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How Much L.F. Amplification?—See page 273

Summer Radio

Although many listeners cut down their periods of listening during the summer months, there are many who make a practice of taking with them on outdoor excursions portable receivers or radio apparatus which has been adapted for outdoor listening. Portables have changed considerably in design and performance since the days of the "portable" set was introduced. At first the portables were anything but portable. Apart from their weight they were bulk and had to be transported and the batteries alone added considerably to the total load. The improvement in values enabled fewer to be employed with better results and gradually circuit improvements were introduced and weight and size cut down. From large wooden-cabinet constructions the design changed to "suit-case" models and has progressed to-day to extremely compact dimensions. The latest portables have been built round new valves which do not need an accumulator for heating the filaments, and a single small battery provides both H.T. and L.T. In this issue we give some of the more interesting data relating to a number of modern portables which do not need an accumulator for heating the, filaments, and a single small battery provides both H.T. and L.T.

More Uses for Radio

Radio, in the form of a remote-control device, has now been adapted for the testing of motor-cars. Recently at the Morris Works it was found desirable to test a new form of body construction. For this purpose two cars were taken, one with an old body and one with the new type body. The cars were started up and by means of a built-in radio control device the design changed to "suit-case" models and has progressed to-day to extremely compact dimensions. The latest portables have been built round new valves which do not need an accumulator for heating the filaments, and a single small battery provides both H.T. and L.T. In this issue we give some of the more interesting data relating to a number of modern portables which do not need an accumulator for heating the filaments, and a single small battery provides both H.T. and L.T.

Summer Variety Plans

Fifty-six different concert parties, broadcasting within a period of eight weeks, form the main feature of the B.B.C.'s plans for summer-variety broadcasts. John Watt, Variety Director, and Chief Producer, S. Pepper, began organizing the series months ago, in the dull drab days of winter. And, although there remains a considerable amount of detailed work to be done, concert party organisations, whose performances will provide one of the principal attractions at seaside resorts all over the country, have enthusiastically approved the general scheme.

Audimeter Tests

The B.B.C. are now using the audimeter in gauging the audience response in the new "I Want To Be An Actor" series. This device records the amplitude of applause and is switched on for 15 seconds at the conclusion of each turn, an accurate record thus being obtained, and the choice of the audience being correctly interpreted.

On Other Pages

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Finding an Ancestor

PETER WATTS, a writer new to radio, has written an entertaining programme entitled "Finding an Ancestor," to be broadcast on June 17th, describing two young people's search for an ancestor in order to prove their right to a fortune. He takes them first to Somerset House, then to a country churchyard, then to the Probate Registry, the reading room of the British Museum, and finally to the Public Record Office. In each place they ask a variety of questions and they, and listeners with them, pick up a great deal of interesting information. This is a feature programme treated in a new manner, cleverly combining fact and fancy. The producer will be Stephen Polder.

Entertainment Tour of Blackpool

The first big Blackpool "outside broadcast" of the summer season will be in place on June 9th, when the programme will consist of one of those very popular entertainment tours of places of amusement at this famous Lancashire resort. Harry Finch will be heard at the organ of the Empress Ballroom; Ernest Bina's show, "The Arcadian Follies," with Harry Corris heading the cast, will be visited by microphone for a short time; some of the variety acts from the Palace Theatre are to be heard. From the Central Pier, Tom Vernon's "Royal Follies" will broadcast, and an excerpt from the cabaret at the Pleasure Beach Casino will also be included. Victor Smythe is arranging the programme, which will have a special presentation in lyrical form by Frank A. Terry. John Woods Smith will be the entertainments compiler for this programme which is likely to maintain the entertainment standard of the many previous "tours" which Blackpool and the North Region have provided.

"The Frogs and the Ox"

"THE FROGS AND THE OX" is the fable which the North Region will contribute to "Roundabout" on June 7th. Produced by Martin C. Webster, it will be the sixth in the "Asop Retold" series which Henry Reed, who is responsible for both dialogue and music, writes in the "Silly Symphony" manner. These fables programmes are very freely based on Asop stories, and they have amusingly characterised animal and bird voices.

Cricket Commentaries

COMMENTARIES during the second day's play of the Glamorgan v. Nottinghamshire and Yorkshire v. Hampshire matches will be given on June 5th by E. W. Swanton from St. Helen's Ground, Swanpen, and P. G. H. Fendal from the Bramall Lane Ground, Sheffield. Commentaries on the third day's play will be given on June 9th.
ROUND the WORLD of WIRELESS (Continued)

Ultra-Low Power

A NOTABLE achievement by a Danish short-wave amateur, OZ-DR479, has just been reported. He has constructed a portable 1.2 watt, 112 mc/s transmitter-receiver from which R6-S9 reports have been obtained over a distance of nearly 20 miles.

Radio Progress in Greenland

Radio-Communications facilities in Greenland have advanced considerably during the past year, and the country now possesses 23 radio stations which handled 17,000 messages last year. The first four native operators have just qualified for their licences, and four other Eskimos are taking a radio course which was opened by the Danish Colonial Office early this year.

Worth its Weight in Gold!

JESSEY BURNS, WNL-WSAI special event announcer, refuses to join in the general praise of pets. "My Cocker spaniel," he said, "is the dumbest creature that ever lived. He eats too much and sleeps too much, he weighs too much and that ever lived."

The Thin Red Line

NUMBER nine of the series entitled "The Thin Red Line," will be broadcast in the Regional programme on June 4th, when listeners will hear the history of the Gloucestershire Regiment. Rich though their history is—a glance at their Battle Honours will verify its richness—the programme to be broadcast will deal principally with their history during the Great War, when they fought in France, Italy, Greece, Gallipoli and Mesopotamia.

Studio Variety

FOUR artists will broadcast in a variety programme from a Birmingham studio on June 7th. Courtney Hope, of Welllington, borough, who is well known as a J.P. and as a producer in Northamptonshire, will give some chauvinistic studies; Dorothy Parsons, of Coventry, will entertain as a silesse; Fred Adcock, one of Jack Wilson's Versatile Five, is to bring his Rhythmic Violin; and Jim Collier, the

INTERESTING and TOPICAL NEWS and NOTES

Music by Eric Coates

ERIC COATES will conduct the B.B.C. Orchestra on June 9th in a pro-

gramme of his own works, including the first performance of a concert waltz, "Footlights." A selection of his songs will be sung by Gunda Hall (soprano).

Melville Gideon's Melodies

THE third of the series reviving popular melodies by Melville Gideon, in which the melodies are played and sung by Harry Evans, will be broadcast in the Western programme on June 5th.

R.A.F. Life at Catterick Camp

AN unusual but topical "actuality" feature will be broadcast in the Northern programme from North York-

shire's great military headquarters, Catterick Camp, on June 7th, when Victor Smythe is to present a programme about the life of Royal Air Force men. The broadcast will be made from records secured at Catterick, and will provide a picture of the work and play of the Junior Service's young men—of the mechanics and riggers, no doubt, as well as the pilots.

Music from the Seaside

A SIGN of the arrival of the summer season is the frequent appearance in Northern radio programmes of popular orchestral concerts from seaside piers and entertainment halls and from inland resorts. Broadcasts of this type will be given on June 5th, when Jan Hurst and his Blackpool North Pier Orchestra will broadcast in the Regional and later in the Northern programme, and when the Municipal Orchestra, conducted by Louis Cohen and led by H. S. Cropper, will be heard playing from Harrogate's Valley Gardens. Northern listeners on June 6th will also be able to listen to the orchestra at Scarborough Spa, conducted by Kneale Kelly.

SULVESTHIS!

PROBLEM No. 350

Bentley had a small firm of three A.C. mains self- contained receivers in which the quality was not at all what he desired. He decided that by converting the pentode output stage to pushpull he would improve quality, and accordingly he bought another similar pentode valve, con-

verted the transformer secondary to push-pull working by the old dodge of placing two resistances across it, and used the push-pull connections already provided on his loud-

speaker. He found, however, that results were no better—if even as good—as with the original arrangement. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 350 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, June 5th, 1939.

Solution to Problem No. 349

Instability was the cause of Burrows' trouble, and when the choke was screened this reduced the in-

stability, but owing to the decrease in the inductance of the choke this reduced the in-

duced signals. It was necessary to restore the stability by converting the pentode output stage to push-pull working by the old dodge of placing two resistances across it, and using the push-pull connections already provided on his loud-speaker. He found, however, that results were no better—if even as good—as with the original arrangement. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 349 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, June 5th, 1939.

Dance Music from Buxton

BUXTON, Derbyshire's famous spa, will be on the air early on Wednesday evening, May 31st, in the North Regional programme, with a half-hour broadcast by the Lyrians Dance Band from the Palace Hotel, Buxton.
TESTING BY SHORT-CIRCUIT

A Simple Explanation of a Method of Isolating and Tracking Down a Faulty Component by Systematic Short-circuiting of Different Sections of the Complete Circuit

If you have not previously given thought to the question, you will probably be surprised to find how many faults can be traced and tests carried out by short-circuiting components or sections of the complete circuit. One obvious example is in connection with the on-off switch; absence of contact, causing failure of the set to operate, or dirty contacts which give rise to crackling noises, can easily be checked by connecting a short piece of wire between the two terminals. It is hardly necessary to emphasize that when the receiver is mains-operated the power supply should be turned off at the wall switch before making the test.

The only objection to making tests by the short-circuit method is that, if they are carried out carelessly there is a danger of a component or the power supply components being damaged. This is mentioned rather as a warning than as a deterrent to the use of this simple method of testing, however.

Tracing the Cause of Noises

When a receiver is "noisy"—that is, when "hissing" or "cracking" background noises are troublesome—it is often fairly easy to find which component is at fault by short-circuiting parts of the circuit in turn. Thus, in dealing with a simple three-valve H.F. receiver with a circuit similar to that shown diagrammatically in Fig. 1, the input valve and speaker would be checked by short-circuiting the secondary of the L.F. transformer by connecting a lead between the points marked a, a. Should the noises cease after this has been done it will be fairly certain that the fault is in the component on the H.F. side of the set; to the left of the points a, a, in the circuit diagram. If the noise is unchanged the output valve and speaker would come under suspicion, and the speaker could be tested very roughly by connecting two leads from it to a 4.5-volt dry battery. An intermittent connection between the speaker or the transformer would probably be indicated by a "fizzing" sound. Should the speaker be O.K., the valve would be suspect. There is also the possibility of a fault in the H.T. or L.T. circuit, but that would in all probability be suggested by a diminution in noise level after shorting the transformer secondary.

Working Backward

Were it found that this test did not yield any useful result, the primary winding of the transformer—points b, b—should be shorted, as a test for the transformer and other components in the detector anode circuit. A further test could be made by short-circuiting the H.F. choke and decoupling resistor in turn. Before shorting this resistor in a mains set it should be ascertained that an excessive H.T. voltage will not be applied to the detector valve.

Should it have been found that there is no appreciable difference in noise level after making the tests so far described it would probably be advisable to short-circuit the grid winding of the detector valve, by joining together the two points marked e, e in Fig. 1. This would still leave the aerial-earth and I.F. circuits out of action, but if the noise was heard (and assuming it was not heard when b, b were shorted), it would suggest a probable fault in the grid condenser, grid leak, valve, or connections to one of these. Tests would, therefore, be confined to this section of the circuit, all wiring being examined and new parts temporarily substituted if possible.

The H.F. Circuit

If the noise had been inaudible during all three short-circuit tests already mentioned the next step would be to short-circuit the input tuning circuit between the points marked d, d in Fig. 1. Recurrence of the noise would then indicate a fault in the H.F. valve, or the components in series with its electrodes. Disconnection of the screen grid from the fixed potentialmeter and connecting it directly to a tapping on the H.T. supply would temporarily eliminate the two resistors, and a test of the H.F. choke in the anode circuit could be made by bridging its terminals. To test the efficiency of the coupling in the input coil by transferring the aerial lead, with series condenser in circuit, to the top of the grid winding.

The complete H.F. stage can be virtually cut out by connecting the lead to the anode terminal of the H.F. pentode; thus, if the receiver works better, or not less satisfactorily, with the H.F. stage eliminated it can be fairly certain that there is a defect in one or more of the components in it. As a further check it might be useful to take the aerial connection to the top end of the coupling winding of the inter-valve H.F. transformer, or even to the grid terminal of the detector valve. Incidentally, it should be remembered that low signal strength might be due to a fault in the aerial-series condenser which can be tested by short-circuiting. This is not advised, however, in the case of a D.C. set where the positive main is earthed.

Superhet Tests

When dealing with a superhet many of the tests described can be applied, but there are a few additional points to watch. For example, you cannot very well transfer the aerial lead to the grid of an I.F. valve or

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Fig. 1. Some of the points at which short-circuit tests can be made in a simple H.F.-Det.-L.F. circuit are shown here, and are indicated by letter references.
TESTING BY SHORT-CIRCUIT (Continued from previous page)

The method illustrated in Fig. 2 eliminates both frequency-changer and I.F. stages, and does not, therefore, narrow down the field, in which the fault probably lies, to a very great extent. It is, of course, possible to connect the lead from the input tuner to the grid of the I.F. valve, after breaking the original grid lead, but it is then necessary to replace the second I.F. transformer by a tuner or by a choke-capacity coupling circuit, consisting of an H.F. choke and a 0002-mfd. fixed condenser. That is a clumsy method, but one which is applicable when no other is possible. At the same time it would not assist in tracing a fault in the I.F. transformer, which is put out of circuit.

Checking the I.F. Stage

Another alternative method that can be used when testing a superhet, when the oscillator section is suspected, or when it is desired to eliminate the I.F. stage, is to short-circuit the oscillator grid circuit and to connect a tunin circuit or a choke-capacity filter in the anode circuit of the H.F. pentode section of the frequency-changer and to take a lead from this to the grid circuit of the second detector (after having broken the original grid lead). The effect of this is to convert the receiver to a "straight" one with H.F., Det., and L.F. stages. The method is easily applicable only to receivers having a triode second detector, and cannot well be employed if a double-diode-triode valve is used for this position. In fact, many of the tests described in this article would be totally inadequate for other than a receiver of the simple type. Nevertheless, it will be found that by making slight modifications to the methods outlined, similar tests can be applied to many sections of almost any receiver circuit.

Caution

It should be stressed once again, however, that short-circuit tests should always be carried out with care, and made only after it has been seen exactly what components are being bridged. For this reason it is a good plan to compare the points in the set with the representations on a circuit diagram.

Fig. 2. The method of using a simple superhet as an H.F.-Det. circuit for test purposes, is shown by a broken line in this skeleton circuit diagram.

NEWS FROM THE TRADE

Philips' Change of Address

A S from Monday, May 22nd, the address of Messrs. Philips was changed from Charing Cross Road to a new eight-storey building at the end of Shaftesbury Avenue, W.C.2. The telephone number—Gerrard 7777—remains unchanged.

"All-Dry" Exide Batteries

The introduction of special portables using valves operating with dry battery L.T. supplies has led to a demand for special batteries combining H.T. and L.T. supplies, and in the Drydex range the following new models are now available:

<table>
<thead>
<tr>
<th>Cat.</th>
<th>List Dimensions</th>
<th>Description</th>
<th>No.</th>
<th>Price (atith &amp; 6d.)</th>
<th>L.T.</th>
<th>H.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1480</td>
<td>2/6&quot; 5 1/4&quot;</td>
<td>22&quot;</td>
<td>2-pin socket base</td>
<td>600</td>
<td>15v.</td>
<td>1.5v.</td>
</tr>
<tr>
<td>1481</td>
<td>3/9&quot; 5 1/4&quot;</td>
<td>25&quot;</td>
<td>2-pin socket</td>
<td>600</td>
<td>15v.</td>
<td>1.5v.</td>
</tr>
<tr>
<td>1482</td>
<td>10&quot; 21&quot;</td>
<td>11&quot;</td>
<td>4-pin socket</td>
<td>900</td>
<td>15v.</td>
<td>1.5v.</td>
</tr>
<tr>
<td>1483</td>
<td>2/6&quot; 4&quot; 24&quot;</td>
<td>22&quot;</td>
<td>2-pin standard socket</td>
<td>15v.</td>
<td>1.5v.</td>
<td>L.T. American No. 742</td>
</tr>
<tr>
<td>1484</td>
<td>3/9&quot; 5 1/4&quot;</td>
<td>21&quot;</td>
<td>2-pin American socket</td>
<td>15v.</td>
<td>1.5v.</td>
<td>L.T. American No. 732</td>
</tr>
<tr>
<td>1158</td>
<td>2/6&quot; 21&quot;</td>
<td>24&quot;</td>
<td>2-pin socket base</td>
<td>45v.</td>
<td>1.5v.</td>
<td>L.T. American No. 742</td>
</tr>
<tr>
<td>1159</td>
<td>3/9&quot; 4&quot; 25&quot;</td>
<td>25&quot;</td>
<td>2-pin socket base</td>
<td>45v.</td>
<td>1.5v.</td>
<td>L.T. American No. 732</td>
</tr>
</tbody>
</table>

Roter C ters

ELECTRO DYNAMIC CONSTRUCTION COMPANY, of St. Mary Cray, Kent, have produced a new leaflet describing rotary converters and similar apparatus for radio. The "Popular Instrument Guide" occupying three pages, has been brought up to date and a section relating to petro-alternator sets has been modified. Copies of the leaflet are obtainable on application to the firm at the above address.

Rider Chanalyst

SERVICE engineers who are in search of a really reliable, foolproof and simple piece of servicing apparatus, should write to Messrs. Holiday and Hemmerdinger, Ltd., of 74-78, Hardman Street, Deansgate, Manchester, for a copy of the leaflet, describing the Rider Chanalyst. This is a modern service instrument with which it is possible to explore every portion of a circuit in a receiver by means of five separate channels. It includes an RF-IF channel; oscillator channel; L.F. channel; wattage indicator; electronic voltmeter; and self-contained power supply.

Mastering the Morse Code

In connection with the article on this subject which was given in our issue dated May 20th last, we should like to take this opportunity of pointing out that some useful Morse keys and associated apparatus may be obtained from Electradix Radios, of 218, Upper Thames Street, E.C.4. Buzzers from 9d. upwards; keys from 3s. 6d., or complete Practice Outfits at 4s. 6d. or 12s. 6d., are some of these lines. Side swing bug keys may be obtained for those who prefer this type at 70s., and there are also some high-class special police keys beautifully made, at 42s. each. For practice on the lines indicated in the article there are some tape Morse recorders for radio to 30 w.p.m., and of these Messrs. Electradix have a number which are partly incomplete, at reasonable prices. Paper tape reels are available, at 6d., and special perforators may also be obtained.
Modern Aerials and H.F. Coupling

(Concluded from page 250, May 27th issue)

TWO further examples of high-frequency coaxial cabling are given in Fig. 7, showing the different commercial methods for obtaining low attenuation, and at (a) it will be seen that the conductors are centred in narrow longitudinal fins, which, in turn, are set in "Telemax" tubing, which provides protection mechanically, and also from the hygroscopic aspect.

The twin-feeder type cable shown is critically balanced, and the insulation properties assure absolute protection against deterioration from external influences of gaseous and moist atmospheres.

Steel Tape Armouring
For conditions where flexibility is not an essential consideration, but where protection against deterioration from external influences is of primary importance, the finish is armoured by steel tape, whilst for more ordinary uses such as television installation, etc., a very flexible cable of the same basic characteristics is available.

The air-spaced disc conductor type, illustrated in Fig. 7 (b) is an interesting comparison, and a product of the same company: the Telegraph Construction and Maintenance Co.

The centre conductor is centred in this case by what are known as "Polystyrol" discs. This is a synthetic substance possessing very good electrical characteristics for high-frequency work.

The attenuation of such cables at certain frequencies is determined on a comparative basis over a given length, and the graph in Fig. 8 shows three types of cabling, "A, B and C."

It will be clear from the curves that the air-spaced type "C" has a much more constant performance with very low attenuation, whilst the solid dielectric type "A," although within very good limits for this class of cable, shows a steady increase in attenuation as the signal frequency increases.

The curve "B" is included to show the gradual straightening out of the curve as the dielectric constant is improved. This curve is characteristic of the semi air-space type coaxial cable.

In conclusion, there is one particularly interesting aerial installation which illustrates the modern trend of design to obtain the greatest efficiency consistent with mechanical stability, ease of erection, and control.

Fractional-wave Conductor
The type illustrated in Fig. 9 is of the uni-directional class, and it will be seen that six fractional-wave conductors of the telescopic type are used, mounted horizontally on a framework of wood.

The assembly, as shown with the quoted conductor lengths, is for 10-metre work, and can be made up from kits of parts supplied by "Premax," whilst if desired for a different form of installation, the required parts only may be obtained individually.

The wooden framework is of unique design, and for durability a careful choice of the type of wood which will weather considerable temperature variations and climatic conditions was made by the manufacturers during the preparatory stages in the design.

The telescopic corulite conductors can be obtained double ended, the limits of each end extension providing a maximum length of 17½ ft.; this double-ended type is depicted in the inset diagram (a) Fig. 9.

Reverting to Fig. 2, it will be seen how two of the single type corulite tubes may be used for a simple vertical reflector system.

On referring to the specification of the system illustrated in Fig. 8, it is interesting to note that with one such scheme used for reception in America recently, it was found possible to separate three stations working on the same frequencies with practically the same intensity, the only adjustment necessary in this instance being the rotation of the framework.

PATENTS AND TRADE MARKS
Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.
PORTABLES are extremely popular at this time of the year, and as size is one of the main considerations our "Parvo" Flyweight Midget has proved a great success. Accordingly, all copies of the issue in which the constructional details were given are now out of print. As blueprints are still available, however, we give here with some of the more important constructional data to enable those who wish to build this receiver to carry out the necessary work, in conjunction with the blueprint. A list of components is attached and the circuit shows that the main detail is the employment of a special type of input tuning device. It is unusual to use a dual-wave frame aerial, covering medium and long waves, but almost as good results may be obtained in a portable by using only a medium-wave winding, adding to this for long-wave purposes a high resistance. A value of 1 megohm is employed in this receiver and it is shorted by the wave-change switch exactly as in the case of a standard dual purpose aerial. The remaining details are quite clear—a midget coil being used for the coupling between the H.F. and detector stages.

Tuning
The frame aerial winding is tuned by one .0005 mfd. tuning condenser, and the interwave coil by a second condenser of the same value. They are not ganged, nor do they have any common connections. The aerial winding is arranged on the interwave coil, and provision is made for the addition of a throw-out aerial where it is desired to improve the strength of signals. A midget high-efficiency speaker is fitted—one of the well-known W.B. products. The layout is extremely simple—a small metal chassis being used with a wooden panel. Four ordinary screws are driven into the panel to accommodate the frame aerial winding, and this is simply pile wound.

Construction
Coming now to the actual constructional work, this will be found extremely simple, and at the same time interesting, on account of the very novel form taken by this particular receiver. It has already been explained that the frame aerial is wound on the panel, and the theoretical diagram shows that the coil and the L.F. transformer are provided with colour-coded leads in place of the more usual terminals. This has been done in order to reduce weight and to avoid making extra connections, as the makers have already connected leads to the components, and as shown in the diagram these are coloured for identification. The chassis is supplied by the makers ready drilled, and the only components to be mounted upon it are the L.F. transformer, valveholders and the coil. Nuts and bolts should be used for these, and the frame aerial and condensers, which are mounted on the front, should not be attached until the panel has been finished. Therefore, the wiring should be commenced as soon as the main chassis-mounted components have been fitted in position.

Frame Aerial
It has been stated that the frame aerial is wound on screws fitted to the front of the very novel form taken by this particular receiver. It has already been explained that the frame aerial is wound on the panel, and the theoretical diagram shows that the coil and the L.F. transformer are provided with colour-coded leads in place of the more usual terminals. This has been done in order to reduce weight and to avoid making extra connections, as the makers have already connected leads to the components, and as shown in the diagram these are coloured for identification. The chassis is supplied by the makers ready drilled, and the only components to be mounted upon it are the L.F. transformer, valveholders and the coil. Nuts and bolts should be used for these, and the frame aerial and condensers, which are mounted on the front, should not be attached until the panel has been finished. Therefore, the wiring should be commenced as soon as the main chassis-mounted components have been fitted in position.

One midget loudspeaker, type 37M (N.B.), 7s. 0d.
One pair headphones (B.T.S.), 7s. 6d.
One metal chassis, 6 lin. x 4 in. (Peto-Scott), 7s. 6d.
Two switches, type S.22 (Bulgin), 2s. lid.
Three valveholders, midget type:
One .0003 mfd. Compax reaction condenser (C4) (T.C.C.), 5s. Od.
One .0001 mfd. (C5), .005 mfd. (C7), .5 mfd. (C6)
One two megohm variable (C1 and C2) (Polar), 5s. 0d.
One .0001 mfd. (C3), .0002 mfd. (C8), .0005 mfd. (C9) (T.C.C.), 5s. 0d.
One .0002 mfd. tuning condenser (C1 and C2) (Polar), 5s. 0d.
One terminal socket strip (A.E.) (Belling-Lee), 9d.
One .0001 mfd. Compax reaction condenser (C6) (T.C.C.), 5s. Od.
Two fixed condensers (tubular type): .0005 mfd. (C3), .0001 mfd. (C5), .005 mfd. (C7), .5 mfd. (C4) (T.C.C.), 5s. 0d.
Two resistors, 1000 ohms (R1 and R2), one 15,000 ohms (R3) (Bulgin), 5s. 0d.
One 1 megohm high resistance.
One L.F. transformer, type L.F.33 (Bulgin), 7s. 0d.
One terminal socket strip (A.E.) (Belling-Lee), 9d.
Three valveholders, midget type: two 4-pin, one 5-pin (G.A.), 7s. 0d.
Two switches, type S.22 (Bulgin), 2s. 10d.
Three resistors, 680 ohms (V1), 4200 ohms (V2), 10,000 ohms (V3) (Hive), 4s. 6d.
One 5.6 mfd. and panel 6 lin. x 7 lin. (Peto-Scott), 7s. 6d.
One set of leads, 4lin. x 6lin. x 2lin., and panel 6lin. x 7lin. (Peto-Scott), 7s. 6d.
One midget loudspeaker, type 37M (W.B.), 7s. 6d.
One H.T. battery (72 volts), type H1139 (Eidele), 10s. 6d.
One 3 A.H. accumulator, type PRP3 (Eidele), 10s. 6d.
One cabinet (Peto-Scott), 19s. 6d.

Theoretical circuit diagram of the "Parvo" Flyweight Midget Portable.

Long-wave Reception
It will be noted that the frame aerial is wound only for the medium waves, and thus for long waves the resistance in series is used as a loading component. This has proved quite satisfactory in use and saves the constructor a considerable amount of difficulty in winding the aerial. Obviously, to obtain maximum results under these conditions a throw-out aerial is desirable, and it will be noted in the diagram that a fixed condenser, C1, has been included between the frame-aerial winding and the aerial socket. The value given in the diagram and list of parts is .00005 mfd., but if any difficulty is experienced in obtaining a tubular condenser of this type, some ordinaly types of condenser may be used, or some other value tried. In some parts of the country it may be found that best results will be obtained with some alternative value, and up to .0002 mfd., may be tried.

Similarly, the earth connection may be connected to some earthed body in order to obtain greater signal strength, although, again, much will depend upon the location where the set is being used.
ON YOUR WAVELENGTH

Television and the Theatre

The P.M.G. recently received a deputation headed by Mr. Walter Paye, to represent the effect of the development of television on the living theatre. The deputation, which included representatives of managers, artists, musicians and theatrical employees in the various branches of the entertainment industry, made representations as to the detrimental effects which they claimed that television would have on entertainment given by the performer in person. They placed before the P.M.G. certain suggestions, the adoption of which would, in their opinion, ameliorate the conditions and prevent an undue increase in unemployment in the theatre. The P.M.G. promised to give full consideration to the views expressed by the deputation and to bring them to the notice of the Television Advisory Committee. Later he received a deputation from cinema interests concerning the development of television in relation to the cinema. He promised that all aspects of the question would be considered by the Committee, and he would not lose sight of their representations.

I now ask the Postmaster-General to give due consideration to my views. They are these. For nearly five years television has been throttled by one interest and another, and it will not be tolerated that older interests shall continue to hamper the new science. I would remind the P.M.G. that conditions to-day would be impossible if the Government had listened to representations made by the stage-coach interests, and as a result had suppressed the railways. We should not have had motor-cars if the horse-drawn vehicle had been granted a monopoly in perpetuity. There comes a time in all industries when the old must give way to the new. That time, as far as the theatre is concerned, is now. The theatre has developed from the open-air performances of Shakespeare's time. The theatre has progressed to a point where it is becoming obsolescent. It is now inconvenient for busy people to have to travel to a theatre, park cars, and scramble for buses and trains in order to see a show.

By Thermion

This is the era of mass-produced entertainment when a central bureau, as with sound broadcasting, can bring the entertainment into every home. The P.M.G. will be well advised therefore, to give due consideration also to the needs of the public as distinct from the needs of the few. The deputation from the cinema industry included representatives from the Cinematograph Cinemas Association, and the Cinematograph Renters Society, and at the conclusion of this discussion the deputation undertook to submit a re-statement of their considered views.

The theatres should not be unmindful of the fact that a lot of money has been spent in developing television, and no-one has yet made any money out of it. I warn them that if they oppose television they will add to their burdens, for the simple fact is that you cannot hold back scientific developments; nor do I believe that television will compete with the theatre. When broadcasting commenced it was thought that it would kill the sale of gramophone records, and that it would prevent people from going to the theatres. We know that has not happened.

How to Run a Wireless Club

A list of the clubs has been published in this journal on many occasions. As this movement is growing, it is necessary to state that unless new societies are run on sound lines, they will not only compete with existing clubs, but will be short-lived. A society cannot exist for very long unless its organisation is planned on a sound basis and the finance is placed on a sure footing. If there is a club in the district, I do not advise the formation of another. Presuming, however, that there is not a club in your district, and that you desire to form one, the first thing to do is to write a letter to this journal, and to the Editor of your local paper, inviting the publication of a notice asking local readers to get into touch with you. The next step is to call a meeting which should not be held at a private house. The local Parish Rooms, or other premises apart from a public house, should be booked. If possible, induce some well-known local man with a knowledge of wireless to take the Chair.

Put the scheme for the club into the form of an agenda before the meeting to avoid waste of time in discussing generalities. The first thing is to get someone to propose that a wireless club be formed, and that the name of the club be . . . . . . . (name of town) wireless club.

Next fix the amount of the annual subscription. These formalities having been arranged, the meeting should appoint a Hon. Secretary, who should immediately begin to take notes of the proceedings with a view to writing the minutes. These consist of a brief statement without comment of the various propositions, with the name of the proposer and seconder, and the result of the voting. Do not think that a record of the accepted motions will suffice. At some future date you may want to refer to a proposal which was defeated on a vote.

The Chairman will be wise to allow a general discussion. This will give those present an opportunity of showing their ability, and airing their knowledge, and thus guide the meeting when the time comes to elect the officers and committee. This should come next, and it should be followed by a discussion on the rules. It is probably wiser to elect a pro-tem. committee with power to draw up a list of suggested rules, and submit them to a further general meeting.

During the interval it is presumed that those present will talk about the club to their friends, so that the second meeting should secure a larger attendance than the first. Beware lest your club develop into a one-man affair, for this is always possible when the idea of the club arises in the mind.
Notes from the Test Bench

Inter-connecting Leads

When using a metal chassis it is customary to drill small holes through which inter-connection leads are passed. In most cases the constructor simply slips a short length of insulated sleeving over the wire and endeavours to make this fast in the hole. The idea is, no doubt, on an economy basis, but there is a risk of the sleeving slipping and a short-circuit resulting. Similarly, where a ragged hole is left and sleeving is used for the full length of the lead, there is also a risk of a short-circuit developing through the sleeving being cut through. A good plan, especially where high voltages are being carried, is to use two or three pieces of sleeving, each of slightly larger diameter, slipping these one over another and wedging them into the hole, a spot of Chatterton's Compound serving to hold them firmly in place. As an alternative sealing wax may be used, but it is liable to chip off.

Testing Condensers

A READER recently asked what he thought to be a most difficult problem. He pointed out that when testing a condenser (without a condenser bridge) it would be impossible to state whether or not the condenser was internally open-circuited, or even whether there was nothing at all inside the case. At first sight it might appear that if one made a test it could be met, but if it is remembered that a good condenser will pass alternating current it will be seen that it is by no means difficult to test such a component. In its simplest form all that is needed is to connect a battery to one side of an ordinary L.F. transformer and to connect the condenser and a pair of 'phones in series across the secondary of the transformer. If the battery circuit is made and broken quickly, the surges on the secondary will give rise to clicks in the 'phones, only if the condenser is intact. A D.C. test will enable one to see if it is short-circuited and thus the "goodness" of the condenser may be ascertained with certainty.

Using Old Valves

A READER recently tried to use an old valve as a half-wave rectifier in a mains set, having, he declared, once read that this could be done. The idea is certainly applicable to good power or L.F. valves, using them as half-wave units (ignoring the grid connection), but an old valve may be lacking in emission and therefore useless for the purpose. The note which he had read probably inferred that unused valves, not odd in the sense of decrepit, could be used in the manner indicated.

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Chairman must keep order and see that the speakers are not interrupted. No member should be allowed to speak more than once on a proposal, except the proposer, who has a right to reply to the arguments before the motion is voted upon.

The Chairman may accept an amendment to a proposition; this must be proposed and seconded, and, after discussion, put to the meeting and voted upon. Whilst it is an amendment it may not in its turn be subjected to amendment, but if it is carried it must then again be put to the vote as a substantive proposition, and in this form it is subject to amendment. It is presumed that the Chairman will have qualified for his position, and his experience will enable him to guide a meeting without dictating its policy. He must be firm on matters of procedure and not afraid of ruling a speaker out of order if he is infringing the rules of debate. Many clubs have a rule which compels a member to attend a certain number of meetings. Here with a model set of rules:

1. That the club be called the radio club.
2. That its annual subscription be payable on Hon. members. New members to pay an entrance fee of Members whose subscriptions are not paid by cease to be members.
3. That the management of the club shall be vested in a committee consisting of the officers, the auditor and six other members, six to form a quorum. Such shall be elected annually at the A.G.M., when the balance sheet, prepared by the Hon. Treasurer and duly audited, shall be presented.
4. That the committee shall meet once a month or upon receiving four days' notice in writing from the Hon. Sec. Any member of the committee absenting himself from three consecutive meetings without explanation shall be deemed to have resigned.
5. That in the event of any member acting in a manner detrimental to the club the committee shall have full power to deal with the matter.
6. Any twelve members shall have the power to call a special general meeting upon written request to the Hon. Sec.
7. Candidates for membership shall be proposed and seconded by two members of the club.

Other rules will no doubt be added to suit local conditions.
MANY constructors appear to have the opinion that the amplification of a signal is simply a question of adding valves to an existing circuit. They seem to think that the process can be carried on indefinitely, and that any odd type of valve will do in the intermediate and/or output stages, while many more are under the impression that if a valve is classed as an output valve, it can handle whatever power you care to inflict on it.

This statement can be substantiated by the number of queries the PRACTICAL AND AMATEUR WIRELESS Query Service is called upon to deal with, and the flood of diagrams which seem to roll in at frequent periods for checking. Diagrams of amplifiers using several intermediate stages, invariably transformer-coupled, with a poor little power valve on the end, presumably having elastic sides, otherwise it would never cope with the signal voltage it would get from the preceding stages of the wonderful circuits worked.

Every would-be designer, and every constructor who is at all interested in this, should tackle the question of getting out his own circuits, and must realise that a valve can handle only a certain amount of work and, if you start giving it more than it can normally handle or more than it is designed to cope with, it will make every attempt to get on with the work; but something will suffer. The quality of the output will be the first thing and, secondly, it will start to crack up under the strain.

If a little consideration, plus even a smattering of elementary knowledge of the operation of a thermionic valve, is applied to the circuit under design, it will soon be appreciated that for any given operating conditions or particular type of valves a certain maximum input and output only can be handled, without running the risk of overload and introducing the consequent distortion and strain on the valve or valves.

Stage Gain

Every valve has what is known as an amplification factor and, ignoring for the purpose of this article any of the deeper technical considerations, this factor plays a very important part in the amplification which will be obtained between the input applied to its grid and the output taken from its anode circuit.

Too Little Consideration is Given by the Average Amateur to the Question of Stage Gain when Designing the L.F. Portion of a Receiver, so L. O. Sparks stresses the Main Factors which Must be Recognised if Quality is Required

Take the simple circuit shown in Fig. 1, which is used purely to make this statement more clear. Assume the valve to have an amplification factor of 20. If a signal having a value of 1 volt is applied to its grid, it would be natural to think that it would be amplified twenty times, and that 20 volts would be available at the anode for passing on to the next stage.

Such an arrangement, if possible, would be ideal, but, unfortunately, there are other things which have to be considered.

Impedance

Every valve has a certain internal resistance known technically as its impedance. This impedance, the same as the resistance in any ordinary circuit, imposes a certain amount of work on the valve, and results in a voltage loss.

Referring to the diagram, the resistance R1 represents the impedance of the valve, while R2 is used to denote the anode load resistance of the external circuit. It can be considered for our purpose as the anode resistance of a resistance-capacity coupling, ignoring any additional external resistance.

The signal voltage which will be available at the anode for passing on to the next stage is directly proportional to the ratio of the external resistance, i.e. R2 to the total resistance of the circuit, i.e. including the valve resistance. Suppose, for example, that R1 and R2 are equal, or in other words that R2 is half of the total resistance.

Bear in mind the above, a volt is now applied to the grid the resultant voltage due to the amplification of the valve will be split up between R1 and R2 to the extent of 10 volts only being available across R2. With this arrangement, therefore, it would appear that the efficiency is very low, but in practice it is possible to increase the effective amplification by increasing the value of the anode load resistance, although it is not usually possible to get more than, say, 60 to 75 per cent. of the total magnification of the valve.

Many might ask why not increase the anode resistance to such a value that would give even higher magnification. This can be easily answered by asking them to remember that a D.C. voltage has to be applied to the anode of the valve, from the usual source of high tension, through the anode resistance, and according to the current flowing so will a voltage drop be produced across R2 which would tend to starve the valve if the resistance was too high in value.

The actual voltage drop can be calculated from the simple formula:

\[
\text{voltage dropped} = \frac{1,000}{1,000 + \text{R1}} \times \text{HT} 
\]

VOLT.

\[
\text{HT} = \text{L.F.}
\]

\[
\text{L.F.} = \text{R2}
\]

\[
\text{R2} = \frac{\text{HT} \times \text{voltage dropped}}{10}
\]

Fig. 2.—By using L.F. choke coupling excessive voltage drop in the anode circuit is avoided.

Choke and Transformer

This defect can be overcome by using a suitable L.F. choke or transformer in the anode circuit of the valve. Either of these components will have a comparatively low direct current resistance, but by virtue of the impedance which their windings would offer to the alternating current which forms the signal, they will produce a similar effect, as far as allowing the signal voltage to be developed across them, as the anode resistance.

In the case of the L.F. transformer, however, one must take into consideration the additional amplification produced by the ratio of the primary winding to the secondary, and as this is invariably of a step-up order, it will be appreciated that a greater overall amplification will be obtained than with a normal resistance-capacity coupling.

It would appear from this that the transformer method is the most efficient, but it in turn suffers from a certain defect when the question of quality of reproduction is taken to a fine point.

For reproduction offered to an alternating current by an inductance varies with the frequency of the signal, and therefore causes uneven amplification over the complete musical scale.
A Possible Repercussion

According to a well-known film authority in the United States the development of television in that country may have repercussions on the film output. It was suggested, therefore, that instead of the double programme picture in cinemas there was a possibility of the supporting film being replaced by televised entertainment. In any case, however, the exhibitors have been urged not to show any traces of nervousness at the impending wide scale expansion of television, as the industry itself used to a system of appreciably electronic scanning moving in the opposite direction at the same rate. The consequent effect was the appearance of a stationary electronic disc having one set of apertures occupying a smaller area nearer to the centre than the second set. Alternate sections then corresponded to the images seen by each eye, separately, and these pictures were reproduced on a geometrically similar disc having one set of apertures occupying a semicircle punched nearer to the edge than the other.

Film Television

The televising of films, although at first thought to be a matter that could be solved by a simple and direct solution than studio scenes, has proved a difficult matter due to inherent defects in the form of electronic apparatus employed. These troubles can in certain cases be overcome by employing the image-dissector tube where there is an absence of tilt and bend, but the Columbia Broadcasting System of America claim to have perfected yet another form of stereoscopic viewing. The suggestion was to use a double spiral scanning disc having one set of apertures occupying a smaller area nearer to the centre than the second set. Alternate scans then corresponded to the images seen by each eye, separately, and these pictures were reproduced on a geometrically similar disc having one set of apertures occupying a semicircle punched nearer to the edge than the other.

Stereoscopic Suggestions

With the increasing improvements which are being effected with normal monochromatic television, many suggestions are being put forward in various quarters for televised pictures having stereoscopic effects. With Baird's experiment scheme he employed a double spiral scanning disc having one set of apertures occupying a smaller area nearer to the centre than the second set. Alternate scans then corresponded to the images seen by each eye, separately, and these pictures were reproduced on a geometrically similar disc having one set of apertures occupying a semicircle punched nearer to the edge than the other.

B.B.C. Staff and Television

In order to acquaint producers of sound programmes with the technique of television production, B.B.C. staff will from time to time be seconded to the Television Department at Alexandra Palace. Accordingly Mr. Val Gielgud, Director of Features and Drama, will be temporarily transferred for six months, as from July 1st next, to the Television service. During this time Mr. Gielgud will act as a television producer, so obtaining practical studio experience. It is hoped that Mr. Gielgud will be only the first to have the opportunity of television production under working conditions.

During Mr. Gielgud's temporary absence, Mr. Manny McCauley, Assistant Director of Features and Drama, will be in charge of that Department.

June 3, 1939

Sections. A manual controlled compensator permits adjustments to be made to allow for any film shrinkage, and ensures that the optical and mechanical frequencies, are maintained in correct synchronism.

B.B.C. Staff and Television

Although the intensive research work now being undertaken with all forms of monochromatic television is in no way being relaxed, it is also evident that colour television has gone beyond the speculative stage. In every country where television's development is being undertaken on any substantial scale, a certain amount of attention is being directed towards the achievement of good colour television pictures, for just as in the cinema industry it is realised that colour pictures of a high quality are what the public are looking forward to, so with television the ultimate aim must be full natural colour with stereoscopic vision. Only the other day Mr. Baird, who has been a pioneer in this particular field, stated that this aim would eventually be realised, but quite wisely he refrained from attempting to link this up with any forecast of the time that must elapse before that period occurred. It is useful to remember, however, that subjects with less picture detail can be watched in comfort if colour is present, whereas with a black-and-white reproduction this would not be so. Many people have already been undertaken to prove that this is the case, and this is important because of the frequency band available to television transmission. In Baird's original colour television experiments he used the three primary colours of red, green and blue, but in more recent work these have been replaced by one of these three colours in turn. To give the same number of complete pictures per second, therefore, whether red, green or blue, the speed of the frequency band transmission should have been increased three times in order to use the single transmission channel. In practice this was found unnecessary owing to many parts being common in the three-coloured television system and doubling the picture speed was found quite satisfactory. The same phenomena prevailed with the big-screen colour demonstrations at the Dominion Theatre, London. Although only of 120-line definition, since the pictures were built up from red and blue/green filters, the resultant picture gave a more pictorial effect to the audience than a black-and-white one of the same line standard. It is certain that even with the frequency band available for to-day's television pictures a changeover to colour television, if such a course were possible, would undoubtedly bring about an improvement in the impression made on viewers with domestic sets. These factors are being borne in mind by present-day investigators and will manifest themselves in a really practical way as soon as technical work on colour television has progressed a stage further.

Volume 4. No. 154
A Handy Lever Switch

A disused seven-pin valveholder can be utilized for making a useful switch, as shown in the accompanying sketches. The top disc is removed and the existing holes used to take four studs. A contact bar is next fastened in one of the holes left by the heater sockets, and with an insulated sleeve attached to the end of the arm a toggle type of switching is obtained. The disc is attached to the inside of the cabinet or to the chassis by using existing fixing screw holes. A slot will, of course, be left by the heater sockets, and with an insulated sleeve attached to the end of the arm a toggle type of switching is obtained. Several uses can be made of the switch which, while being simple to make, is only 3 in. in depth and 13/4 in. in diameter.—J. Tyrells (Elmton).

A Remote-control Device

I recently found it necessary to use a remote control for a battery set, and I made the effective device illustrated herewith. The coil is energized and the strip is withdrawn from the cog wheel, the motor then turning the key which presses on the contacts. This switches on the L.T. In my case the H.T. was separately controlled as it was used with an H.T. eliminator, but the key could be provided with a cross piece to operate two contacts placed side by side, these being placed one slightly in front of the other so that H.T. and L.T. would be switched on separately with the necessary slight delay. There is no stop mechanism, the push-button of the remote control circuit being released when the set is heard to “click” on. Pressure again causes the motor to turn the key and switch off. A good contact surface must be used to avoid loss of current in the L.T. supply.—D. R. Stewart (Newport, Mon.).

A Dual-purpose Combined Tuning and Reaction Drive Assembly

When building a new short-waver recently, I decided to incorporate a rubber novel and efficient system of tuning and reaction control using friction drive throughout. In the diagram it will be seen that with the aid of two toy wheels of the rubber-tyred type, and a spring-controlled driving member of ebonite, a dual-purpose action is obtained. The normal tuning drive reduction is done through the cyclic movement (ratio No. 1), and to obtain still finer tuning it is only necessary to press in the reaction and fine-tuning knob which engages the ebonite drive with the rubber-tyred wheel, giving ratio No. 2, as indicated in the illustration. To ensure a smooth control at this point, two slip washers “W” are provided, as shown. On removing one’s hand from the fine-tuning knob this drive restores to normal, engaging with the reaction wheel under the pressure of the spring, this giving reduction for the reaction control. A backlash-free movement is obtained by using brass shaft bushes “B,” whilst the method of fixing the wheels is simple, and will give quite satisfactory stability. The remainder of the assembly detailing is clearly shown in the sketches.—F. D. Lennox (Sittingbourne).

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A NEW OUTLOOK

By S. Watt

July 3rd, 1939

A Summary of the Utility and Portability of Portable and Transportable Radios

For Car Use

Although from the question of size and weight, they very conveniently fit in with the average requirements of portability from the angle of home use.

It is interesting to recall the time when it was possible to anticipate very closely the performance of a receiver, judging purely by the number of valves, the style of component layout and the size of the H.T. battery. This is by no means the case to-day; the improved valves, the considerably reduced dimensions of the component parts used in the present-day chassis, permitting far more involved circuits to be embodied with fewer valves and without appreciably increasing the weight or size of the set.

Whilst the advance made in component technique has resulted in smaller resistances, condensers, tuning inductances, transformers and chokes, the efficiency of their characteristics has been very greatly improved. Consequently, component limitation which previously had to be resorted to keep the weight and proportions of the receiver down, consistent with the efficiency of the circuit, has been almost completely obviated, any sacrifice from this aspect to-day having negligible effect on the function of the circuit whilst in many instances improving the utility of the set.

H.T. and L.T. Supply

The question of aerial and H.T. and L.T. supply still furnishes plenty of food for thought, although the vast improvements made in battery design again has resulted in the production of small cells having more constant capacity, with obvious ability to handle heavier loads for a greater period of use. This means that the deterioration in performance of a receiver through feed-back trouble which gives rise to instability and calls for considerable decoupling, is reduced to a minimum.

The aerial system in the majority of truly portable designs, where chassis congestion results in the close proximity of certain sections of the receiver to the frame aerial, still necessitates some experiment on the part of the designers to prevent that which was referred to just now—component interaction—but this, by systematic layout and incidental position of the affected parts, seldom proves a serious set back.

T.R.F. Circuit

For quality reproduction with a reasonable degree of selectivity, the straight T.R.F. type of circuit lends itself admirably from the point of view of portable design, and this is therefore widely employed, whilst for a greater receptive range with the same degree of quality, and to incorporate refinements such as A.V.C., the superhet type of circuit is essential.

All-wave reception, which has found its way into the portable class, adds to the steadily increasing list of improvements witnessed in the design of these sets, possibly making the portable unique in demonstrating the development of radio technique.

Short-wave reception requires the most critical attention to detail and component efficiency if the best results are to be obtained.

The moving-coil speaker and the improvements made in the output circuits by the introduction of multigrid valves for increased output and greater selectivity, is another of the considerations which bring the portable up to the standard type in merits of performance.

Midget M.C. Speakers

In this respect, the perfection of the midget type of moving-coil speaker plays an important part, permitting remarkable results to be obtained from the smallest of receivers, whilst box resonance and the like is counteracted with the result that the larger receivers provide considerable volume with a comparatively low order of H.F. From this aspect emerges the fact that quite a margin of economy exists with regard to the drain on the H.T. battery; thus by carefully distributing the load, it is possible to use a smaller battery with consequent advantage from the point of view of true portability with good quality reproduction and selectivity.

Mains-operated portables really come under the category of the transportable, in a car not fitted with suitable noise suppression equipment, and it may be of assistance here to point out that, in many cases, the degree of interference will be almost negligible with other frame-aerial operated receivers or portables working from an external aerial system, although in the latter instance the susceptibility of ignition radiation through the chassis of the car will be greater. The frame aerial can in noticeable cases be used to advantage directionally, rotating in the desired position possibly reducing sensitivity to the signal being received, and increasing the volume control.

Holidays, A.R.P. requirements, the sick bed, cycling, and other activities find the demands for radio for entertainment or educational value, answered by the wide variety of types of receivers now available, but it is wise to plan for the contemplative purchaser of a set to determine beforehand the conditions of use to which the receiver will be subjected. He or she may then obtain the most suitable type of receiver for the purpose; a portable, which, for example, is being taken on extensive touring, will require to be thoroughly foolproof, and able to stand up to varying conditions of climate.

For Car Use

There still exists the misconception that a portable receiver cannot possibly be used
ON PORTABLES

Capabilities of the Modern Types of Receiver

1. Roberts Radio

The receiver manufactured by Roberts Radio, Ltd., and illustrated in Fig. 1, is a particularly good example of a set meeting such requirements, the circuit employed being of the T.R.F. type built along sturdy lines, and providing considerable volume without any irritating effects of cabinet resonances. Four valves are employed, the circuit comprising a high-frequency stage, triode detector, then low-frequency amplifier followed by a quasistable push-pull output stage.

From this alone it will be seen that a really powerful arrangement is provided, capable of efficiently driving the 6JM permanent-magnet moving-coil speaker used from an H.T. battery of only 168 volts.

The writer made a thorough examination of the chassis construction and case detailing, to determine the extent of utility which can be expected from such a design, and as an interesting example of the assembly detailing, and to illustrate the convenience with which the complete chassis and frame can be withdrawn for thorough examination when this may be required after considerable use, the illustration in Fig. 2 is given, depicting the complete "unit" being removed by sliding out of the back of the cabinet. From this illustration it will be seen how conveniently accessible are the H.T. battery (which includes the grid-bias) and the accumulator for replacement and recharging, whilst the diagram shows the clean lines of the chassis design, providing good protection against dust, etc. Both the hinged lid covering the receiver controls and the hinged back of the cabinet are provided with lock clasps, a consideration which falls in well with the requirements mentioned above.

The receiver is for medium and long-wave reception, covering from 200-550 and 1,000-2,000 metres, and the full-visions dial is calibrated in wavelengths as well as station names.

The complete receiver, which weighs approximately 20 lb. and measures 11 in. by 17 in., is priced at 9 guineas. This price includes a further refinement in the nature of a waterproof cover which is unique in that extra reinforcement is provided for loudspeaker protection; this cover is pictorially illustrated in Fig. 3.

The quality of reproduction claimed by the makers of the receiver (Model M.4.Q.) was evident, whilst there was no falling away as the volume was increased almost to the point of distortion under maximum working conditions, and when tried out under adverse conditions in a steel-framed building, a number of distant stations were reproduced with a pleasing brilliance of tone, the North Regional broadcasts being particularly clear for the locality chosen for the test.

Push-button Tuning

Push-button tuning provides a particularly desirable feature for the mains operated transportable type of receiver, and one such model, the Cameo type "P," manufactured by Gordon Elf, Ltd., is illustrated in Fig. 4.

In this case there is a choice of six stations from the medium and long-wave bands, and it will be noticed that there is no tuning dial, the purpose behind this design being for a completely trouble-free type of set, offering absolute simplicity in tuning.

The sequence of stations can, of course, be adjusted to individual requirements, but once set, it is only necessary to press the button corresponding to the desired station in the usual way, but adjusting volume and tone by separate knobs.

Midget-Four Superhet

In the nature of a distinct and interesting comparison of receiver types, and made by the same company, is the Midget-Four superhet, incorporating all the refinements usually found in mains-circuit models; this type is shown in Fig. 5, and takes the form of a suitcase model. This style has particularly good merits from the portable aspect, and furnishes a neat example of the modern version of one of the earlier designs. From this viewpoint then, it will be interesting to glance through the circuit specification, bearing in mind the points mentioned in the opening paragraphs.

An octode frequency-changer is used in this instance, this being coupled to a combined double-diode-triode valve having the characteristic of providing linear detection, delayed automatic volume control, and L.F. amplification. A Q.P.P. valve follows this sequence, feeding a large permanent-magnet moving-coil speaker.

A large frame aerial housed in the lid provides excellent pick-up and range, and here it will be noticed is one of the advantages to be had from this type of design, since the aerial is in this way absolutely...
A NEW OUTLOOK ON PORTABLES
(Continued from previous page)

isolated from the receiver chassis, thus adapting itself to the suit-case style.

"Rotabar" Tuning System

The "Bijou" battery and mains portable receivers in the McMichael range, are interesting examples of the efforts of the designers to combine originality with simplicity, the "Rotabar" tuning system employed in these two models being quite unique, and providing "silly" control for a cam-operated movement, the details of which are given in Figs. 6 and 7.

Referring to these illustrations, it will be seen that two separate scales are used, one for the medium-wave band, and the other for the long-wave band, each scale being marked in station names and wavelengths. A cam-operated movement gives a novel form of reduction drive, no gears of any sort being employed, as will be apparent from the pictorial diagram in Fig. 7.

To the ganged condenser shaft, which protrudes through the chassis side, is fitted a short bar, having at one end a short pin "S" which rides on the edge of the cans between the portable types, one which has an out-standing performance for a low-priced set

The scale pointer (only the L.W. being shown here, as this section shows the principal drive) is secured to the corner of the "Rotabar" strip, and excepting for the condenser assembly details, the identical action takes place for the medium-wave scale on the left.

High-fidelity Circuit

A high-fidelity four-valve H.F. circuit is employed in the "Rotabar" receiver, providing a full-toned reproduction with smooth reaction and very good selectivity, whilst sockets for external loudspeaker aerial and earth are provided, thus extending the capabilities and utility of this model (No. 987) which is retailed at 8 guineas complete. The weight of this receiver is 2lbs. 11oz.

The mains version (model 508) embodies a five-valve superhet circuit having 8 stages, the quality being quite in keeping with the usual McMichael standard. This receiver is listed at 10 guineas, and is for operation from A.C. mains.

Pilot "Little Maestro"

From the range of universal (AC/DC) portable types, one which has an outstanding performance for a low-priced set

is the Pilot "Little Maestro" five-valve superhet, listed at 5 guineas. All valves are of the latest high-efficiency octal type, and standardised on a common basis.

A self-contained "wound line" type aerial is in use in place of the more conventional frame aerial, but whilst it is not essential to unwind the aerial for the majority of requirements, the sensitivity will be increased by so doing, should this be desired. The broadcast range is from 200 to 550 on the medium-wave band, the long-wave band covering from 1,000 to 2,000 metres, the signal being calibrated with station names and wavelengths.

A heptode frequency-changer is employed, the first detector being an H.F. pentode. Second detection is carried out by a double-dode-triode providing also the A.V.C. Resistance-capacity coupling is effected between the D.D.T. and the pentode output valve which delivers 24 watts. Whilst standard chasms are designed for operation on A.C. or D.C. mains 200-240 volts, special models for mains voltages of 100-120 can be supplied when required, at no extra charge.

The portable models are finished in blue leatherette giving them a quiet but distinctive appearance. When weighing only 8lbs., it will be apparent that a very wide variety of programmes can be served by the use of a "Little Maestro," even when the family receiver predominates in the home. In this instance, which typifies the desirability of universal service, the receiver, individual wishes from the listening point of view are better provided for in the use of a portable than in extension-speaker schemes which, considering the cost, do not fall (if at all) much below the cost of the Pilot receiver detailed here, and, of course, the receiver has a much wider field of utility.

BROADCAST EVENTS OF THE WEEK

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

Wednesday, May 31st - Travestas, Acts 1, 2, and 3, from the Plymouth and Torquay Variety Theatre.

Thursday, June 1st - Lucky Dip, Nineteenth Edition—a weekly magazine programme.

Friday, June 2nd — Musical Games, a play by Ronald Mackenzie.

REGIONAL (342.1 m.)

Wednesday, May 31st — "Roundabout," an all-Regional variety show.

Thursday, June 1st — Only a Shop Girl; A musical burlesque by the Mellish Brothers, from Midland.

Friday, June 2nd — Olympia: Royal Tournament.

Saturday, June 3rd — The Midland Automobile Club Hill Climb at Shelsley Walsh: a commentary on part of the afternoon's programme.

WEST OF ENGLAND (285.7 m.)

Wednesday, May 31st — The Leicester Grosvenor-Otter Instrumental programme.

Thursday, June 1st — A Variety programme from the Pavilion, Bournemouth.

Friday, June 2nd — What sort of Music? A round table discussion on the relative value and interest of dance and classical music.

Saturday, June 3rd — A recital of West Country Songs.

WELSH (373.1 m.)

Wednesday, May 31st — Portrait of a Peninsula or A Mirror to Gower, devised by Ethel Ross.

Thursday, June 1st — Britannia School, another of the oldsters to rise in Wales, a talk.

Friday, June 2nd — Elsa Wynne: a feature programme.

Saturday, June 3rd — We Bring a New Song, a musical sequence.

NORTHERN (449.1 m.)

Wednesday, May 31st — Elizabethan Medallions, choral programme.

Thursday, June 1st — They Speak for Themselves: A radio inquiry into "Mass Observation."


Saturday, June 3rd — Northwich Air Race Display.

SCOTTISH (391.1 m.)

Wednesday, May 31st — Scotch Dance Music, Orchestral programme.

Thursday, June 1st — The Troubles of Hector the Crofter or The Selling of the Stirk by Angus MacDonald.

Friday, June 2nd — Concert Party programme, from the Open House, Dundee.

Saturday, June 3rd — Band programme.

NORTHERN IRELAND (301.1 m.)

Wednesday, May 31st — Accent on Rhythm: A presentation of dance tunes.

Thursday, June 1st — Irish Dances: Orchestral concert.

Friday, June 2nd — "17th Century Album," a feature programme.

Saturday, June 3rd — Flute Band concert.
A New Television Rule

IN order to regularise a position which I was not envisaged when their original licences for G.C.A. Photophone of America have now been given up by their recorders to their making recordings, or to alternatively use films already recorded for television programmes. No extra charge is being made for this concession, and there is no doubt that this will help to clear the air somewhat in that country in so far as the use of films for television transmissions are concerned, but the R.B.C. has pointed out the considerable difficulty in securing films for their own programmes, apart from news reels, and in many quarters the feeling has been expressed that a removal of any film ban with, of course, protective reservations in so far as the exhibitor is concerned, would do much to close any gap now existing between the film and television industries. Perhaps when the P.M.G. has received the depositions of the film exhibitors on the whole position and explained the whole position where divergence of opinion exists, the spirit of co-operation will manifest itself once more on an equitable basis.

Not Fantastic Now

THERE is no doubt that the continued attention which has been given to the development of television and methods of defence has caused many people to turn to the science of television as being a possible factor in modern warfare. When television transmission, and the results of the first experiments, was explained the whole position where divergence of opinion exists, the spirit of co-operation will manifest itself once more on an equitable basis.

NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

June 3rd, 1939

PRACTICAL AND AMATEUR WIRELESS

FREE

TELEVIEWS

BARGAINS!!

Amazing Offers you must not miss

SUPER ALL-WAVE S.G.3

Reduced From £25.0.0

BARGAIN £4.19.6 Yours for

5/- DOWN

NEW WORLD All-Wave S.G.3

LIST VALUE 24/10 GASH

BARGAIN £3.5/-

9 to 2,000 metres.

MATCHED VALVES FREE!!

A listener in a receiver de- signed for the I.F.D. and Pho- tonode Oscillator stage. Per the permissions who re- quire quiescent efficiency and equal voltages on C2 or C2 d and 12 positive voltages per 10 minutes maximum payments of 3/-.

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MANY amateurs regard all wavelengths below 100 metres or so as "short waves" and fail to obtain the best results from their short-wave receivers on account of the fact that they overlook many of the important features of some of the shorter wavelengths. Much of this misconception arises from the fact that it is still customary to talk in terms of "wavelengths" and accordingly the type of signal, if we can call it such, is overlooked. It must be remembered that a signal from a transmitting aerial radiates in much the same manner as the ripples on a pond after a stone has been thrown in, and the wavelength is actually the distance from the peak of one wave to the peak of the next—or from any similar point on one wave to a similar point on the following. It is therefore obvious that the shorter the wavelength the greater will be the speed of the waves, or in other words the number of waves in a second. This time factor is the frequency of the signal and you can see, therefore, that as the wavelengths become shorter the frequency increases. It is not an easy matter to explain the behaviour of oscillating currents for beginners, but it is not difficult to see that when the waves are travelling at higher speed they are more difficult to control and therefore it is exceedingly important to ensure that the signal currents go where we want them. They will take the path of least resistance and this is the reason for the need of introducing high-efficiency components and low-loss construction in short and ultra-short wave apparatus.

Amateur Transmissions

When a new short-wave set has been built one of the most convenient methods of testing it is to pick up an amateur transmission as there are usually plenty of these available and it is simpler to tune in these than to attempt to pick up American broadcast stations—although the receiver may actually have been built with this end in view. Amateurs will be found in separate "bands" in the wavelength scale and these are generally referred to as the Amateur bands. There are five of these, commonly referred to as the 1.7, 7, 14, 28, and 56 megacycle bands. They are also known as the 1,700, 7,000, 14,000, 28,000, and 56,000 kilocycle bands. The term megacycles is becoming more popular and it is a simple matter to remember that 1 megacycle is 1,000 kilocycles. A definite band of frequencies is used for each of these Amateur transmitting ranges and these are as follows:

- 1.7 me/c band—1,720 to 1,995 kc/s.
- 7 me/c band—7,005 to 7,295 kc/s.
- 14 me/c band—7,005 to 14,315 kc/s.
- 28 me/c band—28,010 to 32,960 kc/s.
- 56 me/c band—56,020 to 59,980 kc/s.

Calibrating a Set

By picking up an amateur on one of these bands you may hear him state his exact frequency and this is a valuable guide for calibrating purposes where a new set is being used for the first time. The amateurs often give their QRA, or address, and this will enable you in many cases to gain some idea of the efficiency of your set. It should be remembered, however, that on certain short wavelengths a peculiarity known as "slip distance" comes into effect and this may prevent you from hearing amateurs situated quite close to you, so don't be disappointed if you cannot hear an amateur replying whom you know is near to you. In view of the characteristics of the high-frequency signals the aerial and earth system must receive careful attention. You may find, for instance, that you can receive amateurs on the 7 me/c (40 metre) band, but when you try the 14 me/c (20 metre) band, you can get nothing, or reaction fails to function. In this case look to the size of the aerial and the method of coupling it to the receiver. A short aerial should be used; it should be very well insulated at each end, and the earth should be really good. If these points are in order, then the wiring of the circuit should be attended to.

Remember that the aerial currents will take the easiest path to earth and accordingly keep all wires carrying the H.F. currents well clear of earthen objects, screens, etc., and use the shortest possible wiring in this part of the receiver.

Coils and Wiring

In this connection it should also be remembered that the leads from the tuning coil or coil holder to the tuning condenser form part of the tuned circuit and as the frequency increases (wavelength decreases) this extra wiring must obviously form a greater part of the circuit than on higher wavelengths. If care is not taken a point may be reached where the wiring is almost equivalent to the actual coil inductance, and this is obviously an unsatisfactory state of affairs. This is, in fact, one of the reasons why it is not advisable to attempt to make a receiver to tune from 5 metres up to above 20 metres. The coil for 5 metres will only consist of about four turns of wire, and to enable as much of the wire as possible to be wound in the form of an inductance it is desirable to wind a coil holder and mount the coil directly on the tuning condenser, mounting the valve holder in such a position that the lead to the grid terminal is as short as possible. Although these precautions are not essential on 20 or 40 metres, they will definitely play a part in the performance of the receiver, and the only point which has to be watched here is that the coil is kept clear of earthen metallic surfaces such as screens.

A further point in relation to the tuning of receivers below 10 metres is that any means of connecting lead to the tuned circuit will affect the tuning adjustment and thus not only will erratic tuning adjustments be experienced, but it will be found practically impossible to tune the receiver one day and repeat settings the next.

H.F. Chokes

One final component may be mentioned in connection with the short-wave receivers, and this is the H.F. choke. On the normal broadcast bands any old choke may be found to function—an ordinary resistance often being used in place of a choke. When we go down the scale, however, the efficiency of the choke will be found a vital factor in obtaining smooth and effective reaction. Special short-wave and ultra-short-wave chokes are available, as well as all-wave chokes, the latter generally being unsuitable for use below 10 metres. Remember that the function of the choke is to prevent the H.F. currents from passing out to the earth side of the unmode load and to divert them through the reaction circuit. Although only a few turns of wire are needed for the choke, they must be on a well-insulated former, and it should be mounted as close as possible to the valve. The ends of the detector valve—again remembering the previous details concerning the length of leads and the H.F. carrying wiring.
Leaves from a Short-wave Log

Honduras Calls

At present there are only three short-wave radio transmitters operating in the Republic of Honduras (Central America); HRPI, at San Pedro Sula (Eco de Honduras) works on 47.24 m. (6.351 mc/s) with a power of 100 watts. It is on the other nightly from B.S.T. 19.00-20.00, and again from 01.45-04.00. HRD2, at La Ceiba, a 5-kilowatt on 48.12 m. (6.235 mc/s) styles itself "La Voz de Atlantida", opens its programmes with a Marinha sextroto "Solo Tuyo", and closes down with an electrical recording of the popular Good Night Song (Ted Lewis). Finally, HRN, in the capital city of Tegucigalpa broadcasting on 51.00 m. (5.875 mc/s), La Voz de Honduras, is the principal station, and is rated at 1 kilowatt. Its programmes are occasionally well received in the British Isles from midnight onwards, but the station is on the air from roughly B.S.T. 19.00 until 05.00 daily.

Germany's Mystery Station

It is reported that the exact location of the German short-wave transmitter (Freundsender), which has been operating for many months on channels around 29.8 m., has been discovered by the authorities, and that the plant has been dismantled, and the operators arrested.

A Call from Haiti

H28S, Port-au-Prince, which for some time had been working on 50.68 m. (6.818 mc/s) is now broadcasting on 49.37 m. (6.795 mc/s), the channel previously allocated to the Government station HRK. In addition to its sponsored programmes arranged by the West Indies Broadcasting Company, this short-wave transmitter relays the entertainments of the medium-wave radio HRV in the Haitian capital.

Have You Logged These?

A READER reports that he has picked up the call: HIZA station testing on 23.45 m. (12.795 mc/s) towards B.S.T. 20.30. Although no details of this transmitter are given in the official Berne list, the call-sign would appear to be that of a station in Saudi Arabia. Another broadcast, in Spanish, on this occasion, was picked up on 44 m. (6.818 mc/s) at about the same time. The call heard was: Aqui Benito, La Voz de Rio Muni. This apparently emanated from the Spanish colony of that name on the West Coast of Africa. Lastly, on 48.5 m. (6.165 mc/s) the same reader states that he logged signals from a short-wave station situated at Blantyre (Nyasa-land). Has any reader picked up any of these broadcasts?

Explorers in the Tropics

An expedition organised by the Government of Venezuela (South America) has started to explore the frontiers of Brazil and New Guinea. Under the call-sign YV9AB, this Expedition of the Gran Sabana (Grand Savannah) will install a 1-kilowatt radio station at its base camp, and transmissions giving details of its activities will be made daily from B.S.T. 12.00 on 14.125, 14.122, 7.285 and 7.221 mc/s.

Romania versus Havana

TUNING IN to 32.61 m. (9.2 mc/s) on a recent evening to secure a broadcast from the Radio Nacional station COBX, at Havana (Cuba), the writer of these notes logged an experimental transmission from Bucarest in which the call Radio Romania was repeated at frequent intervals. The transmissions have been heard on two or three occasions with an English news bulletin at B.S.T. 22.45.

Radio Continental

CALLING Radio Continental de Montevideo, the voice of a woman announcer was well received recently after B.S.T. 22.00. The station is CX2S at Montevideo (Uruguay), on 31.35 m. (9.57 mc/s), from which broadcasts are made daily from B.S.T. 16.00-04.00. The studio uses one stroke on a gong to denote intervals in the programme.

A Pilot 5-VALVE SUPERHET for 5 GUINEAS!

"BIG SET" PERFORMANCE

HANDY PORTABLE SIZE

AC/DC MAINS

SEND COUPON for FULL PARTICULARS and FREE WAVELENGTH CHART.

FREE TRANSATLANTIC WAVELENGTH CHART

SEND COUPON TO DAY

FOR FULL DETAILS.

PRACTICAL AND AMATEUR WIRELESS

June 3rd, 1939

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5 GNS., or by easy Wit. Purchase Terms. (Prices do not apply in Eire)

In Walnut or Light Grain Oak.

FREE! TRANSATLANTIC WAVELENGTH CHART

Please send me:
(1) Full details of the Pilot Little Maestro.
(2) Free Transatlantic Wavelength Chart for use on all short-wave receivers.

Name:
Address:

PILOT RADIO LTD., 31/2 PARK ROYAL ROAD, N.W.10
72,威利路214

P.W.L.
A Practical Programme Suggestion

Sir,—The B.B.C. would satisfy a long-felt want by instituting a series of short programmes solely devoted to practical and amateur wireless. I am of the opinion that a move of this nature would unfold endless possibilities in the form of entertainment for this class of radio enthusiasts, as practical demonstrations could be given to show the various improvements which could be occasioned by certain adjustments to receiving sets and the use of sundry components.

Broadcasting House has often pointed out that its object is not merely to entertain, but to help towards improving the knowledge of the British public. Honestly, I think of no better subject than this for discussion on the radio, as it strikes me as behoving of infinite importance that the listening community should be enlightened so that it can hear and enjoy the transmission to the full through the medium of perfect reception.

Needless to say, the most favourable time of day for such broadcasts would give rise to many questions, and not a few headaches. I think it would be safe to say that the best programmes would be those held on Saturdays, as that day is usually felt want by instituting a series of programmes to meet with most listeners' wishes. This is the enthusiasts' time for discussion on the radio, as it strikes me as behoving of infinite importance that the listening community should be enlightened so that it can hear and enjoy the transmission to the full through the medium of perfect reception.

Needless to say, the most favourable time of day for such broadcasts would give rise to many questions, and not a few headaches. I think it would be safe to say that the best programmes would be those held on Saturdays, as that day is usually rather interesting comparison. No, I am a regular reader of your paper from the time, and have no hesitation in saying that this is the best paper of its kind I have come across. Wishing it every success.—B. K. BHATTAGAR (Delhi, India).

A Correction

In a recent issue we published a letter from a reader residing in Kenya, and inadvertently his address was given as Kenya, S. Africa. We wish to state that our staff has not discovered a new colony, and the address should have been given as Kenya Colony.

SIR,—Referring to Mr. P. Ganesa Iyer's letter, published in your paper dated April 29th, 1939, I may say that the designs of receivers as desired by him would be highly appreciated by your Indian readers, and would be just right for satisfying every requirement of Indian listeners.

I am afraid, however, that if the wave-range requirements as desired by Mr. Iyer are adhered to, the receivers would be too expensive. Therefore, propose that in order to reduce the cost a range of 10 to 50 metres, and 150 to 550 for, say, 450 metres would just be enough. As this could be covered with two coils only, the switching arrangement would be simple and cheaper. As the 80-metre transmitters have not proved as useful as the 60-metre ones, the broadcasting authorities have given them up, and as far as I know they do not propose to revert to them. I do not think that an A.C./D.C. receiver is absolutely essential when a separate A.C. detector can be published, but I think that a D.C. receiver with 0.1 amp. valves would meet the requirements, and as its current consumption will be about 60 per cent less than that of the A.C. receiver, it is expected to become very popular with the Indian listeners. The electrical energy costs from 4d. to 9d. per K.W.H., the latter being the rate in the majority of the cities. It, therefore, desirable that the consumption of the receiver may be kept as low as possible. For receivers other than the D.C. receiver, I think the American valves, or their Oetal base English counterparts may be safely used.

In order that the receivers may well compete with the factory-built American sets it is essential that the price for mains sets should remain in the neighbourhood of £3 to £3 10s., it is therefore essential that all the tuning coils including the I.F. transformers and H.F. chokes, may be home-made components.

I am a regular reader of your paper from the time, and have no hesitation in saying that this is the best paper of its kind I have come across. Wishing it every success.—B. K. BHATTAGAR (Delhi, India).

Cut This Out Each Week

—That although clockwork mechanisms may be used for small tiny motors drivers, they do not have the smoothness (electrically) on short waves.

—That aluminium screens for L.F. chokes and transformers are only effective from an H.F. point of view.

—That the current flowing through a fixed resistor should be carefully calculated when closing this type of component.

—That the adjustment of an aerial series condenser will affect tuning settings and also control the effect of aerial damping.

—That the position of a speaker in a small self-contained receiver should be carefully chosen as the field may be quite large.

—That peculiar effects may be experienced if a valve is placed within a speaker field.

—That voltage dividers may be made up from separate components and form useful H.F. adjusters for multi-valve receivers.

SIR,—In the issue of PRACTICAL AND AMATEUR WIRELESS for April 29th, you published a letter from a reader residing in Kenya, and inadvertently his address was given as Kenya, S. Africa. We wish to state that our staff has not discovered a new colony, and the address should have been given as Kenya Colony.

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RADIO IN AVIATION - 6

In this Concluding Section on the Problems of Listening-
through and Electric Shocks, We have been addressed.

EXHAUSTIVE trials made by the Air Ministry showed that the valuable property of automatic and instantaneous rectification could be secured at a high reliability due to any or all of the following causes: (A) The difficulty of applying a background suppression when the background is subject to sudden change, such as when the pilot turns his head and when engine speed is altered or when guns are fired. (B) The failure of electrolytic condensers at low temperatures. (C) The reduction of speech level at high altitudes.

A solution may perhaps be forthcoming in the future, but at present the conditions would appear to be very unpromising.

**Electric Shock**

In an aircraft installation, involving the presence of H.T. voltages of the order of 1,200 volts in close proximity to the appliances used, the apparently deceptively low insulation of ground standards is railed out, and great care is necessary in planning the design and particularly the laying out of circuits. The very small factors of safety which have to be accepted in the design of H.T. switches and components necessitate the use of circuits which in the great majority of cases where microphones were not used, the insulation of which may not be such as would be adequate. To reduce this danger an attempt was made to shunt the high potentials into the components handled by the operator touch the aerial circuit with the mouthpiece is damp the operator perceives a slight burning sensation, which is decidedly more than a tingle and is particularly unpleasant. As it is impossible to ensure that all earthy components are at exactly the same potential, the occurrence of this effect is normally prevented by the insertion of high-frequency chokes in the microphone leads. In particularly difficult installations on aircraft built partly of wood and partly of metal it is frequently necessary to insert chokes in all leads from the transmitter to the external accessories. When the transmitter is intended to cover the short-wave band as well as the medium, the choke insulated telephones, completely enclosed telegraph keys, and insulated microphones. In addition, safer circuits are employed. Any breakdown of the H.T. positive occasions a short-circuit of the H.T. generator, which may burn out but will not occasion danger to the operator.

Eliminating Microphone Shock

There is another form of shock which, while constituting no danger, can be particularly unpleasant; this is caused by high-frequency potentials of low value which are led into the microphone. When the mouthpiece is damp the operator perceives a slight burning sensation, which is decidedly more than a tingle and is particularly unpleasant. As it is impossible to ensure that all earthy components are at exactly the same potential, the occurrence of this effect is normally prevented by the insertion of high-frequency chokes in the microphone leads. In particularly difficult installations on aircraft built partly of wood and partly of metal it is frequently necessary to insert chokes in all leads from the transmitter to the external accessories. When the transmitter is intended to cover the short-wave band as well as the medium, the choke...
Abstracts Published.


In a set of windings for a loud-speaker comprising an annular permanent magnet B, Fig. 1, the area of the surface between the annular magnet and the outer edge of the rotor a between the centre polepiece d and the outer pole-plate e is of the order that the feedback may be substantially reduced, Fig. 2, where the secondary windings 30, 31, 32 are short-circuited. In the next position of the switch (not shown), the intermediate range B is selected, and the winding 56 now serves as the upper-frequency primary for the secondary winding 31, which becomes connected to the tuning condenser 54, the lower-frequency primary being the winding 54. The primary coils 56, 57 are now tuned by the condenser 56, the windings 32, 58 are short-circuited, and the higher-frequency winding 55 is left in circuit. When the switch 33 is set for the lowest range A (not shown), the windings 57, 58 serve as the higher- and lower-frequency primary windings for the secondary winding 32. Stability throughout the selected range is enhanced by reducing the grid resistance 63, and changing the grid resistance 11 correspondingly.

Electric switches. In the rotary switch 33, fixed contacts such as 65 are adapted to engage the rotatable segments 68, 42 but do not engage the latter pair of rotatable segments 73, 43.

VALVE CIRCUITS FOR WIRELESS RECEPTION; MECHANICAL SWITCHES WITHOUT QUICK ACTION.—Marconi’s Wireless Telegraph Co., Ltd., No. 498983.

A reaction oscillator, particularly for use in a superheterodyne receiver, is provided with a wave-range switch 33, (Fig. 2), whereby for each range one of the three secondary windings, 30, 31, 32 of the feed-back transformers is made effective together with two adjacent windings selected from the four primary windings 55, 56, 57, 58, one of the primary windings being tuned above the selected range and the other below it, in order that the feed-back may be substantially uniform throughout the range. When the switch 33 is set for the highest range, as shown, the secondary winding 30 is connected to the control grid of the oscillation-generating pentode 41 with the tuning condenser 14 in shunt, while the condenser 83 tunes the winding 56 above, and the winding 56 below the selected frequency range. The remaining windings, 31, 32, 57, 58 are short-circuited.

In the next position of the switch (not shown), the intermediate range B is selected, and the winding 56 now serves as the upper-frequency primary for the secondary winding 31, which becomes connected to the tuning condenser 14, the lower-frequency primary being the winding 54. The primary coils 56, 57 are now tuned by the condenser 56, the windings 32, 58 are short-circuited, and the higher-frequency winding 55 is left in circuit. When the switch 33 is set for the lowest range A (not shown), the windings 57, 58 serve as the higher- and lower-frequency primary windings for the secondary winding 32. Stability throughout the selected range is enhanced by reducing the grid resistance 11 correpondingly.

Electric switches. In the rotary switch 33, fixed contacts such as 65 are adapted to engage the rotatable segments 68, 42 but do not engage the latter pair of rotatable segments 73, 43.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

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Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet or issued on payment of a subscription of 1s. per Group Volume or in bound volumes price 2s. each.

PRACTICAL AND AMATEUR WIRELESS

June 3rd, 1939

TELEVISION OUTSIDE BROADCASTS

The value of outside broadcasts as part of the programme has been emphasised many times in these columns and tribute to the success achieved by the B.B.C. in these matters has also been given. But the reception of television in the home lies in its topicality, and since the events which the viewing public would like to see occur in so many widely separated parts of the world, there is always the problem of how to feed the radio transmitter at Alexandra Palace or its relay transmitters with signals derived from the source where the event occurs. Three schemes have been used up to the present, namely, a directional ultra-short-wave radio link working on a carrier frequency of 64 megacycles; the coaxial television cable, long runs of which have already been laid in London; and ordinary telephone cable working in conjunction with special terminal equipment to overcome the frequency and phase distortion. The development of the last-mentioned method as an outside broadcast link has enabled many items to be televised which otherwise we might have missed, or which we would now be prohibited from using. If any attempt was made to use coaxial cable throughout, the expense involved would be prohibitive, as apart from the fact that there is a serious time limit involved in laying the cable in suitably-deducted ducts. In the case of the radio link where a clear, high open space can be found for the telescopic aerial and van, the results are generally quite satisfactory. In the town districts, however, parking facilities for three or four vans may prove difficult, while there is always a possibility of picking up some form of electrical interference, and unless the aerial can clear the buildings, signal strength is reduced, and reflections from neighbouring objects may produce those annoying multiple images. The success which has been achieved by the B.B.C. in using telephone lines up to about 3 to 5 miles long has materially reduced. After months of experiment the engineers have evolved very intricate balancing and repeater apparatus, so that the very high modulating frequencies of the television picture signal can be handled by the Post Office cable, and if only this could be extended over long distances, then provincial television extensions would have their biggest difficulty solved.
THE following idea relates to active impedance networks, and is concerned with such networks possessing two terminals and offering a low impedance path to direct currents.

One object of the idea is to provide such a network appearing as a large inductance to varying currents. Such a network is also sometimes of high resistance, or as a large capacity, or as a large negative resistance to varying currents. The network is provided also, whereby a comparatively high resistive impedance is presented to more rapidly varying currents and a comparatively low impedance to more slowly varying currents.

Another use is to provide such a network offering a comparatively low resistive impedance to more rapidly varying currents and a comparatively high impedance to more slowly varying currents.

The suggestion is of application to telegraphic scanning circuits, where it permits of a large gain from a given stage without the use of a very high supply potential. It is also valuable in the grid circuit of a valve where a highly inductive choke is required. Thus it may be applied in television scanning circuits, or it may be applied to smoothing circuits. It may also be applied to smoothing circuits in which very large capacities are required. It has further application to frequency discriminating networks and to oscillator circuits.

In order that the suggestion may be more clearly understood reference should be made to the accompanying illustrations in which Figure 1 shows the network in a diagrammatic form, and Figure 2 shows one practical embodiment.

Refering to Figure 1, T1 and T2 are the terminals of the network and z is an impedance capable of passing direct current, connected in the cathode circuit of the valve V. Z1 and Z2 are impedances forming the other branch of the network and their join is connected to the grid of the valve V.

If a and g represent respectively the anode conductance and the grid mutual conductance of the valve V, then it may be shown that the impedance between the terminals T1 and T2 is given by the expression:

\[ Z = \frac{a + g(\frac{Z_1}{Z_2})}{(Z_1 + Z_2)} \]

provided that the magnitude of this expression is considerably less than the magnitude of the impedance Z1. If this condition does not hold, the impedance of the network is given by the above expression for Z only diminished in the ratio:

\[ 1 + \frac{Z_1}{Z_2} \]

It will however be sufficient for the purposes of illustration to consider only the expression for the impedance of the network contained in equation (1).

Refering to the expression for Z given by equation (1) it will be clear, of course, that the properties of Z depend on the character of the impedances from which the expression is constructed. Before, however, proceeding to illustrate these properties it may be pointed out that especially when the valve V is of the screen grid type, which is a preferred case, the magnitude of the anode conductance a is very small compared with the grid conductance g so that equation (1) may be simplified slightly to:

\[ Z = a + g \left( \frac{Z_1}{Z_2} \right) \]

From this equation it will be clear that by suitably choosing the values and nature of z, Z1 and Z2 the impedance Z may be made to assume the various characters referred to above. z may be made, for instance—and this is the simplest case—a purely resistive impedance, then if Z1 is made resistive and Z2 capacitive, the impedance Z becomes inductive, the case to which Figure 2 corresponds; a similar effect is obtained if Z1 is made inductive and Z2 resistive. If Z1 is made resistive and Z2 inductive, or if Z1 is made capacitive and Z2 resistive, the impedance Z becomes capacitive. Modifications leading to other results already referred to are obtained by arranging for z to be inductive or capacitive in nature, or to be a tuned rejector impedance; the effects obtained with the various combinations may be derived from the above equations.

The network as described in accordance with the suggestion is of wide application, though the idea is not to be regarded as limited to a few examples. The circuit is capable of application at frequencies where the inter-electrode capacities are of importance, provided suitable steps are taken, either to incorporate these capacities into the network or effectively to neutralize them.

Footitissimo

READERS will probably like to know that Reginald Foort is writing his adventurous life story in Tit-Bits. This week he tells of his early days as cinema playing, of the first great cinema organ brought to Britain, of million-sale gramophone records, and of the broadcasts that brought him fame.

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High Voltage Mains Units

"I am very interested in mains apparatus and notice the various schemes for obtaining high voltage in the usual radio and television apparatus. I am interested in the method of obtaining the very high voltages needed for X-ray apparatus, and wonder if you could let me have any details. I know that metal rectifiers are used in television apparatus, but these only deliver very small currents."—E. Leitch.

Special valves are used for the purposes mentioned, and these are known as the E.H.T. class (Extra High Tension). The valves employ special tungsten filaments and are used singly, or in special voltage doubling and tripling circuits. A booklet dealing with the valves and circuits may be obtained from the General Electric Company.

H.F. Volume Control

"I have tried to make up an H.F. unit with a mains variable-mu H.F. pentode, a tuned circuit, and a fixed variable resistor in the s.g. potentiometer circuit, with the usual bias fixed resistor in the cathode lead. I find, however, that no matter how I modify the connections to this part of the circuit I cannot control the volume down to a whisper. Is there any way in which such a valve can be used in a special purpose?"—S. T. R. (Barnsley).

Provided that the correct values are used the circuit should function. It is necessary to make certain that the H.T. voltage is correct if you have adopted the makers' recommended values for the circuit, and these will, of course, only apply when a given H.T. voltage is used. You may, of course, have mounted the control on a metal bracket or panel, and this would show circuited. You may, on the other hand, find it necessary to modify the values so that a much higher bias may be applied to the valve to give you the desired cut-off. Remember, the higher the bias the weaker the signal.

Continuity Tester

"I wish to make up a small tester so that I can test components such as coils, chokes, etc., for breakage. I have a 0.5 milliameter and think that this could be employed, but I am not certain regarding the proper method of doing this. Could you give me a circuit and instructions for making a suitable unit?"—A. P. J. (Hereford).

All that should be necessary is a small battery in series with your meter using one side of the meter and the free side of the battery as "test probe." Connections must be taken so that the total current flowing through the entire circuit will not rise above the maximum reading of the meter and, therefore, probably the best plan, especially if you wish to test certain high-resistance components, is to use two standard 9-volt batteries wired in series and included in series with a 5,000 ohm resistor and the meter.

By-pass Condenser Connections

"I note that in certain battery receivers you use a resistance in the anode circuit of a valve and connect a large value of the anode side of the resistance to earth. I understand that this is a decoupling circuit, but it appears to me that the condenser is virtually in parallel with the resistance, and surely this would be a more efficient way of decoupling the condenser than straight to earth. I wonder if you could tell me why the direct earth connection is usually employed?"—F. Y. T. (Blackpool).

Rules

We wish to draw the reader's attention to the fact that the Queries Service described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot supply the diagrams in all cases, we regret that we cannot supply the diagrams in all cases.

1. Supply circuit diagrams of complete multi-valve receivers.
2. Suggest alterations or modifications of receivers described in the contemporary.
3. Suggest alterations or modifications to commercial receivers.
4. Answer queries over the telephone.
5. Grant interviews to queries.
6. A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are reproduced should bear the name and address of the sender. Requests for blueprints must not be enclosed with queries. Taps will be supplied by a separate department.

You are quite correct in saying that the condenser is virtually in parallel with the decoupling resistance, and it certainly by-pass H.F. currents, but there is still the H.T. supply to be passed before earth is reached, and there is still the battery potential. As there may be a high resistance in the battery this will prevent adequate charging of any of the H.F. currents and, therefore, it is not only preferable, but desirable, to take the condenser direct to earth—and a really efficient earth connection should be used.

Tone Control

"I find that high notes are over-emphasised on my pentode output stage, and I wish to know what to do about it. I am looking through various back numbers I see that the usual scheme is to use a fixed condenser and variable resistor, but I have a number of fixed condensers and fixed resistances and would like to try them out without buying any new parts. Can I use any of these to make an adjustable tone control for my special purpose?"—L. W. (New York).

You can certainly make use of your components effectively in the following manner. A fixed resistance with a value between 10,000 and 20,000 ohms should be connected to the output valve. The other side of this resistance should be joined to a volume plug or volume control. Four or five fixed condensers may be then joined to the H.T. positive line and the other sides of the condensers connected to a row of sockets or merely left empty—the tapping clip in this case being clipped on to the condensers in turn to obtain the desired tone regulation.

A Workshop Hint

"I was trying to make a special slow-motion drive which I had designed on paper, but owing to my lack of workshop experience I find it difficult to drill certain holes for tapping without breaking through. I am using a large piece of ebonite and wish to mount a brass strip on it, 40A. 3½ in. bolts to be used. Obviously I only need a shallow hole in the ebonite, but I drill either too shallow or too deep. The tap breaks when it meets the bottom, or else I drill too far and break through the other end. What is the best way of gauging the depth of these holes?"—L. S. W. (N.W.S.6).

There are two or three methods, the simplest being to look small paper on the drill so that only the required length of drill protrudes. Alternatively, you can cut a short length of tubing to slip over the drill so that it meets the surface again leaves only the required length of drill unprotected. A rougher scheme is to mark a short length of rod with a scratch at the required distance and to drill very slowly, continually removing the drill and putting the depth gauge into the hole—after the manner of using a dip-stick in a petrol tank, for instance.

Replies in Brief

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

W. B. (N.Y.). The trouble may be due to an insufficient number of valves or a faulty receiver. In any case we are necessary to give precise information.

F. D. (Bradford). The terms are synonymous. In one case the name describes the actual apparatus, and in the other it describes the purpose for which it is used. The terms are synonymous.

G. J. (Bristol, 4). The valve does not appear in current lists, and you should write to the makers for full details.

G. L. (Belfast). The valve is the special E.H.T. D.B. 240. There is no substitute, and the price was 1s. 6d.

H. A. G. (E.I.T.). The items you mention are obtainable from Messrs. Peto-Bark, of which firm.

F. D. (Bradford). The terms are synonymous. In one case the name describes the actual apparatus, and in the other it describes the purpose for which it is used. The terms are synonymous.

J. B. (Birmingham, 14). As the issue is out of print we regret that we cannot supply the diagram. The block gives all the information you require.

J. B. (Newcastle). The price of the records is 3s. each (set). An earth is not essential, but is highly desirable.

A. J. F. (Westmorland). There is nothing to be gained by using the choke. In fact, it would be undesirable to insert an earth, as this may introduce distortion.

J. L. (Northamptonshire). The type of coil referred to is a two-pin plug-in model of the old pattern. A simple plug is connected in the coil, and the resistance depends upon the circuit arrangement.

The coupon on page iii of cover must be attached to every query.
### Practical and Amateur Wireless

#### BLUEPRINT SERVICE

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MISCELLANEOUS

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IT SIMPLIFIES ALL SOLDERING.

FLUXITE LTD., Dept. W.P., DRAGON WORKS, BERMONDY STREET, S.E.I.

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Number...

THE AUTOMATIC LIFT—How it Works

NEWNES
PRACTICAL MECHANICS
JUNE 1939

IN THE JUNE

PRACTICAL MECHANICS

The Magazine of Modern Marvels

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FOUR-BAND 3-VALVE S.W. RECEIVER — See Page 307

Practical and Amateur Wireless

A MIDGET 2-Valve AMPLIFIER

Every Practical Wireless Service Man Should Have This Book

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By F. J. CAMM.

A Complete, Practical and Up-to-date Work on the Testing of all Types of Wireless Receivers. 388 PAGES and OVER 220 PHOTOGRAPHS, DIAGRAMS and PLANS.

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JUNE 1939

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MOTORING FOR MEN:

CURRENT OPINIONS FROM THE MAN'S VIEW-POINT, etc., etc.

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1/-

Get your copy to-day, of all Newsagents and Bookstalls.
Amplifiers

We have published several interesting amplifying designs during recent months, and in this issue give yet another design which, although built primarily for experimental purposes; a neat amplifier

communication systems, and many other applications. Small amplifiers are always useful and many experiments are often postponed or abandoned simply because no small amplifier is readily to hand. For increasing the output doned simply because no small amplifier is

amplifiers are always useful and many will find many other applications.

the Stand-by Crystal set recently described,

months, and in this issue give yet another

A.R.C.M., R.M.S.M., who was formerly bandmaster of the 2nd Seaforth High-

landers.

Staggsh Searchlight’s Twenty-fifth Edition

E. S. WILLIAMS will present the twenty-fifth number of “Staggsh Searchlight” on Saturday evening, June 17th. Since the Staggsh transmitter opened in the autumn of 1937, the “Searchlight” has been emitting interesting people and odd happenings in the north-east, and has gained a large following among listeners not only in Northumberland and Durham, but in all parts of the North Region.

Radio Pictures

A NEW system of picture transmission was recently introduced between Canada, New York and London. An 84in. by 42in. picture can now be fully transmitted in less than eight minutes, and the recently published pictures of the King and Queen’s visit to Canada were transmitted on this new system.

Car Radio Ban

IN Canada a regulation has been intro-
duced banning the use of radio and gramophone reproducers in cars passing through or travelling in the city.

World Convention

IT is now announced that the World Radio Convention, which was held at Sydney from April 4th to 14th (1938) cost just over £26,500. Of this sum, £2,500 was granted by the N.S.W. Government, about £100 was provided by the Institution of Radio Engineers and the remainder by contributions.

Opening of Start Point and Clevedon

START POINT and Clevedon trans-

mitters will be opened by the Duke of Somerset on June 14th, and these stations will radiate the Western pro-

gramme on and after that date.

Operas from Covent Garden

CONTINUING the broadcasts from Covent Garden, Acts 2 (Regional) and 3 (National) of “Siegfried” on June 12th, and Acts 2 (Regional), 3 and 4 (National) of “Aida” on June 15th, will be broadcast under the direction of Sir Thomas Beecham, Bart. Siegfried will be sung by Lauritz Melchoir, Amneris by Ebe Stignani and Wotan by Herbert Janssen. Aida will be sung by Maria Caniglia, Amneris by Ebe Stignani and Radames by Gigli.

Coarse Fishing Opens

T. A. WATERHOUSE, one of the best- known practitioners of the art of coarse-fishing, and also one of the best- known writers and broadcasters on the subject, will give a talk on the opening of the season on June 15th. He has been Chairman of the Severn Board of Con-

servators for several years.

Works Band’s Seaside Tour

THE R.A. Lister Military Band starts next week on its summer programme. During the season it is to appear in Worth-
ing, Bath, Cheltenham, Broadstairs and Hastings.

The band is drawn from the employees of Messrs. R. A. Lister and Co., Ltd., of Darley, Glos., and every member is an ex-Army musician, most of whom were soloists in their regimental bands and are now on the reserve.

The bandmaster is Mr. S. T. Webber,
ROUND the WORLD of WIRELESS (Continued)

Extension of Yugoslav Radio Network

According to plans published by the Yugoslav Ministry of Posts and Telegraphs at Belgrade, steps are to be taken immediately to increase both the number and power of the existing broadcasting transmitters. The Skočio station on which work is almost completed is to be endowed with a power of 100 kilowatts, as against 20 kilowatts for which it was originally designed. Other transmitters are to be erected at Split (Splito), Sarajevo, and Maribor.

Scrubbing by Order

At Muldon (Manchukuo) the inhabitants are roused daily by means of siren aires at 6.30 a.m. in order that they may not fail to listen to the radio broadcasts of physical exercises. Following this course of gymnastics they are compelled to clean up their houses according to instructions given to them by the studio announcer. The streets have to be swept in front of the houses, and the roadway watered by slurry dust. Every morning after the broadcast police patrols carry out an inspection to make sure that the radio orders have been complied with.

Canada's New Radio Law

A LAW has now been promulgated to the effect that no new privately-owned broadcasting station in the Dominion of Canada shall be allowed to erect a transmitter exceeding a power of one kilowatt. On the other hand, the programme laid down by the Canadian Broadcasting Corporation is being completed as quickly as possible. Two 50-kilowatt transmitters, namely, CBF, Ontario, and CHB, Quebec, were opened in 1937; another station of the same power, CBA (Maritime Provinces), was formerly launched on the other on April 8th last, and CBK (Prairies) is now ready to work. The power of CBK (British Columbia) has been increased to 5 kilowatts, and it is hoped to install in the near future five more stations in the provinces of Ontario and Quebec. A scheme has now been drawn up for the establishment of a radio station in the University of Regina, and in the near future this station will be ready to work.

Soviet's Proposed New Radio Headquarters

For some years the U.S.S.R. (Soviet Union) has considered the construction of a "Broadcasting House" at Moscow which will surpass in size and luxury that of any other existing in any European state. The building, planned, will be more than 300 feet in height, and will contain seating accommodation in one auditorium for six thousand listeners and spectators. In addition, it will provide a number of studios of various sizes to meet the requirements of the daily broadcast programmes.

Facsimile Tests for Air Corps

The value of facsimile broadcasting as an aid to the Army, Navy and Air corps in time of war was observed recently, when the American station WLW made its first broadcast in collaboration with the United States Air Corps. The test, consisting of five fictitious field messages and maps, was prepared by Lieutenant Colonel Hugh Mitchell, signal corps director at the aircraft radio laboratory, Wright Field, Dayton, Ohio. One was a pencil-written field message, two were general maps, and two were specific maps showing the location of imaginary objectives and moving troops. The special programme broadcast on the regular early-morning facsimile transmission over WLW at 2.15 a.m., E.S.T., was picked up with excellent results by several of the Readio facsimile receivers installed at various locations by Crosley engineers.

Solve This!

PROBLEM No. 351

Burton built a three-valve receiver using push-pull stages and push-pull stage detectors to test his work on the order of the B.B.C. was laid down by the technical section of the United States Air Corps. When tested he found that tuning was erratic and accordingly started making tests. He connected in series with a battery and testing the resonance point the condenser obtained a reading across fixed and moving vanes of one section, but not of the other, and accordingly decided that one section was short-circuited. He removed the condenser, but could find nothing wrong. Was this his test in order, and what did it indicate? Three books will be awarded for the first correctly solved, and a prize of £10 in the top five books, three of which must be posted to reach this office not later than the first post on Monday, June 12th, 1939.

Solution to Problem No. 350

When Bentley added a further pentode to the additional current reduced the H.T. applied to previous rectifier stage and circuit it did not overcome his trouble. A larger rectifier section would have been needed to provide correct solutions. Entries must be addressed to "The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C. 2." Envelopes must be marked "Problem No. 350 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, June 12th, 1939.

INTERESTING and TOPICAL NEWS and NOTES

Poste du Grand Serail

The Compagnie Française Radio-Orient has installed a small broadcasting station, Radio Levant, at Beyrouth (Syria); it works on 258.6 m. (1,046 kc/s). It is not

Spring Chicken!

Over a dish of fried spring chicken last week, Ruth de Vore, of WLW's "Mother River" trio, recalled an embarrassing story with a happy ending. Eating in a swanky Gold Coast dining-room several years ago with specially promoted Chinese friends, Ruth applied knife and fork to a fried half chicken, only to have the object of her appetite do a loop-the-loop on to the floor several feet away. The quick-thinking singer saved the day by calling the waiter and loudly reproaching him, "Next time you serve me fried chicken, be sure you kill the thing first!"
**THE "MIDGET" TWO-VALVE AMPLIFIER**

L. O. Sparks Gives the Complete Constructional Details of a Very Compact Two-valve Battery Operated Amplifier in This Article, and Mentions its Many Applications

A FEW years ago an amplifier having even a modest output was invariably a bulky piece of apparatus and was usually associated only with radio receivers. In fact, it was quite common to have, say, an H.F. and D.C. unit in one cabinet or section and a one or two-stage amplifier in another.

The idea is quite sound, but in the days I have in mind, terminal strips and dozens of connecting wires seemed to be the fashion, consequently the completed installation used to make a most complicated appearance guaranteed to scare off all but those who had earned or adopted the title of experts.

Progress has brought us highly efficient valves, miniature components—without sacrificing efficiency—and a better understanding of high and low-frequency amplification which, in turn, has enabled apparatus to be designed along more compact and economical lines.

Even to-day, however, in spite of these additional facilities there are still many amateurs who have a strong desire to make any form of amplifier look like a small edition of a control panel in a broadcasting station. Such ideas are, I suppose, good for competition manufacturers and at least satisfy individual desires, but, unfortunately, they have a nasty knack of frightening the less, shall we say, ambitious constructor or listener who has a genuine need for some simple means of increasing the volume obtained from an existing piece of apparatus.

The limits of L.F. amplification and the possibility of obtaining considerable power from battery operated amplifiers has been dealt with in past issues, so we will rule out the question of attempting to compete with even a modest mains-operated amplifier so far as output is concerned.

The next point to be settled, then, is what power is required, and will a battery amplifier satisfy the requirements?

These questions I cannot answer as they are governed by individual conditions, but it is hoped that the suggestions given below will enable a satisfactory solution to be reached.

For example, with the amplifier about to be described a loudspeaker could be used which, as we will see, is equal to an efficient crystal set. With a one-valve, headphone could be laid to one side and a loudspeaker substituted. If coupled to a two-valve, more volume than that normally required for domestic amusement will be obtained, and with a three-valve, well, I would not advise such applications, as overloading of the valves would undoubtedly take place.

So much for the radio side. There are, however, other uses for a small amplifier of this type as described below.

When certain types of microphones are being used, a pre- or head amplifier is often required to boost up the microphone output before it reaches the main amplifier. In those instances the Midget would prove a very handy little unit, though, of course, if it was going to be used continually for such work, simple modifications could be made to make it even more suitable.

For inter-room communication, microphone testing, pick-up reproduction or for one of those installations which we are often asked about, namely, the placing of a microphone near baby's cot so that his or her crooning can be heard rii a speaker by those in another room, the amplifier will prove most useful.

The theoretical circuit of the amplifier. Use it to check your wiring.

The Design

The design is straightforward and simple. It must be remembered that it is not intended to be a high-fidelity or a miniature P.A. job with every refinement, but it is capable of giving very satisfactory results when worked within its limits and under reasonable conditions.

It has been made compact so that it will lead itself more readily to the many applications mentioned above and, incidentally, keep its cost well within the more general requirements.

The circuit can be seen in Fig. 1. Many may wonder why two L.F. transformers are used as in certain instances this might seem unnecessary. The one on the input side has been embodied so that the unit is rendered more universal. For example, the two input sockets can be connected directly to the 'phone terminals of a crystal or valve receiver, provided, in the case of a receiver using two valves, that the existing output valve in the receiver is replaced by an ordinary triode of the H.F. or L.F. type.

This precaution is necessary as the primary winding of the transformer has certain current limitations.

The secondary of the input transformer is connected across the grid circuit of the first valve, a triode of the H.F. class, which, in this case, is the Cossor 210HL.

The anode of this valve receives its high-tension through the primary winding of the second transformer, and it should be noted that a separate H.T. lead is provided for this section to allow the voltage to be adjusted to the lowest value consistent with satisfactory operation.

The signal from this transformer is fed into the grid of the output pentode which is of the latest economy type, namely, the Cossor 220HP.T. This particular valve was selected because it possesses the added advantages of being very economical as regards high-tension current consumption, besides having a good amplification factor and being capable of giving quite a reasonable output.

Construction

The illustrations give all the essential details quite clearly, and no trouble should be experienced with the assembly of the components or their wiring. One or two tips, however, will not be amiss, as there are always ways of doing anything and the easiest is not always the quickest.

The same wooden case as that used for the Stand-by Crystal Set (May 13th issue) is used, as it is both cheap and serviceable.

This, it will be remembered, is supplied with a plain white wood finish, so it can be stained or coloured to suit individual taste.

All holes should be drilled first and their edges smoothed off with fine sandpaper.
THE "MIDGET" TWO-VALVE AMPLIFIER

(Continued from previous page)

The valveholders and sockets can then be mounted, although if the specified case is used, it is supplied with the four sockets already fitted.

Next, complete the wiring of the filament circuit, not forgetting the switch to the negative L.T. lead. Fit the two flexible leads for the L.T. supply, and note that the H.T. negative, L.T. negative and the G.B. positive connections are made common outside the amplifier. The illustration, Fig. 2, makes this clear. Before fixing the input transformer in position, connect its green lead, after reducing it to a suitable length, to the grid pin of the four-pin valveholder and join the grey and yellow leads to the two input sockets. Now fasten the grey lead from the second transformer to the anode pin of the same valveholder.

The transformers can be bolted into the positions shown, and their other connections made. A word of warning might be necessary here. Be careful with the fine flexible leads when cutting and baring them. Don't subject them to violent jerks or their connection to the transformers might be damaged.

The anode-pin of the five-pin valveholder can now be connected to the black output socket, together with one end of the .005 mfd. fixed condenser, the other end of which is taken to the negative L.T. pin of the valveholder.

To the red leads on each of the transformers, and to the yellow lead of the second transformer, connect suitable lengths of flexible wire for the G.B. and H.T. connections respectively.

After checking all wiring and connections and inserting valves and connecting batteries, the unit is ready for a test once a suitable input signal has been applied to the input sockets and a loudspeaker to the output.

OPERATING NOTES

Keep the H.T. on H.T.+.1 as low as satisfactory results permit. Apply 1½ volts negative bias to G.B.3 and 4½ volts to G.B.2. These figures being (for 60-80) volts on H.T.1 and 120 volts H.T. on H.T.2.

Never remove the bias connections when the amplifier is switched on. Don't over-load the first valve by expecting it to handle the full output of, say, a good two-valve.

In the interests of quality, it will be necessary to control the input to prevent distortion due to overloading if a powerful input signal is being applied.

PROGRAMME NOTES

"When Day is Done"

The series called "When Day is Done" is widening its scope yet again. This series of light music programmes, of soothing melodies at the end of the day, has been broadcast in the Welsh programme, and can be heard on the main regional wavelength. On June 7th, Scotland and Northern Ireland will also listen to "When Day is Done."

This takes the team as hosts: Betty Hewitt, Mai Jones, Haydn Adams, Lyn Joshua, Cliff Earnshaw, the B.B.C. Welsh orchestra, played by Frank Llewellyn, and the Male Chorus, who will sing arrangements by Idloes Owen. The programme, which has been devised by Mai Jones, will be produced by Glyn Jones.

What the Seaside Thinks of You

The tables will be turned on June 7th, when listeners, instead of hearing what people think of the seaside, will be told what the seaside thinks of them. What do seaside holiday makers, life-savers, beach photographers, guides and all the others who look after visitors on holiday really think of them? Elwyn Evans will be going to some of the seaside resorts of North Wales to try to find out, and he will bring to a studio in London on June 7th some of the people whom he has interviewed.

"Sing Song"

Rockish, light-hearted, home-town of Graeae Fields, seem to make a habit of producing first-rate variety artists. Arthur White, for example, is such a popular stage personality amongst those that he seldom gets the opportunity to entertain audiences much farther afield. He will do so, however, on June 26th, when, on the National wavelength, he broadcasts for the first time in the B.B.C.'s "Sing Song" programme.

Before turning to the stage—as comedian and manager of his own shows—he had a varied career as newspaper seller, "doffer," pig driver, mill hand, miner, navvy, and traveller.

With him in Ernest Longstaffe's cast for the "Sing Song" programme will be Hazell and Dave Regan and Ann, Foster Richardson, Jimmie Elliott, the animal imitator, and two new microphone personalities, Frank O'Brian and Joe Hudson, as "Mr. Twerp and Mr. Twerpington"—two commercial travellers.

Week-end Escape by Canoe

The talks series entitled "Week-end Escape" brings to the microphone on June 8th a speaker who advocates, as the ideal way of spending an out-of-doors week-end that is different, the taking of a canoe trip. Alastair M. Dunnett, who is to reply, "We have to, if we want to keep our jobs." Each speaker will tell what is her attitude to life outside her work, and how she interprets the claims of a busy and exacting professional career with her interests as a woman. They will also discuss how far a professional woman who is not married can have "domesticated" interests and why they both like gardening. A man will "referee" the discussion.
A FREQUENCY RECORDER

A GRAPHICAL recorder is a most desirable piece of apparatus for the experimenter, but is, unfortunately, expensive. There is, however, ample scope for the home constructor to evolve a practical arrangement which would not be prohibitive in cost to make up.

It is along these lines that the writer set about the construction of a moving-coil and rotary drum movement as depicted in the illustrations, the view being to obtain first of all, sufficient sensitivity to record the essential characteristics to distinguish various forms of input, any measurable degrees of accuracy being a secondary consideration but of obvious benefit.

Rotary and Push-pull Operation

Using the push-pull and rotary drum principle proved quite a simple, but very interesting, way of obtaining continuous graphing with a stationary inker, and reference to Fig. 1 will show how this method has been adapted.

A fractional horse-power electric motor is employed, having an incorporated, one stage, reduction providing approximately 47 r.p.m., and this motor is coupled to the recording drum shaft through two 6 : 1 epicyclic reduction drives, bringing the (off load) r.p.m. down to 1.3.

To combine the rotary and push-pull functions, it was necessary to introduce a flexible coupling which, whilst not impeding the shaft drive, offered as little mechanical resistance to the moving-coil action as possible.

Coil Windings

A D.C. load maintained for about half a minute, proved the simplest method of determining the different flux densities of the three types of windings tried out with extremes in wire gauge and turns, the slight but perceptible limits of the graph peak in relation to the tracking lines (see Fig. 3, "T") serving as a guide. The winding finally decided upon constituted about 70 turns of 34 gauge enamelled wire. This moving coil was wound on a thin but in this shaft. The driving shaft fits snugly into the moving-coil former shaft "F," and is secured by two 8 B.A. screws, one of which is shown in the inset.

Assembling the Parts

After mounting the motor and drum assembly on the long baseboard, allowing sufficient space between the drum brackets and the edge of the drum for the push-pull movement, also enough space between the slip-ring former and the adjacent bracket, the moving-coil assembly was finished off by gluing the inside surface, and sliding the coil former on to the slip-ring former.

Having left long ends after winding the coil, these were recessed in grooves made in the ebonite rod and paper former, terminating them at the slip rings by neatly soldering, the grooves then being filled with wax, and scraped flush with a jeweler's knife. When the moving-coil former had thoroughly adhered to the ebonite, the permanent magnet (P.M.) was positioned, and the push-pull movement tested.

When satisfied on this point, two wiper contacts were made from a small sheet of phosphor bronze which was handy, the width of each wiper being so arranged that at the extremities of the movement, the contact was maintained, and without the possibility of a short circuit occurring.

It will be seen from Fig. 2 that the drum assembly comprises a thin paxolin former of conventional type, this being fastened to the driving shaft "P" by four light gauge brass angle strips and 6 B.A. screws, as depicted. Each screw passes through clearance holes in both the brackets and the shaft, being finally locked with nuts.

Aluminum brackets were provided for bearing the drum, no other form of incidental shaft bearing being found necessary for smooth rotation.

Inker Details

The inker used in the model described was devised by cutting down an old stylo pen, and mounting this on an adjustable mount as illustrated in Fig. 1.

Indian ink is not recommended, this having a tendency to clog the fine outlet, thus necessitating persistent cleaning which requires the frequent dismantling of the inker, and this is not desirable when the right pressure and position is once obtained.

(Continued on page 303)
**PLAN YOUR LAYOUT**

**How the Construction of a Set may be Simplified, and Efficiency Increased by Systematic Working to a Plan.**

By W. J. DELANEY

**WHEN** a house or factory is to be built, the first thing which is done is to have a set of working drawings prepared by an architect or engineer. Factory-built wireless receivers are also built on similar lines, although in this case it may be thought that it is essential owing to the fact that reproductions of an original design are required. Many constructors fail to realise that the work of construction may be simplified, and in many cases the efficiency of the finished receiver improved, if a set of working drawings are first prepared. In far too many cases a constructor merely looks up a circuit which he thinks will suit him, looks out spare parts which may be used in the circuit, and then picks and places them in a random manner, and proceeds to build up the set in what he thinks is the best way. Consequently, when wiring is commenced, all sorts of snags are likely to occur, and in many cases it may be necessary to remove certain components and place them in alternative positions. Of course, when building from a published blueprint or constructional data such points will not arise, but let us see just what kind of snags may be avoided by a planned layout, and the best method of setting about it.

**Suitable Components**

Having decided upon a circuit, the first procedure is to obtain suitable parts, and hence such problems as current-carrying capacity and similar electrical features will be the main points to attend to, rather than physical characteristics. All components should be got together first, and then the type of chassis or baseboard may be considered. The coils and tuning condensers will be the main governing features as these will have to be placed in definite positions, according to the connecting points on them, and in turn they will control the positions of the valves to which they are connected. The best plan is, therefore, to place these components on a table or workbench in the positions in which they will eventually have to occupy and then to arrange the remaining components round them in suitable electrical positions. That is to say, transformers or similar components which may have a fairly extensive field which could give rise to interaction or hum difficulties, should be kept as far away as possible from similar components. As these parts are located it will be noted that space can be saved if certain components were placed one above the other, thus indicating the desirability of using a metal or enamelled rigid chassis. Remember in this connection that the chassis will act as a screen between components.

**Wiring Facilities**

When placing components the run of wiring should also be considered, and it may be found that it will be impossible in some cases to shorten wiring without introducing coupling between certain components, and therefore, a complete rearrangement of the parts may be called for. On the other hand, a long lead in certain parts of the circuit may be of little consequence, and thus a little thought is called for in this preliminary planning.

When a satisfactory scheme has apparently been evolved, the next best procedure is to obtain a piece of cardboard or paper of the size indicated for the chassis and to stand the parts on this, marking out the outlines with a pencil. With the theoretical diagram before you, you can then put in the wiring with your pencil, and it will soon be noted that certain points may be “commoned” or the use of earthing tags introduced. This in turn may show that a component may be moved slightly so that an earthing tag may be included on its holding-down bolt to shorten certain leads or to simplify the interconnection of certain parts of the circuit. Resistors and small fixed condensers will form part of the interconnecting leads, and it should be considered whether or not it would be desirable to use a group-board so that these items may all be mounted rigidly before the board is attached to the panel, damage thereby being avoided and final wiring simplified.

Similarly, the presence of earthing tags will enable you to place these on as the components are bolted in position and will save unrewiring nuts and placing these on as the wiring is carried out. Thus, although it may take some little time to prepare these working drawings, there will eventually be a saving of time, and the wiring will be carried out much more expeditiously. This in turn will lead to greater efficiency, as the soldering-iron may be kept in use and the work of connecting up will not have to be interrupted from time to time to make changes in component fixing or other alterations. This, in turn, means that the work will be carried out much more efficiently and the final receiver will be much more likely to function satisfactorily.

We have not dealt in this article with the question of testing all components before they are incorporated, as the idea has been more to show that systematic planning can greatly increase the interest of constructive work, and repay the constructor by providing him with a better article in the finished receiver.
Don't Miss the Miss!

A COMPETITION is being organised in connection with Radiolympia which will certainly add to the interest of what I am certain will be the most interesting show of the whole series. The competition is to select the girl having the perfect radio and television personality, and she will appear at the Exhibition, which extends from August 29th to September 2nd. The heats of the contest are being conducted at the leading seaside resorts, one night each week, commencing July 10th to August 14th. It is hoped that the competition will also help local concert parties and the trade of each town selected. The girl will be chosen for appearance, personality, and microphone voice. The contest will be publicised by means of posters, cards to hang in hotels, cafés, etc. whilst handbills, press advertising, and editorial publicity (such as the paragraph I am now writing) will lend aid. Prizes will be given by the R.M.A. for each heat, and the services of a compère will be available. The judging will be by means of volume of applause from the audience. In connection with it a theme song is being written by a well-known composer, and it is hoped to arrange a broadcast in connection with at least one of the heats, one semi-final, and the final. At the completion of the local heats, semi-finals will be held, in large centres of population such as London and Birmingham, to select 12 semi-finalists who will appear in London for final judging. The semi-finals and finals will be judged by radio critics, film, stage and radio stars, and other well-known personalities. Each semi-finalist will receive a prize of a radio set exceeding 12 guineas in value.

The prizes for the finals will include such benefits as broadcasting engagements, television appearances, contract to appear at a well-known London revue theatre, film test, a complete outfit of clothes by a well-known London modiste, etc., etc., and a cash prize of £5 will be presented to the concert party through whom the winner enters the competition.

In addition to the competition another plan of general interest is open to co-operating concert parties. The R.M.A. will supply small coloured discs (red for men, blue for ladies) bearing the words "Let's all Go to the Radio Show," and having progressive numbers. These can be given away at every performance. The object is for each man to find the girl wearing the ticket bearing the same number as his own. Prizes will be provided by the R.M.A. for distribution each week to the winners. Further details from A. J. Dannhorn, 59, Russell Square, London, W.C.1.

Wind Chargers

SUCH a welter of correspondence, since I published my paragraph about wind chargers, one reader has kindly forwarded practical details showing how he converted a 6-volt car dynamo for wind-charging purposes. In the meantime readers might like to know that Messrs. A. W. Gamage are supply a commercial product for £3 17s. 6d. It is of American manufacture and, I believe, very efficient.

Mikes Dipped in Gold

THE microphones used by the King when he broadcast to his Empire from Canada on May 15th (there were four of them) were dipped in gold. They were of Western Electric manufacture, and 90 more of a different type, each surmounted by a gleaming crown of sterling silver, were placed at the King's disposal in the various cities. Extraordinary precautions were taken to ensure a faultless broadcast. Special supporting stands, equipped with special expanding tripod bases, provided firm mounting for each instrument. Also, 20 cardioid directional microphones were provided for use on occasions where crowd noise or other interference might have marred the King's broadcast.

The "Baby-bull" Horn

LATEST product to be announced in the field of public address equipment is known as the "Baby-bull" horn—a powerful loudspeaker, made by the Western Electric Company, which is capable of radiating enjoyable music and high quality speech to an open air audience of thousands. Because of its unique electro-acoustic characteristics and weather-resistant construction the instrument is expected to find wide application as a sound reinforcement device in baseball parks, exposition, county fairs, outdoor concerts, and similar public gatherings where large masses of listeners are scattered over a broad area.

In efficiency, the new speaker compares favourably with the finest units employed in talking motion-picture or high quality public-address work, and its frequency response is substantially uniform over a range extending from 110 to 6,500 cycles. When driven by a 50-watt amplifier it is capable of radiating approximately 17 watts of acoustical energy.

The "Baby-bull" speaker consists of a single metalic horn of exponential type which is driven by two dynamic receivers enclosed within a moisture-proof aluminum housing. This type of loudspeaker has directional characteristics which permit faithful reproduction throughout an angle of approximately 30 degrees. This quality helps to solve the public-address engineer's problem of distributing the sound to desired areas without creating a disturbance in adjacent locations. Permanent magnet fields eliminate the necessity for external excitation. The device is officially known as the 6030B horn. It weighs 65 lbs. complete, measures 55in. overall in length and is 25in. wide at the bell.

Radio Gramophones and Pick-up Terminals

APROPOS my query concerning pick-up terminals, I have received the following letter from E. J. O., of Wandsworth:

"Regarding your article on radio-gramophones, my opinion is that a new circuit, plugged into or added on to a set, via terminals, would never be so efficient as one that is built in with
short rigid leads to a switch on the panel. I have had a heap of trouble on various made-up sets with plug-in pick-up sockets; even with screened leads the slightest vibration seems to upset the radio whilst you are tuned to a station. How many ways are there of connecting a pick-up? I have a friend's set here; he has made a radiogram cabinet and wants me to fix the gramo, part for him but I think it has me guessing. It is a commercial type of superhet. I tried several ideas of fixing, then wrote to the makers for the circuit, but was informed that it was out of print. I wonder if any of your readers happen to have one to loan me, if so I would gladly repay the cost of posting on returning print, and would greatly appreciate the loan.

(Lissen 7 Superhet.)

Herewith is another letter from A. N. (Nottingham) on the same subject:

"In reply to your article on radiogramophones, I am giving you my point of view. In the first place I am wholly in favour of sets with gramo sockets with appropriate switching. With such sets one can make or buy a cabinet incorporating electric motor and pick-up arm, and a nice, roomy record compartment, making a very fine piece of radio furniture. I find with modern sets and a gramo attachment as described above that the quality compares very favourably with the complete radio-gram, and as your records are so conveniently to hand the gramo attachment is used more often, thus giving more pleasure. With the complete radiogram there is no record space or cupboard. I honestly believe that sets with gramo sockets, in conjunction with a good commercial gramo attachment, are the best proposition."

If You Want to Know the Time...

E VERY radio fan now adjusts his clock and/or his watch by means of the six pips which are accurate to 1 of a second per day. My readers may not know, but I am an amateur horologist, and I have just succeeded in tuning a watch I picked up for a few shillings to a limit as accurate as the six pips. These tests were first instituted in 1888, just over 50 years ago, and very few watches have managed to secure the hall-mark of the almost perfect watch, namely, a Kew A certificate. The test lasts for 44 days during which the watch is tested in extremes of temperature and in various positions. A watch which just passes the test obtains a certificate, but marks are awarded when the watch improves upon the limits laid down on the tests.

A perfect watch would have 100 marks out of 100 for consistency of rate, 40 for constancy of rate at changes of position, and 20 for temperature compensation. My watch was submitted from April 1st to May 15th, and obtained 78 marks out of the maximum 100. Its mean variation of rate is .2 (1/5th) second per day; its mean change of rate per degree F., only .09 seconds per day, and in respect of consistency of rate obtained 35.9 marks out of the maximum of 40, 28.1 out of a maximum 40 for constancy of rate with change of position, and 14 marks out of 20 for temperature compensation. With my watch I am now able to tell you whether the pips are accurate! One interesting fact emerged during the seven months I spent adjusting this watch, and that is that mains clocks, contrary to popular belief, do not tell the exact time throughout the day. During one period they were 21 seconds out in the day, although, of course, they are corrected each day.

The Orchestral Library

THE B.B.C. Symphony Orchestra is remarkable, both in size and for the number of programmes it performs—few large orchestras of the world are an integral part of a broadcasting organisation; therefore, they do not usually play so many different programmes. Mere figures convey but a poor impression of the value of the Orchestral Library which the B.B.C. has, consequently, to maintain. But they may at least give an idea of its extent.

Actually, the library is one of the biggest in the world. It contains, for example, some twenty-seven thousand separate works—and an orchestral work may very well consist of anything from ten to one hundred and twenty separate pieces of printed music. To these may be added the score of the conductor, scores for use in the Control Room and for the technicians who "balance" the music according to the wishes of the conductor.

And because some work may be required the same week in the programme of one of the Regional stations, there is an "A," "B," and "C" Library containing 5,000 works.

Six large rooms at Broadcasting House are occupied by the library, where a staff of thirty-three people are working full time. Excitement, speed—and temperament—cause orchestral music exceptionally hard wear—and the repairs department keeps four people busy every day.

Notes from the Test Bench

Dust Leakages

ALTHOUGH dust can cause noises in certain parts of a receiver, its effects may be much more serious. Dust inside variable condensers generally gives audible warning of its presence by crackling noises as the condenser is rotated, but in modern receivers there are several places where dust can gradually accumulate and eventually cause a short-circuit. Although the layers of dust may not carry much current when in a dry state, in a moist atmosphere the current may be sufficient to prevent satisfactory working, and a case of this nature recently came to my notice where the dust had formed a leakage path across the trimmers of an I.F. transformer. The result was that H.T. was being applied to the grid of an I.F. valve and preventing it from functioning by making the grid slightly positive. A good clean with the blower attachment of a vacuum-cleaner periodically is a good idea with modern receivers which are not dust-proof.

Capacity Aerials

We repeatedly receive readers' wrinkles in which the hint is given that a bed-mattress makes a good aerial. The idea of a large metallic surface acting as an aerial is, of course, very old, and there are many commercial types of aerial in which an elevated capacity is used in this manner. In some types of portable or self-contained receiver it is also possible to make use of the idea by fitting a large plate of copper beneath the lid of the cabinet, and connecting this to the aerial terminal. In flats or other places where a short direct earth is difficult to provide, it will also be found that a similar plate placed beneath the bottom of the cabinet and connected to earth will prove very efficient. This idea was, in fact, incorporated in the first receiver to be provided at Buckingham Palace.

Neutralising

THE early types of receiver in which H.F. amplification was employed made use of a small capacity coupling anode and grid. This was to remove oscillations in the balancing out inter-valve capacity, and although the idea is not now needed with S.G. and H.F. pentode valves, it is still very valuable in transmitters where trideo P.A. stages are employed. Special condensers should be used for this purpose, however, and old pattern neurodyne condensers are not generally suitable for the high working voltages which will be found in the P.A. stage.
Receiver Testing Fallacies

Details of Mistakes that are Often Made, and Some Notes on the Correct Methods to be Followed

It is very easy to make a slip when carrying out even routine tests of a receiver, especially if a copy of the wiring diagram is not kept in sight. An example of this was exemplified recently when a thoroughly experienced experimenter made what he later found to be a foolish blunder in checking through the mains unit of an amplifier.

Before connecting it to the amplifier, valves he wished to make a test of the output and to ascertain that all voltages were correct. And as he had made use of a mains transformer which had not been in use for some time he thought it desirable to make sure that this was not below par. A high-grade multi-range meter was used, this being set to read A.C., and the voltage on each side of the centre tap of the H.T. winding of the transformer was measured. A similar reading of slightly under 400 volts was shown connecting the meter to one end of each of the two windings. To his surprise, a reading because the valve had not been removed from its holder.

Of course there was a voltage reading because the valve had not been removed from its holder. The valve was then removed and the test repeated; no reading. Another test was made by connecting the meter to one end of each of the two windings. To his surprise, a reading of approximately 380 volts was shown by the A.C. meter. For a few minutes the experimenter was stumped; and probably you would have been. It was not until he had made some additional tests with the transformer that he realised why a reading had previously been obtained—for there was no doubt that the component was in perfect condition and entirely free from inter-winding or core-winding leakage.

The Reason

The explanation should be clear from the diagram. When the transformer was connected and the rectifying valve was removed from its socket there was no reading between the points marked 1, but there was one between those marked 2. If you have not yet "tumbled," the explanation is that the H.T. supply was A.C., and that the circuit between the centre tapping of the H.T. winding and the L.T. winding was completed by the smoothing condensers. These would have been insulators for D.C., but on A.C. an 8-mfd. condenser (the capacity of the two in parallel) has an effective resistance of only about 400 ohms at 50 cycles. When using a high-resistance meter such a resistance is negligible as far as the reading is concerned.

Parallel Resistances

The position is not improved by transferring the positive lead from the meter to the points marked b and c. When connected to b there is still the anode resistance in series with the valve anode, and when connected to c there are actually three resistances in parallel: that of the valve (A.C. resistance or impedance), that of the meter, and that of the two resistors and H.T. supply all in series. It will be seen, therefore, that the indicated voltage might differ appreciably from the actual voltage.

Measuring Anode Voltage

A mistake is often made in determining the voltage applied to the anode of a valve. Even when a battery is used for H.T. supply you cannot tell the voltage by noting the tapping used to feed that anode, for there is always a resistance of some kind in the anode circuit. This might be only a few hundred ohms through the primary winding of an L.F. transformer, or several thousand ohms, through a coupling and/or decoupling resistor. Thus, an initial voltage of 100 would be reduced to 50 if there were a series resistor of 5,000 ohms and the valve passed 10 m.A. In the same conditions the voltage drop would be only 5 if the total anode resistance were only 500 ohms.

The matter is not greatly simplified even when a good-quality high-resistance voltmeter is available, for reasons which are shown diagrammatically in Fig. 2. If the negative terminal of the meter were connected to the earth line, and the positive one to H.T. + (the point marked a), the reading would be valueless. In the first place, the reading would not take into account the voltage drop across the two series resistors in the anode lead. In the second place, the resistance of the meter would be in parallel with that of the valve, and its anode resistors in series; consequently, part of the H.T. supply would pass through the meter so that the reading would be slightly less than the voltage provided by the H.T. point.

Fig. 1.-Points at which unexpected meter readings were obtained when testing a power unit using a full-wave rectifying valve and mains transformer.

Fig. 2.-Special care must be taken when attempting to measure anode and grid voltages.

(Continued overleaf)
In fact, the only value of this test would be in finding whether or not an anode voltage was being applied to the valve. With a cheap, low-resistance meter it is even possible that no voltage reading would be given.

**Voltage from Current**

The only convenient method of determining the correctness of the applied anode voltage is, peculiarly enough, by measuring the anode current by means of a milliammeter. If this were inserted at the point marked X, the current consumed by the meter should be appreciably less than that of either component separately. A factor which might easily be overlooked is that a correct reading might not be obtained if the negative side of the meter were connected directly to the grid of the valve at the point marked 1. In that case the grid-leak resistor would be in series with the meter, and since this might have a value up to one megohm or so its effect would be marked. In normal running conditions there is not, of course, any voltage drop across the leak due to the fact that grid current does not flow—the bias is merely a potential applied to the grid.

The same conditions apply when dealing with a battery receiver, and in this case the meter should be connected between the positive end of the bias battery and the tapping point employed, not to the grid of the valve. This is illustrated in Fig. 3. When dealing with a battery set having automatic grid bias, as shown in Fig. 4, measurements should be taken in the same manner as for a mains set; that is, the high-resistance meter should be joined across the bias resistor.

**Anode Current Totals**

A mistake is sometimes made when checking the total of individual valve anode currents against the total current found by inserting the milliammeter in the H.T.—lead. It is frequently found that the sum of the currents is appreciably smaller than the single total reading. A search might then be made to find where leakage is taking place, but without result. This is because it has probably been overlooked that there is a potentiometer across the H.T. supply used to feed the screening components separately. A factor which might easily be overlooked is that a correct reading might not be obtained if the negative side of the meter were connected directly to the grid of the valve at the point marked 1. In that case the grid-leak resistor would be in series with the meter, and since this might have a value up to one megohm or so its effect would be marked. In normal running conditions there is not, of course, any voltage drop across the leak due to the fact that grid current does not flow—the bias is merely a potential applied to the grid.

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**Coil Testing**

Another fairly common mistake is often made by constructors wishing to check the resistance of coil windings, and also the change in resistance when the wave-change switch is operated. When an ohmmeter is not available—and few constructors have one—the best course is to use a low-resistance ammeter in series with a small dry battery, as shown in Fig. 5. Thus, if a 11- volt dry cell were used in conjunction with an ammeter reading up to one amp., the readings at long and medium wave positions of the switch for a coil with resistances of 2 and 5 ohms for the M.W. and L.W. windings would be approximately 76 and 2 amp. If the method of using a milliammeter in series or parallel with a fixed resistor were employed (and this is often convenient and sufficiently accurate) the difference in readings probably could not be detected.

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**BROADCAST EVENTS OF THE WEEK**

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

- **Wednesday, June 7th.**—Otello, acts 1, 3 and 4, from Covent Garden.
- **Thursday, June 8th.**—American Humour, feature programme.
- **Friday, June 9th.**—The Trial of the Glasgow Cotton Spinners, a play.
- **Saturday, June 10th.**—Aldershot Tattoo.

**REGIONAL (342.1 m.)**

- **Wednesday, June 7th.**—Roadabout, an all-Regional variety programme.
- **Thursday, June 8th.**—Dignity, a play by Teresa Deely, from Northern Ireland.
- **Friday, June 9th.**—A Northern Entertainment Tour from Blackpool.
- **Saturday, June 10th.**—Dance Band programme.

**MIDLAND (296.2 m.)**

- **Wednesday, June 7th.**—Studio variety.
- **Thursday, June 8th.**—Light Listening, a radio magazine.
- **Friday, June 9th.**—Water Folk, a song sequence by Martin Shaw.
- **Saturday, June 10th.**—Bond programme.
- **WELSH (373.1 m.)**

- **Wednesday, June 7th.**—When Day is Done, soothing melodies, old and new.
- **Thursday, June 8th.**—Cardiff's Oldest Theatre—memories of the Palace.
- **Friday, June 9th.**—Dolgelley Town: Fair Dolgelley Town, a feature programme.
- **Saturday, June 10th.**—Farmhouse Night Entertainment.

**WEST OF ENGLAND (285.7 m.)**

- **Wednesday, June 7th.**—The House and the Man; Thomas Hardy at Mincing Gate, a talk.
- **Thursday, June 8th.**—Organ and choral concert, from the Guildhall, Southampton.
- **Friday, June 9th.**—Cocklemouth Comet, No. 2, The "Comet" covers a wedding.

- **NORTHERN (449.1 m.)**

- **Wednesday, June 7th.**—The Royal Air Force, a feature programme of life in the Junior Service recorded at Catterick Camp.
- **Thursday, June 8th.**—Three Short Plays.
- **Friday, June 9th.**—A Northern Entertainment Tour from Blackpool.
- **Saturday, June 10th.**—Orchestral and instrumental programme.

**SCOTTISH (391.1 m.)**

- **Wednesday, June 7th.**—Pipe Tunes: A recital.
- **Thursday, June 8th.**—Gaelic Concert.
- **Friday, June 9th.**—Concert Party programme.
- **Saturday, June 10th.**—Scottish Dance music.

**NORTHERN IRELAND (301.1 m.)**

- **Wednesday, June 7th.**—Inter-Schools Spelling Bee: Method o' V. Just.
- **Thursday, June 8th.**—Dignity, a play by Teresa Deely.
- **Friday, June 9th.**—Cricket: Ulster v. Leinster, a commentary from the Northern Ireland Cricket Grounds, Belfast.
A Trap for Acid Fumes

MUCH damage can be caused by the corrosive action of acid fumes when the accumulator is housed inside the cabinet. In addition, if the accumulator is being trickle-charged, the danger of minute drops of acid spray is ever present. To ensure against further damage to a set which had been cleaned and repaired, the "fume trap" shown in the sketch was tried and proved successful.

A short length of rubber tubing is attached to a small bakelite funnel "A," while a piece of wood, "B," has a small hinge fixed to one end, and is drilled and slotted at the other. This hole should be the same diameter as the tubing where it is connected to the funnel. Slip the tubing through the hole and tighten the screw "C." Fix a piece of spring wire into the hole already there for a grid lead. As the lead-a diode it is unused.

The inside of the funnel can now be lined with a cone-shaped piece of blotting paper, taking care not to cover the hole leading to the tubing. Place the accumulator inside the cabinet in a position which will allow the funnel to cover the filler cap.

A Tool for Awkward Corners

FIRST an old lamp socket was dismantled means of I lock-nuts, a piece of brass, as the end of the other wire I fastened, by stiff wire, turned the ends, and soldered at the other end of one a terminal spade. At the end of the other wire I fastened, by means of lock-nuts, a piece of brass, as shaped in sketch.-F. HOLFFORD (Hednesford).

A General-purpose Connector

A novel dodge for trapping acid fumes from an accumulator.

A method of applying reaction to an I.F. stage.

Applying Reaction to an I.F. Stage

HERE is a rather novel way of applying regeneration to the I.F. stage of a superhet, giving a great increase in sensitivity and selectivity, particularly the latter.

First I soldered a lead to the grid of the I.F. valve (top cap in my case) and connected it to one side of a small variable condenser—an old-type air trimmer I had on hand. The lead—a well-insulated one—from the other side of the condenser, I pushed into the last I.F. transformer can, through a hole already there for a grid lead. As the following valve is a diode it is unused.

With the condenser half in mesh, I pushed the lead into the I.F. transformer can until the stage was just oscillating. A few experiments soon found the right position for smooth control, and then a drop of sealing wax fixed the lead permanently.

A Trap for Acid Fumes

In the first "hook up," the regeneration control altered the tuning, but this was cured by using low-loss mountings—a small piece of Trolit I had left—and an insulated extension rod for control from the panel.

The main advantage of this arrangement is the great increase in selectivity—in fact, on the crowded 40m. band, there are very few amateurs that I cannot get in the clear by the use of the control. The condenser is mounted on a bracket, as shown in the sketch, as close as possible to the valve.—W. J. MARKWICK (Windsor).

A General-purpose Connector

A method of applying reaction to an I.F. stage.

THAT DODGE OF YOURS!

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

SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page 303.

The inside of the funnel can now be lined with a cone-shaped piece of blotting paper, taking care not to cover the hole leading to the tubing. Place the accumulator inside the cabinet in a position which will allow the funnel to cover the filler cap.

Fumes are led outside the cabinet by the rubber tubing, which should be clipped to the back cover at any convenient point.—ALEC DAVIE (Edmonton).

A General-purpose Connector

A handy general-purpose connector made from odds and ends.

A Trap for Acid Fumes

In the first "hook up," the regeneration control altered the tuning, but this was cured by using low-loss mountings—a small piece of Trolit I had left—and an insulated extension rod for control from the panel.

The main advantage of this arrangement is the great increase in selectivity—in fact, on the crowded 40m. band, there are very few amateurs that I cannot get in the clear by the use of the control. The condenser is mounted on a bracket, as shown in the sketch, as close as possible to the valve.—W. J. MARKWICK (Windsor).

A Tool for Awkward Corners

FIRST an old lamp socket was dismantled and the plungers taken and filed as required, then a piece of ebonite rod was shaped and drilled, or two ebonite sleeves can be used for insulated caps, one of which will have a slot and the other a peg. The leads are taken through the ends of the sleeve attached to the screw at the end of plungers, and the whole plunger then slid back into the sleeve. The connector is pushed together, and a slight twist locks the two ends fast. The sketches show the idea clearly.—C. ELIAS (Watford).

A General-purpose Connector

A method of applying reaction to an I.F. stage.

Applying Reaction to an I.F. Stage

HERE is a rather novel way of applying regeneration to the I.F. stage of a superhet, giving a great increase in sensitivitity and selectivity, particularly the latter.

First I soldered a lead to the grid of the I.F. valve (top cap in my case) and connected it to one side of a small variable condenser—an old-type air trimmer I had on hand. The lead—a well-insulated one—from the other side of the condenser, I pushed into the last I.F. transformer can, through a hole already there for a grid lead. As the following valve is a diode it is unused.

With the condenser half in mesh, I pushed the lead into the I.F. transformer can until the stage was just oscillating. A few experiments soon found the right position for smooth control, and then a drop of sealing wax fixed the lead permanently.

A Trap for Acid Fumes

In the first "hook up," the regeneration control altered the tuning, but this was cured by using low-loss mountings—a small piece of Trolit I had left—and an insulated extension rod for control from the panel.

The main advantage of this arrangement is the great increase in selectivity—in fact, on the crowded 40m. band, there are very few amateurs that I cannot get in the clear by the use of the control. The condenser is mounted on a bracket, as shown in the sketch, as close as possible to the valve.—W. J. MARKWICK (Windsor).
A Swift Move?

A FEW days ago the Postmaster-General received a deputation from the Radio Manufacturers’ Association. The object of this meeting was to urge that steps be taken to establish a B.B.C. television station in the provinces, and to make effectively the first important move of the national campaign which has been organized to press for a station in the Birmingham area. It was pointed out that other countries in the world established transmissions on different systems, and an enormous potential export market would be lost to Great Britain, which to-day held a two and a half years’ lead over other countries in this field. London area television sets are being sold at a high rate, large-scale production cannot be interfered with by manufacturers with the wide area of potential viewers in the Midlands opened up. It is certain, too, that if the step was taken by the Government it would remove the experimental atmosphere from the London transmissions, and so break down the last sales resistance of possible set purchasers who feel that the present service is not really stable. In replying to the manufacturers, Major Tryon promised to give full weight to the representations made by the deputation, and a full meeting of the Television Advisory Committee under the chairmanship of Lord Cadman has been called so that a report can be made to the P.M.G. If one judged by the replies given to questions in Parliament on the same subject, it would seem on the surface that there has been some manoeuvring to postpone a decision by arguing the respective merits of the coaxial cable, and a series of directional micro-wave radio links. Such tactics really beg the question, and all the argument really means is that there are two possible methods already in existence, either of which would be used with a virtual certainty. Although the manufacturers have got together and announced that they will inaugurate a new era for the very large section of boxing supporters, and better financial days for the boxers and organizers themselves. It is not so much the home viewing angle which is likely to bring this about, but the fact that cinema audiences can see the match by big-screen television, as proved conclusively by the three recent important matches held in London. While it is appreciated that at the moment there is a ban imposed by the British Boxing Board of Control, London boxing promoters have got together and announced that they intend forming their own association. The idea which is now being developed is the provision of regular televised fights on cinema screens, and every effort is being made to expedite the installation of receiving equipment in theatres for this purpose. Small delays have arisen because of the demands imposed on certain firms for constructional work, and in addition the power of the London station would have to be increased enormously.

C.R. Tube Scanning

In the usual forms of cathode-ray tubes used for television picture reconstitution the movement of the beam of electrons is undertaken by variations in an electrostatic or electromagnetic field through which the beam is made to pass. In spite of difficulties, some of which are very largely associated with linearity of spot movement over the available scanning area, the results have been satisfactory. This has in no way, however, prevented the development of other schemes designed to achieve the same ends in another way. One of the most interesting of these proposals is to provide an electron stream control by actually reflecting it from an equipotential surface set up within the tube envelope. With an ordinary light beam, it is reflected from a surface so that the angle of incidence equals the angle of reflection. The same law holds good with an electron stream, and the main idea of the invention is to vary the contour, on inclination of the equipotential surface, in such a way that the beam is made to traverse across the fluorescent screen in a series of juxtaposed lines at the correct line, and frame scanning frequencies.

Television and Boxing

It seems certain that in the very near future the art of boxing and the science of television will be very closely linked together. This will inaugurate a new era for the very large section of boxing supporters, and better financial days for the boxers and organizers themselves. It is not so much the home viewing angle which is likely to bring this about, but the fact that cinema audiences can see the match by big-screen television, as proved conclusively by the three recent important matches held in London. While it is appreciated that at the moment there is a ban imposed by the British Boxing Board of Control, London boxing promoters have got together and announced that they intend forming their own association. The idea which is now being developed is the provision of regular televised fights on cinema screens, and every effort is being made to expedite the installation of receiving equipment in theatres for this purpose. Small delays have arisen because of the demands imposed on certain firms for the installation of receiving equipment in theatres for this purpose. Small delays have arisen because of the demands imposed on certain firms for the installation of receiving equipment in theatres for this purpose. Small delays have arisen because of the demands imposed on certain firms for the installation of receiving equipment in theatres for this purpose. Small delays have arisen because of the demands imposed on certain firms.
Radio is one of the hardest of all hobbies to get started in. There is literally no coming, simple and logically progressing literature designed for the would-be amateur—the avid outsider looking in. Excellent handbooks and engineering treatises are available—but are just so much Greek to the beginner. Most of us, being human, and still quite "small boys" at heart, don’t want to take up a hobby which requires months of hard, drudging study to master enough theory to make an actual start. We want to start "playing," learning as little or as much as we desire actually start. We want to start "playing," learning as little or as much as we desire.

In amateur radio, and the surmountable barrier between the beginner and the experienced operator desiring to form his efforts to help beginners to get into amateur radio have taken. They go even farther than the harest tyro's satisfaction, for in producing a complete transmitter and receiver—a complete amateur station—less only key, headphones and aerial—he has also carefully considered the needs of the opposite end of the amateur spectrum, the experienced operator desiring a compact and portable send-receiver for holidays, car and emergency operation. Embraced in the "Send-Receiver" is simplicity coupled with the beginner coupled with such advanced features as 6-band transmitter and receiver band-switching with performance capable of giving an amazing account of itself in local "rag-chewing" or distant "dx"—as has been proved in actual amateur operation.

Neat in Appearance

From commercial appearance, from front panel to the last detail of construction, the "Send-Receiver" is professional, and something of a marvel in that its full professionalism is well within the constructional capabilities of the veriest tyro. Embodying entirely the circuit and mechanical simplicity so attractive to the usual engineer, the writer, in conjunction with the engineering staff of Edwin I. Guthman and Co., Inc., hewed directly to the line of highest efficiency—the maximum of results for the minimum of complexity. In this field of multi-valve superhet-terodyne receivers altogether too much sight is lost of the fact that for sensitivity to bring in weak, distant signals and interference-piercing weak-signal selectivity, there is still nothing better than the simple regenerative receiver. It is still the stand-by of a major percentage of all amateurs—and it is significant that the consistent long-distance operators all too frequently are found using, not an "empty-umph valve hooter-dyne," but the simple one or two valve regenerator. It always works, and is so simple that it’s hard to build it wrong, or have it spring a failure just when a receiver is most desired. From a pure long-distance standpoint, the simple regenerative detector and one stage audio amplifier will reach out and get as many stations as the "multiest" tube superhet yet devised—and do it without the fuss, complexity and ear-splitting noise of many bigger receivers.

Again, the popular delusion that for a transmitter a "power house" will do a materially better job than a simple little rig was sedulously avoided. Here, too, winners of distance championship laurels are seldom found using the full legal allowance of one kilowatt transmitters. Quite the contrary, for they have realized that 100 watts is "down" only 10 decibels from 1,000 watts, and that 10 db. doesn’t make a whale of a lot of difference in distance worked or dependability of contact. They know that 10 db. is less than two "S" units—just a comfortably notice-able change in volume, but far from what would be expected from a ten-time power increase. So in the "Send-Receiver" the transmitter is a simple, fool-proof crystal controlled 15-watt affair—only a hair over 7 db. down from a 100-watt rig, and capable of going plenty of places in national—and international—distance range. It is so arranged that it can be added to as desired, and starting as a simple one-valve crystal oscillator, can grow to a two-valve, 15-watt m.o.-p.a. rig, to which can be then added one or two valves to turn it into a telephone transmitter for voice-phone as well as c.w. telegraph transmission—as the beginner advances to such stages. All this is accomplished without a wasted or discarded penny. It can be used as an "exciter" for much more powerful amplifiers if, as the beginner grows up, he joins the "kilowatt" parade of more power and cost for little real improvement in distance range.

The Controls

The "Send-Receiver" front panel, illustrated above carries all receiver controls at left and all transmitter controls at right. The small knob at the upper left is the receiver tuning condenser, or band-setting knob. In operation, it is set to the edge of any amateur band from 1 to 160 meters (or is used to tune regular and short-wave broadcast bands which the receiver also covers), after which stations in the desired band are tuned in on the large 3-in. vernier "band spread dial, on which they come in comfortably spread apart for easy tuning even as low down as 5 metres. The lower left knob is the master on-off switch and receiver volume-regeneration control. Set up to just below oscillation, as evidenced by a hiss in the headphones.
A COMBINED TRANSCEIVER  
(Continued from previous page)

the loudspeaker, so great is its "long range." To the lower left of the dial is the handphone jack—with loudspeaker terminals on the rear, for this super-efficient two-valve receiver designed for domestic and foreign stations on a simple loudspeaker very well indeed. At the top centre is a hole for a millimetre for the transmitter, when it can be afforded. This hole is ordinarily covered by a neat disc, as illustrated. Directly below is the six-band wave-change switch, mounted on a blank plate which shifts power from receiver to transmitter, and shifts antenna connections, too—the scene of modernity.

The microphone jack is at the extreme lower right, not used in the one-valve transmitter, but covered in the practical version. A single valve only is to be used here, the sending key jack and send-receive switch which shifts power from receiver to amplifier and vice versa, and which is to be used in any amateur band or bands from 10, 20, 40, 60 and 100-metre amateur bands can be added at will—for full-band change with the "Send-Receive" switch is as fast as on the most expensive commercial transmitters. So much for rapidity, even faster.

In one-valve form, with three crystals plugged into their sockets, instant choice of three amateur bands is had, while two stations can be covered simply by swapping crystals. In two-valve form, when the amplifier may also double the number of bands, six bands can be instantly covered by using each crystal on a separate plate circuit. Here is, indeed, flexibility for around $25.00—something heretofore for about $25.00—at last justifying the particular amateur bands wanted in loudspeaker operation. So much for the receiver output.

At the bottom of Fig. 1 is the A.C. power supply unit for both transmitter and receiver, with A.C. on-off switch mounted on P1 and commercial power supply mounted on the right, with A.C. on-off switch mounted on P1 and batteries, control of either is complete at the front panel. Provision for battery operation exists in the parts in Fig. 1, so that the A.C. or batteries, control of both crystal and oscillator plate circuits). This hole is ordinarily covered by a milli-ohm meter which shifts power from receiver to amplifier and shifts antenna connections, too—the scene of modernity.

The Audio output of the detector is fed, through usual r.f. isolation by-pass condenser on to the grid of the 6SJ7 detector. The 6SJ7 detector goes into oscillation so smoothly that the only evidence is the change in character of signals from voice to voice accompanied by the heterodyne squeal necessary to c.w. telegraph reception. Regeneration is controlled by potentiometer P1, varying 6SJ7 screen voltage, with P1 by-passed for noise by C6.

A time-tried and proven method of obtaining regeneration is used. The most obvious method would be to tap the cathode of the 6SJ7 up about one-quarter of total turns on the secondary, and this would work. However, tapping the cathode up thus would impair its "Q" or excellence, particularly at the lower frequencies, and not be conducive to best results in this simple circuit where every bit of efficiency has been zealously guarded. Therefore, this is done only on the last two bands, where it is essential to get oscillation. On the other hand, where extreme single-bearing "band-set" tuning condenser of 156 mfd. capacity, with "band-spread" provided by an identical but smaller 1.5 mfd. condenser. Thus sharp-shunt wave stations are well spread apart upon the large 5jin. "Butler", finished dial. The six bands so provided tone well from 500 metres for ship and distress calls right on down through the 5-metre amateur band without a "dead spot" anywhere in between.

The receiver, illustrated above at Fig. 2, is the one coil selected for reception by SW1: to prevent absorption losses except and separate secondary is short-circuited to the sending key jack and send-receive switch which shifts power from receiver to transmitter, and shifts antenna connections, too— the scene of modernity.

As shown in the practical version, a single valve only is to be used here, the sending key jack and send-receive switch which shifts power from receiver to amplifier and vice versa, and which will also switch oscillator plate coils when the transmitter grows to two valves.

The new 6SJ7 (single-ended 6J7) sharp-cutoff r.f. pentode functions as a high-frequency amplifier, or "heterodyne detector," and- send-receive switch which shifts power from receiver to amplifier and shifts antenna connections, too—the scene of modernity.

The receiver illustrated above at Fig. 2 uses two of the newest valves. The new 6SJ7 (single-ended 6J7) sharp-cutoff r.f. pentode functions as a high-frequency amplifier. The audio output of the detector is fed, through usual r.f. isolation by-pass condenser on to the grid of the 6SJ7 detector. The 6SJ7 detector goes into oscillation so smoothly that the only evidence is the change in character of signals from voice to voice accompanied by the heterodyne squeal necessary to c.w. telegraph reception. Regeneration is controlled by potentiometer P1, varying 6SJ7 screen voltage, with P1 by-passed for noise by C6.

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A time-tried and proven method of obtaining regeneration is used. The most obvious method would be to tap the cathode of the 6SJ7 up about one-quarter of total turns on the secondary, and this would work. However, tapping the cathode up thus would impair its "Q" or excellence, particularly at the lower frequencies, and not be conducive to best results in this simple circuit where every bit of efficiency has been zealously guarded. Therefore, this is done only on the last two bands, where it is essential to get oscillation. On the other hand, where extreme volume. When the 'phoneplug is pulled out, and a 5,000 ohm loudspeaker is connected to the two terminals marked "LS" in Fig. 1, the 7CS" "sees" just a bit less than 6,000 ohms—the condition for maximum power output such as is wanted in loudspeaker operation.

So much for the transmitter output. It is simple, ultra-effective and will reach out when using a small antenna through bad weather.
A FREQUENCY RECORDER

(Continued from page 299)

on the former: the writer found that the best results were obtainable with "Quink." As mentioned previously, the ultimate right to the use of D.C. impulse is depicted, maintained for a period of time "Y" which, when broken, brings about the same back thrust effect. D" straight upon the face, and needs no enlargement, being typical of a pure sine waveform under ideal conditions.

For C.W. work this recorder not only proves useful as a means for infallible registering, but provides the amateur DX listener with a novel method for filling in QSL cards, suitable signal graphs being cut neatly into "telegraph type" strips and then glued to, or otherwise pasted upon the transmitter with a true speed and timing check.

The example given is for the letter "R" (\(\rightarrow\)), any other sequence being added with spacing taken from the end of the peak "X" to the commencement of the next word.

There is one other point to mention concerning the flexible coupling, and, referring to Fig. 3, it must be seen that a short length of aluminium shafting "S" clamps in telegraphic manner one of the coupling coils "C" to the shaft "D" which is a larger diameter, grub screws finally securing. The action on the coupling by the push-pull movement of the moving coil is depicted by the dotted lines.

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ITEMS of INTEREST

North Atlantic Air-Mail Service

The Postmaster-General announces that air-mail correspondence for the United States of America, Canada, Newfoundland, and the Azores can now be accepted for transmission from Marseille by the United States transatlantic air service.

The postage rates are as follows: 3d. per half-ounce (postcards included) for the United States of America, Canada and Newfoundland, and 6d. per half-ounce (postcards included) for the Azores. A blue air-mail label should be affixed to the top left-hand corner of the envelope, which should also be superscribed "North Atlantic Air Service."

The latest time of posting at the Head Post Office, London, E.C.1, for the first available service was 7.30 a.m. on Wednesday, the 31st of May, and correspondingly earlier elsewhere, and the aircraft was due to reach New York the following Saturday about noon. Correspondence for destinations in the United States of America beyond New York, and in Canada, will be forwarded from New York by air without additional charge.

The latest times of posting for subsequent services will be announced in the Post Office Daily List.

An Announcer's Home!

ROGER BAKER, heard on regular sports commentary programmes on WLW, recently moved into a brand new house, perfect in every detail—a careless morning shower, and was nearly scalded to death. A blue air-mail label should be affixed to the top left-hand corner of the envelope, which should also be superscribed "North Atlantic Air Service."

Mr. Boyle (left) and Mr. Ricker experimenting with their radio-controlled car at Cape Town.

Mr. Berry was fired for shaving in the firm's time, and so a great act was performed for the stage! In 1909, Professor (now Sir Aimé) Fleeming was technical advisor to Ediswan, and not long after Captain Mullard began his career at Ponders End under the conditions, yet found time to organise the Black Swan Ministrel Troup!
PRACTICAL AND AMATEUR WIRELESS

BOOKS RECEIVED

GEN WHO ARE SHAPING THE FUTURE. By Edgar Middleton. Published by The Scuttle Bug. 25s. 210 pages. Price 2s. 6d. in boards.

The purpose of this book is to give details of the scientific achievements of different countries and of Britain in particular. It is written by a journalist who specializes in science for other scientific and technical journals, and the story is told in a simple and non-technical language. Descriptions of the life work of such men as Sir William Bragg, Sir Edward Marland, John Roxby, Prof. F. L. Hopwood, Sir Leonard Northcliffe, and S. M. Low, make interesting reading. The story of the development of radio, television, and photography, and the account of Mr. G. H. Hopkin's work in connection with television, are of the utmost interest and have an emotional interest. Mr. Middleton is to be congratulated on this book. He has succeeded admirably in writing at the right level.

The statistical Year Book 1939 of the International Tin Research and Development Council, compiled by the Council's statistical office at The Hague, has just been published. From this Year Book one may trace the development of the world's tin industries over the past 135 years. The tin smelting and refining industries started at the time of the Napoleonic Wars and grew through the periods of the South Sea Bubble, the American War of Independence, the South Sea Bubble, the Crimean War, and the Second World War. The tin smelting and refining industries are now concentrated in a few countries, with Malaya, Bolivia, and Indonesia accounting for the bulk of the world's tin production. The Year Book is fully illustrated by graphs, and contains 270 pages of useful information. It is written by a journalist, and is thoroughly readable and informative.

Mr. A. Ayton was arranged, and a club receiver was discussed by Mr. L. Soulsby.

Further members will be welcomed, and full particulars of the work are to be obtained from the International Tin Research and Development Council, at The Hague, has just been published. From this Year Book, one may trace the development of the world's tin industries. The tin smelting and refining industries started at the time of the Napoleonic Wars and grew through the periods of the South Sea Bubble, the American War of Independence, the South Sea Bubble, the Crimean War, and the Second World War. The tin smelting and refining industries are now concentrated in a few countries, with Malaya, Bolivia, and Indonesia accounting for the bulk of the world's tin production. The Year Book is fully illustrated by graphs, and contains 270 pages of useful information. It is written by a journalist, and is thoroughly readable and informative.

His Grace the Duke of Somerset, D.S.O., B.E., will open the transmitters, of the B.B.C., at Stonport and Clevedon, on June 14th, 1939, at 3 p.m.

Mr. H. R. Cummings has joined the B.B.C. Overseas Intelligence Department, to carry on the radiostations duties in connection with the Corporation's broadcast heard in foreign countries.

Mr. Robert McClean has joined the B.B.C. Overseas Intelligence Department, to carry on the radio and gramophone industry.
Time by a region of the mosaic which is the camera begins a new frame it is sur-
result of the strong black pulse which sometimes makes an appearance at the top
is reached the potential change is slow and long time, and so making the peak potential
exhibition. A large-screen equipment is to be demonstrated, and if the radiated signals
for a comparatively
Ith out. In the case of the black band which
of lighting if it is a studio trans-
distribution, etc.

a negative potential than normal, with the result that the secondary elec-
trons liberated by the electron beam impact tend to the collecting anode in numbers excess of the usual.
In the majority of cases this edge effect is suppressed in the amplifiers, but when conditions are not favourable it can extend right into the picture.

The Artist's New Outlook

QUITE apart from solo acting in a television studio, the stage artist, whether engaged in a dramatic or humorous role, is rapidly falling into a new technique as then reduced amplification can
impossible as his or her characteristics are concerned. With the promise of service ex-
tensions, with its natural corollary of increased program hours, there are many authorities who have gone so far as to claim that television will eventually affect an actor's whole value in his relation to the living audience. This will arise quite naturally from the fact that television has already imposed on both

Tilt Distortion

URING the course of the discussion in this P.E. paper describing the Emitron camera a short time ago, repeated reference was made to forms of distor-
ting tilt signals depend on a number of factors, such as small stray magnetic fields, type of mosaic signal plate surface, illumination distribution, etc. When there is a white

of facilities. One thing is certain, the greatest appeal will come from news events, but this alone is sufficient to justify the cost involved for installation.
Recent progress in this line of television's work has been so rapid, and spectacular, that it tends to overshadow the vast increase in home receiver sales which manufacturers report, but the two aspects combined leave no doubt that every section of the community within the signal service area is being made television conscious, and the industry as a whole cannot fail to benefit.

PRACTICAL MECHANICS | HANDBOOK

By F. J. CAMM

If at 8/- by post from George Newnes, Ltd., Tower House, Southampton Street, W.C.2
SHORT-WAVE SECTION

AN EXPERIMENTAL THREE-VALVER

This Article describes in Detail the Construction of a Four-wave-band Three-valve Experimental Receiver Designed Around a Pair of Lissen Sky-scraper Type Four-wave-band Switched Coils.

SHORT-WAVE experimenters as a rule prefer receivers which have been specially designed for short-wave reception, and which by means of inter-changeable plug in coils cover both amateur and short-wave bands without a break.

There are, however, some who favour the popular type of four-wave-band receiver in which quadruple wave-band transformers are incorporated, and in which the wavelength is carried out by means of integral switching mechanism.

In the receiver to be described, apart from the coils specified, the experimenter may use components to hand, provided that they are of suitable types, and to specified values.

Having the specified coils to hand, together with data concerning the relations and combinations of the various windings, the writer had to devise a suitable circuit in which to incorporate them as a pre-liminary to practical experiments.

Then followed a series of practical experiments, in which various additions and modifications were carried out, in order to achieve an acceptable standard of overall efficiency throughout the full tuning range of the coils used.

The Circuit

The final circuit is shown in Fig. 1. This consists of a single stage of S.G. high frequency tuned by a .0005 mf. tuning condenser, followed by a triode detector, also tuned with a condenser of equal capacity, the final stage being transformer coupled L.F. suitable for power or pentode valve output. This forms a simple but efficient combination.

Before going further I think it best to discuss the various features in detail. It will be noted that three separate aerial inputs are incorporated and designated as A.1, A.2, and A.3 respectively. The reason for this arrangement is because the writer realises that short-wave aerials as used by experimenters differ as to type, length and height, no two, as it were, being alike, whilst in some instances indoor aerials of comparatively low efficiency, due to the damping of the down lead, are used. It will be noted that the coupling condenser between the plate of the S.G. valve and terminal No. 4, Fig. 1, is of .0001 mfd. capacity, and of the pre-set or semi-variable type, and that individual tuning condensers are used in the case of the tuned circuits as distinct from ganged condensers, whilst the reaction condenser is of .0001 mfd. capacity. Reference will be made later to band-spread arrangements.

Coil Particulars

The specified coils are fitted with a four-range switch mechanism, and cover the following ranges:

- S.1 = 12 to 28 metres
- S.2 = 20 to 90 metres
- S.3 = 100 to 200 metres
- S.4 = 200 to 2,000 metres

The H.F. chokes used must therefore be of the all-wave type, and capable of functioning efficiently throughout the full tuning range of the receiver without peaking. The writer used the Graham Parish screened type. It is a biunial type choke in to hand, and of suitable design as to efficient choking range, this should be used in the H.F. stage.

Coupling Condenser

Reverting to the pre-set coupling condenser. A fixed condenser can be used in this position, but the .0001 mfd. enables the operator to obtain efficient coupling between the two stages, and will be found by type, as an aid to smooth operation on the lowest range. In addition, it is an effective means of improving selectivity on the broadcast and S.W. bands, if used with discretion.

During experiments, various grid leak and associated condenser values and combinations of values were tried, and the same applies to decoupling, by-pass condensers, and grid-stopper condenser values as specified, however, proved to be the most satisfactory individually, and collectively, and complete freedom from any adverse effects is the result.

Where a power valve is used in the L.F. stage a 3 to 1 ratio L.F. transformer is advised. If, however, a pentode is to be used, and a 7 to 1 transformer is to hand, by all means use it.

With reference to the plate lead of the S.G. valve, this should be screened, and the screening earthed.

Panel and Chassis Lay-out

Fig. 2 shows the panel and chassis assembly, which consists of a 20-gauge aluminium panel and chassis of plywood, lined on the underside with copper foil.

The panel brackets may be of aluminium or of wood, and tucked into the chassis ends as shown, but in any case should have feet at least 3 ins. wide in order to assure a rigid assembly. The disposition of the various controls are shown, together with the chassis and panel dimensions.

Fig. 3 shows the component lay-out which allows all leads to be kept comparatively short and direct. Earth return points are taken direct to the mooring bolts designated M.B. These should make sound mechanical and electrical contact with the copper foil on the underside of the chassis, which in turn is earthed via the earth terminal.

The coil screens and also H.F. choke screens should also be earthed to the chassis, the tuning condensers having their moving plates automatically earthed by direct contact with the panel. The panel should be effectively bonded to the chassis foil in the interests of stability.

Band-spreadung

With reference to band-spread, it will be noted that this is only applied to the detector stage. As the H.F. stage tunes sufficiently broad enough to cause the small increase in capacity to have the minimum of effect, so far as tracking is concerned, it was considered unnecessary to band-spread both stages. The specified capacity provides a spread of 50 degrees on the 40-metres band, and makes tuning much easier.

Experimenters who have a mechanical band-spread type twin-pointer dial to hand, may, of course, use it, whilst others who prefer a smaller condenser capacity, simply to provide a vernier effect, may do likewise.

A few general comments may be of interest. First, concerning the fact that the experiments outlined were undertaken to find out exactly how the coils to hand would perform in a simple straightforward circuit. Using pentode output, a considerable number of European transmissions are receivable at loudspeaker strength on the medium, long, and short waves, which compares very favourably with average dual-purpose receiver performance.

(Continued overleaf)
SHORT-WAVE SECTION
(Continued from previous page)

S.W. Performance

Concerning actual short-wave performance in detail, loudspeaker reception at satisfactory volume on the speaker may be expected from the more powerful European transmitters, and under favourable conditions the usual Americans and South Americans at audible strength.

The writer, however, was most impressed with a test he carried out and in which previous instances A.C. operated receivers have failed, due to high background ratio. The test was to receive VUJ on 31.28 m., the 10 kW station located at Delhi, India. This was accomplished, admittedly, by using headphones, and a power valve in place of the L.F. pentode and at about Rs. The high signal to noise level proved that the existing sensitivity was usable without fear of bringing up the background, and swamping signals.

On 40-metre Band

Whilst in the writer's opinion the overall efficiency on the short waves is below that of the special S.W. type receiver, the number of receivable transmissions is considerable, whilst reception on the 40-metres band of phone and C.W. is highly satisfactory.

All bands an entire freedom from hand-capacity and threshold bow was noticeable.

Another point concerns the fact that used with a first-class A.C. eliminator of the valve-rectifier and standard type, hum-free reception on speaker and headphones over the full coverage was found possible.

Choke Output

Experimenters who build a similar receiver for headphone reception, however, may, in the interests of safety, strongly advised to incorporate choke output arrangements, a sufficient space being left, as shown in Fig. 3, for this purpose.

One fact which, as in the case of all experimental receivers, must not be overlooked, is that experimenters will, apart from the coils, use components of different makers to those used by the writer. Because of this it is important that the recommended values should be adhered to, so that, should snags be met, it will not be as difficult to locate the source, as would be the case were different values used, and additional complications introduced.

Low Loss Valveholders

In all instances the writer used ceramic low-loss valveholders, and the increased efficiency due to this change during experiment proved to be fully justified.

Careful attention should be paid to screen and plate voltages on the H.F. valve, and also the pentode. The same applies to grid bias, and detector plate voltages.

As various makes of valves will be used, it is best to follow the makers' recommendations, and putting those, experiment for best results, making a note of the most suitable voltages as applied to the individual valves.

The basic idea should be to obtain an acceptable balance in performance over the full waveband coverage, remembering that the 4-band type receiver is a compromise between a broadcast receiver and a short-wave receiver.

Good Signals from Saigon

RADIO SAIGON (French Indo-China), on 49.05 m. (6,116 m/s), has now established a regular schedule of broadcasts, and is on the other daily from B.S.T. 00.42-06.45, and from 13.16-16.30. An English programme is given at B.S.T. 08.15 and 16.30. Transmissions are broadcast simultaneously on 336 m. (888 kc/s), and occasionally on 22.02 m. (11,991 m/s).

Reports of reception should be sent to the Societe Indo-Chinoise de Radiodiffusion, Boite Postale, 412, Saigon (French Indo-China).

San José Logged Again

T2XD, SAN JOSÉ (Costa Rica), with the call: La Voz de la Republica, on 25.15 m. (11.93 m/s), was recently well heard after B.S.T. 23.00. The station works daily from B.S.T. 17.00-19.30, and again from 23.00-03.00. Address: Estacion T2XD, Apartado Postal, 1729, San José (Costa Rica).

Broadcasts from Algiers

ON the first and third Tuesday in each month Radio Algiers, through TP2Z (Algiers-Euclayptus), on 23.48 m. (8.06 m/s), broadcasts between B.S.T. 22.00-23.00 a special programme destined to Syria and the Near East. Through TPZ, on 24.75 m. (12.12 m/s), transmissions are made occasionally in French and Arabic at about B.S.T. 20.30.

Ultra Shorts from Australia

IT is reported that VK2MA, Australia's first ultra-short wave transmitter at Sydney (New South Wales), has been heard testing on Sundays between B.S.T. 10.00-16.00 on 42.86 m/s, near the 8-metre band.

Leaves from a Short-wave Log

Fig. 3.—Suggested layout to simplify wiring in the 4-band receiver.
The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

A Car-radio Set!

SIR—Your correspondent, W. G. R. Bowden, is probably right. I, for one, have been waiting and hoping for a very long time for a constructive article on car-radio.

Mr. Bowden's suggestions seem good enough for me, with just one exception. I would like to see the set to be described run entirely from the car battery. This would not be impossible nor difficult.

I distinctly dislike the idea of a separate H.T. supply, and, in any case, why add a long time for a constructive article on car—radio.

Thanking you, and wishing your excellent paper every success.—D. A. BLYTH (Westminster).

Correspondents Wanted

SIR—I have been a very keen reader of your excellent paper for several months, and find it very helpful to beginners in radio like myself. I should be very pleased if any of your readers would correspond with me, preferably residing in India or Egypt.

I shall also be very glad to exchange my S.W.L. card with anyone interested, either at home or overseas.—A. K. GReAvES (296, Hollins Road, Oldham, Lancs).

A Tuning Fault

SIR.—A curious complaint was recently brought to my notice. It was stated that a receiver, an all—mains H.F.—Det.—Pen., would not receive London Regional. Accordingly, I tried the set for myself. It would not! At 7 p.m. Strasbourg, Milan, Poste Parisien and all stations in the neighbourhood were there, but not London Regional. I could obtain anode current at all valves, and oscillation at all points on the dial. I could receive London Regional at full strength on all other receivers in the house. An explanation of the cause would most be welcome.—R. W. LYNE (Eastbourne).

The most likely explanation of a peculiarity of this nature would be a short-circuit across the tuning condenser, due to a hair which only shorted to the position of tuning of the London station. Perhaps readers may have some alternative solution to offer for such an unusual fault in an otherwise perfect receiver.—En.

Station V57RA (Ceylon)

SIR—May I point out a slight error in which I made in my letter published in the May 20th issue of Practical and Amateur Wireless? The letter was headed "Station V57RA", and in the letter the call sign was again mis-typed as V57RA. This should read V57RA of Ceylon.

The British call sign was correctly given as VS7RA (174, Peakham Rye, East Dulwich).

SIR—I have been a reader of Practical and Amateur Wireless for four years and I am very pleased with the articles appearing therein. I shall be glad if you could put me in touch with any other young reader living in this country or abroad who is interested in short-wave reception and transmission.—L. SANDERS (2BIH) (39, Stowell Road, Kingsingleton, Birmingham, 23).

A 20m. Log from Hendon

SIR.—For over a year I have been a regular reader of Practical and Amateur Wireless, and its pages have been the source of most of my radio knowledge. I follow old developments with much interest and I submit a selection of 20m. amateurs I have logged here during the past week.

W5Z5; WA0OCH, 1DY; W7IUB BVO; XM9BY; K46GF; COB9GE; VP3CO; C8LY; CESAC4; VP1Y; 1BH 2H; 2GB, 3BH, 2EN, 4CB, 4AU; L4U2HF, 3RA, 50K; 8AB; YVIQA, 2CB, 4RA, 50K; FASC9; SUTWM, 1MM; KNONY; SK4A; and V2AA. My receiver is a O-V-1 with 'phones, and the antenna is a 30ft. inverted—L, 20ft. high. I would like to correspond with a short-wave listener abroad (except Europe) with a view to exchanging 20m. logs and information on S.W. reception.—L. COLLOP (31, Albert Road, Hendon, N.W.4).

I.E.E. NOMINATIONS

The Committee of the Wireless Section of the Institution of Electrical Engineers makes the following nominations to fill the vacancies which will occur on the Committee on September 30th, 1939—

Chairman : E. B. Moullin, M.A., Member (Oxford University)

Vice-Chairman: Dr. R. L. Smith—Rose, Member (National Physical Laboratory)

Ordinary Members of Committee (three vacancies): W. L. McPherson, B.Sc. (Eng.), Member (Standard Telephones and Cables, Ltd.); J. A. Ratcliffe, M.A., Associate Member (Cambridge University); M. G. Sanders, B.Sc., Associate Member (Consulting Radio Engineer).

Not later than fourteen days after the publication of the Committee's list of nominations, any five (but not more than five) members of the Wireless Section, being Members or Associate Members of the Institution, may nominate any other duly qualified person as Chairman, Vice-Chairman, or Ordinary Member by delivering such nomination in writing to the Secretary, together with the written consent of such person to accept office if elected, but each such nomination shall be despatched from the nominating any other person for the same election.

The Committee of the Section for the present session is as follows:

Chairman: * A. J. Gill, B.Sc. (Eng.).

Vice-Chairman: * H. Bishop, C.B.E., B.Sc. (Eng.).

Immediate Past Chairman: * T. Wadsworth, M.Sc.


* Elected. The following members may also constitute a Committee: Col. R. Elsdale, O.B.E., M.C., M.A., nominated by War Office; Capt. P. F. Glover, R.N., nominated by Admiralty; N. F. S. Hoch, and Teleed by Air Ministry; A. H. Munford, B.Sc. (Eng.), nominated by Post Office.

Together with the following ex-officio members: The President, I.E.E.; The Chairman, I.E.E. Papers Committee; J. S. Beadle, M.Sc. (Council Representative). * Retires on September 30th, 1939.
LOUDSPEAKERS.—Murphy, Radio, Ltd., and Brayshaw, G. S. No. 496487.

In a loudspeaker having a diaphragm 1 (Fig. 1) mounted in one wall of a cabinet 2, a tube 3 coaxial with the diaphragm and of some what greater section extends from the wall surrounding the diaphragm to the back opening of the cabinet. A lining 4 of sound-absorbent material, such as hair felt, is spaced at a small distance, say 1 in., from the tube which is closed by a pad 5 of sound-absorbent material. Specification 483,745 is referred to.


A loudspeaker 6 (Fig. 2) is suspended from the motor-board 9 of a gramophone. The two partitions need not be entirely flat when the (Fig. 3, are of the shape shown in front elevation and extend at an angle to each other into the cone 1 so that their edges 5, 6, 7, 8 lie close to its surface, Fig. 4, and do not quite touch the cone when the latter is vibrating at maximum amplitude. The length b extending beyond the cone is approximately equal to the part a within it and both together are at least twice its height c. The two partitions need not actually meet and the parts extending outside the cone may be formed separate from the inner portions.

Fig. 1.

Fig. 2.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office and the Official Journal of Patents can be obtained from the Patent Office, 25, South- emption Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 8s. 6d.).

Latest Patent Applications

13637.—Baird Television, Ltd., and Baird, J. L.—Apparatus for the presentation of stereoscopic images to a plurality of observers. May 8.


13518.—Calvert, R.—Thermionic valve circuits, etc. May 5.


13897.—Cossat, Ltd., A. C., and Jofeh, L.—Electric circuits, etc. May 9.


13745.—Magyar Wolframgalya Gyar Kremenezky Janos R. T.—Methods, etc. eliminating interference in radio reception. May 8.


13505.—Radioakt.-Ges. D. S. Loewe.—Methods, etc., for the televising of cinematograph films. May 6.

13898.—Telefunken Ges. für Drahtlos Telegraphie.—Tuning of wireless receivers. May 8.


Specifications Published

505170.—Beatty, W. A.—Wireless apparatus.

505079.—Blumlein, A. D.—Wireless transmission of receiving apparatus.

505036.—Marconi’s Wireless Telegraph Co., Ltd., and Parkin, T. D.—Tuning arrangements for radio transmitters.

505197.—Baird Television, Ltd., Doves Ltd., and Thomas, G. C.—Television and like systems.


505072.—Compagnie für die Fabri- kation der Compteur et Matériel D’Ustensel a. G.—Television or telecamina transmitters.

504866.—Namboose Vennootschap Philips’ Gheelelampenfabriken.—Supply arrangements for radio-receiving sets.

505167.—Radioakt.-Ges. D. S. Loewe.—Television transmission. (Divided out of 503207.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southempton Buildings, London, W.C.2, at the uniform price of 1s. each.

MURDER ON THE SECOND FLOOR

FRANK VOSPER’S thriller, "Murder on the Second Floor," is one of the most impressive of the year’s ceremonial events—was an outstanding success last month and viewers who saw it last week remember the very fine pictures obtained, including a view of the Guards’ Memorial.

Two Super-Emiton cameras on the roof of the Horse Guards building will give views of the entire parade. While a third camera near the Whitehall entrance of the Parade Ground will give intimate glimpses of the Duke of Gloucester, who, as the troops wheel past, will be taking the salute in the absence of the King.

A commentary will be given specially for television.

WESTERN CABARET No. 3

The setting of the third of Harry Pringle’s Western Cabaret programmes—"Shindig," which is an American expression for a camp fire concert. On June 13th and 17th the visitors will be nature—for Claude Damper and Billy Carlyle. Claude will appear in the nearest approach to Western garb as is possible, and his dog will be seen with him. It will be the dog’s first appearance for viewers in this programme, and it is said that if he doesn’t approve of his master’s act he yawns rather bluntly.

The visitors will be in the usual jovial company of Harry Lester and his Hayseeds, in their comic act; the Three Van Strattans, who are making their first appearance for viewers in their whip-cracking and rope-swinging act; Larry Adamon, a yodelling cowboy (another newcomer to television); some of his favourite well-known to viewers for his Texas monologues. Genial Big Bill Campbell will compere the show.

Western Cabaret will be televised in the evening on June 13th and repeated in the afternoon programme on June 17th.
Transmitting Licence

I am keen to get a transmitting licence, and in past issues I have read the details you have given. I only wish to experiment with telephony apparatus, and I wonder if it is necessary in this case to pass the Morse test. I want to build a one-valve, for economy purposes, and naturally would have to use separate modulator, but I do not intend to transmit Morse. What is the exact position?—L. E. D. (N.W.8).

Although you may not intend to transmit C.W., signals, you must still pass the Morse test before you can obtain your licence. This qualification is necessary under International Regulations, and the operator of a station must be in a position to act upon instructions in Morse which may be issued by a Government or commercial station. A charge of 5s. is made for the Morse examination and is additional to the normal licence fee.

Earth Bonding

I have noted several points regarding the efficiency and method of carrying out earth connections in modern receivers, but I am just one point about which I am doubtful. I wish to use an aluminium chassis and most components will be bolted down. Is it preferable to use the nearest bolt as an earth point, or to make only one or two bolts earth connections and run leads to the nearest of these?-L. W. de A. (Barnsley).

In some cases it may be quite in order to use the nearest bolt as the earthing point. In others, especially where two H.T. voltages are in use, it may be preferable to use only one bolt for each stage, and to take all earthing leads to the common bolt by the most direct route. It may also be found desirable in some cases to link up all such earthing points by heavy gauge wire.

Potential Dividers

I have noted that in some circuits, especially where S.G. or pentode valves are used, potential dividing circuits are adopted for H.T. voltage supplies. This scheme is also used in some receivers for obtaining all of the H.T. voltages in the circuit. How does one work out the appropriate values of the separate sections of such a device? I find this very confusing?—P. E. R. (Limerick).

In the first case the total current flowing through the potential divider must be calculated according to the value of the total resistance and the H.T. across it. Then the current flowing through each "arm" of the device must be calculated according to the value of the valve or electrode which is being fed from it. Then, in some parts of the divider you will see that there is the sum of two or more currents flowing, and by Ohm's Law it is usually possible to work out the voltage drop. The process is not exactly simple, but if you make a primary is direct across the mains. Could you give me any assistance in this direction?—D. C. R. (Colchester).

It is quite in order to use condensers in the primary circuit and there are two methods which are generally adopted. In some cases a single condenser from earth to one side of the primary may prove sufficient, and in all that is necessary, whilst in other cases you may find it desirable to use two condensers, one from each side of the primary to earth. A value of .01 mf. generally proves satisfactory. The condensers should be of the 400-volt working type.

Testing An Eliminator

"I have built an eliminator from parts that have been tested and found O.K., but where I should get 150 volts max. I get 240 volts max., where I should have 100 volts (No. 2) I get 200 volts. Could you tell me where I have made a mistake? This may make a 250 D.C. The eliminator is, of course, D.C." (A sketch was enclosed.)—E. T. (Twickenham).

The circuit which you sent shows that the circuit is perfectly in order, but the maximum H.T. positive line contains only the smoothing choke. Unless a fairly large current flows through this there will not be 100 volts drop, which is necessary to reduce the 250 volts mains supply to 100 volts. On the other hand, the potential divider and series resistance for the other tapping should give the low voltage with a small current, but we imagine that you tested the unit without a load. To test a unit of this type, the receiver should be connected and a high-resistance voltmeter must be used for the testing.

Transverse Current Mike

With reference to the "Transverse Current Microphone" described in your issue No. 348, where could I obtain the mica diaphragm, and what would be its approximate cost?—G. F. K. (Charnford, Leicestern)

The diaphragm may be obtained, together with the remaining parts for this microphone, from T. W. Towers, 176, Greenwich High Road, Greenwich. The diaphragm costs 6d., and a complete set of parts needed, including the carbon granules, costs 7s. 6d.

Field Strength Indicator

"I wish to make several pieces of apparatus for inclusion in my amateur station which I am building, and when I get my transmitting licence I shall have a properly equipped shack. I have got a number of interesting details, but would like the simplest form of field strength indicator which could be made compact and neat. Have you described such pieces of apparatus in a recent number and do you give any details for this?"—L. C. (Harrow).

A standard plug-in coil for the wave-length covered, with a diode or other valve coupled to a standard low reading meter, would be quite suitable, but we have not described such a piece of apparatus although we hope to do so in due course. You may use an ordinary bridge connected as a diode, a standard single diode, or a double-diode with anodes strapped, and the meter should, of course, give a total reading consistent with the particular valve in use.

R U L E S

We wish to draw the reader's attention to the fact that many of the problems described only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our past issues or in other matters. We regret that we cannot, for obvious reasons—

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

A stamped addressed envelope must be enclosed with every query. Send your queries in the usual form. We regret that we cannot, for obvious reasons—

(1) Supply circuit diagrams of complete radio sets.
(2) Suggest alterations or modifications of receivers as described in our contemporaneous articles.
(3) Supply altered circuits of complete multi-valve receivers.
(4) Grant interviews to correspondents.

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 past issues or in other matters. We regret that we cannot, for obvious reasons—

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(3) Supply altered circuits of complete multi-valve receivers.
(4) Grant interviews to correspondents.
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Mains Operated.

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A.C. Two-valuer for America
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Blueprints are drawn full size.
PRACTICAL AND AMATEUR WIRELESS

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Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face are charged at 3d. per word. Display Items are charged at 6/- per line. All advertisements must be prepaid. All advertisements should be addressed to the Advertising Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

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Incorporating a Var.-Mu pentode amplifier followed by a high frequency detector. Designed for high fidelity reception. Range 200-500 and over 5000 m. 59-6 and 6-6 complete with valves.

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Complete to the last detail, including all Valves and coils, as well as theoretical and practical diagrams and instructions for building and working. Each kit is supplied with a steel chassis and panel and uses plug-in coils to tune from 13 to 170 metres. 1 Valve-Short-Wave Receiver 33/6. 1 Valve Short-Wave Superhet Converter Kit 20/-.

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Remote Control

One of the most fascinating side-lines of the home installation is control of the various sections from a distance. In most homes the broadcast receiver forms part of the furniture and although extension speakers are used, the operation of the receiver has to be carried out in one room. We have before mentioned that the radio apparatus should be conspicuous by its absence. We would not tolerate the gas or electric supply meters in the living-room, and the custom is now to place these in a cupboard out of sight, carrying out the switching in the room where the supply is needed. The same thing should take place with radio, and the ideal arrangement would be to install a really powerful set in a cellar, and by means of near remote-control switches in each room the selection of stations, control of volume or tone and any other desired operation should be effected with ease. There are dozens of these schemes available, and in this issue we give a novel system which has been evolved by one of our readers which will no doubt present points of interest to others who are keen on the home installation is control.

French Television O.B. Unit

It is understood that the French authorities have placed in hand constructional work on a mobile unit based on the studio of the French Television O.B. Unit at Start Point and Clevedon which has been built. It is anticipated that the unit will come into operation during the autumn.

Start Point Programmes

As from June 14th the new transmitters at Start Point and Clevedon will be broadcasting the Western programme, at present provided by transmitters at Washford, Bournemouth and Plymouth. The Duke of Somerset is to perform the opening ceremony.

Camp Fire Sing Song

This summer the North-East is again to provide broadcasts from camp-fire singing-songs, and the first programme of this kind in the new season will be on Friday night, June 23rd, when listeners will be taken over to Howick Camp, near Alnwick, Northumberland. This camp is organised by the Northumberland Association of Boys' Clubs, and at the time of the broadcast, in Newcastle Race Week, there will be well over 200 boys from clubs in many parts of Northumberland and Durham at the camp. This will be the first broadcast from the camp, which is situated on the estate of Lord Grey.

"Listeners Answer Back"

In the third of the "Listeners Answer Back" programmes, critics of broadcasting the Bible will produce dramatic readings of Old Testament stories, but, by means of contrasted voices and a strong comedy element, will produce a really good baffle.

Big Variety Bill from the North-East

For months past Cecil McGivern, B.B.C. programme producer stationed at Newcastle-on-Tyne, has been holding auditions for amateur variety talent and putting on broadcast programmes under the title of "Town and District Variety," the artists in each show being drawn from some particular town or district in the North-East. To end the series, McGivern will put on a really powerful unit called "All the Best!" and its twelve or more turns will be some of the most outstandingly popular acts of the whole series. Singers, mimics, instrumentalists, a yodelling guitarist, and a dance band are on the bill, which also includes a strong comedy element.

Blackpool Dog Show

Blackpool Dog Show, an important two-day championship event drawing impressive entries from all parts of the country and offering big awards, is to have a place in the broadcasting programme this year, for on June 21st, on the Northern wavelength, a fifteen-minute description of the show, straight from the ring, will be on the air. The talker will be Dr. L. C. Floyd-McKee, of Blackpool, who is a judge, a breeder and an exhibitor—and a vice-president of this particular show. His account of the show, from the Corporation Transmitters at Blackpool, will be recorded as it is given during the afternoon of June 21st, and from this recording broadcasts again during the early evening. Both broadcasts will be on the Northern wavelength.

Broadcasting the Bible

With the general title of "The First Stories in the World," Val Gordon will produce dramatic readings of Old Testament stories. It is not his intention to tamper with the text, but, by means of contrasted voices and the use of actors to speak lines that individual Biblical characters are quoted as saying, to bring out all the beauty of language and of incident. The first broadcast, which will take place early in July, will be concerned with the story of Ruth.

Short-Wave Failures

Readers which will no doubt present points of interest to others who are keen on broadcasting, the Bible, will produce dramatic readings of Old Testament stories. It is not his intention to tamper with the text, but, by means of contrasted voices and the use of actors to speak lines that individual Biblical characters are quoted as saying, to bring out all the beauty of language and of incident. The first broadcast, which will take place early in July, will be concerned with the story of Ruth.
ROUND the WORLD of WIRELESS (Continued)

Radio Pirates in France

As a consequence of the new law, owners of wireless apparatus who listen to broadcast programmes without taking out a licence are now condemned to pay five times the amount of the annual tax on such receivers. The number of broadcasting licences in France on April 30th last was 5,360,285, as against 4,967,886 at the same period a year ago.

"Bon Voyage," Mauretanian

LISTENERS all over Britain have heard about the laying-down, the building and the launching of the great new Cunard White Star liner Mauretanian. Soon they will hear from her again on the occasion of her maiden voyage across America. This opportunity will come in a North Regional feature programme, "Bon Voyage," on Sunday night, June 18th. It will be largely a recorded programme recounting the building, launching, trials and the departure (from Birkenhead on the previous evening), but it is to include a contribution, by wireless link, from the ship in mid-Atlantic; Richard North will be the commentator, and the whole feature will be presented by Victor Smythe.

"Stagshaw Searchlight"

E. WILLIAMS will present the twenty-fifth number of "Stagshaw Searchlight," in the Northern programme, on June 17th. Since the Stagshaw transmitter opened in the autumn of 1937, the "Searchlight," has been spotting interesting people and odd happenings in the north-east, and has gained a large following among listeners not only in Northumberland and Durham, but in all parts of the North Region.

G.E.C. Sound Reproduction Equipment in Singapore

G.E.C. sound reproduction equipment has been supplied by the Singapore branch of The General Electric Co., Ltd., to the local Assistant Controller of Labour (Chinese) to help him to make himself heard in his own Court when a local labour dispute is being heard in full hearing. The report of the special meeting of the Legislative Council to approve the expenditure for this purchase is included in a recent issue of The Straits Times.

It appears that during the occurrence of a labour dispute it is by no means uncommon for several hundred employees to crowd into the Court of the Assistant Controller and indeed at times there have been well over a thousand employees in that Court and its precincts. The unusual clour may have been so great that even when satisfactory terms have been reached to settle the dispute it has been impossible, to convey the fact to the crowds. Now, however, with the help of a G.E.C. microphone, amplifier, and power speaker, it is hoped that law and order will be restored.

INTERESTING and TOPICAL NEWS and NOTES

"Quinneys"

HENRY AINLEY, who played the name part in "Quinneya" at the Haymarket Theatre, will play his original part in a radio version which has been prepared by Michael Goodwin to be broadcast in the Regional and West programmes on June 14th; the play will be directed by Michael Goodwin and Felix Felton. The author, Horace Annesley Vachell, lives near Bath.

Fleetwood on the Air

FLEETWOOD, the Lancashire resort and fishing port, will be on the air for forty minutes on June 23rd, with an excerpt from Ernest Binn's Marine Folies show at the Marine Hall.

"The West Entertainers"

A REGIONAL ROUND-UP is the description of a programme entitled "The West Entertainers," to be broadcast in the Regional programme on June 14th. Cabaret will be broadcast from the Grand Hotel, Torquay, and from the Royal Bath Hotel Ballroom, Bournemouth, which the artists will include Claude Dampier, assisted by Billie Carlyle, Murray and Mooney, and Chris Oll.

Eighth World Education Congress

Recognises Esperanto

FOLLOWING the recent recommendation of Esperanto by the Brazilian Ministry of Education, now comes the news that the Organising Committee of the Eighth World Education Congress, to be held in Rio de Janeiro during the coming August, has admitted Esperanto as one of the official languages of the Congress.

HALF-AN-HOUR's music from the massed brass bands of a Festival at Skegness, Lincolnshire, will be broadcast on Sunday afternoon, June 18th, in the Northern and Regional programmes. This will be an Outside Broadcast from Butlin's Holiday Camp, and the bands taking part will be those of Luton, Blackhall Colliery, Metropolitan Works, and Coventry Colliery. Denis Wright, military and brass band expert of the B.B.C., is to be the conductor.

"Between You and Me and the Mike"

BEGIN eighteen months ago by Martyn Webster, the Midlands series of intimate revues entitled "Between You and Me and the Mike" have proved popular. Gordon Crier has taken over production for the next in the series to be broadcast on June 16th, during the absence of Martyn Webster in Manchester. The book and music are by two young Midland authors—Edward Mason and Basil Hempseed respectively—and the company consists of eight Midland artists.

Solution to Problem No. 351.

Berton overlooked the fact that the detector stage coil is in parallel with the condenser, and that a D.C. test would give a reading and would not necessarily indicate a short-circuited condenser. The D.C. test would not give this result as the coil is in parallel with the condenser, and thus a D.C. test would give a reading and would not necessarily indicate a short-circuited condenser.

The following three readers successfully solved the problem: E. J. C. Gurney, 35, Hylands Park, Thorpe Bay; Enex; M. S. Cottrell, 6, Chart Road, Folkestone.
Aerial Equipment and Installation

Results Depend More Upon the Aerial than the Receiver. Some Valuable Hints are Given in this Article by W. J. DELANEY

Now that the summer has arrived, and the gardens are dry, it is a good plan to devote some attention to the aerial system, either cleaning up an existing installation or erecting something new for the coming season. Unfortunately, in all too many cases the listener considers it a waste of money to purchase sundry insulators and spend time on the aerial, imagining that because he has a really good receiver that all defects in the aerial will be overcome. Although on the medium and long waves excellent results can be obtained with an inferior aerial system, the short waves will soon show up the differences. Aerials play just as important a part. The energy is picked up on the aerial, but this is merely a collector and the signal currents then have to be taken to the tuning circuit in the receiver. Obviously, therefore, no alternative paths must be provided, and this means that a long leakage path must be arranged for at each end of the aerial wire, and the lead-in wire, which forms part of the aerial system, must also be completely isolated from any earthed object. Insulators are not dear, and there are dozens of alternative types. On the cover this week may be seen popular types, all of which find a definite use in varying conditions. If the wire is to be suspended between poles or masts, then the ordinary egg type, or better still, the ridged cylindrical pattern, should be used—not simply, but in a chain of at least three. Wire may be used to link these together, but turn in the ends of the wires so that there is no risk of short-circuits between them, either from the wires themselves touching, or by such things as spiders’ webs being built across them. Such a web has, before now, caused a breakdown in a high-powered broadcast station, simply due to its accumulating moisture and thereby providing a leakage path.

Wall Fittings

Where a mast cannot be erected at the house end, various types of wall fittings may be called into use. These should, of course, be so arranged that they are well clear of the walls, and the long-screwed spike type seen on the cover will serve in most cases, although greater spacing from the walls can be obtained by attaching a length of board or quartering to a wall, gutter support, or chimney stack, and attaching one of the insulators, such as the Bulgin shrouded type, at the end. Anchor the aerial wire so that it does not swing in the wind. If the aerial is very long it is bound to swing a little, but if possible, arrange things so that in its swing it does not approach any earthed object, and in this latter connection, remember that a tree, although of wood, is earthed. In rainy weather it forms a very good conductor and will certainly cause signal leakage as well as offering a risk of short-circuit at a later date when branches have lengthened. If necessary, the centre of the aerial may be anchored to some fixed object by attaching a guy, via a chain of insulators.

The Lead-in

Although the lead-in is, as its name implies, intended merely to lead the current down from the aerial to the receiver, it also picks up energy. Interference is similarly picked up, and this may be balanced out, as has been explained before in these pages, by using a screened lead-in or by using a twin feeder wire, transposed or twisted throughout its length.
Station Indicating Arrangement for Motor-driven Press-button Tuning Systems

A type of motor-driven press-button tuning system for a radio receiver consists of a commutator-type station selecting switch which is coupled to the tuning member of the receiver. The switch is mounted on a permanent electric motor. The station selecting switch consists of a rotor and a stator. The rotor comprises a drum provided with two commutator segments which are connected respectively to the windings of the motor which produce clockwise, and counterclockwise rotation thereof. The stator comprises a supporting member which is arranged to support a number of contacts rota mounted opposite to the contacts. Each of the contacts is connected to one of a bank of press-button switches. The arrangement is such that when a press button is operated, a circuit is closed which includes a source of electric supply, one or other winding of the motor, the rotor of the station selecting switch, the chosen station selecting contact, and the operated press-button; the motor is thus energized and rotates the rotor of the station selecting switch, and the tuning element until a zone of insulation between the commutator segments makes contact with the selected station contact, and the motor circuit is broken. Each contact is, of course, positioned so that the motor circuit is interrupted when the receiver is tuned to receive a desired transmitting station.

Interlocking Latch

To avoid the necessity for the operator to hold the selected button during the tuning operation, it is usual to provide a bank of press buttons with a mechanical latch which holds a selected press button in its switch closing position until another press button is selected; that is to say, the press buttons are interlocked by means of a latch so that only one press button may be latched at a time, and the station being received is indicated to the operator by the fact that the press button which selects that station in its switch closing position.

The arrangement illustrated is perfectly satisfactory when only one bank of press buttons is provided for controlling the receiver, but the mechanical relented form of latch has certain disadvantages when means are provided for controlling the receiver from two or more positions. For this purpose it is preferable to hold a selected press button in its switch closing position, by means of a holding relay in series with the contacts of the switch, which will maintain the switch closed only until the motor circuit is interrupted by the station selecting switch; that is to say, only until the required tuning position has been reached. As soon as the motor circuit is opened the holding relay is de-energized and the press-button returns to its normal. “off” position, and there is then no indication as to which station is being received.

Station Selecting Switch

An arrangement which overcomes this difficulty is illustrated in the accompanying illustration. The station selecting switch is represented by the reference 1, 2 inches B in diameter. The rotor of the station selecting switch, and 3, 4, the commutator segments which are connected respectively to the windings 5, 6, of the electric motor.

The rotor of the station selecting switch is mounted on the shaft, indicated by the dotted line XY, of the tuning transformer 7, and the motor is coupled to this shaft in any suitable manner. The rotor 2 of the station selecting switch is connected to a contact 8 which lies adjacent to a zone of insulation between the commutator segments 3, 4. The contact 8 is connected to a secondary winding 9a of the transformer 9.

Two stator contacts 10 and 11 are connected by conductors to one bank of press buttons A which may be located on the receiver, and to another bank of press buttons B which may be located at a point remote from the receiver. The press buttons at A are numbered 12 and 13, and each one is provided with a holding coil 14 and with a small electric lamp 15, which may be supported behind a panel in the container of the press buttons, and is preferably latched behind a window bearing on it the name of the station which will be selected by the particular press button. One pole of each lamp is connected to the conductor associated with a press button and the station-selecting switch and the other poles of the lamps are connected to the secondary winding 9a of the mains transformer 9 as shown. The bank of press buttons provided at the point B is identical with the arrangement shown at A and press buttons 12 (at A) and 16 (at B) are arranged in parallel, and in series with the stator contact 10, so that the station represented by this contact may be selected from either position. Similarly, press buttons 13 and 17 are arranged to control the circuit of stator contact 11. One pole of each press-button switch is connected to a pole of the secondary winding 9a of the mains transformer 9, and the other pole of this secondary winding is connected to the common terminal 18 of the driving motor.

Operational Details

In operation, if, for example, press button 12 is operated a circuit is completed from the secondary winding 9a of the mains transformer through winding 5 of the motor, commutator segment 3, stator contact 10, press button switch 12 and its holding relay 14, and back to the transformer secondary 9b. The motor is thus energized and the rotor 2 of the tuning condenser 7 rotated until the position of the rotor 2 is such that the zone of insulation is in contact with the stator contact 10; the circuit of the motor is then broken, the holding relay 14 of press button 12 is de-energized, and the press button will be returned to its “off” position by a spring which has not been shown. When, however, the zone of insulation on the rotor engages the stator contact 10, the contact 8 on the rotor also engages this stator contact with the result that a circuit is now completed which includes the secondary winding 9a of the transformer, rotor contact 8, stator contact 10, lamp 15 and the secondary winding 9a. The lamp 15 thus lights up and serves to indicate the station from which the transmission is being received; current from the secondary winding 9a of the transformer also passes through the lamp 19 of the press-button switch 16.
CORRECTING L.F.-STAGE FAULTS

Intended for the Less Experienced Constructor. This Article by Frank Preston Deals with a Number of the Simpler Kinds of Fault which Cause Unsatisfactory Reproduction and Indicates How Remedies can Easily be Applied

If the quality of reproduction from a new set is not up to expectations, if there is a lack of volume or if distortion is obviously taking place, the average constructor is inclined to turn to the L.F. portion of the set. Sometimes the fault lies in that section, but this is by no means an invariable rule. Before going to a good deal of trouble to check the transformer, grid and anode voltage and blaming the lack of decoupling, it is wise to eliminate the H.F. or L.F. and frequency-changer sections of the set by connecting a microphone or pick-up (preferably a good pick-up) to the appropriate terminals.

Should the trouble still be in evidence, there is a strong possibility that the low-frequency amplifier is at fault. If the pick-up terminals are joined to the grid circuit of the detector, do not overlook the possibility of a fault in the detector circuit. Also bear in mind that the detector valve—acting as a first L.F. amplifier—will probably overload when the volume-control is advanced; this might result in distortion when using the pick-up, although distortion on radio is due to a fault in the earlier stages.

"Thin" Reproduction

It is not an easy matter to describe sounds, and it is therefore rather difficult to explain the consequences upon reproduction of different low-frequency-circuit faults. Probably the most usual with simple battery sets is that which results in "thin" reproduction. That is, music lacks timbre and fullness, whilst there is a "tizzy" sound as a background to speech. Of course, it can be due to the speaker, so if any doubt exists about this the best course is to have it tested on another set or to try a different speaker on your set. But bear in mind that the speaker must be correctly matched to the output valve; this can generally be ensured by connecting to the proper (small-power, super-power or pentode) terminals on the speaker transformer. Continuance of the poor reproduction when the speaker is exonerated, probably points to too low an H.T. voltage, too much G.B. in relation to the applied anode voltage or poor emission from the valve filament. The last-mentioned is normally to be expected only when a valve has been in use for a long time, or when it has been inadvertently over-run. The only satisfactory course is to replace the valve by a new one. The first two points can be checked with sufficient accuracy by means of a voltmeter. It should be remembered, however, that the grid-bias voltage should always be reduced as the H.T. battery runs down, since the bias should be in proportion to the anode voltage. As most readers are aware, excessive G.B. or insufficient H.T. prevent the valve from giving its proper emission. A useful test for all three of the items just mentioned is to measure the anode current, which should be roughly similar to that shown on the makers' literature.

Defective Components

It should not be overlooked that low filament or cathode emission might well be due to a fault in the anode coupling or decoupling resistor, or to too high a resistance in the cathode circuit of an indirectly-heated valve. The simplest test for the resistors is by replacement, but do not forget that a source of high resistance might be outside the actual resistor—in the mounting clips or soldered (alleged) joints, for example. Even when a resistor is in perfect condition there is a possibility of its value being different from that marked on it or indicated by the colour coding. This is, of course, extremely unlikely when the component is of good make, but there is a faint possibility, there is also the possibility that the dealer who supplied the component "mis-read" the colour coding.

Overloading

Distortion which is noticed only when the volume-control is turned up, or when the set is tuned to the local station, might be due to one of the faults dealt with above or to the application of insufficient grid-bias. With a battery set this might mean that the bias battery is exhausted or that there is a broken or dirty connection to one of the winder plugs. In a mains receiver it might indicate that the bias resistor is of too low a value or that it is short-circuited by a wrongly-made connection, by the resistor holder or by a faulty by-pass. Again, the easiest method of testing when meters are not available is by replacement. Sometimes a condenser short-circuit can be checked simply by disconnecting the component, but in many instances the resulting hum will be so loud that the test will not be sufficiently conclusive. There is also the likelihood that disconnection of the condenser will cause a certain amount of instability, which would itself produce distortion.

Unstable Operation

Poor reproduction due to instability in the L.F. circuits is generally evidenced by a light ringing sound which is heard as a background, but there might sometimes be a peculiar muffling or even a groan which is heard at certain volume levels or on (Continued overleaf)
CORRECTING L.F. STAGE FAULTS

(Continued from previous page)

different kinds of reproduction. This trouble is often due to insufficient decoupling or to the use of an intervalve transformer of too high a ratio for the valve into which it is connected. The decoupling of the anode circuit is in most cases sufficient to prevent any trouble in this direction, but there are times when grid-circuit decoupling should also be employed. With a battery set all that is necessary is to insert a fixed resistor of about 50,000 ohms between the grid terminal of the valveholder and the lead which was previously connected to that terminal. In a mains set it is sometimes helpful to follow the same course, although an alternative or additional decoupling resistor should be included in the lead between the earth line and the grid-circuit component (leak, or load from the secondary of the transformer) as indicated in Fig. 1.

New Valves

These modifications are especially helpful if an old valve has been replaced by a new one which has a higher amplification factor or higher mutual conductance; in other words, one which is more efficient. With such a valve it might also be helpful to decouple the screening grid, as also shown in Fig. 1. The decoupling resistor in this case should be kept as low as possible, seldom more than 5,000 ohms, because if it is so high that the H.T. voltage is appreciably reduced, the amplification provided by the valve will be affected adversely.

Lower Step-up Ratio

When L.F. transformer coupling is used between the valve, it is often wise to reduce the step-up ratio provided—or at least to reduce the input to the valve following it—when new valves are installed. One method is by addition of 50,000 or 500,000-ohm potentiometer as shown in Fig. 2, and another is by modifying the connections to a parallel opposition as shown in Fig. 3. This method of reducing the step-up ratio brings down the actual ratio to a little more than unity if the component has a primary winding of 200 ohms, or of 20,000 ohms if the nominal ratio is lower. In some cases the alteration to the connections also improves the quality of reproduction, making the tone rather more "full"; this does not always apply, however.

The positioning of the L.F. transformer has been mentioned in these pages on many previous occasions, but there are some constructors who still do not appreciate that a slight alteration to its position or the angle at which it is placed can sometimes be of great advantage (not very often with modern small components) have a marked effect. When the set has not been built to a published design and there is a form of distortion or instability which cannot be traced to any other cause, it is a good plan to make a few tests in this direction. The same principle applies to any mains hum which is apparently not the result of inadequate decoupling or the use of smoothing and bias by-pass condensers of too low a value.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, June 14th.—Roundabout, all-Regional variety programme.
Thursday, June 15th.—Dance Band programme.
Friday, June 16th.—Recital of French Piano Music.
Saturday, June 17th.—Music Hall programme.

REGIONAL (342.1 m.)

Wednesday, June 14th.—The Lightfoot T.T. Race: Commentaries from the Isle of Man; Thursday, June 15th.—Quinneys, by Horace Amunday Vochell, from West. Friday, June 16th.—Diction: You and Me and the Mike, an intimate revue.
Saturday, June 17th.—Joyce Jamboree: dance band programme.

MIDLAND (296.2 m.)

Wednesday, June 14th.—Eye-witness account of National Trust Exhibition in Birmingham by Francis Britt Young.
Thursday, June 15th.—Works by William H. Harris: Orchestral and choral programme.
Friday, June 16th.—Listeners Answer Back, at Mansfield.

SCOTTISH (391.1 m.)

Wednesday, June 14th.—Toom Byres, a comedy of the Scottish Border by Robert McClellan.
Thursday, June 15th.—Scott Songs.
Friday, June 16th.—Singing Band programme.
Saturday, June 17th.—Scottish Dance music.

NORTHERN IRELAND (301.1 m.)

Wednesday, June 14th.—Accent on Rhythm: a programme of dance tunes, old and new.
Thursday, June 15th.—Organ music from the Betsy Cameron, Belfast.
Friday, June 16th.—Piping, Fiddling and Singing programme.
Saturday, June 17th.—Flute Band and Silver Band programme.

LIVERPOOL'S magnificent new Philharmonic Hall, completed at last on the site of the famous old "Phil Hall," which ended its days in a disastrous fire a few years ago, is to be opened on June 19th; and on the following evening Regional listeners will be able to hear a broadcast of the first part of its opening concert—a notable musical occasion at a hall which has been specially equipped for broadcasting. Sir Thomas Beecham will be the conductor, and Florence Austral (soprano) the soloist with the Liverpool Philharmonic Orchestra and the Liverpool Philharmonic Society's Chorus. Elgar's "Cockaigne" overture opens a programme which includes four choruses from Handel's "Solomon;" Elizabeth's Greeting, from "Tannhauser" and "Laisse, Laisse," from Der Freischiitz" and Weber's "Oberon" overture. For a quarter of an hour before the concert starts, Northern listeners will be given a description of the new hall by W. G. Holcroft, the distinguished young Liverpool architect, who is Lever Professor in Civic Design at the University of Liverpool.

Lowering the Pitch

It should not be necessary to lay stress on the fact that "nearly" or high-pitched reproduction when using a new output valve might point to nothing more serious than the omission of a tone-compensating resistor between the anode of the valve and earth. A variable tone-control can be bought cheaply, or one can be made by wiring a 0.1-mfd. fixed condenser in series with a 25,000-ohm variable resistor; connect one side of the condenser to the anode and one side of the resistor to earth. Another simple tone-compensator, which also reduces a tendency toward L.F. oscillation, consists of a resistor of between 100,000 and 250,000 ohms joined between the ends of the secondary winding of the L.F. transformer. If this simple arrangement gives the desired effect it is probable that attention to the decoupling or the grid-input circuit would prevent, instead of cure, the prime cause of the trouble. The method mentioned should be tried upon simply as a makeshift or as a means of testing for unsatisfactory design, not as correct "means of obtaining better reproduction. When using a large mains super-power valve in the output stage, additional decoupling is often desirable, in the form of a power-type resistor of between 100 and 200 ohms. This should be fitted between the anode and the primary winding of the speaker transformer; the speaker terminal when the transformer is built into it, as is usual.

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A Midget American Portable

I HAVE been testing out for the

Editor of Practical Motorist, one of our sister weeklies, a midget American portable and I am amazed at its performance. It is a 4-valve superhet and measures only 9in. by 7in. by 5in., which makes it suitable for use in car, boat, or for picnic purposes. It does not use a low-tension accumulator, but is operated from dry batteries which give a life of 300 hours, continuous use, or 500 hours intermittent, before the low-tension side requires renewing. It weighs only 9lbs. complete with batteries, and the specification includes a built-in directional aerial, aerial dip and output signal to indicate when the switch is turned off, and a modern fabric-covered cabinet. It costs £5 15s. od., and is quite the most efficient small portable of the commercial type which I have yet tried.

English manufacturers are, I know, producing some portables using the new low-tension dry cells, but I have not yet been permitted an opportunity of testing them.

This journal, of course, pioneered the three and four-valve superhet circuits, and also the design of midget portables. It was due to this journal that midget batteries and speakers, tuning coils and condensers were first manufactured.

The Wireless Den

I HAVE not received a large response to my request for photographs of readers’ dens, but Mr. R. Guillaume, Jr., of Weybridge, has sent me the photograph (reproduced) of his. He tells me that his den is roughly square—the smallest in the house, and is next to the kitchen. He has laid this out to include a table, a carpenter’s bench, cupboards and chairs, whilst the walls are covered with valve comparison boards and chairs, whilst the walls are covered with valve comparison boards and chairs, whilst the walls are covered with valve comparison boards and chairs. The cupboards contain spare parts, and everything is in orderly array. This reader combines photography with wireless, and the room also contains a certain amount of photographic apparatus. The den is more or less self-contained. He uses an outside aerial. His window looks out over the tennis lawn, and

he tells me that he has enjoyed very many pleasant hours in this room.

I wonder how many of my readers have realised that lofts make particularly good wireless rooms; being at the highest part of the house a very short lead-in can be used, and if the loft has a boarded floor there is adequate floor space to accommodate all of the impediments. Most lofts are entered through a cavity covered by a board, and access to the loft is by means of a pair of steps. There are

A Seasonal Hobby?

ACCORDING to the B.B.C. survey, listeners forsake their wireless sets in considerable numbers during the summer. The peak listening period, of course, is the winter. I suppose nothing can be done, or ought to be done, to change this state of affairs, for the appeal of the wireless programme can never supersede the attractions of outdoor pursuits in summer. I am not certain that television when it is a national as distinct from a local service will not change this order of things. It is certain to do so for a few years at least, until television becomes the accepted form of radio entertainment. Considerable moves are being made to establish television all over the country, and the Postmaster-General, the B.B.C. and the Trade are all co-operating to that end. It takes time, however, to erect a television transmitter, to arrange for television artists and announcers, and so on. It will therefore be at least a year before further transmitters are erected.

The efforts need to be implemented by a considerable public demand for television in the provinces, and I express the view that when the public samples television at Radiolympia this year, that demand will be forthcoming. To see is to believe, to marvel and to want, and those are the ingredients of the insatiable desire which alone can break down resistance and opposition, and encourage manufacturers. At present manufacturers are working to supply a local demand. That is large, but by no means so large as it will be when television is national.

The new setting at Radiolympia for wireless sets and television will, I hope, exert an enchanting influence on the public and those who hold the purse strings. The Trade is doing its best to persuade responsible people to pay more than lip service to the new science.

That is one reason why provincial people who do not normally visit Radiolympia should this year make a special point of doing so. There must be tens of thousands of provincials who have never seen a
Toscanini's Praise of B.B.C. Symphony Orchestra

Toscanini's praise of the B.B.C. Symphony Orchestra in 1930 reflects his proper perspective to the importance of the orchestra and the realization of its potential. He has attributed much of the credit to the B.B.C. for allowing the orchestra to expand and develop its skills. Toscanini's appreciation of the B.B.C. Symphony Orchestra, conducted by the greatest living conductors, chose those who were among the most important musical talents of their time. Toscanini conducted the B.B.C. with such an instrument at his disposal, the B.B.C. and the films, that the Americans don't try to understand, and that the English can be said to have understood, and that the orchestras are a strange race which the English try to understand, and that the Americans are a strange race which the English don't try to understand. However, I see no more reason to speak in American than to do so in French, German, or any other language which is not true English.

Toscanini's Praise of B.B.C. Symphony Orchestra

"IT is one of the best orchestras I have ever conducted... I am very happy, very pleased, very satisfied with everything." When Toscanini, one of the world's greatest living conductors, chose those words to express, with glowing sincerity, his appreciation of the B.B.C. Symphony Orchestra, he reduced to absurdity the assertion, once fashionable, that the English are unmusical. More than that, his judgment gave proper perspective to the importance, in the history of music in England, of the formation of the orchestra in 1930.

Till then the very existence of orchestras in this country had been somewhat precarious. Lack of funds made it impossible for them to secure adequate rehearsals—especially in the case of new works. Economic necessity forced the players to eke out a livelihood out of sight of the public and accepting "outside" engagements whenever they could; one result was that depuitising, prime barne of orchestral conductors, was common.

Conditions such as these raised almost insuperable difficulties in the way of organizing orchestral concerts, and of maintaining an orchestra matching the best on the Continent.

A National Orchestra

THEN, suddenly the gloomy scene changed. The B.B.C., realizing well enough that the time had come for bold action if orchestral music in England was to be rescued from the disintegrating forces which threatened it, decided to create a permanent, salaried, national orchestra.

From that moment England was endowed with a body of carefully selected musicians drawn from all parts of the country and engaged on a full-time contract under the direction of a permanent conductor—Sir Adrian Boult, the B.B.C.'s Director of Music. Because the players are all salaried, deputies are not allowed. As a result, the members play continually together, and of that has welded them into a homogeneous instrument, alive, sensitive, responsive, even to the almost imperceptible flicker of Toscanini's expressive fingers. He, indeed, has been so gratified with their work that, on several occasions he has cancelled rehearsals, satisfied that their playing was as perfect as he would have it.

With such an instrument at its disposal, the B.B.C. has naturally been able to expand and develop its music policy in a way that would otherwise have been impossible. So it is that the orchestra—and the various sections into which it can be divided to meet the requirements of different types of music—is responsible for more than four hundred programmes a year; its public concerts are among the most important musical functions in the country. In its travels, undertaken in accordance with the B.B.C. policy of making the orchestra a national, rather than a Metropolitan, institution, it has also gone abroad, making appearances in a number of European cities—appearances that have been enormously successful.
LISTENING to short-wave transmissions is all bunk. It is one of those things which is greatly overrated, and although I have fiddled about with a short-wave set for quite a while, I have never yet been able to get a kick out of it. The results are never the same for two evenings following, in fact, I am beginning to wonder if all the talk about the thrill of listening to America and stations in the remote corners of the world is well—just blarney!

No. Get back in your chair again and don't worry about penning an indignant letter to the Editor to ask what is wrong with the writer, because the above statement does not come from me; it is a typical example of what many so-called enthusiasts have said to me from time to time.

Of course, it is very difficult to convince such persons that short-wave listening can and does provide endless thrills, plus a generous portion of entertainment, because their own efforts always appear to fail most hopelessly as soon as they attempt to try their hand at S.W. work? Through meeting so many pessimists, I have been able to compile a little list of the things which are mainly directly responsible for their feelings, and the lack of results.

The list is quite small. In fact, the items could be tabulated under four headings, namely, poor or faulty selection of apparatus, lack of operating knowledge and patience, failure to select right times of listening and, lastly, unsatisfactory aerial arrangement or local conditions.

Let us take the first of these and see what are the snags. Now, assuming that the person concerned is a beginner to this section of radio, it will be obvious that the most simple set will be the best to graduate with, and I would suggest an efficient little battery-operated two-valve. The circuit of such a receiver is very simple and quite inexpensive to build, but don't make the first mistake of using any odd inferior parts because you only wish to see what it is like. That is one of the biggest blunders that can be made. It must be remembered that short waves have very high frequencies, and currents of that nature do some very funny things if they are not given a square deal. For example, in a medium- and long-wave set, which is concerned with frequencies of a much lower order, the constructor/operator is allowed far greater latitude in all respects, but with the higher frequencies particular attention must be given to the layout of the components, the wiring, the selection of the parts—from the point of view of H.F. losses and self-capacity, the operating conditions, and the actual aerial to be used.

The theoretical circuit of a reliable two-valve is given in Fig. 1, and if good parts are used and the lay-out arranged to keep the wiring of the aerial tuning and detector circuits as short as possible (Fig. 2), very satisfactory results can be obtained with the headphones. For doubtful listeners I would mention that with an aerial of average efficiency a set of this type is capable of logging amateur stations on most continents.

Why So Many Failures?

Why is it that so many constructors appear to fail most hopelessly as soon as...
SHORT-WAVE SECTION
(Continued from previous page)

Ranger S.W. Two, described in the issue of March 11th, is ideal for those who wish to construct the coil. When selecting commercially-produced plug-in coils it is essential to use the capacities specified by the makers for the tuning and reaction condensers, otherwise the tuning range will be affected. For those who wish to use 450-mfd. tuning condensers, it should be noted that it is possible to get coils wound for use with that capacity.

Variable Condensers
Owing to the very high frequencies involved it is possible for a few degrees on the tuning dial to represent the settings of several stations, therefore it is essential, when spacing and tuning condensers are required, to use a condenser having a low capacity. An average value is 0.0015 mfd when used in conjunction with a good slow-motion dial.

A better adjustment and, likewise, even easier tuning, can be obtained by using what is known as band-spreading. This consists of a very small variable condenser connected across the main or tank tuning condenser. For example, with the above value of 0.0015 mfd, a bandspread condenser of 0.0005 mfd should be used. The idea is shown in Fig. 1.

H.F. Stoppers
To keep the high-frequency currents along their proper paths, it is always advisable to make use of H.F. stoppers in various parts of the circuit as these all help to improve the overall efficiency of the set by making it more stable, which, in turn, allows a greater gain or amplification to be obtained, together with easier operation.

Reliable H.F. stoppers, especially wound for short-wave work, should be used, although resistances having a value of, say, 10,000 ohms for anode circuits and 50,000 ohms for grid circuits are satisfactory substitutes.

In many instances it will be found that H.F. currents do get through to the headphones, causing a peculiar form of instability and apparent band-capacity effects. In such instances a good H.F. choke in each 'phone lead (Fig. 3), will usually eliminate the trouble, but it is far better to try and trap the cause in the stages preceding the output valve.

Operating a Short-wave
Unlike the average modern medium- and long-wave broadcast receiver, it is not possible to turn the tuning control and just let the stations, so to speak, fall in.

Tuning on short waves calls for a very much more delicate and accurate touch and, until one has got used to the feel of any particular short-wave set, many transmissions will be passed over; in fact, it is not unknown for a beginner fail to pick up a signal, although many were there when an experienced hand took control.

It is this rather important item which calls for patience on the part of the novice. Each wave-band must be explored a fraction of a degree at a time, keeping the reaction control adjusted so that the circuit is always just at its most sensitive point. This, by the way, does not mean oscillating.

Particular attention should be paid to the detector, which, in operating voltages, the value of the anode by-pass condenser, and the source of the H.T. supply.

PRACTICAL AND AMATEUR WIRELESS

Oslo Programmes on High Power

Oslo appears to have suspended its broadcasts through LKC (1 kilowatt) on 31.48 m. (9.53 mc/s), and is now working daily from B.S.T. 20.00-07.00 through the 5-kilowatt station LGG, operating on 31.25 m. (9.49 mc/s). Signals and modulation are excellent at all times.

The Tokio Transmissions

The Japan Broadcasting Corporation now radiates the daily short-wave transmissions through the following stations: JZJ, 16.87 m. (17.78 mc/s), B.S.T. 22.30-23.30, and 02.00-03.30; JZK, 16.79 m. (15.16 mc/s), 06.30-07.30; 13.00-14.30; JZJ, 25.42 m. (11.81 mc/s), 14.00-15.30, and 22.30-23.30.

Broadcasts from Newfoundland

LISTENERS report the reception of the broadcasts from the medium-wave station VONF, at St. John's (Newfoundland), via VONG, on 30.15 m. (9.98 mc/s). Address for reception reports: Stations VONF and VONG, Box 135, St. John's (Newfoundland).

Leaves from a Short-wave Log

A Good Canadian

CHNX, relaying CHNS, Halifax (Nova Scotia), on 48.92 m. (6.13 mc/s), may be logged almost nightly after B.S.T. 22.00. This 500-watter is on the ether daily until B.S.T. 04.15, starting its programme on weekdays at midday, and on Sundays at B.S.T. 10.00. The studios are located at the Lord Nelson Hotel. Broadcasts close with the playing of the hymn: O Canada.

Address: The Maritime Broadcasting Co., Ltd., P.O. Box 908, Halifax (Nova Scotia).

Printed News Bulletins by Radio

THE St. Louis Dispatch recently inaugurated its first teleprint newspaper. The first issue of this radio electrical publication was transmitted from 2.04-16 p.m. on 9.46 m. (31.6 mc/s), and comprised nine pages of text five inches wide, each of four columns. The broadcast is now being regularly received at expensive of the special apparatus which prints the paper in their own homes.

Another Polish Station?

IT is reported that a 2-kilowatt transmitter installed at Niepokalanow (Poland) is carrying out experimental broadcasts every Sunday from B.S.T. 19.00-20.00 on 41.2 m. (7.28 mc/s).

From the Land of Fruit and Flowers

WX4B, relaying W1OD, Miami (Florida), broadcasts the radio programmes of the Isle of Dreams Broadcasting Company on 49.67 m. (8.04 mc/s), with a power of 5 kilowatts. You will hear the announcer give out that you are "listening to International station W4XB, Miami, by the palm-fringed shores of Biscayne Baye in tropical America." (Transmissions are made on weekdays from B.S.T. 18.00-20.00, and 02.00-05.00, and on Sundays from 21.00-23.00, and 02.00-05.00.)

Radio Nacional de Peru

WITH this coupled to that of Emisora y OAXAX, the principal radio station at Lima is now clearly received on most nights on 49.33 m. (9.98 mc/s) between B.S.T. 06.30-06.00. The distance from London is roughly 6,400 miles, the standard time in Peru being six hours behind B.S.T.

All reception requiring more than an ordinary aerial should be addressed to these stations at Avenida Petit Thouars, Lima (Peru), South America.

The Aerial

It is always a very difficult matter to say that any one type of aerial is the best, as so much depends on local conditions and space available.

With the average "inverted-L" type of aerial, having an overall length of 12yds., quite good reception should be obtained, provided the horizontal portion is at least 20ft. to 30ft. above the ground and well clear of surrounding earthed objects, such as trees, buildings, and overhead wires.

The down-lead must also be kept as clear as possible from walls, and some simple arrangement adopted to prevent it from swaying about, otherwise signal fluctuation will, no doubt, be experienced.
Preventing Shorted Turns in Short-wave Coil Tapping

As will be seen in the accompanying sketch, with the aid of a few hollow-type resilient plugs and some split-pin plug shanks I have evolved a simple and efficient method of tapping for short- and ultra-short-wave coils, where the turns

intermeshing with suitably-adjusted fixed vanes, quite an efficient pre-tuning unit could be made up for use either as a tuning or reaction system. To this end I cut a number of cardboard discs, and two wooden end mounting pieces, assembling these equidistantly spaced on aluminium mounting brackets, as shown. The difficulty at first was to determine the exact sectional capacities for the different settings, but I got over this by using lead foil glued to the discs in the approximate positions required by the reaction scheme in which this unit was to be used as a test. With a fine penknife blade I was able to trim the fixed "vanes," taking notice of the settings, the centre "plate" constituted a thick copper wire which could be slid in or out of the outside "plate" or winding; this condenser is shown at C. Systofflex was used as a dielectric for these condensers.

The inset diagrams (a) and (b) show two of the capacity adjustments arranged, and it will be noticed that although there are only three fixed vanes illustrated in these examples, the relationship or spacing provides quite an appreciable difference in capacities, the reason for which will be quite clear on studying the interleaving.

A neat instrument knob and a home-calibrated paper dial complete the hook-up.

- F. S. Welsh (Cichlussford).

Small Capacity Aerial Condenser

REQUIRING an aerial condenser of maximum capacity, 00015 μfd., I devised one out of flashlamp containers, as shown in the sketch. Two containers are required, the larger one being taken from a two-cell zinc battery, and the smaller one from an old grid bias battery. Both were easily cleaned out. A terminal being soldered to the base of the larger zinc container. A threaded brass rod is soldered to the base of the smaller container, as shown. At A, a nut, which will fit the screwed rod, is soldered over a hole in the bracket B. The larger container is fastened to the base of the stand by a bolt through the centre, and the threaded rod is screwed through the nut A. A knob is fitted to the end of the threaded rod, and an angle bracket screwed on at C to give stability to the upright. It will be found that this arrangement will allow very fine adjustments to the aerial circuit.

AN A.C.-D.C. REMOTE CONTROL SYSTEM

Constructional and Operating Details of a Useful Piece of Apparatus for the Electrician

A. C.-D.C. remote control system is often used for controlling various devices in an electrical system. This system allows for the control of devices from a distance, either A.C. or D.C., using a two-wire system. The remote control system can be used for tuning, volume, and other control functions.

Construction of Relays

Relay A is a small relay used in the system. It is connected in series with the control wires and is operated by a small current. Relay B is a polarized relay, which is used in conjunction with relay A. When A.C. current flows through the circuit, relay B will operate, whether A is energized or not. When D.C. current flows through the circuit, relay A will operate, whether B is energized or not.

Two-wire Remote Control System

The circuit diagram is shown in Fig. 2. Relay A closes its contacts when A.C. current flows through it, and the current flows through the transformer T to another relay G. Relay B is switched on when D.C. current flows through the circuit, and the contacts close, allowing the current to flow through the motor and the load. The time lag necessary to operate relay B is greater than the relay A.

Refinements

Three refinements are given, as these will depend on the type of relay used, and can only be tested out by experiment. The remote control points may be as numerous as required, and are wired in parallel with the other control points.

Operating Details

When the push-button switch is pressed, the relay is energized, and the contacts close, allowing the current to flow through the motor and the load. The system may at first seem complicated, but once understood, it is quite simple to use. The remote control system can be used for tuning, volume, or tone control, and is a useful piece of apparatus for the electrician.
The method of remote control to be described will be carried out by means of three small control wires. This may seem a disadvantage but the control wires may be easily switched by individual experimenters and thus give any degree of control. Many refinements will be dealt with, which may be omitted as required.

The basic principle will be first described with reference to Fig. 1. It is a small transformer supplying 6-Volt A.C. to A, which is a relay operating on A.C. only, and B is a small transformer supplying 6-Volt D.C. to B. This is overcome by extra contacts on relay B. Relay A is made so as to operate on either A.C. or D.C., but to have a choice 1/2, greater than the other. Thus, when A.C. flows through the circuit, relay A operates because of the A.C. field, whereas when A.C. is changed to D.C. A does not operate. Relay B operates on D.C., but B will not operate if change-over switch S is placed to one side, a direct current will flow from the transformer T, which is coupled back on to one side, a direct current will flow through it, which is determined by the current taken by the voltmeter. It is possible to determine the exact current taken by the voltmeter.

Constructional and Operating Details of a Useful Piece of Apparatus for the Experiment

1. “On-off” control.
2. Timing contacts (or push-button controls).
3. Relay A. (see Fig. 2.)
4. Relay B. (see Fig. 3.)

Refinements

1. Two-speed timing—This may be achieved by another small relay, D, as shown in Figs. 4 and 5. For slow speed a resistance R₁ is connected in circuit with the relay to reduce the current, and thus relay A will not operate but B will. A resistance R₂ is included in the motor circuit, thus allowing the motor to run slowly.
2. Indicators of position of tuning condenser—One wire will be required to operate the indicator, instead of the usual two wires. The extra L.F. wires are used for the extra L.F. wire. The extra L.F. wire is used to give remote indication of the position of the tuning condenser.

Construction of “On-off” Relay “C”

As shown in Fig. 4, the potentialmeter P is connected to a suitable D.C. supply and is connected by the tuning condenser. The condensers N, N₁, and N₂ are blocking condensers of about 300. They are fixed to B. M₁ and M₂ are small L.F. chokes, and V is a voltmeter. The D.C. voltage is used to overcome the resistance of the chokes, and the potentialmeter is adjusted to overcome the resistance of the voltage. This method is used to determine the position of the tuning condenser.

Operating Details

When C is adjusted B is pulled down, and the pin V fits into the cut-out piece of G, and turns the pin V into the cut-out piece of G, and turns the pin V into the cut-out piece of G. The relay is not required to give remote indication as described.
Another Big Screen Triumph

WHILE it is generally conceded that the large screen pictures which have been shown so far on the Baird cathode-ray tube equipment have been outstandingly good, there has been no pause in the research work which is aimed at securing greater clarity and increased brightness. It therefore came as no surprise to learn that for the showing of the Derby improvements had been effected in the tube manufacture, with the result that the pictures seen showed a marked increase in intrinsic brilliance when compared with the last occasion of the Epsom Derby. Not only were they more clear-cut and brighter, but viewers in the cinemas bad to notice the marked difference. Obviously, one of the main reasons for this improvement is the extended frequency range encompassed by the signals, for according to published figures the modulated radio frequency output from the Alexandra Palace station has an overall frequency response which is sensibly uniform from 10,000 cycles right down to 40 cycles. In addition, however, the harmonic distortion has been brought to a very low level, indeed, for the second harmonic content does not exceed .01 per cent. for 100 per cent. modulation, while under the same conditions the third harmonic content is about .01 per cent. It is this very low odd harmonic content, in addition to the extended frequency range, which is said to be responsible for the high quality of the sound transmissions.

A Survey Report

THE Americans are very fond of undertaking surveys and issuing reports dealing with scientific and technical matters. As an example, one of the latest to be carried out deals with television, and was submitted to the U.S. Government by the Baird unit in New York. This report goes on to state that while there has been no pause in the research and development work which is aimed at securing greater clarity and increased brightness, there is a transmission defect, and therefore serious difficulties have been encountered in the transmitting of television pictures over the Atlantic. It is known that a limit is set to the magnitude of the picture signals by the effects of the scanning beam itself. As a consequence it is impossible to extend the power to transmit any further over the Atlantic without encountering difficulties. It is therefore proposed to limit the total power available for television transmission to the figure of 95 watts. However, this power will not be content with blind listening once television is successfully demonstrated. Although full of scepticism, and comment is made on the tremendous technical and financial difficulties ahead, it is significant that the report states that this industry will be well established in America by the spring of 1940 or 1941.

High Quality Sound

THE high quality of the sound which accompanies the B.B.C. television transmission has for a long time been the subject of very favourable comment. Anyone who compares the ordinary broadcast quality with that provided by the same programme radiated on the ultra-short waves cannot fail to notice the marked difference.
A REVIEW OF THE LATEST GRAMOPHONE RECORDS

PRACTICALLY everybody was sorry when the B.B.C. announced the finish of "Band Waggon," that great little show that became a weekly attraction. Fortunately, the last programme, which was made up of earlier Band Waggon days, was recorded (by permission of the B.B.C.) on three double-sided H.M.V. records, which provide twenty minutes of high-speed fun.


Most people have seen Joan Crawford on the screen, but how many have heard her recorded voice? Accompanied by the M.G.M. Orchestra, she sings "I'm in Love with the Honourable Mr. So-and-so." from the film "Society Lawyer," and "The Great Waltz" on Decca F 7051 and a new album of the Savoy medleys arranged by Debroy Somers when he was in charge of light music are the Savoy medleys arranged on H.M.V. BD 697.

Finally, you must not miss swing's latest innovation. Accompanied by the band's lead singer, he sings "Deep Purple" and "A Violin in a Fiddle" on H.M.V. BD 697.

Decca MYSTERY surrounds the identity of Renara, the brilliant girl pianist whose name appears in the June Decca list. All you know is that her name is a famous one in the world of classical music. On Decca F 7092 she has taken "Mexicali Rose" and "All That I Can Tell You." from the film "Night and Day" and "Gershvin's cytav." It's "All So New to Me" on H.M.V. BD 8010.

Funny records are few and far between. Listen to the dry Scots humour of Dave Willis on H.M.V. BD 703 and Max Miller's impudent cockney wit in numbers from his film "Everything Happens to Me." on H.M.V. BD 697.

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A New Crosby A NEWCOMER to the H.M.V. list this month is Dick Todd, who can be called a vocal double to Bing Crosby. In co-operation with "The Three Reasons," Hylton's band to supply the music, Bryan Hylton sings "I'm in Love with the Honourable Mr. So-and-so." from the film "Society Lawyer," and "The Great Waltz" on Decca F 7051 and a new album of the Savoy medleys arranged by Debroy Somers when he was in charge of light music are the Savoy medleys arranged on H.M.V. BD 697.

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Standardising Kinematograph Terms

CLOSELY following the television industry's effort at standardising terms and definitions comes the news that the cinema industry is aiming at securing an authoritative glossary of terms in its own sphere. This has come at a very opportune moment, and a very representative technical committee has been formed to finalise the list which has already been prepared. To give some idea of the extent of the ground to be covered the following headings can be mentioned: -

- Pictures and projection
- Studio and projection apparatus
- Distribution
- Receiving
- Home appliance

America is Behind

NOW that the various radio manufacturers in the United States have made known their television-receiver plans, it is rather remarkable to find how many of the sets models use small cathode-ray tubes. It is quite common to see a specification for a 24-volt set, and yet the picture tube has a diameter of only 9 in. For home-constructor kits, which the Americans are also sponsoring, the 3-in. and 5-in. tube is no doubt an admirable component. Convenience of assembly because of its small size, lower voltages, and cheapness, are essential factors for consideration where a set has to be assembled at home, but surely these factors should not rule in a complete commercial product. For consistent home viewing the very small television screen has its drawbacks, and a minimum size of 9 in. is becoming very popular in this country. To see the illustrations of American sets, and read details of their features gives the impression that the design is an all-wave console with the television section added as an extra sales inducement. Experience here has shown that this is the wrong method of approach. Viewers buy television sets, which may or may not have all-wave radio as an additional amenity, and unless the American psychology is very different from the English, manufacturers over the water will soon have to change their tactics. Perhaps the relative minor success of transmission times has had some influence on this outlook, for the signals are still experimental, and no commercial licence for advertisement revenue-earning purposes has yet been issued by the Federal Communication Commission.

Two Forms

IT is not always recognised that the modern electron microscope, which undoubtedly owes its existence to electron optical research for television purposes, can be divided into two main types. In the first there is usually a low degree of magnification, and an image of a cathode screen surface, which is electron-emitting, and on which the subject to be examined is focussed optically, is electron optically focused on to a fluorescent screen for observation either visually or photographically. It is this principle which can be made use of for the purpose of examining the surface of the cathode in a standard form of cathode-ray tube. To carry this into effect a proper inter-adjustment of the first and second anode potentials has to be made so that an image of the cathode can be projected on to the front screen and enlarged where necessary. If a magnetically operated type of tube is to be used in this manner, then the modulation electrode becomes the first anode, and has a positive potential applied to it so that it gives the electron focusing system in conjunction with the normal single anode which characterises these tubes. Magnification is brought about by altering the direct current flowing through the external solenoidal focusing coil. With the second form of microscope the electron beam furnished by the radiation from the hot or cold cathode is used to irradiate some completely independent object whose form can be defined on a remote fluorescent screen or photographic plate. The glass lenses are, of course, replaced with their electron optical equivalents, and the electron beam takes the place of the light rays.

Large Screen Queries

THE plans for the installation of big screen equipment in various London cinemas, with the prospect of an extension to the provinces, once the Government have made up their minds concerning the one or more stations which are to operate both in the Midlands and the North, have raised a number of questions concerning the operation of the apparatus in its one or more forms. Naturally, the ultimate aim, at least as far as the cathode-ray tube projection apparatus is concerned, is to house the apparatus in the projection box, where it will be under the direct control of the film machine operators. How long development will take before this important step is possible cannot yet be stated, but the difficulties seem to be chiefly optical. The controls are not more difficult to handle than those of a standard film projector, although it would seem preferable to judge the degree of contrast from the body of the theatre, instead of inside the box, in just the same way as the volume of sound is standardised in cinemas now. Local authorities appear to be quite satisfied with the fulfilment of all the safety regulations, for the L.C.C. ones are among the most stringent in the whole country, and these are adhered to by the cinema installations already undertaken. Even the question of incombustible screens has been met in spite of the precautions necessary to secure adequate brightness by a special treatment of the screen surface. There seems little doubt, therefore, that the projectionist of the future, once he has become familiar with the essential principles of television, will not find it difficult to operate and service where necessary the big screen apparatus now being designed for cinema use.

Scopolana, famous for their large-screen television system used on recent big sporting events, held their Annual General Meeting at their London offices at Campden Hill, recently. Our illustration shows Oscar Deutsch explaining points of a Big-screen Cinema Receiver to Sir Maurice Bonham-Carter (left), the Chairman, and Mr. S. Sagar (right) the Managing Director, at the General Meeting.
 broadcasts to Schools

It is interesting to note that the annual programme of Broadcasts to Schools, recently issued by the B.B.C., contains, in addition to details of the various series to be broadcast between September, 1939, and January, 1940, a number of articles of major importance. The first is entitled "The Contribution of School Broadcasting" and is designed to illustrate how, in the present rapid state of educational development, the microphone can assist and amplify existing schools curricula. This outline of theory is followed by its practical application described in "Classroom Use," in which experienced advice is given on preparation for the broadcast, actual listening and revision once the programme is over. "Problems of Installation and Reception" are then dealt with, and finally, particulars of "Pamphlets and Registration" are provided. Details are given of how a school may register with the Central Council for School Broadcasting and the privileges it will obtain by doing so, and of information relating to the constitution and composition of the Central Council.

Increase in Numbers

The number of registered schools during the past year has increased from 8,250 to 9,759, and this increase has been general throughout the different types of schools. Two-thirds of the total number of approved secondary schools in England and Wales are now registered and very nearly one in every four of the elementary schools and departments are also listed with the Central Council.

Physical Training Series

The programme for September, 1939, to June, 1940, follows closely the lines of its predecessor. The physical training series will continue throughout the year. Co-operation with Scotland has been carried a step further; first as an experiment for one year, the Junior Geography series which has been planned in Scotland will be taken by the English schools, where it will be known as "Travel Talks." Secondly in Biology, the series entitled "Our Daily Life" will be the first of a new two-year series to be taken by both English and Scottish schools. The series will be given by Professors Peacock and Garry, who are well known to English schools.

A further innovation will be a new course for rural schools. The new series, "Let's Build a House," will introduce schools to the various matters to be taken into account in planning, building and furnishing a house in the country, and it is expected that they will form the basis of much practical and other work in the schools.

Series for seniors include, in Geography, "Migrant Men Seeking New Homes," in which the three terms will cover America, Asia, Africa and Australasia; British History, which will be closely around the central theme of "Our Civil Liberties;" and History in the Making, which will consist of talks concerned with modern problems intended primarily for boys and girls in their last year at schools.

Feature Programmes

Topical talks and feature programmes for senior pupils will be divided into three main groups: "The World at Work and Play," "The World of Art and Play," "The World of Science and Discovery." As before, talks for sixth forms of secondary schools and a series for seniors on "Science and Gardening" will be included in the programmes.

World History

Courses for juniors include, in English, plays, stories and poems with a special appeal to children between nine and eleven years of age. The series of travel talks will be concerned with the British Isles. World History, again for juniors, will deal, in the first term, with the ancient civilisations to the age of the Vikings; in the second, with the cultural conquests from the Middle Ages to the eighteenth century; and, in the final term, with modern times.

Music Broadcasts

Anne Driver will continue her courses on "Music and Movement," one for infants and one for juniors. Other music broadcasts will consist of a series entitled "Early Stages in Music," for juniors and seniors, by J. W. Morton, which will short, and with a series of Preparatory Concert Lessons, by J. W. Morton, for juniors and seniors.

A series of Concert Lessons for seniors by Dr. Armstrong, organist and lecturer in music at Christ Church, Oxford, will be broadcast in collaboration with Herbert Wiseman, Director of Music in Edinburgh Corporation Education Committee.

Five series of modern language broadcasts will be included: Early Stages in French, Early Stages in German, Intermediate German alternating with German for Sixth Forms, Intermediate French, and French for Sixth Forms.

USEFUL COMPONENTS INTRODUCED BY BULGIN

A new aerial, the B.B.C. type, is designed to receive either B.F. or G.M. service. It is suitable for small houses and is supplied with a 3½ inch base, a 4½ inch mast and fitting to suit different kinds. It is also available for wireless purposes. The aerial is constructed of brass, and is available at the following prices:

- 3½ inch base: £1.60
- 4½ inch mast: £2.60
- 5½ inch mast: £3.60

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Mails for Iraq

The Postmaster-General announces that, in extension of arrangements already in force whereby all first-class mail (letters, letter packets and postcards) for Empire destinations in East and South Asia, India, Ceylon, Australia, New Zealand, etc., and for Egypt, is forwarded by air as the normal means of transmission, the arrangement will be extended to Iraq and Kuwait after the despatch by surface route to Iraq as from Saturday, May 20th.

On and after May 21st, the postage rate for letters and letter packets addressed to Iraq and Kuwait will be 1½d. per half ounce.

Printed papers, commingled papers, samples, and parcels will still be forwarded by surface transport at the existing rates of postage for those classes of correspondence.

The air mail service to Iraq, for which a special air postage rate of 3d. per half ounce has been in force, has been discontinued after the despatch from London on the evening of Saturday, May 20th.

There will be a special broadcast revue, week from this country to Iraq and Kuwait and first-class mail should be delivered in Baghdad and Basra in about two to three days, compared with six to seven days by the former surface transport services.

A Housewife's Lament

Give me my pea and my butter, my gin and my beer, O what can I do, act while you're warm my moisture, Irown while the washing's still damp

I have made up my mind I must enter The make of these pepe who write To the B.B.C. recommended centre To complain that the programmes are trite.

My dear B.B.C. (I am starting) In making this protest I feel From the world-trotting pains I'm departing But my grievance is none the less real.

I accuse you of making the Wireless A damn sight too sweet on the ear if only we could have a programme Of programmes I simply must bear.

I haven't got time to go shopping Because I listen to Children's Hour My stitches I'm constantly dropping But how can I bear overlooking One feature of In Town To-night!

Mr. Middleton stops me from reading, Dora! Arnold Infiets me with my meals; If I need I may find I'm not heard The words of the Weekly Appeal.

Is it right to present Henry Asley? Or Dunsany broadcasting a play While the crooks in the story vary, And the moments pass swiftly away?

Gram Swing keeps me up on my bath night; George Nash mutes his despair, I can't keep the brush on the bright height. If the Black Dog is taking the air.

I must skip round with Ann Driverv I hate to miss Ambrose or Flora. It's so hard to remember that I've a B.B.C. to call.

In this welter of wonderful matter How is a poor housewife to choose When it comes to turning a letter Or holding the Six O'Clock?

And so, B.B.C., at Antwerp I'd beg on my knees if I could, That so far we were not exempt You don't make them a quarter as good!
AERIAL EQUIPMENT AND INSTALLATION

(Continued from page 312)

length. Various special types of aerial are available to the transmitter, but many of these may be applied to receiver technique. A scheme not often used by the listener, but one which has many valuable points in its favor, may be used when a sloping roof covers a loft, a support for the aerial then being placed on a convenient chimney stack and the lead-in being anchored to an insulator fitted to the ceiling, when it may be taken straight to the receiver, all portions of the aerial thus being rigid and at the same time short. The tiles may be drilled with an ordinary twist bit, although it calls for two people to attach the insulator, one holding the tile whilst the outer is attached. The tiles may be drilled with an ordinary twist bit, although it calls for two people to attach the insulator, one holding the tile whilst the outer is attached. For aerial equipment and installation, it is useful to use simple aerials which have many valuable points in their favor.

Aerial Equipment and Installation

AERIAL EQUIPMENT AND INSTALLATION

(Continued from page 312)

Wall Aerials

Finally, for those with restricted space the suspended wall-type of aerial should not be overlooked. The Bulgin insulators already referred to enable a rigid wire to be held clear of a wall and with many short-wave or all-wave receivers these will be found to offer better results than long horizontal aerials, whilst the fact that they are non-directional is often a boon in removing interference from a local station. The insulators and fittings are preferably mounted on wooden struts.

NEW TROPHY 6 COMMUNICATION RECEIVER

Yes, here's the most sensational value! A real Amateur's junior A.C. or G.H.S. or communictions model with all essential tuning refinements. The TROPHY 6 is made in 1 1/2 to 500 metres and the sensitivity is amply demonstrated in the static shots. Separate dial electrical feedbacking. Frequency calibrated scale. A.V.C., B.C.G. and Send/Receive switches. Plunge control. Built-in speaker. Phone: 322. And remember, you choose an all-British receiver when you choose the TROPHY 6. It's yours for 12/- down and 10 monthly payments of 1/-.

FOR BATTERY USERS

FOR RADIO'S BIGGEST THRILL—CHOOSE A TROPHY

Enjoyable short-wave listening makes only one demand—your must tune in on a specially designed TROPHY. There's a model in the price range £2 15/- to 12 and 3/- to suit you on any stage of your plans. Send for details.

TROPHY 3 Years for 7/- down

There are dozens of short-wave enthusiasts who own their TROPHY 3's for all-world contact. The TROPHY 3 covers 1.5 to 500 metres and the sensitivity is amply demonstrated in the static shots. Separate dial electrical feedbacking. Frequency calibrated scale. A.V.C., B.C.G. and Send/Receive switches. Plunge control. Built-in speaker. Phone: 322. And remember, you choose an all-British receiver when you choose the TROPHY 6. It's yours for 12/- down and 10 monthly payments of 1/-.

Call or Post Order to

PETO-SCOTT Co., Ltd.,

77 (P.W.41), City Road, London, E.C.1

Phone: Holborn 1279.

George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, Strand, London, W.C.2

ELECTRADIX BARGAINS

MICROPHONES. Table Model "N.W.11." For home broadcasting. Balanced square-booth type on wooden base, containing transformers, switch and plug and is a microwaves production at a low price. Worth 2 guineas. Only 1 1/2. Living Model, No. 150, Ideal. Same as above, 5 guineas. New. Model, No. 120, Ideal. Less than half price. 5 guineas.

Fitted adjustable electric contacts, 45/-. Bridge "ditto, 10/-. FOURNIER THERMOMETERS by Bridge. Thermometers. To 150 Cent., 3/6. Central Immersion Thermometers, To 150 Cent., 4/-. Mercury Therometer, To 40 Cent., 3/6.


ELECTRADIX BARGAINS

MERCURY CONTACT. Mercury Switches will operate with the same characteristics as their normal counterparts, because they are of the very best materials and absolutely pure. Mercury Switches are of many types, such as Avo and Avo Minor periodically to check up valve performance, batteries and power output. Then you'll always keep your set in good condition. A 13-amp precision-built instrument it tells you all you need to know, and enables you to locate quickly the seat of any trouble. Direct readings. No calculations. Complete in case. 45/- with carriage. Avo Minor, in suitably padded leather case, with crocodile clips for Avo Minor, in suitably padded leather case, with crocodile clips.
ETTERS 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).

Station DX222A (New Zealand)

SIR,—I have recently received a card and a letter from R. A. Rymroft, 21, Anzac Road, Whangarei, N.Z. (DX222A), who says he would very much like to hear from S.W.L.s in Great Britain and will QST 100 per cent of signals.

I would be interested to know if any readers of PRACTICAL AND AMATEUR WIRELESS have logged a station, the call-sign being 'PM', located at Port Moresby, New Guinea. —F. WILLIAMS (London, S.E.24).

Logged on the Prefect S.W. Three

SIR,—I was pleased to see my log of 24th March published in PRACTICAL AND AMATEUR WIRELESS recently. Since then I have added a pentode output, in place of the pentode voltmeter, and have obtained excellent results. Readers may be interested in the following log heard on evenings April 12th to May 16th. Aerial 20ft., inverted-L, N [missing].

TY2BH, 4TJ; T12HP, T05GJ, VY4AC, LU7AG, 4EZ, 2HA, 7DC, PY4CT, 2HY, HZ2D, O90OM, CX2CO, 1AA, C1EAT, ZP06H.

W1BK, JMG, QG, AJZ, BML, BLO, 21JU, XY; W4CQG, VE1CH, 3LF, 3AT.

VU2FA, FN1C, KAI1ME, 3KK; VP300, VQ4CM, VK4PF (my best so far), FA3HP, 31JH, 1JF; ZS1S, 1D, 1Q, 2B, 2BZ, 2DV, SV5, 5AB, 6FY, 65Z.

America.—CO2LY, VP300, 6FG, 6HO, 4KS, 4PT, 5JT.

8. Asia.—PY1GR, 2BH, 2GC, ZC6HS.

Cut this out each week

Do you know

—THAT coils may be matched by moving the end few turns in so as to modify both inductance and capacity.

—THAT the gain, and thereby the noise level, of a short-wave may be controlled on the L.F. side.

—THAT one simple means of carrying out the above idea is to vary the voltage on the screen of the output pentode.

—THAT the angle at which a gramophone pick-up travels across the record will not only affect the tone, but the frequency response.

—THAT it is often advisable to place a variable component back on the bassdrum or chassis and control it through an extension speaker.

—THAT in stormy weather it is often advisable to short-circuit an air-dielectric series-series condenser.


SIR,—I would like to correspond with any 'ham' or radio-enthusiast anywhere in the British Empire about my new set. —FRED BURNS, 31, Edge Fold Road, Walkden.

SIR,—I have been a regular reader of your interesting paper for about two years and would be very glad to get in touch with readers in any part of the world who like to correspond with me. —FRED BURNS, 31, Edge Fold Road, Walkden.

Station HZA

SIR,—With reference to a paragraph included in "Leaves from a Short-wave Log" in PRACTICAL AND AMATEUR WIRELESS dated June 3rd, I was interested to see that a reader had picked up a station giving HZA as its call-sign. I also received a similar call, but owing to the QRM I was unable to hold the station in order to distinguish all that was spoken. I received stations on Sunday at about 00.15 G.M.T. giving calls QG6A, 4KA1F and HLSO. All these were heard on the 20-metre band. I should be interested to know if there are any such stations as I am not able to find them in any list. I would like to correspond with any other "ham" or radio-enthusiasts anywhere in the British Empire about my new set. —R. STRETTON, 6, Viola Square, Wormholt Estate, Shepherd's Bush, W.12.

SIR,—I have been a regular reader of PRACTICAL AND AMATEUR WIRELESS since I first started to study wireless telegraphy, and I find your paper an excellent guide in building wireless telegraphy for eight months, and I am at present building a short-wave set with the help of your Handbook. I would be very pleased to get in touch with a corresponding who is interested in wireless telegraphy, and who is a regular reader of PRACTICAL AND AMATEUR WIRELESS. —WILLIAM WAUGH, 15, Bank Street, Greenock, Scotland.

SIR,—With reference to your letter of last month. All reception was on 20-metre band. —W. G. R. BOWDEN (Bromsgrove) about "my short-wave set for a household guide". —F. WILLIAMS (London, S.E.24).

SIR,—I have recently received a card and a letter from R. A. Rymroft, 21, Anzac Road, Whangarei, New Guinea. —F. WILLIAMS (London, S.E.24).

SIR,—I would like to correspond with any reader anywhere interested in amateur radio. —L. STREETON, 74, Raleigh Street, Nottingham.

Correspondents Wanted

SIR,—I would like to get into touch with any short-wave enthusiast in my district. —R. STRETTON, 6, Viola Square, Wormholt Estate, Shepherd's Bush, W.12.

SIR,—I have been a regular reader of your interesting paper for about two years and would be very glad to get in touch with readers in any part of the world who like to correspond with me. —FRED BURNS, 31, Edge Fold Road, Walkden.

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June 17th, 1939

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EVERYMAN'S WIRELESS SERVICE MANUAL

6/-, or £1/1 by post.

WORKSHOP CALENDAR AND TABLES AND FORMULAR

3/6, or £1/1 by post.

All obtainable from GEORGE NEWNES, LTD., Tower House, Southampton Street, Strand, W.C.2.
NOTES FROM THE TRADE

New Cossor Receivers

Two new superhetes are announced by Messrs. Cossor, one for battery operation and one for mains, both of the superhet type. The battery model is a push-pull, four-valve, all-wave receiver of the table type, and re-setting of the buttons may be carried out from the front of the receiver. Bands covered are 10.48 to 34.190 to 550, and 820 to 2,200 metres. Permeability tuned I.F. transformers are used, with iron-core pre-selector coils on the medium and long wavebands. The circuit incorporates A.V.C., automatic grid bias, and in addition to tone control a switch plug is provided for extension speaker switching. The price is 9 gns.

All-Dry Exide Batteries

In our issue dated June 3rd we gave some details of new Exide batteries for the special portable list recently introduced. The first five in that list are Pertrix models, and the last two provide 1.5 and 45 volts, and the catalogue number should carry the prefix H. These two are Drydex models.

The correct catalogue reference numbers are therefore: Pertrix 1490, 1481, 1482, 1483, and 1484, and Drydex H.1158 and H.1159.

Philips Car Radio

A considerable number of detail modifications and improvements, without radical changes in design, are to be noted in the new 268 series of Philips MotoRadio. The complete range and prices of the new models are

- Single unit Models:
  - Type 268 V for 6-volt operation—13½ guineas.
  - Type 269 V for 12 volt operation—13½ guineas.

- De Luxe (Separate Speaker) Models:
  - Type 258 V for 6-volt operation—15½ guineas.
  - Type 259 V for 12 volt operation—15½ guineas.

The range and prices of the Philips MotoRadio aerials remain as at present—chromium stream-line roof aerial at 10s. 6d.; telescopic side aerial for scuttle or door hinge mounting, 21s. ; telescopic side aerial for scuttle or window opening, 21s. ; unher ear aerial with attachment to console at 25ft. length of special screened cable at the original price of one guinea.

New Streamline Home Broadcaster

The G.E.C. announce an improved version of the popular Home Broadcaster Microphone. The unit is contained in a streamlined case of glossy black bakelite, mounted on a base which also contains the energizing battery and a volume control. In addition it is supplied with a 28ft. length of special screened cable at the original price of one guinea. The microphone cell itself is a new improved pattern and the overall length of the unit is 6ins. and it is 3½ ins. wide and 4½ ins. high.

New Mazda Valve Chart

MAZDA have produced a new valve chart which will be found of the greatest value to servicemen. Of the harking type, this chart has separate panels for each type, and those are numbered and also coloured. It is thus a simple matter to turn up the desired sheet instantly, and all the relative data of that particular class is thus readily seen. One sheet contains all base connections and another all Mazda equivalents in the B.V.A. types. The sheets are attached by press-stud fastenings so that new sheets or revisions may be added from time to time.

EXHIBITORS AT RADIOLYMPIA

As a result of the ballot for space at Radiolymia the following firms have so far registered for stands and offices:

Manufacturers’ Stands in Grand Hall and Annexe

- Armstrong
- Bush
- Cossor
- Ferranti
- Ford
- Goodmans
- J.C.F.
- Mullard
- Muncie
- Philips
- Pye
- Sterling Batteries

Wholesalers’ Stands at West End of Main Hall

- British Rola
- Bush
- Cossor
- Ferranti
- Ford
- Goodmans
- J.C.F.
- Mullard
- Muncie
- Philips
- Pye
- Sterling Batteries

REMEmBER THE DATE!

RADIOLYMPIA

AUGUST 23rd to SEPT. 2nd
In a transmission line L, Fig. 2, by a match over a wide range of frequencies is coupled referred to.

"Black out" periods of the tube. Magnetic current intermittently, plates. The cathode may be supplied with indirectly heated and it may be enclosed in slotted diaphragm 13 stops electrons on the one formed by the electrodes 11, 12.

A horn has an air column conduit incorporating a cavity wall structure, which is loaded wholly or in part with cork. As shown the invention is applied to multi-cellular horn comprising any conduits 5, Fig. 2, with curved walls forming the cavities which are filled with cork, preferably of granulated or chipped form. The cork may be mixed with an agglutinant or spirit and forced under pressure through an opening 9 in the outer wall of the horn and may be maintained under pressure in the cavities. In some cases, the cork may be wholly or in part in the form of strips or plates.

ACOUSTIC HORNS.—Young, L., and Young, A. No. 500692.

An acoustic horn has an air column conduit incorporating a cavity wall structure which is loaded wholly or in part with cork. As shown the invention is applied to a multi-cellular horn comprising any conduits 5, Fig. 2, with curved walls forming the cavities which are filled with cork, preferably of granulated or chipped form. The cork may be mixed with an agglutinant or spirit and forced under pressure through an opening 9 in the outer wall of the horn and may be maintained under pressure in the cavities. In some cases, the cork may be wholly or in part in the form of strips or plates.

NEW PATENTS

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41784.—Crawley, D. J.—Radio receiving apparatus. May 17.
41791.—Moore’s Wireless Telegraph Co., Ltd.—Radio antenna. May 15.
41706.—Perceval, W. S.—Wireless transmitting, etc., systems for two-way communication. May 12.
41750.—Lamps, Ltd.—Radio receivers with pre-set tuning. May 13.
41757.—Philips Lamps, Ltd.—Circuit arrangement, etc. May 13.
41760.—Lamps, Ltd.—Superheterodyne radio-receivers. May 15.
41768.—Philips Lamps, Ltd.—Television transmitters. May 16.

Specifications Published.

505400.—White, E. L. C., and Pauldell, G. L.—Cathode-ray tube television and like apparatus. (Cognate Application, 258438.)
505500.—Haidfield, B. M.—Non-linear thermionic valve stages.
505548.—Radioakt. Gen., D. S. Loewe.—Amplifier arrangements for television purposes.
505574.—Fernsch Akt. Gen.—Telekinematograph apparatus.
505643.—Weiss, G.—Cathode-ray scanning method for television and like purposes.
505630.—Telefunken Ges. Fur Drahtlose Telegrafie.—Radio and like transmitters.
505480.— HIMLIN, A. D., and White, E. L.C.—Thermionic-valve circuits. (Divided out of 304683/37.)

Printed copies of the full published specifications may be obtained from the Patent Office, 25 Southampton Buildings, London, W.O.2, at the uniform price of 1s. each.

LATEST PATENT NEWS

Group Abstracts can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2 either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes price 2s. each.

Abstracts Published

CATHODE-RAY TUBES.—Bull, C. S. No. 501058.

An electron beam is focused into a small spot by constraining electrons emitted from a rod-like cathode first into a sheet-like form by means of a cylindrical lens and then using a further lens to reduce the sheet-like beam to a spot on a luminous or mosaic screen. The cathode may be a filament, Fig. 1, placed between the rods 9 acting as a control electrode, which receives a television signal. A flat box-shaped electrode 10 with the rods 9 forms the cylindrical lens and the second lens may be a spherical one formed by the electrodes 11, 12. A slotted diaphragm 13 stops electrons on the edge of the beam. The cathode may be indirectly heated and it may be enclosed in a box-shaped control electrode. The second lens may be cylindrical. The electron beam may be dimensioned so that the terminating resistance W becomes effective at the frequency at which the capacitative reactance of the cable is equal to the characteristic impedance.

ACOUSTIC HORNS.—Young, L., and Young, A. No. 500692.

An acoustic horn has an air column conduit incorporating a cavity wall structure which is loaded wholly or in part with cork. As shown the invention is applied to a multi-cellular horn comprising any conduits 5, Fig. 2, with curved walls forming the cavities which are filled with cork, preferably of granulated or chipped form. The cork may be mixed with an agglutinant or spirit and forced under pressure through an opening 9 in the outer wall of the horn and may be maintained under pressure in the cavities. In some cases, the cork may be wholly or in part in the form of strips or plates.

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Detector Circuit

"I am trying to design a short-wave which will be of the straight type but which will be reliable. I have tried several standard detector stages but even though I can get smooth reaction and various other desirable features, sensitivity is not all that could be desired from them. Can you offer any suggestions for 'out of the ordinary' circuits which I might try?"—L. E. R. (Harrow).

Whilst out-of-the-ordinary circuits may be found useful, it is preferable to use tried and tested circuits for short-wave work. If you need something a little different, why not try a pentode detector with electron-coupled reaction? This could be arranged on standard plug-in coils, and for a few pence a screen potentiometer would be found ideal. Some experiment would have to be carried out to find the best tapping point on the coil, but the arrangement is smooth, gain is high, and if a flatly-tuned H.F. stage precedes it you will find that no dead spots will be experienced and you should get all that you desire on such an arrangement.

Carbon Granules

"I should like the address of a firm supplying fine grade carbon granules suitable for the transverse current mike described by you recently."—D. M. (Malta).

A small phial of granules, sufficient for the mike in question, may be obtained from Messrs. T. W. Thompson, the Small Clix House, Southampton Strand, London, W.C. 2. The price is 2s.

Choke Coupling

"I have been trying choke coupling in a small gramophone amplifier which I have built for the purpose of improvement. I enclose a circuit and should like to know whether the trouble is due to the choke being unsuitable. If so, you recommend a component which will work in this circuit? I want to use this arrangement as I have been told that better quality is obtainable and I am anxious to see if this is so in my case."—L. S. W. (Barnsley).

The choke shown by you is an H.F. component and is therefore unsuitable for L.F. coupling. You need an iron-core or L.F. choke. Special components are available for the purpose, or you can use the primary winding of an ordinary L.F. transformer. It is also possible to connect primary and secondary in series if a higher inductance is required, but in this case care must be taken to connect the windings in phase, or the inductance will be decreased.

Oscillation

"I have a small four-valve which is giving trouble, due, I believe, to the H.F. stage being wrongly designed. I have a straight pentode with fixed screen voltage, but I get a squeal when the H.F. and detector stages are in tune. The squeal varies in note just like reaction oscillation, and I should like to know whether this indicates merely interaction or H.F. instability. If so, what is the cure?"—C. R. (Southport).

EVERYMAN'S WIRELESS BOOK

By F. J. CAMM

Wireless Principles and Fault Tracking simply explained.

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

Valve Renewal

"My set has been working very well, and I was satisfied until a friend told me that I needed new valves. To prove this he brought round one valve and I put this in the detector stage. There was an immediate increase in signal strength which, he said, proved his point. I am not quite certain of the matter, however, and should be glad to know whether he was right."—W. T. A. (Newbury).

It is quite possible that your friend knew what he was talking about, but if the H.F. and L.F. stages are in tune you will know that the valve is oscilating. A more reliable check is to include a milliammeter in the anode circuit. When the grid is earthed the anode current will rise if the valve is in an oscillating condition. The remedy is to modify the screen voltage, provided, of course, that there is no interaction between anode and grid leads or components which could cause a feed-back sufficient to produce oscillation.

Extension Speaker Switching

"I have fitted an extension speaker to my commercial set, but although I have mounted the sockets in a suitable position there is no connection when the switch is turned on. Can you suggest a possible cause?"—J. G. (Eddystone)."
Two-valve:  
- "Junior" Crystal Set  
- A.C. Fury Four Super (SO, SO, I) 
- All-World Ace (HF Pen, I) 
- Enthusiast's Power Amplifier (HF Pen, I, Pen) 
- F. J. Carrom's A.C. All-Wave Silver Armada Mains Three (HI, Pea, I) 
- Ubique (11F Pen, 1) (Pen), Pen) 
- A.C. leader (HF Pen, D, Pow) 

Three-valve:  
- A.C. Twin (D (Pen), Pen) 
- A.C. All-Wave Corona Four (SO, D, LF, Pen) 

Two-valve:  
- F. J. Carrom's "Limit" All-Wave Fury Four Super (SO, SO, D, Pen) 
- Sonia one Four (SG, D, IF, 1') 
- 1938 "Triband" All-Wave Three (IIF Pen, 1), Pen) 

A.C. leader (HF Pen, D, Pow) 

Two-Valver:  
- "Jointy" Crystal Set 
- A.C. Fury Four Super (HF Pen, D) 
- All-World Ace (HF Pen, D) 
- Beauty-Pride "Jr." (HF Pen, D) 

Three-valve:  
- A.C. All-Wave Unipen (Pen) 
- F. J. Carrom's A.C. All-Wave Three (SG Det, 1'en) 
- Full-volume Two (SG det, 1'en) 
- Melody Ranger Two (I), Trans) 

Three-valve:  
- F. J. Carrom's A.C. £4 Superhet (Three-valve) 
- Universal Superhet (Three-valve) 
- F. J. Carrom's Universal £4 Superhet (Three-valve) 

Four-valve:  
- Two-valved Crystal Set 
- P. J. Carrom's A.C. £4 Superhet 4 Universal 
- A.C. £5 Superhet (Three-valve) 

Two-valved Crystal Set
Every Practical Wireless Service Man Should Have This Book

PRACTICAL WIRELESS SERVICE MANUAL

By F. J. CAMM.

A Complete, Practical and Up-to-date Work on the Testing of all Types of Wireless Receivers. 288 PAGES and OVER 220 PHOTOGRAPHS, DIAGRAMS and PLANS.

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George Newnes, Ltd.
A 10- AND 20-METRE RECEIVER  

Car Radio

The summer months bring to the fore the problem of car radio, although many motorists now make regular use of this part of modern car equipment. For temporary summer use a standard portable may, of course, be used in the car, but where permanence is to be permitted, as it is with many motorists, there are many problems to be overcome. Apart from the size of the apparatus, which must be considered where there is not much room to house a permanent receiver, there is the question of screening and the removal of interference from the various electrical items in the car. The question of the aerial, too, is not easily answered as there are so many alternative types now seen on the roads. The circuit is another problem, and in some cases a very powerful superhet may be thought desirable, whilst for picnics or other pleasure trips a simple two or three-valve may give all that is desired, especially if a temporary aerial is slung on nearby trees. Some of these problems and others in connection with car radio are dealt with this week, and full details will be found on page 348.

Police Radio

Small transceivers are to be provided at every chief police station in the London Metropolitan area. These are to be used for urgent police work, although the main idea underlying the installation is in connection with A.R.P. work. At Stockholm, in Sweden, a new ultra-short-wave transmitter has been installed, working on 94 metres, for use in connection with radio-equipped patrol cars and local stations.

Café Colette

Walford Hyden and his Orchestra make a welcome return to B.B.C. programmes in a new "Café Colette" series which will begin on July 3rd. This will be a programme of dance music from the Continent and other parts of the world, in addition to the orchestra, listeners will hear Lola Shari, Marcel de Haes and Dimitri Vetter. Production is by John Sharman.

Walford, who promises something new in these programmes, and is making an extensive tour of Europe, collecting material. He recently spent a week in the Basque country in Spain, where he discovered some very lovely folk-tunes, many of which, he feels sure, will never have been heard before by listeners. These were sung to him by the villagers, who also played them on instruments made in wood of the tin-whistle pattern—usually in quartets made up of drums and three of these instruments.

"All Down for the Finale"

Reginald Burston was the originator of the idea of a programme which would recall some famous musical comedies with the call-boy's "All Down for the Finale," and his reminiscences of plot and counter-plot as the "peg" for musical illustrations. The second programme of this type will be broadcast on June 26th. It will be presented by Gordon Crier. Reginald Burston will conduct the Midland Revue Orchestra and Midland Revue Chorus, and four soloists will take part in the programme.

Flying Time—1

Major Oliver Stewart, a pilot of long experience, will give a series of four talks on the practical work that goes to the making and perfecting of an aeroplane. The speaker, who was engaged for some time on experimental and test flying for the Government, and who is a writer on aeronautical subjects, will deal with the tests through which a new aeroplane goes before it is accepted for general use; with the remarkable inventions which have helped to improve aircraft performance and safety; with aeroplanes and their uses in discovering the handling qualities of different machines in the air, and with some of the strange aeroplanes that have been produced with special objects in view.

The Test Match

The first Test Match between England and the West Indies opens on June 24th. The B.B.C. is arranging to cover the match fully by giving commentaries during several periods of the day. This match will be staged at Lord's—a ground where the West Indies have put up many excellent performances in the past. The B.B.C.'s commentators will be Howard Marshall and Michael Standing. Broadcasting periods are timed for just before the intervals, so that not only will listeners hear a running commentary, but also a summary of the previous play and a general appreciation of the progress of the match.

British History

Carola Oman, well-known novelist and daughter of a famous historian, is to broadcast on the development in nursing services during the last hundred years. She will speak on June 22nd, of Sairey Gamp, Charles Dickens's famous character from "Martin Chuzzlewit," who, with her husky voice and moist eye and aroma of spirits, was a typical nurse of the period. Then came the Crimean War and Florence Nightingale, and this indomitable heroine saw to it that her country had nurses who were a credit and not a disgrace.

Northern Command Tattoo

Once again the North Region is arranging broadcasts from the Northern Command Searchlight Tattoo at Romford Park, Leeds. Early in the evening, on June 29th, listeners will hear a sound picture of the preparations and rehearsals of the Tattoo, recorded at the arena in the Park. Victor Smythe has arranged this programme, and Richard North will act as commentator.
ROUND the WORLD of WIRELESS (Continued)

European Statistics

At the end of 1938 the total amount of energy radiated by the 310 long- and medium-wave broadcasting stations in Europe totalled 8,230 kilowatt-hours. It is to be assumed that with the increase in transmitters, of which the number will attain 350 by the end of 1939, and the extra power to which some of the existing ones are being boosted, the total energy should reach 11,000 kilowatt-hours. Denmark still heads the list for the highest number of radio listeners in proportion to population, with 20.6 per 1,000 inhabitants; Sweden is next with 19.4, followed by Great Britain with 19.3. Greece and Turkey are the least radio-minded States, as they only possess three licences per 1,000 head of population! The aggregate number of radio receivers in Europe is now estimated at 35,130,000. Although a great increase is shown in the numbers of listeners acquired by each State, there should be no room in mind that some figures may prove misleading as, for instance, Germany has granted free licences to 78,653 homes, whereas such an advantage in Great Britain has only been conceded to 51,872 disabled persons.

Some Interesting Harmonics

Many listeners are puzzled by broadcasts tuned in on unusual sections of the short waveband, and for this reason find some difficulty in identifying the transmission. In many instances these signals are harmonics of broadcasts made by medium-wave transmitters. On channels above 50 metres the following are particularly frequent: 4th harmonic of London P.T.T. (7.25 m. (8.5 mc/s), and the 6th on 62.56 m. (4.985 mc/s).

The 4th harmonic of Rennes P.T.T. is well heard on 57.7 m. (5.2 mc/s), and Radio Normandy can be logged on its 7th harmonic, 39.14 m. (7.665 mc/s), and the 6th on 34.25 m. (8.79 mc/s).

Southport Entertainments

On Wednesday night, June 28th, Victor and Edith James will produce in the Northern programme on June 27th a Cabaret Entertainment, with Jessie Driver, Taylor Frame, Doris Gambell, Muriel Levy and Pat Lovith, as the artists. David Webster will be the compere and Maurice Arnold and Doris Kenna will be at the piano.

Theatre Orchestra from Aberdeen

The orchestra of the Tivoli Theatre, Aberdeen, under its conductor, Clifford Jordan, will broadcast a short programme of music before the evening’s programme begins on June 30th. Listeners have often heard the orchestra accompanying the variety artists who have broadcast from this theatre, but on June 30th they will be given an opportunity to hear the band giving an entertainment in its own right.

Australian Short-wave Transmission Schedule (July, 1939)

| VK2ME (Sydney) | Sundays (Sydney Time), 3 p.m. to 5 p.m. (05.00-07.00 G.M.T.); 7.30 p.m. to 11.30 p.m. (09.30-13.30 G.M.T.) | Mondays, 2.30 p.m. to 4.30 p.m. (16.30-18.30 G.M.T.) |
| VK3ME (Melbourne) | 31.5 m.: Nightly (Melbourne Time), Monday to Saturday (inclusive), 7 p.m. to 10 p.m. (09.00-12.00 G.M.T.) |
| VK5ME (Perth) | 31.5 m.: Nightly (Perth Time), Monday to Saturday (inclusive), 7 p.m. to 9 p.m. (11.00-13.00 G.M.T.) |

The programme will include the London-derry Air, the “Ständchen” serenade, Alford’s march “The Quarterdeck,” selections from “Chu Chin Chow,” and Scottish songs.

Isabel Bailie’s Recital

ISOBEL BAILEY will be the soloist in the next of the North Region’s special series of recitals by distinguished Northern singers, accompanied by the B.B.C. Northern Orchestra under H. Foster Clark. She will be heard on Tuesday, June 27th.

Cabaret from Bournemouth

ARTISTS in Tea-Time Cabaret from the Continental Restaurant, Bournemouth, on June 23rd, will include Renee Barr (soprano), Eric Shrimpton (electric and Spanish guitar); Peter Valerio (“The Wonder Boy Accordionist”), and Leonardi and his Wiener Orchester.

Saturday Concert-Hall

Lucy Pierce (pianoforte) will be the soloist with the B.B.C. Northern Orchestra in “Saturday Concert Hall,” on July 1st. H. Foster Clark will be the conductor, except in the last item of the programme, “Variations on an Original Theme,” by Gordon Jacob, which he composer himself will conduct.

SOLVE THIS

Solution to Problem No. 352

Jackson was not satisfied with the selectivity on his two-valve battery receiver and decided that a wave-trap would be of value to him. He looked through his spare box and found a suitable former with several old spools of wire. He had no idea of the gauge of the wire but selected what he thought would be suitable material and from a coil-winding data sheet wound a coil of the correct number of turns on the selected former. He connected a standard .0005 mfd. condenser in parallel with the coil and tuned the two in series with his aerial. The wave-trap failed to function. The connections were all perfectly in order. What was wrong? Three books will be awarded for the first three correct solutions opened.

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In Response to Many Requests
L. O. Sparks Explains in this
Article Many of the Items which are Not
Too Apparent to the A.A. Licence Holder,

It is becoming increasingly evident
that the articles on Transmitting
which have appeared in these pages in
past issues have been the means of
starting many enthusiasts along the right
road to amateur transmitting. It is also
becoming apparent, by the numerous
letters received by the Query Service
Department, that there are quite a number
of items which raise certain doubts in the
minds of those who have reached the A.A.
stage, and who wish to make the most
of the facilities thus granted. It would be
impossible to deal, in detail, with all the
little snags which crop up in the experi-
menter's path in a single article, therefore
those which seem most common have been
selected for attention in this issue.

In the first place, there is one query
which can be termed general and in view
of this and its nature it calls for a few
words if only to save others postage and
waste of time. It relates to the would-
be applicant for an A.A. licence. On
receiving the application form from the
Engineer-in-Chief (Radio Section) of the
G.P.O., many are at a loss how to com-
plete certain sections of the form and, quite
naturally I suppose, they write to the
Query Service Department for advice or,
in other words, instructions on how to fill
in the required details. Well, while it is the
Editor's great desire to render every possible
assistance through the Queries Dept., it
must be appreciated that there are
certain things which, in fairness to all
parties, they cannot undertake.

Unless the applicant can answer all the
questions himself, it would be advisable
for him to delay his application until
he has obtained more knowledge about the
subject, by reading, co-operating with a
licence holder, taking an active part in
his local radio club, or by attending a
series of suitable lectures. Please, there-
fore, don't ask the Q. Service to fill in the
missing words.

Selection of Apparatus

Whether it is through seeing photo-
graphs of rather fine and, in some cases,
élaborate installations of amateur trans-
mitting stations, or whether it is through
the desire to make the apparatus look very
important and awe inspiring (to the unin-
tiated) I cannot say, but it is quite obvious
that many seem to think that a whole heap
of special components and coils are essen-
tial for the satisfactory operation of even
a very modest rig. Fortunately, the idea
is quite harmless, though often rather expen-
sive to the person concerned, but looking at
it from another angle, such impressions if
elaborated on often have the effect of
throwing a wet blanket on a would-be
enthusiast's ambitions on account of possi-
able expenditure alleged to be necessary.

For the average amateur constructor, and
even many 10 watters, special equipment is not
necessary. Ordinary good makes of fixed
and variable condensers can be used; ordinary grades of short-wave coil formers
are quite satisfactory, and well seasoned
wood can be used for the baseboard and
panel if so desired. It can be summed
up in a nutshell by saying that most S.W.
gear, provided it is good grade stuff, can
be used quite safely for the average low-
power installation.

If funds permit buying some of the
components designed for amateur trans-
mitting work, and there are several British
firms of high repute who specialise in such
products, well, so much the better, as they
will then be to hand when the day comes
for the building of a more powerful high-
voltage outfit, but don't let the bogey of
costly apparatus stop you from taking up
your hobby.

Circuits

The essential part of a transmitter is a
generator of oscillations. This function
is performed by a valve similar in all
respects to those employed in certain
sections of a radio receiver or L.F. amplifier.
They can be divided into two types, namely
triode and pentode. The question which
so often arises is "Which type shall I use?"

Both types of valves make good oscilla-
tors, therefore the ultimate choice might
be governed by which is to hand. If, how-
ever, a valve has to be purchased, then
it should be noted that there is one im-
portant advantage offered by the pentode.
When oscillations of the type associated
with a transmitter, i.e., H.F. oscillations,
are generated in a valve circuit which has
its frequency controlled by a quartz crystal,
a certain amount of heat is produced, and
the crystal is subjected to stresses and
strains which, if allowed to exceed certain
limitations, will cause frequency drift
and damage to the crystal. If a triode is
compared with a pentode, it will be found
that it is possible to obtain a greater out-
put with a pentode than with a triode.

This means that with crystal conditions
being equal, the pentode is really the better
of the two valves, and this fact is amply
proved by its popularity amongst amateurs.
As one is concerned with valves having
generous anode emission, when considering
the triodes or pentodes must, of course, be of the L.F. power types.

One other feature which adds to the
attractiveness of the pentode is, those types
which have the suppressor grid brought out
to a separate valve-pin, as with most valves
of the multi-pin type, enable a very easy
and efficient form of modulation to be ob-
tained, this being known as "suppressor-
grid" modulation.

Another problem which so often faces
the transmitter constructor is "How many
valve stages shall I require?"

This is a question which cannot be

Cocontinued on next page.)
TRANSMITTING TOPICS

(Continued from previous page)

The simplest C.W. transmitter need only have one valve, it is also possible to build an oscillator and telephony modulator by using some of the modern multi-electrode valves which, to quote one example, can consist of two triodes or pentodes in one bulb.

Another very popular and efficient arrangement is that which uses a pentode in a triode circuit. This enables the valve to act as a crystal-controlled oscillator and/or as a C.O. and frequency-doubler.

It will be realised that this combination allows two or more wavebands, harmonically related, to be covered efficiently. Other stage arrangements can be, to quote but the fundamental circuits, the above Triode feeding into one or two valves as a power amplifier; a single valve as C.O. plus another as P.A.; this, of course, would only operate on the fundamental frequency of the crystal. The same combination plus an additional valve as modulator, or a more ambitious circuit could consist of a C.O. plus a buffer or doubler stage plus a P.A. stage plus a two-valve modulator section.

The ultimate selection really depends on requirements and funds, but the latitude of circuit arrangements is so wide that there is no need for the keen A.A. enthusiast should not try all possible combinations, and make most careful observations of the behaviour and operating conditions of the individual tests.

Modulators

This is another section of a transmitter which appears to cause quite a number of wrinkled brows. Actually, there is really no need to become troubled through trying to calculate this and that concerning what type of amplification to use, or how many watts of L.F. output will be required to modulate fully a given carrier wave.

It is not possible in this article to go into technical details, so a few brief facts must suffice, at least in this issue. The modulator stage is essentially for the purpose of amplifying the weak signals obtained from the microphone to a strength sufficient to modulate the C.W. carrier wave when injected into the transmitter at a suitable stage. It is a plain L.F. amplifier. The only care necessary is that which will ensure distortionless amplification of the microphone's output.

IMPORTANT BROADCASTS OF THE WEEK

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

Wednesday, June 21st.-Concert from the Public Schools.
Thursday, June 22nd.-Madonna of the Streets, from St. Michael's, Chester Square.
Friday, June 23rd.-Music from the Moon.
Saturday, June 24th.-The Church by the Sea, a play.

REGIONAL (341.3 m.)

Wednesday, June 21st.-Roundabout—an all Regional variety programme.
Thursday, June 22nd.-Sacred Service, by Ernest Bloch, from St. Anne's Cathedral, Belfast.
Friday, June 23rd.—Theatre Royal, Bristol, feature by Wilfrid Rooke Levy.
Saturday, June 24th.—The House and the Man—D. H. Lawrence at Tregerthen.

MIDLAND (296.2 m.)

Wednesday, June 21st.—Ranking Your Own Show—Village Players.
Thursday, June 22nd.—British National Songs and their Stories.
Friday, June 23rd.—Discussion—Home-work.
Saturday, June 24th.—General Release: Songs from the Current Films.

WELSH (371.1 m.)

Wednesday, June 21st.—Sunday School Trip: Part 2.
Thursday, June 22nd.—Welsh Flannin, The Saga of a Mid-Wales Industrial Town.
Friday, June 23rd.—Music, Mussato, Please: A Parade of Song Hits.
Saturday, June 24th.—Prehistory in the Countryside: The Roads of Wales.

WEST OF ENGLAND (285.7 m.)

Wednesday, June 21st.—Concert from the Public Schools.
Thursday, June 22nd.—A La Carte—variety programme.
Friday, June 23rd.—Theatre Royal, Bristol, feature by Wilfrid Rooke Levy.
Saturday, June 24th.—Redlands, Act 1, from Dartington Hall.

NORTHERN (449.1 m.)

Wednesday, June 21st.—The Blackpool Dog Show, from Blackpool.
Thursday, June 22nd.—All the Fun of the Fair, from Town Moor, Newcastle-upon-Tyne.
Friday, June 23rd.—The Marine Follies—variety from Fleetwood.
Saturday, June 24th.—Orchestral Concert.

SCOTTISH (391.1 m.)

Wednesday, June 21st.—Scottish Dance Music.
Thursday, June 22nd.—Gaily or Not Gaily: Gaelic play by Mary A. Campbell.
Friday, June 23rd.—Excerpts from the Summer Show at the Theatre Royal, Edinburgh.
Saturday, June 24th.—Pebbles March Riding and Beltane Festival: a recorded impression.

NORTHERN IRELAND (301.1 m.)

Wednesday, June 21st.—Stop Dancing—variety programme.
Thursday, June 22nd.—Sacred Service, by Ernest Bloch, from St. Anne's Cathedral, Belfast.
Friday, June 23rd.—Irish Rhythms.
Saturday, June 24th.—Choral Society.

PRACTICAL AND AMATEUR WIRELESS

June 24th, 1939

The circuit can consist of any of the usual L.F. output arrangements, power, Class A pentode, or a pentode Class B, the latter becoming very popular owing to the output available with modest voltage and current requirements.

The connection of the output of the modulator to the transmitter depends on the form of modulation employed. This does not mean the form of amplifier but the method of adding the L.F. signal to the carrier. These methods will be discussed later.

Now as regards the L.F. power required to modulate a given carrier, say 100 per cent. When a carrier wave is modulated to this extent, its strength doubling, therefore the peak power at any given instant will be four times the unmodulated power of the carrier. In case this is not clearly understood, it is worth noting that the average power of the modulated carrier will be 50 per cent. greater than when it is unmodulated or, in other words, if it is doubled, the peak power will be four times the average power. In this way we shall have to use a modulator capable of giving an output of at least 2\text{\textsuperscript{2}} watts, and so on. But more about this anon.

AMERICAN TELEVISION PROGRESS

VARIOUS reports keep filtering into this country concerning the progress of television in the United States since its inauguration on April 30th. Unbiased British observers who have visited the States to view the results, however, are unanimous in stating that they found a much lower standard than that enjoyed here. Even so, it is interesting to take note of the various reactions provided by the British press concerning what has been done so far, as that is a standard much lower than that enjoyed in Britain.

Studio Building

The studio building plan which was launched three years ago by that company provided for television in its stage construction. On the other hand, one prominent authority rather pessimistically says that television has come forth owing to its development past about four million pounds, enjoys a great fame but slight performance, and consists essentially of sales promises, anticipations, hopes and promotions. Then, again, the major distributors have refused to supply old shorts for television purposes. Because of this, an N.B.C. official stated that motion picture companies could not break television by ceaselessly refusing to sell it to the new industry with films. Neither can picture interests solve the problem of what effect television will have on the film business by dodging the new art. It has, therefore, been suggested that for its own welfare the picture industry should enter into a short period of collaboration with the television and weigh the lessons learned before deciding to cut television cold. Perhaps the film producers in the States may be taken to heart from what has happened in this country, but even those people with short memories can recall the spirited opposition offered by the film industry to the introduction of sound.
Programmes from Start Point and Clevedon

WEDNESDAY, June 14th, was the opening day of the new transmitters at Start Point and Clevedon, taking the place of Bournemouth and Plymouth. Bournemouth was opened on October 17th, 1923, and Plymouth on March 28th, 1924. The official opening of these two stations was carried out on the day mentioned by Sir Allan Powell, chairman of the Governors, who called upon the Duke of Somerset to open the transmitters. There was no ceremony at Clevedon, but the Lord Mayor of Bristol (Alderman W. A. Winchester) was one of the chief guests of the Corporation at the opening ceremony at Start Point and he made a speech of welcome to the new broadcasting service. The Lord Mayor of Plymouth (Councillor G. S. Scoble) and the Mayor of Bournemouth (Alderman I. W. Dickenson) also spoke. The Corporation's thanks were conveyed to the speakers by the Chief Engineer of the B.B.C., Sir Noel Ashbridge.

Start Point Station Details

The following is a brief description of the Start Point Transmitting Station. Its function is to provide an improved Regional programme service in a district comprising the counties of Cornwall, Dorset, the southern parts of Devon, Somerset, Wiltshire, and Hampshire, and the South Coast to the East as far as Sussex. In conjunction with the new transmitting station at Clevedon, in Somerset, it supersedes the low-power transmitters at Plymouth and Bournemouth, which provide only a strictly local service, and the 285.7 metre transmitter at W Alexandra, which has radiated the Western programme since July, 1937. The wavelength used by Start Point will be 285.7 metres (1,050 kilocycles per second), and its power will be 100 kilowatts.

The building is similar in plan to other recent B.B.C. high-power stations. It has a single storey, except for the office block at the front which has two storeys. The arrangement of the apparatus inside the building also follows previous practice. The rotating machinery is kept away from those parts of the building where quietness is essential, such as the control room, where the quality of the programme is checked, and the offices.

Careful thought has been given to minimizing the programme time lost due to breakdowns. Spares are provided for all the important items of apparatus, and are arranged so that they can be quickly brought into use.

The front part of the building contains the offices, staff mess-room, valve store, a quality checking room, and the control room. The control room is connected by high-quality telephone lines to the Plymouth studios and thence to Bristol and the simultaneous broadcasting network. In the control room the programme is passed through amplifiers which increase its volume to that necessary for the transmitter. There is a programme control position at which control and switching operations are carried out.

A studio is provided for emergency use and for testing, as at other B.B.C. transmitting stations.

In this part of the building there is a room containing the quartz crystal drive unit which keeps the wavelength of the transmitter constant to a very high degree of accuracy. To prevent the wavelength changing, the temperature of the crystal must be kept constant within a small fraction of a degree. The crystal is therefore contained in a specially designed oven which is heated electrically, the temperature being controlled by a thermostat.

(Continued overleaf)
PROGRAMMES FROM START POINT

(Continued from previous page)

The Transmitter Hall

This contains the transmitter itself, apparatus for regulating the high-tension, filtering and supplies and control of the high-tension smoothing equipment. The transmitting valves and circuits are in a metal enclosure which has glass windows letting in so that meters and other details can be seen. For the safety of the staff, all the enclosures containing apparatus are protected by electrical and mechanical interlocks so that they cannot be entered until the high-voltage supply has been disconnected and the apparatus made safe.

Facing the transmitter is a control desk at which the various power supplies to the transmitter are regulated. The motor-generators in the next room can be started and stopped from here and the spare machines brought into use.

The Machine Room

The voltage of the mains supply in the building is 240 volts, but to operate the transmitter various voltages are required, up to a maximum of 14,000 volts for the main power supply. These voltages are produced by motor-generator sets in the machine room. Each machine is duplicated in case of breakdown and can be started by hand from a switchboard in the machine room, although this is normally done from the transmitter control desk.

Power Supply

Power for running the station is normally taken from the mains of the Borough of Torquay Electricity Undertaking. A standby generating set is, however, installed in the building for use in the event of the public supply failing. This is a Diesel engine driving an alternator which generates enough power to operate the whole station. Provision is made on a switchboard in the engine room for a rapid change over from the normal supply to the standby.

The Diesel engine is stored in two tanks at the rear of the building. These have a combined capacity of 80 tons.

The Aerial

The aerial system is different from any other B.B.C. stations and is modelled very closely on the new transmitter at Aberdeen which was opened last September, although the power of the new transmitter, 20 kilowatts, is higher than that of Aberdeen. The single storey building is of modern design, built of brick with an external rendering of cement. Its size is approximately 44 feet by 17 feet, and it contains a transmitter room, machine room, control room and various subsidiary rooms.

The programmes arrive in the control room over special high-quality telephone lines from the Bristol studios, and may either originate there or come from some other part of the country by way of the simultaneous broadcast system.

The control room contains amplifiers to increase the volume of the programme, a radio-check receiver and general testing apparatus on one side, while on the other side are the motor-generator sets which supply the small building near the base of the mast which contains the aerial-coupling circuits and a system of antenna to be used for domestic reception. Power is normal hand-operation is available as a standby.

The Aerial

Clevedon Station Details

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The Aerial

Jo'burg to Have a New Station

The South African Broadcasting Corporation is inviting tenders for the construction and installation of a powerful short-wave transmitter to replace the 5-kilowatt station ZRH now in use at Roberts Heights. Short-wave broadcasts of the Johannesburg (Union of South Africa) programmes from ZTR are now being made on 49.94 m. (6.01 me/8).

Country Journeys

S. P. B. MAIS will give the first talk in a series of programmes entitled "Country Journeys," to be broadcast on June 26th. Although he knows Somerset well, he made a special journey over the Quantock Hills for the programme. He is both energetic and conscientious, he went over them in the only way in which the programmes can be heard, from the variety of their appeal—that is by walking. He visited, among other places, Alfordon where Wordsworth lived and wrote, and in his talk he will tell listeners about the past of the hills as well as the present, in a way that will appeal to the visitor.

W8XAL on a New Schedule

A NEW transmission schedule has been announced for W8XAL; short-wave broadcasting is to be handled by the Crosley Corporation, Cincinnati. The 10,000 watt short-wave outlet is now relaying WLV programmes at the following times: Sundays, 8 a.m. to 8:30 p.m., and from 11 p.m. to 2 a.m. E.S.T.; Mondays and Thursdays from 5:45 a.m. to 2 a.m.; Tuesdays, Wednesdays and Fridays from 5:45 a.m. to 5:30 p.m., and from 11 p.m. to 2 a.m., E.S.T.—Saturdays from 5:45 a.m. to 11 p.m., E.S.T.

The Power Supply

The power supply for the station is obtained from the mains of the North Somerset Electricity Supply Co. Ltd., at a pressure of 11,000 volts A.C. This is transformed in a substation on the site to 400 volts and 230 volts for operating the apparatus in the station.

Water Supply

The water supply for the station is obtained from the mains of the Clevendon Water Company.

Student Songs

ON June 28th (National) the B.B.C. Men's Chorus, conducted by Leslie Woodgate, will broadcast a programme of Student Songs, arranged by Leslie Woodgate and Stuart Holbrook, from the BBC Studio at the Royal Albert Hall. The soloist will be the soprano, with Ernest Lush at the piano-volta. On June 29th (Regional) the B.B.C. Men's Chorus, conducted by Leslie Woodgate, will broadcast a programme of English Madrigals.
ON YOUR WAVELENGTH

The Legion of the Lost

I was reading a Sunday paper the other day, and noticed advertisements for missing relatives, and it occurred to me that someone ought to devise some scheme so that the radio can be used for that purpose. I think by now that almost everyone in the world at some time or another listens in to wireless, and thus there could be no surer method of tracing missing relatives, particularly if such messages were sent out on Sunday when most people are at home.

I realise all the difficulties, for people who have merely gone away for a week or two without informing someone of their whereabouts, might cause anxious relatives to have the names broadcast when there is no need to do so. I do not think it would be impossible to devise some system of careful vetting of applications for broadcast requests for information regarding missing relatives, and perhaps even a small charge could be made for the service. I believe the matter has been considered by the B.B.C. on a number of occasions. There is no reason, however, why some of the Continental commercial radio stations should not undertake such a system. The names would, of course, be announced in alphabetical order, with the time programme to be announced for the A’s, B’s, G’s, and so on.

The Radio White List

The radio trade, like many others, has suffered a good deal at the hands of incompetent dealers. Unfortunately, the law is such that it is illegal to publish a black list, although it is, I think, in order to publish a white list, if it is presented in a certain way. It is necessary to be very careful, however, even with a white list, because the omission of a man’s name from it might be taken to imply that he was virtually on a black list. After all, if the reasons for being on a white list are that the dealer concerned is known to be reputable, the implication is that those not on it are not reputable.

The white list has, therefore, to be published in such a way that it contains a disclaimer which states that the absence of a name from the list does not imply that the absentee is not reputable. Thus, the value of the white list is largely lost.

Now for some time past the radio trade has been endeavouring to purge the retail side of certain dealers who do not comply with fair trading conditions, but at a meeting held recently the Retail Distributors Association, which represents most of the larger retail stores in Gt. Britain, and has members throughout the world, the statement was issued that they could not subscribe to the undertaking laid down in the terms of the agreement issued by the set makers sections of the R.M.A. I do not know whether further steps will be taken.

The Viewers go to Tea

I like the idea which the B.B.C. has instituted of inviting a number of regular viewers to tea as they will with their first television tea-party on June 22nd. At this tea-party the viewers will meet members of the Alexandra Palace staff and exchange views and opinions on the television service, whilst Mr. Gerald Cock, the Director of Television, gives an address. These parties are limited to 150 people, and they start at 4.30 p.m. with tea. Then Sir Stephen Tallents, B.B.C. Controller of Public Relations, takes the Chair, and Mr. Cock speaks.

I believe that it is the hope to include television announcers amongst the visiting staff, and members of the party will be permitted to talk to some of the producers.

The B.B.C. considers that this opportunity for personal contact will enable them to gauge the public’s likes and dislikes.

Radio in the Census?

Rumours are current in America that in the next American Census information concerning radio will be included amongst the items. The next American Census will be in 1940, but as long ago as 1930 the R.M.A. was instrumental in securing in the census of that year a question on the wireless installed in the home. The American scheme will include this question, and probably an additional one regarding car radio.

Radiolympia

Steps are already being taken to ensure the success of this year’s radio exhibition. Many useful suggestions have been put forward, and I am now pleased to note that the organisers are anxious to look with favour upon any really constructive efforts on the part of important press publications to present Radiolympia as a big feature to the public—either during or just prior to the Show. It is believed that one or two papers are already well advanced with special ideas on the subject. Any ideas in this connection should be forwarded to the Exhibition Committee, who will consider them with sympathy as possible. We shall, of course, be at our usual position and hope to see old and new readers turn up in strength as usual. I understand from the Editor that some interesting new receivers will be on view and that the usual arrangements will be made to answer all problems which may be put to the staff. Once again, I ask you to make a note of the date in your diaries—August 23rd to September 2nd, both dates inclusive.

Transmitting Jargon

I was trying out a new short-wave receiver the other night and chanced upon the 40-metre amateur band. I was surprised at the waste of time and energy on the part of a large number of those whom I chanced to hear. The use of “Old Man” after every sentence; the lack of clear thought evidenced by the long-drawn-out “er, ’er, er’s” in everything that was said, and what to my mind was much worse, the continued use of telegraphic terms in ordinary conversation gave an indication that transmitting licences are apparently being issued ad lib. F.B. is a telegraphic symbol for “fine business,” yet I heard several amateurs refer to receivers as “Very F.B.
**Notes from the Test Bench**

**WHEN** using up old lengths of flex, it is generally found that the metal is tarnished and that the outer cotton covering is partly perished. The result is that when a portion has been bored for connection purposes, the whiskers of cotton are left which render the appearance untidy, and furthermore, soldering cannot be easily carried out owing to the difficulty of cleaning the wire. A penknife should not be used as there is a risk of cutting through one or more strands and in some circuits the unconnected ends may give rise to trouble. The rubber should be carefully scraped away and a metal held to the cotton ends. They will flare up quickly, but the flame should not be allowed to remain for too long or the copper wire strands will be annealed. Blow out the flame and it will then be found that the cotton ends will rub off, the charring having broken them down and the slight heat will have affected the covered wire. The removed wire should then be passed between a piece of old emery cloth held between the finger and thumb, which should bring them up quite bright and clear for soldering. Use a good flux.

**Cutting Large Holes**

**WHEN** mounting meters or similar large components on panels or chassis, some difficulty is experienced if a large washer cutter is not available. A tramnel may be cut from stiff material and a cutting point made from a gramophone needle. This should be rotated several times with pressure, and the panel or chassis turned over and the process repeated from the other side. In all but thick steel, this will be found to score deeply enough to enable the disc to be torn out by drilling a small hole at one point, lifting the edge and gripping with flat priers. The deep score will act as a guide and very little cleaning up will be called for afterwards.

**Black Crackle Finish**

**IT** is fashionable now to use panels and cabinets with a black crackle finish. Old aluminium panels which are being used up may be modernised by filling the holes with any plastic metal and then painting the panel with black crackle paint. The holes will be rendered practically invisible and the panel may be drilled for further use, case being taken, of course, to avoid making a fresh hole running into one of the original holes, as this may cause the filling to fall out. Aluminium solder or ordinary solder may be run into the old holes, laying the panell flat on a bench whilst the hole is filled, and smoothing up after it has set.

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**An Historic Collection**

**STUDENTS** of electrical history will be interested to note that two additions recently made to the Ediswan Collection of Historic Lamps are a Cooper Hewett mercury vapour lamp and a Nernst “Lunar” pattern lamp. The Cooper Hewett dates from 1908 and is, therefore, one of the first practical mercury vapour lamps put into commercial use. It is the tilting type which operated in the horizontal position on 200-volt circuits at 2 amps. and gave a 1,200 candle-power light intensity. The lamp stood up to seven years’ service in the dye house of Messrs. Wood and Burt, of Holmfirth, who are the donors, before it was replaced by tungsten filament lamps. The lamp is also a little long and apart from a small hole through which all the mercury has escaped, is in an excellent state of preservation.

The Nernst lamp, with the orthodox Nernst rare metal oxide filament, is one of the more elaborate patterns introduced anterior to 1907. This lamp was given by Mr. Arthur Douglas, of Kirk Ella, Yorkshire.

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**News Bulletins in European Languages**

**I** AM informed by the B.B.C. that as from June 14th a late news bulletin in Italian is being given from 10.45 to 11 p.m. (B.S.T.), on weekdays and Sundays, and will be broadcast from five medium-wave Regional stations and from two short-wave transmitters at Daventry.

In future, all foreign news bulletins on medium waves will be transmitted from the Welsh Regional transmitter instead of from the West Regional transmitter as hitherto. Transmissions will continue from the London Regional, Midland Regional, North Regional transmitters, and from Stagshaw, as before.

On weekdays the timing of the late French and German bulletins remains unchanged, at 10 p.m. and 10.15 p.m., respectively. On Sundays, however, the late French bulletin is broadcast at 10 p.m. on short waves only, and the German news broadcast on medium and short waves will begin at 10.50 p.m. instead of at 10.15 p.m. as on weekdays.

The early bulletins in French, German, and Italian continue as before to be radiated on the short waves only from 8.15 to 9.0 p.m. on both weekdays and Sundays.
SHORT-WAVE SECTION

A TEN AND TWENTY-METRE SET

How to Obtain Maximum Efficiency on the Shorter Wavelengths with a "General-purpose" Short-waver. By W. J. DELANEY.

Many constructors build short-wave receivers which might be termed "General-purpose" sets, since they are designed to cover all wavelengths below 100 metres or so. This is quite in order so long as no attempts are made to get below about 15 metres. Some receivers will, of course, give quite good results down to 10 metres, but the particular requirements of apparatus for these very low wavelengths are such that when it is desired to gain good efficiency on that band it is desirable to start from that end and design the receiver for that purpose. Amateur transmitters, and those who wish to listen to them, will use the 10, 20 and 40-metre bands most frequently, and station searching on the 10-metre band is not too simple with a normal type of short-wave set. Apart from the quest on "dead spots" and losses, there is the problem of tuning, and the following ideas are introduced with a view to simplifying the operation of tuning on 10 metres so that a performance comparable with a standard short-waver may be obtained.

Coil Problems

Standard 4- or 6-pin plug-in coils may be obtained for use down to 9 metres. Better results on 9 or 10 metres are obtained with an air-spaced self-supporting coil, and if the standard type of coil-holder is eliminated wiring may be reduced, thereby enabling more wire to be put on the coil with a consequent increase in inductance and better signal strength. This means that some provision must be made for taking the standard 20 and 40-metre coils, and it is suggested that the small stand-off insulators be wired direct on the tuning condenser with sockets inserted in the top of the insulators. A standard 4- or 6-pin coil-holder should then be fitted with two pins so that it may be inserted in place of the special coil, and a standard coil can then be used in the normal manner. To mount the insulators on the standard condenser to obtain correct spacing for the pins (mounted in the screw holes of a standard coil-holder) small metal brackets will usually have to be constructed, and the sizes and shapes will depend upon the particular tuning condenser.

The coils for 10 metres should be wound with the 16 or 18-gauge tinned copper wire usually employed for wiring purposes, and the required number of turns (dependent upon the diameter) should be held in position with a strip of celluloid attached by Durofix. A suitable diameter is 1 in. Provision for reaction or primary windings will again depend upon the type of circuit and general tuning arrangements which are adopted.

Tuning Arrangements

The usual form of short-wave tuning is that known as "band-spreading" wherein a condenser of .0001 to .0002 mfd. is used for a preliminary setting and a very small variable connected in parallel with it for a fine adjustment. It is now suggested that a variable of 18 mmfd. or less be used for this purpose, and the special coil-mounting device be connected to this condenser. The band-setter should be placed as close as possible to this, and when tuning on the 10-metre band the band-setter should be set to zero (or minimum capacity), and all tuning effected on the small condenser. This will, of course, not provide the same wide tuning range, but will give very much better tuning, and by using further coils to cover the range between, say, 10 and 20 metres, a better L.C. ratio will be obtained with improved signal strength. Furthermore, each small band can be individually adjusted for reaction, aerial coupling, etc., and difficulties due to "dead spots," etc., will be overcome.

On most short-wave sets a series aerial condenser is used and it is often found that although this may be adjusted to provide smooth reaction and all other desirable features on one waveband, it has to be re-set for the other bands, and exact settings or calibrations cannot be easily carried out. If the new scheme is adopted, the reaction or primary windings may be adjusted on the coils themselves, and then by using a large slow-motion dial for the small tuning condenser, and a small dial only for the band-setter, a reliable calibration chart may be drawn up for all coils. In an experimental receiver built on these lines which has been in use for some time at my station the 10, 20 and 40-metre amateur bands are covered by exactly one revolution of the large Eddyson Dial, type 1,070, the 10-metre coil being so wound that it only covers this particular amateur range. It is, of course, possible to wind coils so that the broadcast stations are also covered on the coil ranges in question, but where a receiver is to be used in conjunction with a transmitter for accurate logging, the new idea will be found preferable. The dial may be incorporated into the tuning cycles, and accurate readings of the divisions of the amateur bands can then be made.

Wiring and Modifications

All wiring must, of course, be rigid and short, especially in the tuned circuits.

(Continued on next page)
New Venezuelan Wavelengths

Many of the Venezuelan stationstransmit on wavelengths between 44 and 55 metres have been allotted higher channels. YV5RM, Caracas, now 10 kilowatts, is easily captured on 39.32 m. (9.04 mc/s). Other stations which the authorities have moved up are: YV3RM, 39.88 m. (5.01 mc/s); YV6RO, 60.73 m. (4.04 mc/s), and YV9IU, 60.99 m. (4.92 mc/s), all in the Venezuelan capital. YV3RX, La Voz de Lara, now 2 kilowatts, at Barquisimeto, has replaced YV3RA, and is operating on 60.12 m. (4.99 mc/s). A new station, YV3RN, has also been opened in that city and is testing on 62.24 m. (4.82 mc/s). From Barcelona, the call: YV6RE, has been heard on 62.76 m. (4.78 mc/s), and the station announces a power of 000 watts; YV1RJ, Romero Tol- con, installed at Coro has been logged on 60.36 m. (4.97 mc/s), also YV1RK, Radio Popular, Maracay, on 50.99 m. (5.03 mc/s). Coro must be taken not to confuse the Venezuelan with the Colombian broadcasters which are now also using the same section of the waveband.

The Bombay and Delhi Channels

Listeners who wish to hear the broadcasts from British India should tune to YUV2, Bombay, on 31.4 m. (9.55 mc/s) between B.S.T. 03.30-04.30; 08.00- 10.00 or 11.00-12.00; also on 61.48 m. (4.89 mc/s) between 13.30 and 18.00. Delhi broadcasts simultaneously through VUD4 on 19.62 m. (15.29 mc/s), and VUD2 on 31.28 m. (9.59 mc/s) between B.S.T. 03.00-04.00, and through VUD2, 31.28 m. (9.59 mc/s) and 40.49 m. (4.96 mc/s) from B.S.T. 13.30-18.00.

Daventry Empire Broadcasts

The frequencies now used by the Daventry short-wave broadcasters are the following: GST, 13.52 m. (21.55 mc/s); GSP, 13.58 m. (21.53 mc/s); GSL, 13.97 m. (21.47 mc/s); GSV, 16.86 m. (17.81 mc/s); GSP, 19.6 m. (15.31 mc/s); GSS, 19.66 m. (15.26 mc/s); GSX, 19.77 m. (15.17 mc/s); GSK, 19.76 m. (15.18 mc/s); GSF, 19.82 m. (15.14 mc/s); GSW, 25.38 m. (11.82 mc/s); GYX, 25.35 m. (11.75 mc/s); GSV, 25.38 m. (11.75 mc/s); GRY, 31.25 m. (9.6 mc/s); GSK, 31.32 m. (9.58 mc/s); GSS, 31.55 m. (9.51 mc/s); GSL, 40.1 m. (6.11 mc/s), and GSA, 48.59 m. (6.05 mc/s). Through these various stations the British broadcasts in English and foreign languages are almost continuously on the air throughout the 24 hours.

Radio Guadeloupe Changes Wave- length

For its short-wave radio network the Norsk Ringskringkasting has officially announced that the following call- signs and frequencies have been allotted to

Leaves from a Short-wave Log

the new Jeløy and Oslo stations: LKZ, 13.55 m. (21.46 mc/s); LKX, 19.77 m. (15.17 mc/s); LKW, 16.99 m. (17.75 mc/s); LKV, 36.78 m. (15.17 mc/s); LKJ, 25.50 m. (11.83 mc/s); LKQ, 25.50 m. (11.83 mc/s); LKE, 31.34 m. (9.572 mc/s); and LKC, 31.48 m. (9.53 mc/s). The power of LKX and LKC is 30 kilowatts.

Chungking on 17 Megacycles

X GOX, Chungking (China), now transmits daily between B.S.T. 03.00-04.00 on 16.85 m. (17.8 mc/s) with a power of 35 kilowatts.

Radio Sofia

There are not many broadcasters on the 8-megacycle band, but a search on this section of the condenser dial will soon reveal LZA, Sofia (Bulgaria), on 4.94 mc/s. Announcements in several languages are made in a feminine voice, and the call is put out at regular intervals. The station is seldom late on the ether, and usually closes down towards B.S.T. 21.30.

La Voz de la Pro- vincia

C O G F, Matanzas (Cuba), has re- appeared in the log; it is working on 25.42 m. (11.8 mc/s), and may be easily mistaken for CB180, Santiago, Chile, which is to be found on the same channel. Both, unfortunately, use chimes as an interval signal, but the latter station alternates with a bugle call occasionally. Slightly higher up the scale listeners report the reception of Red^9 Rancho Grande, which would appear to be the call of OAX 42 A, Trujillo, in the Repub- lic of Peru, given as operating on 25.44 m. (11.79 mc/s).

SHORT-WAVE SECTION

(Continued from previous page)

A close-up of Madame Tabouis, the famous French political columnist, who is the new Jeløy and Oslo stations: LKZ, 13.55 m. (21.46 mc/s); LKX, 19.77 m. (15.17 mc/s); LKW, 16.99 m. (17.75 mc/s); LKV, 36.78 m. (15.17 mc/s); LKJ, 25.50 m. (11.83 mc/s); LKQ, 25.50 m. (11.83 mc/s); LKE, 31.34 m. (9.572 mc/s); and LKC, 31.48 m. (9.53 mc/s). The power of LKX and LKC is 30 kilowatts.

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SHORT-WAVE SECTION

(Continued from previous page)

Sixteen or 18-gaured tinmed copper is best, and for the aerial condenser the Eddystone type 057 condenser is desirable, and this may be mounted on the base- board or chassis, between the aerial and first grid. An aperiodic H.F. stage should be used, with a reliable choke between earth and the grid of the H.F. valve. A variable-mu valve with adjustable bias will enable volume control to be effected and by this means the reaction control may be turned up to the desired point to give maximum volume, and when a powerful station is heard, instead of backing off reaction the H.F. volume control is em- ployed. This is a further advantage in accurately calibrating the set as reaction in most cases affects the setting of the tuning condenser. If reaction is always set to one position no variation in tuning will take place. The H.F. stage must be screened to avoid interaction with the detector stage wiring and consequent tuning shift. Reaction control by means of a variation in the screen voltage of an H.F. pentode is the ideal arrangement for a receiver of the type mentioned, and a diagram is given in Fig. 1 with the layout to be adopted shown in skeleton form in Fig. 2. The model in use is A.C. operated, but a battery receiver may be built on exactly similar lines, and valves of any desired make may, of course, be used.
A Heavy Duty Rocker-type Relay

TWO disused bell movements having removable pole pieces made possible the biased rocker action relay illustrated in the accompanying sketches, the construction being as follows. Slipping the bobbins from the removed poles, these were rewound with a thinner gauge of enamelled wire until each bobbin was practically full, then after resetting the bobbins on the poles, securing with a little glue as they were rather loosely fitting in the first instance, I then shaped two aluminium brackets, one of these being provided with a bearing bracket or lug "B" for the tension spring fitment.

After determining the extent of the influence of the polarised coils on a "hook-up" a suitable baseboard was marked out and a soft iron armature "A" centralised, as depicted.

The action of the tension spring was assisted by making the armature engaging end slide in a slot, provided by bending over and soldering a short piece of tin to the armature, as shown.

The other end of the spring "S," which by the way, was broken off an old clock spring, is freely bent round a 6BA screw, this being accomplished by heating. To the tip of the bearing screw is made a blob of solder to keep the spring in position.

The contact bank comprises a few pieces of ebonite and a simple nickel contact assembly obtained from old parts from the junk box, two of these contacts being fitted with a buffer of ebonite. This combination gives a forward "make," and a back" contact.

The practical wiring diagram gives in schematic form the coil relationship, and from this it will be seen that the coils are series connected, L1 to L4 and L2 to L3. When, as the armature is drawn over, the centre is passed (see the inset diagram) the spring accelerates the action and keeps the armature over both ways.—S. L. WURZE (Walthamstow).

A Dustproof Condenser Cover

A neat dustproof cover for small condensers can be constructed from an old potentiometer case. Remove the element from the potentiometer, and build a variable condenser in its position; any number of vanes are used, according to the capacity desired. Two of the three terminals are used for wiring, while the third, which is not used, can be removed, and the hole plugged.

The centre spindle is passed through the centre hole of the potentiometer case and a knob attached to it. The back is then placed in position after slots have been made for the recessing of the terminals.—A. C. FRIMMALL (Tring).

A Bicycle Aerial

THE accompanying sketches give details of a bicycle aerial which I have made and used with success. I am using with this aerial a two-valve set S.G. det., transformer coupling and pentode output. For H.T. I am using 4 9v. G.B. batteries and a small 2v, accumulator for L.T.

I find this aerial gives quite good headphone strength on the local station up to a distance of 15 miles (while riding). Beyond this distance a throw-out aerial must be used while the bicycle is stationary; or if one should be in the vicinity of overhead telephone wires, by using the aerial on the bicycle and stopping the machine as near as possible beneath these wires excellent results can be obtained. Constructional details and method of fitting the aerial to the bicycle are clearly shown in the illustrations. —J. H. JORDAN (Belfast).
It is clear from the number of requests received by the Editor of this journal for constructional details of a "simple car-radio receiver" that many readers do not appreciate the difficulties which confront the designer of a car receiver suitable for home construction. Even when car-radio sets are to be produced in a well-equipped factory by modern "quantity-production" methods innumerable difficulties are encountered; these difficulties are multiplied both numerically and quantitatively when the design is intended for the amateur.

The preceding paragraph is not intended as a "wet blanket," but it is better that the constructor should be aware of the troubles that he would encounter than that he should proceed in ignorance. In the latter case disappointment would result, whilst not a little money might have been spent to no good purpose.

Exemplary Compactness

An average commercially-produced car-radio receiver has over-all measurements of about 8in. by 7in. by 6in., or the dimensions give an approximately similar volume. If you take a piece of card and bend it to form two sides of an imaginary rectangular container of the size given you will at once be struck by the small amount of space in which the components must be mounted. Place within the space allowed the smallest loudspeaker on which you can lay your hands, and then drop in a two-gang condenser (a three-gang unit is often a necessity in practice), and then stand five valves upright on the flat base. If you have been able to get all of those parts into the permissible volume you have not done badly. But now find space for a couple of I.F. transformers, two coils and an L.F. transformer—if you can!

If you make this simple experiment it will be clear that real midget components are essential. Great difficulty will probably be found in buying many parts which are small enough, and it should be borne in mind that midget valves are practically out of the question, because very rigid I.F. valves are needed to withstand the vibration to which the set will be subjected, and for operation from the car battery—6 or 12 volt.

The argument might be raised: "Why not use a three- or four-valve straight circuit, and simplify the set in every possible manner?" The reply is that such a receiver will not generally prove adequate for your needs. It must be remembered that none of us is satisfied with indifferent reproduction now; we want quality at least closely approaching that given by the average domestic receiver. Also bear in mind that the car aerial can only be a comparatively inefficient affair at best, and that it will be badly screened during a large part of the time that the car is on the road.

Make This Test

If you are not convinced that the difficulties are as bad as I have outlined, fit an aerial to the car—over the roof, under the running board or in V-shape under the chassis—connect it to the domestic set, which can be carried on the rear seat, and make a few simple tests. First, however, connect the earth terminal to a chassis bolt by means of a stout stranded cable. With the car outside the house and as clear of buildings as possible, tune in the local station. Set the volume control to about its midway position, and then drive the car into the garage. Again switch on the set, without altering the controls and note the change in signal strength unless the receiver has an efficient A.V.C. system even the local transmitter will probably be almost inaudible.

Next go out in the car and make tests of signal strength on the open road, when under a bridge, when the car is parked in a city street and when it is under some trees. This will give an idea of the extremely wide range of A.V.C. which is required if reception is to be worth while. Incidentally, it is suggested that all these tests be made when the engine is switched off, since reception will be impossible at other times unless ignition suppressors are fitted. It will also be appreciated that the volume level needs to be at least twice as great when the car is being driven as when it is stationary if reproduction is to be heard comfortably above the noise of even a quietly-running car.

It Can Be Done

If you make the tests which have been outlined, do not be discouraged into thinking that the whole business is just impossible. It is not—but it is well to be forewarned of the problems which have to be solved. There is no doubt that they can be solved,
EIVER PROBLEMS

analyses the Question of Car-radio and Sets Out<br>
Disses Which Have to be<br>
Satisfactory Answer Reached

for this is fully proved by the excellent results to be obtained from most of the ready-made car-radio receivers on the market. They have also been solved by several constructor-experimenters, but in most cases it has been necessary to dispose of them in turn by a meticulous process of elimination. Not only is it possible to ensure such good A.V.C. action that signal strength does not vary to a very marked degree in the circumstances of the tests above suggested, but it is possible to obtain interference-free reception by the use of a minimum of suppressors on the car. When using almost any commercial car-radio set it is necessary to fit only a resistor suppressor in the main H.T. lead to the ignition distributor and a condenser across the contact-breaker. This result is achieved by the liberal use of small rejector inductances in the leads within the set; they are mainly in the power-supply circuits. Nevertheless, many readers might wish to fit suppressors in the sparking plug leads as well, for the ignition equipment of any car can cause interference with short-wave and television receivers. That particular matter is, however, beside the point of this article.

So far I am afraid that my criticisms have been more destructive than constructive. Let us look at the other side of the picture. Given a five-valve superhet—preferably with pre-frequency-changer H.F. stage—it is possible to obtain excellent reception and to have a sufficient measure of A.V.C. High-tension can be obtained from a self-rectifying vibrator unit, which is not very expensive and is fairly compact. Low-tension supply may be drawn directly from the car battery if 6.3-volt or 13-volt valves are used, according to the voltage of the car battery; and these indirectly-heated valves have a high efficiency. If the best possible aerial system is employed, signal pick-up is satisfactorily good, but it is desirable to use single-screened co-axial cable for the lead-in. Ordinary screened cable has far too high a self-capacity, even in a four- or five-foot length, and will "waste" a large percentage of the pick-up. An under-running-board aerial is more effective than

will probably be necessary to have the controls placed directly on the receiver; if this is mounted under the dash on the offside, the controls will not usually be very difficult of access. The second unit can be on the other side, and the two units can be joined together by means of ordinary screened twin leads, the screening of which should be earth bonded. There is another possibility by using this form of construction, which is that the vibrator-type power unit can be replaced by an H.T. battery if desired; in that case the battery-speaker unit could be placed almost anywhere in the car, since long leads would not present any great difficulty. Unfortunately, the average constructor will not take easily to the idea of using a dry battery when it is possible to dispense with it.

Manufacturers, Please! Push-button tuning is in many respects more logical for a car receiver, since the driver must not look away from the road to the tuning control. The constructor is up against the snag in this respect that—as far as I am aware—there is not on the market a sufficiently small mechanically-operated push-button tuning condenser. If there were one of the cam-operated pattern many of our troubles would be overcome at once. Will any manufacturer take the hint or will makers say that the demand would not justify the production? In this respect they should bear in mind that homemade construction is still very active, and constructors as keen as ever. They should also appreciate that the condenser would be used for domestic as well as car-radio receivers—and it would be a very popular component.

Well, that is the position as I see it, and I am not speaking without experience of the building of car-radio receivers and the extended use and test of various commercial models, the designers of which merit high praise. Readers will probably wish to give their views and to make practical suggestions; in the meantime they can rest assured that the Technical Staff of Practical and Amateur Wireless is fully alive to their wishes and is constantly making experiments that might lead to the creation of a real home-constructed car radio. But the Editor would not agree to the publication of a design that had not been proved, and which could not be successfully followed by a large percentage of readers.

In this Ferranti receiver the speaker is in a separate unit.
AN INTERESTING CONVERSION

This Article Describes How an Old Writing Bureau was Cheaply Converted into a Useful Apparatus Desk

Record Cabinet
A small selection of the most useful records for both test and amusement is filed under the gramophone turntable in section "Bl," each record being separated by plywood partitions thoroughly sandpapered down and coated with varnish to a smooth and glossy finish, thus giving a cheap but reasonable degree of protection to the records when constantly sliding these in and out.

The bottom drawer of the desk is considerably deeper, and good use was made of this by allocating it to the dry batteries for the short-wave and the remote control scheme.

A commercial broadcast receiver covering the medium and long-wave bands only is used separately, thus the whole of the desk conversion could be given to the experimental side. It was realised, however, that a separate cone type, or perhaps this should be designated as a moving-iron type, speaker would be a desirable consideration from the short-wave aspect, and the "A" section was kept free for a cabinet speaker of this sort.

Reproduction from the L.F. amplifier can be relayed by the broadcast receiver speaker through the medium of a switch, this switching arrangement also taking into consideration the reproduction of strong signals of entertainment value from the short-wave receiver.

Wave-change switching in the short-wave is carried out by the rotary coil unit principle, thus overcoming the difficulty arising normally in housing the chassis in this manner and so preventing access to the coils when of the plug-in type.

Illumination
A "strip" illuminator was constructed out of aluminium, and fitted to the top of the desk, and although only three 4-volt bulbs are used, supplied from a spare secondary of a mains transformer, this provides quite satisfactory lighting.

(Continued on facing page)
AN INTERESTING CONVERSION

PRACTICAL AND AMATEUR WIRELESS

WHAT IS A TETRODE?

The Characteristics of this Useful Addition to the Range of Modern Valves are Briefly Explained in this Article by PERCY RAY

THE tetrode is undoubtedly a useful contribution to the range of valve types available, but it is, after all, a modified pentode, and it is doubtful if its advantages and limitations are really understood by the average constructor; furthermore, there is the word "tetrode" in the minds of those who follow the science in a casual way.

The word "tetrode" unquestionably means four electrodes, and, therefore, must include the screen-grid H.F. valve, the four-electrode intermediate L.F. amplifier (a type more or less unknown in this country), the bi-grid valve used some ten years ago as a mixer in superhetodynes, the space charge valve—which has an extra grid—positively charged to enable it to work on an H.F. voltage of 10 volts or so—and the modern output valve. Although the derivation of the word "tetrode" must include the types mentioned above, in practice it is intended to refer to a type only of ordinary screen-grid H.F. amplifier, and the modern output tetrode. It is curious that a valve should date back so far, fall into disuse, and then reappear for a purpose so utterly different from that in which it originally served.

The Screen-grid Valve

The H.F. tetrode, or as it is colloquially called, the screen-grid valve, was introduced into the world of radio because of the shortcomings of the triode, and when news of its existence became generally known, it was thought to be a valve that would cure all existing ills. Its greatest snare, however, was the nasty dip in its characteristic curve which made it impossible for the valve to handle any appreciable amount of H.F. swing, and made it necessary for the circuit designer to provide the anode with projections, and by suitably designing the tetrode, and providing the anode with projections, and providing the output and other electrodes, a tetrode of sensibly linear characteristics could be produced. The large spacing between the anode and nearest electrode is important, resulting in lower capacity between anode and other electrodes, as already described.

Third Harmonic Distortion

Tetrodes may be considered as similar to equivalent pentodes, inasmuch as their order of sensitivity is the same, the anode load impedance, and the H.F. and L.F. plate ratings were in many cases identical. These facts make tetrodes and pentodes interchangeable, so that the choice of one set of direct connections for the experiment. Like the pentode, the tetrode is troubled more with third harmonic than second harmonic, and when used with the correct modulating system, the second harmonic distortion is sensibly absent in some types now available, whereas neither has any great advantage over the other from the point of view of third harmonic distortion, although the tetrode is more tolerant towards an incorrect load than the average pentode.
Following British Methods

When the service of high-definition television started in this country two and a half years ago, at every exhibition where receivers were shown in operation crowds of unprecedented size had to be handled. Everyone was anxious to see what results could be achieved through the medium of this newest of inventions, and in spite of the relatively low quality of the programme material the comments on the results were most flattering. The latest news from America shows that exactly the same sort of thing is happening in that country. At the World’s Fair in Flushing Meadows, and at all the show rooms, people flocked in hundreds at all hours of the day to see television pictures. Press stories have explained beforehand in simple language how the systems worked, but this is the first opportunity given to the American to see the results. The quality of reproduction is inferior to that now enjoyed in this country, but although set prices are fixed at a high level, strenuous efforts are being made to boost sales. The biggest problem that the industry is now brought face to face with, is how television can be adapted to their own sponsored programme system. Already opinions are being expressed to the British method of entertainment without advertising may be the best, after all, but it is doubtful whether the U.S. government will be prepared to finance such a scheme.

In the meantime, however, the manufacturers are bearing the brunt of the costs on both the technical and programme sides because of the publicity furnished by the Fair, but before long these service problems will have to be settled on a commercial basis.

Under-water Television

The recent submarine tragedy where nearly a hundred men lost their lives in the ill-fated Thetis, has served to bring to light once more the suggestions made some years ago by a continental inventor named Hartmann for using television transmission equipment under water. This idea was put forward when low-definition disc scanning apparatus was the only satisfactory method then available for producing television pictures, but with the modern electron camera in one of the many forms now developed to such an advanced stage, it may not be too much to hope that the scheme may be resuscitated with a greater chance of success. As far as the original suggestion was concerned, the accompanying photograph gives a good idea of what was in the mind of the inventor. A thick walled spherical metal container was used to accommodate the transmitting camera, here shown as a disc and photo-electric cell. Self-contained lighting provided sufficient illumination for picture signals to be generated in the cockpit of the lens used with the apparatus. After amplification, these signals were fed to a monitor receiver accommodated in a boat connected by cable to the underwater camera. Small propellers enabled the apparatus to be raised or lowered so that a satisfactory exploration of the underwater scope could be effected. Assuming now that the simple mechanical scanning device could be replaced by a sensitive television camera remotely controlled from the ship above, there is no reason why such apparatus could not be rushed to any point where underwater observations may be the means of saving life. The same apparatus could, of course, be used to provide pictures of the ocean floor where a scientific investigation of water life was being carried out.

Television and the Telephone Cable

It was made known recently that the engineering staff of the National Broadcasting Co. of America have been carrying out a series of experiments for the relaying of television signals over an ordinary telephone line, instead of using a coaxial cable. The tests were carried out over a distance of one mile in connection with a special outside transmission, and the results were stated to be quite satisfactory, due to the employment of special amplifiers. This work has been undertaken because of the high cost of coaxial cable—$1,000 per mile—but the Americans seem to have lost sight of the fact that quite regularly in this country the B.B.C. have made recourse to telephone lines for relaying television signals from points outside the coastal ring with which is laid round the South of England. Ashbridge recently drew attention to the extension of range provided by the use of ordinary Post Office telephone cables, as a result of a very careful equalisation of the frequency characteristics, telephone cables, in pairs, can be employed most successfully for handling vision signals up to distances of the order of four miles. Under these circumstances it is essential to employ specially-designed terminations. Two two intermediate line repeaters with equalisers installed at Post Office exchanges along the route. The lines travel, however, are in no way interfered with, and it was made known over a year ago that distribution schemes of a similar character were being developed in Germany for use within the Berlin area.

Televising in Box ing

It is generally conceded that the event which marked a milestone in big screen presentation was the televising of the Boon-Danahar boxing match in February. It raised the rediffusion of pictures to a big scale, and the portrayal on large screens of a size never attempted before. Now the news has come through from America that a Baird big-screen projection receiver was erected in a cinema for private exhibition, and the whole of the Baer-Nova fight was shown to the enthusiastic audience. The results were claimed to be as clear as those observed in this country, and represent a British engineering triumph of no mean magnitude. American experts are amazed at the clarity of the picture, and it is certain that both home and cinema television will develop together in that country instead of the former having a substantial lead as was the case in England due to the early start of the B.B.C. service for home-viewing.

Seeking Co-operation

Mr. Cock, the B.B.C. Director of Television has now returned from his visit to America, and one result of his trip is said to be the establishment of a basis where ideas for television programmes and scripts would be exchanged with America. He has gone a long way towards removing the antagonism shown by the film industry to television’s development in that country. As far as the B.B.C. service is concerned it is now suggested that a film half-hour may be introduced, the object being to deal with film releases by showing special trailers which portray the high-light in the films themselves. This idea is certainly an admirable one and was put forward as a constructive suggestion. In these columns several months ago as a contribution to a way out of the impasse then existing between film and television interests. The occasional renewal of their classic would also do no harm, especially if the members who regularly look in at home are only a fraction of the total who pay a weekly visit to the local for their entertainment. A little give-and-take on both sides would remove immediately the misunderstanding which seems to exist, on both sides would remove immediately the misunderstanding which seems to exist, on both sides.

An early suggestion for an under-water television camera.
PRACTICAL AND AMATEUR WIRELESS

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The Derby in Retrospect

NOW that the natural excitement associated with televisioning of the Derby is over it is opportune to examine the results in a dispassionate manner. Not only were the results watched by an estimated audience of 100,000 on home screens, but there were also five demonstrations of big screen equipment. In the case of the E.M.I. company, a private view of their new projection type cathode-ray tube apparatus was given in their Hayes laboratories. The equipment, built in compact form, gave a front projection picture, the receiver being situated about 40ft. in front of the screen and using a 14in. wide aperture lens. The projected straight on to a screen was 15ft. by 12ft., but the cinema industry is reserving its final judgment until it is seen operating in a modern cinema under normal conditions. The Scophony mechanical system was seen in the Odeon Cinema at Leicester Square. The apparatus was being back projected on to a somewhat directional screen slightly less than 15ft. wide. The results showed an improvement on the 6ft. by 6ft. picture which had been used for all previous demonstrations. Three cinemas featured the Baird equipment, for in addition to the Tatler and Marble Arch Pavilion, the New Victoria Cinema, had an entirely new receiver installed. In each of the three cinemas, however, the latest form of projection tube, giving a material increase in brightness and employing fluorescent screens from which the picture is projected straight on to the remote screen, was used. The reaction of the cinema audience to the transmission gave evidence of their satisfaction, but in one or two points the B.B.C. made mistakes. In the case of the sound commentary, it was wrong to give both the television and ordinary broadcasts on the vision sound channel, for this caused repetition — the horse numbering was heard two or three times — while some of the remarks contradicted one another. Then again, in the long shot of the start of the race, when a 20in. telephoto lens was employed, the picture was exceedingly poor and had a double image which spoiled the whole effect. It was kept on far too long and emphasised how great an improvement could have been effected if the two O.B. units had been in commission, one at the start and one at the finish of the race. To attempt to cover the whole of the race from one camera position was too ambitious, but apart from the extreme long shots the film produced was of another. The P.M.G. asked the promoters to present him with a memoranda of their case, and although, at first, it was thought that there would be a joint trade opposition to the rediffusion of television to cinemas, the reports of subsequent conferences indicate that there is a cleavage of opinion. It is said that the C.E.A. want the K.R.S. to ban the televising of films, but at the same time they are prepared to encourage the introduction of large screens into cinemas for the portrayal of outstanding news events. It will be recalled, however, that both Odeon and Gaumont British, who are prominent members, are making a big effort to equip cinemas as fast as possible. There is no doubt that the industry is unanimous on one point, however, and that is a measure of protection against exorbitant charges being made by the promoters of those events which lend themselves so admirably to rediffusion. Lord Oadman’s television report to the P.M.G., which is expected shortly, is said to recommend that the entire control of television, including the fees to be paid by cinemas, shall remain vested in the B.B.C. It is also expected to state that the price to be paid for a televised event shall not be dictated by the promoter, and that there shall be no monopoly given to one particular circuit to the detriment of another. There is no doubt that these promising innovations, if adopted, will do much to remove the uncertainty which has hitherto existed in the trade.

Output Intensification

CONTINUED efforts are being made to intensify the output provided by a cathode-ray tube used for television reception, and one of the most recent proposals is that the tube should become a form of relay. For this purpose a double screen would be employed, this being built up from a group of quartz rods arranged side by side and held together by a suitable binding material. At one end provided by the rod faces, a coating of fluorescent material would be applied, and at the other a light-sensitive material so that the combined effect is a mosaic screen. In use the light image produced on the fluorescent face by the impact of the modulated electron beam would be conveyed to the mosaic image by internal reflection inside the individual quartz rods. In this way it is claimed that the usual dispersion losses would be reduced very considerably.

A Constructive Suggestion

The financial and copyright problems associated with the rediffusion of television pictures to those cinemas having big screen apparatus installed are at the moment fairly considerable and have proved the subject of considerable discussion among the various trade interests involved. In an attempt to solve these problems in an equitable basis a definite proposal has now been put forward to the B.B.C. by Mr. Deutsch of the Odeon Company. On rather broad lines it is to the effect that the B.B.C. itself should undertake all the negotiations which are involved. This would result in the promoters of any event to be televised being paid a comprehensive and adequate fee which would cover not only the ordinary broadcast rights but also rediffusion to cinemas. When this has been settled the B.B.C. would then make a charge to each cinema desiring to show the pictures to their patrons, and as the number of cinemas scheduled to have equipment installed is rising, it is anticipated that there would be sufficient profit to the Corporation to enable them to increase the surplus towards making improvements in their O.B. equipment. There seems little doubt that, an extra amount by internal nature would be preferable to the one now in existence where the rediffusion rights and copyright are vested in two separate authorities. How far this will go towards bringing about a satisfactory solution only time will tell.
Remote-control Tuning

ARRANGEMENTS are already known for the remote control or push-button control of the tuning device of a receiving set with respect to one or several pre-determined positions. In this known arrangement a switch corresponding with the pre-determined position is connected in series with a sliding contact moving on a surface consisting of two parts for right-hand and left-hand rotation, with the winding of the motor coupled to the tuning device and with a current supply.

The principle of this arrangement is shown in Fig. 1. The contact surface consists of the two part surfaces F1 and F2, firmly connected with each other but provided with a break, and the sliding contact K slides on this contact surface. The switch S provided at the control point and a D.C. potential supply Q are connected in series with the sliding contact. The free pole of the potential supply is connected through the winding W1 of a motor with the contact surface F1 and through the winding W2 of the same motor with the contact surface F2. The windings are arranged within the motor so that when current passes through one winding the motor rotates in left-hand direction, and when current passes through the other winding the motor rotates in right-hand direction. The motor is coupled with the device to be adjusted, for instance with the tuning condenser of the receiving set to be adjusted, for instance with the tuning condenser of the receiving set to be adjusted, for instance with the tuning condenser of the receiving set to be adjusted.

Constructional Details

The details of the construction of the break in this known arrangement is shown in Fig. 2, which describes the arrangement in a run-in condition in which the contact K is at the break. The ends of the two contact surfaces F1 and F2 are kept together by an insulation piece J, which also fills the break itself. The effective width of the sliding contacts in this arrangement must be considerably smaller than the width of the break, if hunting is to be avoided, whereby the accuracy of adjustment becomes limited. The width of the range of possible positions in which the motor is without current and the arrangement can therefore remain at rest, is equal to the difference of the width of the break and the effective width of the sliding contact. It is in this case not possible to make the width of the contact even by a very small amount smaller than the width of the break, as in such case, apart from errors in manufacture, owing to the fly-wheel mass of the whole device the contact would continue to move after leaving the surface F1 until it makes contact with the surface F2, whereby its direction would be reversed, resulting in a continuous pendulum movement.

In accordance with the present suggestion, for the purpose of increasing the accuracy of adjustment, the sliding contact and the break between the two parts of the contact surface are so designed that when the sliding contact reaches the desired position it is in electric connection with both halves of the contact surface. At the same time a relay device or a time-switch are provided which, when the current is interrupted in the moment of time when the desired position has been reached, very intense current is taken from the current supply, which is, however, soon interrupted by the relay device or the relay switch so that no permanent harmful short-circuit current can occur.

One way of carrying out the idea is shown in Figs. 3 and 4. The circuit of Fig. 3 as compared with that of Fig. 1 is different in so far that a relay is provided between the potential supply Q and the connection point of the two motor windings W1 and W2. This acts upon the switch S in such a sense that it opens the closed switch S as soon as the current flowing through the relay winding exceeds considerably the value existing during the adjustment. When the adjustment has been reached, or shortly afterwards. In particular, the contact surface should have a groove at the break, and the point of the sliding contact should be so radiused that practically only in a single position of the contact surface with respect to the sliding contact this is in electric connection with both halves of the contact surface. The advantage of the idea consists in the fact that the end position at which the motor

Fig. 1.—Diagram illustrating the principle of a remote-control button system of tuning.

Fig. 2—Details of the break and contacts.

Fig. 3.—A similar arrangement to that shown in Fig. 1, but with the addition of a relay and limiting resistance.

Fig. 5.—A remote-control system using a motor with a single winding.

Fig. 6.—Showing the arrangement of contact surfaces to provide for a smoother swinging-in of the contact.

An Arrangement for the Remote Control or Push-button Control of an Adjusting Device, Particularly of the Tuning Device of a High-frequency Set
The motor is without current. A short-contact makes contact with the two surfaces to be switched in compulsorily whereupon switch S is operated, the switch S' has also and the variable condenser C. is coupled with the spindle of the motor M as half rings and arranged on a roller which resistance R2 to the contact surface F2. The free pole of the potential winding of the relay R to the contact with a limiting resistance R1 and with the variables Q1 and Q2 connected in series. The short circuit current, which is much larger than the current during the adjustment movement of the contact S and the contact S', so that no permanent short-circuit current can flow. In order to avoid any loss of output, chokes may be connected instead of the ohmic resistances R1 and R2.

It is furthermore possible to connect another switch S' to the switch Q, which is firmly coupled with the switch S'. In this case the relay has only to operate the switches S' and S", and the switch S may remain in the switched in position when the adjustment is completed.

In order to obtain a smoother swinging in of the contact into its final position the contact surfaces may be so constructed that the part of the surfaces nearer the break are 'connected with the more remote parts through such resistances. The adjusting movement of the motor is reduced the sliding contact approaches the break. A design of this kind is shown in Fig. 6. Two metal bands, F1 and F2, running over drums T1 and T2 and connected by insulating pieces to an endless band, are provided as contact surfaces. Near the break two short paths F1 and F2 are separated from the contact surfaces F1 and F2 and are connected with them only through strips B1 and B2 consisting of resistance material.

Motor-operated Relay

Under certain circumstances the separate relay arrangement may be replaced by the motor itself. An example of such an arrangement is given for a wireless receiver with push-button control. The arrangement of the contact surfaces of the sliding contacts may be that of Fig. 6. The switch S1 is shown by the pin P of the push-button D1 as well as by the leg H1, fitted at the insulating plate P. The pin is taken through the metal plate B and pressed with its point, when the push-button is pressed in, through a recess of the plate P on to the contact leg H. This contact the motor M whose rotor begins to rotate in a certain direction. As the rotor of the motor has no fixed bearings the stator attempts to rotate in opposite direction and pulls therefore the plate P through a good N against the force of a spring F towards the left-hand side in such a way that the push-button D1 is maintained in its pressed-in position. This limits also the rotating movement of the stator. The rotor of the motor operates through a cable gear the disc F, whose spindle is coupled directly with the spindles of the tuning condenser, which is not shown in the drawing. The knob G makes it possible to adjust by hand if required. The pointer Z is moved parallel to itself in front of the scale of the receiver.

As soon as the final position has been reached and the rotor comes to rest, the torque upon the stator ceases also and the blocking plate P is pulled back by the spring F into its position of rest in which the knob D2 is released back into its position of rest. The same plate may also be used for blocking further push buttons which belong to other stations to be tuned in and of which only one more, namely D3, is shown in the drawing. Furthermore, a fuse may be provided in series with the potential supply and the motor winding which fuse may prevent a continuous short circuit current through the motor windings and thus the burning out of these windings if the unblocking arrangement should fail.

It is also possible to provide a separate two-part contact surface for each of the pre-determined positions, and an example is given in Fig. 8, with regard to a remote control arrangement for an aircraft transmitter. The circuit is in principle similar to the circuit according to Fig. 3, with the exception that several contact surfaces are connected in parallel and that a corresponding number of series connections of sliding contacts and plug switches are also connected in parallel. In the complete circuit, a single return lead to the potential supply via a time switch S, which is so constructed that it is closed only when one of the push switches S1, S2 is operated and which is automatically opened again after a certain lapse of time which is in any case sufficient to adjust on the value desired. The windings which have such values or additional resistances (ohmic resistances or chokes) and must be connected into the lead so that the short circuit currents flowing for a short period can do no harm. It is, of course, also possible to provide for a relay arrangement acting immediately when the desired position has been reached, instead of the time switch.

The return leads may, of course, be combined into a single return lead. The time switch or the relay arrangement may be replaced by a switch present at the point of operation and to be opened by the hand directly.

This development has arisen in the laboratories of Telefunken Gesellschaft für drahtlose Telegraphie m.b.H., of Berlin.

Fig. 7.—Diagram illustrating the principle of a motor-operated relay.

Fig. 8.—A remote-control system for an aircraft transmitter.
The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

A Tuning Fault

SIR,—I was interested in reading the letter from Mr. R. W. Lyne in your issue dated June 10th, in which it was stated that the receiver was silent when tuned to London Regional only.

There are three possibilities which come to mind—but, of course, I am not offering any as an explanation in this instance.

1. Is there anything in the aerial circuit which acts as a wave-trap tuned to London Regional?
2. Is there any component or circuit between the aerial and the detector tuned circuit which acts as a filter of the natural wavelength of London Regional?
3. Is there any component or circuit after the detector which resonates at the frequency of London Regional, or which has a natural wavelength corresponding to London Regional only.

I submit my log of DX hams heard on 14 mc/s, 'phone and CW, between May 14 and June 14.

A Prizewinner's Thanks: Amateur Transmitting

SIR,—I wish to thank you for publishing my article on Amateur Transmitting—M. S. Crotenthal (Folkestone).

[We hope to publish further articles on Amateur Transmitting from time to time, and another contribution to this series appears in the present issue.—Ed.]

A 14 Mc/s Log from Bournemouth

SIR,—I wish to thank you for publishing my letter concerning station YM4AZ. I submit my log of DX hams heard on 14 mc/s, "phone and CW, between May 10th and June 8th, 1939.

CE5AT, CO6BC, CR7AU, C2XCO, FR9AH, E3CI, HIEN, K9EF, K4PV, K3AF, K5NYD, K1AF, C8, HS, LR3K, 7EH, EF, LO1UGA, 4BH, PK1LK, MG, KG, BI, VY, 3WI, 4FS, HS, HW, KS, PY1FX, GJ, 2BH, DA, GC, HV, MI, 4CB, CT, 5AJ, AQ, UO0BC, V8L2G4U, AJU, 5BM, XG, 4CW, EI, PF, 8D, V3PO, G7Z, 6LN, MR, MY, YB, 9R, VQ2BI, CM, 5HP, 4CRE, V8TRA, VE2FA, HS, LI, WOPAE, GRHL, KYD, YV1AP, AQ, GABY, AK, ZBB, Z2OREL, ZE1JN, ZL2ZW, GY, ZB2I, SQ, 6DY, M1BB, ZA0L, K5Z0, Z5Z0, W02V, 0-2, with phones, and the antenna is an inverted L in the roof.—PAUL W. GIFFORD (Bourne-mouth).

EXCHANGING QSL CARDS

SIR,—I saw in a recent issue of your paper an offer to exchange S.W.L. or B.R.S. or "A.A." cards. I would be pleased to acknowledge any cards by return post. Every success to your very fine paper.—CHARLES W. HARRIS (31, Bolingbroke Road, North Shields, Northumberland).

SIR,—I have been reading your fine paper with great interest, and find it very interesting. I would be very pleased to exchange my S.W.L. card, and correspond with any S.W. enthusiast.—R. JALEY (W3 reproductions, Warclaw Road, Bearsden, Dunbartonshire).

SIR,—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for over two years, and find your articles very interesting, especially the short-wave section, in which I have found much to help me in my experiments, as I am a keen short-wave listener. I found the article "Mastering the Morse Code" in your issue No. 348, very helpful, as I am soon going up for my Morse test for a Licence. I would be glad to exchange my QSL card with any A.A. 'Ham,' full ticket "Ham," or any short-wave listener station anywhere.

Sending Comes off Smoothly

SIR,—I wish to report a sending comes off smoothly. I have been sending S.B.S. together with the London Regional programme. The London Regional programme has a standard 1-amp. coupling condenser. The S.B.S. programme has a very small coupling condenser. This is due to the fact that the S.B.S. programme is much lower frequency than the London Regional programme. I have been using a valve oscillator and 2 tubes in cascade. The transmitter was tuned to London Regional only.

PRACTICAL AND AMATEUR WIRELESS is still as interesting as ever, and I particularly enjoy reading the present articles.—D'ARCY FORD (Exeter).

A Contribution to Amateurs"

SIR,—I am a member of the WIRELESS club of the University of London, and I would like to submit a contribution to this series. The club has a large number of members, and we are always looking for material for our monthly magazine. The club members are interested in all aspects of Wireless, but we are particularly interested in the practical side. We would like to submit a contribution to this series, and we would be grateful if you would consider it.

PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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Who can care to send theirs.—DENNIS G. GALEUS (135, Hersey Street, Ipswich, Suffolk).

A 20 M. Log from Northumberland

SIR,—Being a newcomer to PRACTICAL AND AMATEUR WIRELESS I consider it a fine weekly, and I look forward very much to every copy.

After seeing some fine logs, I felt I would like to submit mine. Although conditions have not been so good this last week, here is a log for 20 mc/s (full report to 11th).

YV1AQ, YV1ABQ, YV5AB, YV5AB, PY1AFF, PY4AFF, PY1AT, PY1B, KF4AF, KF4CK, CE3BK, CE3DW, CE3AA, CE3IT, LU3HK, VP7NS, VP8FO, CN8NH, CO2BG, CO2KH, CO2XG, OH1(10), OH2(12), OH5NW, SP1RP, SP2PH.

The usual amount of locals and Americans were logged, but predominant in my logbook these last few days seemed to be Italian "Hams."—A. T. BROWN (Gosforth, Northumberland).

NEWS AND NOTES

Paris Fair

IN this year's Paris Fair Radio Salon it would seem that television has been featured only for publicity purposes. Although it is agreed that the results represent a technical advance on what has been shown before, the programme material has not been chosen with the idea of stimulating the sales of home receivers. Looking ahead, however, and with the idea of promoting efforts on the technical side, the Societe des Electriques is arranging for a series of papers on the subject of television to be presented in Paris in November during the Paris Fair. An invitation has been extended to English engineers to take part in the discussions, and by a healthy interchange of ideas it is hoped to progress the science to the mutual benefit of all concerned.

Olympic Games Television

WHEN the Olympic Games were last held in Berlin the Reichspost Zentralamt made very elaborate arrangements for televising the most important events. Two forms of electron camera were used, together with an intermediate film scanner which was accommodated in an outside broadcast van. The pictures were received in specially designed rooms in Berlin where the public were admitted free of charge. One large screen was used, but in all other cases sets of a domestic type were employed. On many occasions the weather conditions were adverse, and when this occurred the pictures provided by the intermediate film scanner gave very superior results to those transmitted by either of the electron cameras, the normal contrast range with adequate detail being far surpassed. At the Olympic Games in Berlin in 1939 both the Olympic Games and the Olympic Games of the Empire were to be held at Helsinki, in Finland, and it is learned that German television apparatus is to be installed in the principal sports arenas. In addition to reception on home type set arrangements are being made for retransmission on big screens in cinemas.

WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA

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LATEST PATENT NEWS

Abstracts Published.

DIRECTIVE WIRELESS SIGNALLING.—Lorenz Akt.-Ges., C. No. 500624.

Relates to spaced aerial systems of the Adcock type, particularly for short waves where the size of the aerial is of the order of the working wavelength. In this case the variable condenser, such as C, Fig. 1, inserted to balance the earth and aerial currents induced by horizontally-polarised waves is no longer fully effective, since the aerial reactance is then predominantly capacitive. It is accordingly supplemented by (a) a resistance R and (b) by the inductance of the coil L which couples the aerial A to the shielded feed-line. The coil L may be divided into two parts, these being arranged either in shunt or in series with the resistance R.

WIRELESS RECEIVING-SETS ; DESKS.

—Schwarwald, A. No. 500762.

A programme holder for a wireless receiving-set is accommodated when not in use alongside one of the external walls of the receiver cabinet and is brought into use by moving it so as to project from the cabinet. In Fig. 2 the programme is supported by the plate 7 hinged to the front of the cabinet. In Fig. 4 the supporting plate 18 can be slid out of the drawer-like space 17 and swung downwards into a sloping position about the hinge 19. In any of the modifications described the programme may be illuminated by a lamp which is switched on automatically by the movement of the supporting plate.

TELEVISION.


TELEVISION—

Specifications Published.

506063.—Kinross, R. L.—Aerial systems and circuits for use with such systems for wireless reception.

506072.—Triggell, E. de Haen Akt.-Ges., J. D.—Method of applying carbon layers in television tubes. (Convention date not granted.)


506211.—Kolster-Brandes, Ltd., and Smyth, C. N.—Synchronising systems for television, etc. May 25th.


506279.—Phillips Lamps, Ltd.—Electrolytic condensers. May 20th.

506306.—Phillips Lamps, Ltd.—Superheterodyne radio receivers with pre-set tuning. May 26th.

506332.—Phillips Lamps, Ltd.—Super-electrolyte radio receivers. May 31st.

506341.—Rediffusion, Ltd., and Adorjan, P.—Electrical-communication systems. May 29th.

NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. 6d. weekly (annual subscription £2 10s.).

LATEST PATENT NEWS

Group Abridgements can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued or in payment of a subscription of 3s. per Group Volume or in sound volumes price 2s. each.

A blocking-oscillator valve 15, Fig. 5, is connected directly to the detector 11 of a receiver that the synchronising signals are separated from the picture signals, which modulate the carrier in the opposite direction. So the "square on" view will be obtainable from a point opposite the Royal Box. In previous years one camera, used for occasional "square on" shots, has been left unattended, but this year all the cameras will be manned and will be brought frequently into circuit with rapid changes of lenses. Television from Wimbledon will begin on July 1st, and as the all-important Finals Week proceeds, more and more play will be televised. On the last two days, July 7th and 8th, cameras will be in continuous operation from 2.30 to 5 p.m. The finals to be televised will include the men’s and ladies’ singles and the men’s doubles.

TELEVISION FEATURES

WIMBLEDON TENNIS TOURNAMENT

Wimbledon camera positions should give even better television pictures from the centre court at Wimbledon this year than in 1938 and 1939. Formerly the "shots" have been made from an oblique angle, but this year all the cameras will be "square on" view will be obtainable from a point opposite the Royal Box. In previous years one camera, used for occasional "square on" shots, has been left unattended, but this year all the cameras will be manned and will be brought frequently into circuit with rapid changes of lenses.

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PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM.

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GEORGE NEWNES, LTD.

Tower House, Southampton Street, Strand, W.C.2.
Hum Trouble

"I have been using a home-made quality A.C. set for some time, and have recently made several improvements." I find now, however, that hum is very noticeable, and wonder whether this indicates a fault or that improvement in L.F. response has made it audible. Can you suggest any tests which would be of use to me in this connection?"—L. R. (Banbury).

If your improvements did affect the frequency response, it is quite possible that the hum has now been made audible and that it was previously present. A new speaker, for instance, might easily bring out the hum if the speaker gives better low-note response than a previous model. On the other hand, your circuit modifications may have led to a low-note resonance, or alterations in the wiring may have resulted in interaction, and therefore all of these points must be considered and the best plan is to make a stage-by-stage test, using phones where the signal strength is not too great and preferably with aerial rejection turned off. The noise level in each stage may be more accurately judged.

Aerial Design

"I was interested in the article recently published on aerials, and I should like advice concerning an improvement at my station. I am using a wire in the left doubled to form an open square, the sides being about 10ft. long. Would it be an improvement if I suspended a wire along one side of the house, supported on insulators attached to wooden strips screwed to the gutter supports under the eaves? I am keen on improving long-distance reception, but cannot put up a good aerial in the garden owing to trees."—P. F. L. (Cardiff).

It should be possible to improve results with an outdoor aerial on the lines indicated. It was once an axiom that the best indoor aerial was not so good as the worst outdoor one, but in these days this is not entirely correct. However, if you support your outdoor wire, well clear of the gutter and wall, by using fairly long strips of wood with insulators at the end, you should notice a considerable improvement in range. The most important thing to remember, however, is that the aerial should be at least 1ft. from the gutter or wall.

Dial Movement

"I have five controls on an experimental set, and these have ordinary control knobs with dials screwed to the panels. I find that the condensers on some of these controls are rather loose, and the result is that I cannot get an exact setting of the pointer, as the act of removing the fingers causes the spindle to make another partial turn and exact working is very difficult. Can you offer any suggestions?"—T. S. (S.W.4).

A GOOD plan in such a case, and one which has been adopted in one or two cases to which I have had access, is to use one disc dial under the knobs. Remove one of the knobs and obtain a piece of felt—such as carpet underlay—and cut discs just smaller than the diameter of the control knobs. Make holes in the centre to clear the spindles and then place the disc on the spindle and force the knob on so that the felt is wedge-shaped firmly. In some cases where a long spindle is used, it may be necessary to use two discs of the felt, but this will definitely be found to provide a nice smooth action which will be quite definite in setting and overcome your difficulty.

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 these pages, and not for tunes appearing in our text or on general wireless matters. We regret that we cannot, for obvious reasons—

(1) Supply circuit diagrams of complete sets.
(2) Suggest alterations or modifications of receivers described in our content.
(3) Suggest alterations or modifications to condenser boxes or aerials.
(4) Answer queries over the telephone.

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

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnham, Ltd., Tower House, 81 and 83, Strand, London, W.C.2.

The coupon must be returned with every query.

Tapping Bare Coils

"I am winding some ultra-short wave coils of the bare self-supporting type and wish to tap the coils for aerial and reaction. As the tapping points which I may need have not been found experimentally, I should like to know the best method of arranging for this. With ordinary clips there is a risk of short-circuiting adjacent turns and it means very wide spacing if the ordinary crocodile clip is to be used. I prefer these clips, as I have a fair number and they are so easy to handle."—W. L. D. (W.I.4).

We appreciate your difficulty, and one way in which the trouble was overcome by us when building some similar experimental coils was to wind them with projections. A standard solid 1-inch diameter former was used, and a piece of fin square section wood was employed in the following way. The wire was anchored and the first two or three turns placed on. The wood strip was then slipped up to the last turn and the next coil anchored and the place. The method of anchoring the wire down firmly to follow the contour of the strip. The wire was continued, and when the strip was reached again it was withdrawn until the next tapping point was called for. Then the wood strip was moved round the former so that the results of the winding were staggered. If desired each turn could be provided with projections in this manner, staggering them so that risks of short-circuits are avoided.

Signal Strength and Coils

"I am anxious to get maximum volume from a crystal set, and should like to know the best coil arrangement for this. I am not up in theory, and should like a non-technical description as to the best arrangement for my purpose."—F. G. (Bracknell).

The crystal set has no form of amplification and therefore you need the greatest possible signal voltage across it. The signal voltage is therefore dependent upon the differences in potential at each end of the coil, and therefore it is obvious that you must choose the largest possible coil which will tune to the station you wish to hear. Tuning is effected by means of a variable condenser, and thus the coil has to be chosen so that at a minimum the desired minimum wavelength will be obtained. Usually this will give maximum volume, the circuit in question and at maximum wavelength position, with condenser at maximum, the signal strength is not the same owing to the change in the coil and condenser ratio, or L/C ratio as it is called. You should, therefore, wind your coil so that it may be tuned with the condenser at zero and a large diameter will enable more turns to be employed. They should preferably be slightly spaced.

Aerial Condensers

"What is the best series aerial condenser to use? I should like to know the capacity and whether air or solid dielectric is best. The set is for short waves, for which I understand the condenser is essential."—V. R. (Sudbury).

Although you can use a variable condenser mounted on the panel, if you wish to make aerial adjustments, you will find that variation in the condenser will alter tuning settings. A pre-set number at the rear of the box or chassis will overcome this difficulty, or you can use an "artificial" condenser made up from twisted flex, shorting a lead from the aerial terminal to the aerial lead. If the set is to cover a wide wave-range then a panel-mounted condenser may be necessary to enable best results to be obtained on each band.

 Replies in Brief

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

G. R. H. (Winchester). We think the most suitable receiver in your case would be the Hurricane Abine Three, blueprint P.W. 30, issued April 30th.

Kit "A" costs £2.

H. H. (Dartington). The "no coil" unit is not now obtainable but you can use a set of Verity coils for this particular receiver.

L. W. (New Barns). You could not expect more with the crystal receiver. An R.F. stage or a single one-valve would be more useful in your case.

C. E. (Dagenham). Write to Baynton, Ltd., Holloway Head, Ilford.

J. H. W. M. (Cheltenham). The A.C. Leader Three should be ideal for your purpose. The blueprint is available.

W. P. (Leech, Leeds). We are unable to trade at this moment due to the war.

A. C. (Winscham). We suggest you obtain a copy of the "Wireless Constructor's Encyclopedia" and then build one of the simpler receivers described from time to time.

J. W. (Walsall). A large number of names and addresses of amateurs in all parts of the world will be found in the "Radio A.C." magazine. The "Radio Craftsmen" and "News and Views" will also give information. Write to J. W. H. Logie, 17, Kensington, London, W.8.

G. W. R. (Learn). Straight push-pull is to be preferred. Each component with variable tapping, and this would enable you to control the number of turns left to the terminal to give best results. It is advisable for R.F.

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