

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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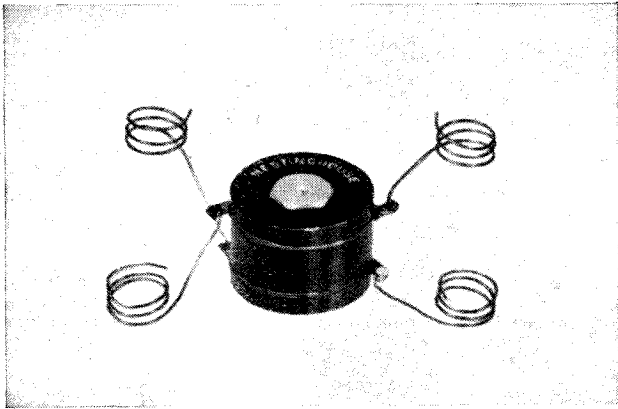
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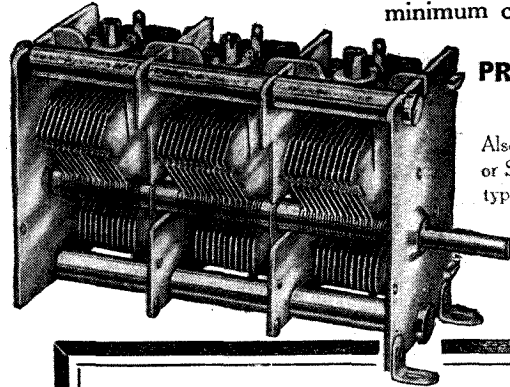
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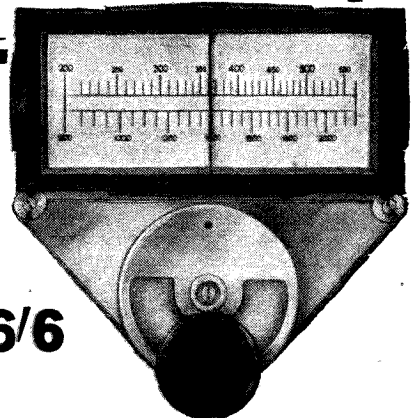
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THE EXPERIMENTER'S EQUIPMENT

See Page 719.



Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,
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, JZ1, 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 Caesar, 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

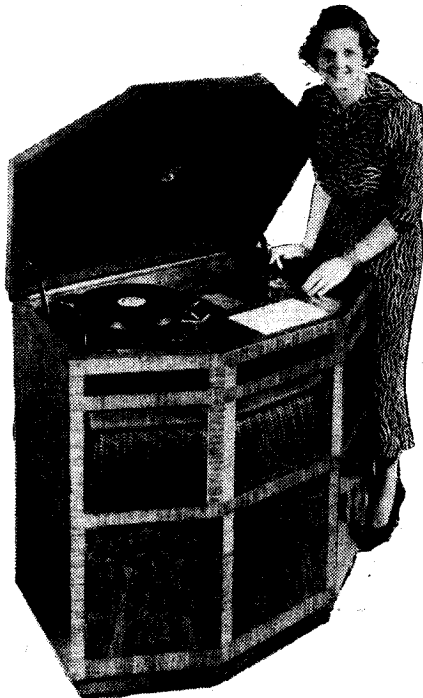
FRANK OLSEN, at the organ of the New Cinerama, Glasgow, will play on March 11th: Overture, "Light Cavalry," by Suppé; Selection of Leslie Stuart's Songs, arranged Olsen; Fox-trot, "I'll sing you a thousand Love Songs," by Warren; Selection, "Good-night, Vienna," by Pos-

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 Mae 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. Churrett, Merton, 13, 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

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.

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

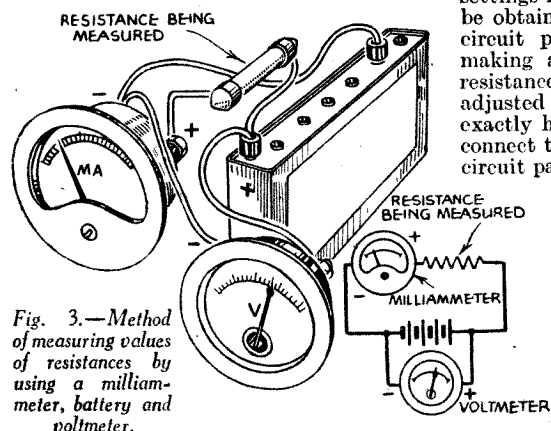


Fig. 3.—Method of measuring values of resistances by using a milliammeter, battery and voltmeter.

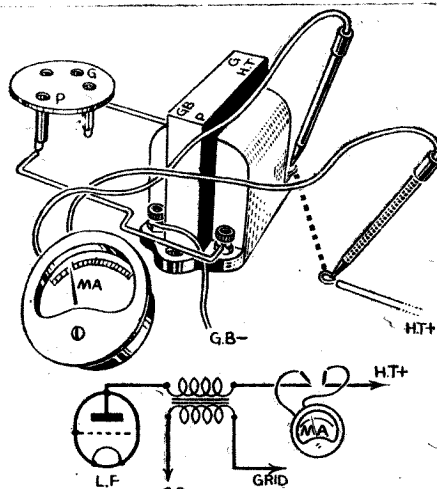


Fig. 2.—How a milliammeter is connected to read anode current.

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)

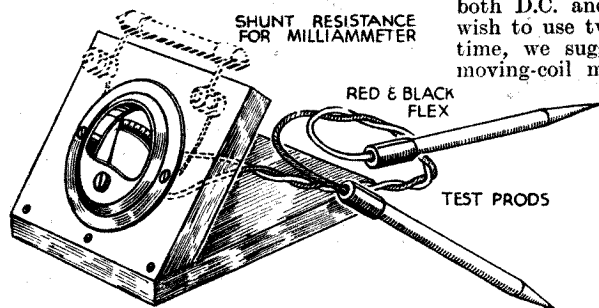


Fig. 1.—A convenient method of mounting the meters.

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.

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

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 $1,000,000 \text{ over } 2\pi fC$; 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

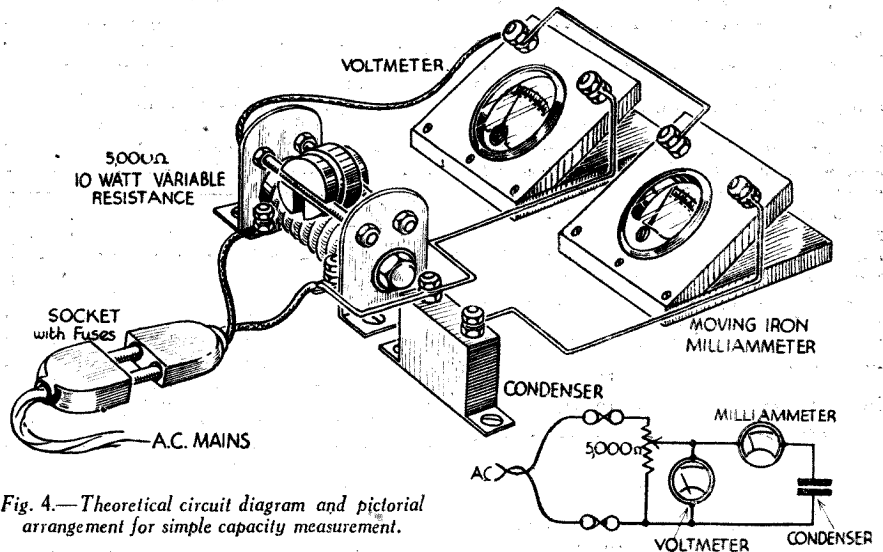


Fig. 4.—Theoretical circuit diagram and pictorial arrangement for simple capacity measurement.

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 set 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

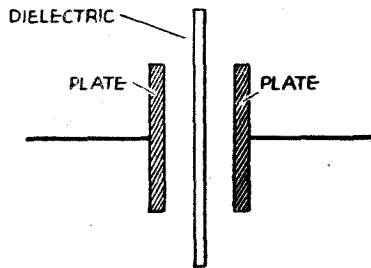


Fig. 1.—Flat laminated construction used for paper and mica condensers.

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.

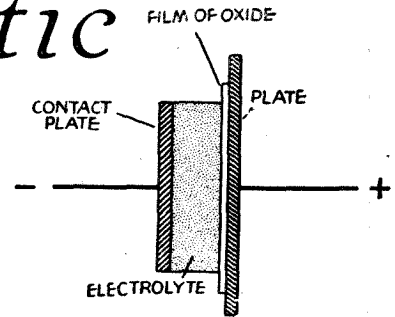


Fig. 2.—Internal construction of an electrolytic condenser.

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

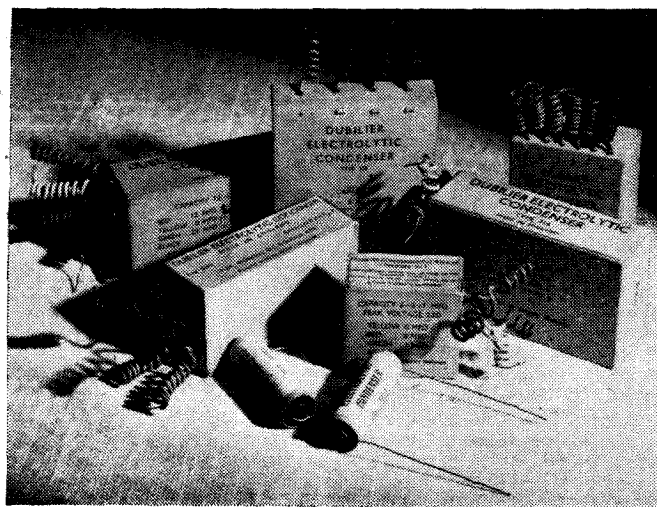


Fig. 3.—Group of manufacturers' type dry electrolytic condensers.



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.

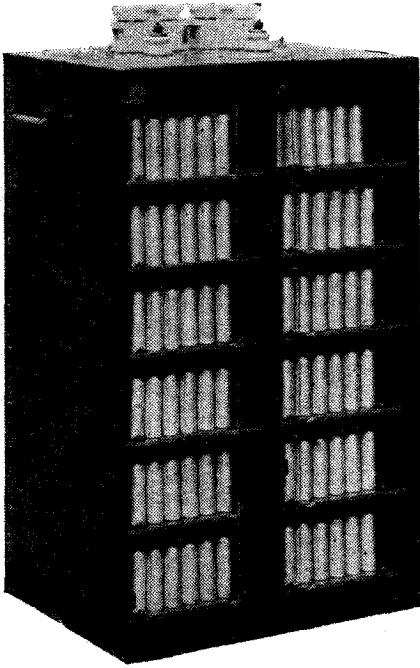


Fig. 5.—Group of wet electrolytic condensers used for filter purposes at a tramway depot.

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-

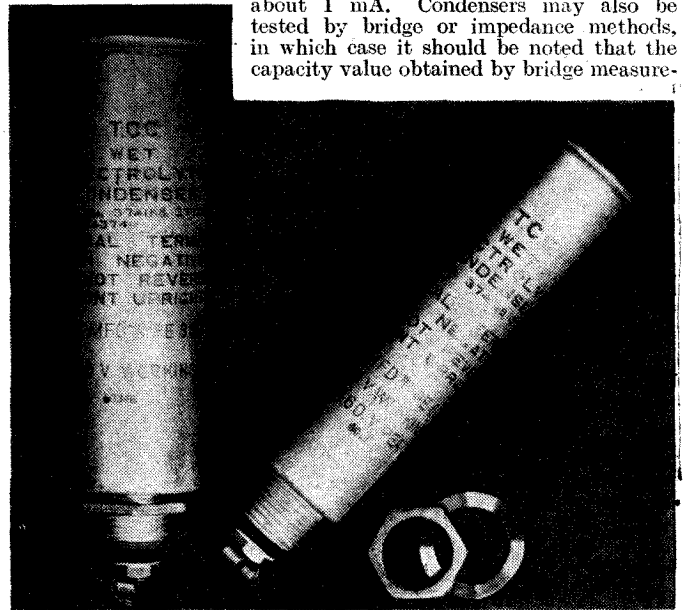


Fig. 6.—Two T.C.C. electrolytic condensers of the type shown in Fig. 4.

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

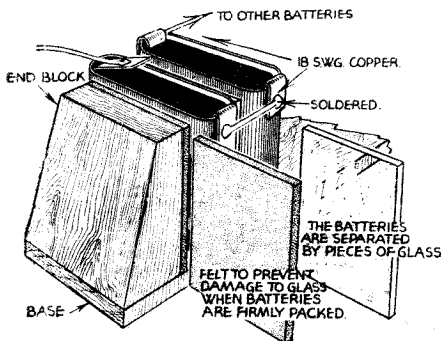
SUBMIT YOUR IDEA

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

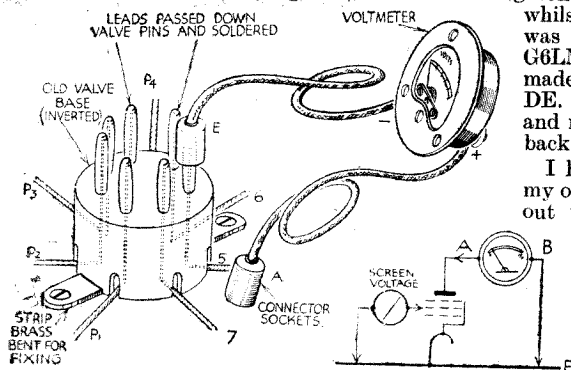


An improved method of assembling flash-lamp batteries for forming an H.T. unit.

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).



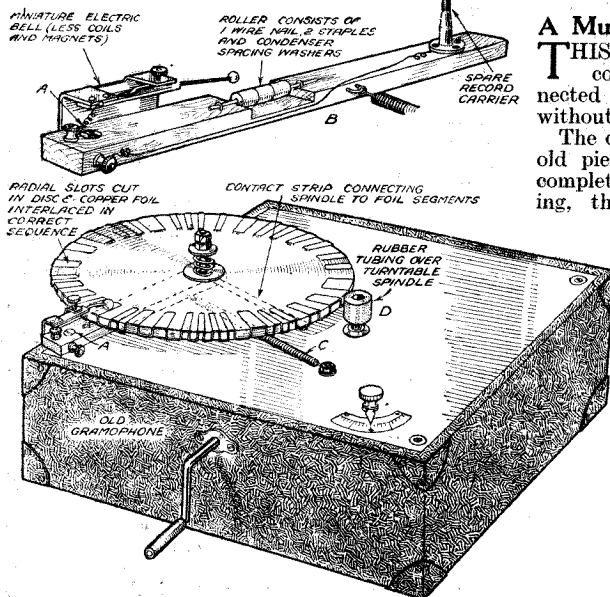
Details and circuit diagram of a simple tester.

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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 8 ins. 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).

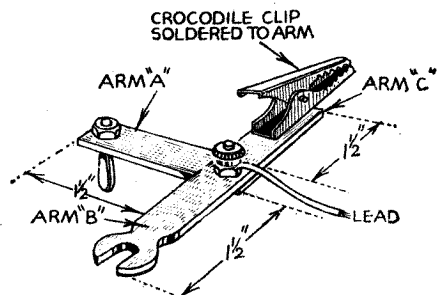
A Multiple Connector

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,

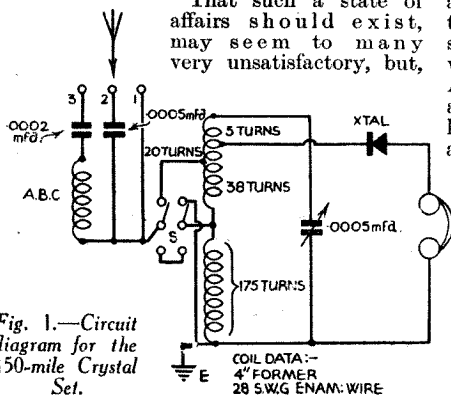


Fig. 1.—Circuit diagram for the 150-mile Crystal Set.

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 a couple of small bolts; 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.

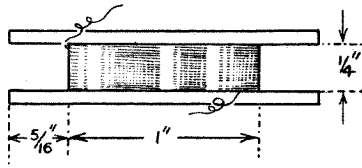


Fig. 2.—Former for the choke coil, A.B.C.

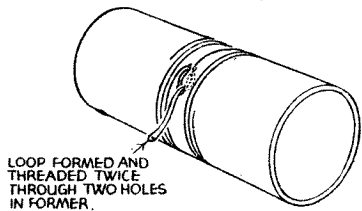


Fig. 3.—How the leads from the coil windings are brought out through the coil former.

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

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 3/4 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

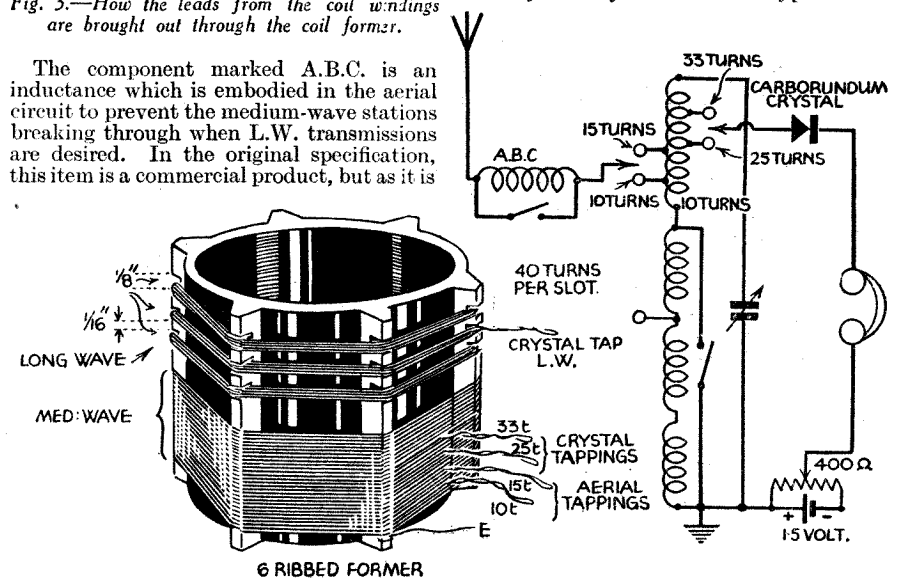
This receiver (blueprint number A.W. 444) was described in the issues of *Amateur Wireless* of August 4th and September 22nd, 1934.

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 1/4 in. in diameter.

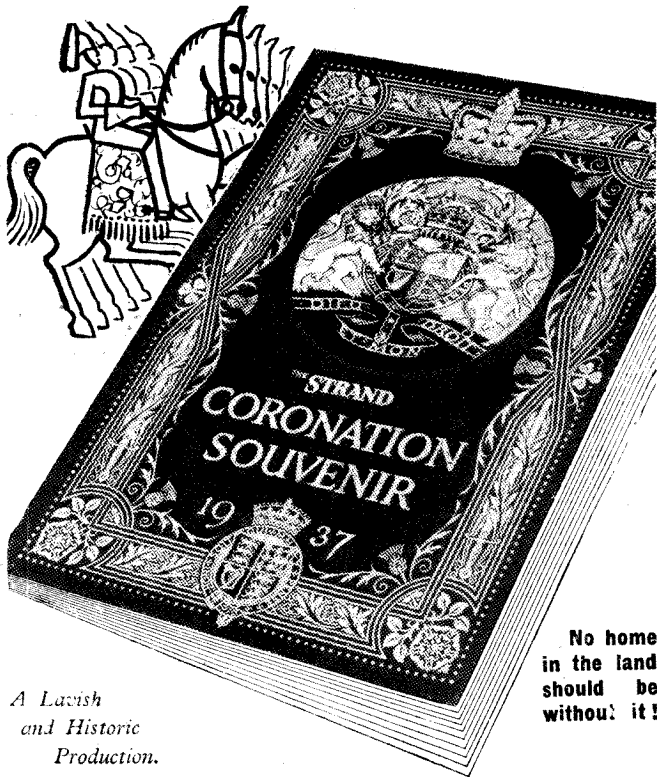
Tappings are taken at the points indicated in the diagram, and an anti-break through choke, the same as for the previous set, is included in the aerial lead, a switch being connected in parallel to cut it out of circuit when medium waves are being received. The wire required for the coil is 22 S.W.G., 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.



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

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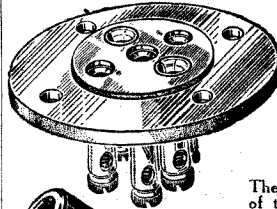
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A Single-valve All-waver

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 arrangement

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

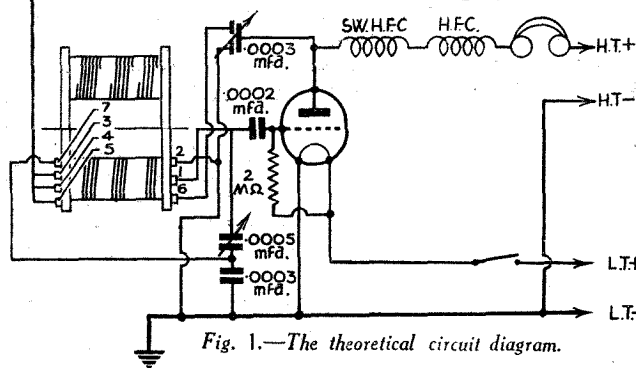


Fig. 1.—The theoretical circuit diagram.

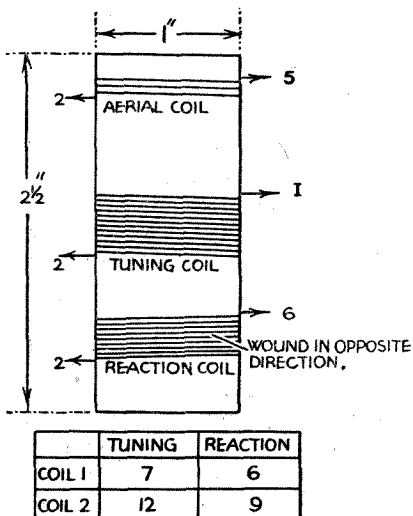
ment is quite conventional, except for the tuning unit, details of which are given so that this should present no difficulty.

The tuning unit consists of three coils wound on 1in. 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 1in. diameter and 2½in. long, four separating spacers being fitted ¼in. 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



AERIAL COIL — 3 TURNS.

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

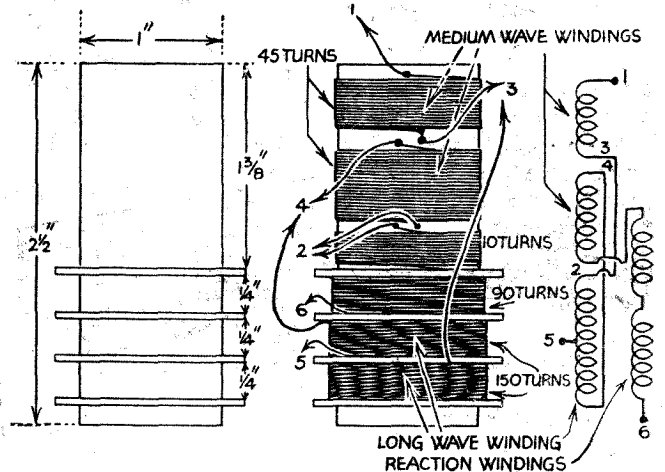


Fig. 2.—Details of coil former and windings for the medium- and long-wave coil.

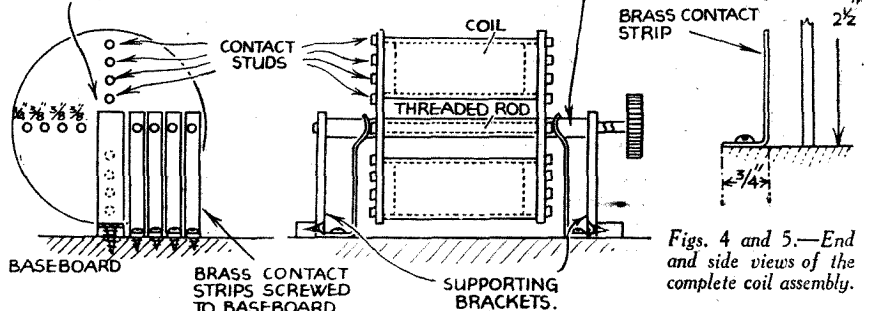
after winding 150 turns.

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

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

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



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

third slot, and the remaining 10 turns on 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.

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)

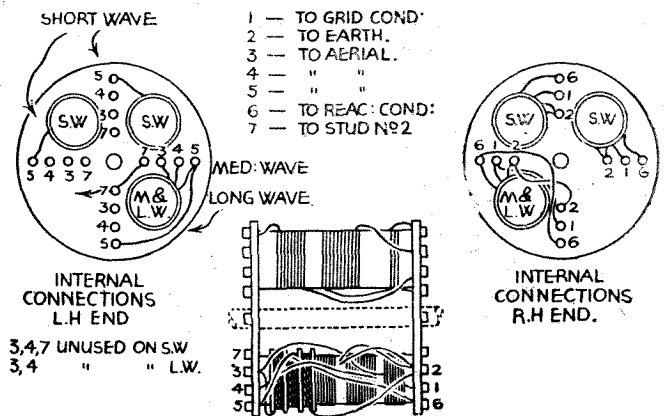
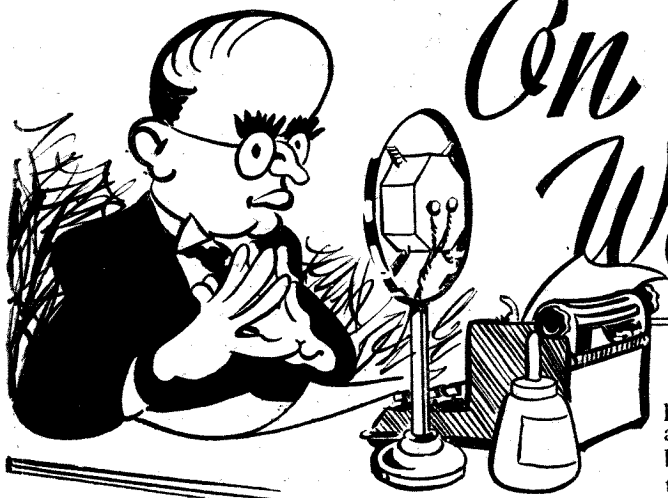


Fig. 6.—Showing the connections between the coils and contact studs.



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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

you can keep a good man down. I blame manufacturers as much as anybody for the fact that television has been kept back for at least three years. The Baird Company say that their installation at the Alexandra Palace was not of itself revenue earning, and their loss of the right to transmit from the London station will not affect the financial position of the company. It is, of course, very probable that they will transmit from some of the provincial television stations.

In my view, the Cossor system of transmission should be given a trial. Sooner or later the B.B.C. will find out that velocity modulation is the inevitable system for television transmission, and they should give it a chance to demonstrate its claims, equally with any other system. It had, in my opinion, a raw deal at the hands of the Television Committee.

Personnel of the B.B.C.

A PROPOS my recent note about our friends over the borrrrrrrrrrrrrrder, several correspondents have gleefully pointed to the fact that the personnel of the B.B.C. is largely Scottish, and they ask me why. I don't know. Sir John Reith is Scottish, and there are others I know in the B.B.C. who belong to the same race. It is perhaps a matter for inquiry as to why, if it is so, so many Scots are employed at the B.B.C. Some of my correspondents are suggesting that the first requirement before you can get a job there is that you must be Scottish, and I must say that on those occasions when I have had to ring up the B.B.C. I am answered by someone who speaks the dialect. The B.B.C. should be constituted of people best able to carry out the particular job. It probably is, but I am not one of those who subscribe to the doctrine that intelligence is indigenous to the soil of Scotland only. I know my Scottish friends think so, but I would respectfully suggest that they stayed at home in their own country, which is sadly in need of development, before gravitating to England, and telling us what smart Aecs they are.

There is no doubt at all in my readers minds that the fact of you being Scottish weighs heavily when applying to the B.B.C. for a job. Shall be glad to publish any reply they make.

Car Ignition and Television

THE methods used to overcome interference with television reception caused by the ignition systems of motor-cars and electro-medical apparatus, which was mentioned by



Notes from the Test Bench

Record Three Volume Control

SEVERAL readers have complained that the 50,000-ohm potentiometer fitted on their Record Three does not effectively control the volume. In most cases this trouble has been due to the spindle of the control being in contact with the supporting bracket, thereby earthing the centre tag. Insulating washers are supplied with the potentiometer, and these should, of course, be used to insulate the spindle from the bracket. If there is any doubt whether the spindle is effectively insulated the metallising underneath the bracket should be removed. If this does not provide a remedy the fault will probably lie in the potentiometer itself. This may be verified by removing the G.B.—lead from the end tag and the 50,000-ohm resistance from the centre tag, joining the G.B.—lead to the resistance, and then noting whether volume is progressively reduced as the plug attached to the G.B.—lead is moved upwards from the + to the -9 volt socket of the G.B. battery. If a progressive reduction of signal strength can be produced in this manner, but not by means of the potentiometer, it will indicate that the latter is faulty.

Limit Four Coils

IF trouble is experienced in obtaining medium and long-wave reception on this receiver, the switch tags at the base of the Wearite coil unit should be examined. We have found in some cases that these touch the metallised surface of the chassis when the coil unit is screwed down tightly. The clearance between the tags and the chassis is normally very small, and if a tag happens to protrude slightly it will touch the chassis and the coil winding to which it is connected will be earthed. To avoid the possibility of this occurring a piece of thin cardboard may be fixed underneath the coil unit.

Superhet Selectivity

IT is not generally realised that the selectivity of a superhet is governed to a much greater extent by the I.F. couplings than by the H.F. tuned circuits. Improving the selectivity of the H.F. circuits reduces whistles, due to unwanted signals reaching the frequency changer at the same time as the wanted signal, but the actual station spread is governed by the I.F. circuits. Selectivity may be improved by adding an extra I.F. stage or even by only adding an extra I.F. transformer. Another method is to provide a greater separation between the windings of the existing transformers.

Sir Noel Ashbridge, the B.B.C. engineer, in a lecture in London recently, were described by G.E.C. technical experts in an interview.

Normally within five or six miles interference is not serious, because the signal strength is so high, but farther out, especially beyond twenty miles, television receivers on main roads may be subject to considerable interference from motor-car ignition.

As it is not possible to fit every car with a suppressor, other means have been found to minimise the interference. The main method is to raise the signal input to the receiver by an "aerial array," i.e., an arrangement of reflectors and directors in conjunction with a dipole aerial.

There is an example of an array on the roof of Magnet House, the G.E.C. headquarters, where there was some interference from the Ophthalmic Hospital. This consists of three reflectors, one placed a quarter of a wavelength behind the dipole in line with the transmitter and two reflectors at the side of the dipole at a distance of half a wavelength. (The television wave length is approximately 7 metres.) Before the erection of the array, interference often completely spoilt the programme; now, it is practically negligible and the programme can be enjoyed.

Television Inquiry Bureau

OWING to the rapidly growing public interest in television, the General Electric Company has opened an information bureau at Magnet House, Kingsway.

"Since the reduction in the price of television receivers, inquiries from both the trade and the public have increased," said Mr. D. Murdoch, who is in charge of the bureau. "The most frequent inquiries are from the public to know if they are in the reception area. From our experience of installing sets up to fifty miles of Alexandra Palace, we are able to give them detailed information. We have also received many inquiries about the prospects of the Coronation ceremony being televised.

"We have discovered, rather surprisingly, that many misapprehensions about television still exist. A lady rang up to-day to ask what size of screen it was necessary to have in the drawing room: another inquirer thought that television provided still pictures like a magic lantern.

"We have also received many inquiries on transmission from the trade, which are dealt with by the technical staff."

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

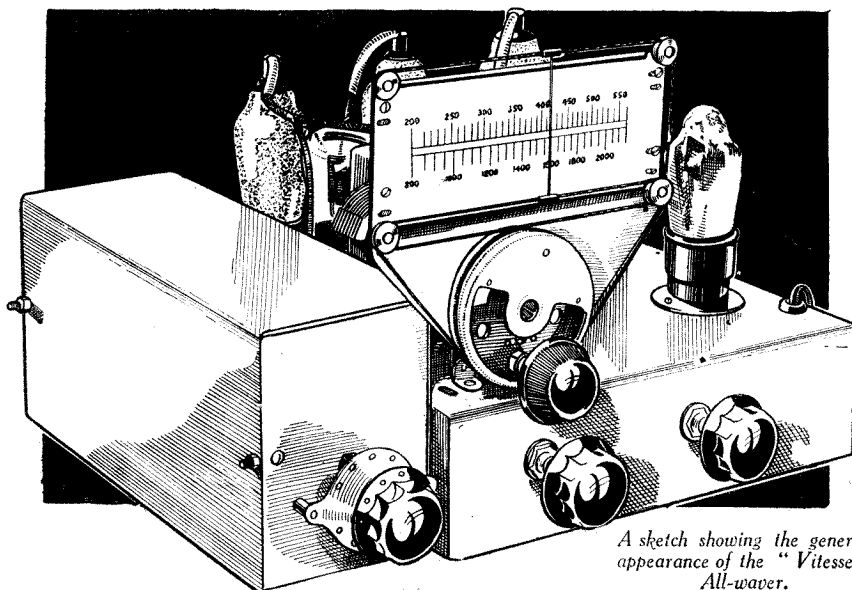
A BLUEPRINT FOR THIS RECEIVER — No. PW.75, MAY BE OBTAINED FROM THIS OFFICE — PRICE 1'

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.

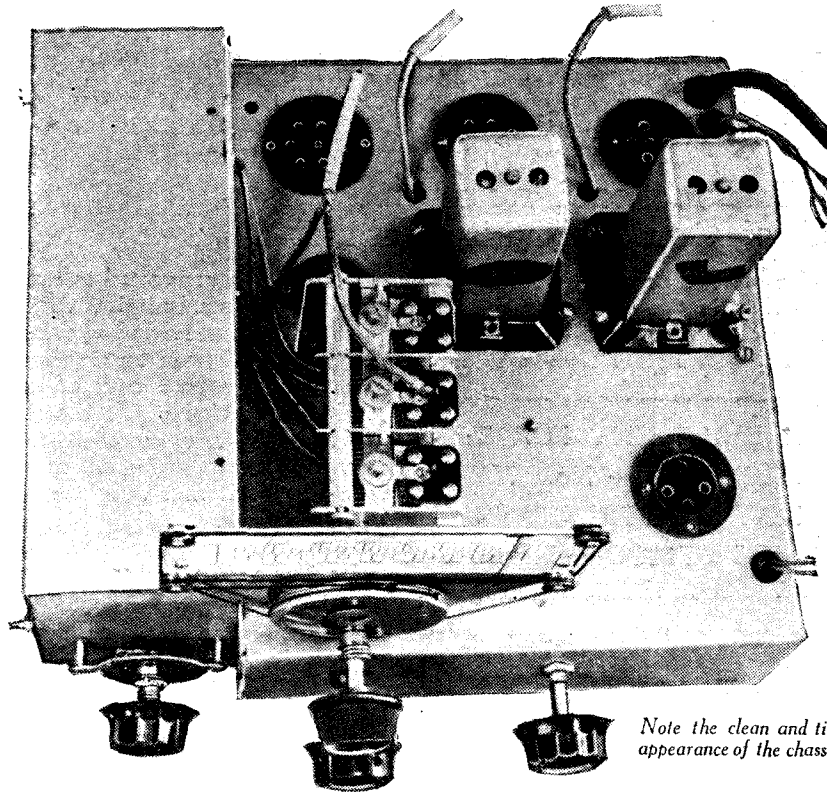
centre which is in contact with the centre section fixed vanes. Finally, make certain that the chassis is quite clean (scraping away the paint and any dirt which may be present) at the points where the ganged condenser and the earthing bolts are connected.

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.

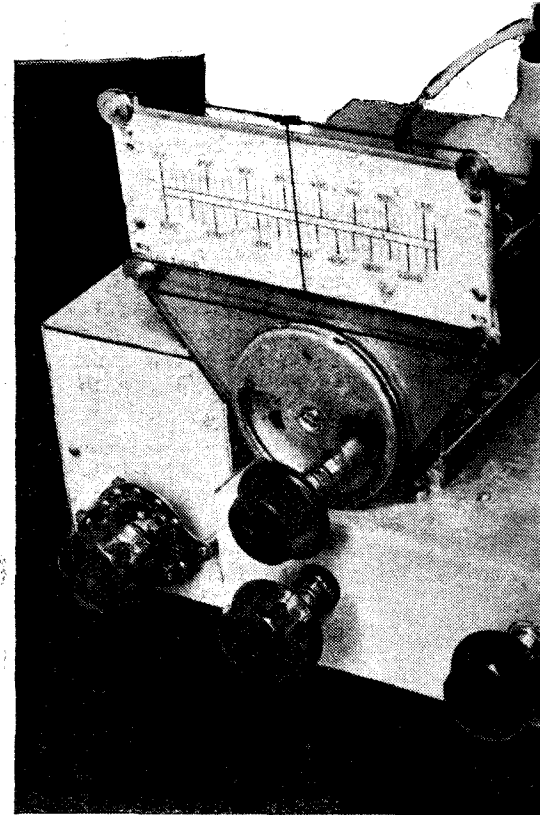
Adjusting the Receiver

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 HT 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



This is the receiver ready for

LIST OF CO

- 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)
 - Two .01 mfd. }
 - One .5 mfd. }
 - Four .0001 mfd., type M } T.C.C.
- Seven fixed resistors (½ watt type)
 - One 30,000 ohms
 - One 40,000 ohms
 - One .1 meg.
 - Two .25 meg.
 - One .5 meg.
 - One 1 meg. } Bulgin
- Two variable potentiometers; 500,000 ohms (type VS.63); 50,000 ohms (type VC.60) Bulgin

t 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,

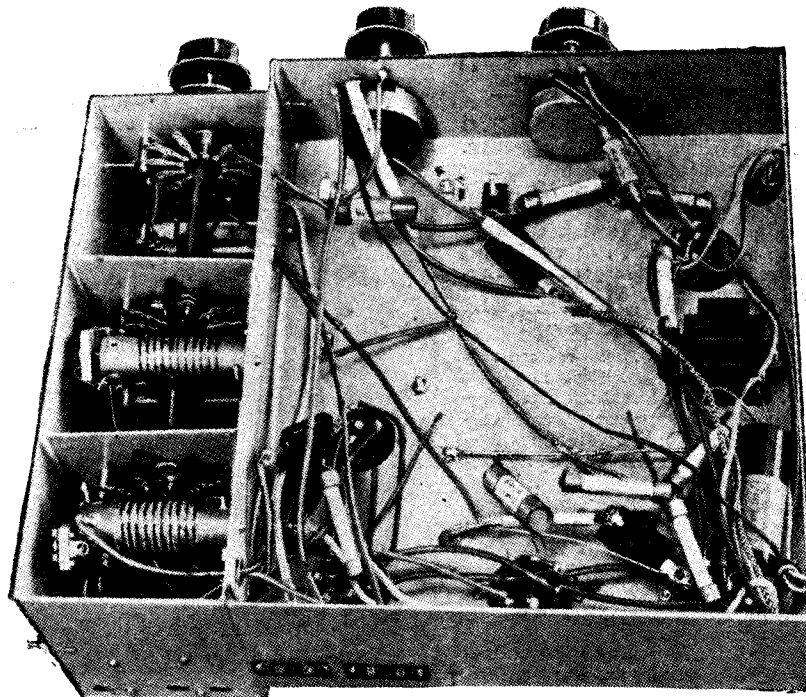
the switch operating after the first few degrees, and will be heard as well as felt in the finger tips. Turn the tuning control to a point on the dial

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



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 $\frac{1}{4}$ 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..... Bulgoin
- Five chassis type valveholders: two 7-pin, two 5-pin, one 4-pin..... Clix
- Two socket strips, A.E. and P.U..... Belling-Lee
- Two six-way battery cord 30in..... Belling-Lee
- One steel "Vitesse" chassis, ready drilled
- Peto-Scott
- Three Midget plugs: GB+, GB-1, GB-2
- 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.

EVENING INTERLUDE



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

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-

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.

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.

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 "fits-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 Gooden

Richard Gooden—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/-

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 £8/15/6, 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, £10/13/6, 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 3/8. **4/6 DOWN**

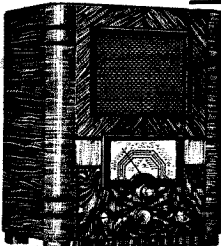
FINISHED RECEIVERS

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 Intermediates 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 18 monthly payments of 12/3.

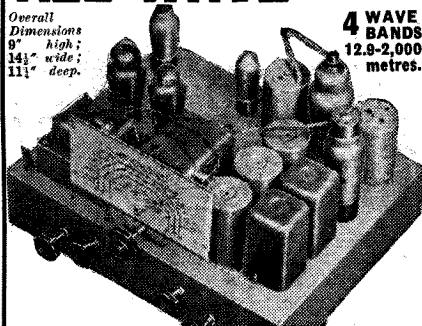
PETO-SCOTT 5-VALVE ALL-WAVE (A.C. Model)

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 1/2" deep.



4 WAVE BANDS 12.9-2,000 metres.

12 MONTHS GUARANTEE

WITH 6 BRITISH VALVES

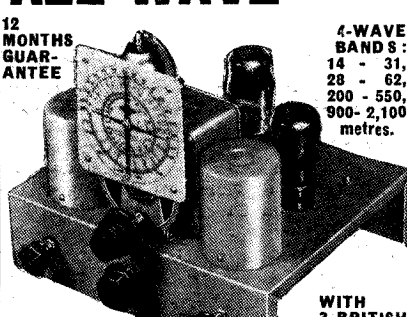
- 4 Wavebands : 12.9—35, 35—61, 200—550, 900—2,000 metres ● Inter-station noise suppressor ● Bandpass input ● A.V.C. ● Independent Volume and Tone Controls ● Station and wavelength calibrated dial.

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 L.F. Amplifier, resistance-coupled to a power triode output valve giving 2 1/2 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/-.

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● 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 Harries' High Efficiency distortionless output pentode. Variable selectivity by alternative aerial tapplings. 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 7/8.

5/- DOWN

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Peto-Scott Moving-Coil SPEAKERS!

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Latest 1937 model permanent-magnet M.C. Speaker. High fidelity reproduction. Suitable for all outputs. 3" diameter cone. List Value 32/6. Our price, 21/-. Cash or C.O.D. Carr. Pd., or 2/6 down and 8 monthly payments, 2/6.

2/6 DOWN

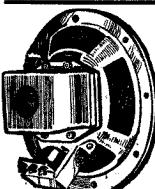
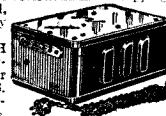
H.T. for only 1d. A WEEK!

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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 2/6 down and 8 monthly payments of 3/3.

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Practical Television

March 6th, 1937. Vol. 3. No. 40.

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 Heavyside 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.

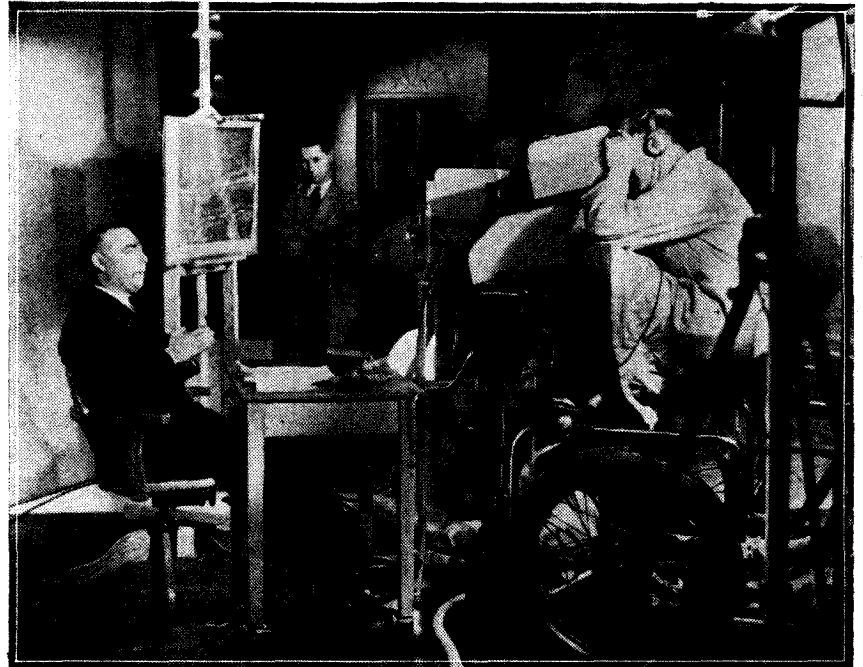
Use of "Echoes"

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.

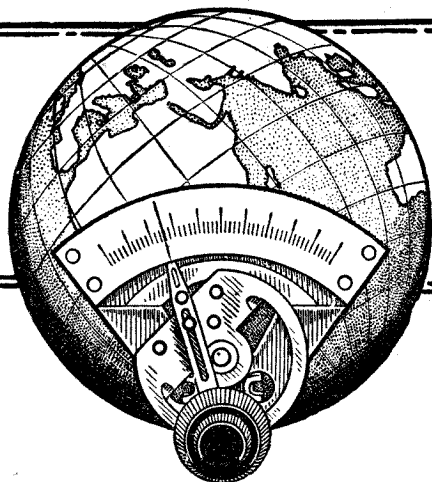
In Germany

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

LISTENING TO THE AMATEURS

Fascination of Amateur Reception : Method of "Calling" : The "Q" Code : A Suitable Circuit : Making the Coil By FRANK PRESTON

ESPECIALLY for those who hope eventually to take out a transmitting licence, there is a considerable amount of interest in listening to amateur transmissions. These are made on a number of channels, but the 20-metre and 40-metre bands are generally of greatest interest to the listener. On Sunday mornings these two bands are extremely busy, and listeners in any part of the country can be sure of picking up a number of transmissions at good strength. Those who have not yet tried it will find a considerable amount of fascination in "following" the two-way tests between amateurs situated miles, hundreds of miles, or even thousands of miles apart. In most cases it is possible to tune from one transmission to the other by moving the tuning condenser through a few degrees.

Exchanging Call-signs

It is usual for two or three amateur transmitters to arrange to chat together at a certain time. One of them starts by giving the call-sign of the station he is calling, followed by his own call. For example, British station G2XY might call British station G2YZ thus: "Hello,

has not arranged to "work" anyone in particular, and wishes to establish contact, or two-way working with another transmitter who might report on his transmissions, or on any particular tests which he wishes to carry out. At the end of each transmission the transmitter announces "G2XY now changing over," or "G2XY over to G2YZ—dah-de-dah." This means

the transmitting side, for he can follow the various experiments which are being carried out. In some cases, he can even take part in those experiments by sending a report of the reception to the transmitter concerned. Generally, it is of little use doing this unless the distance between the listener and the transmitter is more than a couple of hundred miles, but this rule is not

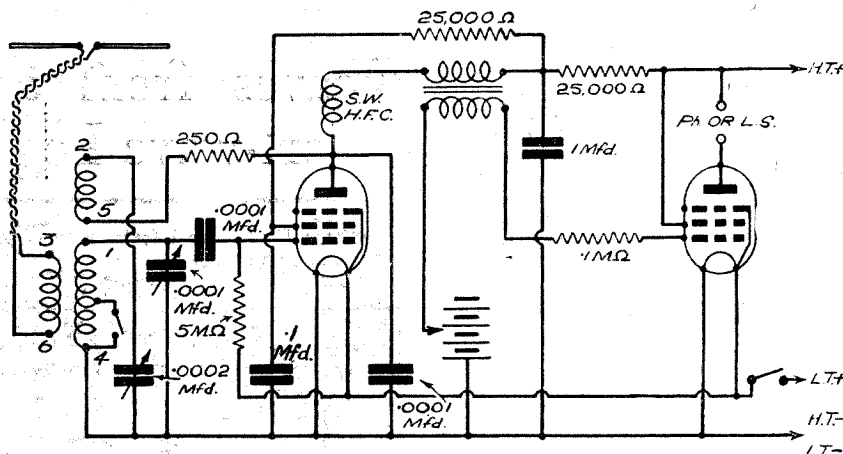


Fig. 1.—Theoretical circuit for a straight two-valver for the 20- and 40-metre waves.

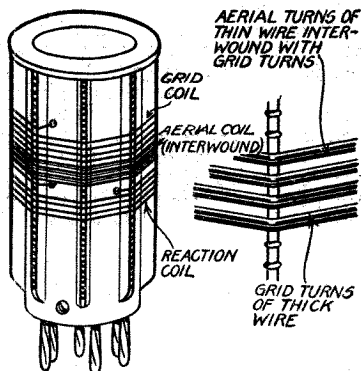


Fig. 2.—This shows the arrangement of windings for a six-pin plug-in coil.

that he is switching over from transmitter to receiver in order to pick up the signals of another amateur who might wish to give him a call, or with whom he is working. Incidentally, it should be mentioned that the international prefix (G for Great Britain, etc.) is not always given when two stations of similar nationality are working together.

Radio "Shorthand"

At first it will seem that several foreign expressions are included in the remarks of these very active transmitters, for one might tell the other that he is receiving his signals at R5 with slight QRM. This means that the signals are being received at fair strength, but that there is some interference. The meaning of the "Q" signs and of the "R" symbols were given in PRACTICAL AND AMATEUR WIRELESS dated May 18th, 1935, so there is no need to explain them fully here.

By following these transmissions the amateur can learn a good deal about

invariable and depends upon the nature of the tests. When valuable reports are received, the transmitter generally acknowledges these by sending a QSL (or reply) card, overprinted with his call-sign and giving brief details of his station. Additionally, he might give details of his times of transmission.

Names and Addresses

Names and addresses of almost every amateur transmitter in the world are given in the *Radio Amateur Call Book Magazine*, which is obtainable in this country from F. L. Postlethwaite, Esq., 41, Kinfauns Road, Goodmayes, Ilford, Essex, for 6s. post paid. This also gives all of the inter-

(Continued overleaf)

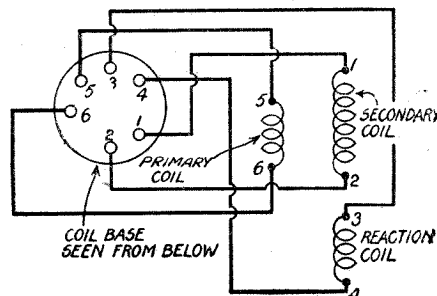
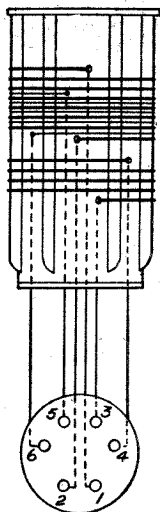


Fig. 3.—How the three windings are joined to the six pins of the coil former.

G2YZ, G2XY calling." [This is repeated several times, sometimes giving equivalent words in place of the call letters to avoid possible misunderstanding. Thus an amateur whose call is YT (preceded by a numeral) might give his sign as "Yokohama, Tokio." To the uninitiated this might give the impression that the transmitter is speaking from Tokio, when actually he is probably in Wigan. This arrangement will soon be understood by regular listeners.

In other cases, a transmitter might announce "G2XY calling test," or "G2XY calling CQ." This means that he

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

ON the upper section of the short-wave band two Venezuelans have made their appearance; they are YVIRC, 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 YVIRC to Apartado Postal, 261, Maracaibo, Venezuela. At Quito, Ecuador, HCIPM, *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, Podedbrady 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.

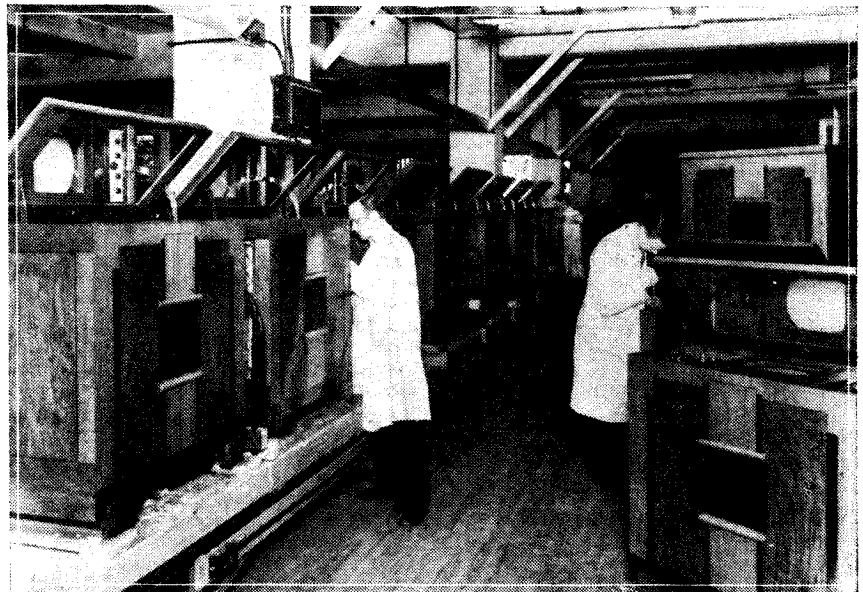
A Distant Call from China

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: Almagem



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 YVIRC 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.

NEW TIMES SALES BARGAINS

B.T.S. ADABAND

Adds the Short Waves to your Set

★ AMAZING BARGAINS

(Wavelength 13-74 metres)

List Price £6:12:6

BARGAIN

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Your set rests on top of the ADABAND BRINGS AMERICA to your present set! Simply stands beneath and plugs into your existing receiver, of almost any kind. Walnut veneered cabinet. Single tuning control... long, medium or short wave reception on one switch without disconnecting. Wavelength 13-74 metres.

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2/6
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2/6
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12-94 metres

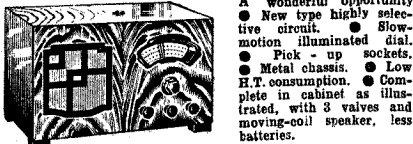


Comprises baseboard, 3 variable condensers, .0001, .0002 and .00015 M.F.D., on/off switch, L.F. Transformer, 3 four-pin holders, short-wave H.F. choke, 2 terminal mounts, 4 terminals, 3 fixed condensers, slow-motion drive, grid leak, connecting wire, 3 4-pin S.W. coils, and wiring diagram. Cash or C.O.D. Carriage Paid 27/6, or 2/6 down and 11 monthly payments of 2/6.

2/6
DOWN

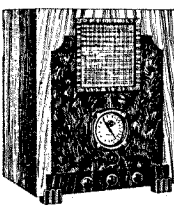
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"Gnome" Charger

FOR the battery user who wishes to charge his own accumulator there are many types of trickle charger available. The neatest which we have yet seen is illustrated below, and has been sent for review by Gordon Equipments, Ltd. This charger measures only 3 1/2 in. by 2 1/2 in. by 2 3/4 in., and is finished in a neat blue enamel. A substantial length of mains flex, fitted with a two-pin plug for connecting purposes, and two output sockets are mounted on the side of the charger. These are coloured red and black, and two wander plugs are provided for attachment to leads for subsequent connection between the accumulator and the charger. The casing is perforated to guard against overheating, and the charger incorporates a standard Westinghouse metal rectifier. The output is rated at .5 amp., and the consumption from the mains at about 5 watts. The charger has been tested and found to deliver 1/2 amp. without any suggestion of overheating. It is a neat and efficient unit, and should prove of great value to those who are not within easy reach of an accumulator charging depot. The price is 13s. 6d.

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

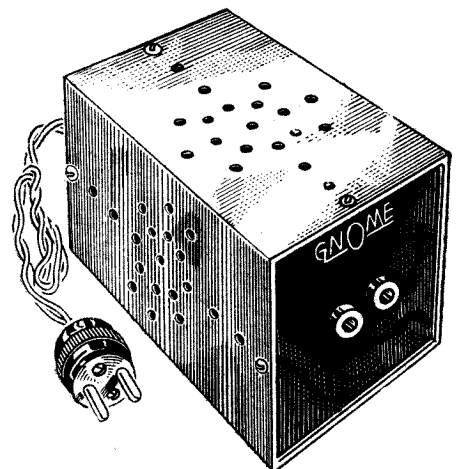
SOME new batteries are announced by the Ever Ready Company, and these include two new L.T. accumulators measuring 2 1/2 in. by 1 1/2 in. by 5 1/2 in., and 4 1/2 in. by 3 in. by 6 in. The first model is known as model J153 and costs 11s., whilst the second is model T284 and costs 12s. 6d. Two H.T. batteries 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 3/4 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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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. (Hull). 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 Edmendon). 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.

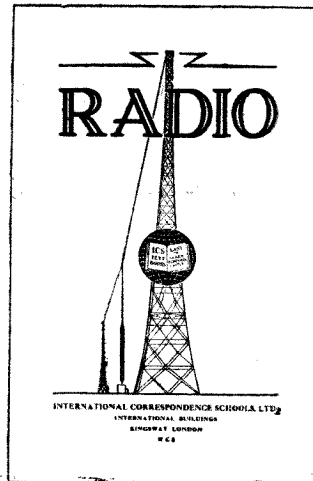
J.V. (Be'ness). There are several coils which answer to your description and the connections are all different. We suggest that you write to the makers and explain clearly the type of coil you have.

J. M. (Liverpool, 13). Any standard I.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, VE1E1, 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.), WIBLO, W2ASA, W2DX, W3FIH, W2XE (broadcast 13 m.), W3AIR, W1EQA, W2AKK, HB9AY, CTIAY, VEIGH, EI8G, EI9J, F8QD and SUIKG.—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. W81WG 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 Zeesen 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 1/4in. 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 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.

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. Trafford, 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, Stanmore, 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. Cholot. 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.

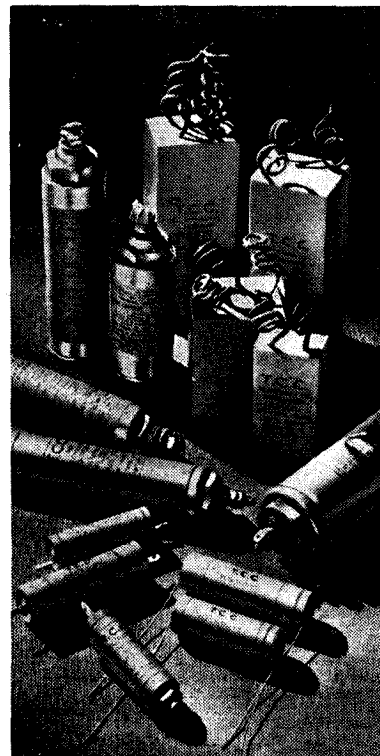
Radio, Physical and Television Society

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 loud-speakers 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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PRACTICAL WIRELESS.

Date of Issue. No. of Blueprint

CRYSTAL SETS.

Table listing various crystal sets with columns for description, date of issue, number of blueprints, and price. Includes items like '1937 Crystal Receiver', 'All-wave Unipen (Pentode)', and 'Superherts'.

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 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
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) — 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) — 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) 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
Minitube 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 WM381

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. Consolelectric Two (D, Pen) A.C. — AW493
Economy A.C. Two (D, Trans) A.C. — WM286
Unicorn A.C./D.C. Two (D, Pen) Sept. '35 WM394

These blueprints are drawn full size. Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, which are additional to the cost of the blueprint. A dash before the Blueprint Number indicates that the issue is out of print.
Issues of Practical Wireless... 4d. Post paid
Practical Wireless... 4d.
Practical Mechanics... 7d.
Wireless Magazine... 1/3
The index letters which precede the Blueprint Number indicate the periodical in which the description appears: thus PW refers to PRACTICAL WIRELESS, AW to Amateur Wireless, EM to Practical Electronics, 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.

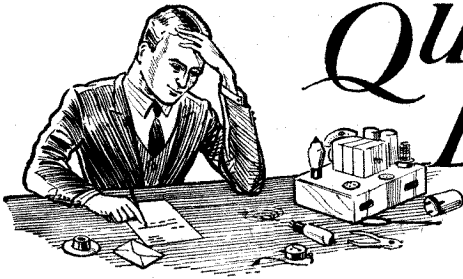
Table listing various wireless sets with columns for description, date of issue, and price. Includes items like 'Home-Lover's New All-electric Three', 'S.G. Three', and 'A.C. Triodyne'.

Table listing superherts and portable sets with columns for description, date of issue, and price. Includes items like 'Modern Super Senior', 'Varsity Four', and 'Midget Class B Portable'.

Table listing four-valve and two-valve sets with columns for description, date of issue, and price. Includes items like 'Midget Class B Portable', 'Holiday Portable', and 'Family Portable'.

Table listing one-valve and two-valve sets with columns for description, date of issue, and price. Includes items like 'S.W. One-valve converter', 'Rome Short-Waver', and 'Ultra-short Battery Three'.

Table listing miscellaneous sets with columns for description, date of issue, and price. Includes items like 'Enthusiast's Power Amplifier', 'Listener's 5-watt A.C. Amplifier', and 'Radio Unit (2v.)'.



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. (Leix).

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 fit 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...

RECEIVERS, COMPONENTS AND ACCESSORIES

RADIOMART SHORT-WAVE SPECIALISTS

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc.

TELESEN 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/S., 1F 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/-.

TILITY 2-gang uniknob 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.

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

BUSHBACK Wire, 6yds., 6d., heavy, 9d. Resincore solder, 8ft. 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/-, for 10/-; also 5/- parcels.

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

TILITY 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 1/4d. 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.

ALCO ELIMINATORS AND CHARGERS.—4 H.T. taps, 120v./150v., 20 ma./30 ma., 1s/-. With 1/2 amp. charger, 2s/-.; charger alone, 7/6; 1/2 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, 4/6 each. H.L.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.

BATTERY VALVES, 2 volts, H.F., L.F., 2/3. Power, Super-Power, 2/9. S.G., Var.-Mu-S.G., 4- or 5-pin Pentodes, H.F. Pens., Y.-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, 13-20, 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, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit, 2/6.

COIL FORMERS, in finest plastic material, 1 1/2 in. low-loss ribbed, 4- or 6-pin, 1/- each.

SUPER CERAMIC CONDENSERS, S. L. F., 00015, 00011, 2/9 each; double-spaced, 00015, 000025, 000015, 2/- each. All brass with integral slow motion, .00015 tuning, 3/9; .00015 reaction, 2/9.

H.F. CHOKES, S.W. 10-2000 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/-.

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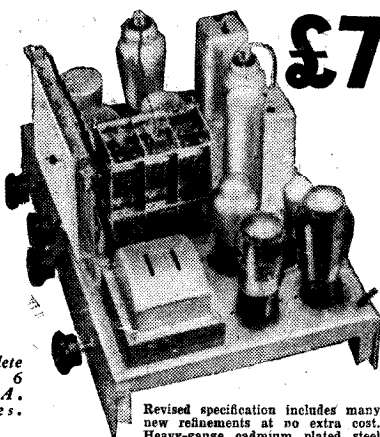
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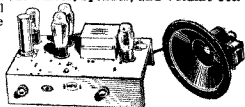
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