Rear View of a Midget Battery Three-valver. Full Constructional Details in This Issue
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PREMIER RADIO
MORRIS AND CO. (RADIO), LTD.

OUR 1943 LIST IS NOW AVAILABLE. All inquiries must be accompanied by a 2d. stamp.
Television

THOUGH the Radio Industry Council the radio industry has expressed its approval of the Government's endorsement of the recommendation of the Hankey Committee on Television. They say that the earliest possible resumption of the television service is a step in the right direction and that manufacturers now know where they stand and can proceed with production plans.

Thus the regular transmission of a still test picture becomes more urgent than ever, and an announcement from the B.B.C. on this matter is eagerly awaited.

So far as the manufacture of television receivers is concerned, the labour position, as in all other industries, is still acute, but the industry confidently hopes to have sets ready by the time the television service is resumed. Prices will inevitably be higher than before the war, and if television is to reach the mass-market, as has been confidently predicted, the abolition of the Purchase Tax and the extension of the service to the provinces are necessary. The industry is already planning to urge these considerations in the right quarters.

The pre-war television receivers are waiting expectantly for the day when they can switch them on again. The industry issues a word of warning here. These receivers have been standing idle for over six years and it is most important that they should have an expert inspection before being brought into use. Manufacturers are already making arrangements to this end, but in the meantime dealers are advised to stress this point with their customers. This journal is making arrangements for the publication of designs of television receivers suitable for amateur construction, but we shall not release them until components of a satisfactory type and price are available.

American Receivers and Components

THE American End-lease announcement has naturally caused the Government to review the dollar position. During the war many receivers and components were imported from America. The replacement position was always difficult, particularly with valves. The situation will now become worse, and owners of such receivers will have to lay them by when they cease to function. On the other hand, the French valve industry is improving and there has been a marked increase in home-constructed receivers, as the sales of our blueprints indicate. At the same time there is a shortage of certain components, notably condensers and loudspeakers, and readers are therefore advised to make quite certain that components are available.

This they may do by writing to the following advertisers and submitting a list of the components required.

The labour position in the radio industry is not likely to improve for at least six months. It is unlikely, therefore, that receiver and component sales will be available in anything but small quantities for some time to come. It is equally unlikely that there will be a radio show next year. The organisation of an exhibition is a vast task and work on it usually commences early in the year when manufacturers have settled their season's programme. That will not be possible until 1946 when advanced. Dealers will, therefore, make good this omission by running local exhibitions as goods become available.

Design Centres

LARGE exhibitions, like that proposed for next year, in which all British goods will be shown are stimulants to manufacture and to all concerned with the manufacture, sale and use of goods. There will, undoubtedly, be a radio section to this Government-sponsored national exhibition which is being organised by the Council for Industrial Design. The exhibition is to be held in London next summer. The Council has announced its plan for carrying out the Government's desire to put design in industry on a basis comparable with scientific and technical research. Design centres are proposed, the functions of which will be to study the problem of design in relation to the products of the particular industry, to collect and make available to the industry information relating to changes in public taste and trade practice in home and overseas markets and to hold exhibitions both at home and overseas; to conduct and encourage research.
SHORT WAVES FROM CAPE VERDE

MADRID Radio announced that a new short-wave broadcasting station has been built in the Cape Verde Islands and would operate daily from 1000 hours G.M.T., using a wavelength of 47.5 metres. The transmissions are being heard at good strength in England.

ANKARA

One of the strongest stations heard in England on the 31-metre band is that of the Turkish station in Ankara; the transmissions are mainly in English, and appear to have an aerial directed on this country. The schedule is unreliable, but always can be heard from 1800 hours until 0200 hours. Ankara time is two hours ahead of G.M.T.

AUSTRALIA CHANGES IN SCHEDULES

In an announcement from Sydney it was stated that transmissions for the Forces would in future be on 31.32 and 31.50 metres. These transmissions are now being heard all over Europe at good strength.

TESTS FROM HOLLAND

Already short-wave tests are being made from Eindhoven on a wavelength of 10.71 metres between 10.00 and 11.00 G.M.T. each day. These transmissions are beamed on Dutch East Indies, but reception is good in England. The station should by now be in regular daily service.

PRISONER BROADCASTS

Broadcasts from internees are now being made from Shanghai on a wavelength of 25.9 metres 13.15 hours, G.M.T., on a frequency of 25,580 kc. As was the case before the war, this station can be well heard in England and its recent broadcasts have been most interesting.

PROGRAMMES FROM THE FAR EAST

The Malay National Service can be heard in England on 31.35 and 25.29 metres, and amongst the broadcasts are programmes for British troops and news of interest to those with friends in the Far East. This programme is in addition to the Regional programme broadcast on 31.55 metres. Singapore can now be heard in England when using the wavelength of 31.44 metres.

TELEVISION FROM PARIS

PARIS RADIO recently announced that television transmissions have been resumed, and that the studio transmissions would in future come from the new Television Centre in the Rue Cognac-Jay.

Regular transmissions are made from 15.30 to 17.30 daily, Monday to Friday, on the pre-war frequencies.

It will be remembered that viewers in the South of England could, before the war, see quite good pictures from Paris on normal British television receivers.

AMATEUR TRANSMITTING

The Government of the Irish Free State have announced that all restrictions imposed on transmitting by amateurs have now been removed and steps are being taken to re-issue licences in the near future. No indication is made of the frequencies that will be allotted.

This lines up with the conditions in America where amateur bands are for the time being using a frequency of 144-148 m.c.s. until such times as the normal lower frequency bands are cleared for amateur use.

In a broadcast from Sydney it was also announced that restrictions on radio amateurs had been removed and licences would be issued at once.

The situation with the British amateur is that the G.P.O. have allowed applications to be made for radiating licences from those holders of pre-war licences, but no indication has been given as to when the issue of licences can be expected.

It is almost certain that in the first instance the band given to amateurs will either be 112 to 118 m.c.s. or 144 to 148 m.c.s. to line up with the American allocation.

BANDOENG

The old favourite short-wave station of Bandoeng, Java, that was received in this country so well for ten years before the war, has reappeared in new form as "The Voice of Free Indonesia," operating on a wavelength of 16.6 metres.

Although the station announced that it was also operating on 24.4 metres, no reception on this wavelength has so far been reported.

CKNC

The Canadian short-wave broadcasts on 19 and 25 metres have now been supplemented by CKNC on 16.84 metres. This station, which starts at 12.00
hours daily, is very powerful, and can be heard in England at great strengths with the simplest receiver. The programmes are mainly for Canadian troops in Europe.

**B.I.R.E. Meeting**

At a meeting of the British Institution of Radio Engineers, Upper Belgrave Street, S.W.1, on October 17th, a joint paper on "A Symposium of Mathematical Methods for Radio Engineers" was contributed by L. J.ofet and M. M. Levy.

**New Appointment**

We are informed by Banes (London), Ltd., Mechanical and Electrical Engineers, of Chatham, London, S.W.4, that Captain G. J. Redfern, formerly of Mitcham Works, Ltd., and the Philco Radio and Television Corporation of Great Britain, Ltd., has joined the firm in the capacity of Chief Electronic Engineer, and will be handling all the technical side of Messrs. Banes' business.

**Increased Membership of American I.R.E.**

According to the Annual Report of the Secretary of the U.S. Institute of Radio Engineers the membership has increased by 2,000, bringing the total to 12,472. About 12 per cent. of the total membership reside outside the United States. The increased membership in Great Britain was responsible for the addition of over 100 members in Europe.

**Cable and Wireless Appointment**

Col. W. J. WELLINGHAM, who has been Cable and Wireless, Ltd., Press Liaison Officer since February, 1944, has been promoted Manager, London Branches. He will take over his new appointment on December 1st, when Rear-Admiral George F. Thomson, who has been Director of the Press Censorship Division, Ministry of Information, during the war, joins the company to undertake press liaison duties.

Col. Wellingham, M.C., T.D., is a Norfolk man and an engineer by profession; he is M.I.Mech.E., M.I.A.M.E., M.I.E.C., and Associate I.E.E. He joined the Western Telegraph Company—now merged with others into Cable and Wireless, Ltd.—in 1914.

In February, 1944, after some time in the Royal Electrical and Mechanical Engineers, with which he served in the Tunisian Campaign, he was seconded from the Army to establish the newly created Press Liaison Office at Cable and Wireless, Ltd.

**Travelling Post Offices**

Now that the travelling post office service has been resumed it is interesting to note that the first travelling post office, which consisted of a horsebox temporarily fitted up as a sorting carriage, ran experimentally in 1855 between Birmingham and Liverpool, and covered 100 miles in four and a half hours. The first travelling post office from London started at Easton in the same year, and reached in a point little north of Bletchley. Later in 1858 this service was extended to Preston.

The first postal train in this country was run by the G.W.R. between Paddington and Bristol on February 1st, 1854. These services rapidly grew until just before the war the whole of Great Britain was covered by a network of more than 70 travelling post offices.

**Radio Dealer’s Exploit**

The evening of the first day a dealer displayed a new Philco radio in his window and it was stolen. The dealer, Mr. W. Phillips, of Langley Mill, Nottn., told this to the Philco Company and they supplied another set.

Wireless Receiving Licences

The following table, showing the approximate number of wireless licences issued during the year ended August 31st, 1945, was recently released by the Controller and Accountant General of the Post Office:

<table>
<thead>
<tr>
<th>Region</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>London Postal</td>
<td>1,722,000</td>
</tr>
<tr>
<td>Home Counties</td>
<td>1,383,000</td>
</tr>
<tr>
<td>Midland</td>
<td>1,405,000</td>
</tr>
<tr>
<td>North Eastern</td>
<td>1,334,000</td>
</tr>
<tr>
<td>North Western</td>
<td>1,349,000</td>
</tr>
<tr>
<td>South Western</td>
<td>820,000</td>
</tr>
<tr>
<td>Welsh and Border</td>
<td>860,000</td>
</tr>
<tr>
<td>Total England and Wales</td>
<td>8,741,000</td>
</tr>
<tr>
<td>Scotland</td>
<td>982,000</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>151,000</td>
</tr>
<tr>
<td>Grand Total</td>
<td>9,875,000</td>
</tr>
</tbody>
</table>

By dealing 900 police can now be brought to the scene of a crime in 60 seconds. This has been brought about by 30 new police cars, of which is stationed in every Metropolitan borough, that have been equipped with two-way radio. These radio sets are powered by two 6 volt batteries in the boot of the car, and have a range of 20 miles. The sets are so constructed that electrical interference is cut out, and the messages cannot be heard on domestic radio. The illustration shows the set in the back of the police car.

Mr. Phillips was taking no chances this time. When he put the new radio in the window he laced it to all the other sets on display.

The burglar called again, but as soon as he tried to make off with the Philco the other sets followed him. Brought to his bedroom window by the noise, Mr. Phillips saw the thief in the darkness below and jumped. He missed the burglar by a yard and fell heavily, breaking both heel bones. Naturally, the burglar escaped.

No more radio sets are being displayed in the shop window until Mr. Phillips is up and about again. Then he is determined to capture the thief. "If necessary," he said, "I will blow the shop front in on purpose to catch him."
On the Beam

An Explanation of "Standard" Beam Approach—a Radio Aid for Landing Aircraft in Conditions of Poor Visibility.

By FRANK PRESTON

Of the many systems that have been devised to increase the safety of landing aircraft in conditions of poor visibility beam approach is probably the simplest. It is also the only device of this kind which has been extensively used throughout the war. But it is first necessary to correct certain false impressions that were formed after reading various "stories" in the daily press. These stories were published at intervals during the European War, and left the average reader with the belief that, due to this German Lorenz system, which was fairly widely used by the civil air lines before the war. For a time the name Blind Approach was used, but it was later considered that the present name was more appropriate. S.B.A. depends upon the transmission of an ultra-high-frequency tone-modulated beam within which the aircraft can fly toward the transmitter—described as a main beacon. In addition, there are two so-called marker beacons. These feed into horizontal dipole aerials designed to produce an upward beam. These are valuable landing aids, our bombers were able to set out and land safely at their bases in any kind of weather. That, of course, was sheer nonsense. Fortunately, it was corrected to a large extent by the explanations and demonstrations that were given at the R.A.F. Exhibition held at Dorland Hall, Lower Regent Street, London, during late March and April, 1945.

Beam approach does permit the pilot of an aircraft fitted with the necessary receivers to locate an airfield and to fly over the runway. In fact, the pilot can make an accurate approach, and can do almost everything except make the final touch-down in conditions of zero visibility. For the final landing, however, a certain amount of visibility is necessary.

It has been stated, and proved, by at least one well-known exponent of the system, that he could teach any good pilot to land a four-engined bomber "on the beam" given a horizontal visibility of 100 yards and vertical visibility of 10 feet. The claim has never been made authoritatively that a "blind" landing is possible with this aid: the name itself makes quite clear the fact that the system is intended for approach, which is entirely different from landing.

The system in present use by the R.A.F. is known as Standard Beam Approach, the initial word relating to Standard Telephones and Cables, Ltd., who pioneered and developed beam approach equipment in this country. The S.B.A. system is developed from the situated on the ground at two points along the track of the main beam, and indicate to the pilot his distance from the main beacon. It should be noted that the main beacon is situated at the end of the runway and feeds into a vertically polarized aerial system.

![Diagram of aerial installation](image)

**Fig. 1.**—The theoretical polar diagram for a vertical aerial without reflector.

**Fig. 2.**—When a reflector is positioned parallel to and a quarter-wavelength away from a vertical aerial the polar diagram becomes elliptical.
First, let us see how the main beacon operates. There is a transmitter with an output of about 30 watts, and this is tuned to an allotted frequency within the band of approximately 30 to 40 Mc/s; this is equivalent to a wavelength of 10 to 7.5 metres. The transmitter is modulated with a pure tone having a frequency of 1,759 c/s, and the output is applied to a vertical dipole aerial.

It is known that an aerial of this kind gives omni-directional radiation, the theoretical polar diagram being a circle, as shown in Fig. 1. It is also known that if a reflector (a half-wave rod similar to the aerial) is placed a quarter-wavelength from the aerial the polar diagram is "pushed over" to form an ellipse, as shown in Fig. 2.

Use is made of this fact in the main-beacon aerial system by placing a reflector at each side of the aerial and arranging that the two reflectors are brought into operation alternately. This is done by splitting each reflector in the centre and fitting a relay switch to close the gap between what are, in effect, two quarter-wave rods mounted end to end. Fig. 3 illustrates the arrangement diagrammatically.

It may be seen from Fig. 3 that whereas one relay is spring-biased so that its contacts are in the closed position when the relay solenoid is not energised, the other relay is biased in the reverse manner. The relay solenoids are in series, and are fed from a voltage source through a cam type of contactor. The cam is so cut that the projections are one-seventh as long as the recesses, measured circumferentially. The simple cam illustrated has four projections and four recesses, and therefore if the cam is rotated so that it makes one complete revolution every four seconds the "dot" reflector will be in action for 1 second and the "dash" reflector for 3 second in every second.

From this information the polar diagram shown in Fig. 5 may be plotted. This shows a "dot" area on the right of the aerial system and a "dash" area on the left. Down the centre line, and in line with the radiator, the "dot" and "dash" polar lines cross each other. This means that a receiver operated along this line would reproduce a steady note, due to the spaces left between the "dashes" being filled in by the "dots." If the receiver were moved toward one side of the centre line the "dots" would predominate; if it were moved towards the other side "dashes" would predominate.

Due to the relative insensitivity of the human ear the steady note can, in fact, be heard over a few degrees on each side of the centre line, the actual width of the "equi-signal zone" being governed by the exact adjustment of the reflector lengths. To permit of their adjustment to suit any particular frequency within the range, and also to give any required beam angle, sliding rods are fitted at each end of the tubes forming the reflector elements.

**Fig. 3.—This diagram illustrates the principles of the switching system adopted for the reflectors used in conjunction with the vertical half-wave dipole aerial in S.B.A. system.**

Some radio aerials used by our bombers.
In general, the reflectors are adjusted so that the effective width of the equi-signal zone is between 2 and 2 degrees, but almost any other beam angle can be provided if required.

As might be expected, there is no sudden change from equi-signal to dots and dashes. Instead, there is what is described as a "twilight zone"; this normally covers an angle of approximately 40 degrees overall. In this zone (there are actually two zones, one on each side of the equi-signal zone) the gaps between the dots or dashes are partly filled in, with the result that the characters are heard superimposed upon a steady background note. This is shown diagrammatically in Fig. 6.

With such a form of radiation as that described, the pilot of an aircraft fitted with a suitable receiver could easily find the approach line, or equi-signal zone. He could also, by flying along the line of equi-signal, locate the airport. In poor visibility, however, he could do little more than this, and he would require more assistance to allow him to make a gliding approach preparatory to landing.

The additional assistance required is provided by the marker beacons which have already been mentioned. One of these is situated on the course line close to the "touch down" end of the runway. The other is situated on the centre line of the main beam about two miles beyond the first. These marker beacon transmitters are described as inner and outer markers respectively, for obvious reasons.

A horizontal dipole—or a pair of horizontal dipoles arranged to provide a narrow beam—is used with the marker beacons to project an upward beam, as shown in Fig. 6.

Each marker beacon transmits a keyed, M.C.W. signal. That from the outer marker consists of dashes transmitted at a speed of two per second on an audio frequency of 700 c/s. The signal from the inner marker is of a more "urgent" character and consists of dots with an audio frequency of 1,200 c/s. sent at a rate of six per second.

A fixed frequency of 35 mc/s (about 8 metres) is used for all marker beacons, irrespective of the frequency of the main beacon.

In order to receive both main and marker beacon signals simultaneously it is necessary to employ two different receivers in the aircraft. The main beacon receiver is a six-valve superhet with frequency selection over the 30 to 40 mc/s. (approximately) band, and a sensitivity of the order of 50 microvolts. The marker receiver is a simple two-valve set, fixed tuned to 35 mc/s.

The output from both receivers is mixed and can, if desired, be fed into the aircraft intercommunication system by throwing a switch. This switch has three positions marked: "B.A."—"MIX"—"I/C." With the switch in the first position the pilot only can hear the S.B.A. signals without interruption by crew conversation; in the second position S.B.A. reception is superimposed upon the intercommunication; in the third position, intercommunication (generally described as intercomm) only is heard in the phones of the pilot and crew.

Fig. 7 shows in diagrammatic form the layout of the items comprising the aircraft installation; the separate items are all illustrated in accompanying half-tones.
Fig. 5.—This diagram shows the radiation pattern of an S.B.A. main-beacon aerial system when using "dot-and-dash" keying.

It will be seen that the units are connected together by means of braid cables, which are assembled as flexible insulated conductors passed through metal-braid tubes provided with multi-way connecting plugs. The purpose of the junction box is to provide a convenient means of making multiple connections between the units and to simplify the testing and replacement of any particular cable assembly.

Before describing the receivers in rather more detail it is well to explain briefly the purpose of the various auxiliary items shown in Fig. 5.

The power unit is of the rotary converter type and is operated from the main aircraft battery supply—controlled by means of a carbon-pile type of voltage regulator. Motors are available for input voltages of either 12 or 24 (nominal) and in either case the consumption approximates to 80 watts. Three output voltages are provided: 15 volts for L.T., 200 volts for the main H.T., and 120 volts of stabilised H.T. The power unit also contains the necessary smoothing circuits and an H.T. fuse.

Five controls are provided on the pilot's control panel, in addition to a telephone socket for test purposes. First there is an ordinary toggle switch for on-off switching; this actuates a relay in the power unit. At the top left-hand corner there is a "Normal-Test" switch. When this is turned to the "Test" position additional bias is applied to the first I.F. stage in the main beacon receiver. The result of this is that A.V.K. action is

Fig. 6.—The radiation pattern from the marker-beacon horizontal dipoles is shown here, in relation to the radiation from the main-beacon aerial.
restricted so that a signal-strength meter can be used to determine whether the aircraft is flying toward or away from the main beacon when it is within the beam. In the top right-hand corner there is a fine-tuning control which can be used to trim the oscillator portion of the frequency-changer in the main-beacon receiver. A six-position frequency selection switch is situated in the bottom left-hand corner. This simply brings into circuit six sets of four pre-set tuning condensers and, therefore, allows the pilot to tune his set to the known frequency of a particular S.B.A. ground installation. The remaining knob is for a potentiometer volume control, which acts on the signals from the main-beacon receiver only; there is no means of varying the output from the marker receiver.

It should be explained that the particular control panel described is used only with a type of main-beacon receiver which is pre-tuned to six selected frequencies. Other types of receiver, with continuously variable tuning are made, but are of relatively recent design and have not yet come into very wide use. Reference will be made to these receivers later in this series of articles.

The so-called "Mixer Box"—Junction Box type 57, to apply the official description—contains a transformer and three-position switch, the function of which has already been explained. The connections made by the switch contacts in the three positions are illustrated in Fig. 4.

The visual indicator shown in Fig. 7 is normally mounted on the pilot's main instrument panel. It has three functions and comprises two moving-coil meters and a pair of neon tubes. This indicator bears some resemblance to a human face and the parts may be referred to for convenience in terms of features. The "nose" is a signal-strength meter and is used in conjunction with the "Normal-Test" switch already described. The "mouth" is known as a course meter or marker meter; the latter name is given due to the fact that the pointer kicks to left or right in certain circumstances. When the aircraft is flying on the "dot" side of the main beam the needle kicks to the right, indicating that the aircraft should be steered in that direction to bring it into the equi-signal zone. When the aircraft is on the "dash" side of the beam the needle kicks toward the left.

The "eyes" are neon lamps mounted behind gauge dials. Their purpose is to give visual indication that the aircraft is flying over a marker beacon. It should be noted that the indicators can be used at the same time as an aural indication is being received, and also that the neon are not always used, the lamps being removed. The neon tubes are actuated by the output from two audio filter circuits connected to separate windings on the output transformer of the marker receiver. When the aircraft is flying over an outer marker the output from a 700 c/s filter is applied to the neon on the left, marked "O." On the other hand, the 1,700 c/s audio output received from an inner marker is fed to the right-hand neon, marked "L." An initial stabilised D.C. voltage is applied to the neon tubes, this being adjusted to such a value that the neons just fail to strike in the absence of a signal.

A vertical whip type of aerial is normally employed with the main receiver, but other types of quarter-wave vertical aerials are used in some cases. The aerial is connected to the receiver through a coaxial line. Should the line exceed 50 feet in length, a matching unit is included in it. In practice, it is seldom necessary to exceed that length, even in a four-engined bomber.

(To be continued.)

Fig. 7.—Pictorial layout of the S.B.A. receiver installation in a typical aircraft.
Ultra Midget Battery Loudspeaker Receiver

A Small Portable Set Designed to Give Reasonable Reception

This receiver was designed to give reasonable loudspeaker results, and no exaggerated claims are made as to what may be expected. On the small frame aerial the Light and Home programmes come in at comfortable strength. If a throw-out aerial of a few yards and an earth is used, results are up to single valve standard, taking into account the size of speaker used.

Size and Weight

The set complete with batteries was fitted into a case 5\(\frac{1}{4}\)in. \(\times\) 2\(\frac{1}{4}\)in. \(\times\) 2\(\frac{1}{4}\)in., so it can truly be claimed as a "gadget". No special ultra midget components or "gadgets" are necessary, and all parts can be bought from any of the dealers advertising in PRACTICAL WIRELESS, excepting the switch.

The total weight of the set is under 3lb, so that no one needs to grumble about carrying the set.

The aerial is fitted in the lid of the case, and when opened is clear of batteries, etc.

Another feature is that to operate the set the lid must be opened, when the set automatically switches on. A simple switch is incorporated to switch on when lid is opened and switch off when lid is closed. (This also saves space.) There is no difficulty in the construction, care being taken that the basic layout is adhered to, otherwise instability will result. There is ample space in the set to work in, and nothing has been undue cramped. The small toneite knobs make a neat little job and are easily made. The switch is fitted nearest lid of case, and should project about \(\frac{1}{16}\)in. above metal panel.

The metal frame and aerial are covered with leatherette, the loudspeaker with felt thus making a professional job.

All screws holding loudspeaker, etc. to

---

Fig. 1.—Back view of the receiver, showing positions of the various components.

Fig. 2.—Side view of the receiver and details of the switch.
December, 1945

PRACTICAL WIRELESS

Panel are filed flush. Screws on the tuning condenser at the point nearest the panel are also filed down to minimize shorting to the metal panel. Blanked paper can be inserted between panel and condenser.

A small 15-in. M.C. speaker (Celestion) is used, and handles volume well. The H.T. battery lies on top of speaker, being held in position by a spring attached to output transformer.

The output transformer (Fig. 4) is mounted on a bracket to clear reaction condenser which is also raised to clear end of loudspeaker. Also attached to bracket is the spring to make contact with L.T. of type 800 battery. This battery is used because of its long life. It is most important that the connections to the valve holders should be soldered before L.T. (Helga) or similar midget transformer is fitted, as it can’t be done after. Spacers are used to mount transformer clear of valve holders. The resistances are of the 1-watt type, and fixed condenser of tubular type. 20 S.W.G. is used for connections in valve unit, thin flex used to couple set to aerial. Systecflex covering throughout. The circuit is common (Fig. 7).

Frame Aerial

Frame aerial is wound on a sheet of stiff cardboard or plywood 4½-in. x 4½-in. An odd number of slots tin deep are cut around the material used (Fig. 3), as the frame is wound basket coil fashion. This is an efficient and flat aerial. Care should be taken that no turns are shorting.

26 S.W.G. enamelled wire which writer finds best for midgets is wound in and out of slots until 72 turns are completed. Then winding in same direction and 2½ turns for reaction. (This depends on care taken with grid winding also type of condenser used.) So this aerial should be wound carefully, as set is built around it.

Switch

This is simply made out of an old on-off switch case being taken that bush for fixing, if metal, is insulated from panel. A small light spring is used to push up plunger of switch (Fig. 2). The projection above panel should not exceed ½-in. This gives sufficient movement to clear contacts.

The fixing nut is filed down as thin as possible, so that projection won’t be too much to prevent lid closing.

The tuning and reaction are of the small didelectric type, each having a capacity of 0.005 mf. The method of shortening the bush and spindle to take small electric knobs is as follows:

The metal bush through which the spindle passes is cut at the desired length, care being taken not to cut spindle. Spindle is then cut ½-in. clear of metal bush, drilled and tapped 6 B.A. The knobs are made out of ¼-in. sheet electric and drilled 6 B.A. clearance and counterclock (see diagram). A 6 B.A. screw is fitted. The fixing nuts are filed as thinly as possible.

Resistances

These are of ½ watt type, excepting 3 ohm resistor which is made from Eureka wire.

Construcational Details

The first step is to prepare metal panel (Fig. 6) which is ½-in. by 4½-in. At top it is 3½-in. bottom 3½-in. The side which supports type 800 battery is tin (Figs. 1 and 2). Loudspeaker, condenser, tuning and reaction, L.T. switch and bracket on which should be fixed a springy contact to make L.T. contact, is mounted as shown in the illustration. L.T. contact should, of course, be insulated from metal panel.

The valve unit is then wired up (Fig. 5), remembering that all components to valve holders should be soldered before L.T. transformer is fixed in position, using spacers to clear valve holders. See that wiring is neat and tidy and that no blobs of solder or flux are shorting valve pins. The fuse holder (which writer thinks essential in type of this small set) is soldered or fixed on to output transformer frame.

Two small pencil torch batteries in series are used for biasing the pentode valve, and are placed at top of panel above speaker.

Cabinet

The cabinet can be made of wood or thick cardboard (metal must not be used) and can be covered with
Reconversion of the Radio Industry

During recent months the Board of Trade have been dealing with the problem of the reconversion of the radio industry to peacetime production. In normal times receiving sets form the basic product of most firms in the industry, and much has been done under programmes already approved and licensed to ease the difficulties of manufacturers in the present transition period.

At present the manufacture and supply of receiving sets is controlled under the Musical Instruments and Wireless Receivers Order, 1944, S.R. & O. 658/44, and licences have been granted to some 70 manufacturers for the production of about one million sets during the next 12 months. Of this quantity 400,000 are intended for export. Undertakings have been given by the industry that 50 per cent. by value of the production for the home market will be devoted to sets to be retailed at £15 or less, exclusive of Purchase Tax of 33½ per cent. on the wholesale selling price. With the cancellation of war contracts, the supply position in respect of the majority of the principal components required for civilian production has shown considerable improvement and adequate quantities should be available for the present programme for maintenance of existing sets, and for export.

The supply of timber for radio cabinets, however, is not too good at present, owing to the many important claims on the limited quantities available. During the third quarter of 1945 releases were only about 30 per cent. of the industry's requirements, but the position is improving, and substantial increases will be made in the fourth quarter. This improvement, together with the supplies of plastic materials which are available for cabinets, should go a long way towards overcoming the present difficulties.

Before the war the average annual production of radio sets in this country was about 1.4 millions. Of this quantity the average export was 660,000. It will be seen, therefore, that the present programme visualises an overall production of about 70 per cent. of the pre-war figure, but places considerable emphasis on exports.
A Band-pass All-wave Four

Constructional Details of a Receiver with Band-pass Tuning upon Medium and Long Waves

As will be seen from the circuit in Fig. 1, this receiver is provided with band-pass tuning upon medium and long waves. On the short-wave band there are only two tuned circuits, but this is an advantage as slightly more gain will be obtained and there will not be the difficulty of ganging the three circuits. To obtain maximum gain tuned-anode coupling is used between the H.F. and detector stages, and so an adequate degree of both sensitivity and selectivity is obtained.

Two L.F. stages follow the detector, so that good speaker volume is provided on a considerable number of stations. Provision is also made for using phones from the L.F. stage if desired. The usual V1 volume control is used, and the wave-ranges are selected by suitable switching, which is more convenient than the use of plug-in cells, although it naturally complicates the wiring.

Construction

A metal chassis is used, and no particular difficulty should arise, but it is recommended that care be taken, especially in wiring the coils. If this is done satisfactorily results should be obtained.

The layout in shown in Fig. 2. A chassis 12in. x 8in. is needed, and the positions of the valve-holders and other parts upon the top of the chassis are clearly shown. Small bolts are used to secure all the components and tuning dial. A good quality component is recommended for the latter, and it should have a large dial and be smooth in action or tuning will be made troublesome. Various reduction drives are available, and the kind used will depend upon degree upon the cabinet in which the set is to be placed.

The chassis of the Band-pass All-wave Four.

A small insulated piece with two sockets is secured near the right edge of the chassis for phone connections. Speaker connections are made with flex as shown, and the battery leads also emerge from the top of the chassis near the L.F. valve.

There are not many leads upon the top of the chassis, and only the anode connection to the H.F. valve is screened. As this is connected directly to the fixed plates of one section of the tuning condenser low-capacity screened wire is best used or otherwise ganging may be upset.

Fig. 3 shows sub-chassis wiring. The L.F. and output stages are straightforward, and require little comment. An anchoring tag (insulated from chassis) is used for H.F. plus. The phone-speaker switch must have sections insulated from each other, as looking at Fig. 1 will show. A double-pole double-throw switch can be used, wiring it so that when the phones are connected the
The H.F. and Detector Stages

In an all-wave circuit with switching and three tuned circuits, the R.F. stages are naturally more complicated, and there are quite a number of connections. To avoid confusion the following method of wiring is recommended.

First of all, the wave-change switch should be fixed in position. A type with two sections is needed, and the rear section should have three poles, and the forward section two. The small screen shown in Fig. 1 should then be made from aluminium and bolted to the chassis. The spindle of the switch passes through a slot cut in this screen.

The tuning coils should now be fixed in position. Note that the short-wave coils are nearest the switch to shorten wiring, and that the cores of all the coils in each section are at a different angle. If the coils are arranged as shown the cores of the coils operating upon any band will also be at different angles, and the chance of interaction minimised.

The detector circuit may be wired first. A lead is taken from the anode to one section of the switch, and from the grid condenser to the second section (this connection is taken above the chassis as shown and connected also to section 4 of the gang condenser). The short-wave coils are now connected, all leads being shown in Fig. 3. Consulting the circuit in Fig. 1 should make this quite clear.

When the circuits are wired for short-wave operation the switch should be turned to the next position. It is only necessary now to add the connections from the switch to the medium-wave coils, connecting these as for the short-wave coils. Note also that the additional coil in the aerial circuit has to be connected, this coil being taken by section 2 of the switch.

When the medium-wave coils are connected the switch should be returned to the last position and the long-wave coils connected in exactly the same manner. Note that...
in Fig. 3 the switched leads to the medium and long-wave coils are not shown for clarity—they should be wired as for the short-wave coils, the leads for which are shown.

Coil connections are as follows: 1—grid; 2—grid (or H.F. plus in the tuned-anode coupling); 3—reaction condenser; 4—plate. Note that the earth ends of the tuning section of the band-pass coils are not connected to earth, but to the resistor R1 which provides the common-impedance coupling.

It will be seen that the anode leads of the detector are screened to prevent instability. Care should also be taken with the positions of all the wires in the R.F. stages, especially those to the switch and coils. They should be as short and direct as possible, and kept well clear of adjacent connections.

The reaction condenser has a small internal reduction drive and although this is not absolutely necessary it simplifies operation upon the short-wave range. The volume control potentiometer must be insulated from the chassis unless it had a "dead" fixing bush. A small stand-off insulator is used for the aerial. If an earth is used it can be taken to the chassis.

**Operation**

The voltages shown for battery connections are only approximate and may be modified with advantage with some valves, especially the grid bias and voltage of the H.F. screen.

Having found the receiver to function upon all wave-bands, the circuit should be trimmed. The short-wave band can be taken first. To do this, unscrew the trimmers upon the gang condenser to minimum capacity and tune in a signal near the bottom end of the band. (The reason for choosing a station here is because an alteration in the trimmer capacity will have more apparent effect with the tuning condenser near minimum.) The trimmer on section 2 should now be screwed down. If this causes an increase in volume it should be screwed down until further movement causes a reduction in volume—e.g., "peaked" to the signal. If screwing down this trimmer causes a reduction in volume it should be returned to minimum and the trimmer on section 1 screwed down, and the tuning condenser readjusted to the station. The procedure should now be repeated, and if screwing down the trimmer on section 2 causes a reduction in volume the trimmer on section 1 will have to be screwed down even further.

When it is found that tuning or the adjusting of either trimmer brings no improvement in results the circuits are trimmed correctly.

The switch should now be turned to the medium-wave position and the trimmer on section 3 adjusted for maximum response. If screwing this down gives less volume it will be necessary to screw down both trimmers 1 and 2 and re-gang them until trimmer 3 can also be peaked to the signal.

Finally, as a last characteristic is desired trimmer 3 is de-tuned, the amount depending upon the results desired. This will naturally reduce signal strength and if quality is considered satisfactory it may
be left dead on tune. In any case the band-pass characteristic should not be obtained by detuning sections 1 or 2 or this will cause lack of volume on short waves.

In some cases it may be found that the circuits can be re-tuned upon a different setting of the tuning condenser with advantage. If so, the split end vanes of the condenser should be bent slightly in or out to give the additional capacity when required, opening the condenser each time and bending the section just coming into service opposite the fixed plates of the condenser.

When tuned upon the short-wave range satisfactory results should be obtained upon the other two ranges. If not, the coils are not properly matched and this could be alleviated by adding a small trimmer to the coils in question.

No value has been specified for R1. Fifty-seven ohms was used in the original set, and the value has a great influence upon the selectivity upon medium and long waves. A lower value will give sharper tuning. If less selectivity is required upon long waves a higher value shunted with a condenser should be used. The condenser will have less effect upon the lower frequencies and tighter coupling will result. The value used depends upon results required.

In any case a high value with no condenser must not be used or the first two tuned circuits will not gang with the third.

A Universal Test Speaker

A Test Speaker which can be Used to Replace Almost Any Type of Speaker when Servicing Receivers.

By F. J. FORBES

A switch, $S_3$, enables the field circuit to be isolated from the input circuit, this applies for speakers where the field is in the negative lead, or can be used to substitute a smoothing choke and P.M. speaker at the same time. The "normally closed circuit" jack can be used to check the total H.T. line current.

Since one side of the field circuit will be smoothed and the other output from the rectifier, the appropriate terminals have been marked with ; a sine curve for unsmoothed and a pair of parallel lines for the smoothed side.

Study of the circuit shows that it can be adapted at will for a greater range of fields by adding a selector switch with some positions, and tapped fields can be simulated by connection into the resistor network as

The completed test speaker.

The input selector is a four-pole, four-way switch, this gives two values of high impedance—when used in conjunction with $S_4$—push-pull, etc., and low impedance inputs; the ratios and impedances are given in the tables.

Matching is accomplished by $S_4$; this is a single-pole, five-way switch the tables give the ratios, etc., of this control on high or low impedance ranges.

The transformer is a W.B. multi-ratio type, carrying a D.C. current of 25-30 mA; it was salvaged from an old "stator" speaker by the same manufacturers. Any good transformer of this type may be used, more
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BY 198 RUNS

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Lapping points would be an advantage, and a primary winding to carry a larger D.C. current—say 150 mA—would increase the scope of the test gear.

An output jack is wired across the speech coil; into this an output meter can be plugged during alignment of the receiver with the aid of a signal generator. S6 open-circuits the speech coil when required; this coil should have a D.C. resistance of 225 ohms and an impedance of 3.5 ohms, in order to match into the W.B. transformer.

The illustration shows the finished unit; the cabinet is made of mild steel, finished in black crackle enamel, and was sold before the war by Messrs. Premier, for £5 each. Inside measurements are 11 líms. × 11 líms. × 10 líms. which gives plenty of room both for the existing components and any modification as the occasion arises. 

Looking at the control panel, and working down from the top left-hand corner, the controls are as follows: plug and sockets acting as S1; meter switch S2; matching switch S3; input selector S4; output, H.T., mA, and A1/A2 meter jacks; field selector S5; field input switch S6; and the bottom sockets are: 100-80-60-40-30-20. 

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<thead>
<tr>
<th>HIGH IMPEDANCE MATCHING</th>
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<tr>
<td>S6 in position</td>
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<td>Impedance</td>
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<th>LOW IMPEDANCE MATCHING</th>
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<tbody>
<tr>
<td>S6 in position</td>
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<tr>
<td>Impedance</td>
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(Where impedance is in ohms, and ratio is to 1.)

Theoretical circuit of the test speaker.

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An Introduction to Communications Receivers—4

This concluding article deals with the audio-frequency part of the circuit and with the important subject of noise limiters and filters.

By FRANK PRESTON, A.M. Brit.I.R.E.

REFERENCE was made last month to the second detector, but this part of the circuit was treated very briefly for the simple reason that the second detector of the average communications receiver differs little, if at all, from that in any modern superhet. It is just worthy of mention in passing, however, that various systems of delayed and amplified A.V.C. are employed. But as these are generally of standard and well-known form it is not necessary to describe them here.

A very important aspect of the better class of communications receivers is the noise-limiter circuit, which is provided between the second detector and the audio-frequency amplifier. The purpose of the limiter, as the name suggests, is to cut down the background noise level. In general, the limiter is effective principally in chopping off the peaks of noise modulation arising from non-linear static. It is well known that such interference is generally in the form of spurious bursts of static; these give rise to pronounced "crackles" and "bangs" which tend to make reception unintelligible.

Reduction of Static Interference

A limiter can be set to reduce the amplitude of the peaks so that this does not exceed the amplitude of the required signal. The noise is not eliminated by this means, but its effect is reduced to such an extent that signals can be read through it. The ideal form of limiter is that which is self-adjusting to the amplitude of the signal. That is, the limiter "chops off" any noise peaks which are greater in amplitude than the signal, whether it be modulated or C.W. Many limiters, however, are not self-adjusting in this way, but can be adjusted manually to give any desired degree of "cut" to the noise. Clearly, if the noise is not to an excessive degree the signal will also be cut. As a result, the signal volume level is reduced and a certain amount of distortion is introduced. In severe cases, however, it is found worth while to sacrifice a certain amount of signal volume and quality in order to reduce the noise level. After all, the final requirement is a maximum signal-to-noise ratio.

Types of Limiter

There are three or four principal types of noise limiters, but there are in addition several variants of these which have been developed by manufacturers for inclusion in their receivers. A very simple and old type of noise limiter consists of nothing more than two "Westovers" connected in parallel, but with reversed polarity; these are connected in series with a fixed condenser across the telephone or speaker terminals. During normal reception the rectifiers have a certain small by-passing effect on the audio signal, but this effect is more pronounced on sudden noise peaks. Two rectifiers are used in reversed polarity so that the device is effective on both positive and negative half-cycles.

Parallel Diode Limiter

It is more customary to use a diode or double-diode valve for noise limiting, and there are two principal ways in which this can be done: the diode may be connected in series or in parallel with the A.F. output from the second detector. Fig. 1 shows a parallel method of connection where D1 is the second detector and D2 is the limiter. The resistance marked R2 is the A.F. load for the second detector, and the A.F. signal is taken from its upper (negative) end. The cathode of D2 is also connected to this point, however, with the result that, when there is an incoming signal, the cathode is biased negatively with respect to earth. Hence, the anode of D2 was connected to the earth line, D2 would conduct and therefore act as a short-circuit across the audio lead.

But the anode is given a negative bias of such a value that the diode is just prevented from conducting during reception of the signal alone. In the event of noise peaks being applied to the second detector, the cathode of D2 is made more negative. In consequence of this, D2 will conduct and so prevent the application of A.F. to the A.F. amplifier. Therefore, during noise peaks, the amplifier is effectively muted.

In Fig. 1 the anode bias for D2 is shown as being taken from a battery, through a potentiometer. In practice the necessary bias voltage would normally be taken from a convenient point in the H.T. system.

A single-diode series limiter is shown in Fig. 2. In this case, the A.F. supply from the second detector to the amplifier is taken through the diode D2. This diode is...
given an initial bias with the result that it is normally conductive. Only when the anode is driven more negative by noise peaks does D2 cease to conduct, so breaking the A.F. feed and muting the amplifier.

Another method of producing a noise-limiting effect is by operating the first A.F. valve (a triode) at such a low anode voltage that the valve operates close to the saturation point. Noise peaks “kick over” the valve so that it is completely saturated and so becomes effectively muted. This arrangement has obvious disadvantages, chief of which is that a certain amount of distortion is virtually inevitable. An improvement is obtained by employing a pentode, as shown in Fig. 3, by applying a reduced and variable H.T. supply to the screen grid. Saturation again occurs, but better reproduction is possible due to the straighter characteristic of the pentode.

Among the various specialised types of noise limiter is that shown in Fig. 4. This is used in one up-to-date American communications receiver, and is both interesting and efficient. It will be seen that a double-diode is used as both second detector and noise limiter, the two sections of the valve being marked D1 and D2 respectively. The limiter under consideration has the advantage of being very largely self-regulating in that the “gate opening” provided for the noise is controlled by the signal being received.

It will be seen that the anodes of both diodes are connected together and to the I.F. transformer. Rectified A.F. voltages appear across the load resistor marked R4. The cathode of D2 is positively biased through a potentiometer (the front panel limiter control) with the result that this diode cannot operate until its anode is made more positive than its cathode. D1, on the other hand, will operate when its anode is made only slightly negative. Thus R will be seen that D1 is always operative in the presence of any signal, whereas D2 will operate only when a signal of more than a certain amplitude (dependent upon the bias applied to its grid by means of the limiter control) is fed to its anode. In other words, it will operate only when noise peaks are present.

Both signal and noise voltages appear across the load resistor R3, but only noise voltages across R4, which may be regarded as the load resistor of D2. The slider of this variable resistor is earthed and therefore the voltages across R3 are in opposition to those across R2. And since the voltages across both of these resistors is applied to the A.F. amplifier, it will be seen that the noise voltages are cancelled.

The action of the circuit may be found rather easier to follow by glancing at Fig. 5, which is a simplified and rearranged version of the same thing.

Referring again to Fig. 4, it should be pointed out that R3 and the small variable condenser between one end of this and earth are pre-set components, and are set by the manufacturers before the receiver is issued. Resistor R4 is the normal operating control and is set so that D2 is biased well beyond cut-off when limiter action is not required. During reception of telephony when noise is present, the control is turned until the required degree of limiting is obtained. For C.W. reception it is best to turn the R.F. control fully clockwise and to reduce the setting of the A.F. control; this increases the ratio of signal strength to R.F.O. amplitude.

Another type of noise limiter—more correctly, a noise filter—is sometimes used in communications receivers. This takes the form of an A.F. choke in series with a fixed condenser; this is connected in parallel with the audio-frequency volume control by means of an “in-out” switch. The filter is designed to be approximately resonant at frequencies of the order of 1,000 c/s, but produces a sharp cut-off above and below a band around 1,000 c/s. In other cases, the filter cuts off below about 400 c/s, but gives reasonably uniform response at higher frequencies.

The use of a 1,000-cycle filter gives another important advantage: that of increasing the effective selectivity of the receive, especially on C.W. reception. If the filter is sharply resonant at the frequency mentioned, most of the adjacent-channel interference can be tuned out by careful adjustment of the beat-frequency oscillator tuning control. A sharply tuned filter of this kind is not, however, very satisfactory for use on telephony. The audio-frequency amplifier of a communications receiver is generally made for only a limited power output; say, 2.5 watts maximum undistorted output. So limiting the output the main object is to reduce the rating of the output valves. This, in turn, is done to ensure that there shall not be an excessive temperature rise after the receiver is first switched on.
A Loud-speaker One-valver

WHEN recalling some of the circuits used many years ago with a view to obtaining maximum volume with a single valve, the writer decided to see what could be done in this direction with a modern valve. After some experiments a circuit was arrived upon which gives good speaker volume from the local stations. The volume is actually greater than that obtained from a normal Def-L.F. receiver. Of course, even better results could be obtained by using a valve such as a 6V6 or 6L6, but these are really separate valve elements in the same envelope and cannot be called single valves in the sense used in the old sets.

The circuit is shown in Fig. 1, and is a reflex valve. The theory of operation is as follows: the signal is tuned in as usual by the first tuned circuit, and amplified by the pentode in the same way as a normal H.F. amplifier. Reaction is also applied, mainly because it cannot be obtained with the detector as the latter is not a valve. This reaction gives some build-up of the signal, and this is then passed through the 0.003 mfd. condenser to the detector, the H.F.C. barring its passage in that direction. It is then tuned by means of the second circuit in the normal way; demodulated and presented to the primary of the L.F. transformer as an L.F. signal. The secondary of the transformer feeds the signal back to the earthed end of the first tuning coil, which presents negligible resistance to its passage so that it reaches the valve and is amplified. The signal then passes through the reaction coil and H.F.C. and is heard in the speaker.

Thus it will be seen that the valve is acting as both H.F. amplifier and L.F. amplifier. The H.F. gain is naturally not as high as would be obtained by using a proper valve (or the pentode must be of the L.F. type for final amplification), but, due to the use of reaction, it does give a considerable increase of volume.

Construction

Fig. 2 shows the panel layout, and a fairly large panel is needed to accommodate the two 2205 mfd., air-spaced tuning condensers. There are also two wave-change switches, and on-off switch and reaction control. The baseboard and wiring are shown in Fig. 3. Because of the nature of the circuit it is recommended that the layout is followed, and also the run of wiring as shown.

Old type plug-in coils are used as these give good gain, although modern coils could be tried in the set if desired. There are three coils to the left—reaction, medium-wave and long-wave loading coils. If desired, the long-wave coil holder could be omitted and wave-changing effected by removing the medium-wave coil and plugging in another. The right-hand two coils are also for dual-wave operation in the same way, and if plugging-in is resorted to in one holder only will be wanted. The coils are approximately 5 in. in diameter and the turns are as follows: medium-wave, 15 turns; long-wave, 200 turns; reaction, 13 turns. The reaction coil should not be larger than is absolutely necessary, as it is in the anode circuit of the H.F. amplifier.

The transformer should be a good type with step-up about 1:4. The H.F.C. is a bi-conical model and should also be of good quality, for it has to couple the stages.

A Triatron-Zincite detector was used, and this is semi-permanent. When the receiver is switched off the H.F. stage naturally ceases to function and no signal is presented to the detector. Because of this a setting will not deteriorate for quite a long period. To facilitate resetting, the detector is mounted above the L.F. transformer, not on the baseboard.

Operation

A 12 volt battery is wanted, and a valve of the Consor 220HTF type. Both the wave-change switches must be set to the same range, or similar coils inserted. The detector should then be set and the receiver switched on. Both tuning condensers will have to be adjusted to tune in the signal, and the reaction coil moved towards or away from the other coils as required. The detector can then be adjusted for maximum volume—which will be good speaker strength from local stations. Actually it will be found that little or no reaction is wanted unless phones are used and distant stations tuned in. Although operating efficiently on loud signals the detector is not.

Fig. 2.—Panel layout. (A fairly large panel is required.)
equal to a valve for the reception of distant signals, and the receiver is not intended for this.

If reaction cannot be obtained the leads to the reaction coil should be reversed. Care should be taken to see that the medium- and long-wave coils are both connected in the same "sense," as shown in Fig. 3.

A Super Without the Het

Details of a Recent Invention for the Reception of Wireless, Television and Similar Signals.

By D'arcy Ford

This invention relates to circuits, systems, or apparatus for the reception of wireless, television, and the like signals, of the type in which the frequency of the incoming signal is changed in the frequency-changer circuits.

The type of frequency-changer receiving apparatus in general use is the superheterodyne, in which a local oscillator is used to generate an oscillation to mix with the incoming signals, and the output of the frequency-changer circuit is at intermediate frequency. The local oscillator is generally variable-tuned, and kept at a constant frequency difference from the signal frequency over the tuning range of the receiving apparatus.

In the receiving apparatus which is the subject of this invention, the variable-tuned local oscillator, which generates a local oscillation to mix with the incoming signals, and which is kept at a constant frequency difference from the signal frequency, is not used or required. The frequency-changer circuit or apparatus is so designed or made that it oscillates at the frequency which is required as the intermediate frequency. The incoming signals are fed or injected into the frequency-changer circuit and modulate the locally generated intermediate-frequency oscillation in any suitable manner or by any suitable method.

The circuits or apparatus in the receiver may be so designed or made that all unwanted frequencies in any part of the receiving apparatus may be filtered out or bypassed in any desired manner, and the wanted frequencies used for the purposes of the invention. Any suitable method of rectification or detection may be employed, and any type of output of the receiver, radio-frequency amplification, intermediate-frequency amplification, and audio-frequency amplification may be used with this invention in any desired manner. Any form of feedback may be used if desired, and any types or forms of controls.

Rectification

If desired, the circuits or apparatus may be so designed or made that rectification of the incoming signals takes place in a stage before the frequency-changer circuit. The rectified signals may be injected into the frequency-changer circuit, and modulate the intermediate-frequency oscillation by any suitable method.

In the superheterodyne type of receiving apparatus
there are three fundamental frequencies: (1) The input at carrier frequency; (2) The locally generated oscillation frequency; (3) The output of the frequency-changer circuit or intermediate frequency. In the receiving apparatus which is the subject of this invention there are two fundamental frequencies: (1) The input at signal frequency; (2) The output of the frequency-changer circuit at the locally generated intermediate frequency.

As a modification of this invention, there may be provided an additional or second frequency-changer circuit, which locally generates an intermediate-frequency oscillation at a different frequency from the first frequency-changer circuit. The first intermediate-frequency output, before or after amplification, may be injected into the second frequency-changer circuit, and modulate the intermediate-frequency oscillation by any suitable method. The output of the second frequency-changer circuit may be amplified or rectified as desired before the output stage of the receiver. This would be a double frequency-changer, and there would be three fundamental frequencies: (1) The input at signal frequency; (2) the output of the first frequency-changer circuit at intermediate frequency; (3) the output of the second frequency-changer circuit at second intermediate frequency.

As a further modification, or modifications, the invention as described may be used if desired in connection with or combined with any suitable type of circuit oscillator, heterodyne oscillator or apparatus for any suitable purpose.

In a convenient manner, or convenient methods of carrying out the invention, circuits or apparatus may be designed or made in any suitable manner, or all or any of the principles described. Fig. 2 shows an octave frequency-changer valve circuit.

The suggested values for the resistors for a first trial with a Mullard FC2A valve are as follows:

R1, 150,000/200,000 ohms; R2, 50,000/200,000 ohms; R3, 25,000/50,000 ohms; R4, 25,000/50,000 ohms; R5, 20,000/40,000 ohms.

One aim in using the invention is to obtain a quiet background. If no noises are coming in from the aerial, there is no point in generating them in the receiver!

A tuned R.F. stage would give added selectivity and improved signal strength, and even then there would be only two variably-tuned circuits—all others are fixed or preset.

A.V.C. can be applied to the R.F. and I.F. amplifiers in the usual manner, but A.V.C. to a self-oscillating F.C. valve could be separately studied before being applied.

The frequency-changer valve appears to work best when it is a little more than just oscillating, and this is convenient for the input to the I.F. amplifier.

It is suggested that in an experimental receiver a rectified current meter be used in the " second detector " (say on an 0-500 microammeter in the diode lead). This should be watched for the I.F. unmodulated oscillation coming through, and the oscillator kept a little more than just oscillating. For commercial receivers the meter would not be necessary.

Valves

It is thought that the F.C. valve oscillating so gently would not give a constant voltage of output, a separate oscillator could be used and made to oscillate a little more strongly, and a portion of its output taken from a potentiometer—which a fixed potentiometer with a variable oscillator control, or a variable potentiometer with a fixed O.C.

The oscillator anode of the FC2A valve could then be connected to the screen, and a grid leak and condenser used with the F.C. valve for the input from the oscillator. A.V.C. could probably be applied to it without difficulty. The early experiments were with a detector before or combined with an oscillator-frequency-changer valve, and this type of circuit still appears to have possibilities to inject the rectified signal voltages into the F.C. valve.

Any valve in which the oscillator grid of the triode section is connected to G1 is worth giving a trial. Whether or not any special valves will be developed in the future will depend on the value of the invention.

The experiments have been carried out with an intermediate frequency of about 150 kc/s. A higher I.F. than this could be used for the short waves, and probably also the medium waves, but the best I.F. for a long-wave receiver can be determined later.

Modification

With an experimental type of circuit, the first I.F. transformer and the oscillator coil could be combined in one component, by an extra winding or a centre tap to the I.F. transformer-oscillator coil. A variably tuned oscillator coil would probably be better in an experimental receiver.

This invention was first thought out in general principles about 10 years ago, and the writer confesses he has worked very hard over it. He very much regrets to say that he cannot possibly promise to reply personally to all correspondents.

An application for a patent has been made for this invention, but its commercial possibilities are at present undecided.

WORKSHOP CALCULATIONS TABLES AND FORMULÆ

Eighth Edition

by F. J. CAMM

A handbook dealing with methods of calculation, solution to workshop problems, and the rules and formulae necessary in various workshop processes. It contains all the information a mechanic normally requires.

From all booksellers, 6/- net, by post 6/6 from the publisher,

GEORGE NEWNES LTD. (Book Dept.),
Tower House, Southampton Street, W.C.2.

An octave-frequency-changer valve circuit.
A Useful Test Oscillator

A Handy Accessory
Described by 2ATV

The "ideal" receiver for post-war use was in process of being built (and still is!) and the need arose for a test oscillator with which to align the various tuned circuits. A search in the cupboard and a tour of the local "junk" shops produced the materials and ensure that the frequency of that output remains unaffected by the setting of the attenuator. The R.F. choke L2 must be of good quality and suitable for the frequency range it is desired to cover. In practice it is best to use two units in series, a short-wave choke.
connected to a "broadcast" component, the latter being at the H.T. end of the chain. The Helsing system of modulation is used, the audio oscillator being a low-frequency version of the R.F. circuit. When not required, it is switched out of circuit by means of a switch across the A.F. choke winding. A final point is that the outputs are fitted with isolating capacitors, so that they can safely be applied to points at high potential.

Construction

The cabinet and chassis are built up from sheet aluminum, the chassis being fixed to the panel by brackets so that the whole oscillator can be removed as a complete unit, if necessary, for servicing purposes. The covering handles were made from ¼ in. rod bent to shape, the ends being drilled and tapped into the fixing screws. A hinged lid is provided for easy insertion of the plug-in coils; switched inductances were tried, but discarded as the longer wiring necessitated resulted in parasitic oscillation.

The disposition of the components was not found to be critical, and there was no trouble in obtaining a symmetrical panel layout. Naturally, no chances were taken, the power pack being located at the opposite end of the chassis to the R.F. section, with the audio circuits in the centre. The change-over switch from R.F. to modulated R.F. is ganged with a similar switch to which are connected panel indication lamps, as shown in Fig. 1.

It should be noted that the tuning capacitor C4 must be insulated from the chassis, which means that the mounting bracket and the extension spindle, if one is used, must be above suspicion. The dial shown in the photograph was home constructed, being larger than is normally obtainable, in order to take full advantage of the space available. The scales were further "opened out" by arranging for the dial to rotate some 360 deg. This was done by the use of a double-card drive system, a sketch of which is given in Fig. 2. This self-explanatory figure shows that perhaps should be explained being that the small drum should have a diameter slightly greater than the radius of the large drum.

Dial

The main dial plate, like the smaller one, was made of 0.06 s.w.g. aluminum, the boss being turned from an old scrap of dural. A small knob could be used at the boss where turning facilities are not available, the boss for the purpose being one of the small knobs as sold by Raynolds, Webb's and other firms. The 360 divisions were cut with a scriber, as were the individual scale markings after the oscillator had been calibrated. The numerals were stamped in with Imperial numerals, and the dial then cleaned up with emery paper.

The satin finish, for the purpose of preventing electric shock, was obtained by soaking the plate for some minutes in a strong solution of household soda. The induration is blackened by warming the plate and rubbing over with cobweb's beard, the surplus being removed with a clean rag.

Range

As before mentioned, the various ranges are covered by plug-in coils. The Eddystone standard four-pole type was used on this particular instrument, the primary winding being removed in each case. The secondary winding is then tapped at about one-third the number of turns from the grid end. The range covered by a coil will depend on factors which vary in each individual case, so that it is not possible to give precise figures. But, generally, four coils will be sufficient to cover the popular I.F. ranges, and the medium and short-wave bands. As the unit gives an ample output, harmonics afford adequate signals up to some 100 m. The noise on the primary side is negligible, and the R.C coil from 2 to 7 m. For medium waves, type P ranges from 600 to 1,200 kc/s. In order to provide signals at the modern intermediate frequencies, it is necessary to take off some 600 turns from the secondary winding, using a type B.R. coil, and the coverage is then some 60 to 1,200 kc/s.

The remainder of the construction is quite straightforward. It should be remembered, of course, that it is necessary to entirely screen the attenuator network and the output leads, apart from the instrument itself, if a satisfactory low minimum output is to be obtained. Regarding the power supplies, half-wave rectification was found quite good enough, and 120 volts H.T. ample.

LIST OF COMPONENTS

<table>
<thead>
<tr>
<th>Part</th>
<th>Value</th>
<th>Recommended Makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>100,000 ohms</td>
<td>Erie, Dubiler, Bolgin, etc.</td>
</tr>
<tr>
<td>R2</td>
<td>100,000</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>R3</td>
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<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>R4</td>
<td>0.05</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>R5</td>
<td>0.05</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>R6</td>
<td>10,000</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>C1</td>
<td>0.05 mfd.</td>
<td>T.C.C., Bolgin, Huns, Bolgin, etc.</td>
</tr>
<tr>
<td>C2</td>
<td>0.05</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>C3</td>
<td>0.05</td>
<td>&quot; &quot; &quot;</td>
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<tr>
<td>C4</td>
<td>0.05</td>
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<td>C5</td>
<td>0.05</td>
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<td>C6</td>
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<td>C7</td>
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<td>C9</td>
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<td>&quot; &quot; &quot;</td>
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<tr>
<td>C10</td>
<td>0.05</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>L1</td>
<td>1000 turn</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>L2</td>
<td>1000 turn</td>
<td>&quot; &quot; &quot;</td>
</tr>
<tr>
<td>L3</td>
<td>5 henrys choke, tapped, tuned if necessary by parallel capacitance</td>
<td>Varley</td>
</tr>
</tbody>
</table>
ON YOUR WAVELENGTH

By THERMION

Our Forces Issue

As readers in the Forces know, we produced a special edition of this journal during the war, which was distributed in the various Forces libraries, so that Forces were available in most of the Forces libraries. It was a gesture made by the proprietors of this journal to those who were uprooted from their family life and sent to districts where normal methods of distribution were not available. The receipt of their favourite journal kept our readers abroad, and at home for that matter, in touch with their hobby and helped to lessen the tedium of Service life.

I am reminded of this upon receipt of the following letter from Mr. R. C. B. Beadsworth, whom my readers will remember was G3IT before the war, and Secretary of the Romford Radio Society:

"I would like to thank your organisation for the free distribution of PRACTICAL WIRELESS to men serving in the Forces. I was always fortunate in being able to get hold of it first during my year's stay on the Gold Coast while serving as a P.O. Radio Mechanic with the R.N. Now I have been demobilised I have renewed the reigns of the above society and ask if you can give us publicity as you always did pre-war. We have resumed meetings and are holding them every fortnight at 8.30 p.m. at the Red Triangle Club, North Street, Romford, the dates for the month are 9th and 23rd and we would welcome new members. Our programme will be of special interest to A.A. licences and newcomers."—Mr. Beadsworth's address is 9, Geneva Gardens, Whalebone Lane North, Chadwell Heath, Essex.

The Electronic Navigator

In order to explore the post-war possibilities of radar in its application to an improved navigational technique, the United States Maritime Commission is testing five sets of a new type of radar equipment. The new equipment is called the electronic navigator. While somewhat different from the radar of the armed forces, the electronic navigator has indirect possibility of post-war application to Merchant Marine operations. Major advantages have resulted from collision at sea under fog or in darkness with icebergs or other vessels. It is expected that the electronic navigator will do much to diminish this hazard.

Chinese Radio Puzzle

American and Chinese authorities are amazed these days at radio stations assumed to be operating somewhere in China on 1,450 kc. and being on the air uninterrupted for 24 hours a day. This station is broadcasting only American music of transmissions and records, with hardly any repetition of the selections. Thus, it is believed that there must be a tremendous store of records from whichever source the station operates—and even more astounding is the fact that not a single spoken word is heard during the entire day's broadcasts.

What They Say...

"American plans for post-war television are far ahead of any European developments," stated Royal V. Howard, vice-president in charge of Engineering of the Associated Broadcasters, Inc., in an address before the Institute of Radio Engineers of the Engineering Club in San Francisco, upon his return from Europe, where he headed a special scientific staff.

"What we need if we are to build a good peace is the reverse of what happened at the building of the Tower of Babel...I believe that we can achieve that common language which means understanding and working unity among nations and I firmly believe that one of the most important instruments is radio. Where the Tower of Babel brought confusion, the towers of broadcasting can help the world work out a worthy peace."—Edgar Kohake, president of the Mutual Broadcasting System, New York, in a special broadcast to Europe on 811 in Voice of America.

Bits About Here, There and Everywhere

Radio censorship in the United States ended 24 hours after Japan surrendered. Over a thousand electronic devices are being prepared to do jobs cheaper and better than they can be done by man. A consolation; someone is still needed to turn the button on. James E. Carson has been appointed Network Service Manager of the CBS Cadena de las Americas. The Third Inter-American Radio Conference is to begin on September 1st in Rio de Janeiro. The Yellow Cab Co. of Washington, asked for the authority to experiment in the radio dispatching of cabs. The Roll System, in the United States, reports that by the end of this year it expects to have 1,500 miles of coaxial cable network manufactured and at least three-quarters of that mileage in the ground.

Plans for Radio in Nigeria

Plans recently approved by the Nigerian Legislative Council, which will take from 10 to 20 years to implement fully and probably costing some $80,000,000 in all, provide the erection of a broadcasting service and development of telecommunications in this country.

FRESH FIELDS TO CONQUER

Romantic poets shed their tears—
It needs their very tears.
To leave poor Cupid high and dry
And turn their thoughts "to others."
Deserting romance in this way,
The poet's spirit finds a way
Of subjects such as "villas?"?
His sophisticated fancy soaring high,
To earth falls plump and true.
When not for him the lover sighs,
But simply murmurs "villas."

What poppycock! What pumping punk!
How blind the bard must be,
Who cannot in the march of Science
Fresh romance ever see.
Man, now endowed with Godlike power,
Flies hunting through the skies,
And every day fresh wonders stand
Revealed before his eyes.
This we pronounce in ringing voice
And will not back down:
There's romance to the sixth degree
Found in the March of Science.

"Tocca!"
The Decca "Navigator"

A Device for Controlling Ships Coursed by Radio on the sea or in the air, which carries the Decca Navigator, can plot its position and travel a course to a margin of error which can be reckoned in yards. The accuracy of the system expressed in a measurement of time is 2,000,000 of a second.

The "Navigator," works on different transmissions received simultaneously on the one aerial. The space lines are indicated on the chart by coloured lines. Each line is numbered. The space between adjacent lines is called a "lane." The energy received is converted to readings on the dials which are in the same colours. The dial indicator is known as the Decimeter, the readings of which are given by a pointer which indicates on a large dial calibrated in hundredths of a lane. Units, tens and hundreds of lanes are indicated by three dials, the readings of which are visible through small apertures in the main dial.

As a result of one of the many patented features of the design, the Decimeter readings are unaffected by static, morse and other forms of interference.

The Decca Navigator differs radically from Radar technique which, in general, is based on short-wave pulse transmissions and the interpretation of these pulses on a cathode-ray tube by a skilled operator; the Decca system utilizes unmodulated continuous long-wave transmissions which operate direct reading orders. Because it utilizes very long waves its readings are unaffected by intervening objects. It is useful at long range as well as within a mile or two of the transmitting stations, and operates with equal efficiency at ground level or high altitude—over land or sea.

World-wide Operation

The Decca Navigator, given the co-operation of suitable stations, will be operable all over the world. Recent tests have shown it to be twice as accurate as any other known practicable method of navigation. With three radio transmitters placed one hundred miles apart, two space patterns of approximately three hundred divisions or lanes are secured. Each lane is divisible into tenths and hundredths. Thus any craft travelling

Mr. H. F. Schwarz and Mr. W. J. O'Brien, the inventors of the "Navigator."
Radio Butlin

Description of Equipment Installed at Butlin's Holiday Camp, Filey

Mr. St. John Cooper at the controls of Radio Butlin.

(a) Alarm Signal Generator. This unit is an electronic oscillator which generates three distinctive warning notes without employing any mechanical moving parts, these signals being controlled by relays from the console, and are used for sounding calls mainly for administrative purposes.

(b) Monitor Amplifier. This is a small, high quality low level output amplifier which is normally connected to the loudspeakers fitted in the control room. This amplifier enables the operator at the console to check and listen to all broadcasts before radiating them to the various sections of the camp. The loudspeaker is selected via an automatic relay so that it becomes inoperative when microphone announcements are made from the console, thus there is no possibility of microphone howl.

(c) Time Clock Panel. An electric clock with large dials has been installed for use of the operator in order that he can synchronize the programmes and arrangements to fit in with the camp routine.

The equipment has been installed to provide a comprehensive and most flexible system for entertaining the camp and for administrative purposes. After the camp was surveyed it was decided that approximately 1 kilowatt of power would be needed to cover all the parts, chalets, swimming pool, bowling, badminton court, tennis court, etc., and at least 12 separate programmes would be required during the peak entertainment hours of the camp. To provide the most flexible arrangement possible it was decided that the loudspeakers should be installed on as many circuits as possible. Accordingly a total of 60 independent groups was decided upon, which number includes for future extensions, without modifications to the layout of the apparatus, etc. It was decided that the size of the equipment and complex facilities needed would be such that it would be impossible to obtain full control by units mounted on the main amplifier rack assembly, therefore a control console was designed from which immediate control of the entire system and programme selection could be under the care of a single operator. Accordingly the main equipment consists of two assemblies:

1. Seven Channel Rack with:
(a) Sixteen power amplifiers each capable of developing over 80 watts total output, with all channels in operation approximately 1,000 watts of audio power is radiated.
(b) Remote relay panels for automatically controlling the loudspeaker circuits, selecting power amplifiers, and connecting their high tension circuits. Illuminated indicators immediately show when the appropriate amplifiers and circuits have been "made alive" by the operator. These panels are those mounted on the top of the amplifier rack.
(c) Monitor test, output meter and valve test meters are provided in duplicate for routine checking, fault diagnosis, etc., whilst monitor loudspeakers are mounted on the panels for listening to the speech or music output of the apparatus under test.
(d) Two independent high quality radio units have been provided so that, at all times, it is possible for two separate radio broadcasts to be relayed to the predetermined sections of the camp, thus, for instance, news bulletins can be broadcast to the reading rooms, whilst light music programmes can be simultaneously broadcast to other groups, bars and restaurants.
(e) Time Clock Panel. An electric clock with large dials has been installed for use of the operator in order that he can synchronize the programmes and arrangements to fit in with the camp routine.

2. Control Console

This is the heart of the entire installation and from here the incoming programmes are selected, monitored, and distributed as and when required to the various sections of the camp. The main units of this console are:
(a) Illuminated Loudspeaker Group Indicator Panel. This shows the schematic layout of the camp and indicator lamps are illuminated automatically to show the operator which loudspeaker groups are in operation at any one time.
(b) Loudspeaker Group Selector Panel. This panel is placed immediately below the illuminated loudspeaker panel.
group indicator panel; it is fitted with sixty group selector switches for controlling the same number of loudspeaker groups; when one of the key switches is depressed it connects that particular section of loud-speakers to the input circuit of the appropriate power amplifier. Simultaneously, the contact indicators on the panel above are illuminated. In addition to the above six other switches labelled “sub-masters” are provided for each group of the loudspeaker circuits into six sections. These sub-masters are in turn connected to one “master switch”, thus when one is depressed the circuit is connected to the amplifier. 

This special arrangement has been provided to facilitate operation, especially for “paying” or as a calling system; for instance, if it is known that an executive is in one particular department, the call may be made via the telephone in that call only. In the case of the call to that section of the telephone, the appropriate sub-master, the other programmes and musical programmes in the other sections of the camp will not be interrupted. In the event of actual urgency, the probable whereabouts of the executives may be “switched” so that the call circuit is not interrupted, but the call is connected to the microphone in the section to which the executive is in attendance.

It will be noted that the indicator panel notifies the operator immediately which loudspeaker circuits are in commission, but he is also able to listen to the programme being transmitted to any of the loudspeaker lines by depressing a small switch mounted immediately above the loudspeaker group switch. Similar switches are, of course, provided for the sub-masters and master switches. Simultaneously with the operation of these monitor switches a special “peak reading” output indicator meter is fitted so that the operator can measure electrically the power being radiated and can adjust the volume controls situated in this panel to ensure that each channel is being operated with the loudness signal at the correct level. The monitor loudspeaker used for these tests is automatically disconnected when the control connexion is in use, but the indicator dia is left connected to the telephone. This meter is the one mounted on the right-hand side of the panel console microphone and is also equipped with an electric control which enables the operator to arrange and set up the various circuits for the operation of the loudspeaker circuits. Each power amplifier which feeds the respective loudspeaker groups is connected to the jack, and by inserting the appropriate plugs for the loudspeaker circuits, which may be either one of the twelve programmes he can choose the particular power to feed that all to one channel or to any combination that he desires. Thus it is possible, for instance, that one loudspeaker group can be radiating a news bulletin received via the radio unit, another group can be using a second radio unit or alternatively a gramophone programme; the swimming pool speakers can be in operation for announcements originating from the microphone installed there. An amplifying microphone is fitted in the theatre, enabling microphones installed in the theatre to be used in exactly the same manner as those used in the main dining-halls or in any of the other sections of the camp. The operator therefore has the choice of selecting any of the loudspeakers that he requires at the push of a button.

(c) Channel Selector Panel. This is the jack and cord mounted on the right-hand side of the console. It is provided with six sets of special “jacks” and cord plugs, which enables the operator to arrange and set up the various circuits. This panel can be used for selecting any of the twelve programmes he can connect to all to one channel or to any combination that may be necessary. Thus it is possible, for instance, that one loudspeaker group can be radiating a news bulletin received via the radio unit, another group can be using a second radio unit or alternatively a gramophone programme; the swimming pool speakers can be in operation for announcements originating from the microphone installed there. An amplifying microphone is fitted in the theatre, enabling microphones installed in the theatre to be used in exactly the same manner as those used in the main dining-halls or in any of the other sections of the camp. The operator therefore has the choice of selecting any of the loudspeakers that he requires at the push of a button.

(d) Input Selector Panel. This panel, which is situated on the left-hand side of the console, receives and arranges all the programmes that can be connected to the input circuits of the building. There is a 30 channel selector switch, each channel being connected to one of the input circuits of the building. The latter operates the 12 channels to the 60 independent loudspeaker groups, which are arranged in the building, and thus this panel connects the microphone circuit to the loudspeaker circuits.

(e) Gramophone. Two independent electric gramophone motors with connected “pick-ups,” treble and base controls provided, one on either side of the operator. These are so connected to the input selector switches that both may be in use simultaneously to provide two entirely separate programmes from gramophone records on separate channels, or alternatively to operate separate selected loudspeakers both gramophone units may be connected to one channel where “tuning” is required or continuously from one record to another. A unique indicator lamp is mounted on each playing disc control panel to ensure that the operator has the one amplifier and the other amplifier. These indicators do not become illuminated until the circuit has been “set up.”

The above-mentioned units are those which are visible from the front of the console, and those units which are employed for normal operation of the installation. Other intricate units are located inside the console, being readily accessible by opening doors at the rear. The most important items here are the line amplifiers. These are employed to raise the minute signals originating at the programme source to a sufficient level and power to feed the various circuits of the power amplifiers. There is one amplifier for each channel. They are mounted in pairs per unit, and each pair is entirely operated by A.C. mains supplies. These line amplifiers are fitted with an extremely efficient automatic volume control system, making it impossible for distortion to occur; for instance, when any amplifier is in use and the master volume controls for the particular microphone being used are adjusted, the amplifier will continue to give the correct output only. This not only operates on speech but can also be used for operating motors and adjustable lights.

For an installation of this character a large variety of types of speakers is necessary, each chosen to suit the varying acoustic and the changing functional purposes of the buildings. There is a 30 channel selector switch, each channel being connected to one of the input circuits of the building. The latter operates the 12 channels to the 60 independent loudspeaker groups, which are arranged in the building, and thus this panel connects the microphone circuit to the loudspeaker circuits.

For external use there is a number of weatherproof re-entrant horn-type speakers of unique design, which are able to radiate both musical and speech frequencies over a wide area of the camp. These are usually used for announcing the arrival of athletes, sports fields, tennis courts, swimming pool, boating lake, etc.
Improving Loudspeaker Performance—2

By S. O. MAWS

In Part I we were concerned with methods of extending the frequency response of moving-coil loudspeakers. Suppose that this is now as good as we can make it. In order to get the best reproduction of which the loudspeaker is capable some additional equipment such as a baffle-board, a horn or an acoustic labyrinth or something of this sort is necessary. This article is intended to give an account of these aids to high-quality reproduction.

![Diagram](https://example.com/baffle-diagram.png)

**Fig. 1.—A flat baffle-board illustrating an asymmetric mounting of the speaker.**

The simplest of these to understand is the flat baffle-board, illustrated in Fig. 1. The function of this is to prevent radiation from the back of the loudspeaker cancelling that from the front at low frequencies. This cancellation and resultant loss of power can occur when the front-to-back distance of the loudspeaker measured around the baffle equals half the wavelength of the radiated sound. The diaphragm of the loudspeaker is quite capable of withstanding this cancellation at high frequencies, as its dimensions are considerably greater than the wavelength of high-frequency sound waves.

For example, for a 3,500 c/s note is approximately 2in, and average loudspeakers usually have diameters of larger dimensions than this. As the wavelength of a 30 c/s note is 22ft, however, it is fairly obvious that, for a baffle to be successful at low frequencies, its dimension need to be particularly large. For a loss of 3 db. at 50 c/s, for example, a baffle measuring 8ft in diameter is necessary; a baffle measuring 36 in square, a size frequently used by experimenters, gives a loss of about 12 db. at 50 c/s. A point worth remembering, and it is brought out in Fig. 1, is that the loudspeaker should not be mounted centrally in a symmetrical baffle, but should ideally be so positioned that it is a different distance from the various edges of the baffle. The response curve of a loudspeaker mounted centrally in a symmetrical baffle shows a dip and a rise, as shown by Fig. 2.

![Diagram](https://example.com/baffle-response.png)

**Fig. 2.—Illustrating effect of symmetrical baffle mounting on frequency response.**

For the larger cabinets used to house commercial radio gramophones the figure is nearer 100 c/s, which is unfortunate as it happens to coincide with the base resonant frequency of the average 8in. moving-coil loudspeaker. There is thus an excessive response at 100 c/s, which accounts for the unpleasant "boomingness" of such radio grams. This effect can be considerably reduced by introducing some resistance into the acoustic tuned circuit, and one way of doing this is to place layers of felt (the type that is sold for putting under stair carpets is convenient) around the loudspeaker as suggested in Fig. 3. This acoustic damping is much more effective in closed cavities than in those with open backs. The idea, so often advocated, of lining the box with sound-absorbing material has very little to recommend it, since sound waves obviously have a velocity node at any reflecting surface. If there is little or no air movement at a surface, then any absorbent material placed on it cannot introduce much frictional loss unless it is a particularly thick layer. It is, however, good science to line the sides of the cabinet with felt if they are thin and hence liable to vibrate at their natural period, for this is another source of undesirable colouration in reproduction. The cross-battering of cabinets is another method of avoiding vibration of the sides.
Study of Fig. 3 will show that the cabinet is roughly equivalent to a bottle 3 ft. square. If the cabinet is less wide than it is tall, it is also an irregularly shaped bottle, which is a good thing. Moreover, the loudspeaker, being mounted at the top of the box, is azimuthally positioned in the bottle, which is again good practice.

**Acoustic Labyrinths**

So far we have regarded the resonance of air in a closed cavity as being undesirable, and if the resonant frequency lies within the frequency range over which the loudspeaker is efficient, then undoubtedly there will be an unwanted peak in the response curve. It is possible, however, to design an acoustic system to provide a boosting effect at a frequency just below the lower frequency limit of the loudspeaker, in which case the boost will help reproduction by holding up the response curve at low frequencies. We can design such a system as suggested in Fig. 4, in which the back has been removed so as to show the internal construction. In this system the front of the loudspeaker radiates both high and low frequencies directly into the room, but the back feeds the acoustic system formed by the two vertical chambers. The total length of the acoustic chamber is designed to be a quarter of a wavelength long at the bass resonant frequency of the loudspeaker used. If this happens to be, say, 50 c/s, then \( \lambda = \frac{4}{\lambda} \) so that each section of the chamber could be 2 ft. 9 in. long, giving a total length of 5 ft. 6 in., as required.

This is shown in Fig. 4. It is the length of the acoustic path from the loudspeaker to the final opening which is important here; the value of the cross-sectional area of the chamber does not matter much provided it is not smaller than the area of the loudspeaker diaphragm. The theory of this labyrinth is as follows. At the bass resonant frequency of the loudspeaker the labyrinth presents maximum acoustic impedance (it is similar to a quarter-wave aerial in this respect) and thus the amplitude of movement of the cone is reduced considerably. At lower frequencies the radiation from the port at the end of the labyrinth has a component in phase with the radiation from the front.

![Fig. 5. Showing the improvement in bass response produced by an acoustic labyrinth.](image)

![Fig. 4. An acoustic labyrinth. The front to back dimension is not critical.](image)

![Fig. 6. A particularly compact labyrinth.](image)
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Practical Hints

Simple Indicator Lights

HAVING need of some small indicator lights for a midget receiver, I devised this method of making them easily and cheaply.

I obtained from a chemist a small length of jin, diameter glass tubing which I sealed at one end by slowly rotating it in a gas flame. Then I made a scratch with a file on the side, and while the tube was still hot, I sucked off the end of a jin, from the sealed end with which I then broke off. I repeated this process until I had the required number of small tubes. Then I made the same number of jin holes in the front of the cabinet and secured the small tubes in these with a drop of glue at the back. The bulb holders, I mounted in a block of wood an inch square which had jin holes drilled in it at corresponding places to those on the front. The block is secured to the front with a 1/4-in. wood screw.—M. J. Collins (Caterham).

An Adjustable Bench Lamp

As I have a large number of radio repairs to do at home I found that the "light" question is always a problem, so I devised the adjustable bench lamp shown in the accompanying sketch.

It is made up from lengths of electric light conduit, a piece of wood for the base—15-in. long by 4-in. wide—to hold the plug, lampholder, conduit base plate and clamps.

The method of making and assembly is as follows:

Cut a piece of wood jin, thick by 15-in. long by 4-in. wide and on this mount the wall plate, and plug, etc., and screw the "G" clamp on the underside.

Cut the 4-in. pieces of conduit to the length shown, and with a hack-saw cut down centre about 4-in., then prise the cut either way with a piece of bar, round the ends, and drill hole through for OBA bolts. Make spacers to fit inside, and adjust these so that the other piece sits over to make a swivel joint.

The lampholder is either screwed or forced on to the end of a jin piece of tubing and a hole drilled in the bottom of the tin to slide the lampholder through.

The spacers can be made from lengths of brass tube, and the flex is twisted once round, and run through the tube. This saves any pull on the flex when adjusting the lamp.

When completed, the job can be given a coat of black enamel.—H. TANDLEY (Curtainholts).

Power Supply Modification

I HAD to make up a separate power pack, for use on 200 or 250 volts A.C. The only transformer available had only one primary winding, namely one for 250 v. The rewinding of the primary not being a job I would undertake lightly, I rewound the two low voltage secondaries to give 5 and 6.3 volts respectively when used from 200 v. These were both tapped to give the same from 250 v.

The 6.3-v. windings were brought out to 3 terminals to be selected as necessary. The 5 v. supply to the rectifier was connected as shown, and another key slot for the locating peg of the octal base was filed out with a small rat-tail file. Marks were painted on the valve base to indicate which position was for which mains voltage. Hence, simply by removing the valve from its socket and re-inserting it in a slightly different position the change from one voltage to the other can readily be made.

The H.T. can be set to its previous value with a potentiometer if necessary.—A. L. M. (Wolverhampton).
Impressions on the Wax
Review of the Latest Gramophone Records

H. M. V.
Grieg scored an immediate success when he played, in his own presence, his Concerto in A Minor, during his first appearance in England, at the Philharmonic Concert on May 3rd, 1943. The success was not, as in many cases, of a passing nature, in fact, one might well say that time has made the Concerto more and more popular as the years have rolled by. Much has been written about, and we shall say, the restricted appeal of classical music, but this work is an exception, and it is this which undoubtedly accounts for its increasing popularity and wide appeal.

Grieg is a master of creating and setting themes so that he full effect of his genius is revealed, and although his major works are sometimes criticized as regards their form, it is only natural that one whose art is predominantly rich in lyrical tendencies, to modify the generally accepted formation of classical compositions to suit the individual needs of his material.

With the Concerto in question, one enjoys music of a distinctive flavour which is enhanced by delightful melody, and rendered thrilling by its clever arrangement. The work, as recorded by H. M. V. on records 56632-36 (three records, six parts), is performed by Arthur Rubinstein as soloist and The Philadelphia Orchestra conducted by Eugene Ormandy. In this respect, comment is unnecessary, as one does not hear what one would expect from such a combination, namely, a perfectly superb performance.

To follow the above recording, I strongly recommend H. M. V. C31155-60, on which are two records of an excellent work by Beethoven, "Sonata in C Sharp Minor" (Op. 27, No. 2), played with skill and expression by Solomon.

The full title of the composition is "Sonata quasi una Fantasia," and the composer directed that it should be played in the manner of an improvisation or fantasia, and it is through the great beauty of the first movement that the name "Moonlight" has been coupled with the Sonata. Solomon's performance recreates the feeling that the greatest improviser in musical history—Beethoven—must have felt, using all the musical beauties and spirit of moonlight over the Lake of Lucerne, as a critic called Bellis wrote of the first movement.

From the pianoforte, let us turn to a tenor of great ability, and listen to Heddle Nash—with the Philadelphia Chamber Orchestra conducted by Maurice Miles—singing "The Messiah" from "Comfort Ye, My People." "Every Valley Shall Be Exalted".

These two arias are fine examples of Handel's melodic invention, and Heddle Nash gives us an splendid performance on H. M. V. C31545. The highlight in the vocals on this record is H. M. V. B12109, which is an exceptional recording by that great soprano, Elisabeth Schumann, accompanied at the piano by Gerald Moore. Haydn's, "She Never Told Her Love" and "The Sailor's Song" are two delightful songs which Elisabeth Schumann selected for this, her latest recording, and her rendering is an outstanding example of purity of tone, expression and style.

A tenor recording in the lighter Classical series which will be widely appreciated is that by Robert Wilson with Orchestra conducted by Henry Good, who sings with the utmost expression and "Chicken Dimples" and "You Are My Song Divine" on H. M. V. B12109.

The Boston Pomerade Orchestra, conducted by Arthur Fielder, have made a fine recording of Tchaikovsky's "Eugene Onegin—Waltz—Act 2, Op. 24." This is a delightful melodic composition, enchanting and creative of the atmosphere of a great Russian ball reminiscent of the Winter Palace. This recording has a very great appeal to those who enjoy fine orchestral music.

Columbia
"Symphony No. 6 in B Minor (Pathetique) Op. 74" is often stated to be the best known and loved of all Tchaikovsky's symphonies, yet strangely enough, when he conducted its first performance at St. Petersburg on October 28th, 1876, it failed to make any impression, and a few days later, the great composer was dead. There was a sensation in the exact cause of his death, and it is a strange coincidence that the day after the first performance, Tchaikovsky told his publishers to have the work under the title suggested by his brother Modeste, namely, "Pathetic" Symphony.

Following closely on the sensations and publicity given to his death, the second performance received an enthusiastic reception, and although the work now stands on its merits as a Symphony, his popularity has never diminished. It is said of the Symphony, that it was the saddest music Tchaikovsky ever wrote, but this is very misleading of the work as a whole, as for example the nature of the two middle movements which reveal the lighter, happier and stirring side of his nature. The Columbia recording is by the Philharmonic Symphony Orchestra of New York, conducted by Dr. Artur Rodzinski, on Columbia DX1280 (five records—ten parts).

As a distinct contrast to the above, the remaining side, Columbia record is by Harry Davidson and his Orchestra, playing No. 1617 of Old Time Dance Series on Columbia DX1211. This month, he has selected two fine numbers, "The Last Waltz" and "Navel Three Step," and like the other recordings in this series, they should make you feel gay and in a dancing mood.

On the reed, I recommend Columbia D11510: "Sonata in F—Allegro" and "Gigue." Both are played by Reginald Keel (clarinet) and Gerald Moore (piano).

Monte Ray has recorded two good numbers on Columbia FB3147, these are "One Day When We Were Young" and "Play Gipsy Play." He is accompanied by orchestra conducted by Eddie Griffths.

Victor Silverstein's String music make a very tempting record for dancers—if you can do the Tango—out of "Amargura" and "Mi Amigo," on Columbia FB3148. Two good tunes well played.

Parlophone
Richard Taitt is in fine form on Parlophone, RCO2054, on which he has recorded "I'll Turn To You" and "My Heart Is In Vienna Still." Geraldo and his Orchestra offer "There Must Be A Way" and "June Comes Around Every Year"—both fox trots—on Parlophone RCO2091. Fine dancing tunes, well orchestrated and presented.

Joe Daniels and His Hot Shots in "Drammati" play "Nice Going—Moderate Boogie" written by Joe himself and "Talk Of The Town." These are on Parlophone RFO291 and, as may be expected, they are pretty lively.

Harry Roy and his Band have selected two fox trots for their latest recording on Parlophone R7000, "I'd Rather Be Me," and "I Should Care.

Nos. 39 and 40 of The 1945 Super Rhythm-Style Series will be found on Parlophone RCO46. They are entitled "China Boy" and "Rosetta" and played by Teddy Wilson (piano) with rhythm accompaniment, and they are snappy in presentation and arrangement.

Rexall
"The one Rexall I have to mention this month has been a recorded by Teddy Foster and his Band, and they play "Takin' The Trains Out" and "Dream."
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Open to Discussion

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).

Voltage-dropping Calculations

SIR,—I received the May and June copies of Practical Wireless a little late. The delay has not been too much of an inconvenience as I was away in New Zealand during the time they were being delayed they arrived almost together. They are the first I've seen for some time now, and they certainly uphold the pre-war reputation Practical Wireless had.

On looking through the June issue, I noticed T. E. Millward's letter on voltage-dropping calculations for condensers in an A.C. heater circuit. While his solution is the correct one, I thought a simplified method would be of use to some of your readers. This method has the further advantage of using Ohm's Law, therefore, if we know any two factors we can find the unknown.

The usual formula is

$$ C = \frac{F}{t} \times \frac{1}{f} $$

where \( C \) = capacity in mfd, \( F \) = current in amperes, \( f \) = frequency in cycles, and \( t \) = time in seconds. This can be reduced to

$$ C = \frac{1}{f} \times \frac{F}{t} $$

and as 50 cycles are used in the solution and is the most common mains frequency, we can reduce it still further to

$$ C = 3184.7 \times \frac{F}{t} $$

For 25 c/s, multiply by 2; and for 100 c/s, divide by 2.

As \( C \) is acting as a resistance we are actually using Ohm's Law, if \( C = 3184.7 \times \frac{F}{t} \), then \( C \times \frac{F}{t} = 3184.7 \times 1 = 3184.7 \) volts, always remembering \( E \) in this case is voltage dropped.

In the case of four 6.3v, 0.3A and one 40v, 2.3A valves, with a mains supply of 230v, 50 cycles, total heater voltage of 66.4v at 0.3A and as the condenser voltage in quadrature relation to heater voltage, voltage to be dropped of \( \sqrt{230^2 - 66.4^2} = 220.5 \)

\( C = \frac{1}{f} \times \frac{F}{t} \)

As capacity reactance is negative, there is a voltage lag of 0.25 of a cycle, therefore the current to pilot lights of 0.3 amp, would be in their rated value when the set is switched on.

Thanking you for the prompt despatch of Practical Wireless and wishing you a speedy return to the weekly Practical Wireless—T. Moore (S.E.A.C.).

Mains Consumption

SIR,—A very useful estimate of the current consumption of a receiver or radiogram can be made without any expensive apparatus using the following method.

First make sure that all electrical apparatus in the house is switched off with the exception of the receiver. (N.B.—Clocks can be ignored since their consumption is negligible.)

Next, with the aid of a watch, count the number of revolutions of the disc in the electric light meter for a period of 1 minute. A shorter time would do, but the longer period gives greater accuracy. Most meters have either a time or spot marked on the disc to facilitate counting.

Once you have this figure the consumption may be arrived at in two ways. The first is only approximate, but usually sufficient for calculating the number of hours running which may be expected from a unit. It consists simply in switching off the radio and then switching on lights until the disc rotates at the same speed as when the set was on.

The claimed wattage of the lamps required is equal to the drain imposed by the set; for instance, if a 60-watt lamp together with a 15-watt lamp give roughly the same number of revolutions on the meter as the set, the figure of 75 watts may be taken as near enough.

The drawback of this method is that the wattage marked on lamps is often an approximate one only, and also it is difficult, however one juggles the lamps to get nearer than 5 watts. Usually this does not matter.

The second method will appeal to the mathematic-minded and is far more accurate.

Firstly, from the number of revolutions counted for the set in 5 minutes obtain the figure for one hour (i.e., multiply by 12). Next ascertain from the meter the number of revolutions per unit (K.W.H.). This will be marked on the case, and is usually somewhere between 1000-2000.

With these figures one can either work out actual watts consumption as

- **Set revolutions**
- **Watts**
- **Revs. per unit**
- **K.W.H.**
- **Revs. per K.W.H.**

- **or**
- **K.W.H.**
- **Revs. per unit**
- **Set revolutions**

As a guide it may be taken that an A.C. set will consume 45-85 watts with an extra 30-50 on gramophone according to the motor used. A.C./D.C. sets usually consume more since the voltage-dropping system for the heaters is less efficient than a transformer.

This latter method is equally applicable to iron, kettle, and other electrical equipment.—G. KEATING (R.A.F.).

Economy Superhet

SIR,—With reference to P. Streat's Economy Communications Superhet in July issue of Practical Wireless, I would like to point out one slight error in the circuit diagram as this may cause some constructors a lot of inconvenience.

The A.V.C. diode anode (VA) is connected directly to the triode anode (V3) which has about 180v. positive on it. Obviously a condenser should be inserted between the triode and diode anodes. I would suggest 0.01uf as a suitable value.

This is only a small point but it would have disastrous results as the diode (A.V.C.) would pass a large current and the grids of V1 and 2 would become positive in heavy grid current.—R. Badger (Sussex).

Station ZPA3

SIR,—In the current September issue of Practical Wireless your correspondent G. Elliot gives a station on 21,855mcs as having the call ZPA3. I think he is incorrect; this station opens at 2200 G.M.T. under the call ZPA3, and is located in Amsterdam. As Mr. Elliot says, it is used in conjunction with ZP1. Its frequency appears to be 11,880 kHz. On Sundays it appears to open earlier.—C. S. Lyen (Cambridge).

Condenser in Line Cord

SIR,—In the "Practical Hints" of your May edition, Mr. Hedley refers to the use of a condenser in lieu of a line cord or dropping resistor, and says that it uses a negligible amount of power, there being no heat loss. Now I am aware of the fact that the voltage and current are out of phase through the condenser, but even so there seems to be an unaccountable loss of energy somewhere. The power taken from the mains can be found by multiplying the mains voltage by the current taken. But if the power consumed by the set is worked out, this will naturally be less, and yet the "dropping" condenser uses no power. Where does this "lost" energy go to?
I hope you or one of your readers can help me.—

DAVID HOMA (N.W.).

Address Wanted

SIR,—Some time ago The British Short-wave League received an order for our Handbook from a Mr. R. McKillop, Inverness. In the letter forwarded he has requested that his address should be published in the Handbook. We have had no further request from him. It is possible that he may have died, or been unable to follow up the matter. If so, we can do nothing to help him. If not, we would like to have details of his address, if possible.

SIR,—Mr. McCulloh of Inverness, the Honorary Secretary of our Society, has forwarded to us an address which has been published in our Handbook. We have no further details of this address, and would like to have more information about it. If you have any information about this address, please let us know.

The Quest for Quality

SIR,—Other readers may be interested in what can be achieved in the realm of quality reproduction without spending much cash.

My domestic set, which dates originally from about 1912, was bought as a S.G. T.H.F. Battery Three months ago for about £15, making 10s. in, moving-coil speaker. I converted it to an equivalent mains operated version of the same, using a small amplifier with an equivalent output of about 10 watts. I have since added a tone control, which enables the speaker to be turned on or off without disturbing the bass or treble. The result is a very high-quality reproduction, far superior to anything I have heard from any other set.

SIR,—I am interested in the use of tone controls, and would be grateful for any information about this subject. I am also interested in the possibility of reproducing high-quality sound from an old set, using a modern amplifier.

SIR,—I have a set which was originally purchased in 1912, and which has been in use ever since. It has recently been converted to a mains-operated version, and the results are very satisfactory. I would be interested to hear from anyone who has experience of this type of conversion.

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The U.H.F. Bands

SIR,—I have often wondered about the use of U.H.F. bands in amateur radio. I would be interested to hear from anyone who has experience of this subject.

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entirely from a technical side. I like the present size of
the magazine, and hope you will not return to the large
heater appearance when bound, and also fits into
a normal bookcase shelf more easily.

In conclusion I may take this opportunity to remind
the society of the continued existence of the World
Friend Society of Radio Amateurs. With the ending of
the recent hostilities the society is keen to increase
its membership. Any interested readers can write direct
to or to our secretary G7AQ, and we shall be only too
pleased to supply details, rules and objects of the
society, etc.—L. D. COLEY (E. Yorks).

Our Three-valver

SIR,—I have just completed your 3-valve battery
receiver shown in September issue. I made one or
two modifications. I used a metal chassis and I did not use the aerial
windings on the aerial coil, but connected it by a small
condenser to the top of the grid winding. I used a
special, two-gang condenser with trimmers for
tuning, and used the zero beat at the 5th or 7th
interference: this necessitated a slight alteration on the actual
connections but has a much smoother reaction.—S. A.
Moore (Stowmarket).

Phase in Amplifiers

SIR,—Your letter in your October issue seemed to me,
on paper, while correct in its statements, not very
clear without curves to which I referred.

When the grid of a resistance loaded valve is on its
positive half cycle, the electrons comprising the alternat-
ing component of the anode current are leaving the anode
(increasing anode current). This direction of flow
corresponds with the anode being driven positive, as in fact, it does.
When the grid is negative, the alternating electronic
flow is relative to the anode, decreasing anode current, but this
is the direction in which electrons would flow on
the positive half cycle of a generator. In short, the
alternating anode is in phase with the generator of which the
anode is the live terminal; the voltage of this terminal
is as well known, in antiphase to the grid voltage.

Radio on the Road

SIR,—I wish to point out two slips on page 48 of
your November issue, 1945, in L. Jackson’s article.
Centre tap of the primary of the transformer (Fig. a)
should be connected to L.T. +, not 0 L.T.,—otherwise
there will be no current flowing.

A minor detail—also Fig. a—the contact for the
valve should be on the other side of the reed or it
will “muzzle.”

I am a very keen midget-set builder and am now
working on an entirely self contained set 4½in. x 5½in. x
4¾in.—R. COLLINGE (Loughton).

“P.W.” on Parade

SIR,—I would just like to send a word of congratulation
on the way that Practical Wireless has always
managed to be “on parade” during the difficult days
just gone by.

It may be of interest to you to know that copies of our
old faithful have been in evidence in Calcutta, Assam,
and also in India, although jealously guarded by their
owners.

In Calcutta a short while ago I spotted a copy of
Practical Wireless in its original size and on closer
inspection I found a note from the Radiotrunipula number
1931. I sent it home as a real souvenir of the good
days, and hung upon every note he played with bated breath.

If not with the highest critical faculties, much other
good music making was allowed, more or less, to
perish by the wayside, in the overpowering rays of
the great one’s glory and omnipotence.

In closing, I would like to say that Practical Wireless, and so I have had to rely upon
the wise counsel of my countryside for occasional copies to
send me out East. Now that the war is finished maybe
this unhappy state of affairs will disappear, and perhaps
also we can look forward to seeing our old friend lying
on the mat each week very soon.

I don’t lay claim to being the inevitable “reader from
No. 1,” you know, but of all the issues that I have
browsed through since 1923 I guess yours tops the lot for
the average class of enthusiast. Now for a request! Has
anyone still got a copy of Wireless & Magazine for
January, 1927, that has escaped the ravages of

Programme Pointers (Continued from page 30)

Controversial Subject

This opens a very controversial subject: one which I
will not attempt to dispute. Many facets of
the question would have to be studied very carefully before
a satisfactory decision could be reached, such as the
probable reaction of the audience at the actual
concerts and the consequent effect on their commercial
success. Bus the public stay away in any numbers
if they were kept waiting for their beloved Beethoven
and Tchaikovsky for an hour while they had to stand
and listen to works in which they were not particularly
interested.

A questionnaire or “ Gallup Poll” at the actual
concerts might be the most satisfactory way of answering
this and other points.

The fact remains that the boom in the demand for
good music is now at its zenith, and in no circum-
stances should it be allowed to decline. Such an event
would be a calamity having the widest
repercussions. No doubt the large floating population of foreign soldiers
and of displaced persons have helped to increase audiences
to their present enormous numbers. These people are
gradually leaving us and many will have gone by next summer.
But I am confident that the seed sown by the
finest of “musical gardener’s” (if I may be permitted
to coinage of the phrase), Sir Henry Wood, will ever
flourish, provided those in whose keeping the concert
and broadcasting worlds live, i.e., the impresario and
concert manager, play their parts.

Native Music

The encouragement and stimulation that native music
has had in recent years, both creative and executive,
must not be allowed to wane for one instant. We all
want to welcome the foreign virtuoso to our shores again,
and artists like Casals, etc., are quite unique.

But after the last war there was a tremendous reaction,
or “swing of the pendulum,” back to the continental,
and the old shibboleth denying the Englishman’s claim to make
good music required for many years. This is
not allowed to happen again. Our many native artists
of the front rank, though some have gained their places
without having to come up against the full force of pre-
war competition, should continue to be given every
support and encouragement. With a continuation of
the present rate of attendance at concerts, there
should be room for all.

The “big name” in music has, in the past, been
allowed too much space on the hoardings and in the
advertisement columns. In days gone by, while we
have bought our ticket a month in advance for some
famous continental star or other (whose excellence no
one would wish to dispute), and waited for his arrival
and hung upon every note he played with bated breath.

If not with the highest critical faculties, much other
good music making was allowed, more or less, to
perish by the wayside, in the overpowering rays of
the great one’s glory and omnipotence. This is thoroughly
bad for music in all its manifestations. And, whilst
there are as yet no signs of its being repeated, it can do
no harm to sound a warning in the hope that those in
whose hands the problems lie will do all they can to
avoid the mistakes of the past.
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