

“Hands On” to “Hands Free”

Jim Dell & Peter Smith

Significant Dates in the Rise and Fall of Irirangi

1939 *Well before war was declared in September, 1939, concern had been expressed over Wellington Radio stations vulnerability to off- shore bombardment. It was no surprise then that the outbreak of hostilities almost immediately set in train the planning of a new combined- services wireless station further inland. The dominant initial criteria were to be that it be well clear of coastal attack and provide sufficient land for the necessary transmitting and receiving antennas.*

1941 *Preliminary site investigations begin. Common folklore has it that this was done from a canvas tent by Acting Temporary Warrant Telegraphist Biggs. Mr Bigg’s role was not to determine the site of the camp, which had already been negotiated with the Sinclair family who farmed the land, but to determine the likelihood or strength of any interference from the yet to be built transmitting station originally planned to be just one mile distant.*

1942 *In June, the then Public Works Department was authorised to begin construction of a combined Naval and Air Force Wireless Station at Waiouru. The main camp, 5 miles south of Waiouru, was planned to cover some 30 acres on the site of the Sinclair family farm. Original planning was for the camp to accommodate 200 staff with the operations being centred on two main buildings.*

While the receiving stations and camp were being built construction was also underway at the Transmitter site, some seven miles north and approximately one mile north of the junction. The original transmitting station held four separate buildings, two of which were known as AT1 and AT2, representing Air Force Transmitter one and Air Force Transmitter two with the naval stations being similarly numbered as NT1 and NT2.

Altogether, 58 buildings were erected with a floor area of some 45,000 square feet, for a total cost of 100,000 pounds or \$200,000. It should be pointed out that this figure did not include the erection of aerials, cable laying nor the installation of the necessary equipment.

1943 *Little is known about the Air Force’s operation except to note there were several complaints made about the standard of air force accommodation at the main camp. Whether this had anything to do with the RNZAF’s decision of return to Ohakea is unknown but what is known is that in 1946 the air force ceased all operations at*

Waiouru. One result of their departure was that their receiving station, AR1 was taken over by the Navy and renamed NR1, before ultimately becoming the N.Z. arm of the Defence Signals Branch, still later to become incorporated into GCSB before eventually moving to a new location at Himatangi, near Foxton.

No details have become available of the naval operations between 1943 and 1946.

What is known is that the original station receivers were Collier and Beale 941s, a locally produced version of the Hallicrafter using two tuned r.f. stages and plug-in coils. Apart from dedicated listening watch on known enemy frequencies, all operations were standard Morse, using Creed punched tapes for transmissions and inked undulator tapes for higher speed reception.



941 Receiver

1945 The last of the wartime WRNZNS leave in December. Mt Ruapehu erupts. Camp well doused with ash. Following the closure of Cornwall Park, the main SWB8 transmitter, originally destined for Purewa was transported to and recommissioned at Waiouru where it joined the SWB11, becoming the main links to Admiralty on Fixed Service 11 and to Australia on Fixed Service 115.

1946 After the end of WW2, the departure of the Air Force staff and the wartime WRNZNS operators significantly reduced the ship's company. The remaining naval contingent moved from their dormitories into the former Wrens cabins at the southern end of the camp, thereby freeing the now surplus dormitories to be converted, largely by ship's staff, into very basic married quarters.

1947 Services stabilised during this period with Morse being the only mode of operation. Continuous fixed services were operated to Harman, an Australian radio station near Canberra, known as fixed service 115 and fixed service 11 to England, though propagation conditions generally meant that this service only operated efficiently during two five-to-six-hourly periods each day. In addition to the continuous fixed services, scheduled services were also operated to Esquimaux in Canada as Fixed service 67 and fixed service 64 to Oahu in Honolulu. The NZ area broadcast, WV, operated continuously as did the 16 mHz ship-to-shore band. A supplementary transmitter keyed from Tinakori provided additional coverage for the merchant ship broadcast covering the South Pacific area. In addition to the Morse circuits described above, two landline circuits were in operation, one to Navy Office in Wellington and the other to the NZ Post Office at Tinakori, also in Wellington. At the transmitter site,

the SWB11 fed a bi-directional rhombic (long path/short path) for Fixed Service 11 and the ex Purewa, ex Cornwall Park SWB8 fed another rhombic to Australia. The area broadcast transmitters (4, 6, 8 and 17 mHz) all used dipole antenna as did the 12mHz transmitter shared with ZLW at Tinakori.



Tel John Gooder on Fx Svc 11 1948



Landline Room 1948 – on the left is the circuit to/from NZPO, centre is the inward link from Navy Office in Wellington and on the right is the outward link to NO Wellington

1949 *The volume of naval traffic which had decreased markedly following the end of the war began to increase and this, together with a significant increase in commercial marine activity saw a steep rise in traffic which the Morse circuits were finding it*

difficult to handle. Under Lieutenant Bill Brewer, the station commanding officer and Warrant Officer Jack Williamson (both former PO Telegraphists) the first triple diversity receiver installation using three Marconi CRD150s was commissioned at NR2 and initial trials of radio teletype, using the Murray code, began.

- 1951** Waiouru W/T became H.M.N.Z.S. Irirangi. Despite its new name, the transmitter trials were not successful, the reason eventually being found to be the transmitter Morse code keying relays being incapable of handling the higher speed (50 Baud) Murray code. Because of atmospheric noise and interference the receiving stations were also having problems handling the on/off keyed signals. The wartime 941s were replaced by an initial outfit of B40B receivers which did little to resolve the problem. In fact the B40Bs were so ineffectual that an American Collins 51J-4 receiver was "borrowed" from NR1 to handle the 16MHz ship-shore band. When NR1 reclaimed their "borrowed" receiver, it was, to the delight of all the ship-shore operators, replaced by a much superior Racal R117.



Collins 51J-4 Receiver – very similar in appearance to the Racal RA117

To ameliorate the transmitter problems an order was placed for two new British DS13 transmitters with a rated output of 40KW and provision for multi-channelling and full frequency-shift-keying.

- 1952** The outbreak of the Korean War in 1951, the provision of higher keying speeds and higher output powers meant that many of the original wooden masts, and indeed the antennae hanging therefrom, had to be replaced. In total almost 200 poles were replaced or resited, most if not all the work being carried out by ship's staff under the leadership of yet another ex-POTel, Warrant Officer David Ingram.
- 1953** The arrival of the DS13 transmitters, with their 600 square-foot area, had necessitated the construction of a newer larger transmitter building and a new

emergency power source. For the power station, two of the 40-ton diesel alternators from completed hydro stations on the Waikato River were installed and connected. The new transmitter building was built by Ministry of Works (successors to the original Public Works Department) but installation of the transmitters and the diesel generators, all the ancillary wiring, testing and tuning was carried out by the ship's staff who also found the time to construct six medium power transmitters using war assets parts for a total cost of less than \$1000 against a quoted price of \$46,000 for each imported unit. Ships staff also built a 4KW modulator to convert a 4KW RCA CW transmitter. This was to broadcast music and news to NZ ships operating in the mid and north Pacific. The service operated successfully for several months until a mistuning blunder at the transmitter saw Naval Radio Waiouru go off the air together with a large portion of the power to the central North Island. For those of you not familiar with the DS13 txer they were so large you accessed the guts through a door using a metal handle similar to the hand wheels used for securing watertight doors on a submarine (similar handle used to tune the VFO). The power amplifiers and rectifiers were water and air cooled and although the maximum rated power output was 40Kw it was generally operated at a lower level of 20KW at which figure it was still the most powerful of the transmitters in the hall at this time.

Again according to popular myth, Her Majesty The Queen, making her first visit to NZ, was to make her Christmas broadcast to the world from Government House, Wellington, using the first of the two DS13 transmitters direct to UK. Initial trials were carried out and the reception to UK was good, but not good enough for retransmission. Subsequently it was discovered that the fault lay in the noise on the land lines from Wellington, a long standing problem that took many years to overcome. Because of this the broadcast was made ten days earlier using cable circuits and had to be hastily updated when Her Majesty added some additional material concerning the Christmas Eve Tangiwai railway disaster where 153 passengers were killed.

1954 Ship Shore changes were introduced - 4mHz ship shore introduced on 24hr basis. 16 mHz reduced to 0600M to 1800M and 6 mHz operational 1800M to 0600M.

1957 Pilot Carrier Telegraphy, a new high speed signalling system invented by a Polish refugee named Roger Terlecki. Admiralty were persuaded to trial this new system and chose their longest link, Fixed Service 11 to run the system in parallel with the normal link using Frequency Shift Keying. At that time there were no Pilot Carrier Drive units operational at Irirangi so the trial remained one-way. Reports from local practitioners say the system performed better than the traditional FSK but Admiralty remained unconvinced with the result that the inventor and his system ended up in the U.S.A.

1958 Another development this year was the commissioning of an automatic telegraphy link to the U.S. based Operation Deepfreeze headquarters in Antarctica. In addition to operating at a different speed, 45.5 Baud instead of the usual 50 Baud, the American equipment was designed for single-current on-off keying instead of FSK.

1959 Two REMs died in a fire in their cabin at the former Wrennery block.

1961 Modernisation to install a patched aerial exchange to replace the open wire feeders in the transmitter loft.

The rest of the transmitters were one SWB 11, one SWB, four 89P/Q one ATH5 [output 7kW, the first transmitter built by Amalgamated Wireless of Australia] one , CTH7 [details unknown but believed to have an output of 10kW and to have been built by Collier and Beale].

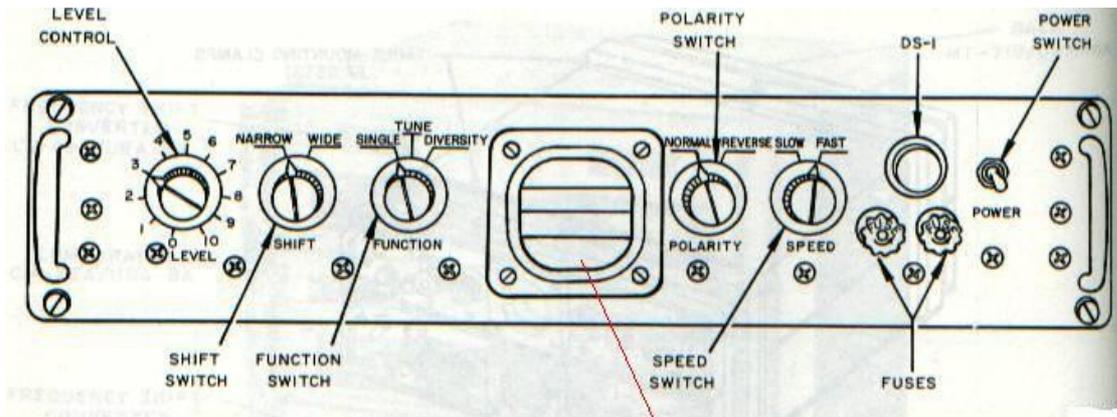
1962 Broadcast WV begins RATT transmissions with SOP reversion to CW.

1963 Being sorely in need of major repair the original transmitter building, NT1, was demolished and a new structure erected a couple of hundred metres from the old rigging hut.

1964 At the receivers the HF receiving bay 5 was commissioned as an off-line ship-shore bay, using two of the new B40Ds an AN/URA 17 converter and 2 type 12 printers According to reports, Oriana used this mode to clear a QTC of 1000 but whether the system enjoyed wide popularity is not known. At the other end of the building, four new triple diversity receiver units incorporating CRD150/20 s began operating and, as if to celebrate, all the time-hallowed Fixed Services were re-numbered. Fx Svc 115 became Fixed Service 175 to Canberra instead of Harman. Fixed Service 11 to Whitehall became FX Svc 10 while FX SVC 67 became Fx Svc 202 but still terminated at CKN. Fixed Service 64 was not immune and emerged as a dual diversity Fx Svc 201 to Honolulu. As if this wasn't confusion enough, Dave Ingram introduced the employment of REMs for Fixed Services



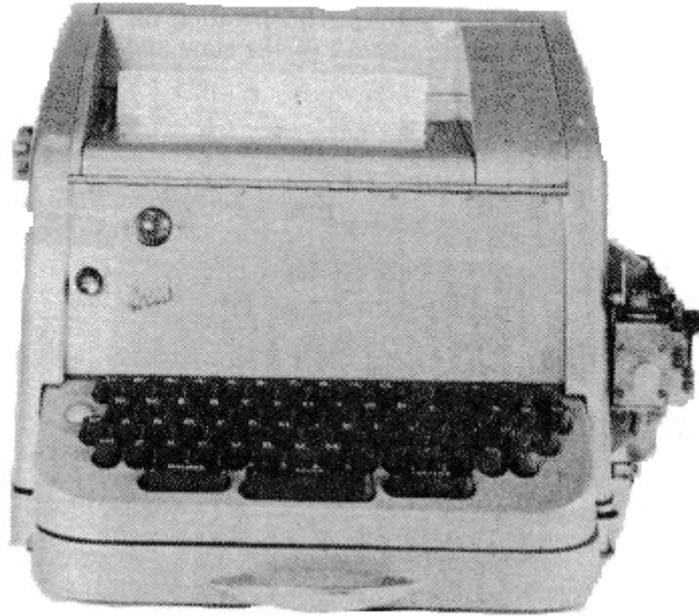
B40D



AN/URA-17 Comparator-convertor

Scope

AN/URA17



Creed Type 12 teleprinter

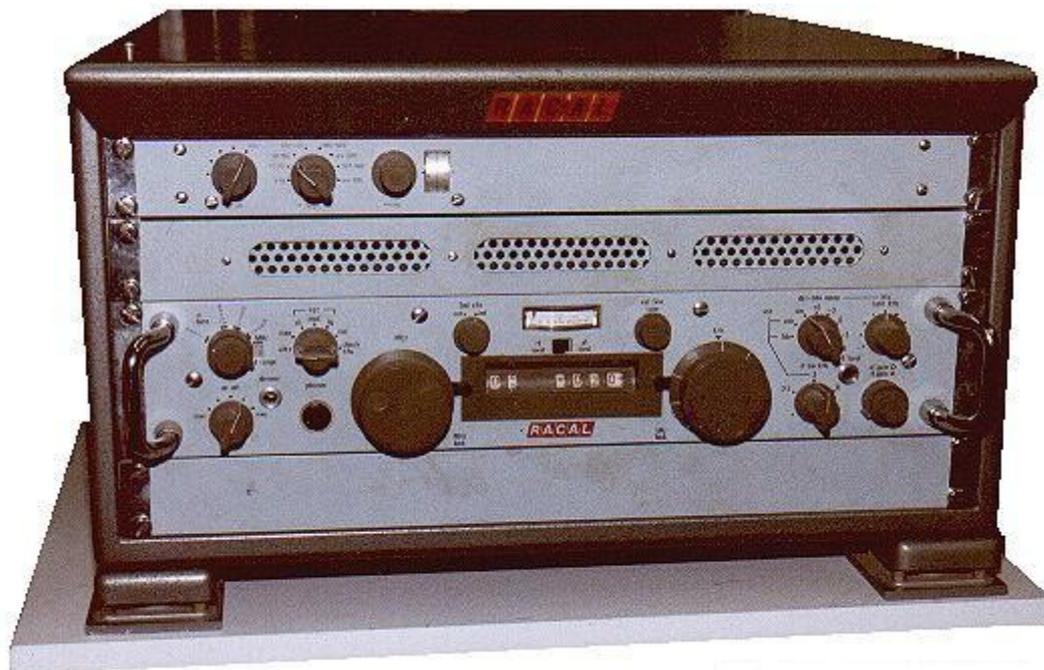
- 1966** *One of the two initial DS13 transmitters was dismantled and removed to create enough room for eight new Collins transmitters*
- 1969** *Accommodation moved to Waiouru Army camp.*
- Simultaneous transmission of FSK and CW commenced on area broadcast WV/WVR*
- 1970** *Radio Supervisors began watchkeeping at NT1.*
- 1973** *HMNZS Irirangi recommissioned. New Zealand Answering Broadcast [NZAB] introduced.*
- 1977** *On 1 November, 32 years after their WW2 sisters left Waiouru W/T (as it then was), ten female Radio Operators arrived at Irirangi. In an interesting aside, the CO at the time, Dai Davies said it would be 6 years before females took over the able rates positions at Irirangi. ROs took over the Fixed Services.*
- 1978** *At the transmitters, a comprehensive antenna re-alignment programme began. On April 20, a further 14 female operators [9 ROs and 5 COs] arrived. The six year interval had shrunk to less than six months. The long-awaited update of the fixed service reception equipment, staff and gender was completed. First Irirangi reunion.*

HSR1 – 2 RA117 Rcvrs – 2 MA350B synthesisers c/w FSK, sideband & Diversity units



RA117 Receiver

HSR2 – 2 RA1217 Rcvrs - 2 MA350B synthesisers c/w FSK, sideband & diversity units



RACAL RA1217 Receiver

RA1217 Receiver

HSR3 – 2 RA117 Rcvrs - 2 MA350B synthesisers c/w FSK, sideband & diversity units

HSR4- 2 RA1772 Rcvrs which incorporated individual diversity and FSK units



RA1772

One AN/FCC31 multichannel voice frequency unit known as Smokey One for VMA

One AN/FGC61 multichannel voice frequency unit for the NPM circuit.

HSR1 was used for spare/NPM, HSR2 VMA, HSR3 spare, HSR4 CKN. HSR4 was fitted with a Barry Research TDM 7-channel modem later in the piece and proved to be an excellent addition to the Fixed Service equipment. There were also the two HL13 Multi Channel Voice Frequency units for the link to the transmitters and CASE for the link to Wellington. This was combined with a Telecom CHF unit to link to North Range Rd. There were also 8 Type 691 UHF transmitters feeding into a locally produced Yagi antenna with a back-up Cambridge transceiver feeding a dipole antenna for emergency voice communications to the transmitters. All receive antennas were rhombics with backup from a single monopole antenna and a wideband antenna amplifier system. These antennae could also be supplemented with Daisy Vees patched through from the Morse room..

1979 The crash of the Air New Zealand DC10 in Antarctica led to calls for Waiouru to have VHF and UHF receivers to be able to participate in any local or national emergencies. This proposal was never progressed but it is a fact that Waiouru, because of its 3000ft elevation and localised inversion characteristics may have been able to play a role in overcoming the tyranny of distance at that time.

1980 Primarily notable for the second Irirangi reunion.

- 1983** First receive LPDA operational for MRLs [ship-shore]. This was a rotatable antenna with a 120ft boom on top of a 100ft mast and was a great antenna for pulling in very weak signals and was used to great effect on MRLs. The log periodic antenna has a large number of driven elements designed to be operated over a wide range of frequencies. Its principal advantage is that it exhibits constant characteristics such as gain, bandwidth and front to back ratio over its entire frequency range.
- 1984** Research was carried out to determine a better transmit aerials for shore to ship. Until then, the broadcast aerials were omnidirectional unterminated vees, joined together to form a square and were incorrectly termed quadrants. One so-called quadrant of two vees transmitted on 4 and 12 MHz and a second quadrant transmitted on 8 and 16MHz with two additional quadrants for the other broadcast. There used to be an old saying at sea that if you could hear ZLO on the broadcast frequencies then you should have been able to transmit into ZLO on the same bands. This was wrong, especially if you were a few thousand kilometres away. Ships' whip aerials had lower take-off angles compared to the "quadrants", causing frustration to generations of ships' operators who used to wonder why ZLO couldn't hear them. After comprehensive trials conducted by WORS Jim Dell, it was decided that new aerials would be erected when the new transmitter building was completed. The two sets of broadcast aerials were redesigned to have similar characteristics to ships whips. Vertical wire antennae, cut to a quarter wavelength were suspended and insulated from a horizontal catenary slung between two towers. Each wire antenna had its own counterpoise – the original earth mat that had been laid down 30 years earlier had been completely eroded by the volcanic soil, leaving only a green tinge showing where the original copper had once been. A separate type of antenna had to be erected to cater for an HF voice circuit. The monopoles were satisfactory for north/south paths and out to sea in east/west directions which meant that ships in harbour on the east and west coasts of the North Island were unable to hear ZLO. To overcome this, a halfwave dipole using two wires for 3 and 8 MHz was erected 10 meters above ground and oriented 10 degrees off north/south, giving good omnidirectional reception onboard ships.
- 1986** Construction begins on new transmitter building
- 1988** On March 17 the new transmitter building was officially opened, although the resident 10 Harris transmitters had been operational since February. A second RLPA was commissioned. Another significant event occurred in August with the demolition of the former NR1 building.
- 1989** In February, the former telegraph link to Awarua ended.

The development of the Joint Radio Project saw site works begin on the old NR1 site.

The Joint Radio Project was established to provide communications for:

- 1 The NZ Defence Communications Network
- 2 Ship to shore communications
- 3 Shore to ship communications

(1) The NZ Defence Communications Network

Prior to 1970 the three armed services had their own networks. NCS Waiouru had fixed point to point services with Canberra (FX501), Honolulu (FX602) and Vancouver (FX601). Earlier on there was even a direct link to Whitehall.

With the formation of the NZ Defence Force, the three single networks were amalgamated into one, known as the NZ Defence Communications Network. The overseas networks were reduced, with some being networked through overseas cable and satellite systems. All current overseas networks changed to the following:

- a. DCN501 – Wellington to Canberra – cable/satellite.
- b. DCN502 – Wellington to Melbourne- HF radio via Waiouru (6 Signal Regiment, Australian Army).
- c. DCN601- Wellington to Vancouver – HF radio via Waiouru.
- d. DCN602 – Wellington to Honolulu – cable/satellite.
- e. DCN602X- Waiouru to Honolulu-HF radio- monthly sked for 24 hours [Contingency circuit to the cable satellite link].
- f. Waiouru to Noumea – HF Radio – monthly sked for 24 hours (French navy).
- g. Waiouru to Hong Kong-HF Radio-3-monthly sked for 72 hours [3 Signal Regiment, Ghurkhas, British Army].

All service communications within the NZ area were routed through the Defence Communications Centre in Wellington. There, the Automatic Message Switching System [a fully duplicated automatic computerised system] directed the messages according to their routing indicators. Each terminal in the country was able to communicate with each other through the single automatic relay system. DCC Wellington covered the central tributaries and was linked to the Northern Telegraph Exchange, Auckland Naval Base and to the Southern Telegraph Exchange, Addington Barracks, Christchurch.

(1) Fixed Services: DCN601 to Canada was now the longest overseas circuit and was subject to huge outages caused by fading and ionospheric disturbances. These problems were eventually overcome by the introduction of a Canadian invention called a time diversity modem made by Barry Research. The TDM had seven channels. This transmitted/received the same character seven times, one second apart and enabled the circuit to stay "in" even if four of the seven channels were taking hits.

(2) Ship to shore communications

In the early 70s NCS Waiouru still had ship to shore transmitters. 4MHz was dedicated 24 hours a day with another transmitter for 6 MHz at night which changed to 16MHz for daytime operation. The Post Office station at Awarua (ZLB) covered 8 and 12 MHz. Receivers in the ship to shore room were Racal 117s, replaced by Racal CJs until these were in turn replaced by the Racal 1772. Ship shore procedures had changed about 1973 with the introduction of the NZ Answering Broadcast [NZAB] which was a CW signal inserted into the area online broadcast Z11W [the old WVR]. The NZAB was offset -1kHz on all Z11W frequencies and was easy for ships to tune to and saved on the use of two separate transmitters.

(3) Shore to ship communications

Initially, NCS Waiouru only had two broadcasts – WVR (On-line RATT) and WV (CW). The CW component alternated with RATT every two hours. To bring them more into line with Allied nomenclatures, designations changed again with WVR becoming Z11W, WVA becoming Z12W and WV to Z13W. 11 was identified as on-line Ratt, 12 was off-line Ratt while 13 was CW. The Z designator was for New Zealand with the W being for Waiouru.

1990 The new Harris receiver suite installed in the recently completed receiver building on the former NR1 site and the installation commissioned on 12 April. Automatic Message Handling System [COMPUCAT] operational. Chirpsounder, a receiver spectrum analyser and frequency management terminal introduced to provide first time communications with both fixed and mobile stations. A 3rd RLPA commissioned at the transmitter site.

- 1991** Naval Tactical Interface Message Switch [NAVTIMS] operational on 19 August. The old NR2 receiver building became the centrepiece for the annual Guy Fawkes day bonfire
- 1992** Stuart Sinclair died. Stu, son of Joe and Mary, had bought the former camp after the Navy departed. Another notable death was Brian Peters.
- 1993** HMNZS Irirangi decommissioned.