	AW389
Full-volume Two (SG det. Pen) .. .	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans) .. .	—	AW377A
Big power Melody Two with Lucerne Coil (SG Trans) .. .	—	AW393A
Lucerne Minor (D, Pen) .. .	—	AW426
A Modern Two-valver .. .	July '36	WM409
Three-valve : Blueprints, 1s. each.		
Class B Three (D, Trans, Class B) .. .	—	AW386
New Britain's Favourite Three (D, Trans, Class B) .. .	15.7.33	AW394
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) .. .	—	AW419
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) .. .	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans) .. .	—	AW437
All-Britain Three (HF Pen, D, Pen) .. .	—	AW448
"Wireless League" Three (HF Pen, D, Pen) .. .	3.11.34	AW451
Transportable Three (SG, D, Pen) .. .	—	WM271
£6 6s. Radiogram (D, RC, Trans) .. .	—	WM316
Simple-tune Three (SG, D, Pen) .. .	June '33	WM327
Economy-Pentode Three (SG, D, Pen) .. .	—	WM337
"W.M." 1934 Standard Three (SG, D, Pen) .. .	Oct. '33	WM351
£3 3s. Three (SG, D, Trans) .. .	Mar. '34	WM354
Iron-core Band-pass Three (SG, D, QP 21) .. .	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen) .. .	—	WM371
PTP Three (Pen, D, Pen) .. .	June '35	WM399
Certainty Three (SG, D, Pen) .. .	Sept. '35	WM393
Minutube Three (SG, D, Trans) .. .	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen) .. .	Dec. '35	WM400
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Lucerne Straight Four (SG, D, LF, Trans) .. .	—	WM350
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Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C. .. .	—	AW403

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Unicorn A.C./D.C. Two (D, Pen) .. .	Sept. '35	WM391
Three-valve : Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C. .. .	—	AW383
S.G. Three (SG, D, Pen) A.C. .. .	—	AW390
A.C. Triodyne (SG, D, Pen) A.C. .. .	19.3.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C. .. .	23.6.31	AW439
Mantovan A.C. Three (HF Pen, D, Pen) A.C. .. .	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen) .. .	Jan. '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All-Metal Four (2 SG, D, Pen) .. .	July '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P) .. .	May '35	WM386
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior .. .	—	WM375
Varsity Four .. .	Oct. '35	WM395
The Request All-Waver .. .	June '36	WM407
1935 Super Five Battery (Superhet) .. .	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C. .. .	—	AW425
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	AW389
Holiday Portable (SG, D, LF, Class B) .. .	1.7.33	AW393
Family Portable (HF, D, RC, Trans) .. .	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21) .. .	June '34	WM363
Tyros 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	AW429
Rome Short-Waver .. .	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det., Pen) .. .	Feb. '36	WM402
Home-made Coil Two (D, Pen) .. .	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans) .. .	—	AW335
Experimenter's 5-metre Set (D, Trans, Super-regen) .. .	30.6.34	AW438
Experimenter's Short-wave (SG, D, Pen) .. .	Jan. '19, '35	AW463
The Carrier Short-waver (SG, D, P) .. .	July '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A.W. Short-Wave World-Beater (HF Pen, D, RC, Trans) .. .	—	AW436
Empire Short-waver (SG, D, RC, Trans) .. .	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P) .. .	Mar. '35	WM383
Superhet : Blueprint, 1s. .. .	—	WM397
Simplified Short-waver Super .. .	Nov. '35	WM397
Mains Operated.		
Two-valve : Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C. .. .	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C. .. .	—	WM368
"W.M." Long-wave Converter .. .	—	WM356
Three-valve : Blueprint, 1s.		
Enlarger (SG, D, Pen) A.C. .. .	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) .. .	Aug. '35	WM291
MISCELLANEOUS.		
Enthusiast's Power Amplifier (1/6) .. .	June '35	WM387
Listener's 5-watt A.C. Amplifier (1/6) .. .	Sept. '35	WM392
Radio Unit (2v.) for WM392 .. .	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-) .. .	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram .. .	Mar. '36	WM403
New Style Short-waver Adapter (1/-) .. .	June '35	WM389
Trickle Charger (6d.) .. .	Jan. 5, '35	AW402
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	WM401
The W.M. A.C. Short-wave Converter (1/-) .. .	July '36	WM403



QUERIES and ENQUIRIES

Detector Anode By-pass

"I attach a circuit of a set I have built, and I am in some difficulty regarding volume and quality. The only point about which I have doubts is the anode by-pass condenser in the detector stage. As you will see, this is a .01 mfd. condenser across the transformer primary, and a friend who claims to know something about the matter says it should be joined to earth and smaller in value. Will you please help me in this point and state whether it is the cause of the trouble? I do not want to make any alterations until I know what I am doing."
—F. G. (Finchley).

IT is highly probable that the trouble you are experiencing is due to the condenser. To complete the process of rectification a condenser must be joined from the anode to earth, and although you have such a condenser connected across the transformer this is just the same thing, as the transformer is joined to the H.T. battery which, in turn, is earthed. If, however, there is no large condenser across the H.T. battery, when this becomes partially discharged and its resistance accordingly rises, this will be in series with the anode by-pass condenser and affect its action. The best position for the condenser is close up to the valveholder, and joined direct from the anode terminal to the filament terminal which is joined to earth (H.T.—). The capacity should also be reduced considerably, a value about .0001 mfd. generally proving most satisfactory.

Radiophone Band-pass Pack

"I have come in possession of a tuning pack known as the British Radiophone Band Pass. Would you please let me know whether a set embodying this pack has been issued by you, or would you tell me where I could obtain a blueprint?"—A. M. (Newcastle).

THE simple band-pass pack referred to was used by us in 1933 in a four-valve battery receiver known as the Radiopax Class B Four, but as the tuning pack is no longer on the market the blueprint has been withdrawn. Furthermore, no back copies of the issue in question (May 27th) are available, but if you have any back numbers by you, you may be able to refer to it. The circuit employed consisted of S.G., detector, L.F. and Class B valves, the H.F. valve being of the variable-mu type. We do not know of any source from which a blueprint may now be obtained for this particular tuning unit.

£4 Superhet 4

"I have just finished converting the above set into the A.C. version. I am using the oscillator coil type BP87, which seems to function all right. Do you think I should get better results by using the proper coil, BP86? There is one difficulty with the set now. If the volume control is turned full on, and the set tuned to about 315 metres, it suddenly bursts into oscillation. Can you suggest a cure?"—G. B. (Wallington).

THE oscillator coil BP87 has a larger reaction coil winding than the coil designed for a mains valve (BP86), and, consequently, if you are obtaining satisfactory results by using the battery coil in the present set there will be nothing to gain by changing to the other coil. With regard to the instability problem, this may be due to several causes. You do not state how you have made the change to A.C.; that is, whether you have simply re-wired the heater circuits and used mains-type valves, or whether you have rebuilt to the A.C. design. Check the voltages on the frequency-changer and I.F. valves and the by-pass condensers used for the decoupling circuits. Also check the bias applied to these two stages.

1937 Crystal Set

"I believe I saw details of a crystal set in one of your issues during January, prob-

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.

Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender. Requests for Blueprints must not be enclosed with queries as they are dealt with by a different department.

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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.

ably the 9th. Unfortunately, I pass my copies on to a friend and now I find that I require the constructional details of a crystal set. Will you please let me have a copy containing this article, if available, and I will remit the amount on receipt?"—J. L. (Co. Armagh).

WE regret that we are unable to send back numbers and blueprints C.O.D. to Ireland, but the back number in question may be obtained from this office price 4d.

THE
LEADING BRITISH
CYCLING JOURNAL!
THE CYCLIST
2d. Every Wednesday

The date you give is quite correct, and you will see from this week's issue that we have since described an L.F. amplifier for this set. Further modifications are given in this issue. A blueprint is available for the crystal set, number P.W.71, price 1s.

Beginner's Two-valve Set

"I am only twelve years of age, and would like to commence wireless set construction by making a two-valve set. Would you recommend a suitable set and let me know what parts are required?"—A. V. (Parkhead, Glasgow).

WE have several blueprints of two-valve receivers which would be suitable, but as you have not constructed a set before we suggest that you make up the 1937 Crystal Set, and carry out the additions which have since been described. The coil for this set is home-made, and the constructional work is very simple. You can obtain a blueprint for the set to help you if you have not got the back number (January 9th, 1937), and when you have used the set you can add the L.F. stage described in the issue dated February 6th. In this week's issue we show how to substitute a valve for the crystal, and if you wish to make a two-valver right away you can make the detector stage from this week's article and add the L.F. stage already mentioned. The two sections, may, of course, be built on a single baseboard with a single panel.

A D.C. Mains Problem

"In an attempt to run three 2v. .1 amp. valves direct from the mains I connected the three valves in series with 2-watt resistances totalling 2,200 ohms to the 230-volt mains. The valves functioned correctly, but the resistances became very hot and I had to switch off. I have been told now that I must use a barretter. If I do how many watts will the circuit consume? Will it just consume .6 watt (6v. x .1A.) or will the barretter consume some of the current due to heat? Why did the resistances become hot in the first case? The current flowing through the valves was .1 amp. at 6 volts, checked by an Avometer."—A. B. H. (Faversham).

NO matter whether you use a series resistor or a barretter, the total mains load will be .1 amp. and, therefore, the wattage, with 230-volt mains, will be 230 times .1 or 23 watts. The series resistors which you used were approximately correct so far as the resistance value was concerned, but there is a voltage drop of 220 across them, and, therefore, the wattage is again 220 times .1 or 22 watts. As you used a number of resistances in series you may have chosen 11 two-watt type, each of 200 ohms or so, in which case it would have been more or less in order, but in view of the heating, you have, no doubt, chosen higher values, and therefore your troubles are due to the fact that they are not designed to dissipate the wattage which is mentioned, namely, 22. Although you could use a barretter, you will probably find that it would be more desirable to replace the 2-volt valves by special Universal types, as the efficiency will be higher and any roughness in the mains supply will not result in hum such as may be experienced when using the thinner filament 2-volt type valves.

The Coupon on Cover iii must be attached to every query.

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

RADIOMART

SHORT-WAVE SPECIALISTS

Announce 1937

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 licenses, aeriels, Class B amplifications, neutralization, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free 7½d., including catalogue.

1937 Short-wave Catalogue only (3 times enlarged) price 1½d., post free.

TELSEN screened dual range coils, switched, 2/11 each. Pair 5/3. Milliammeters, 25 ma. upwards, 5/9. Super, 6/9.

AMERICAN mains transformers 230v. fully shrouded, 350/350, 6.3v., 5v., 6/11. Majestic 250/250, 2.5v., 5v., 4/11.

HEAVY DUTY mains transformer worth 35/-, 350/350, 150 ma.; 4v. 2.5ACT., 4v. GACT., 12/6.

465 KC/S., I.F. transformers, 3/11. Telsen Ace, 1/11. Telsen HF chokes, 1/11.

BRITISH RADIOPHONE straight line wavelength scale, 2/11. Centralab pots., all sizes, 1/6; switched, 2/-.

UTILITY 2-gang unknob and dial, 3/11; 1,500-volt tubular condensers, all sizes, 6d.

ELECTROLYTICS 500-volt 8 mf., 1/6; 4 mf., 1/6; 4 x 4, 1/11; 8 x 8, 3/6; 25 mf. 25v., 1/-, etc.

MOOthing chokes, 20 hy. 120 ma., 3/11; 100 ma., 2/11; 40 ma., 1/11.

DUSHBACK Wire, 6yds., 6d., heavy, 9d. Resincore solder, 6fl. 6d.; tubular glass fuses, 2d.

OLA 7in. PM speakers, 15/6; K.B. 1,500-ohm 7in. MC speakers, less transformers, 4/11.

SPECIAL OFFER Class B valve, driver transformer and valveholder, new, lot 5/-.

TRADERS' monster bargain parcels, value £4/10/-, for 10/-; also 5/- parcels.

FAMOUS Continental A.C. valves, 4/6; American Duotron, etc., all types, 3/6; battery from 2/3.

UTILITY 8/6, microdisc dials, 3/11; Radiophone, 0.00016 short-wave condensers, 3/6; series gap, twin, 3/9.

CERAMIC all brass microvariables, 15 mmfd., 1/4; 40 mmfd., 1/7; 100 mmfd., 1/10; short-wave H.F.C., 9d.

CLEARANCE catalogue 1½d. Goods over 5/- post free. All enquirers must send stamp.

Branches: 19, John Bright St.; 44, Dale End. Mail Orders, 44, Holloway Head, Birmingham. Telephone, MID 3254.

ALL goods previously advertised are standard lines, still available. Post card for list free.

VAUXHALL UTILITIES, 163a, Strand, W.C.2. Over Denny's the Booksellers. Temple Bar 9838.

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, improved type, 120 watts output, at £2/10/0. Send for our comprehensive list of speakers, resistances and other components.

WARD, 40, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

BATTERY CHARGING PLANT

2 VOLT, ½ amp. charger, 8/6, 1a., 12/6; 6v. 1a., 15/-; 2 amps, 21/-; steel cases, metal rectifiers.

12v., 2 amp. car charger, Westinghouse rectifier, special clips, 30/-; H.T. units, 150v., 20 ma., D.C., 8/6, A.C., 17/6; 1a. charger, combined, 21/-, many others. All complete, guaranteed, suitable 200-250v. Mains. 25-cycle models, 2/6 extra.

A.C. to D.C. Set Converters from 35/-, great variety Mains Transformers, from 3/6, mains chokes, 2/-; radio repairs, reliable, reasonable.

BRIGHTON RADIO SERVICE CO., 34, Middle Street, Brighton.

SHORT WAVES

SHORT WAVE on a crystal set. Full building instruction and crystal 1/2 post paid.—Radiomart, Tanworth-in-Arden, Warwickshire.

PREMIER SUPPLY STORES

Offer the following Set Manufacturers' Brand New Surplus Goods at a Fraction of the Original Cost; all goods guaranteed perfect; carr. paid over 5/-; under 5/- postage 6d. extra. Orders under 5/- cannot be sent C.O.D.

ALL POST ORDERS TO JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5. 'Phone: Amherst 4723.

CALLERS, AS USUAL, TO 165 & 165a, FLEET ST., E.C.4 (Next door to Anderton's Hotel). Central 2833. New Branch: 50, HIGH ST., CLAPHAM S.W.4 (Macaulay 2381).

Have you had our **GIANT ILLUSTRATED CATALOGUE AND VALVE LIST? Send 4d. IN STAMPS FOR THIS BARGAIN LIST.**

MAINS VALVES, famous Europa 4 v. A.C. types, 4/6 each. H.L., 1., S.G., Var.-Mu-S.G., H.F.-Pens., Var.-Mu-H.F. Pens. 1, 3 and 4-watt A.C. directly heated output Pentodes. Full-wave rectifiers, 250 v. 60 ma. A.C./D.C. types. 20-volt. 18 amp. S.G., Var.-Mu-S.G., H.L., H.L., Power and Pen. Following types all 5/6 each. Full-wave rectifiers, 350 v. 120 ma. and 500 v. 120 ma. 2½ watt indirectly-heated Pentodes, Octodes, Frequency Changers.

BATTERY VALVES, 2 volts, H.F., L.F., 2/8. Power, Super-Power, 2/9. S.G., Var.-Mu-S.G., 4- or 5-pin Pentodes, H.F. Pens. V.-Mu-H.F. Pens., 5/- Class B, 3/6.

AMERICAN VALVES. Genuine American HYTRON and TRIAD first-grade Valves. 3 months' guarantee. All types in stock 5/6 each. 210 and 250, 8/6 each. New Metal-Glass Valves, all types, 9/6 each. Genuine American DIOTRON Valves, all types, 3/6 each. Valve holders for all above types, 6d. each. Metal bases, 9d. each.

SHORT-WAVE COILS, 4- and 6-pin types, 13-25, 22-47, 41-94, 78-170 metres, 1/9 each, with circuit. Special set of 3 S.W. Coils, 14-160 metres, 4/- set, with circuit. Premier 3-band S.W. Coil, 11-25, 10-43, 38-86 metres. Simplifies S.W. receiver construction suitable any type circuit, 2/6.

COIL FORMERS, in finest plastic material, ¼in. low-loss ribbed, 4- or 6-pin, 1/- each.

SUPER CERAMIC CONDENSERS, S. L. F., .00016, .00015, 2/6 each; double-spaced, .00005, .000025, .000015, 3/- each. All brass with integral slow motion, .00015 tuning, 3/9; .00015 choke, 2/9.

I.F. COILS, S.W. 10-200 metres, 9/-; S.W. screened, 1/8; standard screened 180-2,000 metres, 1/6.

3-WATT A.C. AMPLIFIER, 2-stage, for mike or pick-up. Complete kit of parts with 3 valves, 49/-.

7-WATT A.C./D.C. AMPLIFIER, 3-stage high-gain, push-pull output. Complete kit of parts with 5 specially matched valves, 24 4s.

ELECTROLYTICS. U.S.A. 4 8 mfd. 350 v. peak, 1/3 each. Duffler, 4 or 8 mfd. 500 v., 3/-; 50 mfd. 50 v., 1/9; 10 mfd. 50 v., 6d.; 25 mfd. 25 v., 1/-; T.C.O. 8 mfd. 650 v., 4/-; 15 mfd. 50 or 100 v., 1/-; 50 mfd. 12 v., 1/-; Paper Condensers. W.E., 250 v. working 4 mf., 2/-; 2 mf., 1/-; 1 mf. 6d.; 350 v. working 4 mf., 2/9; 2 mf., 1/6. Duffler 500 v. working 4 mf., 4/-; 800 v., 4 mf., 6/-.

COSMOCORD PICK-UPS, with tonearm and volume control, 10/6 each. **PICK-UP HEADS** only, 4/6 each.

PREMIER MAINS TRANSFORMERS, wire-end type with screened primaries, tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. 4 a. O.T. and 4 v. 1 a. C.T., 9/6. 250-250 v. 40 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 8/6. 350-350 v. 120 m.a., 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 10/6. Any of these transformers with engraved panel and N.P. terminals 1/8 extra. 500-600 v. 150 m.a., 4 v. 2-3 a., 4 v. 2-1 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 17/6. **SPECIAL OFFER PHILIPS MAINS TRANSFORMERS**, 250-250 v. or 300-300 v. at 80 m.a. 4 v. 5 a., C.T.; 4 v. 1 a. Tapped Primary 100-250 volts, 6/11. 450-450 v. at 150 m.a. or 600-500 v. 100 m.a. 4 v. 4 a. C.T.; 4 v. 4 a. and 4 v. 3 a. Screened Primary. Tapped input 100-250 v., 12/6. **AUTO TRANSFORMERS**, step up or down, 60 v. to 150 v., 100 watts, 12/-, **SMOOTHING CHOKES**, 25 m.a., 2/8; 40 m.a., 4/-; 60 m.a., 5/8; 150 m.a., 10/6. 2,600 ohms, 60 m.a. Speaker Replacement Chokes, 5/8.

MILLIAMMETERS, moving-iron, flush 2½in., all ranges from 0-10 m.a., 5/8. Visual tuning, 6 or 12 m.a., 5/8. Moving-coil meters, 2½in. 0-1 m.a., 15/6; 3½in. 0-1 m.a., 22/6. Italian, 1½in. each. Ammeters, 0-1, 8, 10 or 20 a., 5/9.

TELESEN Multi-meters, 30 and 800 m.a., 8, 10 and 240 v., 8/6 each. Reads A.C. and D.C.

TRANSFORMERS, latest type Telsen R.G.4 (list 12/6), 2/2. Lussen Hypernik Q.P.E. (list 12/6), 3/6.

OUTPUT TRANSFORMERS for Power or Pentode, 2/6; Multi-Ratio, 4/6; Push-Pull Input Transformers by prominent manufacturer, 4/6 each.

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TELESEN iron-cored screened coils, W.349, 4/- each. Electric **SOLDERING IRONS**, 200-250 v., A.C./D.C., 2/8.

NEW 1937 1-VALVE SHORT-WAVE RECEIVER OR ADAPTOR KIT 13 to 86 Metres without coil changing. Complete Kit and Circuit, 12/6. **VALVE GIVEN FREE!** **DE LUKE MODEL 14** to 150 Metres, complete Kit with Chassis, 4 Coils and all parts, 17/6.

SUPERHET CONVERTER KIT, 13/6. **De Luxe Model**, 15/6. **S.W. SUPERHET CONVERTER KIT**, for A.C. Mains Receivers, 20/-; A.C. Valve given FREE!

NEW 1937 2-VALVE S.W. KIT, 13 to 86 Metres without coil changing. Complete Kit and Circuit, 19/6. **VALVES GIVEN FREE.** **DE LUKE MODEL**, 14 to 150 Metres, complete Kit and Chassis, 4 Coils and all parts, 25/-; **VALVES GIVEN FREE.** **3-VALVE S.W. KIT**, S.Q. Det. and Pen., 42/-; **VALVES GIVEN FREE!**

BAND-PASS TUNING PACK, comprising set of Telsen 3-gang iron-cored coils with switching, mounted on steel chassis with 3-gang condenser, illuminated disc-drive and 4 valve holders 5/5/- the lot. All Mains or Battery circuit. FREE!

SPECIAL OFFER. LISSEN TWO-GANG SCREENED ALL-WAVE COILS, 12 to 2,000 Metres, complete with switching and wiring diagram, 6/11 per set.

3 VALVE BAND-PASS KIT, 200-2,000 metres. Complete kit of parts, including chassis, all components, valves, M.C. speaker and wiring diagram. Battery Model, 50/-; A.C. Mains Model, 70/-.

MAGNAVOX Mains energised M.C. Speakers, '154', 7in. cone, 2,500 ohms, 12/6; '162', 9in. cone, 2,500 ohms, 17/6; '152' Magna, 9in. cone, 2,500 ohms, 9/6; Magnavox P.M.s.—'254', 7in. cone, 16/6; '252', 9in. cone, 22/6.

Special Offer BTH massive Energized Moving Coils, 10½in. diam. 1,650 ohms field. Power or Pentode transformer (state which), 14/6.

ROLA latest type P.M.s., 15/-; **GOODMANS'** 8in. mains energised, 1,900 ohms field, 14/6 each; Jensen P.M.s., 10/6.

DIALS—Charon Illuminated S.W. slow-motion Dial with 2in. knob, 2/-; Premier All-Wave 2-speed Dial, full vision straight line, dual ratio 10-1 and 150-1, 6/6, with eutechone. Potentiometers by well-known makers. All values up to 1 meg, 2/-; with switch, 2/6. **GRAMOPHONE MOTORS**, Coliaro Gramophone Unit consisting of A.C. motor, 100-250 v., high quality pick-up and volume control, 45/-; Coliaro motor only 30/-; Coliaro Universal Gramophone Motor, 100-250 v. A.C./D.C. with high quality pick-up and volume control, 67/6; Coliaro Universal Motor only, 49/6; Edison Bell double-spring motors, including turntable and all fittings, 15/-; Cosmocord Gramo. unit, comprising A.C. motor, pick-up, and volume control (list 55/-), 35/8.

TUBULAR CONDENSERS non-inductive, all values up to .5 mfd., 6d. each.

Wire-end RESISTORS, any value, 1 watt, 6d.; 4 watts, 1/-; 8 watts, 1/8; 15 watts, 2/-; 25 watts, 2/6 each.

Reliable MORE-KEYS with Morse Code engraved on bakelite base, 2/- each.

Bakelite case BUZZERS, 1/6; Walnut case "Loud-tone," 9/8 each.

Super Quality light weight HEADPHONES, 3/9 pair.

TELESEN Disc Drives, 1/- each.

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REPAIRS to Moving Coil Speakers, Cones and Coils fitted or rewound. Fields altered. Prices Quoted including Eliminators. Loudspeakers Re-paired, 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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NOTHING better available. **SIX MONTHS' GUARANTEE**, complete range of **BATTERY, A.C. MAINS, RECTIFIERS** always in stock, 2 volt Det., H.F., L.F., 2/3. **POWER**, 2/9. **SCREEN GRID PENTODE**, H.F. PENTODE, 5/-; American types, fully guaranteed, 5/6 each, Nos. 18, 24A, 35, 42, 43, 45, 47, 56, 57, 58, 75, 77, 78, 80, 2A5, 2A6, 2A7, 6A7, 2B7, 6B7, 6B6, 6D6, 25Z5, 25Y5. Write for other prices to Dulci Electrical Co., Ltd., Devonshire Works, Duke's Avenue, Chiswick, W.4.

MISCELLANEOUS

GRAMOPHONE attachments for Radio, electric motors, 25/-; pick-ups, 9/6; portable gramophones, 12/-; spring motors, 4/6, dozen 36/-, 100 £12/10/0, 1,000 £100; walnut pedestal Anexagram, £5; soundboxes, tone-arms, horns, cabinets, needles, gears, springs, accessories, cheapest. Quantity buyers obtain lower prices. Catalogue free.—Regentam, 120, Old Street, London, E.C.1.

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ADVERTISEMENT INDEX

Table listing various advertisements and their page numbers, including Automatic Coil Winder & Electrical Equipment, Bennett College, Ltd., British Institute of Engineering Technology, etc.

MISCELLANEOUS

"WIRELESS FOR THE MAN-IN-THE-MOON," by Columbus and Decibel, 2s. 6d. net.—Writing about the book the "Midland Daily Telegraph" says: "It is both good fun and sound theory."—At all Booksellers and Libraries, or from George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

"THE OUTLINE OF WIRELESS," by Ralph Stranger. Fifth edition, 8s. 6d. net.—This book, which covers the subject from A to Z, is to be recommended to all who desire to master the theory of Modern Wireless. At all Booksellers and Newsagents.—George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

A DICTIONARY OF WIRELESS TERMS, by Ralph Stranger. A Wireless Work of Reference that should be on the bookshelf of every keen amateur. Compiled by a master of lucidity, it gives the meanings of all Technical terms in general use. Price 2s. 6d. from all Booksellers and Newsagents.—George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

FIFTY TESTED WIRELESS CIRCUITS, by F. J. Camm, 2s. 6d.—The handbook contains every modern circuit, complete with instructions for assembling, component values, and notes on operation. Obtainable at all Booksellers and Newsagents.—George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

RECEIVERS, COMPONENTS AND ACCESSORIES Surplus, Clearance or Secondhand, etc.

SOUTHERN RADIO'S Wireless Bargains; all goods guaranteed and sent post paid.

RECEIVERS.—Vidor 3-valve battery sets, Model C.N. 212, complete, in attractive walnut cabinet, with 3 Mullard valves, moving coil speaker, batteries, and accumulator, new, in sealed cartons; £3/17/0 (list 6 1/2 guineas).

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LUCILLE.—5-valve American Midget sets, complete with 5 valves, moving coil speaker, ready for use on any mains 100-250 volts A.C./D.C., long and medium waves; £3/15, new, in sealed cartons.

RECORD CHANGERS.—Garrard Model R.C.4, plays automatically and changes eight 10in. or 12in. records of any kind; new, in sealed cartons; £6.

GRAMOPHONE MOTORS.—Collaro electric radiogram units, for A.C. or D.C. mains, 100-250 volts, fully auto stop, complete with pick-ups, can be used on any mains, brand new, in sealed cartons, 57/-; Collaro electric radiogram units, complete with pick-up and fully auto stop, for A.C. mains only, 37/0 each; Collaro triple spring gramophone motors, with 10in. turntables, complete with all accessories, 11/-; Collaro battery radiogram units, comprising double spring motor and pick-up mounted on plate, with all accessories, 35/- each; all Collaro motors are brand new, in sealed cartons.

SPEAKERS.—Celestion Soundex permanent magnet, 10/-; Telsen permanent magnet, with 10-ratio transformer, to suit any receiver, 12/6; Telsen loudspeaker units, 2/0; all brand new and boxed.

COILS.—Telsen iron core, W349 (Midget size), 4/-; type W478 (twin), 9/- pair; type W477 (triple), 16/- per set; type W476 (triple superhet, selector and oscillator), 16/- per set. Telsen short-wave coils, matched set of three, 4-pin bases, 12-26, 22-47, 41-94 metres, 5/- per set; Telsen dual range H.F. transformer and aerial coils, type W154, 3/- each; all ganged coils complete on base with switch; Telsen I.F. transformer coils, 110 kc/s, 5/-; Telsen dual range coils, with aerial series condenser incorporated, type W76, 4/-; Telsen aerial condensers, with shorting switch, 2/-; all Telsen components brand new, in sealed cartons.

AMERICAN VALVES.—A full range of valves for all American receivers; 6/- each.

MISCELLANEOUS Bargains.—All brand new, in original sealed cartons: Telsen A.C./D.C.; multimeters, test anything, radio or electrical, 8/6. Telsen 2-range voltmeters, 3/-; 8-range meters, including milliamps, 4/-; Ace (P.O.) microphones, with transformer, ready for use with any receiver, 4/0; 36 assorted Tru-ohm resistances, 1 watt, colour coded and marked, 30 on card, 6/- per card; Bell transformers, 200-250 volts input, 3, 5, or 8 volts output, 3/6; Morse signal units, incorporating buzzer, tapper and dash, with international code, complete with batteries and bulb, 8/9 each; Varley Square Peak coils, BP5, 2/-; Marconi V24 and Q type valves, useful for short-wave experiments, 1/6; glass insulators, 4d.; lightweight headphones, double-pole, 4,000 ohms each earpiece, 3/- pair; A.C. trickle chargers, for 2, 4, and 6 volts, 17/6.

REGENTONE Eliminators, A.C. 200-250 volts, type W5a, with trickle charger, 37/6.

SOUTHERN RADIO.—Branches at 271-275, High Rd., Willeaden Green, N.W.10; 46, Lisle St., London, W.C.2. All mail orders to 323, Euston Rd., London, N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). Phone: Euston 3775.

BANKRUPT Bargains. List free. All brand new goods. Burnt Midget portables, as listed £5/18/6, for £3/17/6. Decca A.C. Superhet radiograms, 12 gns. Ormond 5v. A.C. Superhets, £5/15/0. Ormond 3v. A.C./D.C., 50/6. All-wave battery, 3v. with MC and valves, 70/6. Lotus 4v. A.C./D.C., £3/15/0; Ditto, A.C./D.C., 4v. midgets, £3. Truphone, Pilot and Ferguson all-wavers, at trade prices. A.C. Cosmoquad gramophone motors with pick-up complete, 35/-; Ditto, Collaro, 42/6. Largest stock speakers, valves and components. Get my price first.—Butlin, 6, Stanford Avenue, Brighton.

3/- EACH—American valves all popular types. 90-day guarantee. Full range in stock. National Union, Hytron, Triad, Metal, Glass and M.G. Send for list.

3/- EACH—Mullard, Cossor, Mazda, Marconi, Osram valves for D.C. receivers; all perfect. 90-day guarantee. State type; Send cash or C.O.D. RADIOGRAPHIC, LTD., 66, Osborne Street, Glasgow, C.1.

RADIO BARGAINS

AMAZING PRICES. I lead, others follow. All-wave A.C./D.C. Table models, £6/15/-, 1937 Superhets, £7/15/6. 1937 Radiograms, listed 18 gns. My price £12/10/-; Sealed cartons. A.C./D.C. compacts, 5 valve, 60/-; Other bargains. American, English valve replacements. Components, Speakers. Stamp for list. Full stock. Amazing all-wave Ferguson models. Trade supplied.—Littler, The Midland Dealer, 2, Barras Lane, Coventry. Phone: 5983.

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PRACTICAL HOME-RECORDING—See Page 12.

Practical and Amateur Wireless

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Edited by F.J. CAMM

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Publication

Vol. 10. No. 235.
March 20th, 1937.

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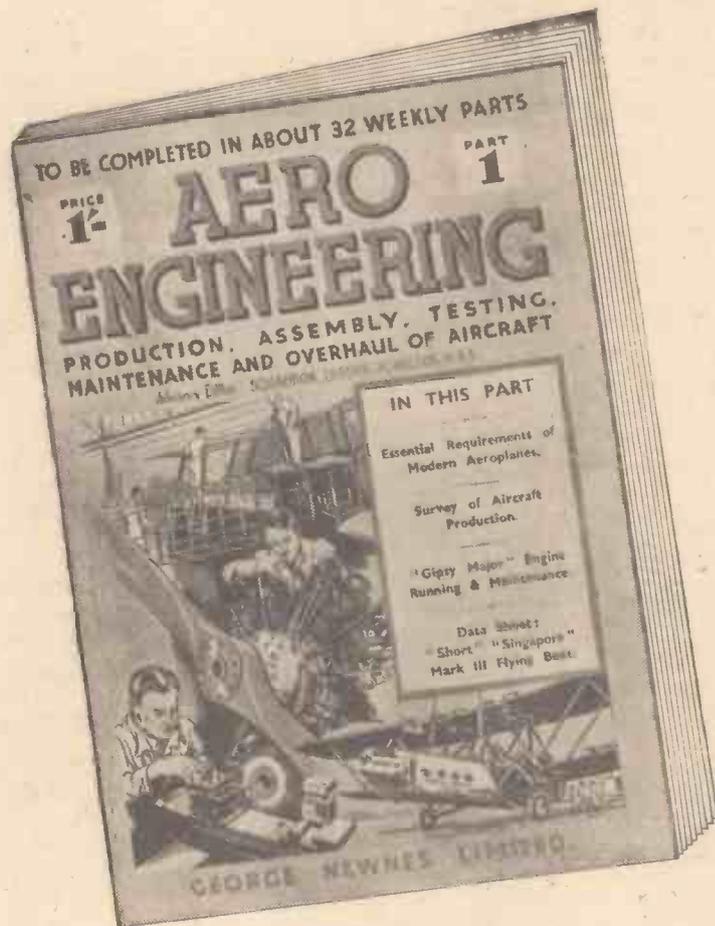


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RECEIVER PERFORMANCE FIGURES

See Page 3



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. X. No. 235. March 20th, 1937.

ROUND *the* WORLD of WIRELESS

Home Recording

ALTHOUGH the recently announced "strip" records have threatened the popularity of the standard disc-type record, there is little prospect of a sweeping change for some time to come. Although the disc has been with us for years, the amateur has not, in the past, made sufficient use of the facilities which are available to him, with his radio and a gramophone pick-up, to record items of his own choice. The reason may be attributed mainly to the lack of suitable facilities, but there are, at the present time, several different types of apparatus on the market which will enable anyone of average intelligence to make quite a presentable disc, either of broadcast items or of music or speech by himself or friends. In London to-day there are many recording studios where one can go and have a record made quite cheaply on durable discs which may be played back with ordinary steel needles and which give almost the same length of life as the standard commercial record. At popular stores and bazaars the aluminium disc is also provided in automatic machines where a record may be made for 6d. or 1s. These have to be played back with fibre or wooden needles to avoid damaging the surface, and this type of record may be made in the simplest manner by practically every listener. Sound-on-film, or strip records are not so easy for the amateur, as they call for photo-electric cells and high-quality amplifiers, but the amateur can make good examples provided that care and thought is expended on the design of the apparatus. Turn to page 12 and read about this fascinating branch of radio, and record your favourite items for future use.

been completed. The set was a wedding present to the Duke by his friends, and it has been installed in his Lagonda by the Lagonda Motor Company. His choice was Model 902T, and it has been fitted under the bonnet on the engine side of the dash, with an extension speaker under the dash in the front driving compartment.

Accidents and First-aid

THE increase in traffic on the roads which arises at this time of the year will no doubt lead to an increase in the number of accidents. The B.B.C. intend to broadcast a series of talks on accidents and

station for the extension of the broadcasting system in India.

Police Radio

ANOTHER demonstration of the utility of police pocket radio was afforded recently at Brighton. A housebreaker had escaped but it was known that he had cut his hand badly. The news was radiated from the central police station, including the news of the badly cut hand, and a warning to look out for a man with blood-stains. A constable on duty heard the alarm bell ring in his pocket and listened to the broadcast information. Within a few minutes a man answering the description passed him and he noticed what appeared to be blood-stains on his tie. He was questioned and turned out to be the wanted man.

Johannesburg Calling

From time to time on 49.2 m. (6.097 mc/s) it is possible to hear a programme from South Africa through ZTJ, Johannesburg. Hello! Hello! this is Johannesburg calling, followed by an announcement in Afrikaans (Cape Dutch), is given out by a male voice. The daily schedule is: G.M.T. 04.45-05.30; 08.15-12.00; 14.00-16.30 and 17.00-22.15. Broadcasts of news bulletins, dance music, gramophone records and vocal and orchestral concerts are the main features of all transmissions.

Four Instrumentalists

FOUR well-known Midland instrumentalists are to give a recital on March 23rd. They are Robert Silvester, the Leicester violinist; Johan Hock, the 'cellist, who conducts the Birmingham Philharmonic String Orchestra; Walter Heard, flautist, who contributed to the first programme broadcast from the old Witton Station in November, 1922; and S. C. Cotterell, clarinet.

"Northern Notions"

VICTOR SMYTHE is to present a further instalment of his "Outside Broadcast Magazine," "Northern Notions," on March 25th. It is not desirable to give specific details in advance, but it will be remembered that this feature includes "curiosity" material of all sorts, and has much in common with "In Town Tonight" and "Owt Abaht Owt"—except that most of the turns are outside broadcasts or recordings of outside broadcasts.

Coronation Week

THE high spots of entertainment during Coronation week will provide splendid material for the home-recorder, and although full details are not yet available, there are undoubtedly to be some good broadcasts. Apart from the many musical feasts, Saturday, May 15th, will be notable for the fact that the Music-hall programme will be extended to one hour and a half. Make up your home-recorder and get in a stock of record blanks for this programme.

Duke of Norfolk's Car Radio

INSTALLATION of a Philco car radio in the car of the Duke of Norfolk has just

the method of first-aid treatment which should be adopted until the doctor arrives. Captain White Knox, an officer on the staff of the St. John Ambulance Association, will come to the microphone in the National programme on March 19th and will explain how even a slight knowledge of the principles of first-aid may result in the saving of life, not only out of doors but also in the home.

Marconi Indian Stations

WE are informed that the Indian Government has placed a contract with Marconi's Wireless Telegraph Co., Ltd., for the supply of four five-kilowatt medium-wave stations, and one short-wave

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ROUND the WORLD of WIRELESS (Continued)

New Radio Station for Stornoway
STORNOWAY TOWN COUNCIL have applied to the Board of Trade for the erection of a wireless station at Stornoway. A previous application made by them was rejected, but the new application has been made on the grounds that during the winter the lifeboat was called out on many occasions to make needless journeys, often 100 miles or more, because it was impossible to get in touch with other lifeboats or ships at sea.



The new "strip" records recently demonstrated in London, with one of the radiograms designed for use with them. It is anticipated that the price of this instrument will be in the neighbourhood of 30 guineas.

Choral Concert

THE Newbridge (Bath) Male Voice Choir, conducted by Frank Pickering, will broadcast from the Western studios on March 19th. This choir has been in existence for nearly 10 years, and successes have been won in many parts of the country.

Parsifal Concert

WE are informed that the following artists will take part in the Parsifal Concert which will be given in the Queen's Hall, under the direction of Sir Henry J. Wood, on Good Friday, March 26, at 7.30 p.m.: Muriel Brunskill (Kundry), Walter Widdop (Parsifal), Victor Harding (Klingsor), Norman Walker (Gurnemanz), Roy Henderson (Amfortas), Foster Richardson (Titirel), and Elena Danieli, May Busby, Janet Powell, Margaret Godley, Margaret Rees and Myra Owen (Flower Maidens), supported by the B.B.C. Symphony Orchestra, the B.B.C. Singers, and the Philharmonic Choir.

Celebrities of the West

IN the series by Celebrities of the West, the artist on March 18, in the Western programme, will be Percy Heming (baritone).

Philco Car Radio Aerials

THE most sensitive and important part in the proper working of any car radio set is the aerial. It is necessary to know certain properties of the efficiency of an aerial in order to have it pick up signal energy from broadcast stations, and also to design radio sets which will perform satis-

INTERESTING and TOPICAL NEWS and NOTES

factorily on a given aerial. To meet the situation, Philco Radio have introduced a component known as a "padder" for use in every car radio they manufacture. With the aid of the padder every radio can be attuned to its own individual aerial when it is installed. The padder ensures the maximum performance on any type of car radio aerial by matching each set with its aerial. By this means the greatest efficiency in pick-up of signals is obtained.

Organ Recital from Glasgow

FRANK OLSEN, at the organ of the New Cinerama, Glasgow, will play for half an hour on March 25th. His programme will include: Selection, "Swing Time," by Kern; "Pierrette Cherie," by Ives; "The Knave of Diamonds," by Steele; and the March, "Cairngorm," by Cahill.

Music of the Hours

TO conclude this series of mechanical chime-tunes, recorded at various Midland churches, Walter Pitchford, who collected the material and presented the programme, has got together a number of arrangements of chime-tunes. These will be given on March 26th by the B.B.C. Midland Singers, conducted by Edgar Morgan, and Norris Stanley's Septet.

SOLVE THIS!

PROBLEM No. 235.

Somerton built an A.C./D.C. receiver for use on D.C. mains with the rectifier connected on the half-wave principle in the normal manner. When tests were made it was found that the rectifying valve was faulty. Could the set be made to work without the rectifier and without the addition of extra components? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 235 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, March 22nd, 1937.

Solution to Problem No. 234.

Some of the turns on the primary winding had become short-circuited. The following three readers successfully solved Problem No. 233, and books are accordingly being forwarded to them: B. Aldred, 11a, Hartington Rd., Bolton, Lanes; E. I. Jones, 34, Prospect St., Aberystwyth; E. Roberts, 1, Deveraux Drive, Poulton, Wallasey.

Midland Orchestral Concert

ON March 27th Leslie Heward will conduct the orchestra in two suites—"Iverija," by Ippolitov Ivanov, and "Piedmont," by Sinigaglia.

B.B.C. Scottish Orchestra

THIS popular orchestra, conducted by Guy Warrack, will play for half an hour on March 23rd. The programme will include: "Sacred Song," "Cradle Song," "Dance Tune," (from "Eight Russian Folk Songs"), by Liadow; "A Lyrical Sketch," by Hubert Clifford; "Serenade" (from "Les Vendredis"), by Arceiboucheff; "On Hearing the First Cuckoo in Spring," by Delius; "Andante," "Gavotte Gracieuse," and "Pantomime" (from "Les Petits Riens"), by Mozart.

Scaled Orders

KENNETH ADAM, of a London evening newspaper, will be the narrator on March 25th in the series entitled "Scaled Orders," which will be broadcast in the Midland programme. Most of the programmes in this series are recorded by the B.B.C. Mobile Unit. There is now sometimes a slight modification of the surprise item idea in that a code word is added to the title; the sub-title for this broadcast will be "Supercharger." The producer of the series is David Gretton.



Bebe Daniels and her husband, Ben Lyon, who have recently arrived in this country from America, are here seen making a gramophone record for "His Master's Voice" at the Company's London studios. The record is entitled, "There's a Small Hotel" from "On Your Toes" (H.M.V. B8543).

Ollerton Colliery Band

THIS well-known Nottinghamshire band, formed in 1927, has broadcast several times. Ernest Slack was appointed its conductor in 1931. Under him it is to play a popular programme from the Midland Regional on March 21st, including Ord Hume's Fantasia, "A Military Church Parade." The vocalist for the interludes will be Walter Payne, the Derby baritone, who has been a broadcasting artist since 1924 and was a member of the British Singers Quartette.

Receiver Performance Figures

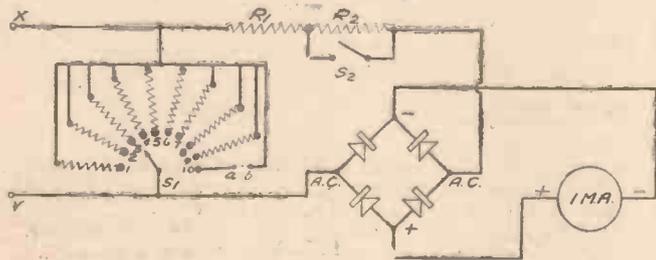
HAVE you ever wondered why it is that if you wish to buy or build a new receiver it is impossible to obtain other than meagre accurate figures concerning the performance of which the instrument is capable? If you buy a car, you probably inquire for details concerning the horse-power, maximum speed, petrol consumption, and so forth. But with a radio receiver you can rarely discover what its sensitivity is, what is the exact degree of selectivity at different wavelengths, the acoustic response, or the amount of distortion which is present in the reproduction.

Of course, it is by no means easy to give hard, cold figures for such details, but it is becoming more and more important that at least some facts should be available. A few years ago you could form a pretty shrewd idea as to the results to be expected from, say, a five-valve set with two tuned H.F. stages, but to-day the number of valves means little, and even the number

A Brief Explanation of the Tests which are Applied to Receivers in Order to Provide Accurate Figures and Expressions Relating to Sensitivity, Selectivity, A.V.C., Frequency Response and Distortion.

By FRANK PRESTON

which are given, but simply to explain in simple language some of the tests which are described. In many cases, the details given are of a highly technical nature, and would be incomprehensible to the



Circuit diagram of an output meter which was described in "Practical and Amateur Wireless," dated October 17th, 1936.

of stages does not necessarily convey very much meaning. There is, however, no reason why manufacturers, at least, should not say precisely how sensitive their various sets are, and why they should not say that the maximum sound output from the speaker when the set is tuned to a signal providing a stated input is of a certain value.

Most readers will be well aware that there is nothing new in the idea of giving the sensitivity of a set in terms of the voltage of the signal compared with the number of watts represented by the output. Until fairly recently, the main trouble has been that different manufacturers were not agreed on the best methods of presenting these figures. The result was that while one maker gave the performance of his set in one manner, another maker adopted quite different standards, so that comparisons could not easily be made.

average constructor, but their meaning is interesting and instructive.

Overall Sensitivity

The R.M.A. suggest that tests for sensitivity of the receiver as a whole should be made when the set is delivering an output of 50 milliwatts—which is the lowest

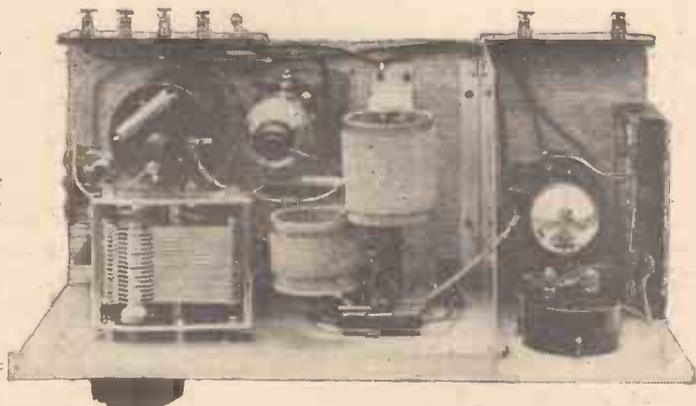
input, or of the carrier wave, but also upon the amount of modulation—sound impulses—imposed upon that carrier wave. Thus, it is recommended that the steady signal, which must be provided by a signal generator of accurate design, should be modulated to the extent of 30 per cent. This means, roughly, that the oscillations representing the sound "mixed" with the carrier wave should be of about one-third the strength of the carrier. It is very important that the signal be constant, and this means that it must consist of a single note; an ordinary signal consisting of speech or music would not do, because of its constantly and rapidly-varying intensity. It is also important that the measurement be taken at a standard frequency—a note of uniform pitch. Thus, it is suggested that a 400-cycle note should be employed for modulation. Such a frequency is representative of the average of the notes given by most musical instruments and of the human voice. For example, the range of the human voice is from about 60 to 1,000 cycles per second, and that of the cornet is from about 150 to 1,200 cycles per second.

It can be seen from the above particulars that by measuring the input to the set in microvolts of a "standard signal" required to produce an output of 50 milliwatts, the sensitivity of any type of receiver can be specified. Moreover, the test indicates the overall efficiency of the H.F., detector and L.F. stages in a "straight" set, or of the frequency-changer, I.F. stages, second detector and L.F. amplifier of a superhet. As the sensitivity of a receiver varies according to the wavelength to which it is tuned, tests must be made at various condenser settings on the various wavelengths covered by the set. The results can then be shown as a smooth curve on graph paper.

Selectivity Curves

When we come to consider selectivity, the same general rule holds good. In

A plan view of the signal generator described in our issue for July 14th, 1934.



loudspeaker output for entertainment value in the average room of a house. This output is referred to as the "standard" output, and the primary object of the sensitivity test is to measure the signal input, in microvolts (millionths of a volt), required to produce such an output. In theory this is simple enough, but there are many practical difficulties in the way of making the appropriate measurements.

The first is that the output is dependent not only upon the voltage of the signal

this case, however, two signal generators are used in series; one of these produces an "interference" signal of the form mentioned above, and the other the "required" signal which is not modulated. The only reason for not modulating the latter is that it would then be impossible to measure the output which is representative of the extent of interference. The output is measured first when the two signals are at the same frequency or wave-

(Continued at foot of next page)

R.M.A. Recommendations

The Radio Manufacturers' Association has been aware of the difficulties for many years, and has now taken an important step by publishing for the benefit of its members two authentic booklets. Both are called "Specification for Testing and Expressing Overall Performance of Radio Receivers;" Part I is devoted to "Electrical Tests," and Part II to "Acoustic Tests." These useful publications are not intended as instructions to members, but as suggestions, with the object of bringing the tests down to a uniform basis. No doubt the suggestions will be generally adopted, in which case the science of radio receivers will have been taken a step further.

It is not intended to repeat the large amount of information, the various formulae and the graphical expressions of results

Concerning "W.M." Receivers

(Concluded from page 754 of last week's issue)

The "W. M." 1934 Standard Three (W.M. 351)

This is a straightforward S.G. three receiver (Fig. 7), the valve combination being an ordinary screen-grid high-frequency amplifier, leaky grid detector and pentode output; ganged tuning is embodied and P.U. terminals fitted.

Baseboard construction is used, the size being 12in by 9in., while the layout is very

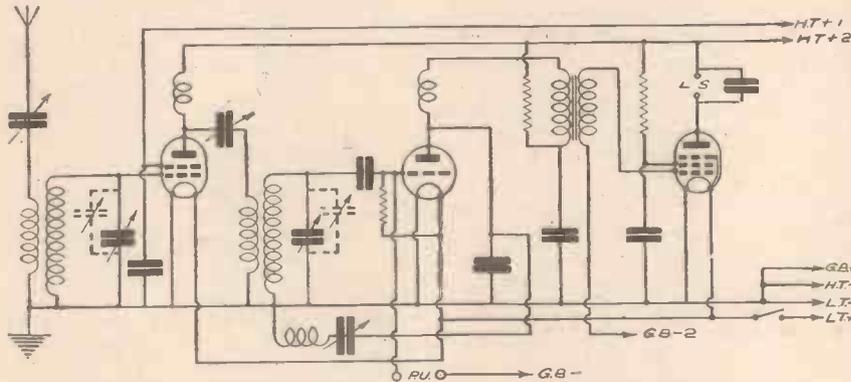


Fig. 7.—The original theoretical circuit diagram of the "W.M." 1934 Standard Three.

simple, and one which lends itself to modifications if one should wish to experiment.

It is hardly necessary to give the complete component list, as the various items are standard and, in view of the fact that some of the specified parts are no longer obtainable, any good components on hand could be used.

The coils are the only items which call for any comment. Those specified are the Telsen W.349, and as it may be rather difficult to secure them the connections are given below for the Wearite coils P.I.C. and T.I.C.

Aerial Circuit	
Telsen 349	Wearite P.I.C.
5.	A.
6.	E.
1.	V.C.
3.	C.
2.	Ignore as switch is in coil.

H. F. Coupling
Remove H.F.C. and .0003mfd condenser from anode circuit of S.G. valve, and connect as follows:—

Telsen 349	Wearite T.I.C.
Anode of S.G.	To spade-fitted lead on coil.
H.T.2.	H. T. Pos. terminal on coil.
1	V.C.
3	C.
4.	R.
2.	Ignore, same as aerial coil.

This modification will convert the circuit into transformer coupled H.F., and greatly improve the selectivity.

The valves required are:—
1 Mazda S.G. 215 or Cossor S.G. 215.

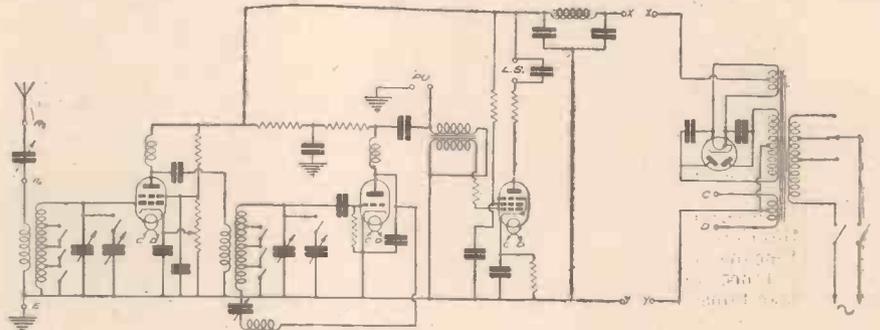


Fig. 8.—Circuit diagram of the "W.M." Emigrator A.C. receiver (14-500 metres).

1 Mazda H.L.2 or Cossor 210 Det.
1 Mazda Pen. 220 or Cossor 220 HPT.

The Emigrator Receiver (W. M. 352)

This receiver, described in the February issue of the *W.M.* (1934), appeals to many short-wave enthusiasts who require an A.C. operated outfit, capable of plenty of punch and good range, and yet also desire to receive the medium-wave stations. With the coil unit specified, the Goltone Colonial Universal, the wave-range is from 14 to 500 metres, a very useful and efficient arrangement.

A tuned H.F. stage is employed on all wave-bands, while the pentode output makes sure of ample L.S. strength on the majority of transmissions during normal conditions. Wooden chassis construction is specified with an aluminium panel, while valve rectification takes care of the mains side of the circuit.

Even if the specified coil unit is not employed, the circuit forms a very efficient basis for a pure short-waver or an all-wave receiver, making use of one of the many all-wave coil units now obtainable.

The theoretical circuit is shown in Fig. 8, but those requiring a full size point-to-point wiring diagram can obtain a copy of the blueprint from these offices, price 1s.

The two switches are Bulgin baseboard on-off type S80B, with 6in. by 5/32 in. extension rod, and K.14 knob with reducing sleeve.

Valves—1 Mazda AC. SG. V.M.
1 Mazda A.C./H.L.
1 Mazda A.C.2, Pen.
1 Mazda U.U.2, or Mullard I.W.2.

Mains Transformer—Primary 200-250 volts.
Secondary, 250-0-250 volts.
60 milliamperes.
L.T. 2-0-2 volts at 3 amperes.
2-0-2 volts at 1 ampere.

The smoothing choke is of the 30 henry 50 mA type, and the L.F. transformer ratio is 3:1 or 3½:1.

RECEIVER PERFORMANCE FIGURES

(Continued from page 3)

length, after which the tuning of the "interference" signal is altered above and below the frequency of the "wanted" signal, and the output obtained at various settings of the signal generator is measured. A graph can then be drawn from the results obtained; this is the reverse of the usual "peaked" curves.

Automatic Volume Control

The recommendations also cover the measurement of the A.V.C. action of a set, again using the "standard signal." When making the tests the signal input is first set to 1 volt, and the receiver volume control adjusted so that the set delivers one-quarter of its nominal power output,

which is normally one-quarter of the rated maximum undistorted output of the last valve. After that, the input is progressively reduced in convenient steps, and the output measured at each step. Theoretically, of course, the output should remain constant, but in practice it tails off to zero as zero input is reached. Nevertheless, when using a highly developed modern set, there is only a slight change in output over the first half of the range of input reduction. Results of these measurements can be expressed on a graph, where the vertical ordinate is marked as audio-frequency output, and the horizontal ordinate in radio-frequency input. Alternatively, the result can be given as a fraction representative of the "slope" of the curve at any particular point. In this respect, the

expression is comparable with that used to indicate the "slope" of the anode-current-grid-volts curve of a valve (this expression is known as the slope or mutual conductance) and may be found in the majority of modern valve catalogues.

Response and Acoustic Output

The "Acoustic Tests" include the preparation of a graph to show the change in "loudness" of the output according to the variation in frequency of the signal modulation. This graph takes into consideration the performance of the valves, intervalle couplings and of the loud-speaker, and is similar in appearance to the curves sometimes given by manufacturers in connection with pick-ups, microphones and speakers.

IT DID NOT HAPPEN THEN

A Natural Conclusion to the Article Entitled "It Does Not Happen Now"

By H. J. BARTON CHAPPLE, B.Sc

IN a previous article we considered various points in regard to which the present-day amateur has outstanding advantages over the listener in the early days of broadcasting. It must not be forgotten, however, that while progress has automatically removed many of the early difficulties and problems, it has also brought in its train fresh problems which were unknown ten years ago. A brief account of some of these will not only be of interest, but will help to explain why, from time to time, this journal emphasises the importance of constructors seeking to learn about the "whys" of radio in addition to the "hows."

Interference

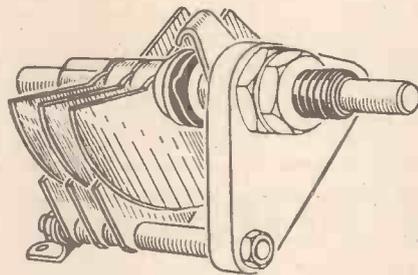
The first point to be noted is that, although the modern listener is no longer troubled to any serious extent by that form of interference which is due to re-radiation from his neighbours' sets, those noises which are due to electrical interference (man-made static) are much more noticeable to-day. This is due to several causes. The first is that during the last decade there has been a great increase in the use of electrical equipment, both industrial and domestic. Trolley-buses, electric signs, fans, refrigerators, ultra-violet ray apparatus, and other paraphernalia of the beauty parlour are the chief industrial offenders, while in the home thermostatically-controlled heating and cooking equipment, refrigerators, vacuum-cleaners, massage sets, and so on, are being multiplied on every hand. In this way the potential causes of electrical interference are being increased. And the more general use of mains-operated receivers and tiny indoor aerials is opening more doors through which this interference can enter the set. Next, the very much enhanced sensitivity of the modern set, compared with that of older models, results in the interference being much more apparent, a cause which is aggravated by the desire of many listeners to listen to signals of low field strength, comparable with the strength of the interference field. Fortunately, ways and means of mitigating the nuisance are in existence, and the listener of 1937 should make himself fully acquainted with them and their method of employment if he wishes for interference-free reception.

Circuit Design

The next point to which we would draw attention is the fact that there is a greater uniformity in circuit design to-day than ever before. Ten years ago the prospective builder of a set had the choice between fifty different circuits—straight and super-het arrangements, numerous types of intervalve coupling, methods of detection, of applying reaction, of types of output valve, and so forth, and the number of different permutations and combinations of these was almost without limit. To-day the choice is limited to less than half a dozen basic designs. As a result, it is sometimes said that the modern amateur has not the same scope for experiment as had his co-hobbyist in the past. This is, however, very far from the truth. Much of the much vaunted "scope for experiment" enjoyed two years ago was not experimental scope at all—it

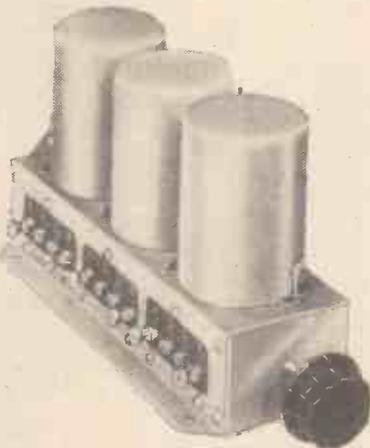
was merely scope for haphazard trial and error; a free hand to play with various components and circuit arrangements in the hope of obtaining better results, and often without any realisation of what was actually happening.

To-day, thanks to a better understanding of technical matters, trial and error can be cut out. General circuit design has crystallised down to a small number of well-tryed and entirely satisfactory arrangements, and the actual making of a receiver is not a matter of experiment—merely a good exercise in workmanship. But there is still ample scope for experiment, and experiment of a very valuable nature.



The modern short-wave receiver utilises high-grade low-loss condensers such as illustrated above.

Instead of experiment being directed to making something which will work, it can now be directed into taking something which already works, and works well, and endeavouring to improve upon the already good. That is something worth while. Amateurs should be encouraged to build their own sets, by all means, but they should, in the main, adhere to a conventional and



Coils may now be obtained in ganged units, complete with switch (such as this Varley unit), with a much more efficient performance than some of the earlier types of coil.

successful design, such as published in PRACTICAL AND AMATEUR WIRELESS, at the same time endeavouring to incorporate into it some feature of their own contriving, which will improve performance in some definite way. Or, if taste does not lie in

the direction of circuit improvement, the question of making the set of greater use in the home might be considered—further simplification of control; remote control; problems of extension circuits; automatic tuning—there are dozens of useful and interesting problems awaiting solution.

Operating Requirements

But in making this statement, we are reminded of another thing which "did not happen then." The constructor did not need such a high standard of dexterity and workmanship in the old days as he requires to-day. Please do not misunderstand this statement. On the one side we are far from suggesting that at any time there was any excuse for bad or slovenly workmanship, nor, on the other side, do we imply that the modern constructor needs to be a skilled engineer. What we do mean to say is that time was when sets and circuits were, in general, so comparatively inefficient and operating requirements so much less critical than now, that the effects on performance of considerable departures from specification in regard to size or components, circuit values, layout, and so forth, were far less serious than to-day. Nowadays, accuracy with regard to all these points is usually vital; quite a small difference in the positioning of some component may result in instability; a wrong value of auto-bias resistance may play havoc with both reproduction and valve life; an incorrect value of fixed condenser may render a set inoperative; or a wrong load resistance reduce volume by 50 per cent.

Delicacy of adjustment is another point which is vital to-day. A fraction of a turn of a trimmer condenser screw, and the set may be completely out of gang.

Skill

On the score of workmanship, it must be remembered that ten years ago one could get along fairly well without the ability to make a good soldered connection, but to-day screwed connectors are seldom seen, practically all circuit joints being made by soldering. At one time, wonders could be done with the aid of a screw-driver and a pair of pliers, a wood base and a plywood panel, together with very little skill. Now, metal chassis, complete circuit screening, and the desire to fit the set into a good looking cabinet call for a further kit of tools, including those designed for metal working; workmanship approaching the precision type; and greater care and artistic ability in the final stages of design and construction.

Components

Compared with even the best components which could be obtained ten years ago, modern components are not only far more efficient in technical design and far better made, but they are much cheaper, and are also better in appearance. In the old days, one could not go into a shop and purchase a set of three coils accurately matched to work together, and in the same shop find a three-gang condenser made, perhaps, by quite another firm, which would not only tune all three coils accurately, but was fitted with a frequency or station scale

(Continued overleaf)

IT DID NOT HAPPEN THEN

(Continued from previous page)

sufficiently accurate for all domestic listening.

Again, we were not able to purchase compact and accurate fixed resistors and condensers with wire ends which could be included in the run of wiring or grouped together on a neat sub-panel. Our condensers had to be screwed down to the baseboard, and often had miserable little terminals which always kept coming undone, and resistances usually had to be placed in special slips which cost almost as much as the resistances themselves, took up much valuable room, and added yet more terminals to screw up. In general, we were not able to accommodate all our small components out of sight below the baseboard. Most of them had to be arranged on the board itself, and the set wiring was therefore in many cases of the bird's-nest variety not from choice, but from sheer necessity.

Reproduction and General Performance

Another thing which "did not happen then," was the publication of long lists and tables of base connections for different kinds of valves. There was only one type of base, and everyone knew the conventional arrangements of the pins. But the multiplicity and complexity of modern

type valves now renders it unwise to start wiring up even the simplest set without checking up to be certain that the valve pin connections are correct. Not that this is a grumble, for we all owe much to the



An extension speaker, such as this W.B. model, will give excellent reproduction with any receiver.

designers of these wonderful valves. But therein does lie a difference between home construction now, and then.

But possibly the greatest and most

important point which must be mentioned—and because of its importance it has been left to the last, is that one of the things which "did not happen then" was for the maker of a receiver to sit by the fire with his family and listen seriously to the performance of the set he had made. In the first place, the reproduction and general performance of early home-made sets, beautiful as it seemed to the proud owner, had little entertainment value for the family. The constructor usually scorned to listen to the local programme and either wished to comb the ether for distant stations, or to eviscerate the set every other day in order to make some fancied improvement.

It is now the aim of most constructors to make a set which shall be of real entertainment value—which can be enjoyed by the whole family. To this end, he takes great care to make the reproduction as good as possible, and, according to his taste and means, limits the capacity of the receiver. There are seldom heard the weird noises which result from attempts to pick up stations which the set is not really capable of receiving well. Moreover, to the eternal credit of the average constructor, there are tens of thousands of home-built sets which daily give not only excellent local station performance, but also consistent and enjoyable reception from the very ends of the earth.

ABSOLUTELY NOTHING!

But a Great Deal Done—in Connection with Modern Valve Construction Methods

IN industry to-day it is quite commonplace for large sums of money to be spent in achieving this or that, but valve manufacturers spend a lot of money in making quite sure that their valves are absolutely full of nothing, or, to be technically accurate, to ensure that they are full of as little as possible. Readers will be well aware that a valve would not work unless the air was pumped out of the bulb, but few who turn on their radio to enjoy the programme (or be desperately bored) have any idea of the enormous expenditure of time and money directed towards producing the very highest possible vacuum, for not only must the vacuum be high when the valve is made, but it must stay so throughout its long life, because any air or gas trapped in the metal or glass itself could easily be released by bombardment from the electron stream, which is the life-blood of the valve.

Baking Process

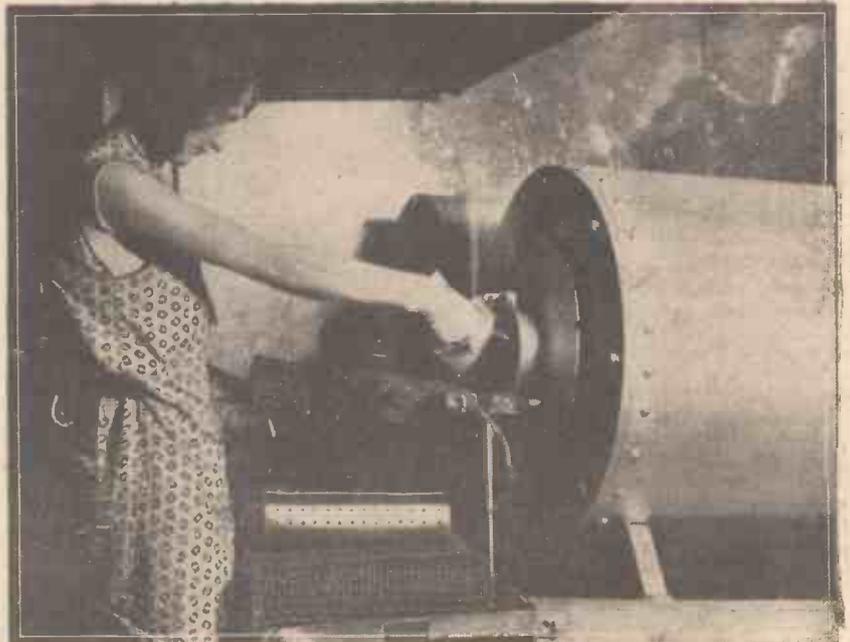
Precautions start in valve manufacture at a very early stage by making sure that the nickel and other metals used are absolutely free from impurities which could lead to trouble.

When the innumerable metal parts of a valve are made, before they are assembled they are put into an oven and baked at round about 1,500 degrees Fahrenheit, with a view to driving out any gas that may be trapped beneath the surface. Precautions are then taken to see that they are not touched by fingers, and assembly proceeds until the parts are safely housed in the glass bulbs which are sealed on gigantic pumps which commence the work of removing the oxygen, nitrogen, and other gases in the bulb. Ten years ago the precautions outlined above would have been considered more than sufficient, but to-day far more elaborate precautions follow.

Sealing the Bulbs

While the actual pumping is in progress, copper coils attached to a short-wave oscillator drop over the valve, and heat the metal electrodes to a cherry red, this process being repeated two, three, or even four times according to the type of valve. Eventually, the glass bulb containing the electrodes is sealed, and the valve is cemented into its base.

However carefully a valve is pumped, there are bound to be stray atoms of gas, as there is no medium between these atoms and the pump itself. To overcome this difficulty a small piece of magnesium ribbon, or other suitable substance, is placed within the valve, and called the "getter." At the appropriate time the magnesium ribbon is heated by bringing an intense magnetic field to play upon it, resulting in the instant disintegration of the magnesium, which, due to the absence of any air pressure, flies outwardly, the leading atoms picking up the stray atoms of gas and carrying them to the glass bulb, where they are duly imprisoned by the subsequent layers of magnesium which deposit themselves, forming the familiar mirror-like backing associated with the modern valve.



A process in the heat-treatment of Cossor valves. One of the electric furnaces that heat the valve parts in an atmosphere of hydrogen so that all traces of unwanted gas are driven from the metal; the temperature used often reaches 1,500 degrees Fahrenheit.



On Your Wavelength

BY THERMION

“The Power of the Press”

I LISTENED in to the broadcast on the above subject the other evening, and must congratulate the B.B.C. in getting a measure of verisimilitude into it. I have lived amongst journals and journalism and printing machinery for more years than the B.B.C. knows of and, quite naturally, I could see the flaws, but all the same, I agree with the impression they desire to create that journalism controls the world. It makes or breaks politicians; can make or break radio artists; it controls and moulds the opinions of the public, it is the most potent force in the world. It can inflame national passion, fan patriotism and national hatreds. You can guess what I am leading up to—my pet hate, crooners. Not alone my pet hate, for I gather that the daily press is now re-echoing my thoughts and arguments in an organised campaign against crooning. The B.B.C. admits that the Press has power, and it is going to use that power to prevent in this country the sort of tripe which amuses that new race—the Yanks! The B.B.C. is, therefore, wisely following the successful methods of the politician in keeping its ear to the pavement of Fleet Street. It has just issued an order to Henry Hall, and all the other backgrounds for crooning voices, that only one number out of three must be vocal. Whilst that is a move in the right direction, it is still one vocal number too many for me. Naturally, I am gratified that the B.B.C. has at long last bowed to my superior judgment and has granted my wish. Because a few young people have not learned better than to like crooning, that is no reason why it should be foisted on intelligent listeners. Most young men start their life as extremists and it is not until they have reached their thirties that they begin

to see political sense. It would, therefore, be just as sensible for the

B.B.C. to foster Bolshevism as crooning. One breeds revolution and the other lunacy; in neither case have you helped to create a useful citizen. You see the risk of granting monopolies. Imagine only one theatre; the manager could put on what he likes. With the B.B.C. you have to listen to hours of tosh in order to weed out the few items you do wish to hear. I welcome this more mellow outlook of the B.B.C. and the dropping of the attitude of the Supreme Iconoclast, who was going to show the world—never mind what they want, they are going to get what we give them, what we think they ought to have, just as if they were administering a dose of castor oil to a sick race.

Yes, the Press has power, and it is largely the power of this journal which has brought crooners into their deserved state of disrepute. Only one thing remains to be done, and that is to banish crooners to Harlem, where they can reside amongst the aboriginal niggers. The B.B.C. claims to be a rival of the newspapers, a newer form of news dissemination. That it can never be. The correct function of a newspaper is to spread news, irrespective of party or politics, to criticise fearlessly; the B.B.C. cannot do that. It must always remain muzzled by the political body which happens to be in power. It is autonomous, but circumscribed in its activities. The B.B.C. should be used as an instrument of entertainment and have a lively eye for what the public wants. It should not cater for the noisy minority who write letters of complaint because there is not enough crooning.

Hard Lot of the Overseas Reader

DIFFICULT though we sometimes find it to obtain components, our lot is nothing compared to that of the Overseas reader. Peruse the

following letter from a reader who resides in the far-off Belgian Congo:—

“Dear Thermion,—In writing the following remarks I have only one desire, and that is to be helpful; so I leave it to your dear understanding self to use the contents of this letter to the best advantage for good and good alone!

“As it takes me six weeks to get my copy of PRACTICAL AND AMATEUR WIRELESS and five weeks for a letter to get to England, it is very possible that the matter which has aroused my pen will have been long confined to the realms of forgetfulness, I refer to the matter of “Components.”

“My dealings have been mainly with a firm who rarely fail to advertise in PRACTICAL AND AMATEUR WIRELESS and who are regularly quoted by you as being able to supply most things.

“People who guarantee to send out a kit complete down to the last screw ought to keep to their word, especially when sending to outlandish places like Central Africa, and more especially when the customer writes two pages begging and beseeching that they will take extra care in making up the order.

“My first order to them they dispatched after a delay of about three weeks. When it arrived it was minus four insulating bushes and washers, holding down bolts for the tuning condenser, a knob for the series aerial condenser, and contained a wrong size of fixed condenser which would not fit down in between other components. From the time of sending in the order it was nearly a year before I had the receiver in a working condition. In the letter accompanying the order it was explained to them that the nearest dealer in components was over a thousand miles away!

“However, a second order was sent to them with a letter reminding them of the unfortunate happenings regarding the first order and asking once again that they exercise a little extra care. Eventually the kit arrived and

was put together, but distortion was the only result obtainable. Two letters were written to Mr. Camm about the receiver, and his conclusion, together with my own experiments, pointed to the coils as being the cause of the trouble. So a letter was sent to the firm about it. They concluded that the wrong type of coil had been sent; they should be B.T.S. type 'E.' Well, they were certainly not type 'E' which I had received. In their desire to rectify the matter they wrote saying they were sending me free, gratis and for nothing three more coils of the right type.

"The coils arrived by last mail. Upon looking at the containers I read, 'Six-pin coil type "S."' Now type 'E' is a four-pin coil, so what was a chap to do? But I opened the containers to make sure. The first one yielded a four-pin coil type 'E,' so I was rather cheered thinking that it was only the containers that were wrong. Alas! the next two containers contained six-pin type 'S' coils.

"The order for this kit was sent to them in March, 1936, and to-day, January 27th, 1937, I am sending to tell them that once again they have let me down about the coils, and I am certain that if they send other coils they will not be here before March, so that will be a year to get a receiver fixed up. By next mail I am expecting from them kits for the Band Spread Three and the Invincible and you can imagine what my feelings are as I await the arrival of them! As I hope to be in England after May, I have told this firm that if I find anything wrong with the next kits I shall call in and see them and scalp the blighter who mails the foreign orders!"

The Television Programmes

BY courtesy of the Cossor Company, I have had possession of a television receiver for the past week. Regarding the receiver itself in the quality of the reception, both as to vision and sound, I cannot find the slightest complaint. It is as near perfect as is possible. Certainly far more perfect than even a good quality home cinematograph. My grouse is with the programmes. I looked in the other afternoon to a lady talking about sculpture—a sheer waste of programme time. On another occasion I saw Carol Gibbons, and on another Jack Payne. Now the object of a band is to make a noise, and you do not wish to see the people who make it, any more than when you visit a hostelry for a glass of sarsaparilla you wish to see the man who draws it off from the barrel. You



Notes from the Test Bench

Valve Screens

A SUPERHET brought to our laboratory for test last week proved to be unstable on the long-wave band, a whistle being heard as each station was tuned in. I.F. instability was suspected, but the wiring of this stage was found to be normal and the screen bypass condenser was tested and found to be in order. The I.F. valve was of the specified screened type and its emission was normal, but it was found that the instability could be cured by placing a screening can over the valve. The metallising was then suspected, and when a continuity test was made between the metallising and the filament pin it was found that there was no connection. Another valve of the same type was then tried and reception was quite satisfactory. This shows that although a valve is metallised, an effective screening effect is not obtained unless the metallising is connected to filament or cathode. The same applies to screened leads—the screening cover is not effective unless connected to the chassis or the negative line.

Low Volume

ANOTHER rather unusual fault occurred in an A.C. Hallmark Four. Reception was reasonably good and reaction was obtainable, but there seemed to be a lack of punch; distant stations could be picked up, but the maximum volume obtainable from the local stations was below normal for this receiver. The L.F. transformer and speaker were suspected but proved to be in perfect order. The valves were then tested and they also were normal. Individual valve current consumptions were then taken under working conditions and it was found that the detector anode current was zero, and it was eventually found that the 750-ohm resistance which was connected in the cathode circuit of the detector valve was broken.

Volts-milliamps Tests

AS in the above-mentioned case most faults can be traced by the intelligent use of the voltmeter and the milliammeter. If the normal consumption of the receiver is known, the application of the theoretical knowledge will indicate the location of a faulty component which causes a variation of consumption. For example, high current in the output circuit of the rectifier is generally due to a leaking smoothing condenser, whereas very low current in this circuit is generally caused by a faulty output valve or a break in the anode-cathode circuit of this valve.

want to see things worth seeing, and bands, in my opinion, are not suitable items to televise. The programmes up to the present are definitely *de trop*, and I am hopeful that they will shortly improve them. I know all the technical difficulties, but it is my opinion that the demand for television receivers will rise when they broadcast a musical comedy or even a revue. I expect there is a difficulty in obtaining artists owing to the opposition raised by the theatre interests. I was not impressed with the news films, which seemed to me not newsworthy enough. The pictures are flickerless and very clear. I suppose that at the next radio show television receivers will be in great demand. Let us hope that programmes have improved by that time.

A Unit of Value

YOU can measure ohms, volts, amps, watts, ergs, and foot pounds, but you cannot measure value. You have mentally to compare the value of a wireless set, or any other commodity. Some of you may take the value offered by a 6d. store as your unit, whilst others use the value obtained at the most expensive stores. Whatever system you adopt you must admit that a technical periodical offers better value for its few coppers per week than any other commodity in the world. A dentist charges you 5s. to draw a tooth, and a doctor at least 7s. 6d. to tell you to go to the chemist's and spend a further 2s. 6d. With a periodical you have expert advice and information on a variety of subjects for a few pence. Even though only one paragraph in each issue interests you, solves some difficulty, or explains something you did not understand before, you have obtained the value of a whole year's subscription. It is not to be expected that every article in every issue will interest every reader; it is not intended to, and certainly however hard an Editor may try it never could, for in trying to please everybody, he would only succeed in pleasing nobody. Take your wireless set; when it goes wrong a letter to us solves your trouble. If you take it to a dealer he will charge you at least 5s., apart from locating a few components which ought to be changed. A technical periodical gives you real service. The information in one issue alone would cost you over one hundred pounds, yet you obtain the results of the printer, the artist, the block maker, the technician, the Editor, and his staff, for a few pennies per week. Think it over!

Practical Television

March 20th, 1937. Vol. 3. No. 42.

TELEVISION FOR YOU!

A Résumé of the Present Position of Television, with Especial Reference to the Apparatus Now Available

MANY new readers (as well as a large number of old ones) are in some doubt regarding the present position of television. So many conflicting reports have appeared in the lay press concerning the results obtained, and the cost of seeing the results in the ordinary home, that, at the risk of repeating information which we have already given, we set out below the main details of the position as it is to-day.

criticisms have been levelled at television without taking into account the high-definition system now used.

High-definition Systems

Preliminary high-definition broadcasts were carried out from a new B.B.C. station at the Alexandra Palace, using two separate systems. That experimental period has finished, and the B.B.C. has decided that, so far as the London station at Alexandra Palace is concerned, the transmissions up to the end of 1938 will be radiated on the Marconi-E.M.I. system alone, thus eliminating the Baird system—which may, however, be given the opportunity of transmitting from some of the provincial television stations when these are erected.

The immediate result of this decision was to stabilise design, with the result that a reduc-

ceivers on hire-purchase terms of £1 per week. This indicates that the design of television receivers is unlikely to change for at least two years, so that you may purchase a receiver secure in the knowledge that it will not speedily go out of date.

There is a third transmitting system, perfected by Cossors, and known as the Velocity Modulation System. It is possible that in the future this may be given the opportunity to demonstrate its claims.

Range of Reception

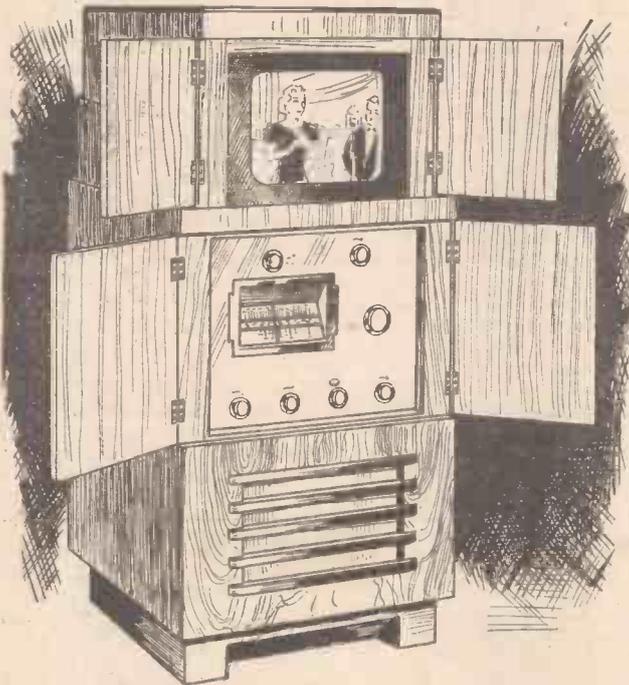
Although it is stated that the range is limited to what is known as "Optical distance" it has been proved that good reception may be obtained under certain conditions over tremendous distances. One listener in Africa has picked up the sound transmission, whilst television receivers are in regular use in Southend and on the South Coast. In these cases, of course, directional reception is employed.

Special cables are being laid to the provinces, and at some future date distant transmissions may be carried out from the London centre through the medium of these cables.

Size of Picture

Some doubt also seems to be present concerning the size of the picture, and at trade demonstrations we have often heard the comment: "Is that the biggest you can get it?" It must be appreciated that, at the moment, the picture is formed on the end of a cathode-ray tube, and the largest size commercially produced provides a picture approximately 12ins. by 8ins., and this is viewed direct. Experimental transmissions have taken place where the picture on the tube end was projected through a system of lenses and covered a large screen, but the loss of light is very great and the arrangement has not progressed beyond the experimental stage. It is surprising, however, how many people can comfortably watch the picture on the 12in. by 8in. screen, and we have already published pictures showing groups of interested spectators at trade demonstrations. Another point which causes some doubt is the degree of brilliance of the

(Continued overleaf)

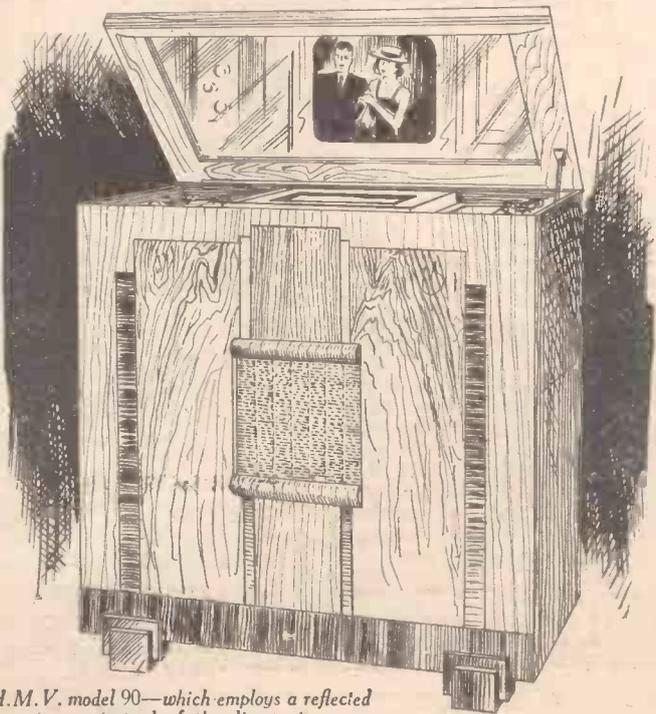


Cossor model 137T, in which the end of the tube is viewed direct, and an all-wave radio chassis is fitted.

Opposition has been raised by various sections of the industry, not alone the cinema and allied trades, who saw in television a competitor which was likely to deal them a severe blow, but even from the radio industry, who anticipated that ordinary radio sets would fail to sell when television came into force. It must be admitted, however, that television is the inevitable outcome of radio as it is more generally known to-day, and without the accompaniment of sight many valuable sources of entertainment are denied to the listener. Acrobatic turns, trick cycling, conjuring and dancing are only a few of the many fields which are at present useless from a broadcasting point of view. With the valuable assistance of television, however, these additional turns provide the user of a television receiver with entertainment of an extremely high level. The early television transmissions were crude compared with the high degree of detail which is available to-day and many adverse

tion of price was possible. In order not to penalise those who had previously paid the higher price, some of the companies have refunded to purchasers the difference.

Television reception is not difficult when one standard only has to be considered, and it is available for all at prices varying from 55 guineas to 80 guineas. The installation of the receiver is carried out by the makers, some of whom are now supplying re-



H.M.V. model 90—which employs a reflected image instead of the direct view.

PRACTICAL TELEVISION.

(Continued from previous page)

picture. It is not necessary now to sit in the dark. By ordinary room lighting the picture is quite clear, although, of course, the television receiver must be so placed that direct light does not fall upon the front of the tube. In the ordinary home it is not a difficult matter to arrange the receiver in this position. As will be seen by our cover illustration this week, we have a commercial receiver installed in our offices here, and it is used regularly in order to keep in touch with the B.B.C. transmissions, and improvements are noted, and we are enabled to carry out tests with various types of aerial and associated equipment.

Interference

The question of interference is also raised

as a drawback to modern television reception, but here in London we find no trouble whatsoever, when the apparatus is correctly installed. Readers who have visited our laboratories will know the handicap under which we normally work. Interference from the large amount of electrical machinery which is installed in nearby buildings renders it exceedingly difficult to listen to ordinary broadcast programmes for any length of time, and in the normal way distant reception is almost out of the question with a standard aerial system. The television pictures which we are able to obtain with a properly designed dipole aerial and feeder cable are completely free from interference, and the synchronisation is such that a complete programme (which at the moment is only of one hour's duration) may be watched without any need for adjustment. The operation is as simple as that of an ordinary modern superhet, and in the majority of cases there are only

three controls—brilliance, contrast and focus.

The Home-Constructor

We have already published brief constructional details of certain of the equipment required for a complete television receiver, and have designed a complete television receiver. In its experimental stage, however, it is at the moment rather beyond the average amateur, and experiments are being continued with a view to simplifying construction and employing standard components which are easily obtainable. Complete constructional details will be given shortly, but, in the meantime, readers should take the earliest opportunity of witnessing a demonstration at one of the big stores or at the Science Museum, in order to remove any doubts which may still be present concerning the stage which has now been reached in television development in this country.

The Factor of Expectation

IN a long discourse devoted to television, a film writer gave it as his opinion that the subject had now reached a stage where it was worthy of serious consideration by the film industry. He summed up the situation in a very able manner and confirmed the remarks that have been printed here so often, namely, that there is no question of replacing film entertainment, but of supplementing it. It is appreciated that the film has many advantages in that it provides a record which can be shown at any time or place which is convenient. With long feature films, of course, many months may have transpired before the film is finally finished, in other words the time factor is not one of importance, whereas in television it is. On the news reel side, however, there is one element which can never be supplied by the film—suspense or expectation. When seeing any news reel it is known in advance what is going to happen for the newspapers or radio have supplied the information some hours or even days before. With television giving an instantaneous view of whatever is happening, the thrill of expectancy is retained, and this is where the subject has a very distinct advantage. For interior or exterior events connected with sport, religion, or national work the advantage of being able to see and hear as the event occurs is a factor which ultimately should be capable of giving thrills to millions.

Interesting Exhibits

IN the trade section of a recent scientific exhibition many interesting items appertaining to television were shown for the first time. On one stand it was possible to see exactly how magnetic focusing was undertaken in cathode-ray tubes. Both the current through the coil, and its position relative to the anode and tube screen, were adjustable so that visitors could manipulate the controls themselves and watch the effects of different alterations. In another case a first class example of precision mechanical engineering was featured. This was a sixty-hole scanning disc used for teleciné machines where the hole size was only three and a half thousandths of an inch across flats (hexagonal-shaped hole). This was too small to be seen properly by the naked eye and a microscope was on the stand to show how perfect these holes were punched. To avoid angular distortion or any form of line displacement, the makers stated that the hole positioning was guaranteed to be

Television Notes

correct in a radial direction to within plus or minus three ten-thousandths of an inch, a precision which is certainly meritorious.

Doubling the Service Range

WHEN the B.B.C. high-definition television service started from the Alexandra Palace last year it was stated that the service area was not likely to exceed twenty-five miles; indeed, those in authority were quite frank in suggesting that this was a conservative estimate. The experience which has been gained by various companies during the past few months on the problems of receiver installation have, however, shown quite definitely that the original figures are an underestimate. The sound signals quite regularly are heard on home built ultra-short-wave

sets up to 100 miles from Alexandra Palace, while a particularly interesting case of television reception has just come to light. Mr. Westhead, Junr., of Dyke Road Avenue, Brighton, bought a standard receiving set from Baird Television, Ltd., and installed it in his home during Christmas. Using the normal aerial equipment supplied with the set, and attaching it to a bamboo pole on the house roof, both pictures and sound came through most satisfactorily, and yet the distance between transmitter and receiver is fifty-five miles. No trouble whatever is experienced with synchronising, the signal strength being quite adequate for modulating the cathode-ray tube over its whole range. Traces of car interference are noticed on the picture screen, and Mr. Westhead is carrying out a series of aerial experiments with a view to still further increasing his signal strength. Already a copper parabolic reflector, located a quarter wave behind his standard aerial, has brought about an improvement.



Miss Elizabeth Cowell, the B.B.C. television hostess at Alexandra Palace, is taking lessons in ballet dancing as a means of keeping fit for her strenuous work. She is here seen being instructed by Miss Joyce Newton, of the Vic-Wells Ballet, at Sadler's Wells Theatre.

A PAGE OF PRACTICAL HINTS

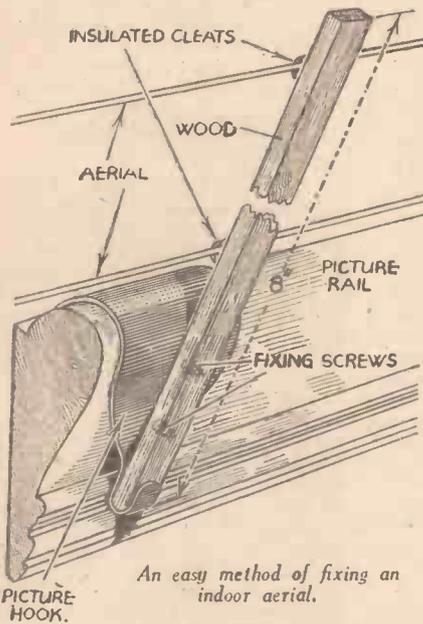
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Fixing an Indoor Aerial

An easy method of fitting up an indoor aerial, without damaging the walls, is shown in the accompanying sketch.

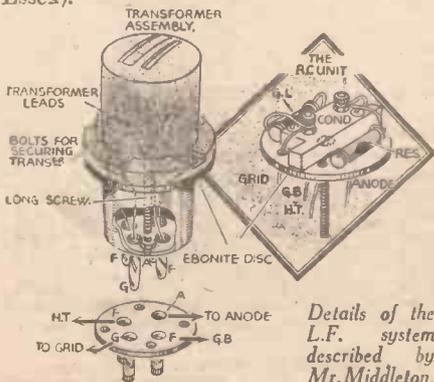


An easy method of fixing an indoor aerial.

Pieces of stripwood 8in. long are fixed to the picture hooks with two small screws, as shown. The aerial wires are supported on insulated cleats screwed into the wooden strips so that they face the wall.—R. DARK (Birmingham).

An Interchangeable L.F. Coupling

The accompanying sketch shows a novel interchangeable L.F. coupling device which enables a quick change to be made in experimental S.W. receivers. It makes use of an old valve base and valveholder, the latter being mounted on the baseboard, to serve as a holder for the two kinds of coupling. Care should be taken with the connections to the valve legs and valveholder on the baseboard. Sizes are not given owing to components varying in size.—T. W. MIDDLETON (Wennington, Essex).



Details of the L.F. system described by Mr. Middleton.

THAT DODGE OF YOURS!

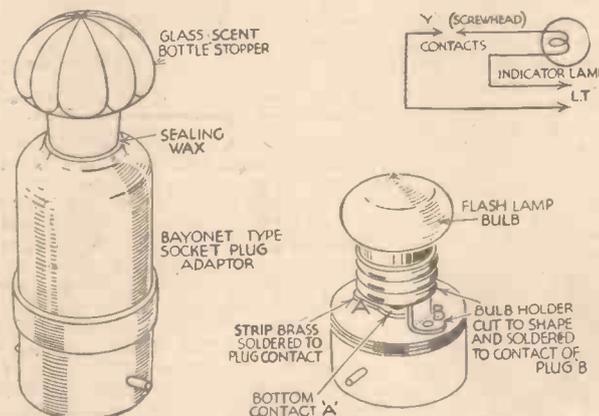
Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account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

When my receiver was switched over to gram. there was no indication externally, and thus it was liable to be left operated for lengthy periods, more so since the motor cut-out was effected automatically. I therefore constructed an attractive indicator light, and the detailed illustration clearly shows its assembly.

The following material was used in its construction:—

One bayonet type socket plug adaptor (terminals and separator cut away and the surface filed down in preparation for the contact pieces A and B); one torch bulb holder cut down to fit, "A" being the tip contact, and "B" the side contact; one cut-glass scent bottle stopper (of small dimensions). The theoretical circuit, inset, illustrates the method of switching which is effected by a brass strip "Y" contacting with a screw affixed in the rear of the arm. When the arm swings round it will be seen that a circuit is completed over these two contacts, and, consequently,



Circuit diagram and details of construction of a novel indicator pilot light for a radiogram.

when the P.U. comes to rest in the centre of the record the indicator light goes on. The whole bulb assembly is fitted into a standard socket which is recessed into the motor board, thus permitting the wiring of the socket being made underneath the motor board. A slot may be cut in the side to illuminate the needle point if desired.—A. T. BASSETT (Edgware).

Converting an Old Pattern Valveholder for S.W. Work

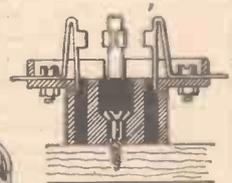
The type of valveholder much in vogue at one time (as shown in sketch) may be readily converted for short-wave work, and whilst, of course, not as efficient as the various makes of S.W. holders advertised frequently in these pages,

OLD PATTERN HOLDER



TYPE OF CONTACT

MOULDING REVERSED AND SPRINGY CONTACT STRIPS FIXED ON TOP SLOTS BEING CUT IN RIM FOR CONTACT ENDS.



SECTION SHOWING CENTRE SOCKET HOLE C/SK. TO TAKE FIXING SCREW

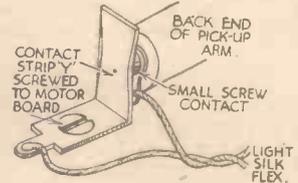


COMPLETED S.W. VALVE HOLDER

Converting an old-pattern valve holder for short-wave work.

it will be found quite satisfactory for reception of the 25-metre band.

To make the conversion, the springy socket pieces are removed, and refixed by their screws and nuts to the underside of the moulding, as shown, the rim being cut away in the form of slots to take the projecting ends of the socket pieces. A counter-sinking hole is drilled in



the centre socket hole of the moulding to take a fixing screw.

The arrangement will be clearly seen from the sketches, and as will be noted, there is quite a long leakage path and very little likelihood of capacity effect. This system also enables the wiring to be kept clear of a metal or metallised chassis.—R. L. GRAPER (Gillingham).

PRACTICAL HOW

How Gramophone Records may be Made
To the Two Simplest Systems for

THERE is nothing mysterious or tricky about the home recording of broadcast programmes or items rendered by the members of your own family or friends, and the lack of popularity of this interesting hobby is undoubtedly due to the failure which has attended many efforts which have been made without correct preparation. If the process is carried out correctly, and a little thought given to the various details, there is no reason why records should not be made at home which are every bit as good as those which can be purchased, although the limitations regarding "studio" space and the acoustics of the ordinary room will naturally prevent the musical reproduction from reaching

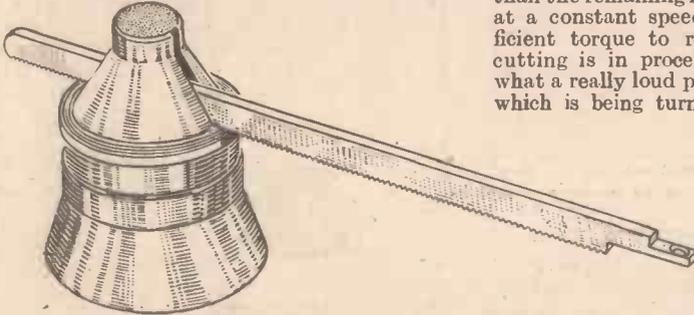


Fig. 1.—This is the complete Feigh tracking device referred to in this article. The details are shown separately in Figs. 6 and 8.

the same high level. There are various processes available, but the two systems with which I have had most success, and which are easiest to understand for the beginner are the Feigh, supplied by Electradix Radios, and the Simplat supplied by the V. G. Manufacturing Co. These two systems may be regarded as the two best examples of the various schemes which are available to the amateur, the first employing the aluminium blank and the second a "bakelite" disc resembling those which are supplied by the big record companies. This gives the best results from the point of view of permanency and quality, although it must not be inferred from this that the aluminium blank is not productive of good results. The latter is, of course, very much easier to use, and if the correct method of recording and playing back is adopted it will give results which will satisfy all normal requirements. If, however, you desire to record some individual talent with a view to submitting it to someone in order to obtain an audition, then the wax type of disc is to be recommended. Furthermore, it must be understood that there are other suitable

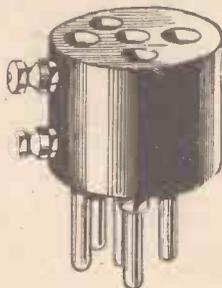


Fig. 2.—A pick-up adapter enables a microphone to be connected to any receiver not provided with pick-up terminals or sockets.

systems for the amateur. These two are merely mentioned as they describe the two distinct systems and are known to the author, and no opportunity has been afforded for trying any others.

The Main Requirements

The main items needed for satisfactory

recording, with any process, are microphone, amplifier, and turntable. The two former may be selected according to the personal taste of the user, but the turntable is a critical part of the equipment and needs much greater care in its selection than the remaining items. It must revolve at a constant speed and must have sufficient torque to rotate the disc whilst cutting is in process. It is remarkable what a really loud passage will do to a disc which is being turned by a weak motor.

With an aluminium blank and a diamond cutter it is possible to stop a well-known synchronous turntable, and even a single spring motor which under all normal gramophone conditions gives highly satis-

factory results, will give sufficient drag to a disc which is being cut to render it useless for reproduction. There are, of course, many suitable motors on the market, and apart from the available power it is essential that no vibration is transmitted to the turntable. If there is any, a pattern will be cut with the recorded item which will be reproduced in the form of a "wow" throughout the disc. A good gramophone motor, of either the clockwork or electric type, may be converted for the purpose by

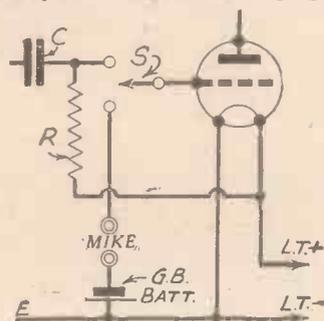


Fig. 3.—How to connect a microphone to a battery detector stage, with change-over switch.

replacing the turntable with a very thick and heavy one, provided there is sufficient torque available. Special recording motors may be obtained for the purpose.

To prevent slipping, when there is sufficient torque available, a rubber mat may be placed between the disc and turntable surface. One of the moulded mats with a pattern is preferable to the smooth rubber type, and these may be obtained from any good gramophone dealer.

Microphone and Amplifier

The amplifier should deliver at least 2 watts if a good substantial cut is desired on the wax-type disc, and naturally a volume control must be fitted. Any ordinary radio receiver may be used for recording, if pick-up terminals are provided. Even if they are not, a microphone may be joined in the grid circuit of the detector or L.F. stage by means of a pick-up adapter

inserted between the valve and the ordinary valveholder. A 4-pin adapter is used with a battery valve and a 5-pin with a mains-type valve. The choice of microphone is wide, but in general, only the moving-coil and carbon types may be joined to the amplifier through extension leads. Other types, such as the piezo-crystal or condenser types, will have to be connected by the shortest possible lead, or a separate small "head" amplifier will have to be made up so that a short lead

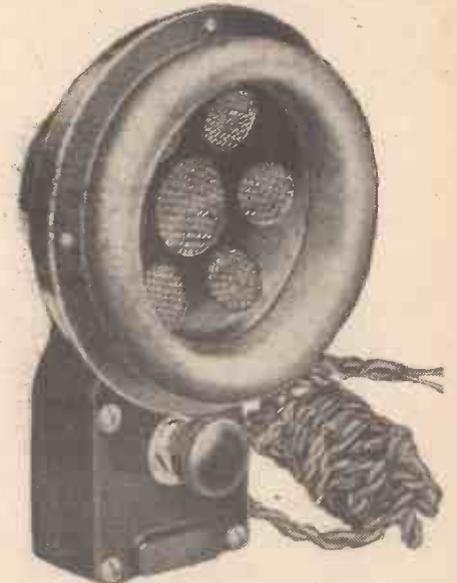


Fig. 4.—A novel hand loudspeaker, which may be used as a moving-coil microphone. This is a Wharfedale product.

to the grid may be provided. A screened output lead may then be taken to the amplifier. The moving-coil microphone will prove very sensitive and has a wide

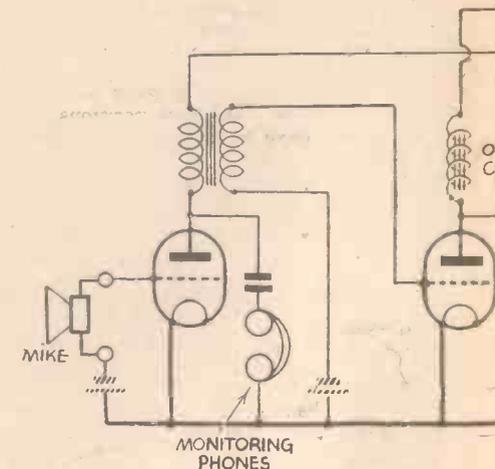


Fig. 5.—General circuit arrangement for home-recording for volume control adjustments. The volume control transformer.

ME-RECORDING

Made at Home, with Particular Reference to the Amateur.
By W. J. DELANEY

angle of reception, and a good moving-coil speaker may be used for this purpose provided the diaphragm is not too large. The carbon types will require a bias or voltage applied to them, and the makers' instruction should be followed in this respect.

volume is the maximum which may be recorded, and during the playing of the item it will be necessary to regulate the output so that if there is a sudden increase in volume it may be reduced slightly to avoid overloading. This naturally leads to a modification of the light and shade, or tone value, of the item, and this is one of the reasons why the expansion circuit is so popular with gramophone record reproducers. It will obviously be preferable for someone with musical knowledge to control the volume, preferably with the score before them, so that they can anticipate the changes in volume and regulate the cutting accordingly. However, these are details, and we must get on to the actual recording.

Diamonds and Sapphires

An ordinary steel needle (such as is used for ordinary record playing) may be used for cutting, but best results are obtained with a sapphire or diamond cutter. A sapphire needle may be obtained from Electradix for 3s. 6d., and a diamond for 7s. 6d., whilst the V.G. sapphires for the wax disc cost 7s. 6d. and 12s. 6d. If an ordinary steel needle is to be used, select one of the medium-tone type (not a loud tone or thick one). Play twosides of an ordinary 10in. record, and the slight wear

pick-up a small nut and bolt will have to be inserted in the side, and the wire soldered to the head of the bolt. If desired, Electradix can supply the gear complete with pick-up and diamond cutter. The V.G. gear consists of a parallel-tracking device which is mounted behind the turntable and driven through a belt from a fitment placed over the motor spindle. In recording on the aluminium blank a thin trace of vaseline or paraffin should be

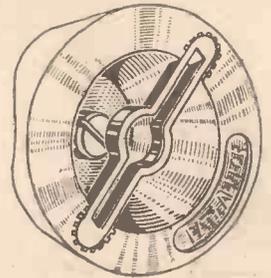


Fig. 8.—The simple clamping device at the foot of the Feigh tracker.

smeared across the disc beforehand, and it should be ascertained that the hole in the centre is a good tight fit over the motor spindle. A thin piece of paper wedged between spindle and disc will ensure non-slip properties. No preparation is required with the Simplat disc. If the needle bears too heavily on the record, undue surface noise will be obtained in the play-back. If too light, many of the softer parts of the item may not be heard, but this latter point seems to depend upon the pick-up characteristics. When the item is concluded, the aluminium blank can be left as it is, although I have found that a rub with a piece of hard cloth such as serge, smeared with vaseline, helps to remove slight particles of metal which may be adhering to the sides of the grooves. The Simplat disc may also be played back just as it is, but it is possible to lengthen the life of this by wiping with hardening and polishing fluids supplied by the makers. By this means the record is rendered almost as permanent as the standard disc and upwards of 200 playing times are ensured. Without the hardening process the record will give about 15 or 20 reproductions before being rendered too rough to be of further use. The hardening fluid

is wiped over, following the makers' instructions carefully, and



Fig. 9.—If the triangular type of fibre needle is obtained an adaptor of this type must be used. Fibre needles may now be obtained, however, with a round shank.

then a polishing fluid is used. The process only takes about five minutes, and may be hastened, if desired, by placing in a current of warm air.

Reproduction

With both of these systems, it is preferable to play back the discs by means of a non-metallic needle. There are many types on the market, but the aluminium disc requires a tough needle with a fine

(Continued on page 16)

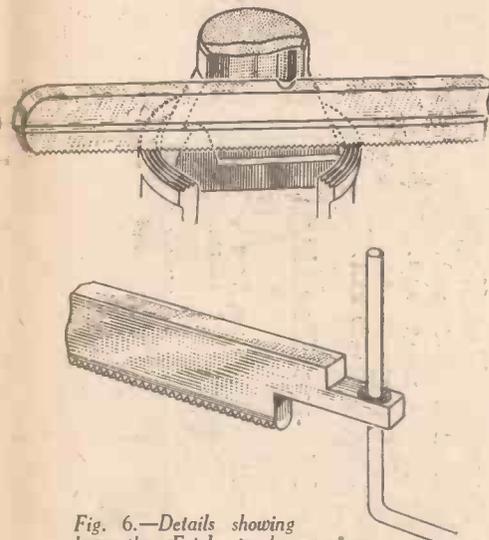


Fig. 6.—Details showing how the Feigh tracker operates and how it is attached to the pick-up.

ATTACH TO SIDE OF PICK-UP.

The pick-up or cutting head should be joined in the output circuit in place of the loudspeaker, and the filter-output connection should be employed as in Fig. 5.

The Pick-up

Any good pick-up may be used, but its weight may have to be modified. In most cases it will have to be increased for the cutting, and with the aluminium blank it may have to be reduced when playing back. This may easily be accomplished by adding a rod to the carrier arm with a sliding weight made from a piece of round rod. The best positions will have to be found on trial as pick-ups vary in their individual design and no definite rules can therefore be laid down. To enable the volume to be controlled to suit the disc it [may be necessary to add a pair of 'phones. The average pick-up will sound something like a small loudspeaker, and this may enable the user to gauge the volume when one or two trial cuts have been made. If 'phones are used, they should be joined in the last stage but one, using the filter-fed arrangement. It will still be necessary, however, to make trial cuts to find just what

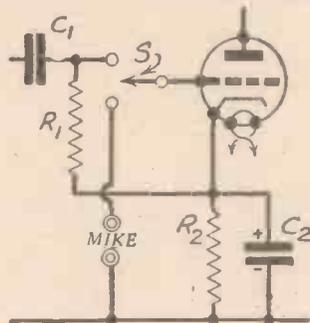
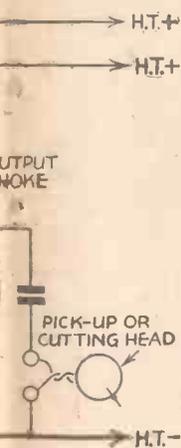


Fig. 7.—Connections for a mains (indirectly heated) detector stage.

on it will have raised a flat which will assist in cutting and will prevent it from digging in, a detail which will often occur if a new needle is used. In view of this, the needle must be left in position, otherwise the worn part will be turned and it will be useless for recording.

Cutting the Grooves

To enable the grooves to be traced on the record blank, some form of gear is required. The simplest is illustrated in Fig. 1 and is obtainable from the Electradix company for 21s. 6d. It consists of a small gear-box which clips on to the spindle of the motor and a rack which is inserted in a slot in the head of the box. A spiral is cut at this point and the teeth of the racked rod engage in this. A small stiff wire must be fitted to the side of the pick-up, and passed through a hole cut in the end of the rack so that it may be pulled along. In the case of a bakelite

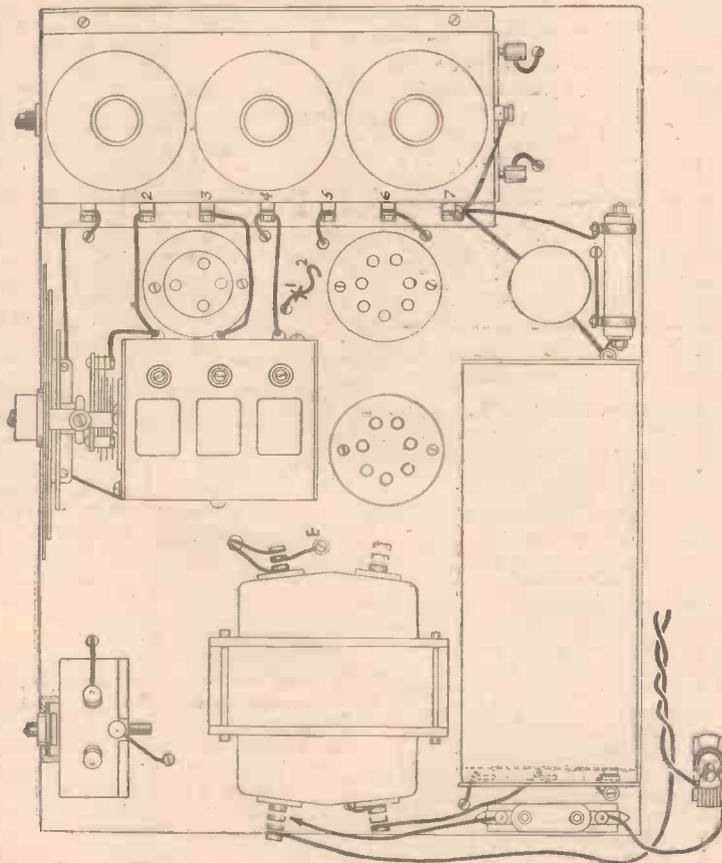


showing headphones may be on mike or

Practical and Amateur Wireless

SERVICE DATA SHEET NO. 29

FOR THE MAINS RECORD ALL-WAVE 3



Top of Chassis View

Approximate Voltage Readings

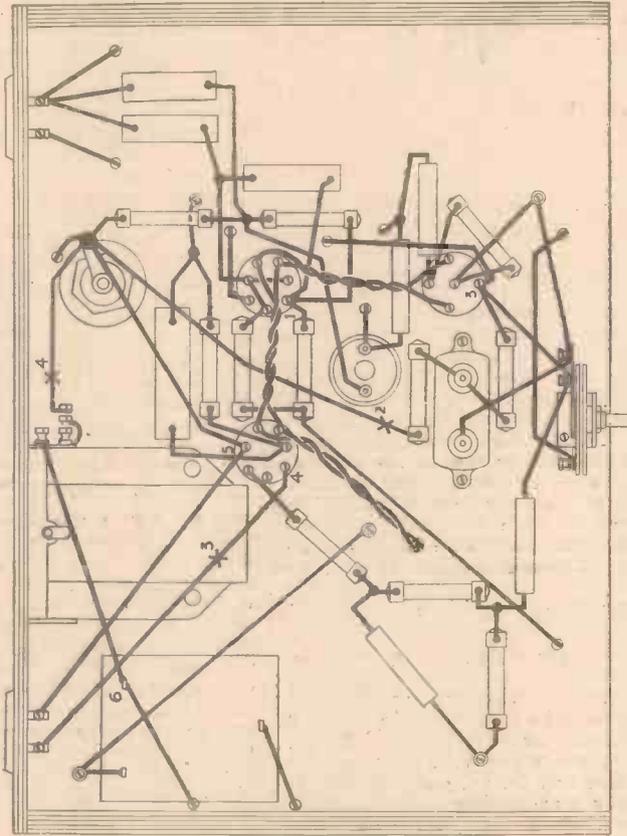
Voltmeter—to E.	
"	+ to 1 = 75 volts.
"	+ to 2 = 200 volts.
"	+ to 3 = 90 volts.
"	+ to 4 = 230 volts.
"	+ to 5 = 245 volts.
"	+ to 6 = 290 volts.

Approximate Current Readings

Milliammeter Connected at	x1 = 6 mA.
"	x2 = 3 mA.
"	x3 = 30 mA.
"	x4 = 60 mA.

Approximate Resistance Readings

Coil Unit.	
Ohmmeter across 1 and 5	= 4, 4, Low, Low ohms.



Underside of Chassis

Ohmmeter across 2 and 7 = 15, 15, 15, 15 ohms.

"	3 and Chassis =	15, 15, 15, 15 ohms.
"	4 and Chassis =	15, 15, Low, Low ohms.
"	2 and 6 =	Zero, Zero, Inf., Inf. ohms.
"	A2 and E =	13, 13, 13, 13 ohms.

The B.B.C. Variety Department

A Brief Description of a Typical Day's Work in this Important Section.

By RUTH MASCHWITZ.

AS time goes on more and more programmes are put under the heading of variety, the once select staff has grown to a large organisation of sixty, and St. George's Hall can no longer accommodate this giant department of the B.B.C. What do sixty people find to do? is a natural query. Plenty! Already at eight-thirty, when the majority of us are eating a hasty breakfast, hordes of people are passing in and out of the swing doors in Langham Place. Engineers, B.B.C. porters, messenger boys, cleaners and commissionaires are saluting the morn, brass is polished, buckets emptied, telephones answered, and letters being distributed in preparation for the moment when the big brains arrive.

By nine o'clock, or sometimes even earlier, the staff has assembled and the work of the day—of sixteen hours' duration more often than not—has begun.

In Full Swing

The post contains everything from scripts by ambitious amateurs, signed contracts from professionals, requests for appointments, questions and criticism about programmes, demands for photographs, to dates on the air. But the post must wait; there is that script to be altered in time for the ten o'clock rehearsal. No sooner is the producer, who must also be writer and ideas man, at work on this than the telephone rings. It conveys a request for an audition for a very special friend of the speaker, or news of a fine turn seen at some obscure variety hall. Sometimes tidings of a foreign star over here in cabaret who *must* broadcast, or suggestions that negotiations with So-and-So would smooth over a difficult situation, provide variety. Bang goes the receiver, and attention is once more given to the script; but interruptions always occur. A young lady is downstairs. She's brought some gramophone records to be heard. Send her up! On the radiogram in the Variety Director's office, with its green carpet and sunshine walls, the records are played over. Maybe they bring to light a possible new radio favourite of the future. Time presses, the script is still unfinished. People begin to agitate. At last it is delivered to the secretary who types it in record time. A minute's breathing space is cut short by the telephone. Luncheon engagements are arranged, an inter-departmental query is raised or news that auditions have started comes through. No time to go down to a listening-room to hear these. They must be put through on the loudspeaker in the office.

Auditions and Rehearsals

While someone's fate is being settled, people continue to pour in. Philip Brown raises a query about the contents of a dance band programme; Mark Lubbock, score under arm, is waiting to try over something on the piano; Max Kester is in search of a rhyme for his latest lyric. A messenger boy slides in with a batch of memoranda, another sprays disinfectant into the air, and a representative of the press department is eagerly in search of stories to circulate.

Auditions finish. Great heavens, it is ten-thirty! Rehearsal of a musical show follows. Down into the auditorium, where the artists are waiting, and the orchestra is trying over difficult passages in the score.

For the next three hours strains of music, impassioned speech and barked commands echo through the one-time home of Maskeleyne and Devant.

Lunch, after all, is out of the question. A flying visit to the St. George's Hall café

provides a sandwich and a cup of coffee. And so back to the office to cast an anxious eye over the afternoon's engagements and set to work on the adaptation of a script for next week's programmes.

At three o'clock it begins all over again. Someone has fallen out of the programmes, influenza or a theatrical engagement. Through to Arthur Brown, in charge of bookings, to ask him to try a quickly-thought-out list of substitutes. Again that telephone. No, there's nothing for the caller at the moment. The B.B.C. will get in touch with him later.

Discussions and Scripts

Charles Brewer has an important matter to discuss. It can't wait. Down with the pen and so into conference for twenty minutes, before a head is poked round the door. This time Bryan Michie, producer

(Continued on page 16, column 3)

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with S.G., Detector and Pentode Valves

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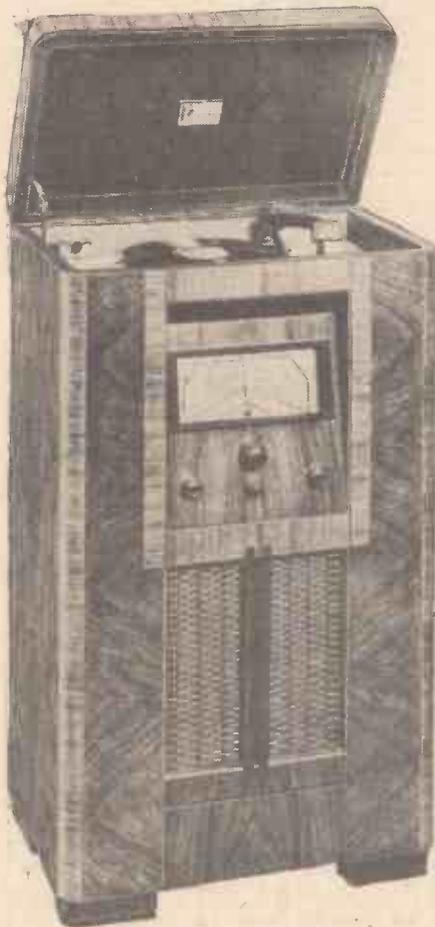


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 EST. 1919

THREE NEW H.M.V. MODELS



Model 495, A.C. Radiogram.

THE demand for the Model 425 receiver has been so great during the past few months that H.M.V. have decided to release an additional three receivers for the present season, and these are illustrated on this page. The first, Model 495, is an A.C. radiogram specially designed to occupy a small floor space. It embodies a 6-valve all-world A.C. superhet chassis, having three wave-ranges: 16.5 to 52, 195 to 580, and 725 to 2,000 metres. An iron-cored I.F. transformer

is fitted to obtain high selectivity without loss of quality, whilst the loudspeaker has a new type of elliptical cone of varying thickness to obtain an even response at all frequencies. The design of this receiver is a departure from the normal H.M.V. practice, in that it consists of a radiogram with the tuning dial and controls on the front of the cabinet, instead of on the motor-board. The dial carries the names and wavelengths of 100 stations, and the short-wave band is printed round the outside of the scale in order to provide the greatest length of calibration, and enables the markings to be made clearer. A horizontal dial-lamp is provided so that the scale is evenly illuminated. The output is approximately 3 watts, and the consumption of the receiver chassis is 85 watts. The price is £23 2s.

Model 494

The second model is a receiver alone, embodying the same chassis as is incor-



Model 494, A.C. Superhet.

porated in the model just reviewed. The cabinet is of a novel design and is strictly in keeping with modern furnishing principles. This receiver costs £12 12s.

Model 167

The third receiver

has been designed for the battery user, and incorporates a two-range straight circuit. The wave-bands are approximately 170 to 580 and 800 to 2,000 metres, and the output is just under half a watt. The circuit employs an H.F. amplifier, triode detector and output pentode. The H.T. consumption is 8.5 mA. and the L.T. consumption 4 amps.

Sockets are provided for extra loudspeaker and pick-up. The price is £7 17s. 6d.



Model 167, Battery receiver.

THE B.B.C. VARIETY DEPARTMENT.

(Continued from page 15)

and compère, wants to elaborate a new idea of his. Three-thirty! Now perhaps the letters can be attended to. An only too brief space for dictation; in the next room Harry Pepper is composing at the piano; below the commissioner is telling some intense newcomer that he can't see anyone without first writing in.

What next? That appointment over the road to discuss a possible series of programmes. A quick glance shows the pile of unread scripts mounting up on the desk. They must be dealt with to-morrow. They'll be more time then—perhaps!

At last a break to stretch and count the cigarette ends in the ash-tray, and observe nicotine-stained fingers ruefully. But now the committee to judge the merits of unpublished songs assembles and, by the by, has anyone arranged for a studio and circuit at Broadcasting House for to-morrow's rehearsal?

At six o'clock, when normal people down tools, the evening programmes begin. One or two lucky ones go off in search of relaxation, others leave the building only to make outside contacts, three or four have programmes to superintend and very often, in darkness save for his desk lamp, the Variety Director is still scribbling away at seven-thirty or eight.

And that, believe it or not, is a typical day in the B.B.C. Variety Department!

PRACTICAL HOME-RECORDING.

(Continued from page 13)

point. These may be obtained from Electradix for 2s. 6d. a dozen, or the B.G.N. needles, obtainable from any gramophone stores, may be used. The weight of the pick-up must be reduced to a minimum to avoid wear on the points. The Simplat makers supply a special trailing needle which fits the groove cut with the sapphire and this naturally avoids damage to the disc.

Such items as microphone technique must, of course, be left to the individual, but a few tests on a record blank (half an inch is enough) will soon enable the best position for performer and microphone to be found. The aluminium blanks cost 4s. a dozen in the 6in. size and 7s. a dozen in the 10in. size. The Simplat blanks are available in five sizes from 7in. to 16in. in diameter, the prices ranging from 2s. to 8s. each.

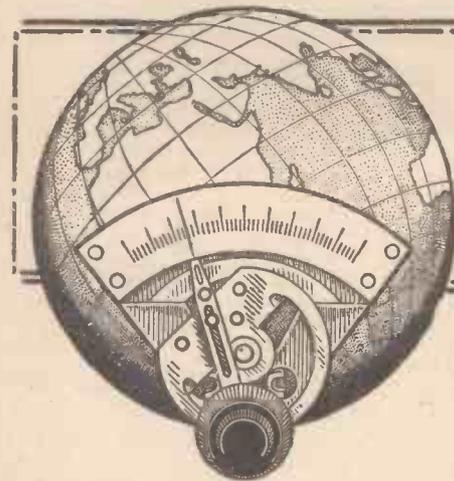
REFLEX CIRCUITS

REFLEX sets are now almost forgotten, but there is still a great deal of interest to be derived from experimenting with them with the added advantages and facilities offered by modern valves. The peculiar part of the old reflex set was the shunting of the L.F. circuit by the H.F. circuit, and vice versa, which was unfavourable when both frequencies were fed into the same grid. With modern valves it is possible to keep the circuit separate, using, for example, a screen grid valve, the control grid taking the H.F. and the screening grid the L.F., or alternatively using an H.F. pentode (of the type with suppressor grid brought to a separate pin), using the control grid for H.F. and the suppressor grid for L.F., or alternatively the screening grid. There is also a very pretty trick of using an H.F. pentode as an H.F. amplifier, and using the suppressor grid as a rectifier.

SHORT WAVE SECTION

THINKING IN MEGACYCLES

On Short and Ultra-short Waves Reference is Generally Made to the Frequency of the Transmission, but many Amateurs Find Difficulty in Converting from Wavelength in Metres to Frequency in Megacycles This Article Explains the Matter, and Also the Value of Frequency Notation



EVER since the early days of broadcasting, technical writers have been urging the use of frequency instead of wavelength notation—but with little success on the whole. For some reason or other the average amateur seems to imagine that it is easier to think in terms of metres than cycles, kilocycles, or megacycles per second. It is not, provided that the matter is correctly approached. But first let us see what advantage there is in working in terms of frequency.

The superhet has gained a considerable amount of popularity during the past few years, and the tuning of the high-frequency amplifier between the first and second detectors is always given as the frequency—who ever heard of I.F. coils tuned to 2,000 metres (150 kilocycles per second), or 650 metres (roughly 465 kilocycles per second)? Besides, if 465 kc/s were correctly changed to wavelength in metres the result, to three places of decimals, would be 645.161 metres; how cumbersome!

Frequency Range

There are several other good reasons, one of which is that the wavelength range of a coil or receiver gives but a poor impression of the number of stations which can be accommodated within that range, or of the degree of selectivity which would be required in tuning. Thus, the long-wave range of 1,000 to 2,000 metres seems very extensive, whereas a short-wave range of 4.3 to 6.7 metres appears terribly restricted by comparison. Change the wavelengths to frequencies, and you find that the long-wave range is from 300 to 150 kc/s, and the range on the ultra-short waves referred to is from approximately 70,000 to 45,000 kc/s. In other words, the long-wave range covers a band of only 150 kc/s, but the U.S.W. range represents as much as 25,000 kc/s, or more than 160 times as much.

The importance of this is apparent when it is appreciated that a minimum of 9 kc/s is required for any one telephony transmission. In consequence, it is clear that the number of stations which could be accommodated on the long-wave band without serious interference taking place is only 17, whilst in the same conditions nearly 3,000 transmissions could be accommodated on the U.S.W. band. The same conclusions show that tuning on the ultra-short-wave band mentioned is 160 times as sharp as on the long-wave band.

The mere fact that the band width required for any transmission is given, and can only be given, in terms of frequency is also a strong point in favour of this method of expression.

Megacycle Bands

Even if we are to assume that the frequency notation is unnecessary on medium and long waves, it is at least very desirable on short waves. Those who make a habit of listening to amateur transmissions will find that the transmitters generally speak in terms of frequency, and if those terms are not understood a good deal of interest is lost. Besides, a difference of, say, 20 kc/s is the same on any wavelength, whereas a difference of one metre varies considerably according to the wavelength range which is being considered.

As many readers are no doubt aware, the ranges over which amateur transmitters can work are given in terms of megacycles. Thus, the so-called 20-metre amateur band is referred to as the 14 megacycle band, and the 40-metre range as the 7-megacycle band. It should be explained here that one megacycle is equal to one million cycles, and that one kilocycle is equal to one thousand cycles (per second). Now that quartz-crystal control of wavelength is used universally, the transmitter must order his crystal according to the frequency of which it is required; these crystals are not normally sold in wavelength gradations.

Going a little further, we have the main

Wavelength (Metres)	Kilocycles	Megacycles
5	—	60
10	—	30
20	—	15
30	10,000	10
50	6,000	6
100	3,000	3
200	1,500	—
300	1,000	—
400	750	—
500	600	—
600	500	—
700	428.5	—
800	375	—
900	333.3	—
1,000	300	—
1,500	200	—
2,000	150	—

This table shows corresponding figures for a number of wavelengths and frequencies. The megacycle unit is generally used for short wavelengths, and the kilocycle for medium and long waves.

tuning bands used for short-wave broadcasting stations, these being the 23, 15, 12, 9, and 6 mc/s bands, which correspond with wavelengths in the regions of 13, 19, 25, 31 and 49 metres respectively.

Wavelength to Frequency

It is, of course, a fairly easy matter to convert the tuning point in wavelength to the frequency in kilocycles or megacycles, but it is far better to try to think in terms of frequency than to think in wavelengths and constantly have to make mental calculations to convert from one to the other. In this respect, the matter is not unlike that of learning a foreign language. Those who are at all fluent in foreign languages tell us that in order to gain fluency it is essential to think in the foreign language, rather than to think in terms of the mother tongue and then to translate the thoughts.

Those who are at present familiar with the wavelength notation can easily become accustomed to the other system after a little practice and by making an effort to think in terms of frequency. For example, 300 metres is equivalent to 1,000 kc/s or 1 mc/s. As wavelength is increased, frequency is reduced, and vice versa. Thus, a wavelength of 600 metres is equivalent to a frequency of 500 kilocycles, whilst a wavelength of 150 metres corresponds to a frequency of 2,000 kc/s or 2 mc/s. In the same way, a wavelength of 30 metres (one-tenth of 300 metres) is the same as a frequency of 10 mc/s (ten times 1 mc/s). Carrying this idea further, it can be seen that 5 metres is the same as 60 mc/s, or that 10 metres is 30 mc/s.

Another Method

Another method of conversion, which might be considered more convenient by some readers, is to divide the wavelength into 300,000 to obtain the results in kc/s. From this we can see that 20 metres is equal to 15,000 kc/s or 15 mc/s. It can also be seen that the answer can be obtained in megacycles by dividing the wavelength into 300; 5 metres is 60 mc/s. The reason is that wireless waves travel at the same speed as light, which is 300,000,000 metres per second (equivalent to about 186,000 miles a second). Thus, if one wave were 300 metres long, for example, 1,000,000 such waves would be created in one second. This is the same as saying that the frequency of the waves is 1,000,000 per second. One alternation (or frequency) is referred to as a cycle, and thus 300 metres is equivalent to 1,000,000 cycles, 1,000 kilocycles, or 1 megacycle per second.

Frequency in megacycles can be converted to wavelength by dividing into 300.

Broadcasts from Down Under

VK2ME, Sydney (N.S.W.), and VK3ME, Melbourne, on their respective channels, namely, 31.28 m. (9.59 mc/s) and 31.54 m. (9.51 mc/s), are now being very well heard. Slight alterations to suit the period of the year will be found in the former's schedule of broadcasts. On Sundays VK2ME is on the air in two sessions, from G.M.T. 06.00-08.00 and from G.M.T. 10.00-16.00, whilst a special broadcast is made on Mondays from G.M.T. 14.00-16.00. On other days this station is silent. The opening call tells you clearly that you are listening to the "Australian National Empire short-wave station," and the announcer usually closes down with information regarding day and time in Australia, also corresponding G.M.T. and E.S.T. equivalents, followed by "*Good morning, everybody; cheerio!*" to a background of the kookaburra's chuckle. You will also hear the strains of *God Save the King* as the broadcast is faded out.

Jaeko, the kookaburra, or laughing jackass, has been heard all over the world, and use has even been made of him as a design of Australia's sixpenny stamps.

Melbourne Transmissions

From VK3ME, Melbourne (Victoria), you may tune in transmissions daily except on Sundays from G.M.T. 09.00-12.00. The broadcast concludes with a time signal from a clock tower in Melbourne of which the chimes are of a slightly higher pitch than those of Big Ben. The announcer wishes you *Good night to everyone in Australia, New Zealand and the distant*

Leaves from a Short-wave Log

parts of the world. *God Save the King* is also played.

Test Match Relays

On the other hand, VK3LR, Lyndhurst (Victoria), works daily from Monday to Friday from G.M.T. 08.15-12.30 and on Saturdays from 03.00-12.30. The interval signal is the call of the lyre bird, only found in Victorian forests. Programmes are usually relayed from VK3AR and VK3LO, Melbourne. It is through this station that a full running commentary on the matches played during the Australian tour of the English Cricket Test Team were recently broadcast.

Steadying the Television Picture

IN radio receivers it is general practice to connect the chassis to negative H.T., or to a potential not far removed from it. In television there is a variety of possibilities, and in some types the third anode is earthed, which means that the chassis is sometimes 5,000 volts above H.T.—The idea of this is to prevent leakages to chassis in wet or damp weather from pulling the picture all over the place, which would be the result unless the most extravagant precautions were taken.

Reported New Broadcasts from Peru

French listeners state that a new station is working at Chiclayo (Peru), and that the call has been logged as *Radio Delta*. The transmitter is said to be operating on 48.86 m. (6.14 mc/s), the same channel as W8XK, Pittsburgh, but that tests are being carried out only between G.M.T. 06.40-07.00. Although the

call-letters of the station have not been heard, it is useful to remember that the international prefix for that country is OA.

On the Ultra-shorts

Listeners on 5 metres should make a point of searching for three U.S.A. broadcasts which are now regularly transmitting relayed programmes from medium-wave studios. The channel is 5,405 m. (55.5 mc/s). Try for W3XKA, Philadelphia, on any weekday between G.M.T. 16.00-04.00, or on Sundays from G.M.T. 14.00. W8XKA, Pittsburgh, relays KDKA from G.M.T. 19.00-02.00, and W1XKA is the outlet of WBZ, Boston; it works on weekdays in three sessions, namely, G.M.T. 11.15-17.30, 19.00-22.00 and from midnight to 03.00.

Long-range Transmissions

On Sundays there is only one transmission, from G.M.T. 19.30-00.30. Although at the outset the engineers were of the opinion that these broadcasts carried out at low power possessed a very limited range, they have frequently been advised that the transmissions have been picked up in Europe.

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NEWNES : LONDON

BRIEF RADIO BIOGRAPHIES—2

Joan Young

JOAN YOUNG, who comes of theatrical stock, made her first stage appearance through pure chance. While on holiday from school during the War, an air raid held up one of the big stars in variety. Joan, who was in her mother's dressing-room and who knew several of her songs, was promptly pushed on to the stage. Her performance was a tremendous success, but having once got on to the stage she had not the vaguest idea how to leave it gracefully. As a result she backed off, almost in tears, causing much merriment.

After this experience Joan returned to school for a time but, immediately upon leaving, decided to tour the halls, which she did until an opportunity of a chorus job in "The Lady of the Rose" offered. Soon after this she left the stage to marry.

About two years ago, intending to return to variety, Joan found difficulty in discovering material for her act, and solved the problem by collaborating with a friend of her childhood, Nene Smith, who composed music. Soon after, another friend said to her: "Come with me to the B.B.C. this morning and I'll introduce you to Cecil Madden." Joan hesitated, but eventually went, was presented, given an audition forthwith and a date a few weeks later.

Joan had never written a word up to date, not even school-girl attempts, but she now put her nose to the grindstone and wrote a series of radio plays, also in collaboration with Nene Smith, which were first performed for the Empire, and later in the National programme. She had the record number of fifty lyrics and five shows on the air last year.

One of Joan's ambitions is to broadcast in the Children's Hour, and her chief recreations, when not occupied with her home and twelve-year-old daughter, are reading and visiting the cinema.

Dick Francis

DICK FRANCIS had his vocation decided at the age of eight when he captured all hearts by his rendering of "The Crossing Sweeper," one of Vesta Tilley's earliest songs, at an amateur performance. Two years later, much to his delight, he and his sister were engaged for a music-hall turn and went on tour, but unfortunately, when he was fourteen, his voice broke, and he was unceremoniously sent back to school.

His parents next apprenticed him to a lithographer, but after three months the old urge proved too great. He ran away, and summoning all his courage demanded an audition at one of the Sheffield theatres. This resulted in an engagement as an entertainer at the piano, which was extended to thirty weeks. He then decided to try a new line and broke into concert party, with which he stayed till he joined the army in 1915.

Back on the stage he toured in revue and variety and when Noel Coward's "This Year of Grace" went to America he joined the company. While Coward was ill he took over his comedy parts.

As a result of a gas attack during the War, his voice began to fail, and after consultation with a specialist it was decided that all his teeth must come out and an operation be performed on his throat. The result was a complete restoration to health.

RADIO CLUBS AND SOCIETIES

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

Southall Radio Society

AT the meeting of the above society on March 2nd, an entertaining lecture entitled "Television" was given by Mr. Douglas Walters (G5CV). The speaker gave a short history of the development of vision, and explained the apparatus used at the transmitting and receiving ends in high-definition television. Mr. Walters has been intimately connected with vision since its inception.

Meetings are held each Tuesday at Southall Library, Osterley Park Road, Southall, at 8.15 p.m. Visitors are always welcome. Hon. Secretary, Mr. H. F. Reeve, 26, Green Drive, Southall.

The Croydon Radio Society

THE Croydon Radio Society joined forces on Tuesday, March 2nd, in St. Peter's Hall, South Croydon, with the Short-Wave Radio and Television Society of Thornton Heath. The topic was: "High Grade Servicing Equipment," with demonstration, given by Mr. T. S. Cawthorne, of the Weston Electrical Instrument Co., Ltd. His radio analyser was an equipment having many features useful to the amateur constructor. A.C. and D.C. voltage ranges up to 1,000 volts were provided, as well as D.C. milliamp. ranges from 2½ to 500 milliamps. Mr. Cawthorne actually demonstrated the radio analyser's many applications on a four-feet high model.

On Tuesday, March 23rd, the Magnavox Duode loudspeaker will be demonstrated by the Benjamin Electric, Ltd.

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

Portsmouth and District Wireless and Television Society

AT the last meeting of the above society it was learned with regret that Mr. Albert Parsons could no longer occupy the position as chairman owing to increasing demands on his time. He will, however, remain with the society, and members will look forward to his instructive lectures. Lt. Jackson was elected chairman, and Mr. Harold Leigh, vice-chairman.

A demonstration was given by Mr. Baigent with an American all-wave 8-valve set, and a discussion followed. Meetings are held every Wednesday, and Morse practice on Mondays, at 7.30 p.m. Harold Leigh (2BBG), 20, King Street, Southsea.

Swindon and District Short-wave Society

THIS society has been allotted the AA call sign 2CLY, and the construction of the transmitter will now be put in hand. The contest for the society's Q.R.K. Cup, which was given by the chairman, Mr. E. W. Mortimer (2BMM), for the best all-round, home-constructed short-wave receiver, took place on March 4th. The winner was Mr. E. G. Rose (74 points); the second prize, kindly given by Mr. P. Malvern (G8DA), was awarded to Mr. D. T. Boffin, with 71 points. Mr. W. C. Barnes (2BWR) and Mr. W. J. Ford (2BVR) tied with 67 points each for the third prize, given by the society. The judge was Mr. R. A. Hiscocks (G6LM), of Chippenham, who is a vice-president of the society. The chairman announced that he would give a cup for competition among the junior members. Hon. Sec., Mr. W. C. Barnes (2BWR), 7, Surrey Road, Swindon.

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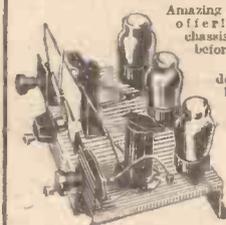


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The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

The "CQ" Call

SIR,—I have been a very interested reader of your weekly paper and trust you will allow me to point out a slight discrepancy in the article "Listening To The Amateurs"? The "CQ" Signal is strictly forbidden for "G" stations. Only the "Test" call may be used. This ruling is on the transmitting licence and is a very important one to adhere to.

I was very interested in your transmitting articles and was sorry when they came to an end.—JOHN L. SIMMONDS (G8HD) (Grimsby).

[We did not say that the "CQ" call should be used, but merely that it is used, as any listener can easily verify. It is better to call "Test," and many transmitters are now doing so. On the other hand, many of the "old hands" apparently find a little difficulty in changing their habits.—Ed.]

Correspondent Wanted

MR. FRANK HALLAM, 17, Moorbridge Cottages, Nr. Bestwood Colliery, Bestwood, Notts, who is a beginner to wireless, would like to correspond with anyone interested in radio, preferably a reader interested in short waves.

A 10-metre Log from Gloucestershire

SIR,—As I have not seen a 10-metre log from this district published in

CUT THIS OUT EACH WEEK.



- THAT a split secondary input push-pull transformer will enable the characteristics of the two valves to be matched.
- THAT care is required when selecting a Westector for use in a modern superheterodyne as there are two distinct patterns.
- THAT a small moving-coil loudspeaker makes a good microphone.
- THAT a differential reaction condenser may be used as a volume control, H.F. coupling condenser and in various other schemes.
- THAT by using soldering tags damage to many components may be avoided as the iron is not brought near to the terminal.
- THAT where no terminal is provided and soldering has to be carried out, the iron must be really hot and only a trace of flux should be used so that the joint is quickly made.

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.

your paper I enclose mine. All stations were received during January on 28 mc/s (phones):—

- W2JJ, W2HFS, W8JFC, W9KDG, W2CBO, W8GY, W8KC, W3PC, W8MWX, W9BKV, W8QDO, W9HBZ, W1WY, W9AKG, W4DFU, W9GAU, W4EED, W1JLQ, W8CYP, W2KGY, W2JKC, W9KB, W8MWL, G5ML, and ZU6P. My receiver is a O-v-1 with an inverted "L" type aerial 66ft. long and 25ft. high.—A. ROZIER (Icomb., Glos).

Back Numbers Wanted

WE have a request for copies of *Wireless Magazine* dated March, 1931 and May, 1935. If any reader having these issues to spare will kindly forward them to this office they will be sent on to the reader concerned.

CQN Port. China

SIR,—In the issue of PRACTICAL AND AMATEUR WIRELESS dated March 6th, 1937, in the "Leaves from an S.W. Log," there is a paragraph on "CQN," Port. China. I am glad to inform you that I received a letter from this station thanking me for my report. Here is what it says:—

"Your letter of 4th December, 1936, including the information and the graph are greatly appreciated by our engineers, and for which I thank you very much. We are glad to inform you that we work from 12.00-13.30 G.M.T. on every Monday and Friday. I gladly inform you also that the wavelength, 31 metres, has been changed to 29.6 metres temporarily since 11th December, 1936, and I will inform you of any change that will occur in the future."

The address is J. Estrela, Chief of Radio Station "CQN," Government Broadcasting Station, Post Office Buildings, Macao, Portuguese China.—G. W. HORTON (Rotherham).

Station W2IXY

SIR,—I think the following will be of interest to readers who are interested in W stations and reports:—

Dorothy D. Hall, operator of 250-watt, 20 m. 'phone station W2IXY cannot QSL unless a reply coupon or U.S.A. stamps are included with such report.

Reports must contain the call of the station worked, also something the operator actually says.

W2IXY is receiving over 300 reports a month, and she has even had R9 reports when not on the air.—G. APPLGATE (Trowbridge).

50 Tested Wireless Circuits

By F. J. CAMM

(Editor of "Practical and Amateur Wireless")

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Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

International Valve Connections

WITH reference to the Marconi International valves mentioned last week under this section, we think it desirable to give the standard connections for this type of valve, and this may be added to the valve-connecting data which has already been published. This type of valve has what is known as the "Octal" base, or, in other words, an eight-pin arrangement, and the diagram shows the pins on the valve viewed from below.

Valve	Pin Connections								Top Cap
	1	2	3	4	5	6	7	8	
Heptode (X63) ..	—	H	A	G3+G5	G1 (Go)	G2 (Ao)	H	C	G4
Heptode (X64) ..	—	H	A	G2+G4	G3	.	H	C+G5	G1
Pentode (W63 and Z63)	—	H	A	G2	G3	.	H	C	G1
Triode (H63) ..	—	H	.	A	.	.	H	C	G
Rectifier (D63) ..	M	H	A2	C2	A1	.	H	C1	G
D.D. Triode (DH63) ..	—	H	A	D2	D1	.	H	C	G
Beam Power (N63, N66)	—	H	A	G2	G1	.	H	C	F
Rectifier (U50) ..	—	F	.	A2	.	A1	.	F	.
Tuning Indicator (Y63)	—	H	A	T	G	.	H	C	.

Where a pin is blank a dash appears, while where there is no pin the column contains a dot.

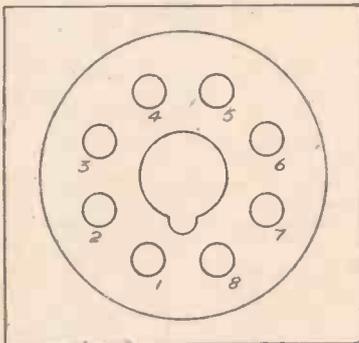


Diagram of the pin arrangement of the Octal valve, viewed from below.

Webb's Economy Condensers

THE accompanying illustration shows one of the new short-wave condensers which are now being marketed by Webb's Radio and Photographic Service. As will be seen, these are of the low-loss type, designed primarily for short-wave work. The assembly consists of a single end plate of ceramic material with all-brass metal parts, and an important feature is the double-ended spindle which facilitates ganging or the combined control of another component. The spindle is of the standard pin type and a single-hole fixing bush is provided. Contact to the moving vanes is of the friction type, but is well-designed and should give no trouble from noises. Soldering tags are provided for connection to the fixed vanes. Three values are obtainable: 15, 40, and 100 mmfds., and the prices are 1s. 6d., 1s. 9d., and 2s. The name of these components is "Apex Economy," and they may be obtained from Webb's Stores, 14, Soho Street, W.1.

Octal Valveholders

TO meet the demand created by the introduction of the Marconi International range of valves, and for use with other octal valves, Messrs. Bulgin, Lectro-

Linx, and Benjamin Electric are introducing special valveholders. These are to be of the chassis-mounting type, but full details with prices have not yet been made available. Messrs. Bulgin announce that they are also introducing a special top-cap connector for this particular range of valves, and a feature of this connector will be its small dimensions.

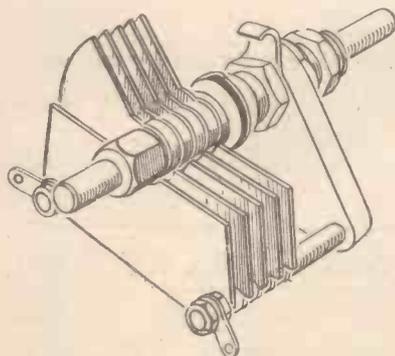
New Tungram Valves

THREE more valves are now added to the Tungram range, a triple-grid

output valve (type APP4G), a Triode (type H14G), and a special non-microphonic valve intended for L.F. phase inversion and other purposes (type H14+). The first valve is a special low-capacity type, ideal for transmitting work. The general characteristics are similar to the APP4, and the price is 16s. 6d. A 7-pin base is fitted. The triode is ideal for general-purpose work and has an impedance of 11,000 ohms. The price is 9s. 6d., and this also has a 7-pin base. The last valve possesses novel characteristics, amongst which may be mentioned the heater, which requires a current of only .65 amps. A 5-pin base is fitted and the price is also 9s. 6d.

New Vidor Portable

VIDOR, LTD. announce a 1937-8 version of the popular suitcase portable which was such a success last year. In its new form, black leatherette covers the cabinet, and the controls and speaker silk are in ivory. The L.T. consumption has been reduced to .35 amp., and the accumulator has been increased to 18 amp. hours capacity. A push-button has been fitted to control the dial lamp. The set is priced at six guineas and is now available.



One of the new Apex Economy short-wave condensers.

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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.

F. B. (Handsworth). The apparatus may have been used as a D.C. unit, but the transformers are not designed for the current usually experienced in a mains set.

B. B. (S.W.8). Coils such as those used in the Vitese or the Record Three may be used.

J. J. H. (Pocklington). We have no circuits which would meet your requirements.

T. L. S. (Wellington). The damp surface of the lino may have contributed to the effect, and it should be kept dry and the accumulator stood upon a rubber mat.

A. H. (Bitterne Park). A wave-trap could be fitted, but is not required with this set. Is the wiring to the coils in order?

W. P. (Rossendale). We think the arrangement would prove unsatisfactory. There are many difficulties in the design, and these have been perfected by the Marconi company in the new recorder such as is now employed by the B.B.C. You would find it difficult to make a recorder of this type at home.

A. B. (Ardgay). Although a lamp might prove satisfactory we think that one of the special barretters supplied by Messrs. Philips would be more suitable. Write to them and give them details of the scheme.

I. J. H. Mck. (Pitlochry). The term is used in connection with the distortion of the curve and is inherent in the single valve. It has been fully explained before, and will be dealt with again in due course. It is too detailed to be dealt with in the form of a reply.

T. (Bath). Full details may be obtained from the Engineer-in-Chief, Radio Sect., G.P.O., Armour House, E.C.1. The wareband will be allotted when you obtain the licence. No radiation should take place.

L. R. A. (Newcastle 2). The trouble is often experienced and is very difficult to overcome when using mains supplies. Screen the heater leads, and include another smoothing choke in the H.T. feed to the valve. The H.T. may be of more importance in the other case than the reaction winding, and some care may be necessary in the disposition of the latter.

H. A. (Grantham). You may have damaged the switch in filing it. As you hear amateurs it would appear that switching and tuning are in order, and you may have made some slip in the wiring to the L.F. stage. Is the H.T. adequate, and are you using a good speaker?

J. W. (Bedlington Station). As the receiver is not one of our designs, we regret that we cannot advise you, as we do not know the current and voltage requirements. Write to the paper from which you obtained the design.

R. H. (S.W.2). If you only require the medium and long-wave broadcasts, we suggest the Tutor 3, blueprint P.W.62. This costs 1s., and a back issue describing construction, dated 29th August, 1936, may be obtained price 4d. by post.

J. M. H. (Isle of Wight). Messrs. Peto-Scott can supply the wire.

R. H. S. (Deptford). The details are beyond the scope of a reply. We have not published any constructional details of apparatus of this type.

R. S. (Abingdon). The coil was supplied by the British General Manufacturing Co., Ltd., of 2, Tyrwhitt Road, S.E.4.

A. V. C. (Finchley). The portable may provide sufficient volume to give satisfactory results on the London stations, but not on any stations farther afield.

G. W. R. (Ebbw Vale). We suggest that you insert a small advertisement in our advertisement columns. We regret that we cannot insert your request in the editorial columns.

W. H. O. (Armagh). We do not recommend the construction of our receivers from parts dismantled from commercial sets. We have no details of the components used in the set in question and therefore cannot give you any guarantee or advice.

G. McM. (Edinburgh, 10). The condensers should have a value of 1 mfd.

G. C. H. (Amsterdam). We regret that we have not used the condenser and coils in any of our receivers.

H. S. (Appledore). We cannot compare commercial receivers, and have no details of the two sets referred to by you. We could not insert your request in our pages.

J. C. (Glasgow, E.2). The blueprints cost 1s., and the back numbers 4d. by post. We have no books dealing with the apparatus mentioned in your postscript.

B. M. (Monaghan). We do not supply blueprints of commercial receivers. Write to the Telsen Company.

J. F. (Harborne). There is no book of the type you mention, and we suggest you follow the various articles which we publish from time to time.

A. R. S. (Drayton). We have no date of the coil in question and suggest you write to the paper in which it was described. The condenser is a differential reaction component and one set of fixed plates is connected to provide a constant by-pass capacity with variation of the reaction capacity.

D. V. (Laindon). The coils may be obtained from the Premier Supply Stores, whose advertisement appears in each issue.

K. C. P. (Haverfordwest). Reversing the connections to the secondary may prove better, or alternatively, check that your wiring diagram is correct. You show the grid-leak on the wrong side of the grid condenser. We presume, however, that this is a drawing error.

R. B. (Sowerby Bridge). We are not familiar with the set and suggest you communicate direct with Messrs. Stratton.

G. F. (Glasgow). The components should be quite satisfactory, and the valve would give good results.

W. N. H. (W.11). Any good eliminator should give satisfactory results with the receiver in question. In the event of any instability it would be a simple matter to add decoupling circuits to obtain stable working.

F. J. H. (S.W.11). You do not state whether you need a broadcast receiver or a short-wave set. The term 6-pin coil is not in itself sufficient to identify it. The Prefect S.W. Three uses a short-wave 6-pin coil and three valves.

J. H. F. (Maidstone). The circuit is not in order. The values will depend upon the valves and H.T. The connections to the second transformer primary are very unusual, and we think you have made a mistake here. The "free" side of the primary should be joined to earth, not H.T. plus.

J. M. S. (Glasgow). The trouble is due to a leakage in the smoothing condenser or condensers.

H. G. (Sheffield, 8). We no longer include station identification as part of our query service.

C. S. (Bridlington). There is no need to give a name to the receiver, simply state the valve combination. The details were given in the recent article in the B.L.D.L.C. columns. We cannot give station addresses, and suggest you obtain a copy of the "Radio Amateurs' Call Book."

R. M. (Blackheath). We did not design the receiver in question. We believe it was published in another journal.

"I've had no Radio trouble since they fitted EDDYSTONE Components"



EDDYSTONE HIGH GRADE SHORT WAVE COMPONENTS

For complete Reliability and Outstanding Performance

SEND FOR ILLUSTRATED LIST. Stratton & Co., Ltd., Eddystone Works, Birmingham. London Service: Webb's Radio, 14, Soho St., W.1.



QUERIES and ENQUIRIES

Resistance Wires

"Would you please let me know from what firms I can obtain resistance wires in all ratings?"—W. W. (Cotford).

MESSRS. A. F. BULGIN AND CO., of Abbey Road, Barking, can supply nickel-chrome, nickel-copper and other resistance wires in various quantities. You can also obtain this material from Messrs. Peto-Scott, and Messrs. Ward and Goldstone.

A Licence Question

"Could you answer this little problem? Suppose I lived in a house and I had the first floor and let the top floor. I own a wireless receiving set for which I pay ten shillings a year. If I was to run an extension speaker up to the other floor would the people up there have also to pay another ten shillings a year for their speaker?"—J. C. W. (N. Cheam).

THE recent action taken by the Postmaster-General against flat-dwellers solved this problem. It was originally found that no licence was required for the distant listening points, provided that a licence was taken out for the main receiving set. Upon appeal, however, this decision was reversed, and it is, therefore, necessary in the hypothetical case mentioned by you for the people to take out a licence for their speaker point.

Dance Band Amplifier

"I wish to build an amplifier for microphone and pick-up, suitable for a dance band, with an output of, say, 7-10 watts. Has such an amplifier been described in your paper? If not, can you please inform me where I can obtain the necessary diagrams, etc. I should also like to add radio to the combination. Can you please tell me how to make up the radio stage capable of receiving British programmes?"—K. R. W. (Bletchley).

WE have not designed any apparatus primarily for the purpose outlined in your letter, although there are three good amplifier designs available. The Enthusiast's Power Amplifier (WM 387) or the Listener's 5-Watt Amplifier (WM 392) are both suitable for your needs although not giving quite the same high volume as mentioned in your letter. The Paraphase Amplifier described in our issue dated Jan. 18th, 1936, may also prove suitable, and an add-on radio unit for this was described in our issue dated Oct. 10th, 1936. In addition, the article on Public Address Systems for the Amateur given in our issue dated July 4th last may also prove of value to you.

A simple Tone-control

"Is it possible to use your tone-control unit described in the issue dated February 27th for the output of a 3-stage push-pull amplifier which I am using for gramophone records? I have been advised by the makers of the speaker I have to use one, and I wondered whether this one would do. If so, how do I connect it?"—E. H. W. (Maida Hill, W.9).

THE tone-control unit could be used with a push-pull output stage under certain conditions. If the output valves are at present joined direct to the push-pull type transformer mounted on the speaker, it will be necessary to include an ordinary centre-tapped output choke between the output valves and the unit, feeding the speaker from the unit as shown in the

RULES

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

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

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

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

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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.

diagram of the unit. If, however, a low-resistance speaker is employed, and the output transformer is included in the amplifier, it would not be advisable to use the unit, unless you modified the output circuit to make use of the choke. When using a choke output in a push-pull stage the two ends of the choke are joined to the two anodes, and the centre tap to H.T. positive. The output to the speaker (or the tone-control unit) is then taken from the two anodes via a 2 mfd. fixed condenser.

Adding an L.F. Stage

"Some time ago I built the one-valve S.W. receiver described in your issue dated December 12th, 1936, and I find it works exceedingly well—the number of stations logged is amazing. However, I am now desirous of converting it into a two-valver. Can you please let me know how to do this without increasing the signals to loud-speaker strength? I feel that such a circuit

would be welcomed by many."—K. A. M. (Walton-on-Thames).

THERE are two methods of adding a valve to a set of this type, using either an H.F. amplifier or an L.F. amplifier. The former will increase the range of the receiver, whilst the latter increases the volume of the signals now heard. This also gives slightly increased range, as some signals may at present be so weak that they are practically inaudible, and the additional amplification will render them readable. The H.F. amplifier gives an increased range of reception, and a great deal of increase in volume of those stations now heard clearly will not be obtained. Added to this, the general background will be increased in strength with an H.F. stage. The Perfect H.F. amplifying stage described in our issue dated June 27th last will be suitable if you decide on H.F. amplification and the L.F. stage described in our issue dated February 6th last will cover the other arrangement. To avoid signals which are too loud, if you adopt the latter arrangement, a potentiometer type of volume control may be joined across the secondary of the L.F. transformer, the arm of the control being joined to the grid instead of connecting it to one side of the transformer, as shown in the diagram. A value of 500,000 ohms should be suitable, but the transformer maker's recommendations should be followed.

Using A Pick-up

"I have a four-valve superhet (Ekeo). As you no doubt know, this has no pick-up sockets or terminals for L.S. extension, and as I want to have a pick-up I am at a loss as to what steps to take with the conversion. Could you describe simply how I might tackle this problem? I do not understand many technical terms."—L. M. (S. Woodford).

THERE is no need to carry out any alteration to the receiver, and the pick-up may be used quite easily with the aid of a pick-up adapter. This is a small plug, obtainable from Messrs. Bulgin for 1s. 6d., which has four pins on one side and four sockets on the other. The detector valve is removed from the receiver, and the adapter plugged in in its place. The valve is then inserted in the sockets on top of the adapter. The pick-up leads are joined to two terminals on the side of the adapter, and when not required, the terminals may be short-circuited. The adapter may be used with the output valve if desired, but volume may not then be sufficient.

All-wave Unipen

"I have a 'British General All-wave Tuner.' Could you please suggest a set in which I could use it? State also the price of the blueprint."—G. T. (Barrow-in-Furness).

THE only receiver for which a blueprint is now available, and in which an All-wave British General Tuner is employed, is the All-wave Unipen, blueprint PW31A. This print costs 1s., but the issue describing construction is now out of print.

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

THE ONE AERIAL FOR THE MODERN SET

PIX INVISIBLE AERIAL

PIX. LONDON, S.E.1

Highly efficient, self adhesive aluminium strip—gives wonderful pick-up clear of interference—fixed in a jiffy without tools—just press it and it sticks.



2/-

Double length 3/6

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Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

RADIO CLEARANCE

63, HIGH HOLBORN, W.C.1.

HOLBORN 4631.

Announcing Special Clearance Sale of High Quality Sets of First-class manufacturer. All Sets individually tested by our Engineers before dispatch. This opportunity will not occur again, now is your chance to purchase the new receiver you have been promising yourself. Remember, stocks are limited, and the demand is sure to be enormous.

LISSEN 4-VALVE UNIVERSAL A.C./D.C. RECEIVER, but with extra Wave Band, covering 12 to 50 metres, £4/17/6. List 9 gns.

HEGENTONE 4-VALVE A.C. RECEIVER, fitted in Handsome Walnut Cabinet. Circuit: H.F. Pentode, Detector, Pentode Output, Valve Rectification. Large Type Moving-Coil Speaker, covers 3 Wavebands, Short, Medium and Long, £4/12/6. List 9 gns.

LISSEN 3-VALVE BATTERY RECEIVER, Screen Grid, Detector, Pentode Output, Large Type P.M. Moving-Coil Speaker, Clock Face Tuning, COMPLETE WITH ALL BATTERIES, etc., 7/0/-, List £7/15/0.

LISSEN 4-VALVE BATTERY PORTABLE. Handsome Walnut Cabinet, Large Type P.M. Moving-Coil Speaker, Circuit: Screen Grid, Detector, Driver Valve, Class B Output, COMPLETE WITH ALL BATTERIES, etc., 7/5/-, List £10.

LISSEN 4-VALVE BATTERY SUPERHET. A really modern receiver, incorporating latest in circuit design. Fitted in handsome Walnut Cabinet, Clock Face Tuning, Large Type P.M. Speaker, £4/12/6 COMPLETE WITH BATTERIES. List 11 gns.

8-VALVE A.C. MAINS SUPERHET—BY PLESSEY, fitted Visual Tuning, Volume Control, Tone Control, etc. Handsome Bird's Eye Maple Cabinet, size 16" wide, 12" deep, and 23" high. Valves as follows: A.C./VPL1, FC4, A.C./VPL1, A.C./VPL1, A.C./HLDD, V914, A.C. 2 pen, IW3, pre H.F. Stage, two I.F. Stages, full A.V.C. A SUPER BARGAIN, £6/6/0. List 16 gns.

3-VALVE A.C. SUPERHET CHASSIS, complete with Valves, details as above, £5/19/6.

SPECIAL.
Announcing 2 First-class Amplifiers, ideal for amateur use, in the home, or small Public Address, etc.

3 WATT AMPLIFIER, COMPLETE, TESTED AND BUILT BY OUR ENGINEERS, £3/2/6. This Amplifier comprises Bryce Transformer, G.E.C. Intervalve Transformer, Centralab Volume Control, T.C.C. Condensers, Polar Resistances, etc., Chassis Heavy Gauge Iron, Finished Battleship Grey. Valveholders, etc. 350. Ly Clix; valves: one A.C./L, one PX/41, one 350 120 m.a. Rectifier. All British Hiwacs.

5 TO 6 WATT AMPLIFIER, comprising Bryce Transformer, Bryce Chokes, Centralab Volume Controls, Bulgin and Polar Resistances, T.C.C. Condensers, Heavy gauge Iron Chassis, finished Battleship Grey, fitted Clix type American Holders. Valves all American firsts, one 6A6, one 37, two 2A3's, one 5Z3. BUILT AND TESTED BY OUR ENGINEERS, £4/19/6.

BRUCE MAINS TRANSFORMERS AND CHOKES, BRITISH AND GUARANTEED, STANDARD FOR THE SEASON.

250-0-250, 80 m.a. 2-0-2 volts, 2.5 amp, 2-0-2 volts, 4 amp, 8/6.
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350-0-350, 150 m.a. 2-0-2 volts, 2.5 amp, 2-0-2 volts, 4 amp, 2-0-2 volts, 2 amp, 11/6.
500-0-500, 150 m.a. 2-0-2 volts, 2.5 amp, 2-0-2 volts, 6 amp, 2-0-2 volts, 2 amp, 2-0-2 volts, 2 amp, 16/6.
H.T.B. TRANSFORMER, 250 volts 60 m.a., 2-0-2 volts, 4 amp, 8/6.

DITTO WITH H.T.B. METAL RECTIFIER, 16/6.
ALL TRANSFORMERS ARE FULLY SHROUDED.
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CALLERS, AS USUAL, TO 165 & 165a, FLEET ST., E.C.4 (Next door to Anderton's Hotel). Central 2833. New Branch: 50, HIGH ST., CLAPHAM S.W.4 (Macaulay 2381).

Have you had our **GIANT ILLUSTRATED CATALOGUE AND VALVE LIST? Send 4d. IN STAMPS FOR THIS BARGAIN LIST.**

MAINS VALVES, famous Europa 4 v. A.C. types, 4/6 each: H.L.L., L.J. S.O., Var.-Mu-S.G., H.F.-Pens., Var.-Mu-H.F. Pens. 1, 3 and 4-watt A.C. directly-heated output Pentodes. Full-wave rectifiers, 250 v. 50 m.a. A.C./D.C. types. 20-volt. 18 amp. S.G., Var.-Mu-S.G., H., H.L.L. Power and Pen. Following types all 5/6 each. Full-wave rectifiers, 250 v. 120 m.a. and 500 v. 120 m.a. 2/1 watt indirectly-heated Pentodes, Octodes, Frequency Changers.

BATTERY VALVES, 2 volts, H.F., L.F., 2/3. Power, Super-Power, 2/3. S.G., Var.-Mu-S.G., 4- or 5-pin Pentodes, H.F., Pens. V.-Mu-H.F. Pens., 5/-, Class B, 3/6.

AMERICAN VALVES. Genuine American **HYTRON** and **TRIAD** first-grade Valves. 3 months' guarantee. All types in stock, 5/6 each. 210 and 250, 8/6 each. New Metal-Glass Valves, all types, 6/6 each. Genuine American **DUOTRON** Valves, all types, 3/6 each. Valve holders for all above types, 6d. each. Metal bases, 9d. each.

SHORT-WAVE COILS, 4- and 6-pin types, 13-26, 22-47, 41-84, 78-170 metres, 1/9 each, with circuit. Special set of 3 S.W. Coils, 14-150 metres, 4/-, with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 39-86 metres. Simplifies S.W. receiver construction suitable any type circuit, 2/6. **COIL FORMERS**, in finest plastic material, 1/1n. low-loss. ribbed, 4- or 6-pin, 1/- each.

SUPER CERAMIC CONDENSERS, S. L. F., 00016, 0001, 2/9 each; double-spaced, 00005, 000025, 000015, 3/- each; All brass with integral slow motion, 00015 tuning, 3/9; 00015 reaction, 2/9.

H.F. CHOKES, S.W. 10-200 metres, 9d.; S.W. screened, 1/6; standard screened 180-2,000 metres, 1/6.

3-WATT A.C. AMPLIFIER, 2-stage, for mike or pick-up. Complete kit of parts with 3 valves, 40/-.

7-WATT A.C./D.C. AMPLIFIER, 3-stage high-gain, push-pull output. Complete kit of parts with 5 specially matched valves, 24/4s.

ELECTROLYTICS. U.S.A. 4, 8 mfd. 360 v. peak, 1/9 each. Dubilier, 4 or 8 mfd. 500 v., 3/-; 1/50 mfd. 50 v., 1/3; 10 mfd. 50 v. 6d.; 25 mfd. 25 v., 1/-; T.C.C. 8 mfd. 650 v., 4/-; 15 mfd. 50 or 100 v., 1/-; 50 mfd. 12 v., 1/-; Paper Condensers. W.E., 250 v. working 4 mf., 2/-; 2 mf., 1/-; 1 mf., 6d.; 350 v. working 4 mf., 2/6; 2 mf., 1/6. Dubilier 500 v. working 4 mf., 4/-; 800 v. 4 mf., 6/-.

COSMOCORD PICK-UPS, with tonearm and volume control, 10/6 each. **PICK-UP HEADS** only, 4/6 each.

PREMIER MAINS TRANSFORMERS, wire-ent type with screened primaries, tapped 200-250 v. Centre-tapped Filaments. Guaranteed one year. H.T. 8 & 9 or H.T. 10 with 4 v. 4 a. C.T. and 4 v. 1 a. C.T., 8/8. 250-250 v. 60 m.a. 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 8/8. 350-350 v. 120 m.a. 4 v. 1 a., 4 v. 2 a., and 4 v. 4 a., all C.T., 10/8. Any of these transformers with engraved panel and N.P. terminals 1/8 extra. 500-500 v. 150 m.a., 4 v. 2-3 a., 4 v. 2-3 a., 4 v. 3-4 a., all C.T., 17/6. **SPECIAL OFFER PHILIPS MAINS TRANSFORMERS**, 250-250 v. or 300-300 v. at 80 m.a. 4 v. 5 a. C.S.; 4 v. 1 a. Tapped Primary 100-250 volts, 6/11. 450-450 v. at 150 m.a. or 500-500 v. 100 m.a. 4 v. 4 a. C.T.; 4 v. 4 a. and 4 v. 3 a. Screened Primary. Tapped input 100-250 v., 12/6. **AUTO TRANSFORMERS**, step up or down, 60 watts, 7/8; 100 watts, 10/-. **SMOOTHING CHOKES**, 25 m.a. 2/9; 40 m.a., 4/6; 60 m.a., 5/6; 160 m.a., 10/6. 2,500 ohms, 60 m.a. Speaker, Replacement Choke, 3/6.

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TELSEN iron-cored screened coils, W.340, 4/- each. Electric **SOLDERING IRONS**, 200-250 v., A.C./D.C., 2/3.

NEW 1937 1-VALVE SHORT-WAVE RECEIVER OR ADAPTOR KIT 13 to 86 Metres without coil changing. Complete 13/-, Circuit, 12/6. **VALVE GIVEN FREE!** **DE LUXE MODEL** 14 to 150 Metres, complete Kit with Chassis, 4 Coils and all parts, 17/6.

SUPERHET CONVERTER KIT, 13/6, De Luxe Model, 18/6. **S.W. SUPERHET CONVERTER KIT**, for A.C. Mains Receivers, 20/-, A.C. Valve given FREE!

NEW 1937 2-VALVE S.W. KIT, 13 to 86 Metres without coil changing. Complete Kit and Circuit, 19/6. **VALVES GIVEN FREE!** Circuit, 12/6. **VALVE GIVEN FREE!** **DE LUXE MODEL** 14 to 150 Metres, complete Kit with Chassis, 4 Coils and all parts, 25/-, **VALVES GIVEN FREE!** **3-VALVE S.W. KIT**, S.O. Det. and Pen., 42/-, **VALVES GIVEN FREE!**

BAND-PASS TUNING PACK, comprising set of Telsen 3-gang iron-cored coils with switching, mounted on steel chassis with 3-gang condenser, illuminated disc-drive and 4 valve holders, 15/-, the lot. All Mains or Battery operated.

SPECIAL OFFER. LISSEN TWO-GANG SCREENED ALL-WAVE COILS, 12 to 2,000 Metres, complete with switching and wiring diagram, 6/11 per set.

3 VALVE BAND-PASS KIT, 200-2,000 Metres. Complete kit of parts, including chassis, all components, valves, M.C. speaker and wiring diagram. Battery Model, 50/-, A.C. Mains Model, 70/-.

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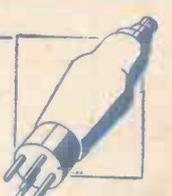
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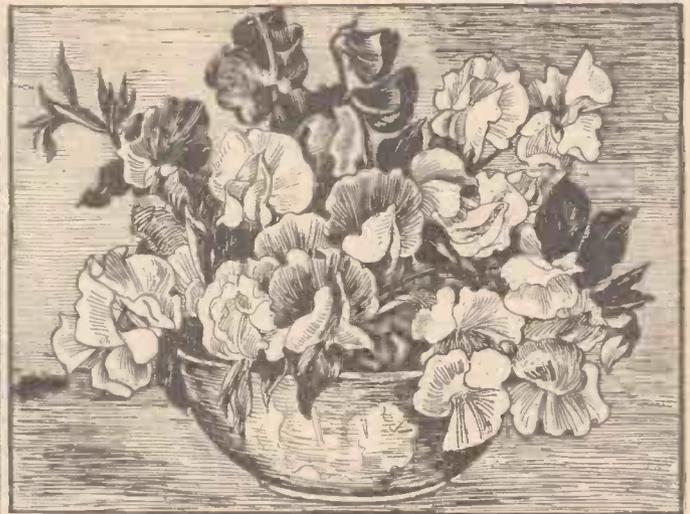
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DON'T BE AFRAID OF THE SUPERHET See Page 29.



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. X. No. 236. March 27th, 1937

ROUND *the* WORLD of WIRELESS

Noisy Backgrounds

ONE of the commonest complaints received from listeners is that of noises in the background, and this occurs with practically every type of receiver. Atmospherics play a large part in this kind of interference, and it is naturally more noticeable in a high-powered receiver than in a small one. This is, in fact, one of the objections which is often levelled at the superheterodyne receiver, and in a modern set of this type the range of reception is limited by the signal-to-noise ratio. The type of noise to which we are now referring is, however, that occasioned by faults in components or in construction, and there are many places in a simple receiver where such noises can arise. On page 27 this week we go into the problem and discuss the causes and cures of some of the commoner faults of this nature, and if you are doubtful concerning some of the background which you hear, carry out the tests mentioned in this article, and apply the remedies recommended.

Radiolympia

IT has now been definitely decided that this year's Radio Exhibition at Olympia will be held from Wednesday, August 25th, to Saturday, September 4th, both days inclusive.

Coronation Night

TO add to the attractions of Coronation week which have already been mentioned in brief, the B.B.C. now announces that on Coronation night an extra hour of dance music will be provided, the Regional transmitters remaining open until 1.0 a.m. for this purpose. The long-wave National will also take this special programme.

Coronation Receivers

WHILST on the subject of the Coronation, it is also interesting to note that one firm has already decided to produce some special models to commemorate the occasion. The receivers, which are to be made by Philco, will have a specially-designed tuning knob with a coronet in the centre and the words "Coronation Empire Receiver" round it. A range of these receivers is to be produced including radiograms.

Lost in Transit

TEN years ago, F. A. Bean gained local notoriety in Yorkshire by hoaxing the railway authorities with a story of a

lost giraffe, supposed to have been dispatched by rail in a crate. Mr. Bean was employed by the railway at the time, and it was only after an exhaustive search had been made that the departmental chief recalled that it was April Fool's Day. Mr. Bean has written a railway farce based on this occasion, and it will be broadcast from Leeds in the Northern programme on April 1st.

Austrian Power Increases

IT has been decided to increase the power of the Graz station from 7 to 15 kW. The authorities are also considering the

was switched on and was then found to work satisfactorily. The explanation, given by the Technical Adviser to the Sales Department of H.M.V., to whom the problem was submitted by a dealer, is that the filament of the lamp had broken, an arc was taking place across the break, and this was tuned by the parallel circuit of the switch and wiring to radiate at a frequency which was picked up by the I.F. coils in the receiver.

Unsolved Irish Mysteries

DR. H. MONTGOMERY HYDE, the well-known Ulster historian, has chosen six of the unsolved mysteries of the past two hundred years of Irish history as the subject for a series of six talks to be given from Northern Ireland, commencing on April 2nd. The first is the Danish Silver Robbery which occurred in 1728, and is still told in the cottages and cabins of County Kerry. It is the story of a Danish vessel which was wrecked off the coast of Kerry in the Bay of Tralee, whilst carrying silver bullion. The valuable cargo was transferred for safety to the house of a neighbouring landowner, and soon after, two of the Danes keeping guard were killed, the house plundered, and the treasure disappeared. It was rumoured that some of the best-known people in the county, including the daughter of an earl, were involved, but although the most searching inquiries were made, neither the culprit nor the silver was ever found.

Organ Recital

ON March 30th, in the Western programme, Reginald Porter-Brown will give an organ recital from the Forum Cinema, Southampton.

Concert from Torquay

MURIEL GALE (contralto) will be the soloist in the concert by the Torquay Municipal Orchestra, to be broadcast from the Pavilion, Torquay, on March 30th.

Binding Cases

KEEP your back numbers tidily, and facilitate reference to previous articles and receivers by obtaining a binding case and index. Binding Cases and Indexes for Volume 9 of PRACTICAL AND AMATEUR WIRELESS are now available. The binding case, complete with title page and index, costs 3s. 6d., and the index alone 7d. by post. Indexes are still available for Volumes 1 to 8, inclusive.

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question of the power of the Vienna short-wave station which has recently been re-equipped, but more extensive alterations will be carried out if the present arrangements are not found entirely satisfactory.

Interesting Phenomena

SOME peculiar troubles arise during the course of radio experimenting and testing, and a case was recently found where distortion arose in a commercial superhet which could not be removed. The A.V.C. level also rose perceptibly. A singing noise was then heard when the set was switched off and this appeared to come from an electric light bulb hanging over the set. This lamp was switched off, but when switched on again failed to light. The set

ROUND the WORLD of WIRELESS (Continued)

Radio for Ocean Service

DURING the recent flight of the flying boat *Cambria* along a 400-mile stretch of the west coast of Ireland, highly satisfactory tests in wireless communication were made. Although the tests were at no great range, they were made on many bearings for the purpose of discovering and plotting local variations or peculiarities in the bending of the wireless rays at different times of the day and night.

Wireless Nuisance in Sweden

ACCORDING to a recent report, Sweden appears to be troubled by selfish wireless listeners who allow their loudspeakers to work with unnecessarily great volume. In Sweden there are police regulations to prevent people making a nuisance of themselves at night, but, according to the Swedish Minister of Justice, there is no law against excessive wireless and gramophone volume during the day, and the Government is contemplating the remedying of this unsatisfactory state.

Easter Concert Party

DURING Easter Week Concert Parties which have been touring the country in the winter find their way back to their summer-time haunts by the seaside. Excerpts from shows presented by the Arcadian Follies at the South Pier, Blackpool, and by the Bouquets at the Floral Pavilion, New Brighton, will be broadcast on March 30th from the Northern Regional.

Western Variety

THE artists who are taking part in a programme of "Western Variety" on March 30th are: Mona Magnet (comedienne), who played the Principal Boy at the Theatre Royal, Plymouth, a few years ago; The Five Microtones (in close harmony); Billy Pound (syncopated violin solos); and Hugh Frossard and his Band.

Holiday Fare

ON March 27th, "Holiday Fare" will be broadcast from two seaside resorts, Boscombe and Weymouth. Variety will come from the stage of the Hippodrome, Boscombe, and the acts will include Jenny Howard, the Comedy Girl, assisted by Percy King (by permission of George Black), and Van Dusen, the Yodelling Comedian. The broadcast from Weymouth comes from the Alexandra Gardens, where listeners will hear Don Rico and his Gypsy Girls' Orchestra.

Ten Years of Short-wave Broadcasting

THE tenth anniversary of the first intercontinental broadcast from Europe to the Far East was recently celebrated; March 11th, 1927, was an important landmark in the history of broadcasting. The most powerful stations then in existence, Daventry and Langenberg, were practically inaudible at a distance of twelve hundred miles, and it was left for the Philips short-wave transmitter PCJJ in Holland to

INTERESTING and TOPICAL NEWS and NOTES

NEW IDEA IN RADIOGRAMS



The young lady seen in our illustration is tuning in on one of the new radiograms which H.M.V. recently released, and which was reviewed in last week's issue. As the instrument can be operated on radio without raising the lid, a vase of flowers can be placed on top. The new H.M.V. 22-guinea all-world radiogram occupies a very small amount of floor space, and will be particularly suitable for flats.

SOLVE THIS!

PROBLEM No. 236

Signals faded away in Edmund's superhet, but when the aerial lead was transferred to the cap of the pentagrid frequency-changer strong signals were again received. What was the probable fault? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newton, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 236 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, March 20th, 1937.

Solution to Problem No. 235

The receiver can be made to work from a D.C. supply by connecting a wire across the heater sockets of the rectifier holder, and another wire across the cathode and anode sockets of the same holder.

The following three readers successfully solved Problem No. 234, and books are accordingly being forwarded to them: T. W. Pearce, 22, Monmouth Avenue, 8th Woodford, London, S.E.18; William Baxter, 49, Crall Street, Parkhead, Glasgow; W. Kettley, 8, Wardman Crescent, Redcar, Yorks.

establish the first link between Europe and Asia, on a wavelength of 30.2 metres.

So successful was the first transmission that the B.B.C. two months later requested the Philips authorities to radiate the Daventry programme to the whole world through PCJJ. This transmission, which occupied six hours, was also perfectly successful, so much so that the radio stations in South Africa, Australia, and New Zealand, and in other parts of the world picked up the short-wave programme and relayed it to their local listeners using their own wavelength.

Weston Municipal Orchestra

THIS popular orchestra, conducted by H. C. Burgess, will broadcast on March 28th. The orchestra is well known to listeners, and for more than seventeen years has been playing at the Rozel Bandstand in Madeira Cove during the summer months.

Easter-tide Music

THE B.B.C. has arranged some excellent musical programmes for Easter, and on March 26th (Good Friday), the B.B.C. Symphony Orchestra, the B.B.C. Singers, and the Philharmonic Choir, under the direction of Sir Henry J. Wood, will take part in the Parsifal Concert in the Queen's Hall (National). The soloists will be Muriel Brunskill, Walter Widdop, Victor Harding, Norman Walker, Roy Henderson and Foster Richardson, and the Flower Maidens' music will be sung by Elena Danieli, May Busby, Janet Powell, Margaret Godley, Margaret Rees, and Myra Owen.

On March 30th (Regional), the British Women's Symphony Orchestra conducted by Boyd Neel, will broadcast a programme consisting of Sinfonia in B flat, by J. C. Bach; Tchaikovsky's Fantasy Overture "Hamlet"; and Delius's Pianoforte Concerto in C

Minor, which will be played by Moura Lympny. This will be the second time that the Women's Symphony Orchestra has broadcast this season.

Ballet Music

LESLIE HEWARD will conduct the B.B.C. Midland Orchestra on April 3rd in a programme of Ballet Music by Delibes, Saint-Saëns, Lambert, and Lalo.

Concert from Bath

ANOTHER popular concert by the Bath Pump Room Orchestra, led by Norman Rouse, and conducted by Maurice Miles, will be broadcast in the Western programme on April 1st. John Bennison (clarinet), will be the soloist.

Chinese Likee Muchee Noisee

IN British Malaya, the United States Department of Commerce have issued a statement advising American manufacturers that the Chinese settlers there like radio because it makes noise, and they judge a set not by tone, but the amount of noise it will make. They always run their sets with the volume full on.

Noises Off— A Helpful Article for the Beginner

Background Noises; Crackling Sounds; Intermittent Scratching Sounds; What Causes Them and How They May Be Prevented
By FRANK PRESTON

INTERFERENCE excepted, background noises of various kinds take away the pleasure of listening more than does anything else. It is also the case that the causes of these troubles are generally more difficult to trace than are faults which result in an absence of signals or pronounced distortion. One reason is that the usual "electrical" tests—tests for continuity, resistance and insulation do not always reveal the source of trouble. Consequently, systematic checks and careful examination of different parts must be made.

Wiring or Components?

One of the first tests should be to observe whether or not the background noises can be started or stopped by lightly jolting the set or by tapping different components. If they can, it will generally be fairly clearly indicated that the fault is external to the components, and that the connections should be carefully checked. The proper procedure is to test different parts of the circuit one at a time, after eliminating the other parts, but the less experienced constructor might become confused by following such a course. He will generally find it more convenient, therefore, to tap different components and connecting wires with the tip of the finger or, better still, with the end of a short insulated rod; wood is suitable. When the set is mains-operated it is strongly recommended that the fingers be kept well out of the "works" in order to ensure against shocks.

Loose Coil Screen

In making these tests it should not be overlooked that a loose coil screen or a valve which fits badly in its holder might be the cause of trouble. If either of these is suspected a fairly satisfactory test can be made by holding the part firmly with the hand or the end of the insulated rod whilst the set is again tapped or lightly jolted; absence of further crackling noises would tend to show that the particular part under suspicion was responsible. This might not be a sure guide, however, because the mere fact of holding some part still might prevent another from being affected by the vibration.

Should it be found that a coil screen is loose, it will nearly always be an easy matter to remove it—after switching off the set!—and lightly bend it. If the coil is loose on the metallised or metal chassis, the need for tightening the mounting screws will be indicated. Where a valve is concerned, it should be removed from its holder and the pins cleaned with fine glasspaper, and opened out very gently with the tip of a knife blade if they are of the split or banana type. Particular care

should be taken with pins of the latter type to see that the connecting wire running down the centre is not severed.

Bad Connections

When the noise is unaffected by tapping or moving the receiver it might result from a badly-soldered joint, dirty switch contacts, dirty valveholder contacts, or a fault inside one of the components. It is worth while first to suspect the on-off switch, and to short-circuit its terminals with a short length of wire—after switching off at the mains or disconnecting the H.T. and L.T.

supplies. Then switch on again; if the fault does not then exist it will be evident that the switch requires to be replaced, or that the contacts should be cleaned or lightly bent, when the switch is not of an enclosed-contact or Q.M.B. pattern.

Should short-circuiting the switch have no effect, examine the mains plug in the case of a mains-operated set. Clean the pins with glasspaper, and gently force the two halves apart with a knife blade. If that makes no difference, see that the wires are properly connected to the terminals inside the plug. Also, where the plug contains fuses, see that the caps of these are clean, and that the springs press tightly against them. If necessary, remove the springs and stretch them slightly. See also that the flex is not faulty where it has been kinked at the outlet from the plug. With a battery set deal with the wander

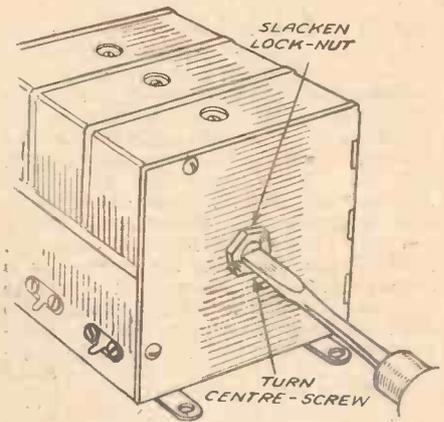


Fig. 2.—A method of adjusting the end-to-end position of the moving vanes of a variable condenser.

plugs, spade terminals and flexible leads in a similar manner.

"Dry" Soldered Joints

Badly soldered joints can give a considerable amount of trouble, as can traces of flux left inside valve sockets or round terminals. The flux is inclined to form a thin layer which acts as a partial insulator or variable resistance. One method of checking soldered joints is, when the set is

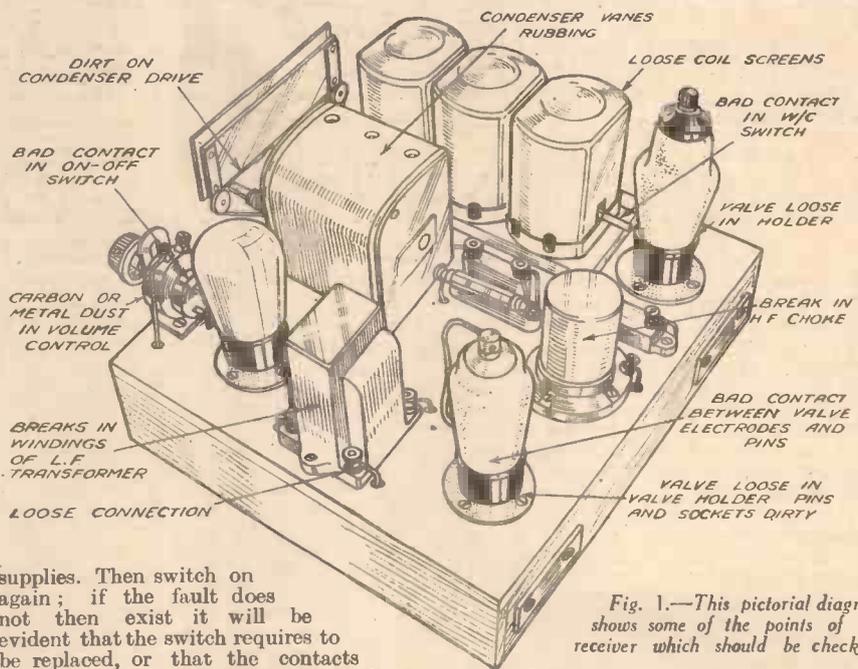


Fig. 1.—This pictorial diagram shows some of the points of the receiver which should be checked.

switched off, to pull fairly hard at each in turn. A badly soldered wire will generally come adrift. An expert solderer can generally recognise a "dry" soldered joint due to its dirty appearance, and due to the dullness of the solder. The remedy is to remove the connection, thoroughly clean both wire and terminal tag, and then resolder, using only a trace of flux (Fluxite is best for general use), and applying a clean hot and well-tinned iron. Incidentally, screw-down terminal connections are better than badly soldered ones.

Faulty Components

Faulty components are usually more difficult to locate than are bad connections, and proper "meter" tests are often desirable.
(Continued overleaf)

NOISES OFF.*(Continued from previous page)*

able. When a meter is not available, or the constructor does not feel fully competent to use one, he can make other tests which will help to locate the fault. Components which are most likely to suffer from a poor internal contact are chokes, transformers, and coils; in other words, wire-wound components. The H.F. choke in the detector anode circuit can be checked by connecting a short length of wire between its terminals. If this stops the noise, the component is almost certainly defective, and should be replaced. A similar test can be applied to H.F. chokes in the anode circuits of high-frequency valves, but in this case the loud-speaker will be silenced whether the choke is faulty or not.

In the case of an L.F. transformer which is suspect, the simplest method is to short-circuit the primary winding (as the secondary does not carry any current it is unlikely to be damaged). This also will mute the speaker, but if it also stops the crackling the transformer will probably prove to be damaged. Resistances can be treated in the same manner, but care should be taken not to short-circuit bias resistances, or anode circuit resistances, which are for the purpose of reducing the voltage applied to a valve to a safe figure. If the constructor is unable to distinguish between the different types of resistance he is advised not to attempt the tests just described, particularly when the receiver is fed from the mains.

Tuning-coil Troubles

Coils are often more difficult to deal with, but it is worth remembering that the background noises are generally more

pronounced during reception of a signal when a coil is at fault. Another indication of a damaged coil is given when the receiver tunes erratically, or when tuning is unusually flat. If a coil is suspected of being defective, switch off the set and remove its screen. Examine the windings, paying particular attention to the ends which are passed through holes in the former; a break often occurs at one of these points. It might be so slight that intermittent contact is obtained; but this is what gives rise to the crackling. It might even be necessary to remove the coil to examine the connections from the windings to the terminals. See that these are properly soldered, and *very lightly* pull at the wires to see that they are unbroken. As the wire is generally thin, a hard tug would probably break it. When replacing the coil, see that the earth connection to the screen is properly made.

If crackling is heard only when the wave-change switch is turned to the long-wave position, although the windings and connections appear to be intact, remember that the switch might not be operating correctly, the contact points failing to break contact. On the other hand, when crackling is heard only in the medium-wave position the contacts might not be closing or might be dirty. Apply the same test as for the on-off switch.

Condenser And Drive

It is not always realised that a valve might sometimes give rise to noises due to there being a bad connection between the electrodes and the pins. The only easy check is to replace the valve which is suspect for another of similar type.

Sometimes it might be found that

crackling or scratching noises are heard only when the tuning control is being operated. That might indicate that the vanes are touching, although this would probably be the case only at one part of the scale. In most cases a cure could be effected only by adjusting the setting of the end bearing pin, so as to alter the end-wise position of the moving vanes. When the vanes do not touch, see that the centre spindle is making good contact with the corresponding terminal; a further test can be made by connecting the terminal to the moving vanes by means of a short length of wire and a crocodile clip. This would prevent the vanes from turning through the full 180 degrees, but would enable a proper test to be made. When the extra connection proves effective it will be clear that a new pigtail should be fitted or that the spindle bearing should be cleaned; this is according to the method of making connection.

It is by no means impossible, although not usual, for crackling to be produced by the slow-motion drive. Where this consists of a metal band running over pulleys and a metal drum, the trouble might be due to the presence of dirt or grease in the band. This is apt to form a thin layer of insulation with the result that a minute voltage is generated between the drum and the band. The varying strength of the insulation results in a fluctuating small voltage which produces a form of interference. Both band and drum should be cleaned with a rag moistened with methylated spirit, petrol or paraffin, after which the parts should be lightly lubricated by rubbing them with the point of a soft-lead pencil, or by lightly smearing on a trace of graphited oil.

HUM IN THE RADIOGRAM

THE average home-built radiogram has a disappointingly high hum level, whether built as a complete radiogram in the first place, or whether built by uniting a pick-up and gramophone motor with an existing chassis.

It should not be overlooked that where mains hum is exactly the same on gramophone and radio, it will appear that the mains hum is worse on the gramophone, due to the soft passages met with on gramophone records, which, dropping down to a volume level approaching that of the hum, naturally tend to accentuate the presence of the latter. Where the smoothing arrangements are such that the hum level, while being the same on radio and gramophone, is objectionable, the usual steps must be taken to increase the efficiency of the smoothing arrangement, a subject which has already received so much attention in these columns that it would be redundant to include it here. On the other hand, when a noticeable increase in hum is apparent when switching to gramophone, very simple steps can be taken to overcome the trouble. In the first place, it is impossible to over-emphasise the necessity of earthing the pick-up arm, and for screening the pick-up leads and properly earthing such screening. Most pick-ups are provided with an earth terminal, but unfortunately in several makes this earth terminal is not in proper metallic connection with the whole arm. This state of affairs arises in those designs where the tone arm is in two pieces, earthing of one piece relying entirely on contact through some swivel or rocker which, while mechanically sound, is

Ways and Means of Eliminating the Trouble are Discussed in this Short Article

electrically indifferent. The remedy is, of course, to earth the odd pieces together, so that the earth terminal provided is in metallic contact with the whole structure. There are usually quite a few screws in various parts of a pick-up terminal, and it is not difficult to link them together with flexible wire. Many metal pick-up arms are finished in black or brown "lacquer," the conductivity of which is questionable, and care should be taken to see that earthing is accomplished to pure metal, the lacquer or other synthetic finish having been carefully scraped away for the purpose.

Screening

For screening pick-up leads almost any screen wire is suitable, provided that it is

reasonably dense, but it is necessary to take more care in earthing the screening than would be imagined necessary. In the absence of a metal band going right round the screen tubing, it is suggested that if an inch of the screening be unplaited and twisted together, and the earthing wire affixed by soldering, a decent contact to each strand of the screen will be ensured.

The very position of the gramophone motor and pick-up causes the leads to these two components to be more or less parallel, and for this reason it is desirable, and is, in fact, general commercial practice to screen the mains leading to the gramophone motor for about two feet of their length, starting, of course, close up to the motor. The electric motor frame will certainly have an earthing terminal on it, which should be duly earthed, and if the motor board is metal this should also be earthed. It is not good enough to rely on the fact that the motor frame is bolted to the motor board, as, in time, oil may find its way under the bolts when they become slackened by vibration, resulting in absence of electrical continuity.

It is not satisfactory to take a single wire connected in turn at the points above mentioned, and finishing at the earth terminal. The most efficient and convenient arrangement being one wire earthing the motor and motor board, and a separate wire earthing the tone arm and pick-up leads. Reversal of the pick-up leads should be tried, as in certain types of pick-up, one particular way round will tend to induce less hum.

To Track That Fault—To learn how a wireless receiver works, obtain

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Don't be Afraid of the Superhet!

This Article Contains Useful Practical Hints for the Superhet Constructor - - - - By IDRIS EVANS

MANY constructors are afraid to attempt the assembly of a superhet owing to the difficulty they think they will experience in making the necessary trimming adjustments. It is true that the superhet requires careful adjustment if optimum results are to be obtained, but if reliable modern components are used and a recognised design is followed, very little

design is followed and the specified components are used, he need not worry about these important points—they are solved for him by the designer.

Construction

The construction of any receiver should be carefully carried out and it is certainly true to say that in the majority of cases where receivers do not give satisfactory results the faults lie in the constructional work. Poor soldering can cause crackling noises and low sensitivity, and bad layout can produce instability and consequent distortion. It is surprising the number of constructors who do not bother to learn how to solder before commencing to construct the set—they spend pounds on reliable components and spoil them with the soldering iron. It is not intended to give soldering instructions in this article, but it will not be out of place to point out that the soldered lead should withstand a good tug, and the joint should have a smooth, glossy appearance when cold. In a superhet, a bad joint in the tuning circuits will cause more trouble than in a two or three-valve straight set because the amplification of the stages following the tuned circuits is greater in the superhet. The more sensitive is the receiver the more pronounced will be the effect of a bad contact, of course.

Screening

More effective screening of the tuned circuit components and the grid and anode leads of the stages preceding the detector is necessary in a superhet than in a simple straight set. Screening should, however, be reduced to the necessary minimum as excessive screening can defeat its own end and cause loss of efficiency. Grid and tuned circuit leads should, therefore, be kept as short as possible in order to reduce the length of material screening cover to a minimum.

In the H.F. section of the receiver, the leads which require screening are those joining the gang condenser sections to the coils, and especially the modulator grid lead (usually the cap lead) of the frequency-changing valve. If long, unscreened leads are used at these points direct pick-up of signals will be obtained, thereby causing interference owing to the reduced selectivity of the pre-selector circuits. In the oscillator circuit the grid and anode leads of the frequency changer should be screened if these are long. It is also advisable to screen the grid and anode leads of the I.F. valves as these are connected to tuned circuits (the tuned windings of the

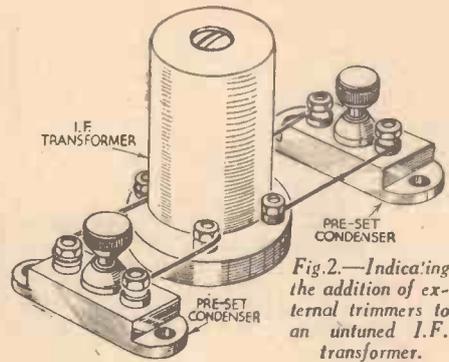


Fig. 2.—Indicating the addition of external trimmers to an untuned I.F. transformer.

I.F. transformers) and can therefore cause interference by picking up signals tuned to the same frequency as the I.F. transformers, i.e., the intermediate frequency used.

Trimming

The average constructor does not possess an oscillator, and therefore other methods must be adopted. The easiest method is to tune in a station at the lower end of the scale, and adjust the trimmer of the oscillator section of the gang condenser until the correct wavelength setting is obtained. The other trimmers should then be adjusted until maximum volume is obtained from this station. The tuning control should now be rotated to approximately 500 metres, and another station tuned in. If the wavelength setting is correct it will indicate that the trimmers are correctly adjusted. If stations tune high at the upper end of the scale the I.F. transformer trimmer capacity should be reduced, and vice versa if stations tune low.

In some cases, the scale will not be marked in wavelengths and, as before, a station should be tuned in at the lower end of the scale, and the gang condenser and I.F. transformer trimmers adjusted for maximum volume. If it is now found necessary to readjust the trimmer of the aerial section of the gang condenser for stations at the upper end of the scale

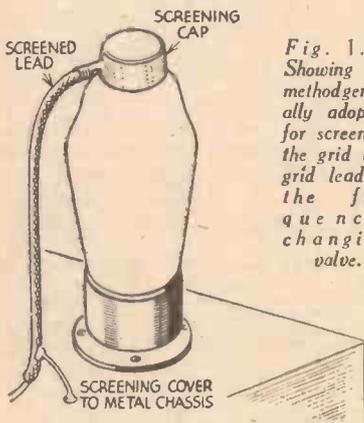


Fig. 1.—Showing the method generally adopted for screening the grid and grid lead of the frequency-changing valve.

more trouble will be experienced than with a simple two or three-valve straight set.

Components

Until approximately three years ago it was customary to use intermediate-frequency transformers of the untrimmed type. Best results cannot be obtained when this type of transformer is used, however, for although the two windings may have exactly equal inductances the stray capacities across the windings cannot be balanced and therefore the two tuned circuits cannot be exactly matched. Constructors are advised not to use this type of transformer unless it is intended to fit an external trimmer across each winding. Another precaution which has to be taken when choosing superhet components is that the oscillator coil of the H.F. coil unit, gang condenser, and I.F. transformers are all designed for the same frequency. For example, if the I.F. transformers are designed to tune to 465 kilocycles the oscillator coil must also be designed for this frequency, and if a superhet condenser is used its oscillator section must be of the correct type for use in conjunction with the oscillator coil. It is not essential to use a superhet type gang condenser, however—many modern superhets employ a straight two or three-gang condenser. When a straight condenser is used the H.F. coil unit must be designed to work in conjunction with this type of condenser, unless additional padding condensers are added externally by the constructor to correct the law of the section of the gang condenser connected to the oscillator coil of the H.F. unit. All this may seem somewhat complicated to the beginner, but if a reliable

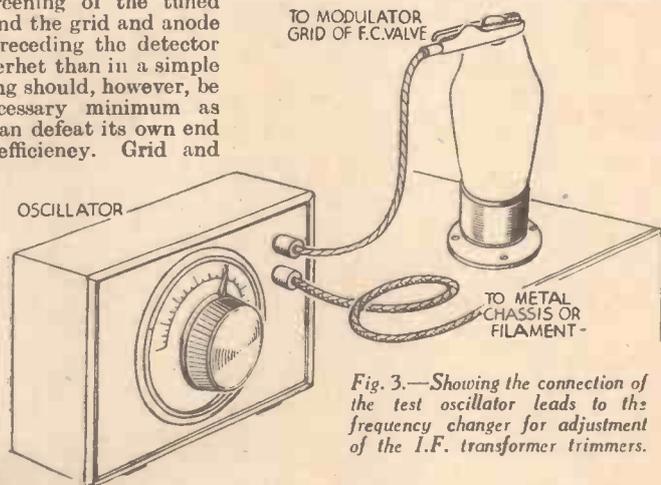


Fig. 3.—Showing the connection of the test oscillator leads to the frequency changer for adjustment of the I.F. transformer trimmers.

incorrect adjustment of the I.F. transformers will be indicated. When these are correctly adjusted the setting of the trimmer of the aerial section of the gang condenser should hold at both ends of the tuning scale. If an oscillator is available, it will only be necessary to tune it to the required intermediate frequency, connecting its output leads to modulator grid and filament or cathode, and then adjusting the I.F. transformer trimmers for maximum volume in the speaker.

Ideas for Amateur Transmitters

Methods of Making Chokes and Coils are Described in this Article

THERE is always more satisfaction to be derived from the finished job if one has been able not only to build it, but also to make components for oneself. The following suggestions may, therefore, be of interest to amateurs producing some of their apparatus for the first time. All these ideas have been shown by experience to be practicable, and will be found to give very satisfactory results.

R. F. Chokes

Transmitting R.F. chokes, effective from 12-100 metres, can be made up by putting three sections of 75 turns each on a lin. diameter former, with $\frac{1}{2}$ in. between sections. Using No. 30 enamelled wire—a $\frac{1}{2}$ lb. reel of which is always handy—the total length of former required for such a choke is 4 in., and the current-carrying capacity will be 120 mA. Ribbed ebonite rod is very suitable, and can be tapped 4BA at the ends to take terminals for finishing off and connecting up. Another good method of finishing is to tap in a valve-pin at one end, with a terminal at the other. The valve-pin can then be inserted into a valve-socket held in a small bracket on the transmitter panel. This makes changing chokes very convenient and provides a neat mounting.

Forming Windings Quickly

A tip which may be new to some people: Windings such as those for R.F. chokes, etc., can be put on very quickly by means of an ordinary breast-drill. The former is held in the chuck and the drill fixed horizontally in the vice. Unless the former is of small enough diameter itself to enter the chuck, a reducing device is necessary. This can be a screw fixed such that it is central with the axis of the former, $\frac{1}{2}$ in. or so being left projecting to go in the chuck.

Counting turns is simplicity itself. Find how many times the chuck revolves for one revolution of the drill handle, and divide this figure into the number of turns to be put on. This last figure gives the number of handle revolutions required, which can easily be counted as it is turned. One hand is used for working the drill and the other for running on the wire, the bobbin being mounted in some convenient fashion allowing it to turn easily.

Zinc for Aluminium

The increased metal prices have lately pushed up the cost of aluminium. Some people are finding zinc, about 1/10th the price, a satisfactory substitute. The only disadvantage is that it is softer than aluminium and therefore needs supporting. Stamped metal angle brackets are suitable and make a neat job.

For those who like to produce as much as possible of their gear for themselves, here is a method of making transmitting

inductances; not the copper tube type, which are simple enough, but the other kind where 12 or 14 SWG bare copper wire is used.

Decide on the diameter required in the finished coil, say, about $3\frac{1}{2}$ in., and on a former $\frac{1}{2}$ in. smaller (3 in. in this case), wind on tightly thick string or blind cord, so that the turns of cord lie closely together. The length of this winding along the

quired for a transmitting inductance necessitates very thick cord.

When the required number of turns have been put on, the second end should be secured by looping it back and tying it down to the former with string. Remember to leave enough for the mounting connections. We now have a former built up to a "false diameter" by means of the cord windings overlaid with paper, superimposed on which are the celluloid strips, over them again being the wire for the coil itself. Fig. 1 is a half-section showing this.

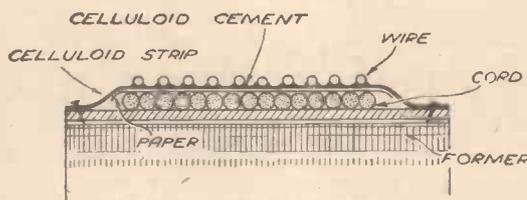


Fig. 1. Showing the method of building up the former.

former should be just a little more than the finished length of the inductance. Then, over the string, lay a few sheets of grease-proofed or waxed paper, fixed in position with strips of sticky paper. We now have a thickened tube on which to form the coil, the thickening being easily removable by pulling off the cord. The next step is to lay celluloid strip parallel to the length of the former, four strips being used an equal distance apart—at 90 degrees when looking at the ends of the former. These strips must be fastened temporarily by screws or tacks to keep them in position.

Method of Winding

After this, the wire can be wound on. The best way to do it is to calculate approximately the length required (multiply the diameter of the coil in inches by number of turns by 3.2, and divide the result by 12, giving the answer in feet of wire), and then get somewhere so that this length can be stretched out. Then, fixing one end of the wire to a hook, pull it tight to get the kinks out. Running the handle of a screw-driver, or something similar, along it will not only help in doing this, but the wire can be polished at the same time.

Having thus stretched out the necessary length of wire, one end of which is fastened, the other end should be temporarily fixed to the former, and the winding can be commenced. Hold the former in both hands, and turn it towards you, keeping the wire tight as you walk towards the end fixed to the wall. Spacing of the turns can be judged by eye, since by turning the former anti-clockwise, as mentioned above, the winding is in view all the time.

Another method of spacing the turns is to interleave the wire with thick cord, but in the writer's experience this is not only very awkward if the turns are to be kept tight, but introduces a practical difficulty in that the spacing usually re-

Fixing the Celluloid Strips

The next step is to fix the wire to the celluloid strips. This is done by making a thick paste of celluloid scrapings rendered down with amyl acetate, obtainable at any chemist's. When buying the amyl acetate, have a proportion of acetone added. This will cost about 6d. altogether for a 2oz. bottle.

Apply the paste with a small brush, paying particular attention to the end turns, and applying it liberally along the whole length of each of the four strips, so that the wire will be locked in position when the cement is dry. Drying takes about 24 hours, and the coil will not be ready for taking off the former till the cement is absolutely hard.

To get the coil off, unfasten the ends of the celluloid strip from the former and then pull off the string from under the paper. This leaves the coil, with the paper sticking to the celluloid in places, free to come off. Tear out the paper, cutting it away with a sharp knife where necessary, and you have your coil, the turns of which are evenly spaced and solidly fixed to the celluloid strips. The final process is to trim off the ends of the strips, close to the end turns, form the mounting loops for attaching the coil to its stand-off insulators, and, if you like, go over the coil with a clear lacquer. Your coil will be a sound job from the R.F. point of view, with the number of turns, spacing, etc., just as you require. The writer has made up by this method 30-turn coils $4\frac{1}{2}$ ins. diameter which are satisfactory in every way.

LATHE WORK FOR AMATEURS

By F. J. CAMM

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On Your Wavelength

By **THE RMION**

Are You a Member of a Wireless Club?

I AM endeavouring to compile a small directory of Wireless Clubs, and although I have managed to collect the names of a good many of them, I have been unable to locate the addresses of the present secretaries. If you are a member of a wireless club would you please send me a postcard giving the name of your club, its address, and the names and addresses of the officials? When any change either of name or officers takes place I should be additionally grateful if you would apprise me of it. I propose to publish this directory when it is complete, and in view of this request I hope none of you will kick me if I omit a particular club. You will know that you have had the opportunity of giving me the information, and that its omission from my list is due to your remissness. So there!

Incidentally, why is it that so many clubs are content to hide their light beneath a bushel? There are not so many clubs in this country that they cannot regularly send in their reports. Is it that their meetings are few and far between, or that they do not discuss anything worth mentioning? Since my recent notes on this subject several new clubs have been formed, and I suggest the time is ripe to consider some parent organisation to which they should affiliate. Perhaps this would do good work in keeping the clubs together, arranging lectures, annual meetings, and an annual dinner in some centrally-disposed spot where all could attend, Oak trees from little acorns grow, and maybe such an organisation would revive interest in club life. I find that so many of them fizzle out after the glamour of the first few meetings, sheerly because those behind their formation lack organising

ability. You cannot run a club for very long without funds. If there is not a club in your district there ought to be, and you should do something about forming one. There are nearly 17,000 cycling clubs in this country, and less than 100 wireless clubs. As there must be more homes with wireless sets than with bicycles, something must be wrong. Do you know that there are more gramophone clubs than wireless clubs, and that they regularly hold meetings to listen to the latest gramophone records? Any assistance which this journal can render in supporting local clubs will be cheerfully undertaken.

The Coronation

HAVE you reflected on the fact that this is the first Coronation since the inception of broadcasting? That being so we shall expect the B.B.C. to rise to the occasion, and, no doubt, they will do so. As it is a time of national rejoicing, it is worth while spending a few hundreds of pounds in getting the very best broadcast material. I hope that the programmes will not duplicate a lot of the work of the daily newspapers, who will be giving us histories of Coronations, incidents in previous Coronations, histories of the Kings of England, and so on. We shall know all that by the time that the Coronation is here, so what about some first-class variety? How about a programme comprised by the Kings of Jazz, the Kings of the Piano, the Kings of Dancing, the Kings of Wisecracks, the Kings of Crooning, and so on, ending up with an official Coronation of each, with the exception of the latter, where I suggest that a mock execution should take place, symbolic of a national exorcism. There's an idea for the B.B.C. which lends itself to expansion.

Is Home Construction Alive?

A DEALER put this question to me the other day and answered

it himself by stating that he did not sell one-tenth of the components that he formerly did. He therefore drew the conclusion that the public were not building sets. I countered his question by asking him whether the dealer was alive (of course, in a business sense), and also answered my own question by suggesting that he wasn't. You do not walk into a boot shop to buy a packet of cigarettes, and this dealer has his window full of bicycles, wireless sets, and other side lines. He therefore is driving his customers away. I asked him whether he had ever staged a window display of, say, a PRACTICAL AND AMATEUR WIRELESS receiver, showing the complete receiver, and the blueprint and components from which it was made. He said he hadn't. In other words, when the demand was enormous goods sold themselves, and providing that he had them in stock he was bound to make easy money. As soon as the demand dropped off he did nothing to revive interest, and hence constructors were compelled to purchase direct from the maker instead of locally. I know that as many sets are being built to-day as ever before, but constructors are naturally more discriminating, and have by them a number of components which they can incorporate without making fresh purchases.

The average wireless dealer is pretty dead, and lacks enterprise. As soon as trade is bad he throws up his arms in despair and does nothing. The circulation of this journal alone is adequate evidence of the continued interest in home construction.

Inverted Reasoning

I DO not wish at this stage to say anything about crooning, but it is very interesting to note the way the mind of the B.B.C. works. We all know that they intend to give us what they think we should like, and the latest edict shows how the great machine works. It is officially stated that only one listener out of three dislikes crooning, so henceforth the

B.B.C. will give us only one crooner in three tunes. Surely, if the B.B.C. is guided by the public taste, they should have made the rule two crooners in three, as on their own showing two out of every three listeners prefer the vocal refrain. Perhaps, from this verdict, the best way for us to obtain an improvement in Music Hall is to write and express our appreciation of the Foundations of Music!

Dud Components

IT is not very often that really defective parts are sent out by manufacturers in these days, but it behoves every constructor worthy of the name to test every part before building a set. This is not a waste of time, but will very often save a lot of wasted time later on when a receiver fails to give satisfaction. I had an interesting example of this the other day, when someone I know had built a very elaborate time base for television purposes. Everything had been wired up, and this included an apparently endless number of resistors and condensers. When tested our results were not what they should have been, and, consequently, elaborate tests and measurements had to be made. It was finally discovered that a fixed condenser, which played a most important part, was internally disconnected. The preliminary tests which had been carried out had only been for short-circuits and had failed to disclose the open-circuited condenser.

Radio Interference

AT last it seems as though some really definite steps can be taken to cut out interference with radio programmes. I refer to the interference which is caused by electrical machinery, of the domestic type, tram and trolley buses, and so on. In certain countries it has already been made illegal to use any electrical apparatus without interference-suppressing equipment, and in this country it is stated that it has not hitherto been possible to introduce such legislation owing to the difficulty of defining interference. The British Standards Institution has now published a specification of apparatus for the measurement of the effects produced by electrical apparatus, and this will enable the Government to draw up the necessary regulations, which will end the trouble.

Radio Societies

HERE is a further list of Radio Societies to add to that which I gave in our issue dated January 23rd:



Notes from the Best Bench

Barretter or Resistance?

IN A.C./D.C. receivers, it is customary to connect the valve heaters in series, with one end of the line connected direct to one of the mains leads and the other end via a current limiting component to the other mains lead. As the value of the current required by the valve heaters is critical, the current limiting component must be carefully chosen. A special resistance lamp known as a barretter, or an ordinary power resistance may be used. The barretter possesses the unusual property of passing a practically steady current with wide variations of voltage. For example, the mains voltage may be varied between 210 and 250 volts without materially affecting the current passing through the barretter. The barretter is, therefore, a very suitable current limiting device for an A.C./D.C. receiver. When the ordinary type of power resistance is used, great care must be taken to connect the mains lead to the correct tapping on the resistance otherwise excessive current may be passed through the valve heater circuit. If the mains voltage is 240 volts, the mains lead must be connected to the 240-volt tapping—connection to the 210-volt tapping would damage the valves. This disadvantage of the power resistance as compared with the barretter is, however, probably counterbalanced by the greater robustness of the former.

Ultra Short-wave Reception

SINCE the inauguration of the television transmissions from Alexandra Palace, several readers have written to ask us whether they can convert their existing short-wave receivers for reception of the 7-metre band. A definite answer cannot be given to this query as the efficiency of a receiver on the ultra short-wave bands is governed to a great extent by the components used and the design and layout of the receiver. Some short-wave receivers designed for reception between 13 and 80 metres, approximately, using plug-in coils, work quite satisfactorily on the 7-metre band, provided, of course, that the new coil used is correctly wound. Lack of results on the 7-metre band in receivers of this type is generally due to the use of excessively long connecting leads in the tuned circuit and to a lesser extent to the use of high loss valveholders and bases. The tuning condenser should be placed as near as possible to the tuning coil in order to keep the connecting leads short, and the valves used in the H.F. and detector stages must be of reliable type, having low loss bases, and the valveholders should also be of the low loss type.

Battersea and District Radio Society. S. F. Harris
93, Balcott Road, Battersea, S.W.11.
Bec Radio Society, 9, Westway, Grand Drive, Raynes Park.
Bournville Radio Society. C. L. Bastock, c/o Messrs. Cadbury Bros., Bournville.
Chadwell Heath and District Radio Society.
Croydon Wireless and Physical Society. H. J. P. Gee, c/o Messrs. Gee & Co., Staple House, Chancery Lane, W.C.1.
Kentish Town and District Radio Society, 46, Lady Margaret Road, Kentish Town, N.W.5.
Kew Ministry of Labour Radio Society, Ministry of Labour, Ruskin Avenue, Kew.
New Eltham Ratepayers Association (Radio Section). E. Lawton, 10, Dalton Avenue, Thatch Leach Lane, Whitefield.
Lambda Radio Society, 4, Howley Street, York Road, S.E.1.
Swansea Radio Society.
Waldron Radio Society. W. E. Simmons, 35, Tranmere Road, Earsfield, S.W.18.
West London Radio Society. D. Reid, 15, Tring Avenue, Ealing Common, W.5.

Demonstrations

G. S., of Oglinton Lane, asks me to excuse him for writing to me instead of to the Boss. Although he thinks that the Vitesse All-waver is the best circuit he has ever seen, he thinks it rather rough to expect people to build a set without first hearing it. He thinks that hundreds of readers would go to a little expense to hear a demonstration. So what? The British Isles looks small on the map, but it is a large place, and however you arranged demonstrations you would find that the times would not coincide with the periods of leisure of all readers. It would be an impossible task. It was because of this that every PRACTICAL AND AMATEUR WIRELESS set is guaranteed.

A Historical Exhibit

THE firm of Selfridges has long been associated with the development of television, for it was Mr. Selfridge himself who gave J. L. Baird his first opportunity of demonstrating when the inventor's finances were at a rather low ebb. This was in 1925, and for two weeks, with rather crude apparatus, outlines and shadowgraphs were shown for the first time to astonished visitors. It is fitting, therefore, that during the Store's twenty-eighth birthday-week celebrations a historical television exhibit should be organised and displayed in the radio department. The original Baird shadowgraph transmitter and receiver was loaned by the Science Museum authorities, and in addition could be traced receiver development from the Royal Institution disc set, through the commercial disc and mirror drum receivers, to the modern high-definition cathode-ray tube receiver. Various component parts, records, photographs, books and other apparatus, suitably described by showcards, were also included, so that the visitor could trace with interest the development of the science from its first crude beginnings to the present-day B.B.C. service.

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CLEAN AND SMOOTH TO THE PALATE

Practical Television

March 27, 1937, Vol. 3. No. 43.

Big Screens Again

THE regular entertainment of cinema audiences by big screen television was brought a stage nearer by the introduction of the Baird Super Screen equipment into the normal daily performances at the Dominion Theatre, London. The multi-mesh scanning which is employed with this apparatus is designed to eliminate flicker, and yet the number of complete picture portrayals per second is only 16½. A careful investigation of the principles involved has made it possible for one central studio to feed simultaneously a number of theatres in which receiving screens have been installed, the link between transmitter and receiver being either radio or line as circumstances permit. Baird Television, Ltd., are undoubtedly the first in the field with a picture large enough and sufficiently bright and clear to be seen by every member of a large audience in an up-to-date theatre. The only other company which is interested in big screen work, state that they hope to demonstrate the results of their work this year, but what form this will take is, as yet, an unknown quantity. If the Dominion experiment is a success it seems certain that many other London cinemas will be anxious to join in until some form of complete television circuit is established.

In Italy

THE first serious television experiments undertaken in Italy were started by purchasing both transmitting and receiving equipment from Fernseh A.G. of Berlin. This was on a standard of 90-line definition, both spotlight and telecine scanners being employed, while discs with a spiral trace of apertures were used as the scanning media at both ends. By using a new type of light source and a good quality optical system the pictures obtained were outstandingly good. This early work inspired the Italians to make further effort, and on the transmitting side it is now known that cameras working on a somewhat similar principle to the Iconoscope are being used. All the receivers now use cathode-ray tubes as the picture reproducer, and one of the most prominent and efficient of these is marketed under the name of Safar. The picture standard is 375 lines interlaced to give 50 frames and 25 pictures per second. The tube is mounted vertically so that the pictures are viewed as reflections in an inclined mirror, while it is claimed that the controls are extremely simple to handle. Radio receiver practice has been followed by allowing one knob to perform multiple functions, but by combining the sound and vision sets into one superheterodyne receiver the total number of valves has been reduced to fifteen.

News from Leeds

THE Leeds Post Office announced recently that new underground telephone cables are to be laid between Leeds and Manchester, Leeds and Hull, Leeds and Middlesbrough, and Leeds and Newcastle among other extensions, and that

in these developments regard is being paid to the requirements of television. One official stated that the new cables in the North, linking Leeds with both Manchester and Newcastle, were intended primarily to meet normal telephone developments, but at the same time cables have been designed with a view to their being used for television—for which a special type of cable is required.

Single Standard Repercussions

THE adoption of a single picture standard for the B.B.C. television transmissions has had some very immediate repercussions. Most important from the viewers' standpoint is the big reduction in the price of television receivers, the cheapest being the Baird instrument now listed at 55 guineas. When it is considered that the number of valves employed in each set varies from 20 to 24, while every commercial receiver incorporates an expensive cathode-ray tube, the prices now ruling are not out of proportion to those asked for good quality radio sets. Each firm claims that the demand for receivers has shown a marked increase, and if this condition is maintained production costs can be brought to a more economic level. Yet another point to be considered as a result of the single standard is the increased studio space now made available to the programme staff. This will manifest itself in brighter and better rehearsed programmes, while the promise of extended hours of transmission should soon materialise. No doubt a further hour in the evening will be provided, together with regular "floating periods" to meet the convenience of certain important artists or personalities who are not available dur-

ing the stated daily periods. Another helpful gesture towards popularising the television service would be Sunday programmes and the assurance that any proposed ban on televising sections of the Coronation would be lifted. Now that the Duke of Norfolk, the Earl Marshal, has returned to town this last named item will receive final official consideration.

Television Enthusiasm at B.I.F.

IF the crowds which daily surrounded the Baird stand at the B.I.F. were any criterion of the enthusiasm of trade buyers, then the future can be looked to with confidence. The assistants were kept busy answering all manner of technical and commercial questions, while the equipment and photographs displayed were examined closely. From 3 to 4 p.m., the Alexandra Palace transmissions were received by radio and shown on a standard receiver, the aerial being positioned on the roof of the National Hall, while a screened flexible feeder linked this with the set itself. Appointments were made in a visitors' book, and the name of nearly every country in the world was included. It was unfortunate that the only Saturday afternoon programme when the public were admitted did not materialise owing to an obscure technical fault at the transmitting end. While endeavouring to get this rectified, the engineers radiated a black cross on a white background, while gramophone records were being played on the sound wavelength. Announcements were made every few minutes, but at 3.45 p.m. it was stated that the transmission would have to be abandoned, much to the chagrin of hundreds of would-be viewers. No statement was made by the engineering department at the Alexandra Palace as to the cause of the breakdown, although it was hinted that the fault was associated with studio lighting. No camera picture was radiated at all, for the usual form of black cross is obtained from the synchronising pulse generator and the camera mosaic is not brought into action. Luckily the fault was corrected before six o'clock, an announcement being made in the ordinary broadcast news bulletin that the evening programme would take place as usual.



In this illustration, Sir Kingsley Wood, the Minister of Health, is seen being televised from the Alexandra Palace. With Professor John Hilton he dealt with the subject of Food and Health in a debate.

A PAGE OF PRACTICAL HINTS

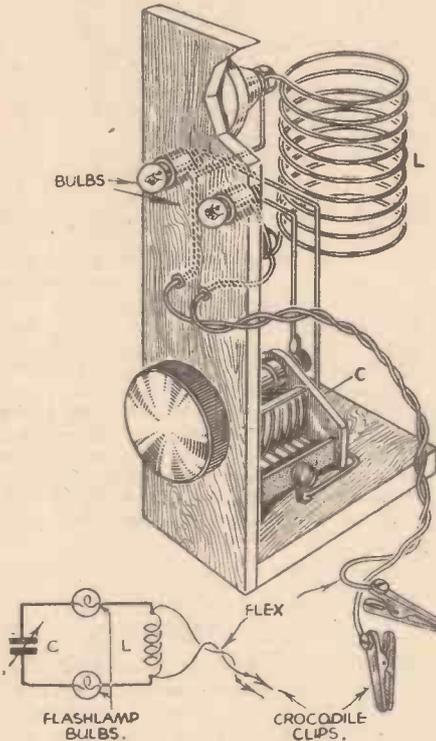
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

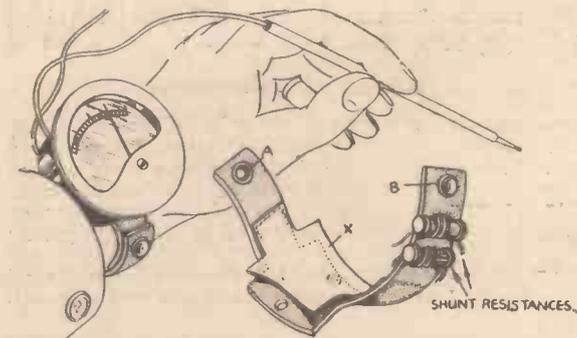
Artificial Aerial for a Transmitter

THE amateur who breaks into the transmitting side of radio often begins with a single valve—mostly a two-volt power



Theoretical circuit diagram, and pictorial view, of a compact artificial aerial unit for a small transmitter.

valve and wanting a greater output tries two valves in push-pull. Then he finds trouble in coupling his single-ended artificial aerial. The arrangement shown in the accompanying sketch will facilitate matters. For 40m. C can be .0003 mfd., L—nine turns of heavy copper 3in. diameter, and the two bulbs, ordinary flash lamp bulbs. For an input of two watts 2.5v. bulbs will do. The crocodile clips are connected to



A novel accessory for use when making exhaustive receiver tests.

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.

the tank coil of the transmitter at same distance from the centre tap.—R. H. JOHNS (Bayton, Kidderminster).

A Useful Accessory for the Tester

THE accompanying drawing shows a method which I have found useful in making exhaustive receiver tests, and as will be seen it constitutes first a shaped piece of leather strapping with provision made—by the aid of elastic—for the inclusion of shunt resistances when requiring different meter scale readings, as shown.

The mode of assembly is as follows:—

(1) Fix meter on to strap by inserting terminal shanks through holes provided, and replace nuts, screwing down tightly to prevent shaking through looseness. A wrist protection piece "X" is constructed out of thinner leather and stitched to the strap.

(2) Place on wrist and clip into position by "glove" type clips A, B.

Prior to this procedure, of course, is the circuit arrangement to be used, and since various meters will be employed, no circuit wiring is shown. However, in the event of a small 1½ volt cell being used, this cell may be included on the strap and connected in the normal manner.—A. J. M. BARKER (Stoke-on-Trent).

A Station Indicating Dial

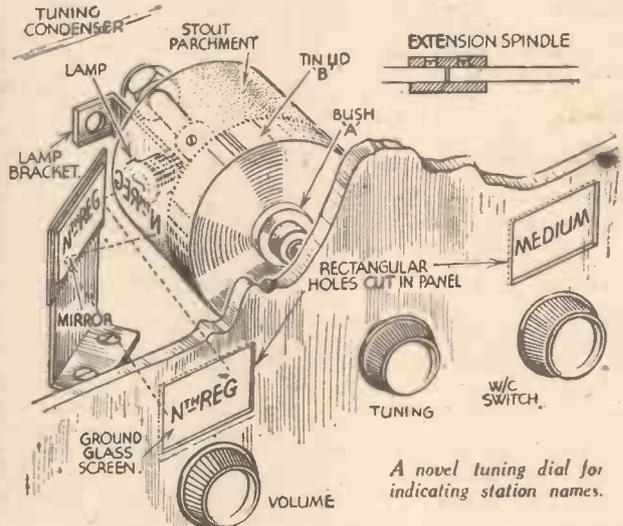
THE accompanying sketches illustrate a novel tuning dial which can easily be made up by the home constructor. An extension spindle is attached to the tuning condenser, and a large tin lid (B) is securely fastened to it with a bush (A). Around the

edge of the lid is gummed a strip of celluloid or stout parchment, and from the frame of the condenser a brass strip projects into the drum thus formed, and carries at its end a pilot lamp.

Two rectangular holes are next cut in the panel, one on either side of the tuning control and a piece of ground glass is set into each aperture.

The station names are next printed on the celluloid or parchment with Indian ink, or black enamel, and a mirror is arranged at 45° to the panel, so that the names, as projected by the lamp are thrown on to the ground glass screen.

For the wave-change all that is required is a disc of celluloid fastened to the wave-change switch spindle and bearing the words MEDIUM, LONG, GRAM, and OFF (if the switch is a 4-position one) with a similar pilot lamp behind it.—JAMES R. BRANNIGAN (Swinton, Lanes).



A novel tuning dial for indicating station names.

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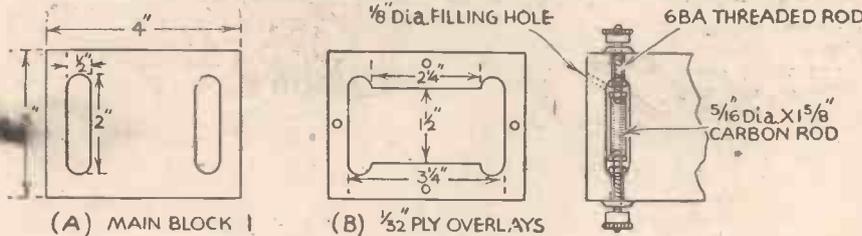
A Simple Microphone

The Construction of an Easily-made Transverse Current Instrument is Described in this Article.

READERS of PRACTICAL AND AMATEUR WIRELESS are, no doubt, acquainted with the transverse current microphone and its capabilities. A development of this type, designed to effect certain improvements, is described below. In order to obtain a greater output, and a wider range of effective audibility, this microphone is double sided, thus permitting a larger number of persons to use it simultaneously without having to group closely together. The advantage of this will be apparent to all readers who have experimented in the home broadcasting of plays. It has also been found that this microphone seems to be sensitive to a slightly wider range of frequencies.

Constructional Details

A piece of mahogany or other hard, close-grained wood 4in. long by 3in. wide and



Figs. 1, 2 and 3.—Details of construction.

1/2 in. thick, is used as the central block. In this two apertures are cut, 2in. long and 1/2 in. wide. (See Fig. 1.) This may be easily done by boring three holes with a 1/8 in. drill, and using a sharp chisel or fretsaw to finish off. Two overlay panels of 1/32 in. thick plywood are made to the same external dimensions, and are cut as shown in Fig. 2. These when placed in position form the shallow troughs for the carbon granules. Before gluing these panels in position, both sides of the main block are sand-papered to ensure absolute smoothness. Next the diaphragm panels are cut to the dimensions shown in Fig. 4. These are of ordinary 1/8 in. ply. Similarly the outer panels, also of 1/8 in. ply, are cut to the same dimensions as above, and on the inner side of each a counter-sinking the depth of one ply, and a width of approximately 1/4 in. is made round the apertures, to receive the gauze (Fig. 5).

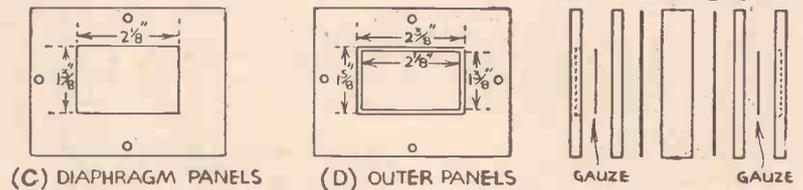
Drilling is now commenced; the holes are spaced on the panels for wood screws, which must not be longer than 1/2 in. In order to make sure that when tightened the screws do not twist the diaphragm panels the holes through the latter are slightly enlarged, and a trial assembly of all the panels is made. After dismantling, the mica diaphragms are glued on to their panels, care being taken that they do not twist or crinkle; these are then left for several hours to set. The diaphragms (3 1/2 in. long and 2 1/2 in. wide) are intended

to cover the whole area of the two apertures, as well as the carbon troughs, in order to prevent any leakage of the granules. Next the two carbon rods 1 1/2 in. long and 5/16 in. diameter (obtainable from a used "Super Power" high tension battery) are drilled lengthwise to a depth of 1/2 in. at each end, using a 1/8 in. drill. With the same size bit, four holes are also bored from the top and bottom of the block to each end of the apertures (Fig. 3). Also with the same drill a filling hole is bored at each side (Fig. 3). The carbon rods are mounted in position, as shown, by inserting the lengths of 6B.A. screwed rod and locking with washers and nuts.

Packing the Granules

Finally, the diaphragms and outer panels are placed in position and screwed tight. If desired the complete assembly can now be

varnished. When the varnish has dried, the carbon granules are poured in through the filling holes, in small quantities, while the microphone is gently tapped and shaken to ensure even packing. When full the holes are stopped by small corks cut to a convenient size. It is necessary to avoid packing too tightly. Half an ounce of fine granules should suffice.

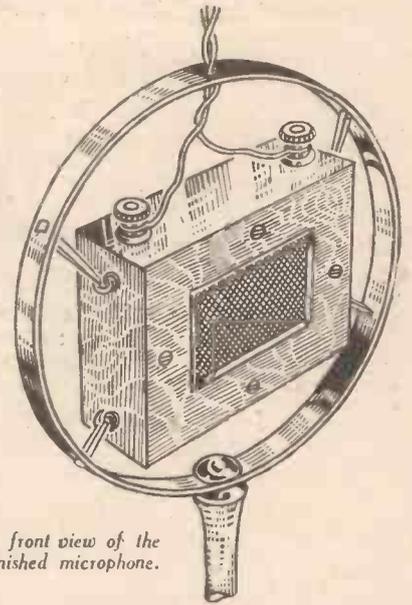


Figs. 4, 5 and 6.—Dimensions of panels and assembly arrangement.

The consumption of the microphone will be from 20 to 25mA at 10 volts. Voltages of 25 to 30 volts have been tried but the

LIST OF COMPONENTS

- Mahogany block (4in. x 3in. x 1/2 in.)
- 1/32 in. ply-wood.
- 1/8 in. " "
- 1/2 oz. of fine carbon granules.
- 2 1/2 in. x 3 1/2 in. x .001 in. mica diaphragms.



A front view of the finished microphone.

results were not commensurate with the consumption.

The transformer to be used should have a ratio of approximately thirty to one. It may be constructed by re-winding the burnt-out primary of an old transformer with a suitable gauge wire; that is, of course, a larger diameter wire than that of the secondary windings.

The lead from the microphone to the transformer should be made as short as possible. The lead from the transformer to the set may be of any reasonable length, at least up to 50ft., and for this purpose a screened lead should be used, the outer screening being earthed at the set.

ELIMINATING CABINET RESONANCE

CABINET resonance is particularly annoying to the constructor, as it can very seriously mar an otherwise excellently-designed receiver, and since the trouble is inherent to the cabinet, the following simple arrangement will minimise, or will often overcome cabinet resonance completely.

The loudspeaker should be removed from the baffle board, and should be refixed with very soft rubber washers slipped over the screws, so that the chassis of the speaker

is spaced from the baffle by about 1/4 in. If no soft rubber can be procured, rubber (not fibre) tap washers can be made to serve. Care should be taken when refixing to drill new holes in the baffle if fixing is by means of wood screws, or to use slightly longer screws.

In order that the sacrifice of bass be reduced to a minimum, a ring of soft felt should be made to fit tightly round the speaker chassis, and placed tight against the baffle, to fill up as much as possible the gap caused by the rubber washers.



SHORT WAVE SECTION

SHORT-WAVE SUGGESTIONS

Hints and Tips for the Newcomer to Short-wave Reception, with Some Common Faults Explained - - - By W. J. DELANEY

ALTHOUGH we have explained many of the troubles of short-wave reception, there are still many snags which are met by the newcomer and which are difficult to overcome. This is particularly the case where an amateur has endeavoured to construct a short-wave set from brief details or without any guide from an experienced constructor. It is also a common difficulty met with by those who endeavour to design an all-wave receiver for the first time. One of the greatest difficulties appears to be the effectiveness of the reaction control. This is often found to function quite well on

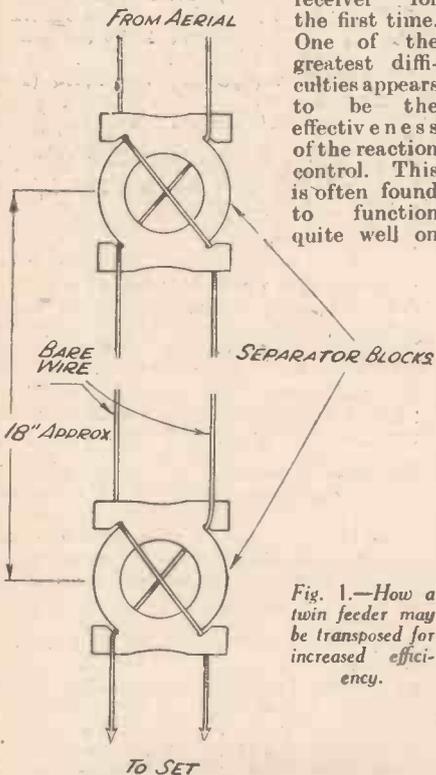


Fig. 1.—How a twin feeder may be transposed for increased efficiency.

the broadcast sections of an all-waver, but fails to function on the short waves. Alternatively, it may be found that it will function on certain short-wave bands but not on others. If the coil or coils in use are of well-known make this trouble can only be due to an incorrect operating condition, and this may be brought about by inadequate high-tension, a defective H.F. choke, or wrong values of grid condenser and grid leak.

H.F. Chokes

The H.F. choke is an important item, and when purchasing this component care should be taken to choose one which is

designed to operate on the lowest wavelength it is designed to work upon. Certain chokes are known as short-wave components, but are not intended for use below 20 metres, and therefore, if it is desired to operate below that wavelength the expedient of connecting an ultra-short-wave choke in series should be adopted. This choke should be joined direct to the anode terminal of the detector valveholder, and the ordinary short-wave choke should be on the H.T. side of this. To assist in obtaining the best H.T. voltage, a separate H.T. lead should be provided for this stage. With an all-wave coil or tuner, it may be found that the reaction winding on the short-waves necessitates a higher H.T. voltage for satisfactory working than is required for the broadcast sections, although

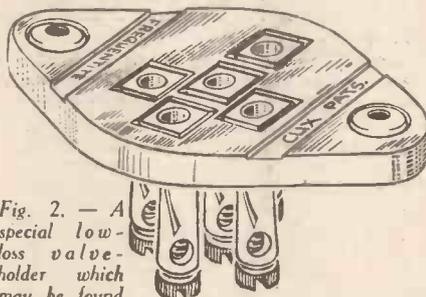


Fig. 2.—A special low-loss valve holder which may be found of great value in improving the performance of a short-wave set.

in a well-made commercial component this factor will not arise. The only satisfactory way of overcoming a difficulty of this nature is to add a turn or two to the reaction winding which is found ineffective.

Insulation

The question of insulation should not normally arise, although it may be found that leakage from an H.F. point of view is sufficiently serious to result in loss of signal strength. The modern short-wave component is designed to provide the best insulation obtainable, and ceramic insulation is now commonly employed. Where old type components are in use, and ordinary ebonite is employed, it may be found that a considerable improvement will be obtained if the ebonite is removed and good paxolin used in its place. Ebonite which has been in use for some years is often found to deteriorate, although much will depend upon the conditions under which it has been used and the light to which it has been exposed. Where it is not possible to make such a replacement, the component itself should be changed for one of the more modern components the efficiency of which is above suspicion.

Hand-Capacity

Much of the troubles of hand-capacity or body-capacity effects are due to wrong design or construction, and it is essential that all those parts which come into contact with the hand or body should be tied down to earth. This means that the variable condenser, for instance, should be wired so that the moving vanes (and, incidentally, the spindle) is joined to the

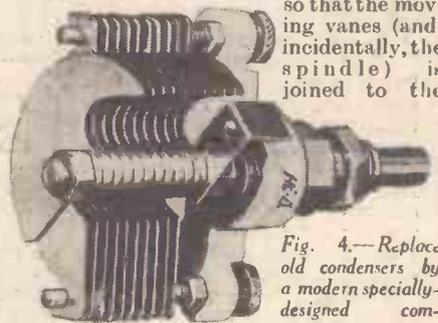


Fig. 4.—Replace old condensers by a modern specially-designed component.

earth side of the tuning circuit, or connected to the chassis where this form of construction is adopted. If headphones are to be worn, they should be isolated by placing H.F. chokes in the leads, and a by-pass condenser fitted. The reaction condenser should also be placed on the earth side of the reaction winding, but where this is not possible, due to the design of the coil, (Continued overleaf)

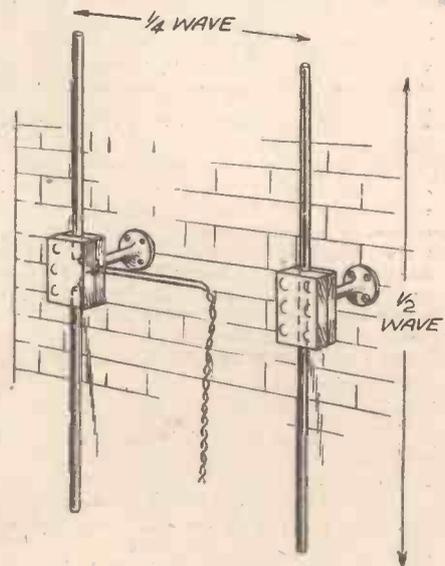


Fig. 3.—A reflector for use with a dipole aerial, with special reference to the television signals. The reflector is on the right, and the transmitter on the left in this diagram.

SHORT-WAVE SECTION

(Continued from previous page)

the moving vanes should be earthed as in the case of the tuning condenser.

Aerial Schemes

The aerial is of much more importance than the earth on many receivers, and it is, in fact, often found that an earth can be dispensed with for short-wave reception. At least one modern commercial receiver is advertised as working better on short-waves without an earth. The aerial must, however, be effectively erected, and insulation is of great importance. Use good insulators, preferably those with a long leakage path, and keep the ends of the aerial and also the leading-in cable well clear of the walls or other earthed bodies. A dipole may be found desirable, but it must be remembered that this is productive of best results on a wavelength equal to twice the length of the aerial. It does not, however, operate only on that wavelength. At multiples or harmonics it also

gives improved results over a single wire, and it may be used for "all-wave" circuits, by shorting the twin feeders used to connect it to the receiver. The type of feeder to

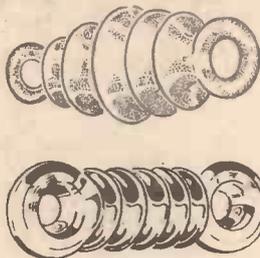


Fig. 5.—Use insulators with a long leakage path such as those shown here.

adopt will depend upon the wavelength, the design of the aerial circuit, and the receiver which is being used, and although to some amateurs there appears to be no practical difference between a transposed

or crossed feeder and two parallel wires, there will be found to be a considerable difference if careful tests are carried out. For trial tests with a transposed feeder, strips of ebonite or celluloid rod (knitting-needles) may be used, and the distance separating the strips may be varied. It has already been mentioned that for the television signals the aerial should be vertical for maximum results, and for those who are situated outside the recognised area of the transmissions, and who wish to experiment on that wavelength, reflectors may be tried out. These consist of a second dipole erected behind the receiving aerial. That is to say, the aerial should be in a straight line between the reflector and transmitting aerial. There are various methods of erecting this reflector device, which is illustrated in Fig. 3. If the exact direction is not known, or there are any local conditions which result in a deflection of the wave, the aerial and reflector system may be temporarily erected in such a manner that they can be rotated and the best position thus found by trial.

Proposed Short-wave Stations

ALTHOUGH for some considerable time the Danes have relayed the Copenhagen programmes through one of the Skamlebaek commercial transmitters, in order to make them more accessible to their nationals resident in various districts of North America, a 5-kilowatt station is being constructed for this special purpose. It is hoped to get the plant ready for work by the end of this summer.

Turkey, also, in addition to the installation of two new long-wave transmitters, is planning the erection of a 12-kilowatt station to be used for short waves only. Such a power would make the Istanbul radio entertainments available to many listeners in the British Isles and Western Europe.

In its turn the Indian government has placed a contract with a Dutch firm for the supply and installation of four 10-kilowatt short-wave transmitters for the All-India Radio organisation. The stations will work on channels between 30 and 90 metres. In the near future, therefore, the Indian Broadcasting system will operate five medium-wave and four short-wave stations without counting several local relays.

B.B.C.'s Coronation All-World Broadcasts

Every effort is to be made by the engineers to get the three new 50-kW short-wave Empire stations ready in time for the Coronation festivities in May. In all, 24 aerials will be erected to radiate the broadcasts to all parts of the Dominions and Colonies overseas. As the three 10-kilowatt transmitters now in operation are to be retained, where necessity arises it will be possible to carry out six broadcasts simultaneously.

Huizen's New Programme Schedule

Broadcasts from the Dutch short-wave station at Huizen have been completely retimed and are now as follows:—

On Sundays, PHI on 16.88 m. (17.775 mc/s) transmits a programme from G.M.T. 12.00-13.00, destined to listeners in China, Indo-China, Japan and the greater part of Asia; from 13.00-15.00, in particular, to India and from 19.00-20.00 for Africa. On Mondays, Tuesdays, Thursdays and Fridays, PHI is again on the air from G.M.T.

Leaves from a Short-wave Log

13.00-14.30 with an extended broadcast on Saturdays to 15.00.

On 19.71 m. (15.22 mc/s) PCJ, Huizen, carries out experimental transmissions every Tuesday from G.M.T. 09.30-11.00, and on the following day from G.M.T. 13.00-16.00; on 31.28 m. (9.59 mc/s) this station may also be heard every Monday from midnight until 01.00 with a special programme for South America, and on Thursdays from midnight to 03.00. Identification of the transmissions is always facilitated by the fact that the announcer gives the call and details of programmes in several European and Oriental languages.

Civil War News Bulletins on Short Waves

From San Sebastian daily you may pick up the call: *Aquí Radio Requete de Guipozcoa al servicio del España y por España*, with a slogan given in Spanish and French: *In Spain the day breaks and the sun is shining*. This station, voicing the political opinions of the Nationalists or Insurgents, works on 41.65 (7.20 mc/s) at G.M.T. 13.15 and again at 18.45. During broadcasts the official songs of the Foreign Legion are played, as well as the *Pelayos* March and the hymn of the Traditionalists. The transmission usually concludes with the Spanish Royal National Anthem and the French Monarchist patriotic song. Before the French version of the war news bulletin the *Marche Lorraine* is regularly played.

Another transmission on 41.20 m. (7.280 kc/s) appears to come direct from the fighting line, inasmuch as the call states that the station is *instalado en el frente de Madrid* (installed on the Madrid front). Mention is frequently made of the *glorioso Generalissimo Franco* thus proving that the broadcast originates in the Insurgent trenches.

On 42.6 m. (7.048 mc/s) giving the call-

letters FEI, an Insurgent station carries out regular broadcasts from Valladolid. Bulletins are transmitted in various languages, namely, at G.M.T. 02.00 (Spanish and Portuguese); 12.00 and 17.00 (Spanish); 17.45 (Portuguese); 18.15 (French); 18.30 (English); 20.00 (Italian); 20.30 (German); 21.15 (Russian, Magyar, Greek); 23.00 (Spanish), and 23.45 (Portuguese). Unless a note is made of these times and broadcasts, the

diversity of the languages is rather inclined to puzzle the listener, and to mislead him into believing that he has tuned in a totally different station.

Radio Tunis

On 49.12 m. (6.107 mc/s) broadcasts are easily picked up daily from the private experimental short-wave station which the authorities are temporarily working at Tunis (North Africa) pending the installation of a medium-wave transmitter. The times are: G.M.T. 13.20-14.00 and 21.00-22.00. Announcements are in French and the interval signal: one stroke on a gong.

Radio Podebrady

The Czechoslovak broadcasting organisation is still carrying out its tests of the relay of the Prague programmes through the Podebrady-Prague short-wave transmitter, and different channels are being tried out. The wavelengths mostly used at present are: OLR2A, 25.34 m. (11.84 mc/s) every afternoon between G.M.T. 14.00-17.00; OLR3A, 31.41 m. (9.55 mc/s) on Tuesdays and Fridays from G.M.T. 01.00-04.00; OLR2, 49.75 m. (6.03 mc/s) which provides news bulletins in English at G.M.T. 21.15 and 49.92 m. (6.01 mc/s) which is sometimes brought into action in the later hours of the evening. The call given by a woman announcer is *Radio Podebrady, the Czechoslovak broadcasting station at Praha*, and the broadcasts open with a short excerpt from Dvorák's *New World Symphony*. When closing down a carillon of bells is heard, followed by the Czech national anthem. In view of the nature of the experiments, namely, the selection of suitable channels, times of transmission are not always strictly adhered to, and other wavelengths may be brought into operation. The listener is advised of all future changes in the course of the broadcasts, announcements being made in at least four European languages, including English.



IMPRESSIONS ON THE WAX

By
T. O'nearm

Fine Tenor Records

THE re-creation of older records is an extremely difficult undertaking.

Only a few can be successfully treated by superimposing a new orchestral accompaniment. Caruso possessed what is known as a perfect recording voice, but only a limited number of his records can undergo this process. It is therefore fortunate that one of his greatest successes, "Lend me your Aid," sung in French, from Gounod's Opera "La Reine de Saba," forms one of the latest re-creations in the new H.M.V. list, coupled with César Franck's song, "La Procession"—H.M.V. DB 3078.

Elizabeth Schumann continues her Lieder series with two more Schubert songs, "De Musensohn" (The Poet) and "Des Fishers Liebesgluck" (The Fisherman's Fortune in Love), on H.M.V. DA 1545. Gladys Swarthout is the star of the film "Champagne Waltz," which was made to celebrate the film jubilee of Adolf Zukor. Introduced into this film is the famous "Softly Awakes my Heart" from "Samson and Delilah" with its companion air, "Love, come to my Aid." It is with this song that Delilah in the opera lulls Sampson to sleep before the hair-cutting incident, and Gladys Swarthout sings it very engagingly on H.M.V. DB 2992.

This list introduces a new tenor to this country, Scandinavian Jussi Bjorling, who is only 25. He has recorded two well-known operatic airs, "La donna e mobile" from "Rigoletto," and "Recondita armonici," from "Tosca" on H.M.V. DA 1548. His voice is of enormous power, and has a quality reminiscent of Caruso.

Paul Robeson forsakes spirituals and film ditties by singing two English songs, "Passing by," the well-known setting of Herrick's poem, and "Oh, no! John," from Cecil Sharp's collection of Somerset folk songs—H.M.V. B 8541.

The popular contralto Essie Ackland, possibly with the Coronation in mind, sings "O Peaceful England," from Edward German's "Merrie England," and an attractive setting of Braga's Serenata on H.M.V. B 8537.

Light Orchestral Recordings

THE light orchestral recordings include a selection from "On Your Toes" by Antò and the Paramount Theatre Orchestra, London, with Al Bollington at the organ, on H.M.V. BD 412 a selection from Bing Crosby's new film, "Pennies from Heaven," by Louis Levy and his Gaumont British Symphony on H.M.V. BD 409, and a very attractive Yiddische Wedding Fantasia played by Alfredo and his Orchestra on H.M.V. B 8539.

Vivian Ellis at the piano plays a medley of tunes from "On Your Toes," for which he composed the music—H.M.V. BD 410.

Peter York, a newcomer to these lists and a favourite broadcasting band leader has recorded two of the best numbers from the revue, "Home and Beauty"—"A

Nice Cup of Tea" and "Love Me To-day" on H.M.V. BD 5179. Two more records in strict dance tempo are contributed by Henry Jacques. They are "Dancing in the Firelight" and "I Found a Rosary" on H.M.V. BD 5176, and "I'm just beginning to care" and "I'm still in Love with you" on H.M.V. BD 5177.

In the swing music series Benny Goodman offers "Tain't no use" and "Did you mean it?" on H.M.V. BD 8535, also "There's a small Hotel" and "Good Night my Love," on H.M.V. B 8542. "Shine," with vocal refrain by Freddie Taylor, and "In the still of the night" are played by the Quintette of the Hot Club of France on H.M.V. B 8534.

Decca

THE national campaign for physical fitness has been very much in the news lately, and special music and special gramophone records have been



Lilli Palmer, recording in the H.M.V. studios. She has recorded songs from two of her new films on B 8544.

recorded by the Decca Company to help you to do the exercises. These records cost 2s. 6d. each, 15s. for a set of six, or complete with album, 17s. 6d. These rhythmic health and beauty exercises are directed by Sali Lobel, leader of the "Every Woman's Health Movement."

Exercise charts, one of which goes with each record, are essential, and cost 3d. each. Records numbers SL 1 and 2 are beginners' exercises, numbers SL 3 and 4 intermediate exercises, and numbers SL 5 and 6 advanced exercises.

Bob Crosby offers one of the best hot records for some time on Decca F 6300. "Sugar Foot Strut" is played in excellent Dixieland style coupled with a sterling performance of "Savoy Blues."

Of interest are two records by Jack Doyle, the Irish boxer. The songs he has recorded are "Little Irish Girl" and "The Garden Where the Praties Grow" on Decca F 5128, and "That Tumbledown Shack in Athlone" coupled with "Just Pretending" on Decca F 5129.

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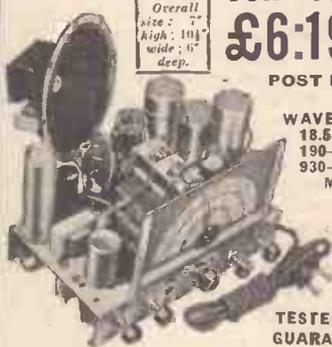
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by RALPH STRANGER

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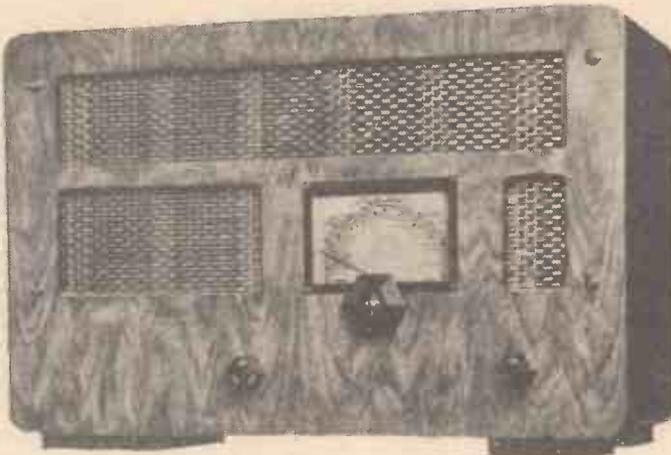
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NEW MARCONIPHONE RECEIVERS

THE accompanying illustrations show three new Marconiphone receivers which are now available. Two of these are for mains operation, and one for battery operation, the former covering three wavebands and the latter only two bands. The battery receiver is known as Model 314 and employs screen-grid, triode and pentode valves in a straight combination, with only three controls. These are tuning, volume, and master switch, with a supplementary sensitivity control concentrically arranged on the main tuning knob. This operates a variable resistance in the filament circuit of the H.F. amplifier. The undistorted output is 400 milliwatts approximately, and the H.T. and L.T. consumptions are approximately 8.5 mA and .4 amps. The price is 7½ guineas com-

The tone control has three positions, and is operative on both radio and gramophone. The volume control is also operative on both sections.

The mains consumption is 85 watts and



Model 314.

the gramophone 100 watts approximately. The price is 22 guineas.

Model 557

This is the radio chassis of the previous receiver incorporated in a cabinet without the gramophone section, and all of the previous details apply. The price is 12 guineas.

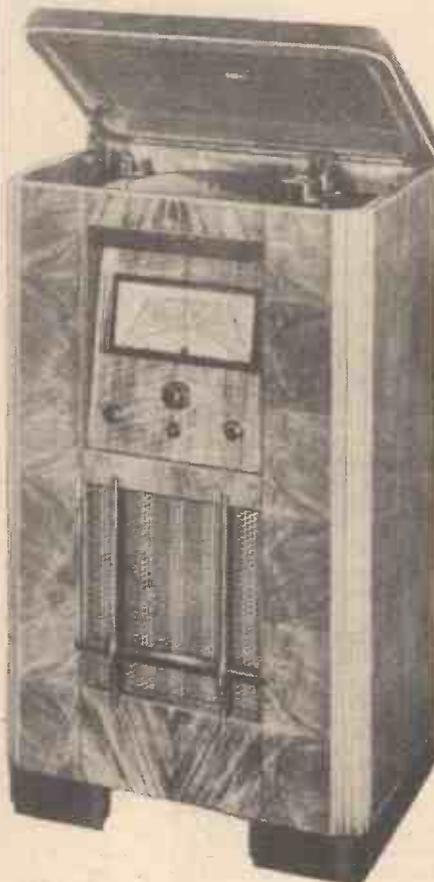


This is model 557 incorporating the chassis used in model 567.

plete with Marconiphone combined H.T. and G.B. battery and Exide 45 A.H. type D.F.G. accumulator.

Model 567

The largest of the new receivers is the 6-valve all-wave radiogram, designed for A.C. mains operation. The radio chassis in this receiver is of the superhet type, employing a signal H.F. amplifier, frequency-changer, I.F. amplifier, double-diode-triode and pentode output valves. An iron-cored I.F. transformer is employed to improve selectivity, and resistance-capacity coupling is employed between the triode portion of the D.D.T. valve and the output stage. Four controls are provided, mains switch and volume control combined, wave-band switch, tone control and tuning control. The latter is of the two speed type, with an inner knob operating a gear of 120 to 1 for extremely accurate tuning.



Model 567.

BRIEF RADIO BIOGRAPHIES—3

By RUTH MASCHWITZ

Eda Peel

EDA PEEL, who was heard for the fourth time in "Songs from the Films" recently, is one of those people to whom success seems to come without effort. Her stage career began at the age of twelve, when Debroy Somers, having taken his children to a party, happened to see her there. She did an impromptu dance, and he was so impressed that he engaged her to appear with his band for a year. During all that time, without previous training, she performed impromptu dances.

At fourteen she signed a contract with Charlot for three years; then went into cabaret at the Hotel Splendide, and did some filming. After an audition at the Café Anglais, she was engaged by the management, but at the last moment it was decided there was not sufficient room for her to dance. Instead, the same evening she made her début as a singer, again without previous training! For eighteen months she continued in cabaret and variety work, and then once more joined with the Somers family, this time with Debroy's son and another youth. For a while she did an act with them, and then returned to cabaret alone. One evening after her turn at the San Marco a Frenchman dashed up and asked her to go to Paris next day. Her engagement was finishing so Eda took the first train the following morning, and the same night found herself singing at the Casanova.

Vic Oliver

VIC OLIVER, the comedian, who will be heard in "Music Hall" on April 3rd, has led an adventurous life. Viennese by birth, he and his sister led the life of the nobility, educated to no profession. When the Austrian currency crumbled after the War, Vic and his family found themselves practically penniless. He decided to try out his luck in America, but with little knowledge of the language and no testimonials he found it impossible to get a job. After three weeks his money was gone, and in desperation he became a dock-hand. Then he was taken on as a drummer in a speakeasy, and spent all his spare time practising the piano so that after a while he began to get better engagements.

His first appearance on the stage was as an accompanist to a Jewish singer. The opening number did not appeal to the audience, and Vic received an over-ripe tomato full in the face. Some time later Vic collected a band together with which he went on tour and gained considerable reputation. Numerous engagements followed as a straight violinist and pianist.

The turning point in his career came about in an unexpected manner. He was appearing in a variety show given for the Actors' Benevolent Society, and someone had to make a speech before the curtain, and as no one else seemed suitable, the manager picked on Vic. Because of his nervousness and incomplete mastery of American, he became hopelessly tangled up, and the audience roared with laughter. After the show, managers who had been in front came round and advised Vic to start on a new line as a comedian.

There's Drama Behind Every SOS

SLOWLY, almost imperceptibly, the pulsating rhythmic music of the late night radio dance band dies away till even the staccato drum-beats fade into stillness, like some distant tom-tom.

Listeners dancing to the tune halt and look wonderingly towards their radio sets. A moment passes. Then the resonant voice of an announcer speaks.

"Here is an SOS message. . . ."

Once again, the B.B.C. is giving the power of radio to the cause of humanity. Once again, broadcasting is playing a last dramatic part in what has been a hopeless search, perhaps for the parents of a child dying, the victim of a road accident; maybe, helping to save a life.

Since the days of 2LO, many thousands of these messages have been broadcast and a large, mounting percentage have been successful. To listeners generally, however, there must be some element of mystery behind these nightly human dramas. "How do the B.B.C. get the requests to issue an SOS? Who decides whether an SOS shall be radiated? How many go out in the course of a year?" are questions that could be answered by demonstration almost any night at Broadcasting House.

Few hours pass without a call from some distracted person appealing to the B.B.C. to help trace, say, the brother, sister, mother, or father of someone who is dying. Obviously, though the B.B.C. is always ready to help, certain formalities are necessary in order to guard against such a thing as a grim jest by some practical joker. But the formalities are brief and can usually be dealt with expeditiously. Two vital questions have to be answered satisfactorily—first: Has every other means of communication failed?; and second: Where is confirmation (preferably telephone confirmation) of the facts available?

In the case of dangerous illness, the hospital or family doctor can usually readily answer both questions. Perhaps only a few minutes may pass between the receipt of the original request for help and the transmission of an urgent message. Where possible, SOS immediately precede the News Bulletins, but, sometimes, it is necessary to interrupt a programme rather than wait even half an hour.

Only a few days ago, an urgent message caused the interruption of an afternoon musical programme when persons living in the neighbourhood of Saltburn, East Yorkshire, were asked to inform coast-guards and life-saving authorities that a vessel was in distress in the North Sea. There have been many such cases.

The Earliest SOS Broadcast Call

In fact, the earliest SOS call broadcast in this country caused a programme from Birmingham—it was 5GB then—to be broken on a Sunday night in the Spring of 1923. A man was dying in a London hospital. The only relative near London was living in a Bedfordshire hamlet which, on Sundays, had no means of rapid communication with the outside world. The only hope of getting in touch with the relative was by radio—a message that might be heard by someone in the district, someone who would realise the gravity of the situation and tell the relative without loss of time.

Seconds May Be Vital. The Humane Side of Radio!

There lived in the village a man who had built a crystal set and who, while listening, was amazed to hear a request for the help which he of all people was able to give. For the dying man's relative lived next door. . . .

Not long ago, the B.B.C. broadcast an SOS message because a man lay acutely ill in an East End hospital, stricken with the virulent germ, tetanus.

His condition was precarious. The only possible hope of saving his life was to get in touch with an eminent doctor, believed to be at Oxford, an authority on anti-tetanic serums.

DETAILS REQUIRED FOR BROADCAST SOS, MESSAGES.

1. Full name of person it is desired to find.
2. How long ago and in what district was this person last heard of?
3. Have you tried all other means of tracing this person, for instance, through the Police, or Post Office?
4. Full name of the patient.
5. Address at which the patient is lying dangerously ill.
6. What is the relationship between the person it is desired to find and the patient?
7. Is the patient asking to see this relative?
8. Name and address of the doctor attending the patient.
9. Are you a relative of the patient?
10. Your full name and address.

So the broadcast went out. Someone living in London heard it and, with a fair knowledge of Oxford, telephoned to those places in the university city at one

of which he knew the doctor would almost certainly be. Ten minutes after the broadcast he was speaking to the doctor who, though he had not heard the broadcast, abandoned the party that he was attending, and drove through the night to London. He reached the bedside of the dying man in the early morning and there began a six-hour fight to save his life. Unfortunately, the germ won, but the very presence of the Oxford doctor paid tribute to the usefulness of the SOS.

On one occasion, the wife of a lighthouse keeper lay dying. Her husband was on duty; surging seas made it impossible for boats to put out from the shore. There was no other means of communication.

Then someone thought of the B.B.C. Yes, the lighthouse had a wireless receiving set and there was a hope that although no boat could reach him he might be able to navigate a boat from the lighthouse to the shore. Luckily, the lighthouse keeper heard the message that went out. He scrambled down to his boat and gallantly rowed it to the shore. Twenty minutes later he was by the bedside of his wife. . . .

For Ships at Sea

Once or even twice a week during the winter months a message is flashed out from the B.B.C. transmitters to one of the many fishing vessels around the coasts. Every listener knows their phraseology; how they appeal to husbands and brothers to return home where wives, sisters, sons or daughters are dangerously ill, calling for them.

In some of these cases the success of the message depends upon the comradeship of the men who sail the seas. Often the smaller trawlers carry no wireless set, and it is then a task for the nearest boat with a radio receiver to get in touch with the smaller vessel.

There was a time when the B.B.C. was less stringent in its regulations governing

(Continued on page 45)



Our illustration shows a policeman listening-in to headquarters with his pocket-radio from the scene of a fatal car crash, at Roedean, nr. Brighton. The outcome of this may be an SOS from the B.B.C. transmitters.



LETTERS FROM READERS

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

The "Prefect" and the "Vitesse"

SIR,—As a reader of your first-class paper from 1930, I feel it my duty to pass on a word of thanks. As a builder of most of your sets, I also make a few hook-ups for testing purposes. After deciding to make radio my "career," I wrote a letter to a private school in London. They welcomed me as a student in 1935. I hope to sit for my P.M.G. 1st and 2nd class certificates in "Wireless Telegraphy" very shortly.

I assembled the Prefect S.W.3 on the day of issue, and received splendid results. After using the battery version for some time, I spent some hours designing a mains version, and, having assembled it, was amazed with the results. I used two pentodes in push-pull output. I then changed the circuit into the all-wave version. I have lots of spares, valves, coils, and L.F. transformers, etc., for repairs and quick hook-ups. I have now assembled the "Vitesse" all-waver, and it sure is a real hot receiver; it grabs hold of every station on the ether.

Whilst testing the short-wave part of this set, I heard dozens of foreign languages, West Indians, South Americans, and Mexicans, etc. I hope there are further reports on this fine set.—R. J. STOKES (Tilbury, Essex).

"The Simplest Short-waver"

SIR,—I have noticed recently letters published in the "Letters from Readers" section about the "Simplest Short-waver," and I would like to add my pæan of praise to these. I built the set about the middle of January, over a week-end, in fact, and since then I have logged and identified by announcement 33 broadcasting stations and over 70 amateurs. The broadcasting stations include W3XAU, W2XAF, W8XK, CSW, and VK3LR. The amateurs include two Canadians, 18 Americans, and EI6J, Dublin. All of these amateurs were on the 40 m. band.

I am using two commercial 6-pin coils, for wavelengths of 11-25 and 20-45 metres respectively, and I have now constructed the 1-valve amplifier, described in your paper a little while ago, and have coupled it to the set, thus converting it to a simple two-valver, but the majority of the above stations were received before the amplifier was built.

I originally used a Cossor 210 H.L. for the detector, and it worked fairly well, but I have now changed this for a Cossor S.G. valve, which is definitely more "lively" and gives a much louder signal. The valve I am using in the amplifier is a Cossor L.F. My aerial is about 40ft. long—outdoors and vertical—and I usually use no earth, except in the case of very weak stations, such as American amateurs.

It may be of some use to some readers if I give the windings on the coils (1½ in. formers).

11-25 m.—Grid 4, Reac. 3, and Aerial 2.
20-45 m.— " 5, " 4, " 3.
—R. ELDRIDGE (Southampton).

A Good Log from Suffolk

SIR,—May I add my contribution to the many good logs you have published. I enclose my 28 m/c log only, for the last two months. On 10 metres: W1DJK, IAV, 1DZE, 1ELR, 110B, 1KH, 1IPV, 1H10, W2DMN, CBL, ACY, ENY, FYK, W3DUE, FQP, EBK, PC, W5LW, WG, EHM, W6DOB, W8MWY, MMH, AAJ, BWB, CJM, ANO, W9GBJ, KPD, VEK, IWX, PKS, FA8JO, FM8AN, U2AE, U2NC, U5KQ, ZBIJ, ZL3DG, OH3NP, 2NB, ON4NC, OK2QP, TA2LT, and SU1SG.

Conditions are improving rapidly on the 28 m/c band, and it remains open very late in the evenings, 22.00 or even later during recent evenings. Best wishes to PRACTICAL AND AMATEUR WIRELESS, not forgetting our friend "Thermion," of old *Amateur Wireless* days; he doesn't improve.—C. R. THOMPSON (Woodbridge, Suffolk).

An Interesting 10-metre Log

SIR,—Noticing the popularity of 10-metre reception, I recently attempted to make my simple two-valve S.W. set reach down to the 28 mc/s amateur band, with successful results. After experiment-

CUT THIS OUT EACH WEEK.

Do you know

- THAT in a transmitter push-pull stage each "leg" should be balanced not only from the circuit point of view, but also as regards layout.
- THAT failure to observe the above point may result in a larger capacity to earth on one side and unbalance the stage.
- THAT additional reaction control may easily be provided by connecting a variable resistance across the reaction winding.
- THAT a soldered joint should not be cooled quickly by dropping cold water upon it or by holding it under a tap.
- THAT the impedance of an L.F. choke varies according to the current passing through it.
- THAT a constant-inductance choke is provided by arranging for an air gap in the iron core.
- THAT a closely-wound coil of wire is ineffective as an H.F. screen unless adjacent turns are short-circuited.

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

ing, I found that a coil with two turns grid, four turns reaction, and half a turn aerial gave good results, 10 metres being at the high-frequency end of the dial. The aerial used is an outside one, 35ft. long and 12ft. high.

My log on the 10-metre band for the last few weeks, 'phones, is: W1COO, W1DTJ, W1HTP, W1IQO, W1JIL, W1JPM, W1LQ, W1SZ, W1WV, W2AG, W2DKJ, W2GFH, W2JIT, W3CRY, W3ERP, W3FIU, W3GPM, W3HKX, W3IU, W3PC, W3ZC, W7EMP, W8BIQ, W8CKY, W8CWP, W8DW, W8FC, W8HSP, W8IPD, W8ISC, W8JFJ, W8OXX, and W8JFC (who writes: "Sure glad U can get me on ur little revr. Only few miles here from Ohio river es gee sum flood es gess river 80ft. now in Cincinnati. Abt 30ft. over flood stage. Juice es abt evrything off. Worked lots emergency traffic until A.C. went off. . . Power 100 watts. Antenna 7 half-waves in phase."). Also W9BHT, W8MXW, VE2FK, VE2KX.

I find the best time for listening on this band is 15.00-18.00, and the best day Sunday.

The following notes might be of interest to QSL collectors: PY2EJ, in Sao Paulo, Brazil, sends a very beautiful card, and W4DSY (Charlotte, N. Carolina) answers very promptly, sending an attractive card. I wrote to VUB in Bombay during November, and have since received two identical cards, one just after Christmas, and the other in the middle of January. This station, I believe, is supposed not to reply.—L. KNIGHT (Letchworth).

Station W4BY

SIR,—I have cut out Mr. R. L. Pluck's letter from your issue of Feb. 27th, as I am fairly sure that Mr. Oeffmeier, the operator of W4BY, will be interested to know he has been heard on a one-valve short-wave receiver in Great Britain. "AARS, W4BY, Fargo, Ga., U.S.A." will find him.—H. O. CRISP (Southampton).

SIR,—In reply to Mr. R. L. Pluck, re W4BY. This station QSLs with a very nice card. I received his card by return of post, and here is a description of it. On top he has his address, Fargo, Georgia, "On The Suwannee River" in blue print. Then his call-sign in red, with a nice photo of a pine forest in the centre of the card, with the slogan underneath—Drop In Sometime and See Us Grow Pine Trees.—T. T. ALLAN, (Newburgh, Fife, Scotland).

An Improved Insulation!

SIR,—I notice in a recent issue that Mr. A. C. H. Johnson criticises the use of rubber tubing as a substitute for insulation tape. The perishing of which he complains is probably due to the fact that he has mounted his rubber tubing directly on to bare copper wire; for copper is an extremely powerful oxidation catalyst as far as rubber is concerned, and the effect is even more severe if the rubber is under tension. This difficulty can be very simply overcome by using only well tinned copper wire for wiring purposes. The life of the rubber tube is greatly influenced by the quality of the rubber and other materials it contains, and it should not be beyond the scope of a technically efficient rubber manufacturer to produce a tube capable of giving good service over a period of at least five years if the rubber is not unduly stretched in use.—RUBBER CHEMIST (Croydon).

Facts and Figures

COMPONENTS TESTED IN OUR NEW LABORATORY

Belling-Lee Television Aerials

IN the new Belling-Lee catalogue, some useful television aerial systems are listed. These consist in the main of enamelled brass tubing, mounting brackets and feeder wires, and are obtainable in various combinations. The tubing is cut to provide maximum reception on the vision channel now employed at the Alexandra Palace, and is mounted in a special casting. This may be affixed to the top of a mast, or attached to the side of a wall by means of a special mounting bracket. The price of the single mast-head fitting and aerial is 45s., and if desired for use with a reflector, the necessary additional holder and aerial may be obtained for a further 20s., making 65s. for the complete mast-head aerial and reflector. For wall-mounting the price is reduced, and the aerial costs 35s., with a similar charge for a reflector, which is, in effect, a duplication of this type of aerial. The feeder cable is of the low-impedance type previously reviewed by us and is sold separately. There are three grades, the standard being sold in a reel of 65 feet for 6s. 9d., but two heavier grades are obtainable at 3½d. and 6d. per yard. This cable consists of two enamelled wires laid in a special non-hygroscopic tough covering, and care should be taken to measure the exact length required, as its efficiency is impaired if it is joined.

Radiolab Price Increases

MESSRS. EVERETT, EDGCUMBE, and CO., LTD., announce that owing to the recent increased cost of raw materials it has been found necessary to increase the prices of Radiolab test instruments by 10 per cent. A complete catalogue of these instruments may be obtained on application to the company at Colindale Works, Hendon, N.W.9.

New Ferranti Receivers

A LEAFLET has just been received from Messrs. Ferranti, showing the new 1937 range of battery receivers, including a straight two at 6 guineas and an all-wave superhet at 12½ guineas. This latter covers the waveranges from 19 to 51, 200 to 550, and 900 to 2,000 metres, and is contained in a handsome walnut cabinet with Macassar inlay and ebonised feet. A copy of the leaflet may be obtained on application to the Ferranti company.

Holmer Service Cement

TROUBLES are often experienced in a moving-coil loudspeaker, due to the speech-coil former becoming loose, or fractures in the cone. Service engineers who have hitherto used various adhesives for the repair of this type of fault will be interested in the announcement that Messrs. Holiday and Hemmerdinger are now supplying a special cement, with a thinner. These are contained in small glass bottles with a brush attached to the screw stopper. The two solutions may be obtained for 2s. 6d., and are supplied separately at 1s. 6d. for the cement and 1s. for the thinner. Where this material is being ordered by post an additional remittance of 6d. must be enclosed for

postage. The address of Messrs. Holiday and Hemmerdinger is Dolefield, Bridge Street, Manchester, 3.

Bulgin Steel Chassis

THE increasing use of large type components in such apparatus as public-address amplifiers, television equipment, etc., leads to a need for a rigid type of chassis and Messrs. Bulgin are now producing three standard sizes of mild steel construction, finished in grey cellulose. These chassis are made from the flat sheet, bent and riveted, and will be found very satisfactory in use. The sizes and prices now available are as follow:—

- No. 1, 13½in. by 7½in. by 2½in., 5s. 6d.
- No. 2, 13½in. by 9½in. by 2½in., 6s.
- No. 3, 18in. by 12in. by 2½in., 7s. 6d.

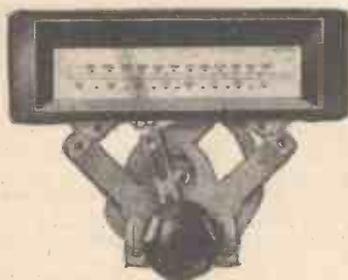
Mullard Service Equipment

MESSRS. MULLARD are shortly to introduce two new items designed especially for the service engineer. These will consist of a combined valve and set tester, and a signal generator. The tester consists of a small unit with a sloping desk top, upon which are mounted valveholders for the main British, American, and Continental type valves, with a meter, indicator lamps, and control buttons. It is intended for operation from A.C. mains (100 to 250 volts). This device tests for bad insulation, short-circuits, wrong or faulty connections, anode current, and slope. The price is announced at £27 10s.

The signal generator is designed to provide an unmodulated or modulated signal on any wavelength between 14 and 3,000 metres in six steps. Harmonics down to 7 metres are available. A swivel-mounted calibration chart is fitted at the top of the instrument, and this also is designed for operation from A.C. mains from 100 to 250 volts. The price is stated to be in the region of £20.

Exide Batteries

THE Exide Company advise us that they have recently supplied two chloride batteries to the B.B.C. for the Penmon transmitter. The batteries supply current for the valves of the control gear which keeps the transmitter on its correct wavelength—this is essential as the station operates on the same wavelength as the West Regional transmitter, which radiates the same programme.



A useful full-vision dial from the J.B. range, which is obtainable in a variety of finishes.



Say "T.C.C."

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PRODUCT OF OVER
28 YEARS' SPECIALISED
EXPERIENCE IN
CONDENSER DESIGN
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QUERIES and ENQUIRIES

Short Waves

"I have applied for my A.A. Licence and intend to build your 2½-watt transmitter. The variable condenser specified is .000087 mfd. I possess a 40 mmfd. condenser already and should like to know whether this would be suitable for this set. Secondly, I wish to construct a receiver to cover only three short-wave bands, and to spread each band over most of the dial. I possess plug-in coils for 9-14, 12-26 and 24-52 metres. What value tuning condenser would be needed to spread the 10, 20 and 40 metre bands over the dial on these coils?"—J. E. B. T. (Winchester).

THE variable condenser specified for the transmitter is 67 mmfds. and your component only has a maximum capacity of 40 mmfd., or slightly over half. Consequently, you will not be able to cover the same waveband, although you could use it if you would like to make another coil having half as many turns more than the specified coil to cover the additional waveband. With regard to the short-wave receiver, you could use your 40 mmfd. condenser for tuning, and obtain the specified condenser for the transmitter, and in this way both of your requirements would be satisfied. We refer you to the article on page 735 of our issue dated March 6th last.

Valve Makers' Addresses

"I should be glad if you would give me the addresses of Cossor, Triotron, Osram, Mullard and Lissen."—D. A. (Creton).

THE office addresses of the firms mentioned are in the order given as follows: Cossor Works, Highbury Grove, N.5; 26, Bloomsbury Street, W.C.1; Magnet House, Kingsway, W.C.2; Mullard House, 223, Tottenham Court Road, W.1; Angel Road, N.19.

Hall-mark Three and Cadet

"I am thinking of making up the Hall-mark Three or the Hall-mark Cadet. Would you please tell me the output of these so that I can make my selection?"—A. J. L. (Willaston).

THE output stage of the Hall-mark Three utilises a Hivac PP220 valve, the maximum undistorted output of which is given by the makers as 250 milliwatts (¼ watt). The output stage of the Cadet is a 362 Valve Company's ME2, and this is rated to deliver 1,000 milliwatts, or 1 watt. It must be understood, of course, that the maximum volume is only delivered when the valve is fully loaded.

Measuring Output

"Is it possible to fit a meter or device of any description to the output stage of a receiver in order that the actual output may be measured for strength? By this I mean where signals can be measured by a standard for reports on amateur transmissions. I notice American receivers fit a microvolt-R meter, such as fitted to the R.M.E.9, and this is the type of device I wish to make use of."—F. G. T. (Billericay).

A STANDARD output watt-meter could be fitted and would give you the output in watts, but in order to make an easier comparison a better scheme would be to fit a milliammeter in the detector stage, as this would give you the exact deflection obtained on every station you tune in. Then, by means of a test with one or two stations you could draw up your R code, with current readings for each of the nine degrees of this code. This is the simplest and cheapest scheme.

Short-wave Aerial Circuit

"I am sending a circuit of a simple 1-valve short-wave set employing a 4-pin coil. Is this any good? If not, could you please

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.

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

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

If a postal reply is desired, a stamped addressed envelope must be enclosed. 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.

suggest any alterations?"—D. A. (Long-sight).

THE circuit is quite standard and there is nothing wrong with it in theory. The only point upon which we can comment is the use of the 4-pin coil. With this, the aerial has to be joined direct to the grid circuit, and the damping of the aerial-earth system generally prevents satisfactory reception of the short-wave stations. A series aerial condenser may be fitted and if this is a variable it will enable the damping to be adjusted on various wavelengths to obtain the best results. It is generally found, however, that the 6-pin type of coil is to be preferred, as this utilises a separate aerial coupling coil which is productive of better results, and we suggest that you consider this modification.

Single-valve All-waver

"I would like to ask two points about the set described in your issue dated March 6th. Firstly, is terminal 7 of the coil unit connected to the fixed or the moving vanes of the .0005 mfd. condenser? Secondly, will a .0003 mfd. differential reaction condenser do for the reaction control?"—K. W. (Croesyceiliog, Mon.).

TERMINAL 7 of the coil unit is joined to that side of the variable condenser which is at earth potential, and conse-

quently this would be the moving vanes. This method of connection tends to avoid hand-capacity effects, as the body is at earth potential, and if the opposite method of connection is employed, when the hand grips the tuning control (which is joined to the moving vanes), additional capacity is added, and this causes erratic tuning and the loss of a station when the hand is removed. The condenser shown for reaction is a differential, and therefore your component is quite suitable and has the correct value.

Mains Unit

"I have an A.C. mains power unit which is rated to supply 100 and 150 volts respectively. When trying it out I find that it only supplies 5 and 30 volts. Could you please advise me as to what to do? I have tried cutting all the resistances out, but I only get 40 volts on each. For the rectifier I am using a 2-volt small power valve (as mentioned in your Do You Know column recently). Can this be the cause of the voltage drop?"—E. B. (Salford).

THE diagram which you enclose does not indicate the windings of the transformer and we cannot say whether the valve is being correctly operated. It is quite possible that the valve in this case is not suitable, although you do not state what method of measuring the output you have adopted. We have repeatedly stated in these pages that the output from a small mains unit must be measured with a very high-class meter, and the ordinary low-resistance meter is definitely unsuitable for the purpose. The reason for this is that such a meter may take considerably more current than the tapings on the eliminator are rated to deliver and consequently the voltage will fall, especially if a series resistor is included, as in your case. A meter with a resistance of 1,000 ohms per volt should be employed, or the unit tested on a receiver which is known to be in working order. The latter point can be verified by using ordinary DRY batteries for supplying the H.T.

An All-valve Tester

"In your Everyman's Wireless Book you illustrate a valve tester. You mention that this is intended for battery valves, but that a similar one could be made for A.C. valves if required, or a combination instrument might be made up quite easily. Will you kindly give details for a combined tester for A.C. valves and battery valves and any advice re the same?"—M. W. (Llanely).

THE tester in question has three meters and is provided with a 5-pin valve-holder. For A.C. valves it would be necessary to fit a 7-pin holder to enable all types of valve to be tested, and in some cases a bias resistor would have to be included in the cathode lead. To use this as a universal tester the best plan is to replace the 5-pin holder by a 7-pin holder and in this type the cathode pin is always standardised as are also the heaters. A flexible lead would have to be provided for the grid and anodes, and the connections to the base would have to be arranged so that the H.F. and multi-valve types could be interchanged. Furthermore, the milliammeter would have to be replaced by one having a higher reading, and the H.T. voltmeter should be replaced by one giving a higher reading. Alternatively, "shunts" could be wound for both of these.

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

RADIO CLUBS AND SOCIETIES

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

The Hackney and District Wireless Club

THE above club has recently been formed in Hackney for the purpose of bringing together amateurs in the district who are interested in transmitting. The club will be run as a branch of the World Friendship Society of Radio Amateurs, and meetings will be held on the first and last Monday in each month. The club will hold a morse class during the first hour of every meeting, and a competent instructor will be in attendance. Further particulars can be obtained from E. Penrose, 2, Coopersale Road, Homerton, E.9.

International Short-Wave Club, London.

ALL readers interested in short-wave reception and transmission are invited to attend the meetings of the London Chapter of this organisation, which are held on Friday evenings, at 80, Theobald's Road, W.C.1. The clubroom is open at 6 p.m., features commence at 8.30 p.m. The Chapter has its own receiver and library of radio reference books, and will shortly install a transmitter.

The fourth annual I.S.W.C. dinner and dance will be held on Saturday, April 3rd, at the First Avenue Hotel, Holborn, W.C.1. Tickets are 7s. each. It will be attended by short-wave listeners from all over the country, besides many radio authorities and representatives of the radio trade. A hearty invitation is extended to readers who it is hoped will take up their tickets as soon as possible.—Hon. Sec., Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

The Croydon Radio Society

THE Croydon Radio Society greeted "Amphion," music critic of *The Croydon Advertiser*, on Tuesday, March 9th, in St. Peter's Hall, S. Croydon. His topic this time was: "At the Microphone End," and he emphasised that the great majority of listeners tolerated the most appalling distortion without, in many cases, being aware of its existence. He asked the meeting to consider the simple waltz tune with its um-pom-pom beat, as played on the piano. When this was transferred to an orchestra, it must be noted that many more people played the same rhythm, and he spent an interesting time explaining what each instrument was doing in the waltz song, and he showed members an orchestral score, explaining how the composer arranged each instrument, and where it would be permitted to play. The value of giving frequent rests to the woodwind was emphasised.—Hon. Pub. Sec.: E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

Torrington and District Short-Wave Club

THE above club was formed at a meeting held at 1, Halsdon Road, on January 20th, 1937. The membership, although at present small, is very enthusiastic, and there is every prospect of increased membership in the near future.

Meetings have been held weekly since the inauguration of the club, with inter-

esting discussions and practical demonstrations of short-wave receivers.

The meetings are held every Wednesday at 7.15 p.m., and all those interested will be welcomed. Prospective members may obtain all information from the Secretary, Mr. A. E. Cornish, 1, Halsdon Road, Torrington.

Clackmannanshire Short-Wave Club

THE above club was formed at a meeting held in the Town Hall on January 24th, 1937. Twenty-two intending members were present and the objects of the proposed club outlined. The necessary officials were elected and the club received its first send-off. Since then meetings have been held every Sunday at 2 p.m. Lectures have been given by GM6TF (Hon. President) on "Propagation of Wireless Waves" and Amateur Transmitting. A morse class has been formed and the club now owns its own valve oscillator. Up to the time of writing the club now boasts thirty members and has also new H.Q. The meetings are now held in the Drill Hall, Alloa.

Anyone interested is asked to get in touch with the Hon. Secretary, Mr. David McIntosh, BSWL100, Cobblecrook Gardens, Alva, or GM6TF, 12a, Erskine Street, Alloa.

Wellingborough and District Radio and Television Society

THE fortnightly meeting of the society was held on Wednesday, March 10th, at the Midland Hotel, Wellingborough, when a lecture was given by the Hon. Treasurer of the Society, Mr. W. Bigley, BSWL122, entitled "Experiments and Experiences on Ten Metres."

Questions were asked, and answered by Mr. Bigley, and the Hon. Sec., Mr. L. F. Parker, took the chair in the absence of the President, Mr. A. E. Fletcher, who was ill.

A sausage-and-mash supper and junk sale has been arranged for a date in April as a winding-up night for the present session.

Leeds Radio Society

THE activities of the above society continue to expand, and the committee have every hope of seeing the membership doubled before many months have passed. One of the most interesting and well-patronised features has been the visits to North Regional, Leeds Broadcasting Studios, and Kirkstall Power Station. There is also a contemplated visit to the automatic telephone department of the G.P.O. Another feature has been the lectures by the President, Mr. Gautley, A.M.I.R.E., G60Y, on Valves and Characteristics, Transmitting and Receiving Aerials, and various other interesting subjects. All radio enthusiasts are cordially invited, and anyone wishing to become members are asked to write for full particulars to Secretary, J. Kavanagh, 63, Dowlish Avenue, Leeds, 9.

Morpeth Amateur Radio Society

THIS society is at present engaged in tests with regard to short waves and weather conditions, and we would like to appeal to your readers for data on this subject, which we are anxious to collect.

Those interested are requested to report reception on any transatlantic station at any time on April 3rd.

The reports should give full particulars of weather conditions and sent to the secretary.

All useful reports will be acknowledged by a special certificate.

We would like to take this opportunity of inviting all interested in short-wave

radio and residing in this district to get in touch with the Secretary, Chas. L. Towers, 2, Edward Street, Morpeth, Northumberland, and he will be pleased to forward them full details.

Exeter and District Wireless Society

ON March 8th Dr. C. Wroth gave an interesting lecture on the high frequencies used by the medical profession. Dr. Wroth was assisted by Mr. Pemberton, of the Royal Devon and Exeter Hospital, in demonstrating how radium is detected and recovered when lost in hospital dressings. Both Dr. Wroth and Mr. Pemberton gave a number of interesting and amusing instances in their experiences.

There will be no meeting on Easter Monday, but on April 5th Mr. G. D. Bateman will give an illustrated lecture entitled "A Telephone Talk."

Meetings are held at the Y.W.C.A., Dix's Field, Southernhay.—Hon. Sec., W. J. Ching, 9, Sivell Place, Heavitree, Exeter.

THERE'S DRAMA BEHIND EVERY SOS

(Continued from page 41)

SOS messages. But when listeners began requesting an early SOS for Tibby, the family cat, who had not been home for several nights and was feared to have met with material damage . . . well, something had to be done about it.

Nowadays, however, besides the SOS for relatives, messages are frequently radiated at the request of the police. Missing persons generally cannot be the subject of an SOS, but, now and again, in the public interest, radio does help in cases where, for instance, foul play has not been ruled out.

Missing drugs and disease-laden swabs that have vanished from doctors' cars, dangerous explosives that have mysteriously disappeared, unknown witnesses of fatal accidents—all these are more or less regular causes of SOS broadcasts.

Some time ago, a chemist realised only too late that he had served a woman customer—a stranger to the district—with the wrong kind of pills. She had taken some which were poisonous. The B.B.C. were asked to help. There was just a chance—a slender chance—that the woman might be listening. The B.B.C. thought the chance was worth taking.

In the Nick of Time

Among the millions of homes into which this curious SOS flashed its way was that in which the mystery woman was listening. A glass of water in one hand, one of the pills of poison in the other, she had paused a moment to hear the SOS.

That is why time is such a vital factor; why none is ever wasted; why programmes are faded out for the few seconds that an SOS message takes to speak.

There was a broadcast SOS at 10.30 one morning recently, when another chemist discovered to his horror that he had sold the wrong powders to the parent of a sick child.

Last year a record number of 1,120 SOS and police messages were broadcast. The percentage of successes was 53.75.

It is safe to say that 6,000 more requests for SOS were rejected because they did not, or could not, comply with the essential regulations. As an example: one young woman writing anonymously from a northern city, begged the B.B.C. to broadcast "a little message for me"—a message for a young man, asking him, "please to get in touch with his girl friend immediately."



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CAN YOU trace faults accurately ?

Current	
0-6 m/amps.	
0-30 "	
0-120 "	
Voltage	
0-6 volts	
0-120 volts	
0-240 volts	
0-300 volts	
0-600 volts	
Resistance	
0-10,000 ohms	
0-60,000 ohms	
0-1,200,000 "	
0-3 megohms	

YES!—if you have a D.C. AvoMinor! With this accurate combination meter it's easy to diagnose all defects in valves, circuits, components, batteries and power units, etc. It is 13 meters in one—gives direct readings of current, voltage and resistance. A precision meter made by the makers of the renowned Avometer! Complete in case with leads, crocodile clips, testing prods and Instruction Booklet. **45/-**

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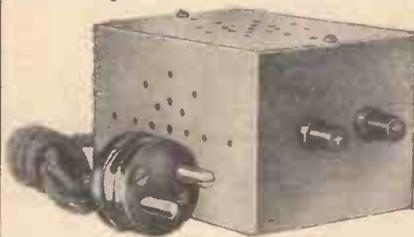
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SEND NOW FOR FULL DETAILS OF THIS REMARKABLE MIDGET BATTERY CHARGER.

12/6

F. C. HEYBERD & CO. 10, FINSBURY ST., LONDON, E.C.2.

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.

F. C. (Edmonton, N.9). The arrangement is quite standard and will, in fact, be found incorporated in many commercial receivers, including those made by firms who are also valve manufacturers.

W. F. (Blackpool). It may be possible to connect the output from the short-wave set to the pick-up terminals of the other set, but we are not familiar with the circuit details and suggest you communicate direct with the makers.

R. H. (Selly Oak). The coils may not be matched to the dial you are using. We suggest you increase the H.T. applied to the detector. The current rise is no doubt due to condenser discharges.

J. A. (Wallsend-on-Tyne). The frame was a centre-tapped model which is no longer on the market. Both long- and medium-wave windings were separate and wound at right angles, and a change-over switch of the double-pole-double-throw type was mounted on the base.

L. H. B. M. (Trowbridge). There is no formula. Take the grid swing to fully load the output valve, divide by the amplification factor of the preceding valve (plus any transformer ratio which may be used) and thus find the input required in that stage. You will not obtain full efficiency, and this will avoid overloading.

W. S. (Bow). We have already published short-wave coil data. Six turns of 22 enamelled wire on a $\frac{1}{4}$ in. former, with a slight space between each turn will cover the range required. For reaction wind six turns of fine wire at the earthed end of the coil. We also recommend an aerial coupling winding of four turns interwound with the tuning winding.

E. R. G. (Oundle). There is a well-known amateur band in the range mentioned, as well as a number of commercial transmitters, but at this particular frequency the range is very short and you must not expect too much. We would remind you that the range of the television transmitter is given as 25 miles, although much greater distances are being covered.

W. H. C. (Streatham). Your reason is correct, but we do not think that such great distinctions in direction are made, and wonder if you have confused certain transmissions.

G. B. (Stornoway). We regret that we cannot give any more details than those published in the issue in question.

H. B. (Smethwick). Condenser discharges can cause the effect mentioned. But it is also likely to be caused by the valves as they dim.

H. O. F. (Staines). A suitable unit is described in our issue dated March 6th last.

S. T. (Sutton Coldfield). Your set may be wired in such a way that there is a surge when switching off. A milliammeter will enable this to be checked.

D. J. M. (East Sheen). We regret that we have no issues now available describing the construction of a suitable receiver.

G. R. C. (Liverpool 17). The trouble is due to instability, which is undoubtedly caused by interaction between leads. Space the wiring on the first and second stages, using an insulated implement for the purpose. We cannot give the range of the apparatus as we have no data concerning conditions in the country mentioned.

R. A. E. (Bristol). We cannot supply blueprints of commercial receivers, and suggest you communicate with the makers mentioned.

T. H. M. (Histon). The component is obviously one specially designed for a manufacturer and has been dismantled from a commercial set. Under the circumstances we cannot give you any indication of the values of the contents.

F. A. P. (Chiswick). The pick-up may be defective, but in the absence of a diagram or details of the connections to the receiver we cannot advise definitely.

G. W. T. (E.17). There is no blueprint for the set in question and it was described in our issue dated December 12th last.

R. J. C. (Dalston). There are several receivers shown in our blueprint list and we suggest you look through these and select one which meets your requirements.

M. H. (Higham's Park). We regret that we cannot give instructions for modifying commercial sets or kits. We have no blueprint which would enable you to carry out the modification as the coils have not been sold separately.

H. A. (Suffolk). We have no blueprint, but suggest that you try out the 21-watt transmitter described in our issues dated December 26th, January 2nd, and January 9th last.

D. V. (Laindon). The coils may be obtained from Premier Supply Stores, whose advertisement appears in our pages.

M. P. B. (Selly Oak). If you do not wish to go to the trouble of building a new set you could fit a Droitwich suppressor in the aerial circuit. This consists of a wave-trap tuned to the long-wave transmitter and should remove your difficulties.

W. F. (Romford). The speaker could not be used with the battery set, and a separate mains unit will have to be bought or made up.

M. B. (Holborn). An ordinary output-filter circuit could be fitted, but the volume on many stations will be much too great for 'phone use, and the manual volume control will have to be used carefully.

G. F. (Bridgeton). A suitable instrument may be obtained from the Baldwin Instrument Company of Brooklands.

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Moving-coil, energised 6" cone, soiled but good, famous makers, 4/6 only. New Speakers, R. & A., 6" cone, 2,500 ohms and transf., 7/6. Hegra 9" with transf., 16/6. 8" with transf., 15/-. Magnavox Type 144, 6" cone, 2,500 ohms, 12/6. R.K. 8" 1,000 ohms, 10/6. A.C. mains energised speakers, with rectifiers, 100/250-v. 11" cone, with transformer, 30/-; 100-v. A.C. 8" cone, with transformer, 20/-; Jensen 220-v. A.C. 8" cone and transformer, 25/-; 100-v. ditto 7" cone, 20/-. Battery Energised Speakers. K.B. 6-v. 7" cone, 8/6; Hegra 6-v. 9" cone, with transformer, 10/-; Brown 6/12-v. 11" cone, with H.R. speech coil, 17/6.

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Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS.

	Date of Issue.	No. of Blueprint
CRYSTAL SETS.		
Blueprint, 6d.		
1937 Crystal Receiver	9.1.37	PW71
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprint, 1s.		
All-wave Unipen (Pentode)		PW31A
Two-valve: Blueprint, 1s.		
Four-range Super Mag Two (D, Pen)	11.8.34	PW36B
Three-valve: Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (Trans))		PW10
Sixty Shilling Three (D, 2LF (RC & Trans))		PW34A
Leader Three (SG, D, Pow)		PW35
Summit Three (HF Pen, D, Pen)	8.8.34	PW37
All-Pentode Three (HF Pen, D, Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow)		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, 2 LF (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)		PW64
The Gladiator All-Wave Three (HF Pen, D (Pen), Pen)	20.8.36	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.		
Fury Four (2 SG, D, Pen)		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) 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
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)		PW18
A.C. D.C. Two (SG, Pow)	7.10.33	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)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW56
Mains Record All-Wave 3 (H.F. Pen, D, Pen)	5.12.36	PW70
Four-valve: Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)		PW20
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)		PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47
SUPERHETS.		
Battery Sets: Blueprints, 1s. each.		
£5 Superhet (Three Valve)		PW40
F. J. Camm's 2-valve Superhet Two-Valve	13.7.35	PW52
F. J. Camm's £4 Superhet		PW58
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	PW75
Mains Sets: Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)		PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three valve)		PW44
F. J. Camm's A.C. £4 Superhet 4		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)	15.9.34	PW38A

Three-valve: Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow)		PW30A
The Prefect 3 (D, 2 LF (RC and Trans))		PW63
The Handsread S.W. Three (HF Pen, D (Pen), Pen)	29.8.36	PW68
"Tele-Cent" S.W.3 (SG, D (SG), Pen)	30.1.37	PW74

PORTABLES.

Three-valve: Blueprint, 1s.		
F. J. Camm's ELE Three-valve Portable (HF Pen, D, Pen)	10.5.36	PW65
Four-valve: Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl. B)		PW12

MISCELLANEOUS.

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

Big-power Melody Two with Lucerne Coil (SG Trans)

Lucerne Minor (D, Pen)		AW384
A Modern Two-valver	July '36	WM409

Three-valve: Blueprints, 1s. each.

Class B Three (D, Trans, Class B)		AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394

Home-built Coil Three (SG, D, Trans)

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)

1934 Ether Searcher: Chassis Model (SG, D, Pen)		AW410
Lucerne Ranger (SG, D, Trans)		AW422
Coscor Melody Maker with Lucerne Coils		AW423
Mullard Master Three with Lucerne Coils		AW424
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)		AW437
All-Britain Three (HF Pen, D, Pen) "Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW448

Transportable Three (SG, D, Pen)

£6 6s. Radiogram (D, RC, Trans)		WM271
Simple-tune Three (SG, D, Pen)	June '33	WM318
Economy-Pentode Three (SG, D, Pen)	Oct. '33	WM327
"W.M." 1934 Standard Three (SG, D, Pen)		WM337
£3 3s. Three (SG, D, Trans)	Mar. '34	WM351
Iron-core Band-pass Three (SG, D, QP 21)	June '34	WM354
1935 £6 6s. Battery Three (SG, D, Pen)		WM362
PTP Three (Pen, D, Pen)	June '35	WM371
Certainty Three (SG, D, Pen)	Sept. '35	WM398
Minitube Three (SG, D, Trans)	Oct. '35	WM393
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
2 H.F. Four (2 SG, D, Pen)		AW421
Crusaders' A.V.C. 4 (2 HF, D, QP 21)	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)

Lucerne Straight Four (SG, D, LF, Trans)	Aug. '33	WM331
£5 5s. Battery Four (HF, D, 2LF)	Feb. '35	WM350
The H.K. four (S.G., S.G., D, Pen)	Mar. '35	WM381
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	April '36	WM384

Five-valve: Blueprints, 1s. 6d. each.

Super-quality Five (2 HF, D, RC, Trans)	May '33	WM404
Class B Quadradynic (2 SG, D, LF, Class B)	Dec. '33	WM320
New Class-B Five (2SG, D, LF, Class B)	Nov. '33	WM344
		WM340

Mains Operated.

Two-valve: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.		AW403

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

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Amateur Wireless	4d.	"
Practical Mechanics	7d.	"
Wireless Magazine	1/3	"

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Economy A.C. Two (D, Trans) A.C.		WM286
Uniform A.C./D.C. Two (D, Pen)	Sept. '35	WM394

Three-valve: Blueprints, 1s. each.

Home-Lover's New All-electric Three (SG, D, Trans) A.C.		AW383
S.G. Three (SG, D, Pen) A.C.		AW390
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF Pen, D, Pen) A.C.	23.6.34	AW439

Mantovani A.C. Three (HF Pen, D, Pen) A.C.		WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401

Four-valve: Blueprints, 1s. 6d. each.

All-Metal Four (2 SG, D, Pen)	July '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P)	May '35	WM386

SUPERHETS.

Battery Sets: Blueprints, 1s. 6d. each.		
Modern Super Senior		WM375
Varsity Four	Oct. '35	WM395
The Request All-Waver	June '36	WM407
1935 Super Five Battery (Superhet)		WM379

Mains Sets: Blueprints, 1s. 6d. each.

1934 A.C. Century Super A.C.		AW425
Heptode Super Three A.C.	May '34	WM359
"W.M." Radiogram Super-A.C.		WM366
1935 A.C. Stenode	Apl. '35	WM385

Four-valve: Blueprints, 1s. 6d. each.

Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW380
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21)	June '34	WM363
Tyers Portable (SG, D, 2 Trans)		WM367

SHORT-WAVE SETS - Battery Operated.

One-valve: Blueprints, 1s. each.		
S.W. One-valver converter (Price 6d.)		AW329
S.W. One-valver for America	23.1.37	AW429
Rome Short-Waver		AW452

Two-valve: Blueprints, 1s. each.

Ultra-short Battery Two (SG det., Pen)	Feb. '36	WM402
Home-made Coil Two (D, Pen)		AW440

Three-valve: Blueprints, 1s. each.

World-ranger Short-wave 3 (D, RC, Trans)		AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.0.34	AW438
Experimenter's Short-wave (SG, D, Pen)	Jan. 10, '35	AW443
The Carrier Short-waver (SG, D, Pen)	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.		AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C.		WM368
"W.M." Long-wave Converter		WM380

Three-valve: Blueprint, 1s.

Emigrator (SG, D, Pen) A.C.		WM352
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Four-valve: Blueprint, 1s. 6d.

Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391
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MISCELLANEOUS.

Enthusiast's Power Amplifier (1/6)	June, '35	WM387
Listener's 5-watt A.C. Amplifier (1/6)	Sept. '35	WM392
Radio Unit (2v.) for WM392	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-)	Dec. '35	WM390
De-Luxe Concert A.C. Electrogram	Mar. '36	WM403

New Style Short-waver Adapter (1/-)

Trickle Charger (6d.)	Jan. 5, '35	AW462
Short-wave Adapter (1/-)	Dec. 1, '34	AW456
Superhet Converter (1/-)	Dec. 1, '34	AW457

B.I.D.L.C. Short-wave Converter (1/-)

Wilson Tone Master (1/-)	May, '36	WM405
The W.M. A.C. Short-Wave Converter (1/-)	June '36	WM406
	July '36	WM408

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TELSEN screened dual range coils, switched, 2/11 each. Pair 5/3. Milliammeters, 25 ma. upwards, 5/9. Super, 6/9.

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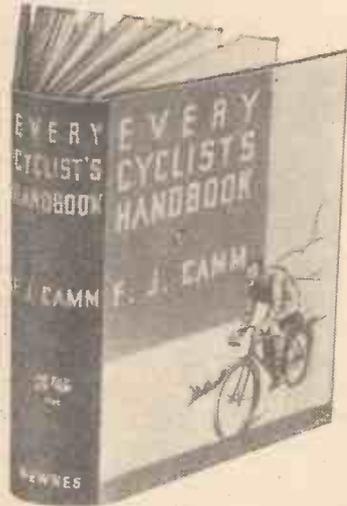
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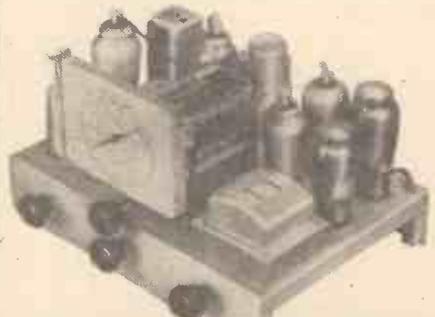
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