Broadcast Receivers

An Inexpensive "Local and Daventry" Receiver of Unconventional Design.

THE unconventional appearance of the Cosmos 3-valve set is the first feature to excite comment during a preliminary examination. The designer has cut adrift from the prevailing fashion of the American cabinet with ebonite front panel, and produced a compact instrument in the form of a railway waiting-room sandwich container. A more detailed examination will reveal that there are many advantages to justify this form of construction. Considerable ingenuity in the arrangement of components has reduced the overall dimensions to a diameter, at the base, of 10in., and a height of 9in.—surely a record for a three-valve set. Further, the robust construction and clean exterior ensure that tuning controls will not be disturbed nor valves damaged during spring cleaning or other periods of domestic activity. Few modern receivers are so satisfactory in this respect.

Neither is the general effect spoilt by an untidy arrangement of batteries and leads. A neat multiple cable connects the receiver with the H.T., L.T., and grid bias batteries, which are assembled in a crate specially designed for the purpose.

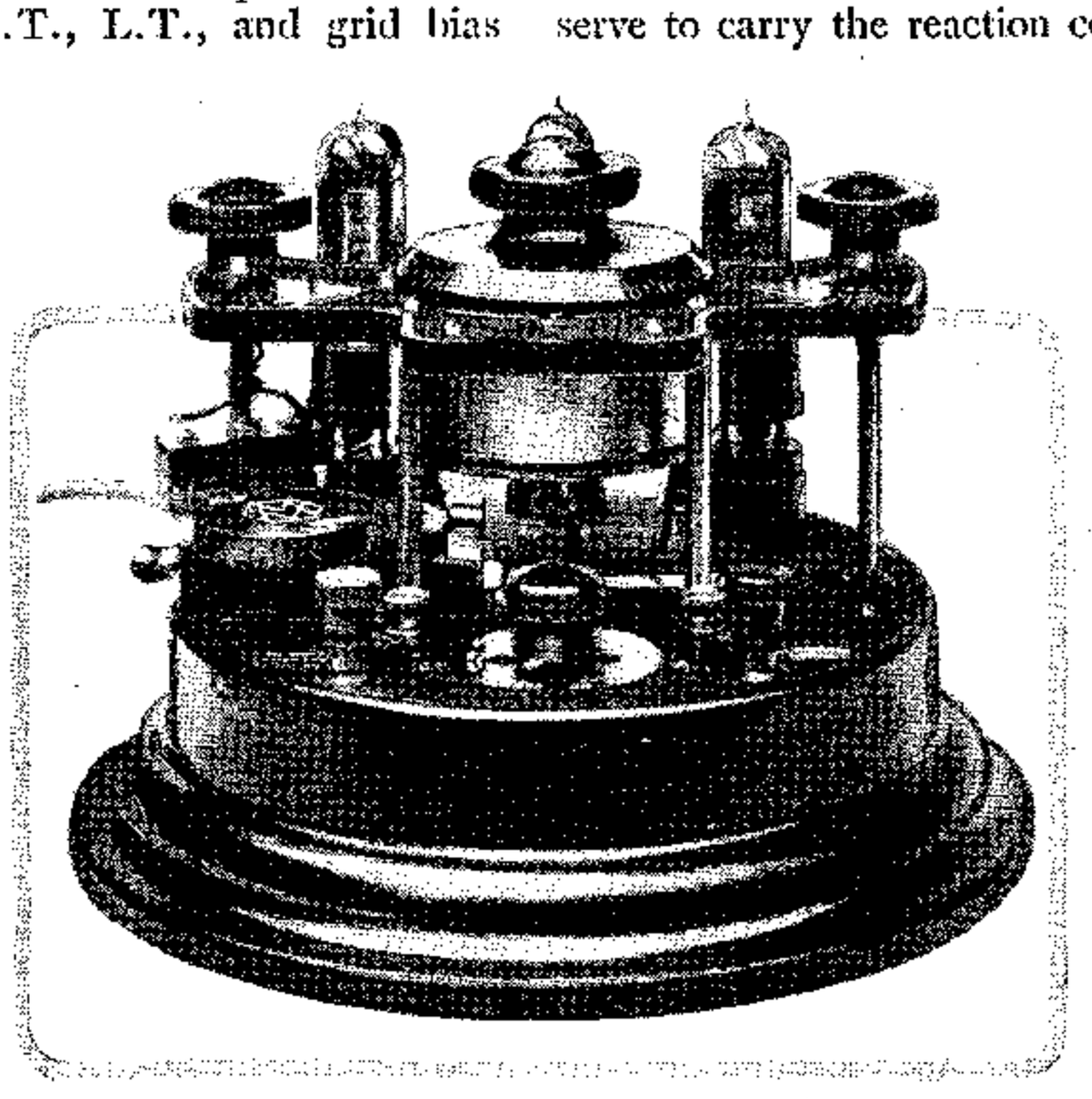
In construction the receiver is no mere assembly of components. It is obvious that every detail has been carefully thought out before the set was put into production, for extensive use has been made of special mouldings. That this method of construction is justified in practice is evident from the low price of the finished product. There is, however, one disadvantage, namely, that progressive detail improvements can only be carried out at prohibitive cost where they involve the alteration of moulds. Thus we find various rudimentary fixtures on the present model which suggest that, at some period during its evolution, a crystal detector was an important feature of the circuit. The circuit at present in use follows well-tried principles and comprises a reacting valve detector with leaky grid rectification, followed by two low-frequency amplifying stages. Resistance-capacity coupling is used throughout, S.P. 18/G valves being recommended for the first two stages, with an S.P.18/R as the output valve.

Details of Construction.

The circular moulded base contains the coupling resistances, condensers, and leaks, and the greater part of the wiring of the set. The top of the base plate carries the three valve holders, the tuning unit, filament rheostat, filament switch, aerial condenser switch and terminals for aerial, earth, and loud-speaker.

All tuning controls are mounted on a separate platform raised from the base on metal rods, some of which also serve to carry the reaction coil connections to the interior of the set. The large central dial operates the tuning condenser, which is of the oil-immersed solid dielectric type, and is consequently rather more stiff to turn than the usual air-dielectric condenser. The control at the right-hand side is a vernier condenser for fine tuning, and the corresponding knob on the left is for reaction control.

Separate tuning units are used for Daventry and for the 300-500 metre waveband. The design of these units is particularly neat, and the change-over from one wavelength range to the other is only a matter of seconds. The rectangular moulded base of the unit slides into position between guides in



Front view of receiver with cover removed.

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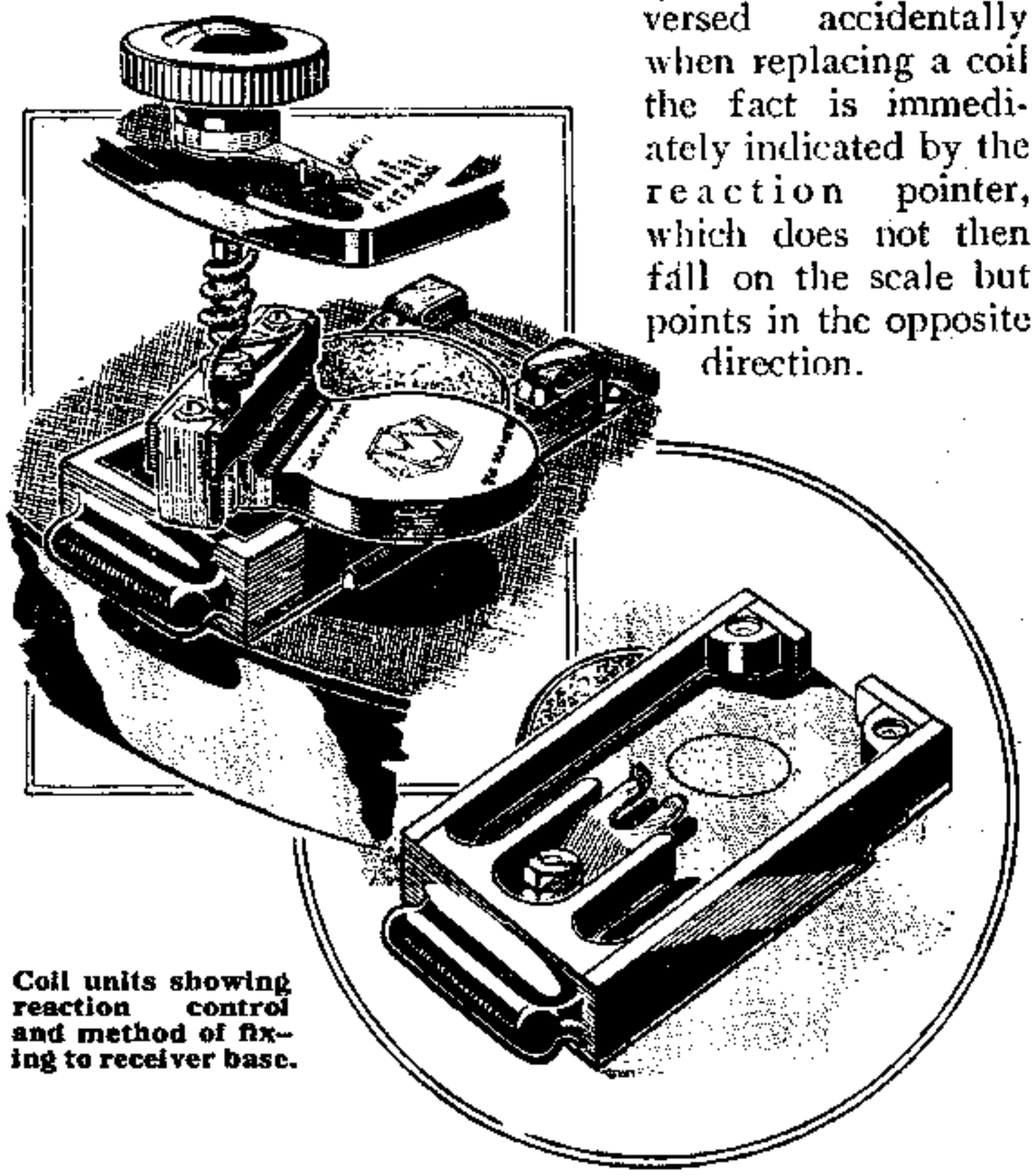
the moulded base plate of the set and is held automatically by two contact springs at one end and by a slotted spring in the recessed base. Connection with the reaction coil is made through two spring clips at each end of an ebonite cross-piece mounted on the reaction control spindle. This spindle is capable of vertical as well as rotary movement, and is pulled up to release the reaction contacts before removing the tuning unit. In practice this device works very well indeed, and if the reaction connections are reversed accidentally when replacing a coil the fact is immediately indicated by the reaction pointer, which does not then fall on the scale but points in the opposite direction.



Coil units showing reaction control and method of fixing to receiver base.

A series condenser is included in the aerial circuit, and may be short-circuited by a screw-down type switch on the base. A similar switch is used to complete the filament circuit, and provides a firm contact of low electrical resistance—a most important point when using 2-volt valves.

Lucid Instructions.

The installation of the receiver can be carried out without any special wireless knowledge, for an informative instruction book, illustrated with line drawings, is sent out with each set. Adequate attention is given to the question of oscillation, and instructions for care and maintenance are also supplied on a separate card.

Before testing on broadcasting a series of routine tests were applied for current consumption, wavelength range, and overall amplification.

Wavelength ranges on a 100ft. aerial were as follow :—

Aerial Switch.	Short Wave Unit. (No. 955703)	Long Wave Unit. (No. 955706)
Up	260-490 metres	1,400-2,550 metres
Down	360-540 metres	1,750-2,800 metres

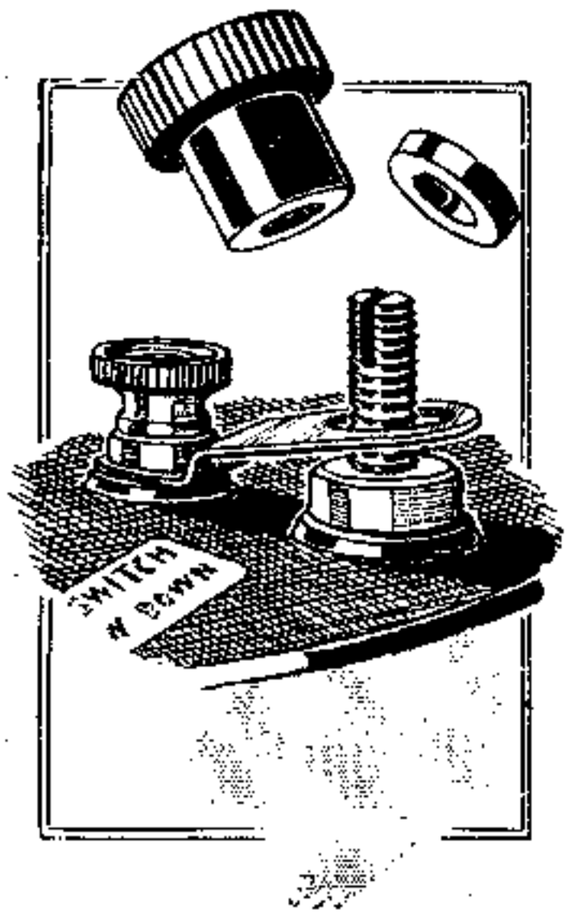
These are in good agreement with the ranges specified by the makers, having regard to the allowance necessary for differences in aerial constants.

The current consumption of the set is high. The filaments take a total current of 0.9 amp. from a 2-volt accumulator cell, and a service of only 30 hours, or approximately one week, may be expected on a single charge of the 30 ampere-hour capacity cell recommended by the makers. Incidentally, the dimensions of the battery crate preclude the use of a larger cell.

Grid Bias Valves.

The total anode current is 15 milliamperes, which is too heavy a discharge for the small-type cells in the H.T. battery. It is not difficult to ascribe a cause for this abnormal anode current. A further test showed that the output valve (S.P.18/R type) accounted for 12 mA., leaving only 3 mA. for the detector and first L.F. amplifier. Now the H.T. voltage on the last valve is 132 volts, and the maker's own curves for the S.P.18/R valve show that a negative grid bias of at least 9 volts is required to correspond with this anode potential, even allowing for the fact that grid current does not start until the grid potential is raised to +2 volts. Yet a grid bias battery of only 4½ volts is supplied with the set—just half the required value—and this fact alone satisfactorily accounts for the anode current measured. With the correct grid bias of −9 volts, the anode current would be 6.5 mA., which is quite a reasonable figure for a valve of this type.

There is just one possible excuse for the choice of such a low value of grid bias, namely, that in course of time the voltage of the H.T. battery will fall and that −9 volts would then introduce distortion. Under present conditions the fall of H.T. voltage is likely to be extremely rapid, and there can be no doubt that a tapped 9-volt grid battery and an additional paragraph in the instruction book regarding progressive adjustment would better have met the case.



Screw-down switch used to break filament circuit. A similar switch short-circuits the series aerial condenser.

In our opinion the quality of reproduction is very pleasing and will more than satisfy average requirements. This fact will no doubt carry weight with musical people to whom faithful reproduction is more vital than excessive volume. Adequate loud-speaker volume can be relied upon within a radius of 15 miles of a main station and 50 miles of Daventry when making use of a standard outdoor aerial.

At £8 5s. 6d. (including royalty) the Cosmos 3-valve set represents good value and can be relied on to give satisfactory service if a tapped 9-volt grid battery is substituted for the standard grid battery.

Necessary accessories add another £6 10s. to the cost, while the moulded dustproof cover involves an additional expenditure of 10s. 6d. The receiver is manufactured at the Trafford Park Works of the Metropolitan-Vickers Electrical Co., Ltd., and is distributed by Metro-Vick Supplies, Ltd., 145, Charing Cross Road, London, W.C.2.