SHIPS' WIRELESS RECEIVERS

40 YEARS OF DEVELOPMENT

COHERER TO MULTI-VALVE

THE fact that the Company is fitting a new type of multi valve radio receiver on practically every ship in the Australian mercantile marine recalls to mind the development that has taken place in wireless receivers used for marine purposes since the first experiments of Marconi at the end of the 19th century.

In the beginning, such wireless communications as were carried on between shipping or between ship and shore employed a receiver with what was known as the coherer detector. This instrument consisted of a loose metallic powder or granules packed into a small space between two pieces of metal, the whole being enclosed in a glass or ebonite tube. Nevertheless, the coherer was effective over short distances and as far back as 1897-98 it was used by Marconi to establish communication over relatively short distances. Also he employed the coherer in one of the earliest uses to which wireless was placed in England, namely, the establishing of communication between the East Goodwin lightship and the shore. One of the few radio men in Australia who have had practical experience of the old coherer is Mr. E. T. Fisk, chairman of Amalgamated Wireless.

About 1905 came the magnetic detector and multiple tuner. The tuner consisted of three circuits with a switch on the top whereby the receiver could be placed in what was known as the Std-bi (standby). In that position the tuning was very broad, allowing the instrument to respond to a fairly wide range of wavelengths. By throwing the switch into the tune position, tuning was considerably sharper. The magnetic detector used in connection with the multiple tuner consisted of a clockwork motor revolving two ebonite pulley wheels on which was an endless iron band, passing continuously through the field of two permanent magnets. Owing to the effects of magnetic hysteresis, the incoming signal made an alteration in the magnetisation of the iron band and this caused the current to flow through the headphones connected with the detector. The magnetic detector remained on many ships until 1914 and rendered excellent service in its time. Under good conditions it would afford reception over ranges of up to 2,000 miles or more at night, although 600 to 1,000 miles was more usual. The magnetic detector was efficient but not foolproof. The operator had to make certain that his pulleys were revolving. If he failed to wind up the clock work about every hour no signal would be heard, and as the pulleys were black, it was not always easy to see whether they were revolving unless something white was pasted over the pulleys. It was usual to stick a piece of stamp paper on the pulley; sporting operators would use pictures of racehorses which pursued each other perpetually as the pulley revolved. One operator achieved fame by covering his pulleys with the picture of a girl running for dear life with an angry alligator in pursuit. Happily the alligator never caught up. Occasionally an operator would sit for half an hour with no signal coming through; then he would wake from his ruminations and realize that the pulleys were not revolving.

The magnetic detector was superseded by the crystal detector which was later used in the early days of broadcast reception. In using a crystal detector it was necessary, of course, to find a sensitive spot. This was done by means of a testing buzzer, but some of the crystal holders used by the operators were rather crude, although they gave good results. The crystal was screwed into a clip and the contact point consisted of a safety razor blade attached to a wire and connected to the other terminal of the crystal holder. The operator would move the blade over the crystal until the most sensitive point was found.

The magnetic detector and crystal were used concurrently until superseded by the three-electrode valve. The first valve receiver made by Amalgamated Wireless for Australian ships was known as the "103," consisting of one stage of radio, a detector and a stage of audio. It was designed and built by A.W.A. in Australia which was an item of importance in the year 1918. Three Q valves were used. At the same time, A.W.A. was using on some of the small cargo ships the 101 balanced crystal receiver. About 1921 the P1 type of receiver, using Expanse B valves, practically superseded the earlier type. Changes were made in the P1 receiver from time to time, and they gave excellent service.

The early valves used in the P1 receiver were "soft". In other words, a certain quantity of gas remained in the valve in contradistinction to the modern valve in which a very high vacuum is obtained. A soft valve might be working very nicely until the door of the wireless cabin was opened. A cold draught of air blowing on the receiver would alter the characteristics of the valve and perhaps make it impossible, temporarily, to carry on reception.

Modern research with the new screened grid valves followed and later developments in valve design permitted rapid advances in receivers. The modern marine receiving set comprises highly selective and sensitive equipment and is undoubtedly the finest type of receiving apparatus on any ships in the world. Not only is the super-heterodyne principle used both on short and medium waves but for the wavebands extending up to 20,000 metres extremely efficient tuned radio frequency receiver has been developed. By the simple means of a switch the requisite tuning arrangement to cover any particular band of frequency is selected at will. This feature represents one of the most efficient means of covering the frequency spectrum and is quite different to most of the older types of receivers where losses were incurred through coils being in circuit, although not actually required for the frequency in use.

One precaution is still taken. If an unexpected calamity occurred—suppose every valve in the set was suddenly burnt out and every spare was broken—the A.W.A. man would still carry on with the aid of a stand-by crystal receiver.