# The BROADCASTER

Newsletter of the Broadcasting Division

No. 18 November 1990


SEA EAGLE NEST IN ANTENNA

## THE BROADCASTER

The Broadcaster is the in-house newsletter of the Broadcasting Division and is published three times a year to inform and recognise the people who make up this organisation.

Articles appearing in *The Broadcaster* do not necessarily reflect the views of the management of Telecom Australia.

Written and photographic contributions are welcome. All material should bear the contributor's name and location and be directed to:

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| Published by: | The Broadcasting Division,<br>Telecom Australia,<br>11th Floor,<br>484 St Kilda Road,<br>MELBOURNE, VIC 3004 |

National Library Card No. ISSN 0816-3235.

## EDITORIAL

One of the articles in this issue concerns John Graeme Balsillie, appointed in 1911 as Australia's first Engineer in Radiotelegraphy to design and construct a network of coastal radio stations to encircle the nation.

At that time, radio engineering in Australia was in its infancy, there were very few people knowledgeable in the service and there was no manufacturing base for radio equipment.

The Government was fortunate in being able to convince Balsillie, a former Queenslander, to return to Australia to take up the appointment with the Postmaster General's Department.

Balsillie had invented a wireless telegraphy system and with the exception of two imported Telefunken stations, he oversighted the successful completion of the network using the system he designed.

The manufacture of the equipment in Australia, the logistics associated with the construction of so many stations, including buildings at isolated sites, the training of installation and operating staff and the fact that within three years of his appointment the coastal radio service could boast some 20 operational high power stations, says a lot for the man as a pioneer in radio engineering management, more than 79 years ago.

JACK ROSS,
Editor.

*Front Cover:* TV station ABW9 Kalbarri WA.

*Contributors to this issue:*

| | | |
|---|---|---|
| Leon Sebire | Jeff Cirson | Bob Horsley |
| Leo Moloney | Doug Sanderson | John Bracken |
| Alvin Hanna | Bruce Wilson | Brian Hey |
| Ralph Denison | Jim Finch | Andy Fisher |
| Murray Fopp | Wes Graham | Ted Hurn |
| Barrie Morton | John Starr | Jack Ross |

*Leon Sebire.*

## FROM MY DESK

The Broadcasting Division's involvement in the provision and operation of transmitting facilities for the ABC's Radio Australia service is probably our least known activity yet it accounts for almost 20 per cent of our total operating costs. Radio Australia is an organ of Australian foreign policy and has proved itself to be of significant benefit during times of international confrontation and strife.

During the recent difficulties in the Middle East, special broadcasts have been initiated from Cox Peninsula near Darwin to the affected area. English language broadcasts have been mounted in both the 17MHz and 21MHz bands to the Persian Gulf area in peak evening listening time. These broadcasts carry a program format specifically designed by the ABC to reassure and keep informed Australians stranded or working in the area. Listener reports indicate that not only is the technical quality good but that the program material is widely appreciated by the recipients including the many Telecom employees currently working under contract in Saudi Arabia. Many letters of appreciation have been received from the target area complimenting both the Broadcasting Division and the ABC on the initiative.

The 1990/91 Federal Budget has also recognised the importance of Radio Australia with the allocation of funds to provide two additional high power transmitters at Cox Peninsula and for further modernisation of the older "flagship" Shepparton station. This is a reaffirmation of the Government's appreciation of the importance of the service and the work involved is to take place over the next three years.

This will be the last issue of *The Broadcaster* in 1990 and I would like to take this opportunity to extend to all Divisional staff, their families and our many reader friends my sincere wishes that they enjoy a Merry Christmas and a prosperous Happy New Year.

**LEON SEBIRE**
General Manager

## STATION ROLL CALL

### ABCLQ7 CLONCURRY

The ABCLQ-7 television transmitter is situated on the site of rocky Mount Avarice, the site of a Telecom repeater tower.

The station serves Cloncurry, a town with a population of about 2 000. The town is some 120 km east of the mining centre of Mount Isa. It was named by Robert O'Hara Burke, the explorer, in honour of his cousin Lady Cloncurry. It is an important marketing centre for cattle and horses from the Channel Country and the area surrounding the Gulf of Carpentaria.

Cloncurry was the birthplace of the Royal Flying Service when it was established in 1928. The first pedal operated transceivers were installed in 1929 and the success of the experiment led to the establishment of radio control stations at other remote parts of the country.

Cloncurry is also famous for its role with QANTAS. The service commenced between Longreach and Cloncurry on 3 November 1922 with its first passenger, an 84 year old white whiskered man, and carrying Queensland's first Airmail. On the return flight leaving Cloncurry, QANTAS carried its first woman passenger who enjoyed drinking morning tea from a vacuum flask at 5 000 feet in an open cockpit.

The TV service commenced on 17 March 1971 using a 50 watt LGT transmitter feeding a COEL four panel antenna system via a $1^{5}/_{8}$ inch Flexwell cable. The transmitter was later replaced by a 50 watt NEC unit. The antenna is mounted on a 60 metre tower and provides an omnidirectional pattern with an e.r.p. of 0.1 kW. The Radio National FM service is also transmitted from the site.

**DOUG SANDERSON**

### 4MI MOUNT ISA

Station 4MI is located about 960 km west of Townsville. The city comprising some 25 000 people is divided by the dry stony bed of the Leichhardt River into the Town Side and the Mine Side. The enormous 200 metre high chimney of the copper smelter, and all the external works of a great mine dominate the skyline. The visitor is occasionally treated to a whiff of sulphur dioxide.

Mount Isa is the site of one of the richest and largest underground mines in the world. Copper, silver, lead and zinc are found close together but are mined and treated separately. The mine extends four kilometres in length, more than a kilometre in width and descends to more than 1 100 metres. Copper from the smelters is railed to Townsville where it is refined and shipped to buyers throughout the world. Crude lead from the lead smelter is exported through Townsville to Britain for refining. Zinc concentrates are also shipped through Townsville.

The Mount Isa field was discovered by John Campbell Miles, a prospector in 1923 but large scale mining did not begin until 1953.

The transmitting facilities comprise a pair of Philips 1648 200 watt transmitters operating in a main/standby configuration. They were commissioned in July 1960 and feed a 42 metre steel pipe omnidirectional radiator. Operating frequency is 1080 kHz. The station has operated in an unstaffed mode since going to air, and maintenance responsibility is undertaken by the Townsville District staff.

**DOUG SANDERSON**

## NEWS ROUND-UP

# 4CH TAKES A BATH

South Western Queensland was severely flooded during the weekend 21-22 April 1990, and the local station 4CH Charleville which had only been in service since May 1987, was fortunate to escape with minimum damage.

At 7 a.m. on the morning of Saturday 21st, the Charleville telephone exchange was turned off, interrupting program, telephone and ACTTS monitoring and control circuits to the station. Commercial power was lost an hour later and was not restored until 60 hours later.

When the program and other circuits were restored at 4 p.m. on the following day, the local telephone exchange staff reported that 4CH was still on air.

When it became possible to travel to the site one week later, an inspection revealed that water had entered both coupling huts of the directional aerial system to a depth of at least one metre. Fortunately the rising water stopped just below the coupling components. At the height of the flooding, both base insulators of the 90 metre masts would have been under water. The transmitter building and emergency power plant building missed water entry by about 40 cm.

It is fortunate that the only visible remains of the flood is mud and debris caught in the fences.

**BOB HORSLEY**

*Debris indicating level of flood waters at 4CH mast base.*

# NEW BRANCH HEADQUARTERS

The Queensland Broadcasting Branch was relocated in February this year, with most Brisbane based activities being concentrated on the one site for the first time. It is expected that the move will result in significant savings in overheads, and improve overall efficiency.

The Administrative, Technical Installation Depot, Branch Store and South East Service Centre are now located in leased premise at Coorparoo in the southern suburbs. The Broadcast Lines Depot, which is still located at Bald Hills Transmitter Site, is the only remaining orphan

The Broadcasting Branch and its predecessor, the PMG Department Radio Section, led a nomadic existence during its 50 years history. The Administrative Headquarters have been previously located in Parbury House, CTA Building, APA Building and Public Trustee House, all in the city area.

The Installation Group were initially located in Mary Street, then Ernest Street, South Brisbane—in the centre of the subsequent Expo 88 site—Perry Park, Peel Street, South Brisbane and Maud Street, Newstead.

The Service Centre's first home was at Woollongabba, although its predecessor, the Radio Laboratory, had shifted on a number of occasions. The Lines group are still in their original home as a purely Broadcast group but had previously operated from depots at Perry Park and Ella Street, Fortitude Valley.

**LEO MOLONEY**


*Artwork by Ralph Denison, Northern Territory Section.*

## NEW ANTENNA SWITCHING SYSTEM

After nearly 30 years of service, the Matrix antenna switch at Radio Australia, Shepparton is to be replaced.

In 1960/61, APO Engineering staff designed and installed the existing Matrix switch to provide flexible switching facilities and expanded short wave broadcasting services at Shepparton. The switch provided 10 transmitter inputs and 36 antenna outputs, and at the time of installation was "state of the art" technology.

The heart of the switch is the large "alumply" switching arms which move within a large matrix type steel framework. These arms contain insulator mounted two conductor 300 ohm transmission lines and are capable of carrying the full 100 kW output from the Shepparton transmitters.

Unfortunately environmental conditions over the years produced corrosion problems, and this resulted in severe deterioration of arms and fittings, while long term wear of bearings, motor drives, and control mechanisms resulted in a number of long term outages and unreliable continuity of performance.

Funding has now been provided for replacement of the switch, and work is well under way on the installation of a Marconi 500 kW antenna switching system capable of switching seven transmitter inputs to 12 antenna outputs.

The new switch is computer driven and has switching times in the order of 20 seconds which will accommodate similar transmitter frequency change times.

As the Shepparton site uses a larger number of single band antenna systems, it has been necessary to include eleven additional Marconi two position RF switches as a method of accommodating antenna selection.

The installation program is running to schedule, and most of the switching components are on site, undergoing assembly prior to installation. The switch is to be supported within a large weather proof mounting structure, and as a result should provide reliable service well into the next century.

**BRUCE WILSON**

## RADIATION RE-ASSESSED

There have been some changes in International recommendations since the Telecom TPH's and the Australian Standard AS2772-1985 were issued.

The major new recommendation of concern is to define a recommended limit on current density.

Theoretical calculations suggested that recommended limit may be exceeded in the ankles of a person standing in a vertical field, such as MF and some HF—a veritable "Hot Foot".

To check on the real situation, Telecom Research Laboratories set out to measure actual currents and to compare the measurements with theory. Measurements were taken on a number of MF broadcasting and Radio Australia transmitting sites covering frequencies from 700 kHz to 40 MHz (as ankle current should increase proportionately with frequency up to resonance at 30 to 40 MHz, with less increase at higher frequencies).

Two measuring methods were used, a current probe clamped round the ankle, and by measuring voltage across a resistance between two plates. In both cases, the measurements were made over a wire mesh ground plane to give good earth conductivity (hence the highest currents, or worst case situation). Similarly, barefoot measurements were made as well as the measurements with normal footwear.

The results:

- Ankle currents are fairly well below the recommended limits when the vertical component of the E field is below the limits set in AS2772-1985.
- The two methods of measurement agree closely.
- Measured currents were some 20 per cent below similar calculated figures (which assume perfect conductivity).
- Footwear reduces the currents measured by some 20 per cent further.

Hence, provided we stick to the practices and limits of TPH 1774 for MF and HF, our ankle currents should remain below recommended limits and we will avoid a "Hot Foot".

**GIFF HATFIELD**

## HERITAGE WEEK

The Northern Territory National Trust sponsored Heritage Week in Darwin during 22-28 April and staff of the Northern Territory Section prepared a display of vintage radio equipment using material normally held on permanent display at the Radio Australia Cox Peninsula transmitting station.

The emphasis of the displays was on Industrial Heritage and the other displays included The Power and the Water for the Territory, Industrial Archaeology in Australia, Then and Now Photographic Display, Our Second Home, Transport Development in the N.T., Gold—Yesterday and Today, and a National Trust Display.

A vacant shop in the new Galleria complex in the Mall was made available to the Section at no cost, and it was ideal for displaying the large number of items.

The display proved very popular with people who visited it.

Items included mantel and console receivers, horn speakers, early amateur transmitters and receivers, headphones, crystal sets and magazines.

**RALPH DENISON and TED HURN**

## RETIREMENTS

The South Australian/Northern Territory Region had an unusually large number of retirements in recent months. They include Wesley Graham, Broadcasting Operations Manager who retired on 10 August after 39 years service. A function held in Adelaide was attended by Leon Sebire, General Manager Broadcasting and Max Chadwick, Deputy General Manager Broadcasting. Other retirements were Brian Beyer STTO3 The Bluff, Don Shirren TTO2 Riverland, Zigurds Hermanis TTO2 BSC and Percy Munchenberg TTO2 BSC.

Dick Suhr CO1 of the Western Australian Branch retired after many years service with the Radio Lines group.

Fred Glover who has been resident Technician at 3GI Sale for many years, retired in June. It was Fred who was responsible for that beautiful leadlight window at the station, installed to commemorate the 3GI Golden Jubilee in 1985.

In Queensland, Leo Moloney, Engineer 4 retired after $44\frac{1}{2}$ years service with involvement in a broad range of Radiocommunications and Broadcasting activities together with 14 months in Indonesia with the Australian Telecommunications Mission's Trans-Sumatra Project. Others who retired include Dave Walker AO5, former Manager, Management Services, Ron Moore, Brisbane MIC and Ross Taylor, Mackay Service Centre.

# 7NT KELSO—LAVENDER COUNTRY

Station 7NT began transmission on 3 August, 1935 and was Northern Tasmania's first ABC broadcasting station.

The original transmitter was a water cooled 7 kW STC model similar to units installed at 2NR and 4QN in the mid 1930's. The last major equipment upgrade took place in 1954 with the installation of an AWA 10 kW transmitter and a 2 kW AWA standby unit. Since 1966, the station has operated with a directional antenna comprising two 152 metre masts.

The station is situated in the central northern area of Tasmania and the service area covers the north-eastern region of the State including Launceston and the Tamar Valley. There is a large plain in the Tamar rift valley which stretches from the north-eastern edge of the central plateau to the drowned inlet of the Tamar estuary and Port Sorell.

*7NT transmitter.*

The region is one of the richest farming and grazing lands in the State. The north-eastern part is hilly but has fertile soil.

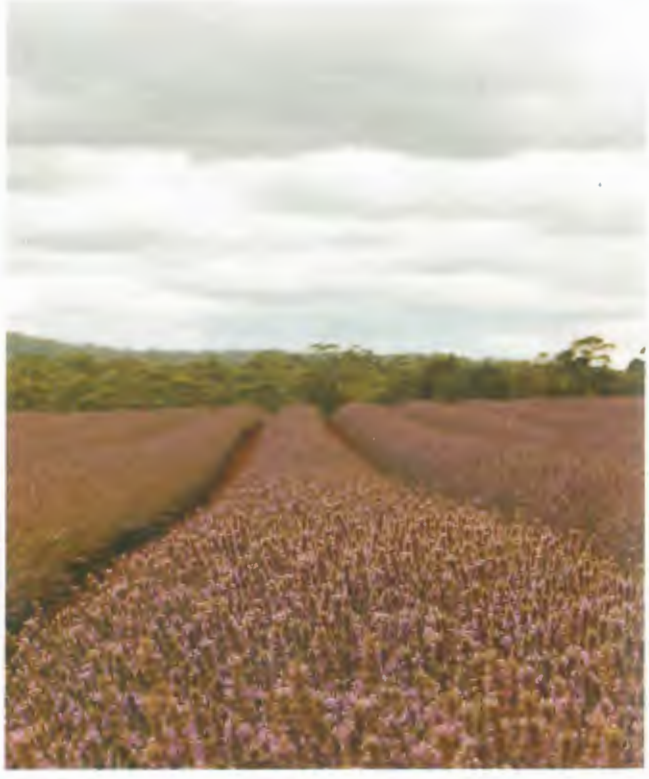
Some notable features in the service area include vineyards and wineries where widely acclaimed Tasmanian wine is produced, a forest of English deciduous trees planted in the 1930's at Lilydale to provide wood for the Alexander Tennis Racquet Company factory in Launceston, and the well known Bridestowe Estate's lavender gardens at Nabowla near Launceston established in 1921. The lavender crop is the only source of true lavender outside Europe. In recent years, it has been recognised as producing the world's finest lavender oil.

What makes this crop so special is the flower's oil, which goes into some of the world's most sought after perfumes.

The crop is a spectacular sight with over 60 ha of dwarf shrubs blooming throughout January and attracting tourists from the rest of Australia and overseas.

**BRIAN HEY**

*Trees planted to provide wood for tennis racquets.*



*Part of extensive lavender gardens.*

*Heemskerk vineyards*

## FIRST WIRELESS EXPERT

# JOHN GRAEME BALSILLIE

On 1 March 1911, Admiral Sir Reginald Henderson completed a report on naval communications for the Australian Navy. In his report he recommended that a system of high power wireless stations be installed to transmit messages from the Navy office to naval vessels and that a system of medium power stations be set up for normal ship-to-shore communication and for commercial purposes. He also recommended that the Government take direct control of wireless for public and private purposes with control being vested in a special Branch of the Post Office.

*Balsillie at Bookaloo on Transcontinental Railway 1916 during rain stimulated tests using high power radio equipment.*

Prime Minister Andrew Fisher adopted the recommendations of the Report and decided to appoint a "wireless expert" to the Postmaster General's Department. His duties were to include the design and superintending of the establishment of various coastal stations.

The High Commissioner in London was asked to invite applications in England from persons competent to perform the work and willing to undertake the duties for a period of three years at a salary of £600 per annum.

There were 43 applications lodged for the job, and as the Prime Minister was in London attending a conference, the Postmaster General asked him to consider the matter with the High Commissioner.

John Graeme Balsillie, a Queenslander by birth was selected for the position. Balsillie at the time was widely experienced in wireless telegraphy work and had developed a system, known as The Balsillie System of Radio Telegraphy. He had designed and erected stations in England, Russia, Germany, Spain and China.

Balsillie's system was displayed in 1909 at the Physical Society of London Exhibition by the British Radio-Telegraph and Telephone Company, and caused a great deal of interest.

About that time, the Marconi Company had resorted to law in England to protect its patents against infringements, and won a celebrated judgment against the British Radio-Telegraph & Telephone Co. which employed Balsillie as its technical manager. Consequently there was widespread astonishment when Prime Minister Fisher, a fellow Queenslander, engaged Balsillie as the Government's "wireless expert".

Balsillie departed for Australia on 4 August 1911 to take charge of the Commonwealth wireless activities, except those associated with the Defence Services. He arrived on 6 September and immediately set to work from offices in Treasury Gardens, Melbourne. His designation was "Engineer for Radiotelegraphy", a position he occupied until 1916 when he resigned.

His charter was to establish what is now known as the Coastal Radio Service, and to administer the provisions of the Wireless Telegraphy Act and Regulations.

Because of the Marconi Company's successful challenge of the original Balsillie system, another system was developed for the Australian stations. Basically it was a unidirectional impulse system using compressed air to extinguish the spark.

The receiver originally used a bornite and zincite combination for detection purposes, but this was later replaced by galena. About 1919, vacuum tube detectors were introduced.

Balsillie assigned his patent to the Government which undertook to defend any actions against patent infringement, but when it became known that all Australia's future coastal stations would use Balsillie's own system, and that the equipment would be made by a local company, there was an enraged outcry from international firms.

The Marconi Co. issued an infringement writ against the Commonwealth Government which gave notice that it would fight all patent actions through the courts regardless of expense.

By far the most significant outcome of the patent dispute was the formation of a new company to represent the world's leading wireless systems in Australia and New Zealand. Incorporated in July 1913 Amalgamated Wireless (Australasia) Ltd. included many people who were later to make memorable contributions to Australian broadcasting and television.

Balsillie was a first rate engineer and manager. By late 1915, he had commissioned twenty stations around Australia using his system.

He was also interested in rainfall stimulation. After he left the PMG Department in 1916, he set up high voltage radio equipment at Bookooloo on the East-West railway where dams had been excavated in arid country to provide water for the steam trains.

Rainfall recordings by railway officials showed a significant increase in rainfall in the area following operation of the transmitter.

Experiments were continued until 1921 when the program was handed to the Bureau of Science & Industry (now CSIRO). It was 30 years before CSIRO resumed the studies—this time with aircraft and seeding techniques rather than kites and high voltage discharges as used by Balsillie in those early days.

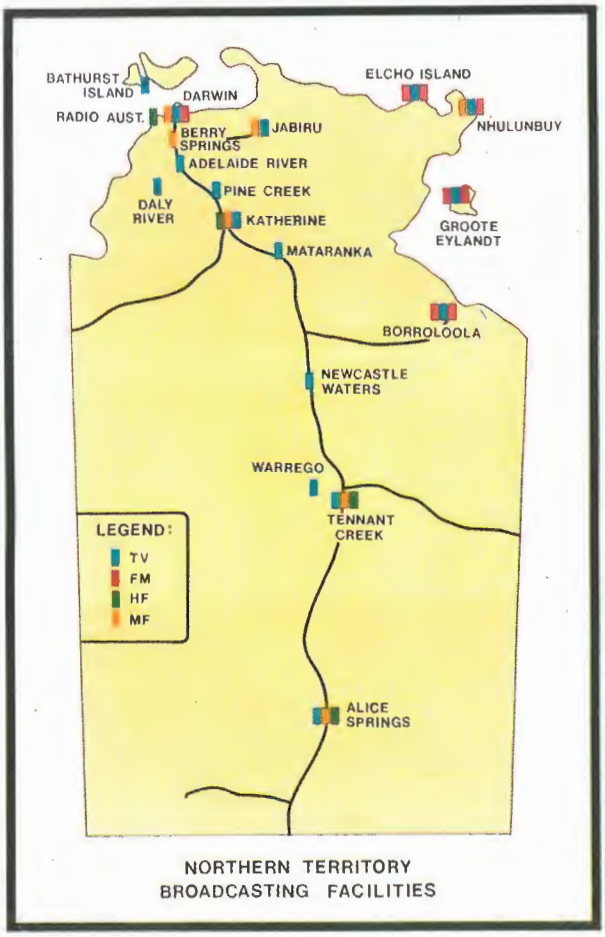
**JACK ROSS**

# NORTHERN TERRITORY

Kakadu, Borroloola, Alice Springs and Bathurst Island are places most Australians dream about going to—or dread that they might have to. These are just a few of the exotic sounding locations that the NT Broadcasting team visit at least once a year as they maintain the 46 stations in the Northern Territory. Covering 1.3 million square kilometres, the district ranges from the arid outback, and the thriving centre of Alice Springs, to the tropical Top End, from sleepy settlements like Alyangula on Elcho Island to noisy mining towns, with transmitters from 10 watts to 100 kilowatts—all unattended and scattered up to 1500 km from their Darwin base.

The big maintenance headaches are caused by weather conditions. Lightning in the Top End, heat throughout the Territory, and in the Centre, winter temperatures of minus 7 degrees wreak havoc with water cooled transmitters. The weather causes problems for both the equipment and the staff. Ten to twenty thousand lightning strikes will be recorded within 80 km of Darwin each December. The potential for damage is obviously great. Driving through these storms can be a frightening experience. Flying through them is to be avoided at all cost!

One thing all the staff like doing is getting away. Because they see so much of the Territory with work, none of them spends a lot of time 4-wheel-driving or camping in Kakadu. Between them they have had nine overseas holidays in the last two years. Living so close to Asia, it is cheaper to travel there than to "go South". To fill in their few spare moments some study, others Ten Pin bowl, ride bikes, coach junior baseball and play golf. Alan Hubbard, the youngest member of the team, is the Darwin Open Golf Champion.




*Northern Territory District Map.*

Is the Northern Territory district a difficult place to work? It can be demanding! Achieving restoration deadlines for stations up to 1500 km away causes difficulties. Determining the real cause for alarms can be equally frustrating. The district receives excellent support from the local Broadcast Lines team and the Adelaide Broadcast Service Centre and local Telecom technicians.

**MURRAY FOPP**

*Adelaide River station.*

*TO1 Dave Edwards inspecting LNC at Nhulunbuy site.*

*Murray Fopp PTO, waiting patiently in the transit lounge at Elcho Island airport.*

# DEMOLISHING THE BROADCASTING STATION

During the Second World War years, there was great concern by the authorities that broadcasting stations were not used to broadcast information which could be of benefit to the enemy and also, that in the event of an invasion of Australia that an adequate plan of action was available for transmitter staff to destroy the equipment so that it could not be used by the invaders. After the Japanese bombed Pearl Harbour in 1941, and began their downward push towards Australia, the military decided that in the event of a landing near Sydney that every studio and broadcast transmitter in Sydney would be destroyed.

As from 8 January 1941, Commercial stations 4AT Atherton, 2HD Newcastle, 5KA Adelaide and 5AU Port Augusta were closed down by order of the authorities and under powers conferred on him by National Security Regulations, the Postmaster General on 7 February revoked the licences.

The 4AT facilities were taken over by the Postmaster General's Department and operated as a National Broadcasting Service station. It is still a National station.

Nearly all transmitting stations were staffed during the War, and the authorities were anxious to ensure that the enemy could not make use of the transmitting facilities should an invasion occur. Security checked all people on the station staffs, transmitter buildings were made secure, in some cases with wire fences and armed guards were posted at important transmitters in isolated areas.

Oversighting day-to-day protection for transmitting stations was in the main, the responsibility of the Volunteer Defence Corps (VDC).

It was considered that sufficient damage could be effected by means of an axe and a heavy hammer to wreck beyond all possibility of repair any broadcasting transmitter likely to fall into enemy hands.

It was decreed that, "demolition should be effected in the following order, bearing in mind that in some circumstances speed may be the first essential:

- Destruction of all transmitter valves in main or auxiliary units including spares, beginning with rectifier valves.
- Destruction of windings of power transformers.
- Should power be derived from generators, these machines to be effectively placed out of order by destruction of windings etc., and commutators damaged by means of sulphuric acid or other corrosive acid.
- Destruction of program material such as scripts, transcriptions, etc.,
- Complete destruction of instruments and other transmitting and receiving parts.
- Aerials and supports crashed by severing the guy ropes with an axe. No explosives will be supplied."

Before closing down the station or demolishing it, the operator was to broadcast the following announcement using the emergency studio facilities:

"We have to announce that our program is being temporarily interrupted in the interest of National Security. For the time being, this station is closing down.

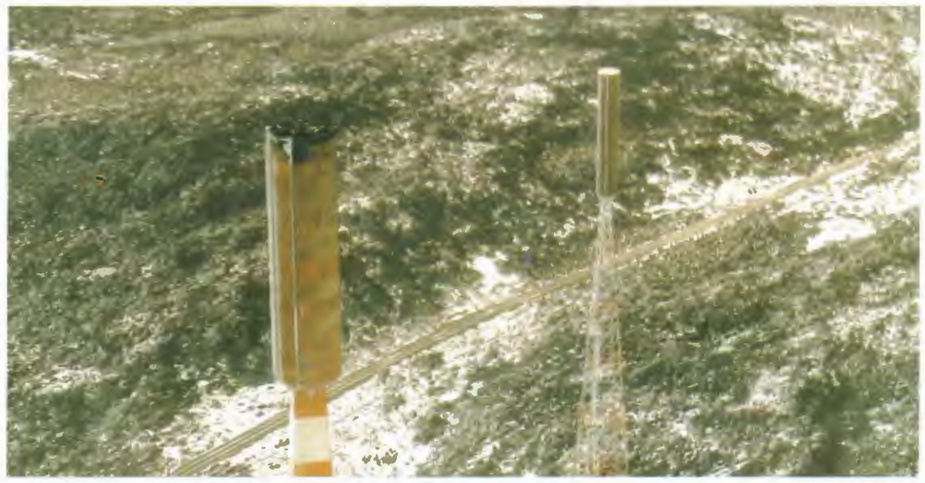
Listeners are requested to remain tuned to any of their local stations for further information as soon as transmissions are resumed."

If the demolishers carried out their destructive work effectively, it would be an interesting exercise to calculate the necessary time for the station to resume transmissions.

**BOB HORSLEY**

*Sea Eagle nest ABW9 Kalbarri.*

*Termite damage to transmission line pole Radio Australia, Shepparton.*



*Lightning damage to ABNT3 Mt. Barrow radome. Commercial antenna TNT9 (R) escaped damage.*





## INFLUENCE OF ENVIRONMENTAL FACTORS

Australia is such a vast land that broadcasting external plant is required to operate under a wide range of environmental conditions.

Good design incorporating the proper use of raw materials with appropriate finish is essential to meet the conditions encountered. The greater the complexity of the plant and the longer the service life required, the greater the design, manufacturing, installation and maintenance effort necessary for success. However, the selection of the best type of material in many cases is not easy.

The selection of insulators for transmission lines and antenna systems, for example, may become difficult when the full operational environment is taken into consideration. The insulators may be subjected to high mechanical stresses, vibration, high winds, high voltage, high frequency, rain, salt spray, industrial fumes, fog, ice, dust, solar radiation, carbon deposits from bush fires, bird droppings, swarms of insects etc., most of which can degrade the effective insulating properties and result in large and random variations in theoretically evaluated electrical and mechanical parameters.

It is not always a single factor that causes deterioration, followed by shortened life and malfunction. For a certain type of equipment or material, it may be a special factor of the climate which is most important. Field experience has shown that the deterioration of many external plant materials is greater in the hot tropical areas than in other environments. This is due to the combination of high temperature, high humidity, drenching dews, cyclonic rains and ultra violet radiation. For stations close to the sea, salt laden moist air and aggressive soil conditions can intensify the problem.

Icing is a problem at some sites because falling large masses of ice can be a hazard to staff, feeders and buildings. Methods of dealing with the problem include electrically heating the antenna elements or enclosing the entire array with a fibreglass radome.

Tall masts and towers are ideal targets for lightning strokes and much damage has occurred over the years to equipment on the structures such as lighting fixtures, radomes, armature support and guy insulators etc. Coupling hut equipment, transmission lines and line switching equipment have also been severely damaged.

High winds have caused much damage to structures. In some cases such as Cyclone Tracy, damage was very extensive.

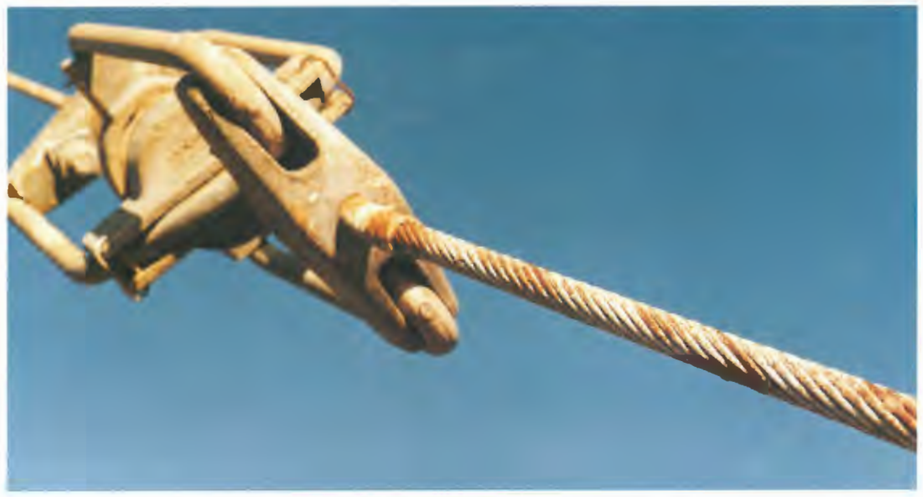
There are, of course, other incidental environmental factors which are of concern in the operation of external plant facilities. These include such pests as rats, mice, birds, frogs, snakes, possums, wild horses, grasshoppers, termites with wooden poles and many others.

A snake was observed at the 150 metre level of the 4QN Brandon mast chasing a frog, a snake was cooked across the horn gap when it tried to climb the 4QG/4QR Bald Hills mast, a crow built a nest in the sectionalising coil of 5CK Crystal Brook, a swarm of bees shorted the open wire coaxial line a 4RK Rockhampton, spider webs and carbon from cane fires at 4QN Brandon, shorted the transmission line, wild horses trampled and broke a buried coaxial cable at Radio Australia, Darwin, parrots cut through the 8AL Alice Springs antenna wire and a sea eagle built a huge nest in the antenna of ABW9 Kalbarri. No doubt a book could be written on similar case studies.

**JACK ROSS**

*Mast base corrosion 8GO Nhulunbuy.*

*Damaged armature support insulator 4QG/4QR Bald Hills due to lightning stroke.*



*Guy rope and insulator assembly corrosion 7NT Kelso.*

## OUR BROADCASTING PIONEERS

# Mr. V. G. (VIC) Le PLA

Vic Le Pla commenced his career in radio when he joined 4GR Toowoomba in 1936, on the operation and maintenance of studio equipment.

In 1938, Vic moved to Sydney and obtained employment with the Broadcast Section of the Postmaster General's Department as Radio Mechanic. His first assignment was with the installation group to establish 2CY Canberra, the first National Broadcasting Service transmitter in the A.C.T. The STC 10 kW water cooled transmitter was commissioned on 23/12/38. During the war years, he was sent to Noumea, New Caledonia to install equipment for the R.A.A.F.

With the post war expansion of the National Service, Vic was associated with a number of projects including transmitter works for 2FC, 2BL, 2BH and 2BA.

Projects of interest involving studio equipment included the installation of facilities in Parliament House, Canberra for parliamentary broadcasts and the design, manufacture and installation of mixing consoles for the ABC Sydney studios.

*Vic Le Pla.*

When FM broadcasting trials were being conducted on 92.1 MHz, Vic spent some time on the operation of the transmitter.

In September 1955, he transferred to the ABC Television Engineering Staff as Supervising Technician Grade B, in charge of Telerecording Section. The section was subsequently replaced by Video Tape Recording.

Having devoted a great deal of time to the study of Motion Picture Engineering, he later became Senior Film Instructor for the Film Services Division of the ABC.

Vic now lives in retirement in Wauchope, N.S.W., surrounded by a room of sophisticated recording equipment, which he uses for a number of interesting purposes, including recording bird songs. He is also active in other fields, including the restoration of early Morse telegraph equipment for the nearby Timbertown Museum. This equipment was used in 1988 for a National Bi-Centenary Morse Code Competition with a Telecom line through to Canberra.

**JACK ROSS**

## MUSEUM GEMS

# POINT CONTACT TRANSISTOR

An item of interest in the Telecommunications Museum, Adelaide is a Type A transistor manufactured by Bell Laboratories in the early 1950's.

In December 1947, William Shockley, John Bardeen and Walter Brattain, physicists at the Bell Laboratories changed the course of history with the invention of a device that exhibited what was called the transistor effect.

On 30 June, 1948 a working transistor was produced heralding one of the most important inventions of the 20th century. The three physicists received the Nobel Prize in Physics in 1956 for their work.

The scientists had been studying the surface properties of germanium semiconductor rectifiers and during these studies noted that the conduction properties of a semiconductor diode could be controlled by an additional electrode attached to the semiconductor. This simple phenomenon resulted in what was later known as the point contact transistor. In terms of the original experiment, the


*The transistor and maximum operating data.*

semiconductor and the one contact (called the collector) made up the rectifier and the additional control contact was called the emitter.

It was found that when an input current was inserted in the emitter contact, a larger current resulted in the collector contact. This, coupled with the fact that the input impedance was much smaller than the output impedance, resulted in a revolutionary amplifying device.

The first point contact transistor to find commercial use in the United States was designated with the code 1A. Basically it employed two "cat's whiskers" and a small cube of semiconductor material. A small hole was provided in front of the cartridge to allow adjustment of the point contacts during manufacture.

Unfortunately, the device had a number of drawbacks including high noise level and it was rather fragile.

However, with the invention of the junction transistor in 1951, transistor technology took off at a fast pace and developments are continuing today. The point contact transistor was abandoned, but during its short life it gave scientists an understanding of the problems involved in reliability and reproducibility of transistors.

**ANDY FISHER**

## ANTENNA INSPECTION

# VISIT TO KIRIBATI

It was my good fortune recently to be sent to Kiribati to examine the antenna system of the local broadcasting authority and to carry out repairs, if practicable.

Kiribati is a small island country in the south west Pacific Ocean. Its territory includes 33 islands spread over some five million square kilometres of ocean. The population is about 70 000 with about 92 per cent living in the Gilbert Islands. Tarawa, one of the Gilberts, is the nation's capital.

During the Second World War, Japanese troops occupied several of the islands. The U.S. marines invaded Tarawa in 1943 and defeated the Japanese in one of the bloodiest battles of the war. Only 17 of the 4 800 Japanese soldiers survived the onslaught. The Americans lost 1 000 men killed and 2 300 wounded.

The broadcasting service comprises a 10 kW medium wave transmitter feeding a T antenna supported by two 48 metre lattice steel masts.

*Standing (L to R) Director Telecom, Postal Director, Cabinet Secretary, Jim Finch and Minister for Communications.*
*Kneeling (L to R) Andy from APO Victor Harbor (Advisor) and Assistant to Postal Director.*

On arrival, I found that the lattice steel masts were in an advanced stage of deterioration and too dangerous to climb. Because of corrosion, the tubular sections making up the leg members had been reduced to less than one millimetre of wall thickness in parts. The wire guy ropes were so badly corroded that it was not easy to identify the strands, let alone the individual wires making up each strand. Any attempt to straighten the structures would almost certainly have led to collapse, thus leading to closure of the station. Land on the island is at a premium and villagers are already living close to one of the masts.

The equipment which had been despatched from Australia for maintenance work had not arrived by the time I had to return, so no repair work was undertaken. Other options are now being considered following my assessment of the plant.

**JIM FINCH**

*Rusted guy fittings.*

*Rusted leg member.*

*Reminder of the War.*

## EMERGENCY STATION

# BERRY SPRINGS

The Berry Springs broadcasting station, located 33 km south of Darwin, and owned by the Northern Territory Government is the only fixed station in Australia built specifically for the purpose of providing an emergency broadcasting capability.

Berry Springs, and another station at Emu Plains near Sydney but since dismantled, were built under Civil Defence objectives related to the threat of nuclear attack. The plan under which they were constructed was developed following a Cabinet decision in July 1963.

The civil defence considerations at the time were identified as follows:—

"The ability to broadcast to the people before, if there is sufficient warning, and particularly after an attack, is of the first importance both for civil defence and emergency government purposes. The threat of fall-out has made it an urgent necessity to be able to advise and control, not only the survivors on the periphery of the explosion, but also those people who are living in fall-out areas. Warning signals are also required, and this is being dealt with in other papers, but they do not reduce the need for a medium which will keep the government and the civil defence authorities in touch with the people.

The main difficulty is to be able to broadcast in the immediate surroundings of the target areas after an attack which we must assume would put out of action stations within 50 km of ground zero for all main capital cities and 30 km from Darwin.

Broadcasting stations used for civil defence purposes would need protection from fall-out, and power which is independent of threatened areas."


*The station building and sign.*

*TO1 Alan Hubbard carrying out adjustment on the transmitter.*

The facility was commissioned by PMG Broadcasting staff in November 1968 and comprises an AWA BTM 2M 2.5 kW transmitter, associated program input equipment, a 60 metre radiator and self contained 15 kVA diesel generating plant. The station is fitted out to operate on 657 kHz the same frequency as the NBS station 8DR in Darwin. It is frequently used as an emergency back-up for 8DR and is connected into the ABC network via a UHF radio link.

Originally the station was tied to an underground studio in Bishop Street, Darwin where full studio facilities, emergency power and links were provided.

Cyclone Tracy which caused such major damage to Darwin in December 1974 was the first real test of the facility. The studio bunker suffered damage from wind and water and could not be used to control the transmitter.

Counter disaster plans formulated since Tracy require the site to be staffed and tested in a staged plan by Broadcasting Branch staff from both the technical and radio lines areas. During a disaster, the authority to activate is given by the Chairman of the N.T. Counter Disaster Council or the National Disasters Organisation. On the recommendation of the Director General of the NDO, the facility was transferred to the Department of Northern Australia in 1975 and later the N.T. Government so that control was close at hand

The site and technical facilities require a high degree of maintenance with weekly attendance by staff of the Darwin Broadcast District to test the link, diesel start batteries and transmitting and local studio plant. Prior to the cyclone season every year, the facility receives a full maintenance routine to specification to ensure satisfactory operation should an emergency situation occur.

**BARRIE MORTON**

# 1 MVA EMERGENCY POWER PLANT

To meet emergency power requirements of additional transmitters, a 1 MVA diesel power plant was commissioned at Mt. Cenn-Cruaich, about 150 km north of Dubbo in central western New South Wales. It replaced a 230 kVA unit which had been in service since establishment of the station in 1966. The new plant was brought into service late last year.

The television station at Mt. Cenn-Cruaich is in the Warrumbungle National Park and is the responsibility of the Broadcast Branch Coonabarabran Outpost staff.

*Alvin Hanna station OIC with new power plant.*

*Mt. Cenn-Cruaich tower and antenna systems.*

The Warrumbungle Range was discovered by John Oxley in 1818. The peaks of the range are the remains of volcanoes that exploded about 14 million years ago. Some of the peaks are volcanic necks which were exposed after erosion wore away the original cone. Other peaks are dykes or sheets of magma, which hardened in the earth's crust and were exposed when the surrounding rocks were weathered away. Names given to some of the unusually shaped sculptures include Breadknife, Belougery Spire, Lughs Throne and The Needle. The Needle peeps up below the television tower and has well developed hexagonal columns.

Preparing the site for such a large machine was not without its problems. The station is located 54 km from the nearest substantial town, and being 1 300 metres above sea level is regularly subjected to very severe cold weather with the 160 metre antenna structure being covered in ice which becomes a hazard for staff below when enormous chunks of ice fall to the ground.

Extensive ground works were carried out with a D7 bulldozer to provide access for the delivery vehicle and a 50 tonne crane required to off-load the unit.

The 230 kVA plant was removed to enable the new unit to be placed in its allocated position and a temporary 500 kVA machine provided. The temporary machine brought its own troubles with it, including "smoke-outs" and starting difficulties requiring that it be test run every second day to ensure starting reliability.

Principal features of the 1 MVA plant which was supplied by an Adelaide firm include a Cummins, Model KTA50G3 twelve cylinder turbo charged diesel engine with continuous rating of 1074 kW at 1500 RPM with fuel consumption on full load condition of 257 litres per hour and Stamford alternator model HC743B with output of 1.2 MVA. Two starter motors are provided for cranking and they are powered by 24 volt Nicad batteries. The muffler is huge and weighs about 2 000 kg.

Although some minor problems were experienced during commissioning, particularly with the test load in dissipating such a large amount of power, the plant has settled in well and with an initial load of only 55 per cent of capacity it just purrs away.

**ALVIN HANNA**

## PROFILES

# GRAHAM BAKER

Graham Baker, Engineer Class 3 H.F., commenced work in the Darwin office of the S.A./N.T. Branch in July 1989.

Graham has an association with Darwin going back to 1970 when he worked for the then Commonwealth Department of Works as an Electrical Engineer. Like many Darwin residents in 1974, his house was totally destroyed by Cyclone Tracy.

After nine years in Electrical Engineering, he took on the job of Medical Engineer at the Royal Darwin Hospital heading up a team responsible for the installation and maintenance of a broad range of high technology medical equipment.

In 1986, Graham accepted a position back with his former employer and was their specialist Electronics System Engineer in the Canberra Central Office.

Graham has had an interest in radio for many years, being an active amateur radio operator (VK8GB) and when the opportunity came for a transfer back to Darwin and into the broadcasting field, he found it too tempting to pass up.

Graham is married with two teenage daughters and wife Beverley is a Community Health Nurse.

*Graham Baker*

*Jim Finch*

# JIM FINCH

Jim Finch, Field Manager in the Darwin office of the S.A./N.T. Branch joined the Radio Section of the Postmaster General's Department in South Australia in 1959. Almost immediately, he was temporarily transferred to Darwin and arrived there to celebrate his eighteenth birthday.

In 1965, Jim transferred to Darwin on a permanent basis to work on the Radio Australia Cox Peninsula complex which initially comprised separate transmitting and receiving stations.

During this period, he was associated with much of the early developmental work and later supervised external plant works by contractors during the construction phase.

The station had its own Radio Lines Depot on site and Jim was in charge of the Depot until things took a dramatic change in direction when the station external plant was flattened by Cyclone Tracy in 1974.

The complex was out of operation for about 10 years and during this period he was OIC of the Northern Territory Radio Lines Depot in Darwin until 1982 when he left Telecom to join Andrew Antennas to work on the provision of new antenna and transmission lines for the station.

After commissioning the facilities, Jim left Andrew Antennas and returned to Telecom where he is now in charge of the Northern Territory depot, part of the S.A./N.T. Radio Lines group.

Jim is married with two children, both of whom were born in Darwin. His hobbies, besides meeting the demands of his grandchildren, include fishing and mud crabbing.

# GRAEME WILMOT

Graeme Wilmot STO3 and Officer-in-Charge Radio Australia, Cox Peninsula, joined the Postmaster General's Department in Hobart as Technician-in-training in 1945.

Following training, he was appointed Technician at 7NT Kelso in Northern Tasmania and while serving there, qualified as Senior Technician, Radio.

In 1957, Graeme served at Stanley and later moved to Whitemark. Stanley, at the time, was the Tasmanian terminal for the Bass Strait submarine cable and the radio telephone link connecting the mainland. Whitemark is on Flinders Island, part of the Furneaux group, and was a multifunction station including radio telephone equipment responsibility.

He then transferred back to 7NT, this time as station OIC, where he spent some 17 years enjoying his off-duty time on the superb golf course and lots of fishing, interrupted only by a three year term as the Radio Telephone Inspection Officer for Tasmania. This work included field survey work in remote parts of the State.

Graeme's next shift was to 7ZL/7ZR Ralphs Bay near Hobart in 1982 where he was OIC for five years before being appointed to his present position at Radio Australia, Cox Peninsula.

On the home front, he is happily married with three children, two girls and one boy, together with one granddaughter.

*Graeme Wilmot*

*Terry Wooster*

# TERRY WOOSTER

Terry Wooster, STO2 Northern Territory Broadcasting District, commenced with the PMG Department in Victoria as a T.I.T. in 1960. After working at many stations throughout the State, he decided Radio Australia Shepparton near his home town was the place to start a career in broadcasting. He received appointment as Technician in 1965, and married the same year, living in one of the on-site houses.

In 1971, Terry transferred to Radio Australia, Cox Peninsula, spending the first two years at the receiving station. He then spent two years on shift at the transmitting station and following extensive damage to the station by Cyclone Tracy in 1974, he spent a long period upgrading the facilities and at the same time completing the Certificate Course of Electronics and Communications at the Darwin Community College.

Following the establishment of the Northern Territory Broadcasting District in 1984, he was appointed TO2 to become a member of the District "Flying Squad". In 1988, he was promoted STO2, assistant to the OIC of the District.

Terry and Judy have two children, Philip and Debbie. He has been active in junior baseball for several years as assistant coach and scorer for his son's Pints Baseball Team. He is also Vice-President of the Pints Baseball Club.

Terry thinks he may leave Darwin some day, but after 19 years residence there, has not yet found anywhere to match the Darwin tropical climate.

# 2NC NEWCASTLE STUDIO

This year is an important milestone in the history of National broadcasting in Australia. It is the Diamond Jubilee of the establishment of 2NC Newcastle, the first regional transmitter and associated studio of the National Broadcasting Service.

The Service began operation on Friday 19 December, 1930. Details of the transmitting facilities were described in the July 1989 issue of *The Broadcaster*.

The station was designed to provide improved service to the 200 000 people then residing in the Hunter River district. Reception from broadcasting stations located in Sydney was very poor and there was a pressing need for a local station.

The facilities were officially opened by Mr J. E. Fenton, Acting Prime Minister, speaking from Melbourne over the telephone network and relayed to a large gathering in the Newcastle Town Hall. Included in the gathering at the Town Hall were Mr Stuart F. Doyle, Chairman of Directors of the Australian Broadcasting Company; Mr J. A. Marden of the Australian Broadcasting Commission; Mr H. P. Brown, Director General of the Australian Post Office; Alderman Parker, Mayor of Newcastle, and Mr R. B. Hungerford, Managing Director, Standard Telephones and Cables, the contractors for the transmitting and studio equipment.

The program comprised performances by many local groups and individuals and included a local band, an orchestra, a choral society and several artists. The program was relayed to 2FC Sydney and 3AR Melbourne.

The studio centre was at the Strand Theatre, Newcastle and comprised two local studios. One a talks and news studio was in use several times daily and was acoustically treated to reduce reverberation period to less than half a second. The main studio was used for local orchestral and choral programs and was also acoustically treated, with the designed reverberation period being in this case, 1.1 seconds.

Only one program line was provided from the Sydney studios and in order to allow a noiseless changeover to broadcast either 2FC or 2BL programs, a specially designed switching system was installed in the Sydney control room capable of being remotely controlled at the 2NC Newcastle studio or the transmitter site at Beresfield some 19 km from Newcastle.

The present studio building was built in Newcomen Street in the 1940's and as the country was at war, it was designed as an alternative to the Sydney complex. It is a tribute to the quality of construction and design that the original building suffered no damage in the December 1989 earthquake which did so much damage to other buildings in the city.

Three studios of the most modern design were built, but facilities were basic to meet program requirements of either playing 78 rpm records or line presentations. It was not until the 1950's that tape recording fundamentally changed the way that radio programs were made and presented.

In its 60 years of operation, 2NC has had four major studio equipment upgrades, with the latest being completed in 1989.

Broadcasts are conducted from 5 a.m. to 10 p.m. each day from the Newcastle studios using the most modern equipment supported by a record library that is so large that music is programmed by a computer. In earlier days the record library comprised only 35 records at the studio and six at the transmitter which had an emergency studio on site.

An earth station with a 4.5 metre dish on the building allows 2NC to supply program for many other ABC stations via the AUSSAT satellite system.

**JOHN BRACKEN**

*2NC studio announcers desk 1990.*

# THE TECHNICAL OFFICER

**The majority of the technical staff of Telecom have to work on types of equipment and plant which are generally not encountered outside the organisation to any large extent, and therefore conventional apprenticeship schemes do not provide for training of appropriate skills. Accordingly, it has been necessary to design special courses of training to meet its needs and over the years, including the days of the Postmaster General's Department, has developed extensive training facilities, including its own schools.**

Primary training for new technical recruits was conducted by the Postmaster General's Department as early as 1914 when a three year Junior Mechanic-in-training course was introduced. By 1926, the course had been extended to five years' training with major subjects being Workshops Practices, Electrical Theory, Drawing, Telegraphy, Telephony and Internal Combustion Engines.

In 1929, when the Postmaster General's Department acquired the A Class stations to form the National Broadcasting Service, the technical staff of the operating organisations had a variety of titles. The Officer-in-Charge was known as Chief Engineer, a title still used today at may Commercial stations, staff at the transmitter were designated Station Operators, staff at the studio were Control Operators and those engaged on pick-up duties were classified as Outside Broadcast Operators. Each designation was on a different pay scale. Most of the staff declined an offer to transfer to the Public Service.

The Department had no staff trained specifically in broadcasting, but in most States the Transmission Section was allocated the task of operating and maintaining the facilities. Fortunately, some staff were active Amateur Radio Operators and it was not difficult to put together a group of competent people.

Major modifications and upgrading works were implemented almost immediately, installation of stations in country areas soon followed, and expertise in broadcast engineering was quickly obtained.

By 1942 there were some 27 transmitting stations in the NBS and staff were also responsible for operation of the ABC studio technical facilities. Specialisation was introduced for the first time into the technical training scheme with Broadcasting being a major subject. Trainees began to specialise in their third year of training. In 1958 specialisation was brought forward when trainees entered this phase at the end of their first year.

Unit courses were introduced in 1965 to provide specialised training for a combination of skills required in the field. At that stage the number of National stations had grown to 64 with many being maintained by staff whose prime responsibility was for the telephone network.

In 1970, a new tradesman/sub-professional technical staffing structure was implemented. The classification Technician (Telecommunications) was replaced by new classifications of Telecommunications Tradesman, Telecommunications Technician and Telecommunications Technical Officer. New courses of training were established for the tradesmen and sub-professional classifications.

Trainee Telecommunications Technical Officers participate in a four year part-time course at an Institute of Technology or Technical College, and also undertake in-house and on-the-job training. On completion of the course a trainee is advanced as Telecommunications Technician pending accumulation of the required six years' experience including training, before being advanced as Telecommunications Technical Officer.

Opportunity is also available for certain staff to qualify as TTO by passing an Eligibility Test.

**WES GRAHAM**


Inspector: "Great scott! Does this transmitter always have 30 per cent distortion?"

Operator: "Of course not - only when it's modulated!"

## LETTERS TO THE EDITOR

**Contributors to Letters to the Editor are reminded that full names and addresses must be supplied. Letters should be brief and to the point. Long letters may be edited. The Editor's decision in respect of the suitability of letters for publication in *The Broadcaster* is final and no correspondence on the Editor's decision will be entered into.**

Sir,

The article by Rawdon Mitchell in the March 1990 issue of *The Broadcaster* on a little known Marconi experimental station in Scotland reminded me of another of Marconi's experimental stations, the "Eaglehurst Wireless Telegraph Station" which I came across in the South of England during a visit to the Southampton area while undertaking some family historical research last year.

Unlike many of Marconi's other experimental sites, Eaglehurst House was selected and furnished by his wife essentially as a home in the country. Adjacent to the house was a tower known as Luttrell's Tower which was erected in 1730. Marconi's daughter, later described the Tower as "a curious and entertaining eighteenth-century architectural folly, a narrow three-storey structure fitted with Regency bay-windows and covered with a round, three-storey turret surmounted by the inevitable battlements and a flag. Underneath, cavernous cellars gave access to the beach and were reported to have been used long ago for smuggled treasure".

Marconi's daughter also tells in the biography of her father how she and her mother climbed to the top of the tower on the morning of April 10, 1912 and watched theTitanic sail by on a voyage that was to be its first and last. Both Marconi and his wife had been invited to travel on the Titanic's maiden voyage. Marconi had to change plans because he had a mountain of paperwork to deal with and switched to the Lusitania because he preferred the stenographer on that ship. The Lusitania departed three days before the Titanic, and Marconi's wife was to follow in the Titanic to meet him in America. Fortunately, one of the children became ill with fever and she postponed the trip.

When his ship docked in New York he heard the terrible news of the Titanic sinking. The Titanic disaster drew into sharp focus the need for high power transmitters on all ocean going ships and for continuous manning of the ship's wireless. For Marconi there were many touching expressions of gratitude including the occasion when the Titanic's survivors marched en masse to his hotel and presented him with a gold medal.

Details of the work Marconi carried out at Eaglehurst House are not known but the site was close to other stations on the Isle of Wight and at Bournemouth and Poole where he undertook experimental work starting in 1897 on the use of wireless telegraphy communications between land based stations and ships.

On an archival photograph of the tower taken many years ago by George Kemp, Marconi's Chief Assistant, is the following caption:—

> "The aerial was taken from the top of this tower to the top of a 150 ft. wooden mast, over the dwelling house roads, lawn and gardens to a private field about a quarter of a mile from this tower. The bay window which faces the Royal Yacht Squadron Club House at Cowes is one of the windows of Sir G. Marconi's wireless and chemical laboratory. From the basement of this tower there is a subterranean passage to a cave on the beach, and another to the basement of the dwelling house. King Edward VII was a frequent visitor to Eaglehurst when Prince of Wales".

Luttrell's Tower is now owned by an organisation, The Landmark Trust who own properties throughout the British Isles and rent them as holiday homes. The properties are well maintained and in some cases, like Luttrell's Tower, the purchase by The Landmark Trust saved them from falling into decay. The guide book on the Tower boasts that the electric cable which supplies power to the Tower was in fact laid by Marconi himself. The Eaglehurst House part of the property was sold in the late 1960's to a family from London who paid £20 000 for it.

Marconi's use of Eaglehurst House ceased in the early days of the 1914-1918 War. Just before Italy entered the war on the side of the Allies in 1915 Marconi was in New York as a witness to a wireless telegraphy patent court case and made decision to return to Italy immediately. As the ship approached the war zone in Europe elaborate precautions were made to safeguard Marconi. His name was removed from the passenger list. He got into clothes suitable for slipping into a hiding place down in the bowels of the ship next to the keel and there was agreement among the passengers that if the ship was stopped by a submarine and Marconi's person demanded, the passengers would all "lie like gentlemen".

In 1916 Mrs Marconi and the children left Eaglehurst House and returned to Italy to join her husband.

**JOHN STARR**

*Luttrel's Tower. Built 1730. From here Marconi conducted wireless telegraphy experiments*

## BROADCASTING MILESTONES

# 4RK GRACEMERE

Station 4RK is located at Gracemere, 10 km out from Rockhampton. It was the first Regional station to be installed in Queensland after the Postmaster General's Department acquired 4QG in Brisbane as part of the establishment of the National Broadcasting Service.

*Original 4RK 2kW transmitter and control desk.*

The 2 kW transmitter, manufactured by Standard Telephones & Cables Ltd., was commissioned on 29 July 1931, and two champagne bottle corks from the opening night are still in existence. It is evident that the installation staff marked the occasion appropriately at the time.

The transmitter and antenna were similar to those installed at 2NC Newcastle in December of the previous year. The transmitter incorporated a crystal-controlled master oscillator with automatic temperature control, 100 per cent modulation capability, automatic push button starting control of rotating machinery and means for tuning the transmitter from a "dead front" panel while under full power. The carrier frequency was generated by a crystal-controlled receiving type tube (4102D), the plate input to which was about 1.5 ma at 130 V giving an RF output of about 20 mW. This was successively amplified throughout the transmitter up to the final power amplifier where the plate input was about 6 kW giving an antenna carrier power of 2 kW. The power amplifier comprised two 4228A water cooled tubes operating as a Class B amplifier. The filament, grid bias and plate supply voltages were all obtained from motor generator sets which with the water circulating pump, were provided in duplicate. Machine voltages were controlled by field regulators on the transmitter panels.

The radiating system consisted of a T antenna with a very short flat top, and a cage down lead. The flat top was about 20 metres overall and consisted of four parallel wires spread just under 2 metres apart. The support structures were lattice steel towers 39 metres high. The antenna is still in service as a standby.

The antenna earth system comprised a large number of copper wires running at right angles to the line of the masts. Altogether, about 11 km of earth wires were buried. The wires were spaced a short distance apart and buried in trenches being commoned up by a main backbone running immediately beneath the antenna.

The transmitter was replaced by an AWA 2 kW 4J5129 model in 1946. In 1954 this transmitter became a standby when an STC 10 kW transmitter was commissioned. At the same time a 128 metre sectionalised radiator was installed.

In 1963, the AWA transmitter was replaced by a 2 kW STC unit.

During 1987-88, the station was converted to unattended operation with a 10 kW Nautel solid state transmitter being later installed in a new building. The new facilities were commissioned on 30 June 1988.

**JEFF CIRSON**

*Jeff Cirson District OIC at current 10 kW solid state transmitter.*