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As many of the circuits and apparatus described in these
pages are covered by patents, readers are advised, before
making use of them, to satisfy themselves that they would
not be infringing patents.

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EDITORIAL COMMENT

U.S. Television

Facing Problems Unknown Here

NOT to be left too far behind in the introduction of television, an enquiry into the future of a television service is now being started in the United States of America. The Communications Commission will hear evidence from all parties concerned, very much on the same lines as was done in the case of our own Television Committee, which was appointed by the Postmaster General.

Although America seems in no hurry to introduce a television service for listeners, this does not mean that that country is neglecting technical development, and it may be expected that when a decision is reached America will show herself as progressive as any other country on the technical side. It is the economic aspect of the television service which frightens America much more than the technical problems, and Americans' estimates of the cost of television broadcasts are somewhat staggering. An official of the Communications Commission said recently that if they tried to make their own motion pictures exclusively for television transmission it would cost at least \$200,000 for each production, and that on top of that the broadcasting time and leasing of telephone lines for a two-hour national hook-up might run into another \$100,000.

Altogether America seems to have no illusions about the cost of successful television programmes and it is realised that to launch a service in America necessitates doing it on a very much bigger scale than is necessary initially here. American broadcasting is almost entirely supported by advertisers, yet no advertiser is likely to pay for a television programme until he is satisfied that he has a visual audience already equipped with television re-

ceivers. It would seem that the outstanding contrast between this country and America in the matter of starting a television service is that there they will not be able to find the money for programmes until the receivers are distributed, whereas here the programmes will be produced first and the audience will be built up gradually.

Refinements in PA

Uses for AVC

AUTOMATIC volume control for speech amplifiers is one of those refinements which is far too slow in finding its way into general use. Its value in maintaining quality, especially with the smaller equipments where overloading can easily occur, cannot be overestimated.

Speakers unfamiliar with the natural shortcomings of speech amplifiers do not realise that when they raise their voices in emphasis they will, as likely as not, make themselves unintelligible to their audiences as a result of overloading and consequent distortion.

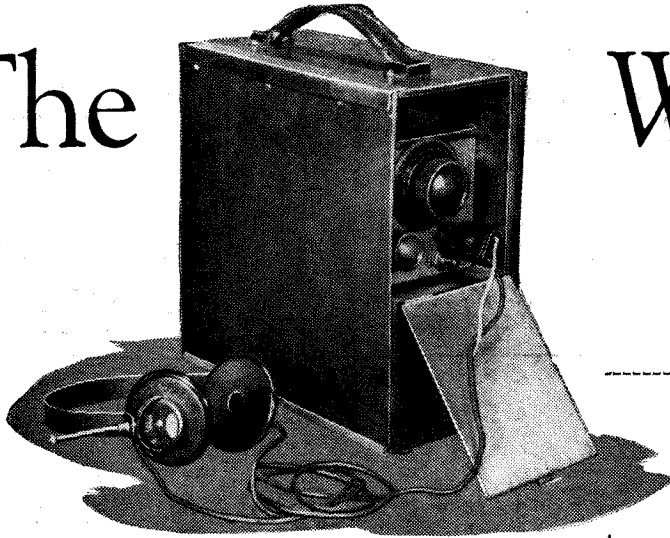
So much for that aspect of automatic volume control, but now another use of the principle is being applied where the effect is practically the opposite, since an increase in input to a microphone is made to increase the output from the PA amplifier and loud speakers. The arrangement depends upon the use of a control microphone, placed, for instance, in the back of a cinema so that the noise of hand clapping or other sounds which might interrupt and make the speech from the loud speakers inaudible, will have the effect of producing a voltage which can be applied to the amplifier to increase its output automatically.

We would suggest that the idea offers great possibilities for political speakers where the efforts of opponents to drown the speaker's voice could be applied to amplifying it instead.

The Wireless World

SELF-CONTAINED, SENSITIVE

By W. T. COCKING



EVERYONE must at some time have felt the need for a receiver which is small and light enough to be truly portable. The *Holiday Portable* is of this type and, in addition to being sensitive, it operates entirely from dry batteries, which are readily obtainable.

THERE are many occasions upon which the need for an inexpensive and truly portable receiver is felt, not to form the only set, but as an adjunct to the main equipment. At holiday times in particular, many wish to be able to listen to running commentaries or to the news bulletin. The size and weight of the ordinary set make it useless for such cases, and the difficulty of erecting a suitable aerial is often prohibitive.

By far the greatest difficulty in designing a portable receiver lies in the batteries, for they are likely to prove the largest and heaviest items in the entire apparatus. Their life must be reasonably long, and they must be readily obtainable. These two considerations at once rule out many types, for although extraordinarily small HT batteries are available, they are relatively expensive and short-lived; furthermore, and this point is perhaps the most important, they are stocked by comparatively few retailers. In designing this receiver, therefore, it was decided to use standard batteries, which are readily obtainable anywhere; the odds are that even the cycle-repairer-cum-grocer-cum-post office at Little Puddleton on the Marsh keeps a supply.

For the same reason it was decided

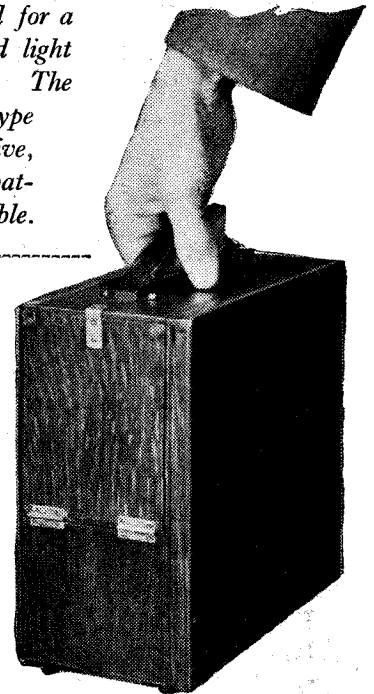
The receiver with the 'phones plugged in ready for operation.

to use a dry battery instead of an accumulator for the LT supply. A new battery can be purchased anywhere, but it is not always so easy to get an accumulator recharged; in any case it cannot be recharged at a moment's notice. The dry battery is, moreover, lighter.

No attempt was made to design the set for loud-speaker operation, for this would have necessarily resulted in an increase in both the dimensions and the weight, while the current drain on the batteries would have been much greater. For headphone use no more than 60 volts HT is needed, and as the total current consumption is only 2.5 mA., a standard type of battery costing 3s. 9d. will give many months' service. The LT battery requires more frequent renewal, but is likely to last at least several weeks with the intermittent operation which will usually be its fate. The current drain on it is about 150 mA. and a 4.5-volts battery is used—the type specified being listed at 1s. 3d.

Since a frame aerial is necessary to ob-

When closed for carrying, the phones fit into a special compartment



tain portability, and its dimensions must be quite small, a high degree of amplification is necessary if a satisfactory performance is to be secured. The number of valves and tuned circuits which can be employed is limited by the space available and by the permissible current consumption. It is consequently necessary to use a fairly high degree of low-frequency ampli-

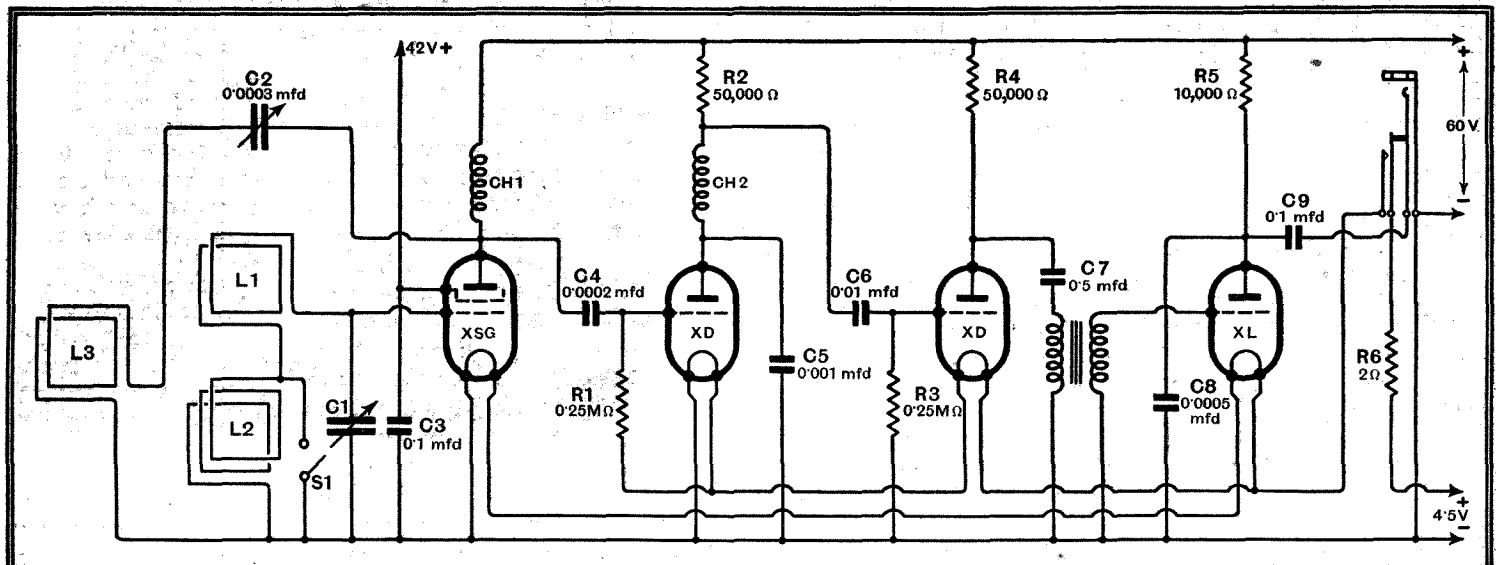


Fig. 1.—The complete circuit diagram shows that the four valves have their filaments wired in series-parallel.

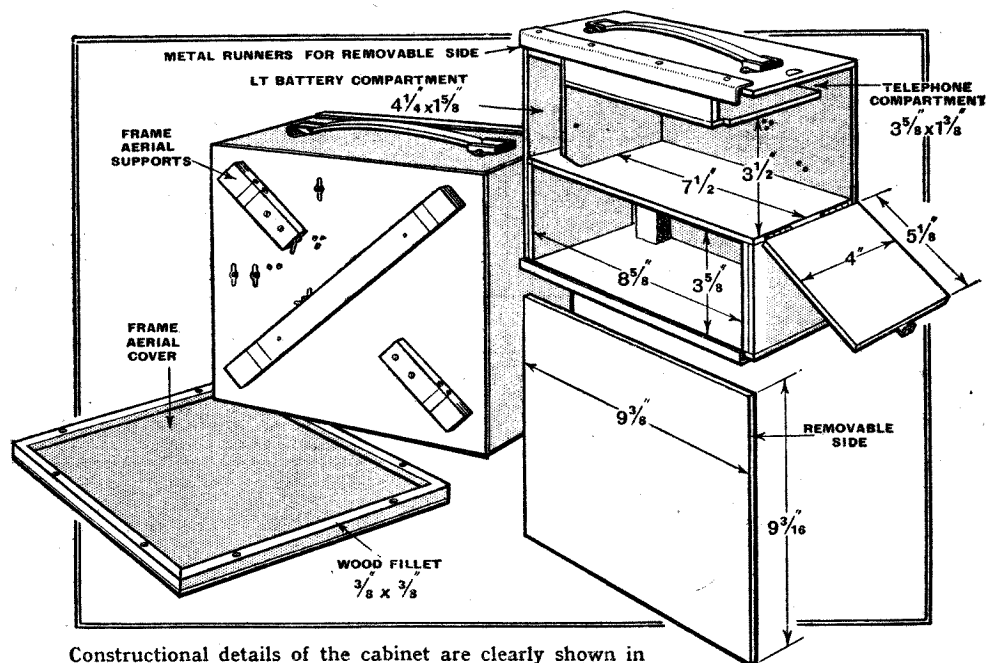
Holiday Portable

AND COMPACT

fication, and to make full use of the properties of reaction. HF amplification is not, of course, impossible, but it is quite difficult to make good use of tuned couplings, partly because of the space which they occupy, but chiefly because of the difficulty of obtaining adequate screening and maintaining stability. The position is made harder by the absence of any earth.

The Circuit Adopted

In this receiver, an aperiodic HF stage is accordingly employed. The amplification obtainable on the medium waveband is, of course, considerably lower than would be the case if a tuned coupling were used, but the gain is still worth while, and as reaction is more effective without an extra circuit, a higher degree of sensitivity can be obtained than one would at first expect. Much higher amplification is obtainable on the long waveband owing to the higher impedance of the coupling,



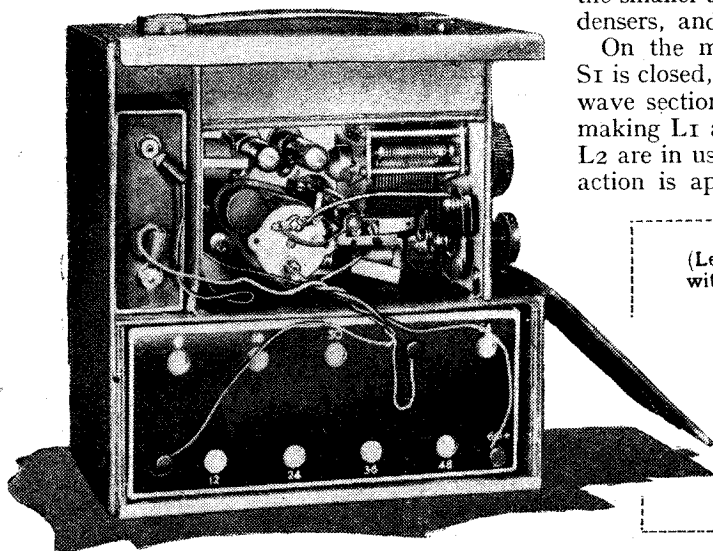
Constructional details of the cabinet are clearly shown in this drawing.

with a slow-motion drive. It can consequently be set much more precisely than the smaller and lighter solid dielectric condensers, and so renders tuning easier.

On the medium waveband the switch S_1 is closed, thus short-circuiting the long-wave section L_2 of the frame aerial, and making L_1 alone operative. Both L_1 and L_2 are in use on the long waveband. Reaction is applied to the frame from the

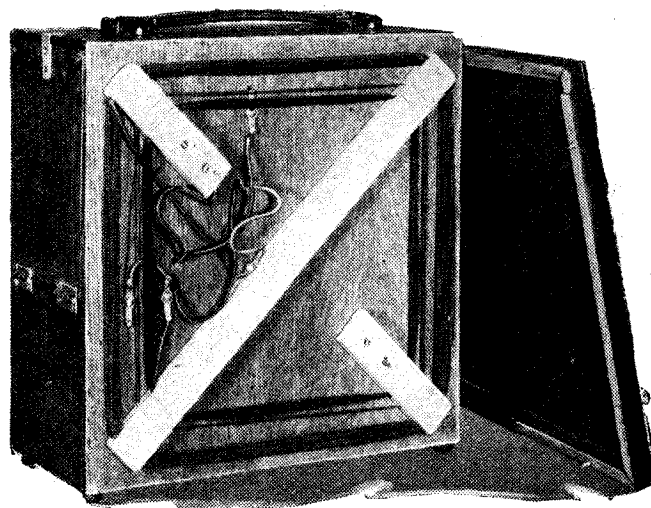
condenser C_6 and a 0.25-megohm grid leak R_3 .

Transformer coupling is used to the second and last LF stage, the transformer primary being resistance-capacity fed by R_4 and C_7 , having values of 50,000 ohms and 0.5 mfd. respectively. The telephones, which are connected in the anode circuit of the second LF valve, are also resistance-capacity fed, the resistance R_5 having a value of 10,000 ohms and the condenser C_9 a capacity of 0.1 mfd. This is done largely in order to make insulation of the 'phone jack unnecessary, but it also leads to some reduction in the anode



(Left) A view of the receiver with the side removed showing the chassis and batteries.

(Right) The frame aerial is wound on the side of the case and covered by a false lid.



and this is advantageous, for it is just at these wavelengths that the frame aerial is least efficient.

The complete circuit diagram of the receiver is shown in Fig. 1, and it will be seen that the four valves are arranged as an HF stage, a grid detector and two LF stages. The valves employed are the Hivac midget class, and each consumes about 75 mA. at 2 volts for the filament. The HF valve is of the screen-grid type, and is operated with 60-volts anode and 40-volts screen potentials; zero grid bias is used. The frame aerial is tuned by the variable condenser C_1 and, contrary to usual portable practice, this component is a good quality air-dielectric condenser

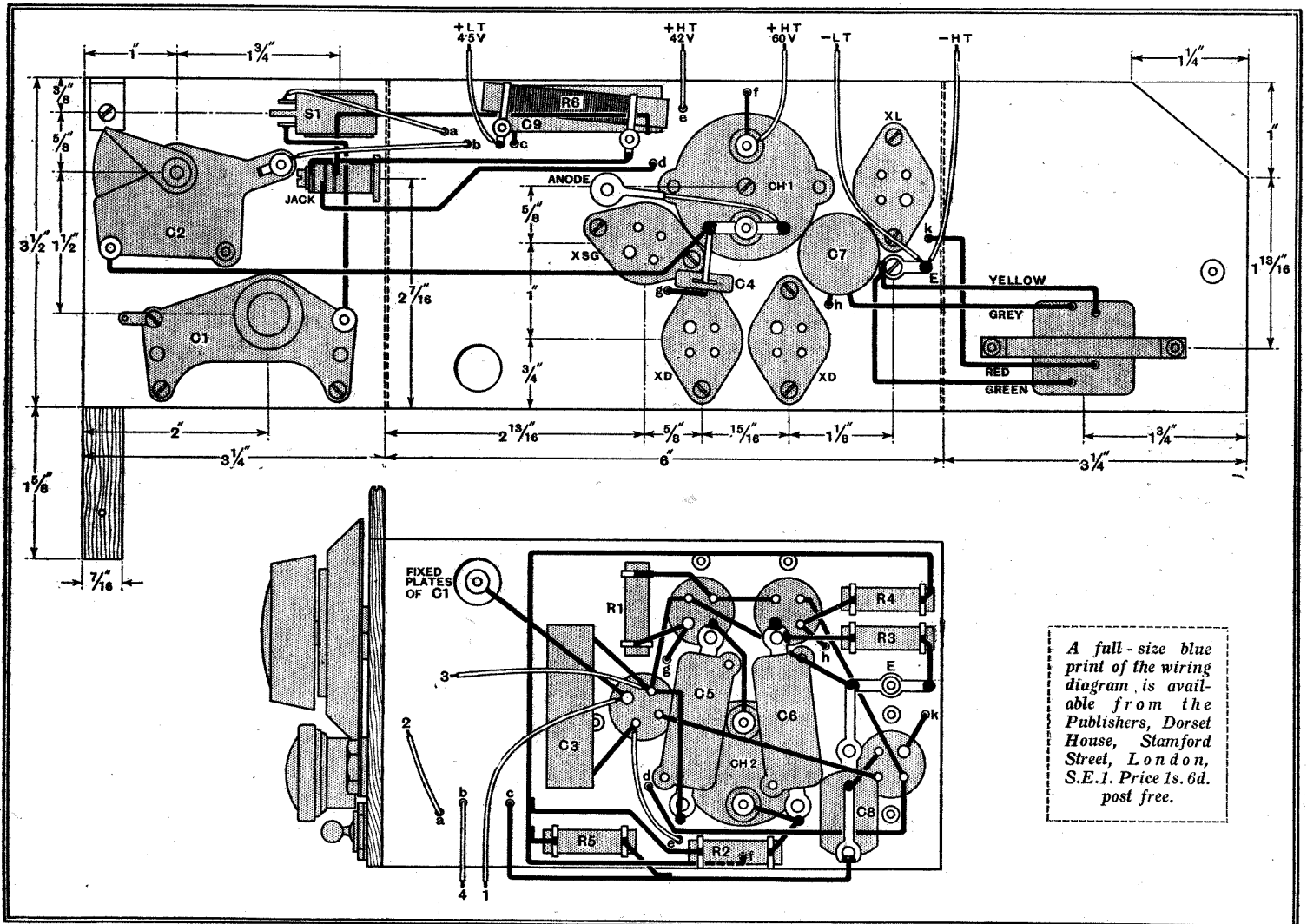
anode circuit of the HF valve by means of the coil L_3 , which is wound between the medium- and long-wave sections. Control is afforded by the 0.0003 mfd. condenser C_2 , which is of the solid dielectric type.

An HF choke Ch_1 forms the principal element in the coupling between the HF and detector valves. The detector is a triode, having a 0.0002 mfd. grid condenser C_4 with a 0.25 megohm grid leak R_1 returned to the positive leg of its filament. In its anode circuit another HF

current consumption of the last valve.

The filament and grid-bias connections are unusual and lead to considerable simplification. The detector and first LF valves have their filaments connected in

RECEIVER ASSEMBLY AND WIRING



The layout of components and the wiring are shown here. A light metal chassis is used.

series, and the detector is connected to negative LT. The grid leak R3 of the LF valve is also joined to this point, and this valve consequently receives the filament supply of the detector—2 volts—as grid bias. A similar course is adopted for the second LF valve, for the filament of this valve is wired in series with that of the HF valve. The HF stage receives no bias, but this is unimportant in view of the small signal amplitudes at this point, and the second LF valve has 2 volts applied to it.

By adopting this series-parallel connection of the valves not only is the need for a bias battery avoided, but the total LT requirements are brought to a more reasonable figure for operation from a dry battery. Instead of the valves requiring 2 volts at 0.3 ampere, they need 4 volts at 0.15 ampere. A 4.5-volts battery can con-

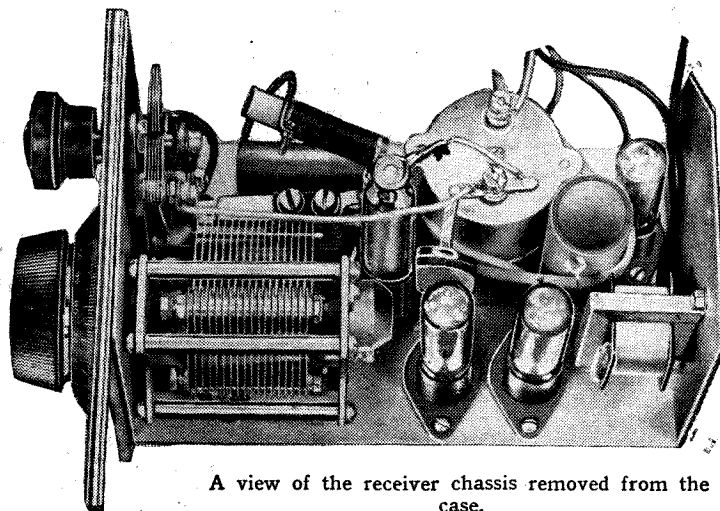
sequently be used with a 2-ohms series resistance R6 to prevent the filaments being overrun when the battery is new.

The controls are four in number and comprise the tuning condenser C1, the reaction condenser C2, the wavechange switch S1, and the telephone jack. This

set on, while its withdrawal automatically breaks the filament circuit.

A metal chassis is used for the receiver, and as there is little room to spare, alternatives to the specified components can be recommended in few instances. The two HF chokes are mounted one above the other, and should be bolted together before mounting on the chassis. These components also serve to support the coupling condenser C7 which is tied to them by thread. The condenser C2 must be insulated from the chassis by an insulating washer. Most of the wiring is carried out on the under side of the chassis where many small components are also accommodated. There is but 3/4 in. in depth available here, so that care must be taken to follow the plans exactly. No difficulty should arise, but it is important to make sure that the resistances do not come into contact with the metal chassis. For safety it might be wise to wrap the ends of such components with rubber tape.

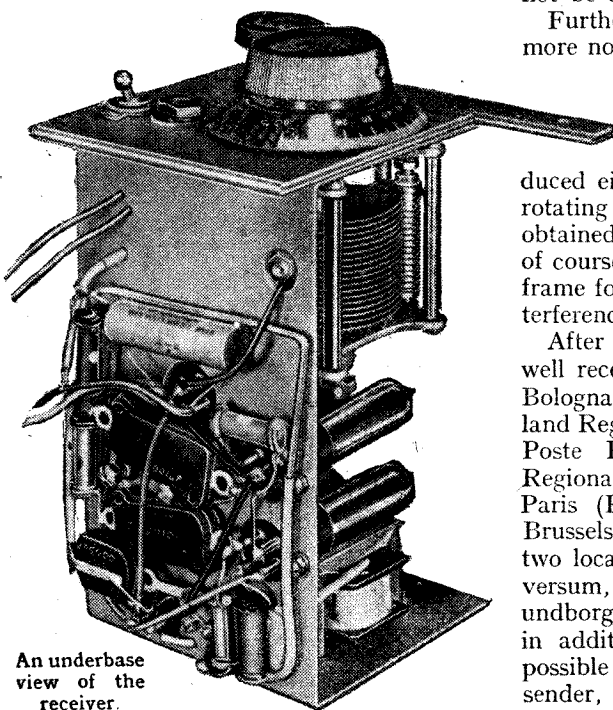
The cabinet is constructed with a false side in which the frame aerial is concealed. The dimensions and winding data are given in the drawings, and all three coils must be wound in the same direction. Long leads should be attached to the set and passed through the appropriate holes in the back of the set compartment; the



A view of the receiver chassis removed from the case.

last is only a control in the sense that it has incorporated with it the on-off switch. The insertion of the 'phone plug not only connects the 'phones but also switches the

The "Wireless World" Holiday Portable—chassis can then be slid in place and secured, and the leads joined to the ends of the frame windings. Compartments are



An underbase view of the receiver.

also provided in the cabinet for the two batteries, and above the chassis for the 'phones. Strips of rubber sponge should be placed at the bottom of the battery compartments so that the batteries are spaced as far as possible from the aerial.

In operation tuning is carried out by C1, but reaction will also require fairly frequent adjustment, particularly if signals are weak. The loudest signals will be obtained when the frame aerial is pointing towards the desired station, but the maximum is not very critical, and good results can generally be obtained from all stations but those which lie in a direction nearly at right angles to the frame. This can often be made use of to eliminate interference from a near-by transmitter, for if the frame be turned to the critical position giving minimum signal from the unwanted station many stations on near-by wavelengths can be received.

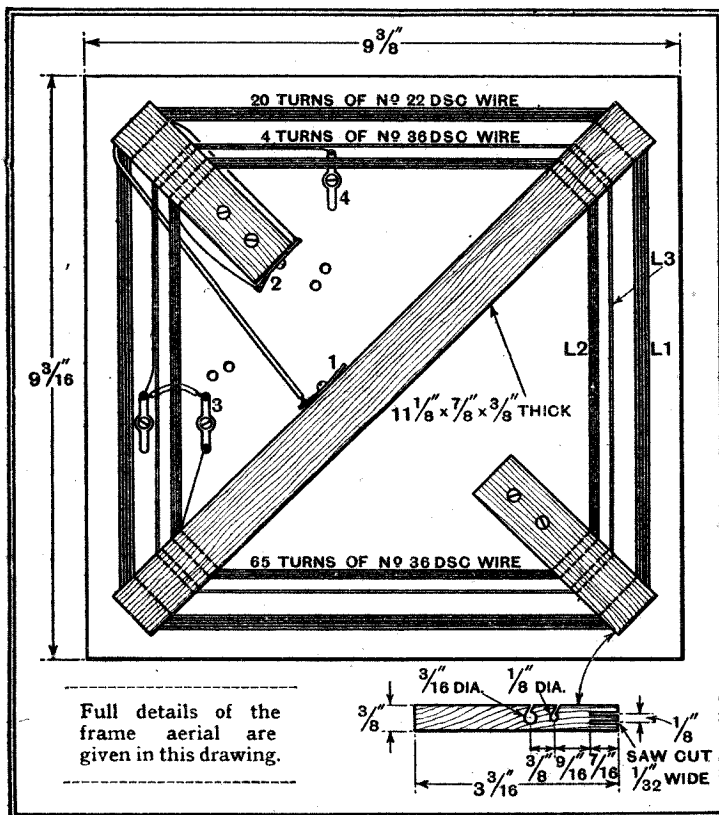
The receiver gave a very good account of itself on test. In a steel-framed building in London it proved possible to obtain very good reception of the two trans-

mitters at Brookmans Park, Droitwich and Radio-Paris, as well as the weather reports from Daventry. North Regional could just be heard in daylight, but could not be called an intelligible signal.

Further tests were carried out under more normal conditions in North London, and it was then found that London Regional was too strong even with reaction at minimum, and volume had to be reduced either by mistuning or, better, by rotating the set so that less pick-up was obtained. The spread of this signal was, of course, considerable, but by setting the frame for minimum pick-up no serious interference was experienced.

After dark, the following stations were well received on the medium waveband: Bologna, Lille, Frankfurt, Fécamp, Midland Regional, Northern Ireland Regional, Poste Parisien, Breslau, Berlin, West Regional, Leipzig, Scottish Regional, Paris (PTT), North Regional, Cologne, Brussels, Budapest, in addition to the two locals. On the long waveband, Hilversum, Radio-Paris, Luxemburg, Kalundborg and Daventry were all excellent, in addition to Droitwich. It was even possible to hear signs of Deutschlandsender, but the interference from Droitwich was severe.

Many of the stations, particularly those on long wavelengths, were strong enough to render critical tuning unnecessary, but on some of the weaker stations some skill



Full details of the frame aerial are given in this drawing.

in tuning was undoubtedly needed, and the adjustments were really critical. This is unimportant, however, for the set is not intended for the reception of such stations; the fact that they can be received, however, does give some indication of the sensitivity of the receiver.

LIST OF PARTS

- 1 Variable condenser, 0.0005 mfd. slow motion drive, C1 Polar 25M
- 1 Reaction condenser, 0.0003 mfd. with knob, C2 Polar "Compax"
- Condensers**
 - 2 0.1 mfd. tubular, C3, C9 Dubilier 4513
 - 1 0.5 mfd. tubular, C7 Dubilier 4517
 - 1 0.01 mfd., C6 Dubilier 670
 - 1 0.001 mfd., C5 Dubilier 670
 - 1 0.0005 mfd., C8 Dubilier 665
 - 1 0.0002 mfd., C4 Dubilier 665
- Resistances**
 - 1 10,000 ohms 1/2 watt, R5 Erie
 - 2 50,000 ohms 1/2 watt, R2, R4 Erie
 - 2 250,000 ohms, R1, R3 Erie
 - 1 2 ohms 10 watts, R6 Bulgin AR2
- 2 HF Chokes, Ch1, Ch2 Bulgin HF8
- 1 LF Transformer Bulgin LF33
- 4 Valve holders, 4-pin Clix "Midget"
- 1 3-spring automatic jack B.T.S.
- 1 Telephone plug B.T.S.
- 1 Toggle switch, on/off, S1 Bulgin S80T
- 3 Wander plugs Eelex
- 2 Spade ends Eelex
- 1 Plug-top connector Belling-Lee 1175
- 1 HT battery, 60 volts Ever Ready "Winner"
- 1 LT battery, 4 1/2-volts Ever Ready 3-Cell 126
- 1 Pair headphones B.T.S.
- Chassis B.T.S.
- Cabinet Peto-Scott
- Miscellaneous:— Scientific Supply Stores
 - 1 oz. No. 36 DSC and 2 1/2 ozs. No. 22 DSC wire for frame aerial; 2 lengths systoflex; wood, wire, screws, etc.
- Valves, 1 XSG, 1 XL, 2 XD Hivac

Le Roi S'Amuse

THE B.B.C. Amateur Dramatic Society's performance of Ian Hay's "The Sport of Kings" at the Fortune Theatre (last week) had all the assurance and professional competence of a number one touring company. Sir John Reith's appearance in the role of Bates, the butler, added just that relish which is necessary to turn a normally enjoyable evening into a memorable occasion. His was no mere walking-on part, but a real character study of the dual personality of the butler, formerly bookmaker's clerk—perspicacious and full of dry humour. It would seem that the B.B.C. has yet another charge to answer, that of depriving the theatre of a talented natural actor.

Sound effects play an important part in this piece and Mr. Cecil Barker produced some really convincing crowd noises "off" with very simple equipment. Traffic noises recorded on special records were mixed with the output from a microphone surrounded by a small crowd of "supers" somewhere in the labyrinth under the stage. An amplifier with a 12-watt push-pull output feeding a single Magnavox "Duode" gave all the volume necessary, during the action of the play, but two speakers were used for relaying incidental music during the intervals.

Brunswick All-wave Receivers

THREE new all-wave receivers for AC mains, a table model, a console and a radio gramophone are announced by Brunswick, Ltd., 1-3, Brixton Road, London, S.W.9. All models incorporate the same chassis, the basic circuit of which comprises a signal-frequency HF amplifier, frequency-changer, two IF stages, diode detector and pentode output valve. Three wave ranges are provided, 16-49, 175-550 and 1,000-2,000 metres. The prices of the table model and console are 18 guineas and 22 guineas, while that of the radio-gramophone, which incorporates a record changer, is 39 guineas.