

# **A Receiver which has Established a World's Record.**

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## **THE "EXPANSE" TYPES 103 AND 103A TRIPLE MAGNIFYING VALVE RECEIVER.**

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**DESIGNED AND MANUFACTURED BY  
AMALGAMATED WIRELESS (Australasia) LIMITED,  
WIRELESS HOUSE, CLARENCE ST., SYDNEY, NEW SOUTH WALES.**

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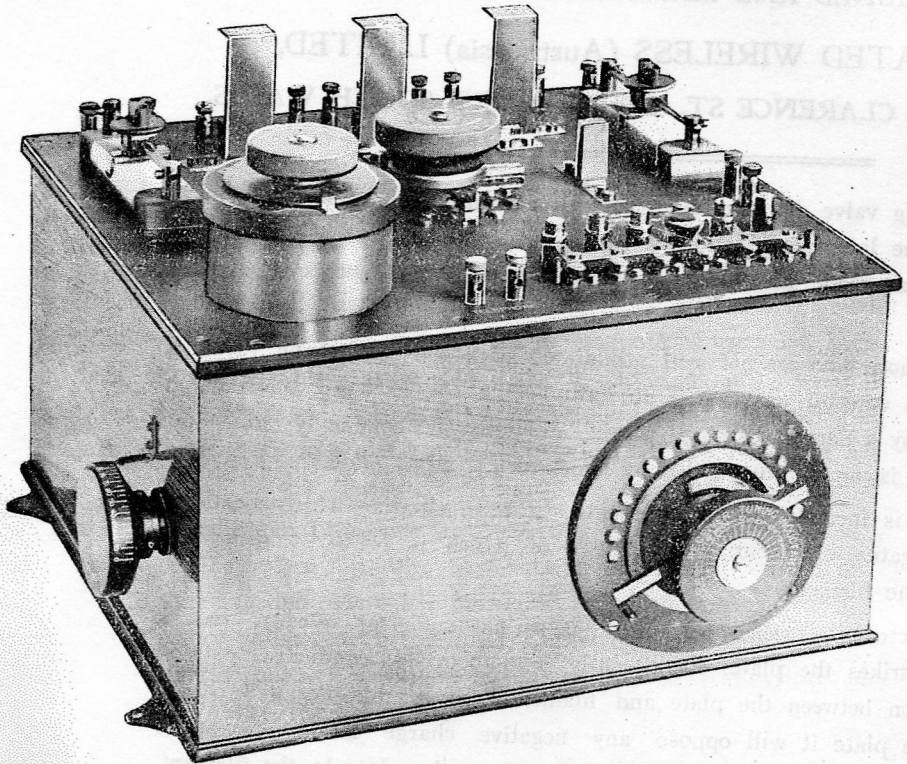
The original Fleming valve detector has been well known in radio-telegraphy for a number of years, and the later modification of that detector, which is usually known as the magnifying valve, has made possible an enormous increase in the range of wireless communication.

For the benefit of those who are not well acquainted with the magnifying valve, it may be stated that this detector consists of an incandescent electric lamp, the filament of which is surrounded by a perforated metal screen or wire mesh, commonly termed the "grid," while the grid is again surrounded by a cylindrical metal plate.

When the filament is incandescent it radiates a stream of electrons which constitute a moving charge of negative electricity, the quantity of which is primarily dependent on the temperature of the filament.

This stream of electrons, or such portion of it as has sufficient velocity, passes through the grid and strikes the plate, consequently, a more or less conductive path is provided in one direction between the plate and filament. Since this negative charge travels from filament to plate it will oppose any negative charge in the opposite direction, yet it will assist any positive current passing from the plate to the filament. If a local battery is connected externally between plate and filament, with its positive pole to the plate and negative pole to the filament, a current will flow from the battery across the path provided by the electron stream. The value of this current will depend upon the voltage of the battery and the carrying capacity of the electron stream, therefore, with a given voltage across plate and filament, the local battery current can be varied if we vary the density of the electron stream. If an ordinary magneto telephone receiver be connected in series with the local battery, the diaphragm will remain steady so long as the battery current does not vary, but it will respond to any variations of

Many different types of magnifying valves have been produced, each type having different characteristics, and valves are used in many different types of circuits. The great aim of modern designers is to produce a complete magnifying valve receiver, with valves of such a type and circuits so arranged, in order to obtain the greatest possible sensitiveness, combined with simplicity in operation, stability of adjustment, and continuous work on any given adjustment without trouble. If this combination is not good any advantage which might be obtained in the way of sen-



**Valve and Secondary Tuning Unit of Magnifying Valve Receiver.**

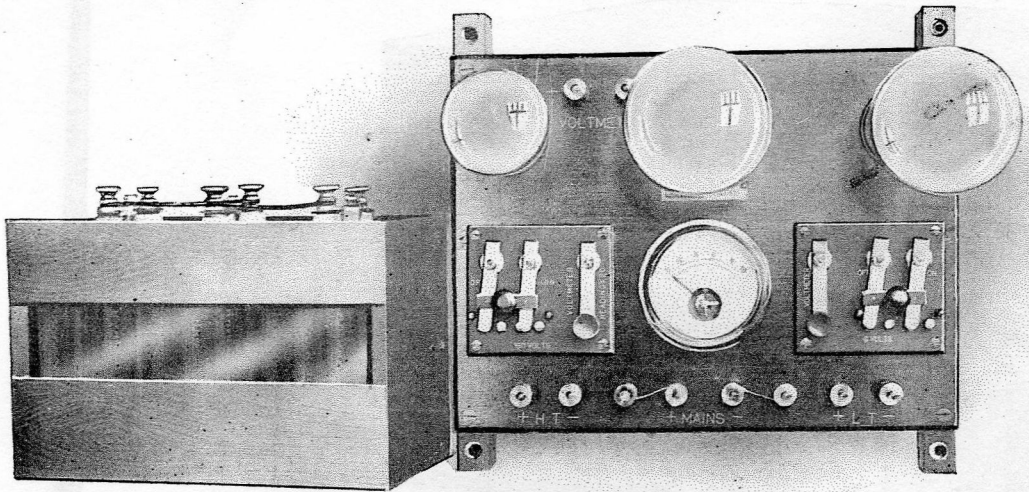
Designed and Manufactured in Australia.

sitiveness is almost entirely destroyed by the difficulty of adjustment by instability and consequent loss of signals in the middle of important messages. Such troubles are almost invariably experienced with valves which use low potentials in the plate circuit, and again in circuits which attempt to impose a number of functions on one valve. In addition to this there are numerous other points in the design and construction of complete receivers requiring careful experiment and special knowledge.

the lighting and high tension batteries, short circuits the telephone receiver and open the oscillatory circuits. The third is a single pole three-way switch which connects the reaction coil for long or short waves or disconnects it when not required.

On the front of this case a specially designed switch is provided for varying the inductance in the closed oscillatory circuit, and on the side of the case a handle is mounted for varying the position of the reaction coil. A small rotary variable condenser for tuning the closed oscillatory circuit is mounted on the ebonite top.

All switches are so constructed that they can be easily removed for examination without disconnecting any internal leads, and the small rotary condenser is also arranged in this manner.



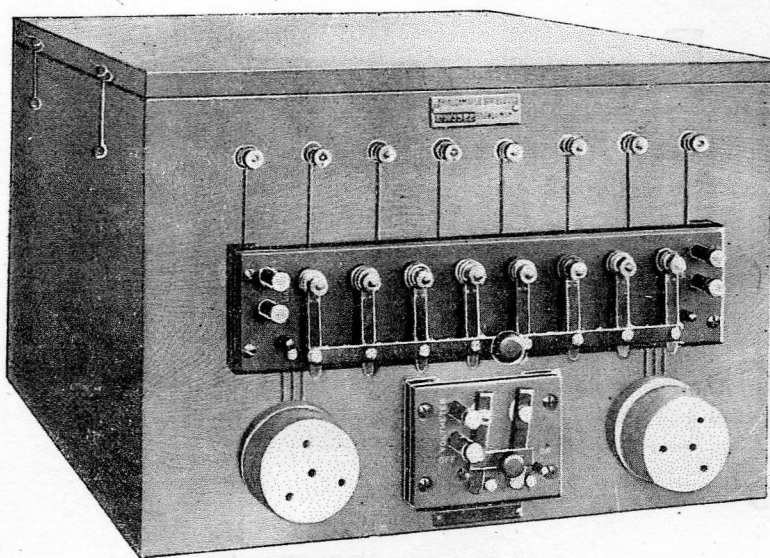
**Charging Board and Filament Battery for Magnifying Valve Receiver.**  
Designed and Manufactured in Australia.

The lighting battery consists of three 40 ampere hour accumulators mounted, for protection, in a wooden case. In order to overcome the difficulties which have been experienced, particularly in tropical countries, in the use of dry cells for the plate potential, also to reduce the cost of maintaining the high tension battery, a very simple accumulator battery of special design is provided with the receiver. This battery is mounted in a separate case on the side of which a charging and operating switch, a voltmeter switch and a pair of fuses are provided.

The battery control board is compact in design and is finished to match the other instruments. On this board are mounted a voltmeter, with keys for reading either high or low tension battery voltages, charging switches and charging lamps.

The complete set of apparatus provides for receiving damped or undamped waves of any wave length from 300 to 6000 metres, also for magnifying signals from any other receiver, such as a magnetic detector, a crystal receiver, or for further magnification of the signals from another "Expanse" type 103 Receiver. The set also provides an emergency crystal receiver which can be used alone or in conjunction with the magnifying valve.

In addition to all of the foregoing, provision has been made both in the aerial unit and the valve unit for connecting additional inductances, so as to extend the range of wave lengths to anything which may be desired. In this manner this particular type of



**High-Tension Local Battery for Magnifying Valve Receiver.**

Designed and Manufactured in Australia.

receiver has been successfully used on all wave lengths up to 15,000 metres. The set can be provided for the higher ranges if desired, and it is then known as Type 103A.

Every receiving set is carefully tested and calibrated before it is issued from the factory, and a calibration chart, showing adjustment of the secondary circuit for all wave lengths, is provided with each instrument.

All the apparatus is illustrated in this pamphlet, and a more detailed description and working instructions are supplied with the instruments.

Results such as those indicated below are being regularly obtained with these Receivers.

### LAND STATION.

Aerial 120 ft. long, 70 ft. high, at Wahroonga, N.S.W., Australia.

First direct messages, England to Australia, received at 1.15 p.m., Sept., 23rd, 1918

Signals from—

	Approximate Distance
Carnarvon, Wales ... ..	) 12,000 miles
Nauen, Germany ... ..	) 11,000 miles
Arlington, Virginia ... ..	—
Annapolis, Maryland ... ..	—
Belmar, New Jersey ... ..	—
Funabashi, Japan ... ..	—

and other high power stations in different parts of the world.

Pearl Harbour, Hawaii, recorded by dictaphone, readable fifty feet from telephones, and transmitted fourteen miles by land-line telephone.

Five kilowatt spark station received strongly all day from a distance of 1700 miles overland.

ALSO

Carnarvon, Wales ... ..	12,000 miles daylight
Nauen, Germany ... ..	11,000 ,, ,,

and other stations.

Signals clearly received at Wahroonga, New South Wales, on an Aerial **four feet high** and one hundred feet long.

### SHIP STATIONS.

1. Aerial 90 ft. high, 160 ft. long.

Darien ... ..	8,000 miles
Nauen ... ..	11,000 ,,
Pearl Harbour ... ..	4,000 ,, daylight

2. Aerial 60 ft. high, 90 ft. long.

5 KW spark station—2,000 metres—	900 miles daylight
5 KW spark station— 600 ,, 650 ,,	,, ,,

3. Aerial 60 ft. high, 106 ft. long.

5 KW spark station—1,800 metres—	1,600 miles daylight
Funabashi, Japan ... ..	4,000 ,, ,,

4. Aerial 60 ft. high, 130 ft. long.

5 KW spark station—2,000 metres—	2,000 miles daylight
5 KW spark station— 600 ,, 800 ,,	,, ,,
Funabashi, Japan ... ..	4,000 ,, ,,
Guam ... ..	3,000 ,, ,,