

Broadcast Receivers PHILIPS

Type 2802

A Four-valve Set,
Tuning from 10
to 2,400 Metres.

WITHOUT being unfair to our Continental competitors there is ample evidence to support the observation that British-built receivers are the best. The exception that proves the rule are the products of the Dutch firm of Philips, and if we dare venture a comparison in this instance one might give Philips the credit of producing much apparatus that is unrivalled. Appreciating that the valve is the heart of a receiver and that progress in receiver design is subsidiary to valve development, it is obvious that the progressive valve maker is in a favoured position when it comes to set manufacture. The advancement made in valve technique by the Philips Research Department is known to every user of P.M. valves, and we turn, therefore, with interest to the new Philips receiving sets expecting to find similar leadership.

Short-wave H.F. Stage.

It is only during the past few weeks that the set under review has arrived in this country. Essentially, it is not a broadcast receiver in that it effectively covers a wave range of 10 to 2,400 metres. A short-wave receiver for the long-range enthusiast with provision for reception on both the normal and long broadcast wave bands is a fitting description. Thus it is a receiver designed for world-wide short-wave listening, yet equipped for broadcast reception. In this respect it will satisfy the amateur who may demur when an endeavour to listen to American short-wave broadcasting means disorganising the home broadcast receiving set. For the Colonial listener, also, it is the set which will give him the best possible chance of getting 5SW or other short-wave broadcasting without preventing him from readily tuning to a local station.

It is a four-valve set with one high-frequency and two low-frequency stages. That an H.F. stage should be used in a short-wave set is an unusual feature, and



this is the first instance in which the adoption of an H.F. amplifier is to be found in a commercially built short-wave set arranged for home reception. Its inclusion is boldly opposed to accepted amateur practice, and the short-wave enthusiast will note with some surprise that the H.F. amplifier is resist-

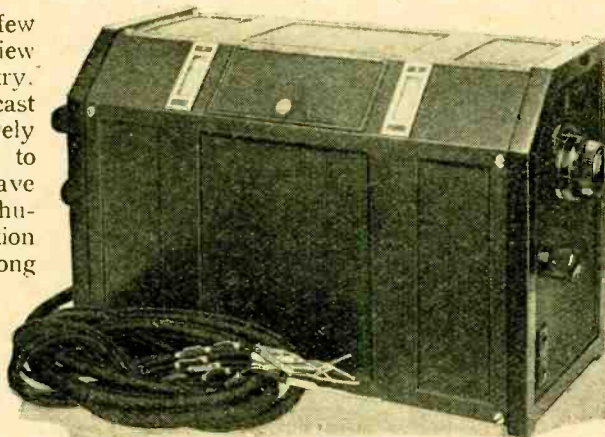
ance-coupled to the detector. Precise details of the method of coupling were not extracted, for in the course of examining the set, the seals were not broken. This H.F. stage probably gives an exceedingly small degree of amplification, and yet as a passenger it is, nevertheless, important. It is responsible for providing a fineness of reaction control unobtainable with the orthodox circuits, and remembering that reaction can provide considerable amplification when capable of critical adjustment the inclusion of the H.F. stage gives a definite advantage. A screen grid valve is used in the H.F. stage, this being the P.M.14. In order to provide sensitiveness to small inputs leaky grid detection is used, the valve being the P.M.4DX "star." This is a valve specially designed to be non-microphonic, a

very necessary feature when followed by two transformer-coupled L.F. stages. A high degree of amplification is provided by both the L.F. valves, these being the P.M.4DX and the P.M.24. The latter is, of course, a pentode. To adopt a pentode in a second L.F. stage is unusual, overloading at once suggesting itself. Remembering the form of detection that is used—the leaky grid which will function on weak signals—it will be seen that the L.F. amplifier is working normally and is not overloaded when the detector

is dealing with exceedingly small signal inputs. A control knob operates a totally enclosed switch which, as well as providing an "off" position, switches the pentode stage out of circuit when the strength of the incoming signal causes overloading.

Plug-in Tuning Coils.

There is only one tuning control operated by a small knurled knob which connects to the tuning condenser



The metal cover between the condenser scales gives access to the tuning coil.

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through a reduction gear. Accurate reading of the condenser setting scale is obtained by a scratch line on a small window through which the edgewise dial is viewed. A similar arrangement is provided for the reaction condenser control. An additional fine tuning control is fitted to the tuning condenser with a pointer indicator. In addition to the reaction adjustment there is an independent volume control which, in view of the fact that it controls selectivity, is probably a variable loose coupling. The receiver is all-metal enclosed, is dustproof and robust. A metal flap between the two tuning scales provides for inserting the interchangeable tuning coils. These coils are well protected and engage in guides. When engaging they are easily pressed home and their four pins make a perfectly reliable contact. Six coils are supplied in a separate metal container, while tuning charts reveal the condenser settings in respect of three of the coils up to a wavelength of 160 metres. Aerial connection is by plug and socket and the battery connections by cable. A two-pin connector interposed in the loud speaker leads produces a lowering of tone which may be desired owing to the use of a pentode.

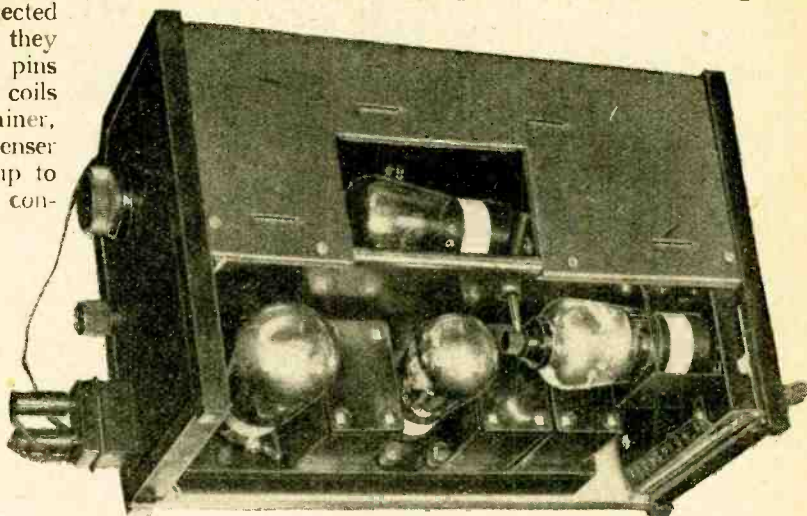
On Test.

Tested first as a broadcast receiver on a normal aerial in a good situation and during daylight many Continental stations were tuned in. Tuning was sufficiently sharp to provide good separation on the normal broadcast band, though reaction was necessary to provide absolute separation between Paris, Daventry, and Königswusterhausen on the wave-range around 1,600 metres. Quality, as judged by one in the habit of using a moving coil loud speaker, was particularly good and tends to give confidence in the possibilities of the pentode. Some listeners may prefer the shunt condenser across the loud speaker for broadcast reception. The cheaper model Philips loud speaker was used for the test.

A current of only 11 mA. was passed by the pentode, and with moderately strong signals this reading was swept, at times, down to 6 mA. In spite of this condition, which occurred when using the voltages recommended in the instructional booklet, quality was unquestionably good. With the switch turned to disconnect the pentode the loud speaker current fell to 4 mA. Dry batteries of small size can thus be used to operate the set. The loud speaker could be brought into contact with the receiver without microphonic effects resulting.

On the short wave band the station of outstanding interest was 2XAO, received at full loud speaker strength. This station takes its programme from New York, and working on 21.96 metres is heard between 8 and 10 o'clock (B.S.T.) in the evening. Signal strength and quality of reception gave a local station atmosphere to the reception, although fading caused periodic weakening of the signal. Pittsburg was

received on 19.5 metres, as well as 2XAF. The Australian stations 2FC and 2ME, which are normally louder than these American transmissions, were not operating at the time of test. In operating the reaction control there was no audible howl, while one was independent of the natural wavelength of the aerial in that there were no "flat spots." Receiver, batteries, and aerial wire could be handled while the receiver was critically tuned to a distant station with scarcely any change in the signal resulting. Short-wave reception is in no way impaired when H.T. current is derived from a mains unit. The Morse code enthusiast will readily identify stations working over an area extending from



Underside view of receiver with back cover plate removed, showing the arrangement of the valves and L.F. equipment.

North America to Egypt. Comment may be made in that the tuning condensers are of the straight-line capacity type. This fact is revealed from an examination of the calibration charts from which it will be seen that 10 degrees rotation of the tuning condenser produces a greater wavelength change at the minimum than at the maximum setting. Although obvious advantages would be gained by the substitution of condensers of the straight-line wavelength (square law) or logarithmic types there was no inconvenient crowding together of stations at the lower end of the condenser.

As the use of reaction generally implies the passing back of energy to the aerial to the annoyance of other listeners, the manufacturers state that the H.F. stage effectively serves on the broadcast band as a barrier and prevents the locally generated oscillatory energy reaching the aerial circuit. When tuning to the ultra short waves, however, the inclusion of a high frequency choke coil in the earth connection is suggested, and constructional details of a suitable choke are given.

Terminals are fitted for introducing a gramophone pick-up, an external potentiometer being necessary to control volume.

The receiver is supplied complete with valves at £30. Compared with other Philips receivers, this seems high, and in spite of the excellence of performance the price may tend to limit the well-deserved popularity of this set.