

AWA and the Teleradio

by

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Part 3 – The Changing of Technology

The war brought with it many changes, including the need for more compact wireless sets, that is, transmitters and receivers suitably packaged in the same case for either land or marine use. Smaller valves started to become readily available in the immediate post war period, but the invention of the transistor in 1948 hastened miniaturisation and allowed reduced power consumption levels. Consequently during the 1950s and 60s significant changes occurred as the old vacuum tube technology was phased out. At this stage the Model number was often preceded by the letters TR indicating a Teleradio.

a) Teleradio Receiver Type C55163 (1950)

As stated in Part 1 the housing of the Model 3 receivers and transmitters in separate boxes allowed a degree of flexibility. At least one other receiver, the Type C55163, was developed and employed as part of the Teleradio series. The set was designed around miniature 7 pin valves (6BA6 RF and IF, 6BE6 converter and BFO, 6AV6 detector and 6AQ5 output) was still large in size and like its predecessor, the C6770, covered the same frequency range of 0.2 to 30 MHz in 5 bands. The set operated from a vibrator power supply. Figure 1 shows the receiver while Figure 2 provides the circuit schematic [19].



Figure 1. The Teleradio receiver Type C55163 - external and internal views [19]

It was a receiver used particularly in PNG, but it is not known what transmitter it operated with. From the date of manufacture most likely the 3BZ version 2. Certainly during the 1950s organisations such as the Christian Radio Missionary Fellowship [20] that operated in PNG had staff upgrade the 3BZ transmitters by replacing the carbon microphone with a dynamic one, and the 3 valve modulator with a solid state version. This gave a three way improvement, better quality audio, more talk power by increasing the modulation depth and reducing accumulator current drain [21]. Yet others simply replaced the vibrator power supply with an AWA made transistor inverter [22].

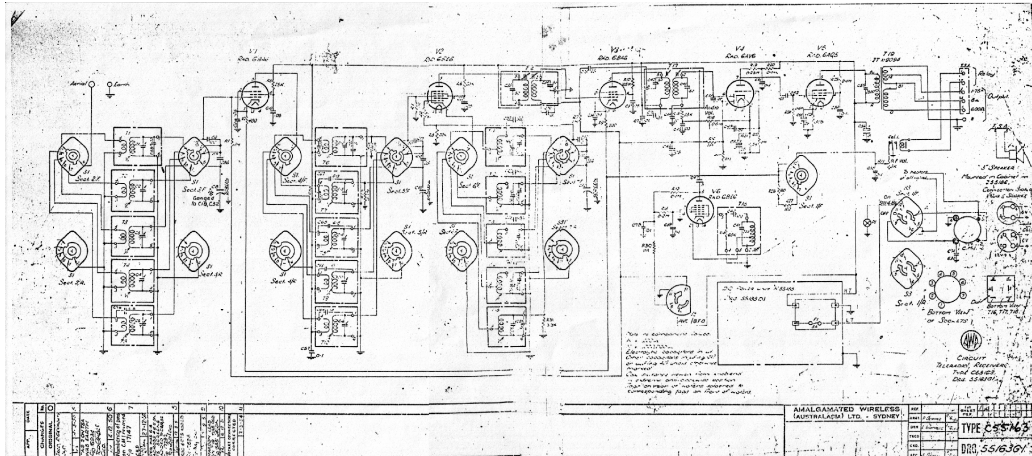


Figure 2. Circuit schematic of the Type CC55163 receiver [19]. Note the word Teleradio under the AWA logo.

b) Teleradio Model 5A, and 5C (1950s)

This Teleradio was the last of the valve transceivers, the last of the Australian sets to employ a carbon microphone and a return to the concept of the receiver and transmitter housed in a single case. It had the type number of J56768. The receiver was not a true general purpose communication receiver, but in three bands covered the broadcast band (550 to 1540 kHz) and the normal Teleradio transmitter frequency range of 2 to 9MHz. In the later Series II version the upper frequency range of the transceiver was extended to 10MHz. The IF frequency was 455kHz. Figure 3 shows a 5A set the receiver being on the RHS. The two controls below are volume and band switch [23].



Figure 3. The front panel of the Model 5 set. The case dimensions are $19 \frac{11}{16}$ " wide, $9 \frac{3}{4}$ " high and $15 \frac{3}{4}$ " deep.

The transmitter was crystal controlled and had up to four frequency channels. The transmitter inductors were preset for these frequencies so that the only variable was the output plate condenser to tune the set for a dip in the 6146 valve output stage plate current. This control is on the LHS of Figure 3. The knobs below are the channel selection switch and function switch, the positions being OFF, REC-TRAN and REC. In the central position the receiver is normally on, and pressing the microphone switch mutes the receiver and applies high tension to the transmitter crystal oscillator and power supply for transmission. Choke modulation was employed. The RF power out is typically 14 watts. With the function switch in the REC position only the receiver is on. For the Model 5A current drain from the 12V accumulator on receive is 3.2A, on transmit/receive standby 5.6A while on transmit 11A. The 5C version has an inbuilt 240VAC power supply rather than a 12V vibrator power supply. Figure 4 shows the circuit schematic of the 5A [23].

In the land based version the transmitter, the output impedance is 600 ohm unbalanced to feed a wire antenna, while for mobile or ship service where a whip antenna would be employed, an internal loading coil was included to provide matching.

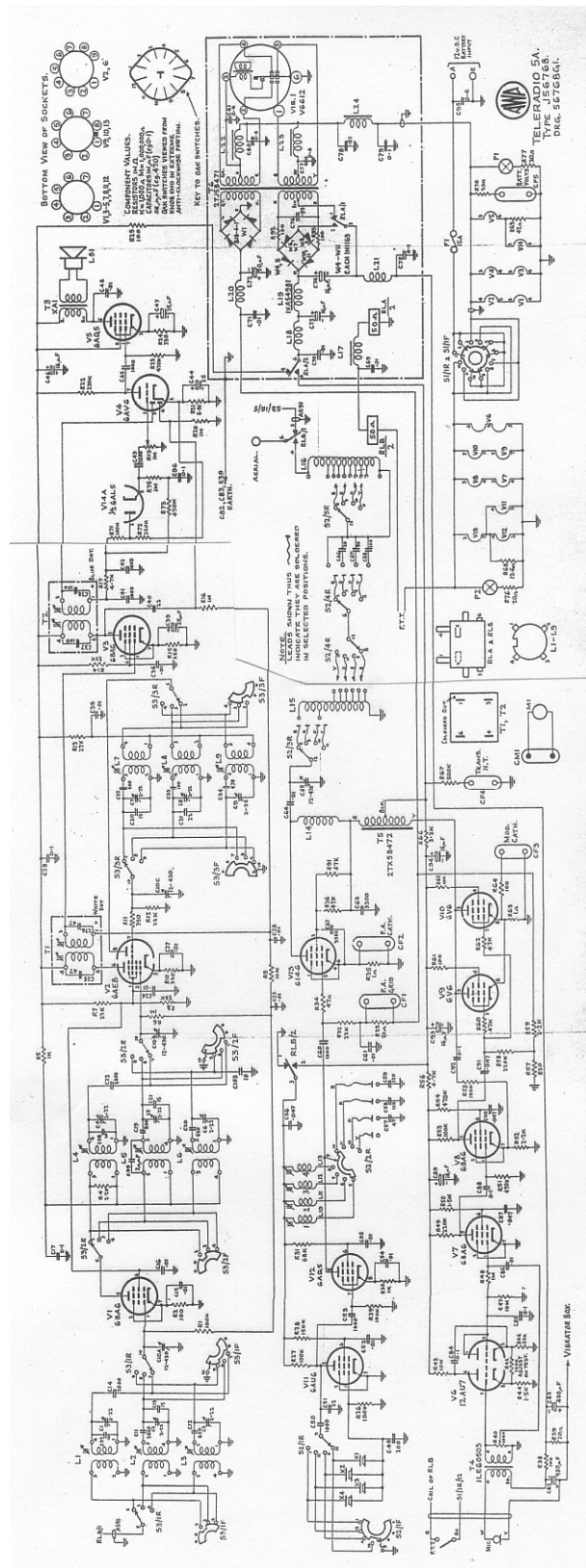


Figure 4. Circuit schematic of the Teleradio Model 5A

c) Teleradio Model 35 (Mark 1 and 2 versions, AWA NZ design)

These were hybrid AM sets designed to work into a whip aerial for marine use. The receiver had a continuously variable broadcast receiver covering 535 to 1605 kHz and a crystal controlled HF receiver, which allowed 5 channels in the frequency range 2000 to 2850 kHz. The five channel transmitter was also crystal controlled. The transmitter used an 12BY7A as the oscillator, a 6DQ6A for the final amplifier and push pull EL84s for the plate modulator. A carbon microphone was employed. DC input power to the final being 35 watts [24].

The difference between the models is in the receiver. The Model 35 has a 9 transistor receiver, while the 35 Mk II a ten transistor. The differences being the Mark I employed a converter in the front end of the receiver and the 1 watt audio amplifier was the push pull transformer type. The Mark II receiver used a separate oscillator and mixer stage in the front end and a complementary transistor audio output stage [25]. Both sets had an 455kHz IF frequency and identical front panel layout. Figure 5 shows the Mark II version and Figure 6 the circuit schematic.

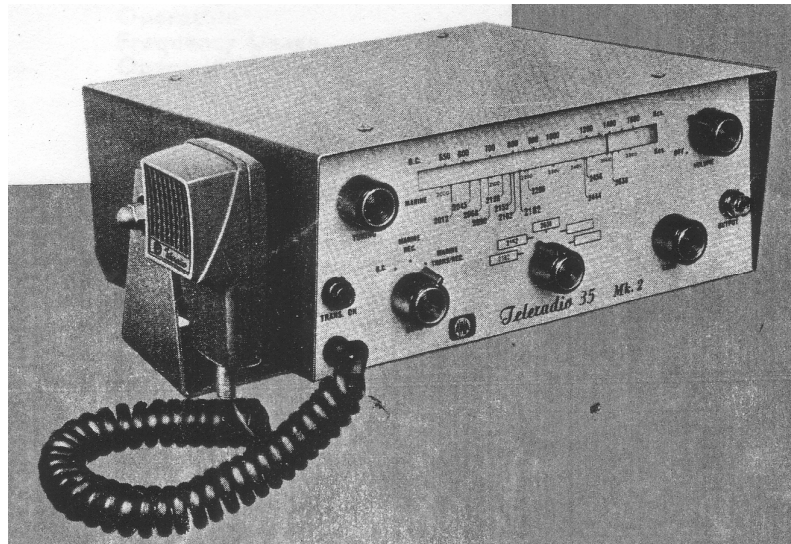


Figure 5. Teleradio Model 35 Mk II.

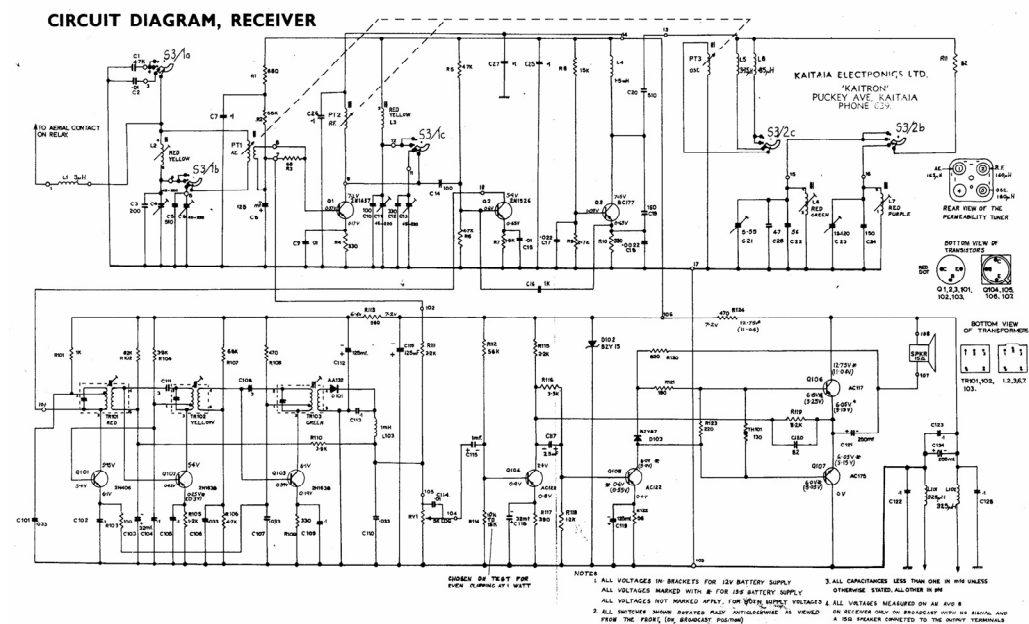
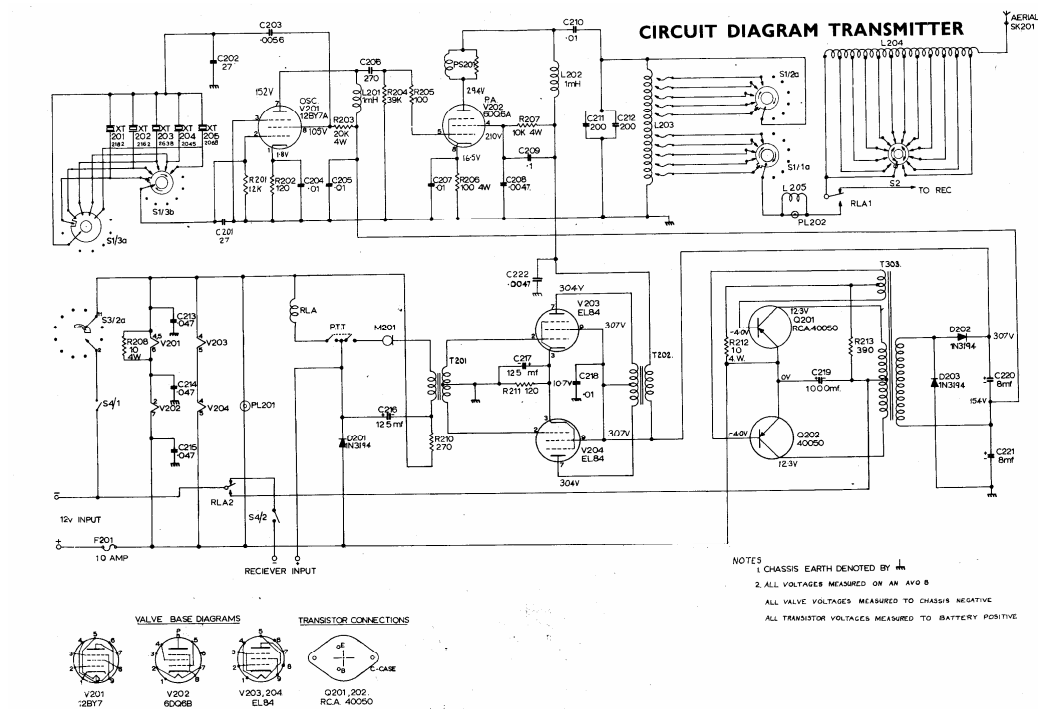


Figure 6. Circuit schematics for the Model 35 Mk II

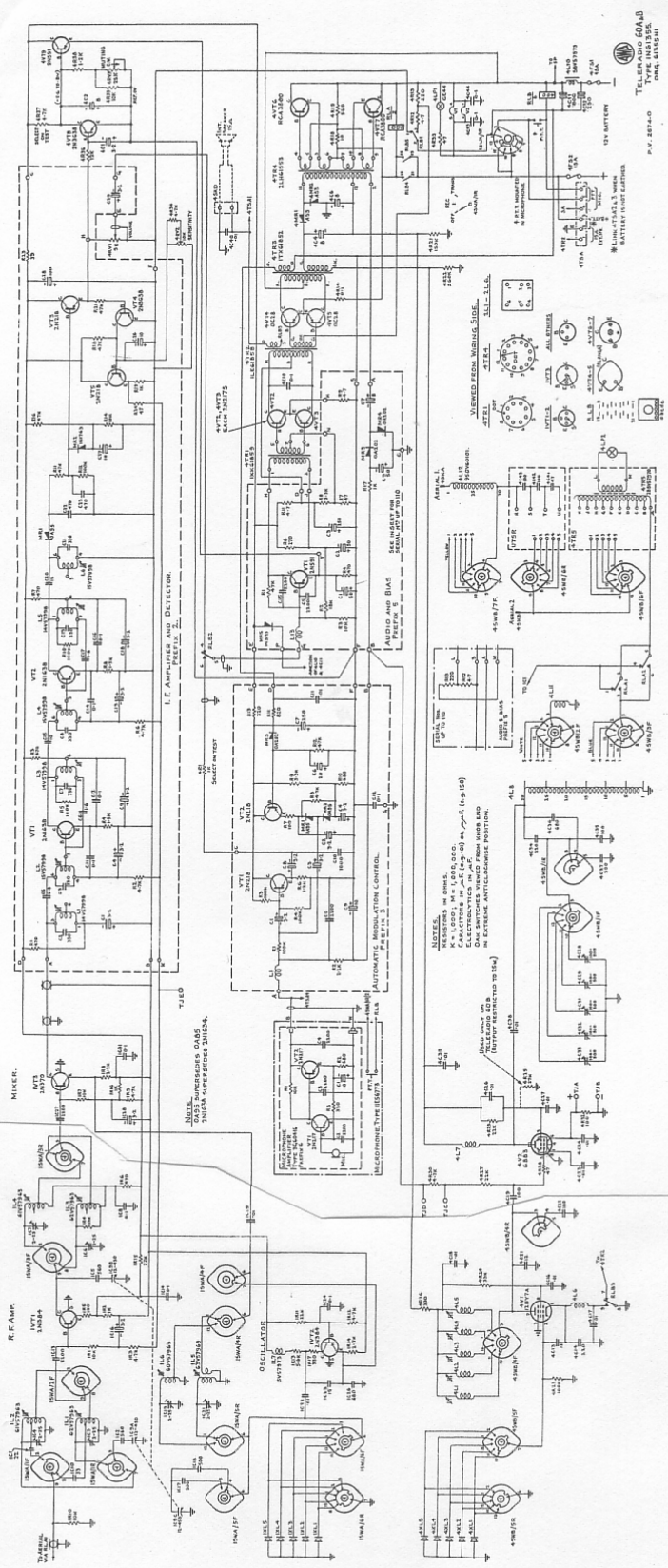
d) Teleradio Models 60A and 60B (Both type 1N61355, Mid 1960s)

This was the first of the Australian hybrid Teleradios where the receiver, modulator and DC to DC converter were all solid state with only the transmitter oscillator and final amplifier being valves. The broadcast band was omitted, the set covering the frequency range 2 to 10MHz. The transmitter was crystal controlled, up to four

channels, while the receiver could be crystal controlled or variable in two ranges 2 to 4.5 and 4.5 to 10MHz. The set came in two versions the only difference between the two was the 60B had a higher value screen grid resistor in the transmitter final to reduce the power from 35 to 25 watts. This was to satisfy PMG requirements of the day [26]. Figure 7 shows the Model 60B, where the 60B label is simply placed over the 60A figures, which was the normal figures on the etched front panel. Two plastic cards, one on either side allow the five transmitter (RHS) and receiver (LHS) crystal controlled frequencies to be recorded. They also have colour coding to match the channel switch positions. Figure 8 provides the circuit schematic for both sets.



Figure 7. The type 60 A and 60B sets had the same panel layout the only difference between the two models being the transmitter output power.



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Figure 8. Circuit schematic for the Model 60 Teleradios [26].

e) Teleradio Models 64, (and later Models 65 and 66) (Mid 1960s, AWA NZ designed)

The model 64 was a 6 channel crystal controlled hybrid AM transceiver with a tuneable broadcast receiver (535 to 1605kHz). Two versions were available 2 to 3 or 2 to 9.5MHz in the HF frequency range. The set was available either as a 12V or 24V DC power input, thus the transmitter output stage was either two parallel connected 6DQ6Bs or 12DQ6Bs providing an RF power output of 30 watts. The plate modulator was solid state using a carbon microphone. Figure 9 gives the transmitter circuit [27].

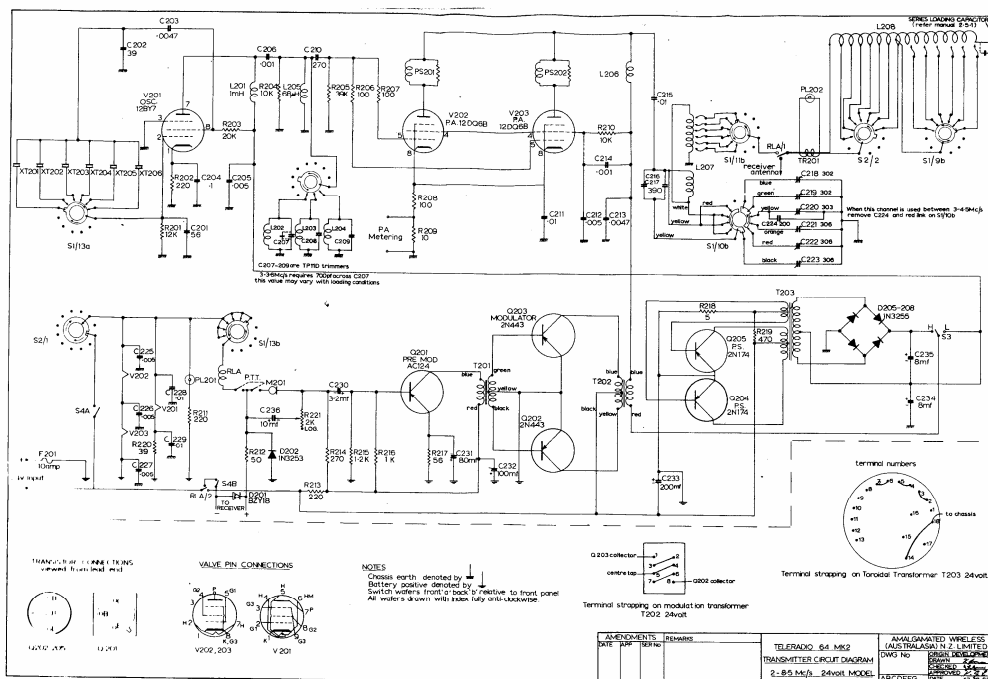


Figure 9. Teleradio Model 64 Mk II transmitter circuit

Transceiver controls include channel switch (1, 2, -- 6, BC), The receiver was solid state having a 455kHz IF frequency. Volume with on/off switch, noise limiter on/off switch, and a RF power out boost control with on/off switch. Internally there was also a full and half power switch, achieved by halving the DC high tension supply to the final amplifier. The half power was used for the initial setting up of the output loading coil taps. There were two lamps, standby and output as well as a phone jack. A mark II version of the set was also produced.

The Model 64 set the approach, both in design philosophy and styling, for a number of marine sets produced by AWA NZ, including the Models 65, 66 and 70 so less information will be given on these sets. Thus Model 65 and 66 Teleradios were similar in appearance, performance and operation except the RF output powers were less [28]. Figure 10 shows a photo of the Model 65 [29].

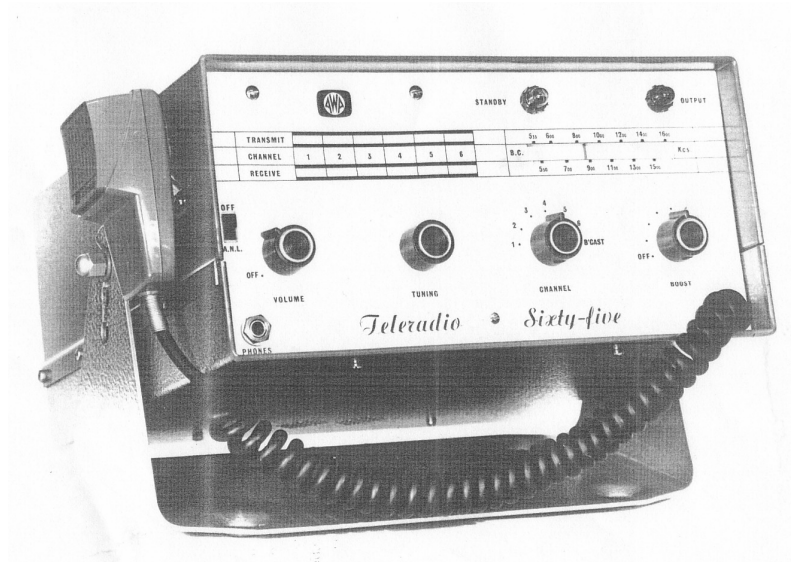


Figure 10. Model 65 Teleradio [29]

f) Teleradio Model 70 (Mid 1960s, AWA NZ designed)

A hybrid AM set designed for small craft, having a solid state receiver and vacuum tube transmitter consisting of a crystal controlled 12BY7 oscillator driving two parallel connected 6DQ6Bs (12V DC input) or 12DQ6B (24V DC input) valve output stage giving at least 30W output power. The set is available in two frequency ranges, either 2000 to 2850 MHz or 2000 to 8500 MHz, both having six crystal controlled transmit/receive frequencies. Both sets have a broadcast band receive only position on the frequency selector switch [30]. Figure 11 shows the set.



Figure 11. Teleradio Model 70 [30].

g) Teleradio Model 80 (1969, AWA NZ designed)

A solid state AM transceiver for small boats. It could operate from either 12 or 24V DC input without any changes. Two models were available, both identical except for the frequency range. These were 2 to 3 MHz with an RF power out of 15 watts or 2 to 6.5 MHz with a 22 watt output at the lower frequencies, falling off with increasing frequency to 15watts. The receiver had two bands, a tuneable BC receiver position

555 to 1550 kHz , the other for six crystal controlled channel frequencies. A series of push button switches allowed channel selection. The receiver employed a 455kHz ceramic IF filter. The set contained 2 integrated circuits, 19 transistors and 14 diodes [31]. Case size was W = 12", H = 4" and D = 8" [32]. Figure 12 shows the Model 80.



Figure 12. The Model 80 transceiver [32].

h) Packsets, Teleradios Model 1 (mid 1960s) and Model 3 (late 1960s), AWA NZ

These rugged lightweight sets were developed for infantry patrols, search and rescue operations, and similar users. They were two channel AM sets, frequencies in the range 2 – 6 MHz and operating from either an internal 12 V supply (8, D cells) or external supply. They could be used with wire aerials or whip antennas tuned to the frequencies of operation. The cases were made from bright yellow, high impact moulded plastic so that the sets could withstand drop impact and mechanical vibrations. There was also a metal cover plate to protect controls as well as a canvas carry bag. The case size of the Model 1 was 7 1/4" (H) by 4" (W) and 4 3/4" (D) and weighed approximately 1 kg with internal batteries.

The sets were of PCB construction the Model 1 consisting of 9 boards plugging into a mother board [33]. Both sets have an IF frequency of 455kHz the Model 1 a ceramic filter and Model 2 a mechanical filter (magnetostrictive) [34]. RF output power was 1 W. Both sets used a microphone speaker.

It is unfortunate that the model numbers for these sets is a repeating of those used for the original valve sets designed in Australia. Perhaps the subtitle PACKSET was used to indicate the difference

i) Teleradio Models (TR)215, (TR)225 and (TR)235 (AWA NZ designed, 1970s era)

These three sets differed from the normal range of Teleradios in that they were all VHF. They were fully solid state, crystal controlled six channel AM transceivers. Figure 13 shows the 215/225 model, the difference being the RF output power available, the 215 was 15 watts and the 225, 25 watts. The frequency ranges available were 39-44 MHz, 70-88 MHz, 88 – 108 MHz, 116 – 132 MHz and 148 – 174MHz. The sets contained a mute that silenced the set whenever a carrier signal from the transmitter was detected [35]. A new plastic material was used for the case front of

the 215/225 sets, one less likely to suffer impact damage in a car accident This plastic was developed by AWA at North Ryde for the Carphone series.



Figure 13. The Teleradio Models TR215 and TR225 [33].

The Model 235 was the last model of the three, a man pack styling designed in the late 1970s. The transceiver was available as a six or twelve channel man pack styling, with a separate RF power module. Output power was 12 watts [36]. Figure 14 shows a six channel version [37].

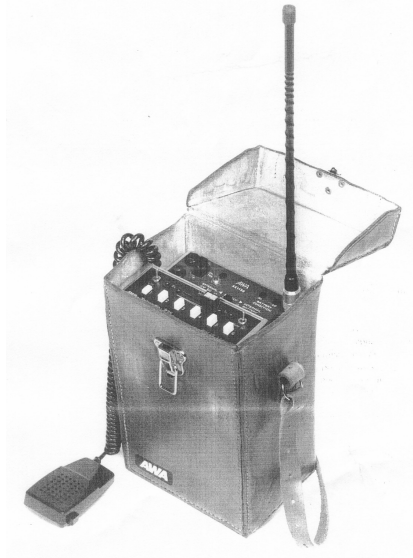


Figure 14. The man pack Teleradio type 235.

The next stage of the technology revolution was the change over to single side band (SSB) transmission. As the method of generation is more complex than for an AM there had to be a sharing of modules between transmitter and receiver to keep costs down, thus eliminating the concept of having a tuneable receiver in a Teleradio. These changes and the range of Teleradio SSB transceivers will be discussed in Part 4.

To be continued - Part 4

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