

ON AIR

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INTRODUCTION

Radio broadcasting in the medium frequency band is now over half a century old and despite the increasing use of very high and ultra high frequencies for television and stereophonic sound broadcasting, the medium frequencies will be effectively in use for a long time to come.

Regular public broadcasting began in this country with both commercial and national stations and the national stations form the network known as the National Broadcasting Service.

This chronicle traces the history of the NBS in Queensland and Papua New Guinea from its inception some 58 years ago to the present time.

There are three sections in the work. The first is a broad historical treatment for the general reader who is not particularly interested in technical detail. The second deals with each station separately. Few stations have remained unchanged since installation. New equipment, variations in methods of operation and sometimes changes in location would have made station integration into a combined chronological sequence difficult and confusing. Each has its own character and story and I have therefore treated each one as an entity. There is considerable technical detail in this section too, gathered from sources which are rapidly disappearing. Facts have been obtained from files and reports, from staff both current and retired and from my own experience in the service. Some readers will know of things which ought to have been included but have been missed and many details are now apparently lost forever. No writer can hope to be complete in such a work as this. I believe however that the trunk and main branches are faithfully recorded, even though some leaves have blown away in the winters of the past.

The third section records a little of what might be called the extra curricular activities of the broadcasting people who were concerned primarily with the installation and operation of the equipment of the NBS. The story of radio broadcasting in PMG/Telecom would not be complete without some reference to these allied activities.

The National Television Service is mentioned very briefly, for although it is a fascinating story in its own right and should be recorded, I had little to do with its provision and subsequent operation. I leave its history to others more fitted and knowledgeable than I and with perhaps a more sympathetic feeling for that medium.

CHAPTER 1

EARLY DAYS - "THE DAYS OF REAL SPORT"

Good stories we are told, start at the beginning and go through to the end. The story of the National Broadcasting Service in Queensland certainly has a discernible beginning, but its end is not in sight. Our tale then cannot be complete and will come to the end of an era about 1988 or thereabouts. Perhaps someone will one day write further chapters in the saga of National Broadcasting.

In this age of slogans and catchcries one could say "Think broadcasting, think 4QG", for the callsign 4QG represents the very epitome of broadcasting in Queensland.

It matters not that QG stands for Queensland Government and that the station predates the establishment of the National Broadcasting Service by almost five years. What does matter is that the Queensland Government established 4QG as part of the Queensland Radio Service in July 1925 and now, well into its second half century, 4QG is still on the air.

In January 1930 the responsibility for the technical operation of 4QG was given to the Postmaster Generals' Department, and the Queensland section of the NBS began its work.

At this stage the Queensland Radio Service became the Australian Broadcasting Company and in July 1932 the Australian Broadcasting Commission was born and absorbed the so called "A Class" stations around Australia.

With the Commissions' basic task of providing programs and the PMG Departments' function of technical operation of studios and transmitters, an effective National service was now possible.

The PMG Department operated 4QG and subsequent transmitters of the National service until 1975 when the Australian Telecommunications Commission was created. The new Telecom Australia as the Commission is called, has continued to operate the National transmitters in Australia in what is now known as the Broadcasting Directorate, carrying on the traditions of the service established by the old PMG.

For more than 10 years the twin towers of 4QG on the roof of the State Government Insurance building at the corner of George and Elizabeth Streets dominated the Brisbane skyline and represented the very latest in the radio technology of the day. They were joined later in the decade by the two towers of commercial station 4BK on the then Courier Mail Building in Queen Street and in 1938 by a new single tower on the Telephone Exchange building in Elizabeth Street, next to the G.P.O. This was the aerial for the second Brisbane national station 4QR.

All of these tall steel towers were dismantled during the 1939-45 war to avoid the possibility of their being used by enemy aircraft for identification or navigation purposes.

Plans were being laid early in the 30's for the expansion of National broadcasting in Australia and this resulted in the establishment of the first two country relay stations, 2NC Newcastle, and 4RK the Queensland National Regional station at historic Gracemere, near Rockhampton.

This was a most appropriate place for the new venture as it was here that the Archer Brothers in 1855 established their cattle station beside the Gracemere lagoon, and so set the stage for the subsequent founding of the tiny settlement on the banks of the Fitzroy River which became the City of Rockhampton.

The new transmitter came on air on the 29th July, 1931, with a special opening program prepared by the Australian Broadcasting Company and produced by local performers in Rockhampton.

4RK had an aerial power of 2000 watts and was constructed in the style of the day; polished black panels studded with controls and meters, and steel grills behind which numerous large glass valves glowed redly. In an adjoining room, generators hummed quietly, producing the high voltages required by the transmitter.

Outside the tidy wooden bungalow type building, two steel towers supported a tee type aerial over 100 feet high. The driveway, soon to be flanked by Norfolk Island pine trees, curved up to the station from the front gate, beside which was the spacious Queensland styled residence of the Foreman Mechanic.

From the highest part of the property, the station looked out over the brown, rolling pastoral countryside towards Rockhampton, some seven miles to the east with its backdrop of the forest clad peaks of the Berserker Range.

Nearby was the tiny settlement of Gracemere with its school, hotel and railway station, and to the south west a distant vista of the Mount Morgan ranges.

After opening, the station took its program on relay from Brisbane over a PMG landline.

There was however, a small local studio installed in the Rockhampton Post Office at this time, and it was used twice a day for local news bulletins and cattle sale results.

Nothing further occurred in the NBS for several years, until in the mid 30's staff from the PMG Research Laboratories in Melbourne made test transmissions in several parts of the State and selected a site for the proposed North Queensland relay station at Clevedon some 20 miles south east of Townsville. The station was built here in 1936 and carried the call sign, as might have been expected, of 4QN.

All program for the new station was taken on relay from the 4QG studios in Brisbane over more than 800 miles of PMG wires.

The new Standard Telephones and Cables (STC) transmitter, resplendent with highly polished black slate panels, was three times the power of 4RK and even eclipsed 4QG. Its area of reasonable reception extended from Bowen in the south to Innisfail in the north and out west as far as Charters Towers.

A 500 feet high steel lattice tower supported the aerial system, a solitary sentinel in a desolate world. For 4QN was built between the mountains and the sea on a flat plain mottled with swamps and salt pans and subject in part to inundation at high tide and in the wet season.

A mere 200 yards from the station was the sluggish serpentine of Crocodile Creek, its banks muddy and mangrove lined. Its aspect was dark and somehow sinister even in bright daylight, and on the bare mud flats nearby the imprints of crocodile claws were often visible.

The staff formed a small community - officer in charge, three technicians, two diesel mechanics (the station was far from town electricity mains and generated its own power), a labourer cum fuel tanker driver, single mens' housekeeper, the families of married staff, sundry dogs and a tame brolga.

Two houses were provided for married staff and another, specially built, for bachelor accommodation.

Being close to the coast, off duty staff spent a considerable amount of time fishing and crabbing in Crocodile and Salmon Creeks and near Cape Cleveland at a spot mysteriously known as Ticklebelly Bay.

This idyllic situation persisted until the station was destroyed by fire in 1951.

Temporary equipment was installed and "old QN" continued at Clevedon until it was moved to a new site at Brandon near Ayr in 1959. More of this later, however.

Meanwhile in Brisbane work was proceeding on the installation of a second national transmitter designed to take its program over landlines from Sydney. It was to be 4BR, Brisbane Regional, but the call sign eventually adopted was 4QR. The transmitter, a comparatively small one capable of 2kW power output, designed to serve principally Greater Brisbane, was installed by PMG staff on the top floor of the Central Automatic Telephone Exchange in Elizabeth Street, and radiated from a self supporting steel tower on the roof.

4QR was opened for service on 7th January 1938, and this gave the listeners in the capital city a choice of two national programs.

Of course all program for 4QR did not come from Sydney and a local studio was installed on the sixth floor of Penneys' Building in Queen Street. At this stage the ABC was establishing its Brisbane headquarters in this building, where it was to remain for many years.

A studio used for drama presentations and live orchestra recitals was also set up in the South Brisbane School of Arts Building next to the Dry Dock in Stanley Street, and it was from this studio that the newly formed symphony orchestra under the baton of W. Nelson Burton made its first broadcast.

So by 1938 three major centres of population in the State, Brisbane, Rockhampton and Townsville, were well served by national stations. In fact reception of 4QG and 4QR was reasonably satisfactory in Toowoomba also, as these were the days of large home receiving aerials. Almost everyone with a radio set had one or two high wooden poles in the back yard, as almost every house today has its television aerial.

However, west of the Toowoomba range, out on the black soil plains of the Darling Downs, reception was inadequate. By 1938 planning was well under way for the first 10 kilowatt relay station, to be built at Dalby.

A fine new brick building was erected adjacent to the Dalby-Bell Road at "Hayfields", some four miles out of town and the smart new style Standard Telephones and Cable (STC) transmitter was installed in a spacious room, the "transmitter hall".

A new type of radio mast was erected nearby and at 711 feet it was and still is, the tallest in Queensland. This was the first for the State of the so called half wave vertical radiators, and with its bands of orange and white paint it was a landmark which could be seen through the rippling heat haze of the Downs for miles by day and its red aircraft warning lights shone brightly through the hours of darkness.

The view from the mast was uninterrupted in all directions and according to the local newspaper of the time, four intrepid Dalby citizens climbed to the top on a Saturday while the installation staff were absent. Further unauthorized sight seeing was soon restricted when the contractor completed the erection of the manproof fence around the base of the mast. To the west, south and east the wheat lands of the Downs extended to the far horizons, while to the north the blue line of the Bunya Mountains was visible at 30 miles. This southern Queensland regional relay station was called 4QS and it was opened with suitable ceremony on 17th October, 1939. Its service area extended from Brisbane to Roma, north to Mundubbera and south to Goondiwindi, covering a far greater area than had so far been achieved by the other transmitters of the young network.

The National Service was now reaching out to the people in no small way, but in September 1939 the Second World War began and further planned regional expansion was suspended, with the efforts of radio planners and staff diverted to the communication needs of the armed forces.

And so we come to the end of the first era, "the days of real sport" as a noted engineer was often heard to remark.

These were the bright new days of the dawn of radio, when it was all so novel and exciting and full of unexpected and sometimes frightening events. A handful of enthusiastic pioneers gathered from far and wide was being formed into that happy band of brothers, the PMG Radio Section, a group often looked upon by those in the telephone world with vague suspicion; a somewhat misunderstood lot dabbling in a new black art. Not for them the telephone bells, the switchboards and the dry cells of the more mundane communications; but the high towers, the glowing tubes and a mysterious something called RF.

CHAPTER 2

THE WAR YEARS

Despite the heavy requirements for men and material, the war period from 1939 - 1945 did see a considerable amount of activity in the NBS. Some but not all of this was directly due to the war.

In January 1941 the Commonwealth Government acquired 4AT Atherton. This commercial radio station, established just prior to the outbreak of war, was owned by a religious organization, and for reasons related to national security was taken over by the Government and became a unit of the NBS.

The term Atherton is used here very generally, as the transmitter is closer to Malanda and Yungaburra than to Atherton.

The site adjoins Gwynne Creek and is very low lying and wet underfoot in the rainy season.

The transmitter was of low power, 500 watts, and was obviously designed to serve the nearby Tableland towns.

The transmitter, studio and station residence were combined in a country style, low set timber house.

The aerial was unusual for its time, being a tall vertical steel pipe of the type known as artesian bore casing, held erect by several sets of steel guy wires.

Nothing of this original equipment now remains, aerial, transmitter and transmitter building having been replaced some years ago. The original residence reverted to dwelling use and has recently been sold and removed.

Similarly to 4QN, all program came from Brisbane over PMG landlines. It was not until well after the war that studio facilities were established in Cairns, enabling some limited amount of notes and news to be generated in the district for local broadcast.

Back in Brisbane, with the war now causing concern in coastal cities, a need was felt to move broadcast stations out of the inner metropolitan areas, and 4QG and 4QR were transferred to Bald Hills some 15 miles to the north of the city.

The Bald Hills site had been selected as the future home for metropolitan national stations in the mid thirties and in 1941 a building was begun and a vertical steel pipe aerial erected with the intention of operating 4QR from here. This was the first aerial of this type built by the PMG Radio section in Queensland, and in subsequent years another six were to be erected in various parts of the State and in Papua New Guinea.

In the following year the 4QR transmitter was moved overnight from the Elizabeth Street site in the Central Telephone Exchange to the new building at Bald Hills. The sections of the transmitter were lowered from the top floor at the rear of the building into Arcade Lane and taken by road to the new site. The job was begun after close down, which in those days was 10.30PM, and completed shortly after opening time next day, 10.00AM, a well coordinated operation with little air time lost.

This process was not possible with the older, high powered 4QG. A small building was leased from commercial station 4BH near Fischel's jam factory at Bald Hills (subsequently usually referred to as the Jam Factory site), and a 500 watt transmitter locally assembled by Radio Section staff was installed therein. The site had been used previously by the commercial station and a serviceable T type aerial was available.

4QG then ceased operation in the city and reopened at the Jam Factory site. Before long, a locally made power amplifier stage was added, bringing the station up to about 5 kilowatt rating.

The high towers of 4QG and 4QR in the city were then removed, the steelwork of the 4QR tower being carefully preserved for future use.

Later in 1942, the installation of a new transmitter was begun in the recently completed Bald Hills building. This was a "short wave" transmitter, the first for Queensland and the second for the NBS in Australia. For some years prior to this the Victorian programs had been broadcast over the short wave transmitter VLR at Lyndhurst, and now the Queensland unit, to be known as VLQ, was added. These and subsequent high frequency transmitters (as the short wave transmitters are more correctly called) were to constitute the Australian Inland High Frequency service, providing reasonable reception in those areas of the country not yet served by the medium frequency regional stations.

VLQ was of 10 kilowatt power rating, and for best reception conditions the operating wavelength was changed three times a day. The frequencies used were in the 31 and 41 metre bands. Horizontal half-wave dipole aerials were used, supported on tall hardwood poles.

VLQ was opened for service in February, 1943 and reports on reception soon came in from as far away as Europe.

The transmitter was built in steel panelled enclosures with a frosted grey enamel finish. The pumps supplying the cooling water for the two power amplifier valves were installed in a small adjoining room and a radiator for cooling the heated water from the valves was mounted on a covered patio just outside.

This transmitter remained in regular service for 33 years and has been retained for intermittent emergency use since then. The equipment is still capable of meeting the original specifications although supplies of new valves are no longer obtainable. A few spares remain, but the faithful old water cooled VLQ is now virtually retired from service.

Having improved somewhat the security of the main Brisbane transmitters by moving them away from the city, attention was turned to the studios.

The situation on the top floor of Penney's Building in Queen Street was considered to be rather vulnerable in the event of aerial attack on the city, and a plan for a better protected site was evolved.

An old style house on a large block of land fronting Alice Street was acquired and beside it a partially underground reinforced concrete structure was built. This was fitted out with two studios each with an adjoining control room, a main switch room, an air treatment plant room and space for limited ABC office and switchboard use.

The old house upstairs was used principally for ABC studio administration purposes, record library and amenities.

The PMG installation work was completed in 1945 and the new studios went on air to 4QG, 4QR, Regionals and Short Wave on 12th December.

One of the studios in Penneys, now vacant, was converted to sporting program use and some other studios on the 6th floor were retained for music and drama. The disk recording booth was transferred about this time to a new studio set up in the Alice Street old house. The remaining ABC office staff remained in Penneys.

At this stage of course, hostilities had ceased, but the Alice Street studios remained in use until a new studio centre in Coronation Drive, Toowong, was completed in 1962.

Technically the Alice Street studios were well equipped but the working environment was not ideal and the studio block was known locally as "the dungeons". Externally there was no landscaping, although the Botanic Gardens across the street did much to soften the surroundings which on one side and to the rear, consisted of ancient and generally dilapidated brick buildings with rusty iron fences.

An old annex which in better days had obviously been the house kitchen, served as a lunch and locker room, a store and a maintenance depot for the outside broadcast equipment; while a broken down galvanized iron shed against the back fence housed battery charging facilities and bulky public address loudspeakers etc.

Altogether, the Alice Street area was hardly a showpiece.

One of its few redeeming features as far as the staff were concerned, was the tennis court built on the south side of the studio block. Many pleasant weekend matches were enjoyed by both ABC and PMG staff.

So far National programs had not been broadcast in Papua New Guinea, the only medium frequency transmitter in the territory being 4PM Port Moresby on 1360 Kcs owned by Amalgamated Wireless of Australia and operated as a commercial enterprise by staff of the AWA coastal radio service. As the war intensified in the Pacific region, this 500 watt transmitter was converted to short wave and used by the Australian Army Signals unit.

At the beginning of 1944, the PMG Department installed a new Philips 500 watt transmitter as a unit of the NBS, and with the call sign 9PA it began operating in February 1944 at Port Moresby in an area known as Wonga Valley.

The 9PA aerial was a simple T type 90 feet high erected by Army personnel under the supervision of the PMG Line Foreman from Rockhampton.

One studio was available at opening and a second was built shortly afterwards.

On air time was limited, but by the end of the war the station was on air for three hours in the morning, two hours around midday and came on air again for six hours in the evenings.

With this comparatively low power, the station served only Port Moresby and the immediate surroundings, and some time was to elapse before a short wave transmitter was installed which gave a reasonable signal, at least as far as spoken programs of news were concerned, to many of the more remote towns.

And so with the war ended and the service established in Brisbane, Dalby, Rockhampton, Townsville, Atherton and Port Moresby, the NBS was up and going and looking forward to great things. In the event, no one could have been disappointed with the progress in the next twenty years.

CHAPTER 3

THE BUSY YEARS

4QL Longreach was the first post war regional station to be installed, and work began in 1946.

Prior to this no medium frequency national transmitter existed in the central inland. The coastal stations at Townsville and Rockhampton were relatively low powered and provided no day time reception in the Longreach district. Night time skywave signals could be received, but these were of little entertainment value due to low signal level, fading, and in the summer months particularly, heavy atmospheric static.

The national high frequency station VLQ at Bald Hills provided a reasonable signal in Central Queensland, but in the war years and just after, few listeners had short wave radio sets.

This first Longreach station was very low powered as it was too soon after the war for any civil manufacture of high power transmitters to be undertaken.

The installation was thus an interim measure pending provision of a permanent high power station when manufacturing of such equipment was resumed and the state of the national economy permitted.

This first station was installed in a disused shed in the yard behind the Longreach Post Office in Magpie Lane. From the decorations on the walls it was obvious that it had been used by the American armed forces during the war years when Longreach had a U.S. airforce bomber force based there.

The station was opened in 1947 and operated at the Post Office site for eight years until the new high power replacement transmitter was installed at a site across the Thompson River, at Cramsie, an area once occupied by an outstation of the Mount Cornish pastoral holding.

Despite its low power, 4QL achieved a very wide coverage, providing a useful daytime signal to Winton, Blackall and Jundah.

Its two 200 watt transmitters, one operating and one spare, provided a real measure of security of transmission. This was the first national in Queensland to have this facility and the practice has been followed at all M.F. stations since then with the recent 4CH Charleville being the first exception.

At the time there was no local ABC studio and all program came over PMG landlines from Brisbane and Rockhampton.

With the station operating and in the hands of its new resident staff, the installation team went to 4QN Clevedon to install a second transmitter there.

This proved to be a most timely move, as barely four years later the main building and transmitter were completely destroyed by fire and the standby unit, which had been installed in a separate building, was able to go to air again next day.

The winter of 1947 was a great time to be at Clevedon on installation. The party lived in tents and enjoyed the northern winter climate and the nearby fishing at Salmon Creek and Ticklebelly Bay.

The AWA transmitter had been sent to 4QN in a multitude of wooden packing cases and metal canisters, so that considerable time was spent in assembling the components in the main steel compartments. This standby transmitter had a power output of 2 kilowatts, so that it was a useful substitute when the main unit was burnt in the fire. It was ready for operation by the end of October 1947.

Associated with the installation of transmitters was a considerable amount of preparation of program input and control equipment. This was done in the Radio Section "assembly shop", and in the early post war years part of

an upstairs floor in an old building in Mary Street was used for this purpose. The area was congested and equipment was received and despatched via a decrepit old goods lift.

Equipment for testing the assembled radio components was also housed here and formed the nucleus of what was to become the Radio Laboratory which was moved in 1947 to the basement of Hesketh House, the PMG administration building in Elizabeth Street.

By mid 1947 a new assembly shop was in production in a large barn-like industrial building in Ernest Street, South Brisbane where it was to remain for several years.

By this time late 1947, an aerial had been erected at Pialba for the new station there, and installation of the 2 kilowatt regional 4QB was proceeding.

The Pialba site was close to the sea, the transmitting equipment being installed in what had been a private house in Charlton Esplanade. The location was a very pleasant one with a fine view of Hervey Bay.

The general area of the site had been examined some 10 years previously when a survey team from the PMG Research Laboratories Melbourne had set up a test transmitter to check the area for likely transmitting sites.

4QB was a very welcome addition to the National network as it put Maryborough in the growing list of major towns with access to the ABC Regional program. In fact, prior to this, Maryborough had virtually no National program. The station opened in January 1948.

During 1947 the new radiator at Bald Hills was under construction. This was another new design for Queensland and was well displayed in newspaper and magazine articles at the time. It was over 660 feet high with a strange daisy petal structure on top some 60 feet in diameter. This radiator was designed to broadcast both 4QG and 4QR, using the two transmitters being installed about that time. These were each of 10 kilowatt power rating and when they came into use in mid 1948 they extended the two ABC programs to a much greater radius around Brisbane than had hitherto been possible.

At the same time, installation of a short wave transmitter was proceeding at Port Moresby. The medium frequency 9PA established during the war, was limited to the area around Port Moresby, and to reach the scattered towns and villages in the rugged territory, a high frequency, or short wave, transmitter was necessary. It became operational in June 1948 with the call sign VLT. The frequencies used were in the 31 and 41 metre bands and the power of the transmitter was 2 kilowatts.

There was very little respite for the installation staff in those days, as during 1949 preparations were being made for a second short wave transmitter at Bald Hills and a new regional station for Cairns.

Tests had been made in the Cairns area as early as 1937 and the preferred site finally selected in 1944. Building plans were drawn and by early 1948 the station building was complete. Installation of the aerial system was undertaken in the same year.

The Cairns site was set amid the fields of waving sugar cane, ten miles south of the city near the railway siding of Kamma. From the station there was a fine view of Walsh's Pyramid and other mountains to the south. In fact, the flat cane lands were hemmed in on the east and west by mountains also, so that the service of the new station was rather limited.

With an aerial power of 2 kilowatts and the call sign 4QY, the Cairns regional went on air in January, 1950.

This gave greatly improved reception in Cairns which, prior to this, had relied on a somewhat inadequate signal from 4AT Atherton.

Program came as usual by PMG landline from the south. Later in the year a small studio was installed in Cairns to allow some items of local interest to be produced. While staff were busy in the Cairns area, preparations were being made at Bald Hills for the new short wave service, VLM. An unused aerial originally designed for VLQ was modified for a different operating frequency and assigned to VLM which was to use the 60 metre band.

VLM came on air in September 1949 using a small temporary transmitter with a power output of only 200 watts.

A new 10 kilowatt transmitter was then installed and VLM changed over to it at the end of 1950. This large, impressive unit with its glass windowed steel cabinets painted in a biscuit colour known as Corio Sand is still in use at the time of writing, having given over 30 years good service.

The two short wave transmitters carried different programs and were designed to reach listeners in areas remote from medium frequency regional stations. The high frequency VLQ was expected to serve listeners at distances greater than about 400 miles from Brisbane, with VLM supplying signal to the remaining close-in area. Later in their life, both transmitters were to carry the common regional, or 3rd network program.

The usefulness of high frequency transmitters depends on whether listeners have the necessary short wave receivers, and in these days of hand held personal portable sets the results obtained from short wave stations are usually inferior. At the time of installation of VLQ and VLM however, there was greater public interest in such reception, particularly as the medium frequency network was incapable of providing coverage over the whole State.

The Bald Hills transmitting centre was a busy place for installers in that period, although not all of the work was concerned with transmitters. Up to this time there was no emergency generating plant for the station, although failures of the electricity mains were rare. In early 1950 a fine brick engine room was erected adjacent to the main transmitter building, and two large diesel engine driven generator sets were installed. They were of a size capable of running all the transmitters in the event of a commercial power failure.

The New Year in North Queensland was heralded by the opening of 4QA Mackay which took place at 8.15PM on 18th January 1951.

Work had been proceeding during 1950 on a site originally selected in 1948 in a low lying area behind a coastal sand dune a few miles north of the city.

The previous owner had built a quaint two storey house on the property and this was retained and used as the official residence of the first officer in charge of 4QA. Three small pre-fabricated buildings were erected to house the equipment which consisted on opening of a two kilowatt STC transmitter, its input and control apparatus, and the usual emergency studio microphone and turntable. A few months later a second transmitter was installed and made available as a spare in case of trouble with the working unit. The accommodation was considered temporary and sufficed until the permanent main building was erected in 1957.

The 4QA aerial was a steel pipe just over 100 feet high erected by the Radio linesmen. This also was temporary and became the standby when a new main tower was erected in 1957.

Operations at Mackay had only just settled down when tragedy struck the NBS. The staff at 4QN Clevedon were awakened in the small hours of the morning of 26th May by the noise of fire destroying the transmitter building. The main building containing transmitter, control room, store room and main engine generator room was completely burnt out. Fortunately the small brick building housing the engine water cooling radiators and fans and the standby 2 kilowatt transmitter installed in 1947 survived, and in short time 4QN was back on the air using this transmitter. A transportable engine generator set was brought out from Townsville to power the station.

Other important equipment destroyed in the fire was the newly installed high stability oscillator which was about to be used in special synchronizing tests with 4QS Dalby.

The cause of the fire was never positively ascertained.

The good news after the fire was the opening of the Gympie regional, 4GM, in August 1951.

Perched on a hill at Monkland just south of Gympie, the station overlooks the valley of the Mary River. Just a few yards from the front door is an old gold mining shaft, for Monkland was in the heart of the great Gympie Goldfield. However, although the station was staffed for the first 13 years of its existence, no trace of gold was ever found on the property, but Chinese goldminers' coins have been recorded.

4GM was, and still is, a small station of 200 watts aerial power, designed to serve Gympie and its immediate surroundings out to about ten miles.

Three projects came to fruition in 1952.

The first was the establishment of a small local studio in the Shire Hall at Longreach.

Up to this time the ABC had no program production facilities here, and this studio enabled local news and notes to be broadcast from time to time.

The second was the restoration of reasonably normal conditions at 4QN Clevedon after the fire. Two new transmitters, 2kW STC, were installed in the surviving annex housing the AWA standby transmitter which was packed up and sent to Canberra. With the removal of the fans and original water cooling equipment, there was sufficient space to provide a control room for the new transmitters.

An additional building was erected and was used to accommodate the diesel generators, the storeroom and the OIC's office. The third project was the establishment of a transmitter at Southport.

After considerable investigation a site was selected and obtained near the coast at Broadbeach, in a tract of sandy land with more banksia trees than houses. Thirty six years later, the scene is vastly different. The station is now surrounded by tall buildings and holiday homes and is almost in the centre of the Gold Coast metropolis.

This station was the same size as 4GM Gympie and like Gympie was initially staffed part time. At nights the automatic equipment was in charge, and faulty operation was signalled to the local telephone exchange so that the staff could be called in for repairs.

This station 4SO was put to air in October 1952 and relayed the Brisbane program. No local studio was established although equipment was provided for emergency announcements and record playing.

The small low set timber building with its garden flower beds merged into the local scene and from a distance looked very much like any other beachside holiday home. The only evidence of anything out of the ordinary was the 100 feet high pipe mast aerial in the middle of the adjoining field.

At about this time, a glass fronted studio was installed in the Science Hall at the Royal National Association showground in Brisbane and the ABC used it during the annual exhibition week. It attracted a great deal of attention and gave the national service some much needed publicity. Each Show for about 10 years brought the public thronging to see their popular ABC personalities and to gaze at the electronic wonders displayed by the PMG Radio Section in the adjoining space.

In 1952 a very fine model of the 4SO site was featured, supported by diagrams, photos and text showing the various steps in selecting a site, designing and installing a new radio station.

In the years before World War II the PMG Department had produced many fine displays at the Brisbane Exhibition each year, displays which have never been surpassed. One popular display was a model city with moving mail vans and other vehicles traversing the streets and obeying traffic lights. Ships and planes arrived, no doubt with mail. Other aspects of the display featured the telephone system. Radio staff joined their telephone colleagues in devising new ideas and providing the hidden mechanisms which animated the display. So after the war the opportunity was taken to again put on a show at the Brisbane Exhibition and a variety of topics were used to entertain and educate. They all featured some interesting aspect of the PMG Radio Sections' activities. However, other PMG sections no longer participated in these displays.

In 1953 an entirely new type of radio was introduced into the national network in Queensland - a frequency modulated transmitter. This operated in the very high frequency band with a wavelength only one hundredth of those commonly used by the medium frequency transmitters. It was able to operate with a wide audio frequency bandwidth, giving greater fidelity to the listener with a receiver designed specially for frequency modulated waves.

As its mode of propagation was quite different from that used for the normal medium frequency transmissions, an elevated site was chosen for the transmitter. This was on the northern end of the Taylor Range overlooking Brisbane, at a place to be known thereafter as Mirrimbul. This was a word derived from an aboriginal dialect originally spoken in the Brisbane region by the Yugarabul people. It referred to hand signals as a means of communicating at a distance, and the central idea of communication seemed appropriate. The new name was approved by the Place Names Board.

This FM transmitter was of 1 kilowatt power and was of American manufacture.

The program radiated was usually that produced for 4QR but the station was on air only from 11AM to 11PM. No call sign was allotted.

The station was considered to be experimental only and attracted a rather small audience. Nevertheless it continued to operate for almost eight years, and then in common with its fellows in other capital cities, was closed down. Nothing further was done with FM broadcasting until the introduction of a stereophonic system in 1960.

An interesting experiment was carried out in 1953 with the synchronization of two medium frequency regional stations. These were 4QN Clevedon and 4QS Dalby. It was hoped that this mode of operation would give better reception in areas of the State which could receive the nighttime skywave signal from the transmitters. It was decided to operate both transmitters for this test on 4QN's frequency. Accordingly two very stable oscillators were designed and built in the PMG Research Laboratories in Melbourne, and one installed at each station.

A test van was equipped and over a period of several weeks nighttime reception was observed at various distances from Dalby and Clevedon. Special tones and recordings were played after normal program had ceased, and these were listened to, observed on a cathode ray oscilloscope and recorded on tape for comparison at the different sites.

The result of the observations was that reception in areas where both stations could be heard at night was marginally improved. One disadvantage of such a scheme however, is that the transmitters must be supplied with identical program, and for stations as widely separated as 4QS and 4QN, program requirements did not normally permit this. At the conclusion of the experiment, 4QS reverted to its normal assigned frequency and nothing further has been heard of the idea. Another type of synchronized operation was later instituted for Pialba and Eidsvold and this will be described later.

1954 was a busy year for the installer with activity mainly in Central Queensland.

After more than 20 years of low power operation, 4RK at Gracemere was transferred to a new 10 kilowatt transmitter and given a new vertical aerial. This combination improved the station's service area greatly, with Street Lawrence in the north, Blackwater in the west and Miriam Vale in the south now within the good reception zone. In this year also, a new high power 4QL Longreach was installed at Cramsie just across the Thompson River. This improved the service area and in fact the daytime primary coverage was and still is, the largest in the State.

The Thompson floods the surrounding countryside from time to time and water extends in big floods almost to the edge of the town. Because of this, the radio station was provided with four staff houses so that even though access by road to the station was cut by floodwater, the staff would be available for duty. The Longreach town council had a motor boat and this was used in emergencies to ferry people and supplies from town to the far side of the Thompson. The course to follow was marked by white paint on the upper branches of partially submerged trees.

The Cramsie installation was completed in 1956 by the addition of a 2 kilowatt transmitter as a standby for the main 10 kilowatt unit.

The aerial used at that stage was a four pole Delta pending the provision of a vertical half wave radiator. This Johns and Waygood vertical mast, 650 feet high came into service in 1959 and the Delta was then used as the emergency aerial.

About this time, installation staff became involved in a work with a distinct cultural flavour. With the increasing use of the Brisbane City Hall for concerts by the Queensland Symphony Orchestra and visiting artists, there was a need for a studio on site.

Accordingly in late 1955 a small installation was made with a window affording a view of the main auditorium, and located above the dress circle gallery. This studio enabled the concert announcer to describe the scene from the privacy of a sound proof booth. Prior to this the duty technician sat with his amplifier and field telephone beside the steps at the edge of the stage in a very exposed position and the operation was conducted as a normal outside broadcast with the announcer back at the main studio. These occasional local works were welcomed by installation staff who in this busy time, seemed so often to be away in the country for long periods.

Broadcasting at Port Moresby had been quietly operating with the medium frequency 9PA and the high frequency VLT, but by 1956 increased activity in the local program area made an expansion in the recording field necessary.

A new recording room was therefore built and equipped at the old Wonga studios. Business was apparently brisk in the recording world, for another recording room was installed barely four years later.

Before long installing staff were busy in North Queensland again. Although it had always been planned to move 4QN to the Brandon area, the fire at Clevedon undoubtedly hastened the move. In 1956 a contract was let with STC for a 50 kilowatt transmitter with a 10 kilowatt standby, and a brick building was erected on the new site. It was ready for the installing team in 1958.

During the year Johns and Waygood erected a 650 feet high vertical radiator and by June 1959 all was ready and the temporary equipment at Clevedon was closed down and broadcasting began at Brandon. As an insurance against the occasional failure of the commercial power mains, two large diesel engines, each driving a 100 KVA alternator were provided in the emergency power room.

This increase from 2 to 50 kilowatts in radiated power made a vast improvement to the station's service area. The old problem of poor reception at Charters Towers was solved at last.

This year saw the introduction of television to Queensland. In November, the high power monochrome service began on Channel 2 in the VHF band, and the output from the Marconi transmitters was radiated from an aerial mounted on a 500 feet high tower on the Taylor Range at Mirrimbul.

The Brisbane television studios of the ABC were built on a new site fronting Coronation Drive, Toowong, and backing onto the Brisbane River. Adjacent to this new area was an old home "Middenbury" which was acquired by the Commission as part of a new sound studio development. Installation of these studios, which were to replace Alice Street, began in a new brick building on the "Middenbury" site.

As the nineteen fifties drew to a close, work was in progress at Mount Isa on selection of a site for a new station. 30 years after the establishment of the NBS, the growing town of Mount Isa had no local radio. By day the broadcast band was virtually dead, with 4QL Longreach the only station which could be heard and then only if one had a good receiver and aerial and the atmospheric static was low. Short wave reception of VLQ Brisbane was possible of course, but few listeners were equipped for it and most were unaware of the value to be had from high frequency transmissions.

And so, out past the airport in a stoney, red field studded with clumps of spinifex, the Mount Isa station took shape.

As the town was compact with almost no outlying settlement, a small power was allocated for the transmitter and a simple short steel pipe aerial was erected.

4MI Mount Isa began broadcasting the Regional program in July 1960. The program line from the Brisbane studios was long, over 1400 miles, all on open wire telephone channels.

The station was equipped with a pair of 200 watt Philips transmitters, used as main and standby. At first it was staffed part time, but later it operated unattended with staff from the local telephone exchange providing remedial measures as required.

The "sixties" proved to be just as busy as the "fifties". As Mount Isa was finished, plans were being made for a big new studio block for Port Moresby. This was to be at Wonga, not far from the old site. Three studios with control rooms were planned, plus recording and replaying booths with associated administration accommodation. This was a large work, and it was not ready for use until late in 1964. As the Wonga construction progressed, three other major works were in progress - new metropolitan studios at Toowong, Brisbane, a new transmitting site at Maigabu, Port Moresby, and a new studio and transmitter installation at Rabaul, New Britain.

The Toowong studio installation was ready for operation in July 1962 and 4QG and 4QR transferred from Alice Street to the new building.

At Moresby, the Wonga transmitting site was inadequate for the proposed expanded services and a new area was acquired at Maigabu. Here during the war had been an airforce landing ground known as Ward's Strip and it was to this site that 9PA was transferred in December 1962. A new 2 kilowatt STC transmitter with an identical standby was installed, and a 200 feet high steel pipe radiator was erected.

The extensive flat area of Ward's Strip was ideal for short wave operation also, and two new 10 kilowatt STC high frequency transmitters were installed which increased the power of VLT and enabled a new service to go to air with the call sign VLK. These high frequency units were ready by the end of 1963 and provided a greatly expanded coverage of Papua and New Guinea. Special aerials were used to direct the signals to the desired regions.

Several rhombic receiving aerials were also provided to enable the Wonga studio newsroom to hear and rebroadcast Australian news from either Melbourne or Brisbane.

The situation in New Britain was still not very satisfactory. There had never been any daytime medium frequency reception, and because of the great distance from any stations, very little at night. The high frequency bands could be used, and no doubt were, by those with suitable short wave receivers, but this was unsatisfactory for the great majority of the indigenous inhabitants.

In late 1960 ministerial approval was given for the ABC to establish local broadcasting at Rabaul and officers of the PMG Department went to the area with a test transmitter to locate a site for the station. An area was chosen at Kurakakaul just outside of Rabaul.

As considerable time elapses between site approval and the final on air date of a new station, a temporary installation was provided during 1962. An army igloo type building was acquired in Rabaul and a studio and transmitter installed in it. On a restricted area of land outside, a small steel lattice aerial mast was erected, and the new station 9RB went on air in December 1962.

The permanent transmitting site at Kurakakaul was not ready for use until the middle of 1966. The studios however, remained at the Rabaul site at this time, although it was hoped to build a new studio and administration block on Namanula Hill overlooking Rabaul. In the event however, independence and the formation of the National Broadcasting Commission of Papua New Guinea occurred before any new installation, and by 1973 the Papua New Guinea stations were no longer the responsibility of the Australian NBS.

At the Bald Hills Radio Centre in 1963, two new transmitters were installed, a modern 10 kilowatt STC for 4QG and a 50 kilowatt unit for 4QR similar to the one at Brandon. High hopes were held for a 50 kilowatt for 4QG also in due course, but alas, this did not eventuate, although both metropolitan transmitters in Sydney, Melbourne and Adelaide were raised to 50. Up in North Queensland, disaster struck 4QN. The main radiator collapsed while a contractor was replacing a guy insulator and the station was forced to operate on a temporary emergency aerial until the main was rebuilt and returned to service 18 months later.

Two other major transmitters came on air in 1963, both for television.

One was ABDQ3 Mount Mowbullan and the other ABRQ3 Mount Hopeful. The former was designed to serve Toowoomba and the Downs and was built high in the Bunya Mountains some 30 miles north east of Dalby, close to the treeless dome of Mount Mowbullan and adjacent to the rain forest of the Bunya Mountains National Park.

The Mount Hopeful transmitter was provided for viewers in Rockhampton, Mount Morgan and Gladstone and was built in high, rough, dry country 25 miles south of Rockhampton.

These two were joined the following year by a TV service for Townsville, ABTQ3. This station was built on Mount Stuart with a wonderful view of Townsville and Magnetic Island at the edge of a 1000 foot high cliff. Access to this site and to Mount Hopeful was provided by the construction of several miles of steep, tortuous mountain road.

In 1964 an event of some significance occurred in the NBS. For the previous 34 years the PMG radio staff had had full technical control of the studios in construction, operation and maintenance and the ABC had provided all facilities for the production and presentation of program material. It was now decided that the ABC would take over the technical side of studio work. PMG staff were given the option of transferring to the ABC and many did so. A few regional studios were so situated geographically that ABC technical control was not initially available, and local PMG staff maintained these studios for some years afterwards. In September of this year the new Wonga studios at Port Moresby were ready for use and were placed under the technical control of the ABC.

Another work in 1964 was the transfer of 4AT from its original building and transmitter to a new building on the same site and a pair of new STC 2kW units designed to give a 4kW aerial power.

Three transmitters came on air in 1965, one TV and two medium frequency. The TV station served the Maryborough - Bundaberg area and was built high in the ranges just east of Biggenden and inland from Childers. The site was called Mount Goonaneman and another mountain road was specially built for access.

The station was staffed and houses for accommodation were bought in Childers.

The two new medium frequency stations were at Pialba and Eidsvold.

4QB Pialba had been operating on 2 kilowatts up to that time, but due to the poor conductivity of the coastal wallum country, the signal in Maryborough and Bundaberg was not as strong as would be desired for such towns. Inland in the Gayndah - Eidsvold - Monto region, reception of the National service was very poor and provision of a regional station to serve this area was highly desirable. So the decision to increase Pialba to 10 kilowatts and to build a similar station at Eidsvold was very welcome.

For many people in the inland areas, the result was not as good as had been anticipated due to a decision by the Australian Broadcasting Control Board to operate the stations with synchronized carrier frequencies, that is, with both stations on the same wavelength. The result of this method of operation was that in an area about midway between Pialba and Eidsvold, the listeners received a somewhat distorted signal. Very elaborate measures were taken at the transmitters to minimise this, but listeners were obliged to do some rather tricky work with their receiving aerials to get a reasonable result.

The area around Biggenden was particularly prone to this objectionable effect and reception there has never been ideal. Synchronized operation in such an area was purely experimental, but the experiment has never been terminated, to the continued frustration of a large number of listeners.

At Pialba two new vertical radiators were erected so that the signal could be directed inland and not be wasted over the sea to the east. A new brick building was built to house the two new transmitters, each of 5 kilowatts, working in parallel to give 10 kilowatts output. Similar transmitters were installed at Eidsvold. At Eidsvold, coverage was required in all directions, so a conventional single steel tower aerial was used. As at Pialba, this structure was 450 feet high.

The new services went to air at the end of November 1965, the Eidsvold call-sign being 4QO. In this year also a new studio was built for local use in Maryborough. There had been since 1950 a studio in the Maryborough School of Arts building, but with the ABC's increasing use of local program material, a new studio with better facilities was desirable. It was installed in the State Government Insurance office Building in Kent Street and was ready for use by August 1965. Pialba, Gympie and Eidsvold regional transmitters took occasional program from this studio.

1966 was an exceptionally busy year for broadcasters with five new transmitters installed. All but one were at new sites so that in addition to the transmitter units all the hardware of a station had to be provided - buildings, transmission lines, aerial and earth systems and emergency engine generators.

The odd man out at an existing site was the television station for Cairns. As an interim measure pending a decision as to the ultimate permanent site, a low power unit was installed in the Telecom Radio Communications building at Bungalow on the southern outskirts of Cairns. There was already a steel tower on this site and the TV aerials were mounted on the top of this.

Another TV station was established on a rocky ridge in a Forestry pine plantation at Paschendale for the benefit of viewers at Stanthorpe and surrounding districts.

In the medium frequency area, a standby mast was erected by radio lines staff at Maigabu for station 9PA and in New Britain, the new Rabaul transmitting installation was completed. The site at Kurakakaul was on a low flat plateau close to Talili Bay, 5 miles by road west of Rabaul. One of the by now familiar steel pipe masts 200 feet high was raised by the radio lines staff, and a two and a half kilowatt STC transmitter was provided. When all was in working order, transmission began at Kurakakaul and the temporary transmitter in Rabaul was removed from the studio site and reinstalled as a spare at the new "Haus Wilus".

The two remaining stations were at Emerald and Street George.

Even with Longreach and Rockhampton both on high power, an area surrounding Emerald was without effective coverage. A site in open country just north of the town was obtained and a brick transmitter building was erected.

A 50 kilowatt main transmitter with a 10 kilowatt standby was installed and connected to the half wave vertical aerial by buried coaxial cable.

The operating frequency allocated was 1550 Kcs at the high frequency end of the medium wave band. This was a clear Australian channel and it was hoped that night time skywave cover would be achieved over a large part of Queensland for listeners in remote regions who had to rely on distant stations. Such a strong signal has been realized, although what use is made of it is not known. Certainly the signal is good enough to be used by other regional stations as emergency rebroadcast material in the event of a failure of a normal program line. On several occasions the Emerald skywave has been rebroadcast from the Thursday Island transmitter, for example.

The requirements at St. George were rather different. The country to the east was reasonably well served by 4QS Dalby, but inland, reception was very poor. The largest of the small daytime signals at Bollon for instance were from Cumnock and Manilla in N.S.W. A directional aerial system was obviously needed and two tall towers were built on a site adjacent to the Moonie Highway seven miles from St. George. As the frequency allotted, 710 Kcs, was shared with the national regional at Launceston, Tasmania, a null in transmission from St. George in the Tasmanian direction was required.

The directional system gave an enhanced signal to the north and round to the west and south west. Reception was improved at Cunnamulla but Charleville gained nothing. However the St. George district now had excellent coverage of normal regional program with an increasing local content from the studios at Toowoomba.

Both Emerald and St. George began operation as fully staffed stations although 4QW St. George became unattended some 13 years later. 4QD Emerald has remained fully staffed. Emerald has developed into a combined radio centre with the staff responsible for a number of low power television stations in addition to the operation of 4QD.

Also in this busy year of 1966, an extensive survey by Brisbane radio staff was made in Papua New Guinea to determine the service areas of the Port Moresby short wave stations VLK and VLT. At this time the Australian Government required a plan for broadcast development in Papua New Guinea to be prepared, and this short wave survey provided information highly desirable in the formation of the plan which was being developed by an engineer of the Queensland radio section. Observations of field strength, fading, interference etc. were made using a communications receiver. The data was collected for several days at each location from about 6AM to station close down at the following towns: Daru, Goroka, Lae, Madang, Wewak, Manus Island, Kavieng, Rabaul, Kieta, Samarai and Popondetta.

The expedition, although of great interest to the participants, was fraught with frustration and difficulty in the transport, communication and accommodation areas.

With the rate of installation still high, three new transmitters were put in place in 1967.

On top of thick scrub covered Mount Blackwood 18 miles north west of Mackay, the last of the State's high powered television transmitters was installed, designed to serve the surrounding sugar cane lands. Out on the Darling Downs the old faithful water cooled 10kW of the original 4QS Dalby was retired and its place taken by a pair of 5kW units with combined 10kW output. These new transmitters in their smart grey steel cabinets were efficient and of high quality but they lacked the character and fascination of the older type construction with its rows of meters and control knobs and interesting views of cherry red anodes and the blue glow of mercury vapour plasma in the rectifiers.

CHAPTER 4

DOWNHILL

The stage had now been reached in the medium frequency field where a fairly large part of the State was effectively served by the 14 stations in the country. There were in addition, the two short wave transmitters with 4QG and 4QR in the Brisbane metropolitan station at Bald Hills.

In the four years from 1967 to 1971 the medium frequency assembly shop had no orders.

New works interest changed to television and in this medium many new low powered transmitters and translators were installed throughout the State.

The first new medium wave broadcaster of the seventies was ironically, the smallest ever installed in Queensland - a 50 watt unit for Hughenden in 1971.

This quite modern semi-conductor type transmitter was not even given a house of its own, but was hidden away in a radio-telephone building in Maclaren Street. Even its simple aerial was hung like an after thought from the lower regions of the microwave tower, from the very top of which the brash new television aerial surveyed the countryside.

Two years elapsed before the installers took to the field again, but in 1973 it was business as usual - a new 10 kilowatt for Julia Creek and a kilowatt for Mossman. Both stations used two transmitters in parallel, 4JK Julia Creek having STC units while 4MS Mossman was supplied by AWA.

The twin aerial towers, 640 feet high, in the level grasslands 5 miles east of Julia Creek are a landmark visible for many miles. This directional array provides some skywave protection for its cochannel at Broken Hill to the south, and an enhanced signal to the previously radio starved Gulf country.

How different was the area around Mossman - rain forest covered hills, lowlands full of sugar cane and the smell of the ocean just a few miles away. Due to the topography, the Mossman service area was confined close to the coast from Daintree in the north, down past Port Douglas to the northern Cairns beaches.

The 4MS site in the monsoon season was virtually a melaleuca swamp, converted soon after the "Wet" by a vigorous growth of tropical grass into a veritable jungle. Judicious clearing has tamed the site somewhat, but the grass slasher is still in frequent demand and many a tree has shot up to transmission line height between visits by the line maintenance party.

Both stations were designed for unattended operation, major items of maintenance being attended to by staff from the Radiocommunications centres at Mount Isa for Julia Creek and Cairns for Mossman.

Two years later the bauxite mining town of Weipa was given a regional station. Duplicate 500 watt AWA transmitters were installed as main and standby, feeding a conventional quarter wavelength steel lattice radiator. For economy, the equipment was housed in a 1000 line size prefabricated telephone exchange type building known as a Jumbo hut. The program came up the Peninsula from Cairns and turned west to Weipa at the old Moreton carrier station. The several hundred miles of open wire line were subject to the usual troubles in the wet season. A remote control system was established enabling the staff at the Cairns Radiocommunications centre to monitor the station and to effect a limited number of control functions at 4WP, such as changing from one transmitter to the other and selecting an emergency program source should the main program be lost on its way to this remote site.

Shortage of Government money in this decade severely restricted the expansion of the NBS although there was a great need for new stations, particularly in the newly developed Central Queensland coalfields. This populous area with the new towns of Moranbah and Dysart was outside the primary service area of any station, national or commercial.

After many years of "some day" and "maybe", a transmitter was finally approved for Thursday Island and a 2 kilowatt station became operational in June, 1979. It was housed, as was Weipa, in a transportable exchange

type building, although, like Weipa, the cost of transporting these buildings from Brisbane was very high. The two 1 kilowatt transmitters with combiner and program equipment were installed in the building in the Brisbane assembly shop and taken to Cairns by road and thence to Thursday Island by barge.

These were probably the last broadcast transmitters STC made before lack of Government orders forced the close down of their transmitter factory.

It was decreed by the Post and Telecommunication Department that 4TI Thursday Island would share the 150 feet high aerial used by the transmitters of the Overseas Telecommunication Commission and a somewhat complicated coupling unit was assembled in Brisbane in a smaller exchange type hut and taken to Thursday Island. The complications arose because O.T.C. operated on three different long wave shipping frequencies at various times of the day and night, and it was necessary to provide the correct load for National and O.T.C. transmitters and prevent any mutual interference. 4TI was pleasantly situated close to the sea with a view of passing ships and in sight of several islands. Thursday Island is very hilly and the OTC site is the only reasonably almost-level area. The radiator is a steel lattice tower, 150 feet high. Many other lesser steel towers clutter the site, some used to support OTC high frequency aeriels, and some unused, now that civil aviation radio communication has moved from Thursday Island to Weipa. One of these towers was used to support the 4TI standby aerial.

Radio interference between 4HU, the local TV transmitter and the Hughenden equipment of the broad-band microwave system eventually necessitated the removal of 4HU to another site. An acre of land on Hospital Hill was acquired and the 4HU equipment was moved and housed in a tidy telephone exchange type building and given the dignity of its own vertical radiator. Leaving Hughenden to go westward, the traveller sees now as the last outpost of the town, a notice board which proclaims "Telecom Australia, National Broadcasting Service, 4HU"; the State's smallest station, but fully equipped with its own site, transmitter building and 80 feet high steel pipe radiator. The new site was operational in March 1981.

During these latter years there had been a growing concern in Telecom as to the future of broadcasting and in particular, the role if any that Telecom broadcasters would play.

Following two Government commissioned reports, the Green and the Dix into among other things the future of National broadcasting and the operation of the ABC, it seemed that the installation and control of the transmitters, for over half a century the province of PMG-Telecom would be contracted elsewhere. There was talk of staff being transferred to the Department of Communications or the ABC and such rumours deepened the gloom which was settling over the Telecom radio staff.

It seemed that the end was in sight after 52 years of responsible broadcast engineering.

CHAPTER 5

GREAT EXPECTATIONS

Despite the gloomy outlook which had prevailed, all was not lost, and in 1983 it was revealed that the NBS would remain with Telecom, and would be reorganized to improve its effectiveness.

At the same time a new Act was passed through Parliament creating an Australian Broadcasting Corporation in lieu of the old commission, which although it did not affect the operation of the transmitters, was to have considerable effect on the program and studio side of national broadcasting.

Within Telecom, a Broadcasting Directorate was to be set up with a Director in Melbourne H.Q. and a Broadcasting Manager in each State branch. The new Directorate was to be as independent as possible within Telecom, with the State Managers reporting direct to H.Q. in Melbourne. Staffed stations were to be returned from the control of the District Telecommunications Managers to the new Broadcasting Branch in each State, and plans were laid for the establishment of inspection and maintenance depots at strategic locations to cope with the unattended stations.

In Queensland the new look became official in January 1984, and as the year progressed there was much talk and quite a lot of action on broadcast matters. The Government's new Special Broadcasting Service was expanding and a high powered UHF TV service was confirmed for installation at Mirrimbul. The stereo FM transmitter at Mount Isa was commissioned and plans prepared for UHF television translators at Mount Tamborine for the relay of Special Broadcasting Service programs and Brisbane National Channel 2. The Aussat satellite was not far off with the possibility of new and different services, including a second National regional sound program for the country.

In the medium frequency area, the long awaited Charleville regional station was approved, with a small fill in unit for Cunnamulla.

4CH Charleville came on air in June 1987, but Cunnamulla was finally served by low power FM. There was a great feeling of hope for the future engendered by the activity associated with the new and anticipated works. The happy band of broadcasters felt that they were regaining their long submerged status within Telecom and could look forward with great expectations to many more years of responsible broadcasting such as the pioneers who laid the foundations of the NBS would have wished.

PART 2

THE BRISBANE METROPOLITAN STATIONS 4QG AND 4QR

When the National Broadcasting Service came into being, 4QG had already been on air for almost five years, and 4QR did not exist.

It is appropriate to include the record of these early days so that the history of 4QG is fully documented from its beginning.

It all began when the Queensland Premier E.G. Theodore wrote to the Prime Minister, S.M. Bruce on 14th August 1924 applying for an "A" class broadcasting station licence.

The suggestion for a State Government broadcasting station came directly from the Council of Agriculture, a body established under the Primary Producers' Organisation Act of 1922 and representing the man on the land. In a lengthy report to the Minister for Agriculture, W.M. Gillies, the Councils' director, L.R. McGregor, laid great emphasis on the value of a station which could give market reports and other relevant information directed to farmers.

The Minister was obviously interested, and in February 1924 he broadcast over a private radio station 4EZ owned by A.E. Dillon and operated from the Brisbane Observatory. This was arranged by the Council of Agriculture as a demonstration.

In August the Minister wrote to Premier Theodore recommending the establishment of a station. Cabinet approved, and the application for a licence was made forthwith. All this apparently made very little impression in Parliament, for in Hansard of 1924 and 1925 only one question was asked about the possibility of establishing a Government radio station. There was no debate recorded.

It is not clear just when the licence was granted but the State Government moved quickly to seek a supplier for their proposed broadcasting station.

There were in Australia at that time, two suppliers known to the Government, Amalgamated Wireless (Australasia) and the Radio Communication (Pacific) Co.

On 3rd September 1924, AWA was invited to tender for a high power transmitting system.

By the end of 1924 a State radio office was in existence in the Chief Secretary's Department, with John William Robinson as manager. He had been associated with the early days of broadcast station 2FC Sydney, owned by Farmer and Co., but resigned that post to come to Queensland as manager of the new broadcasting venture. At this stage, the State radio office became officially the Queensland Radio Service. Robinson continued as chief officer and became manager of first, the Australian Broadcasting Company, and later, manager of the Australian Broadcasting Commission. But this was not until the early 1930's.

Robinson had considered the problem of station location and firmly believed that the studios and transmitter should be cosited. He recommended the top of the Queensland State Insurance building at the corner of George and Elizabeth Streets as being the most suitable site. He advised making an application for a medium wavelength for the transmitter rather than a long wave such as 2FC was using, as the proposed location on a city building lent itself to a shorter wavelength. He also suggested that an application for the call sign 4QG, for Queensland Government, be made.

In January 1925 AWA's tender for a "5 kilowatt station" was accepted. They were to supply and install the transmitting equipment, but the State Government was to erect the studios and the aerial towers.

Details of the operating conditions of the licence had now been received, and in February Robinson advised AWA's Chief Engineer A. S. McDonald that the station was to operate on 385 metres.

At this juncture, after private negotiations, AWA was asked to release Frederick William Stevens to come to Brisbane as Chief Engineer for 4QG. Stevens had considerable broadcasting experience at 2FC and 3LO Melbourne and held strong opinions on the advantages of government ownership of broadcasting stations. He arrived in Brisbane in April, 1925.

No doubt with an eye to additional business, AWA advised about this time that they could supply a small 500 watt transmitter almost immediately, for use until the main unit was ready, which would probably not be until early 1926. They suggested that such a unit could be used as a relay station at Rockhampton when no longer required in Brisbane.

Robinson had recommended this to Premier Gillies in March 1925 and by June of that year, licence No. 24 for a "B" class station, 4RN Rockhampton, was issued to the Queensland Radio Service. As it did not seem that enough revenue would be forthcoming to make the enterprise a success, the licence was surrendered in May 1926. As it turned out, the Government never operated a second transmitter in the country although they would no doubt have liked to expand their service had they had the opportunity. In August 1928 they made an application to operate a 500 watt station at Toowoomba but nothing eventuated from this. The Federal Government's decision to take over all the "A" class stations was soon to remove broadcasting from the control of any state government.

However the Government was keen to go on air, and in July 1925 accepted AWA's quote for the 500 watt transmitter.

In some haste a studio was fitted out on the second floor of the Executive building in George Street, heavily draped and carpeted and housing the microphone amplifier.

A small wooden building was provided for the transmitter in a courtyard in the centre of the Executive building. The aerial was to run vertically from this to a horizontal section supported on two poles on the top of the main building. The complete aerial was thus T shaped and the two poles raised the top of the T some 40 to 50 feet above the roof. The poles were about 100 feet apart, and a counterpoise was installed on the roof below the horizontal top of the aerial.

At this time parts of Brisbane were still supplied with direct current from the commercial power supply mains at a pressure of 440 volts in the area of the Executive Building. Actually one had a choice of 220 volts positive to ground, or 220 volts negative to ground or 440 volts D.C. not earthed. Because of this, a rotary converter was used to provide the transmitter with the 2 kilowatts single phase 240 volt alternating current supply which it needed. The high tension for this transmitter was 2600 volts with the modulator drawing 110MA and the modulated oscillator 200MA. i.e. the DC anode input was 520 watts. The aerial power must have been considerably lower than this.

AWA despatched one of their installers, S. M. Newman, who had the small transmitter ready for operation in about three weeks.

On Monday, 27th July 1925, at 8PM, W. N. Gillies, now State Premier, officially opened 4QG and regular public broadcasting began in Queensland.

A local newspaper described the opening broadcast as disappointing.

At 7.50PM the announcer, Norman Cooling, opened the microphone and said "Hello, Hello, station 4QG Brisbane, Queensland Radio Service; stand by for the tune in signal". A high pitched buzzer then sounded for a short while, followed by two test records. The announcer apologized for being unable to bring listeners the Tivoli Theatre Orchestra as arrangements had not been completed, and then at 8PM the Premier opened the station.

4QG was "on air".

The remainder of the program until close down at 10PM consisted of local singers and instrumentalists and gramophone records direct from the studio.

Meanwhile the new "big" station was under construction.

Robinson was apparently a man of many parts and in conjunction with the State Public Works Department officers, designed the new structure on the roof of the Queensland State Insurance building to house the technical, administration and program departments.

The new station accommodation was in effect the eighth floor of the building and was built in the latter half of 1925. It was 120 feet above the corner of George and Elizabeth Streets.

A Brisbane firm, Harvey Brothers, had the job of erecting the two aerial support towers on the building. The towers were square in section, steel lattice, self supporting and tapered. They were 100 feet high and 127 feet apart and each one had a 17 feet long crossarm at its top, to the ends of which the aerial wires were attached.

The towers were erected in November and December, and the studios and transmitter hall were ready for equipment installation by the beginning of 1926.

The aerial wires were hoisted into position on the towers one Sunday morning in January 1926, to avoid traffic in George Street.

On 31st Dec. 1925, AWA despatched the transmitter from Sydney in the ships "Monara" and "Mildura". By 12th January, AWA's installer R.C. Humphreys was on the job. J.B. (Joe) Reid followed soon after but Newman was ill and did not participate. Local technician L.S. Jefferies whose parents were the main building caretakers, assisted.

In February and March a studio was equipped in the premises of the Council of Agriculture in Turbot Street so that first hand farming news and market reports could be broadcast. The Brisbane firm of Trittons supplied the drapes and soft furnishings for this small studio.

By early April the transmitter was ready for testing, and apart from some reservations concerning the microphone amplifiers, Robinson accepted the installation as satisfactory.

So on Thursday 22nd April 1926, the opening program was sent out on the new high power transmitter, and about 3PM the State Premier, W. McCormack made a broadcast speech, declaring the new station officially open.

The accommodation comprised an enquiry office, various administration offices, a large reception hall in the centre of the building, two studios, main transmitter hall with sound proof windows into the studios, workshop, laboratory, battery room and fan room.

The transmitter hall was 23 by 36 feet, main studio 17 by 26 and small studio 14 by 18. The timber used was Queensland silky oak. The battery room housed two main battery banks, one of 720 volts and one of 162 volts. The first provided the high tension supply for the single valve MC1/50 sub modulator, and the latter was the bias supply for the 10 parallel connected MT7B modulator valves.

The transmitter was typical of the practices of the nineteen twenties with a high power self excited master oscillator driving a high power modulated amplifier which was then coupled to the aerial circuit.

The master oscillator comprised two triodes type MT7A connected in parallel with grid excitation derived from a coil inductively coupled to the oscillator tank circuit, connected to give positive feedback and hence oscillation.

The oscillator tank circuit was inductively coupled to the grid circuits of the 4 parallel connected MT7A triodes of the modulated amplifier.

The modulator consisted of 10 triodes type MT7B in parallel, and modulated the power amplifier via a Heising choke circuit.

The handbook - recommended high tension supply of between 8000 and 9000 volts was derived from a 3 phase double star connected rectifier set of six diode valves type MR7A fed from a 415 to 12000 volt AC 3 phase transformer.

One sees from the operating instructions that the D.C. anode input to the modulated power amplifier was 5kW, hence the term "5 kilowatt transmitter" which was the way transmitter powers were specified in those days. Depending on the efficiency of the amplifier which could have been up to 60%, the power to the aerial would have been 2 to 3 kilowatts. The final output energy was inductively coupled into the aerial circuit at a point between the aerial proper and the counterpoise.

Technically the aerial was an "inverted L" used against a counterpoise which was supported on steel pipes, and covered the roof area. The flat top of the aerial consisted of two horizontal cages 2 to 3 feet in diameter with their cage type down leads joining to take the feed out via a large ribbed conical insulator on the roof of the transmitter room.

Photographs show that the free ends of the flat top were insulated from the supporting halyards with twin corona ring rod insulators.

The aerial and counterpoise were reputed to be in quarter wave resonance at about 1 megacycle, but the system was tuned to radiate on a wavelength of 385 metres, equivalent to a frequency of 780 kilocycles per second. The aerial input current was normally 12 amps.

At some time later, before 1930, the frequency was changed to 760kcs.

The frequency was again changed, this time to 800kcs, but the date is uncertain. It was before July 1936 however, as a Research Laboratories Test Report (No. 488) records field strength values measured at that time with 4QG on 800kcs.

The frequency of the station was monitored with a wavemeter and adjusted as required.

The low level studio audio amplifier was supplied by the Western Electric Co. (Australia) and Western Electric, Reiss and Amplion microphones were used.

No electric reproduction of gramophone records was possible at that stage, so a microphone was placed in front of the sound box of an Aeolian Vocalian gramophone in the studio.

Two Western Electric portable amplifiers were provided for outside broadcasts at sites remote from the studio.

Everything requisite for running a large broadcasting station was now in place and the staff began settling into the new routine.

Technical operating staff in those early days were Alf Bauer, Cyril Moran, Harold Oxford, Charles Stephenson, Will Bardin and Alf Jackson. Raymond McIntosh was taken on in January 1927 as station engineer, to work under Stevens, the chief engineer. Stevens left after the takeover by the PMG. He eventually joined the Department of Civil Aviation. Other staff members were (in 1929) R. Wight, Markets officer; H.S. McCallum, Musical Director; T.H. Humphreys, Announcer; L.L. Shiel, Clerk; Mavis McFarlane and Connie Archdale, Typists; Leo McCarthy, Messenger.

An examination of the annual reports of the Queensland Radio Service for the years 1926 to 1929 reveals many interesting facts.

The station carried paid advertising and also had revenue from listeners' licence fees. In one year from 1926 to 1927 the number of licences in Queensland rose from 8,373 to 23,163 and the Q.R.S. showed a profit in its first year of 730 pounds. This rose to 5,334 pounds for the period 1926-27 and was 3,310 pounds in the period 1927-28. During the next year the profit was 5,211 pounds, and the station paid the PMG Department an "A" grade licence fee of 15 pounds per annum.

Initially the hours of transmission were approximately 1PM to 2PM, 3.30PM to 4.30PM and 6PM to 10PM, and totalled some 40 hours a week.

The following years saw additional on air periods added - early morning news and a women's session - and by mid 1929 the station was broadcasting 60 hours a week.

Children's bedtime stories were popular, and some of the story tellers were the Misses Archdale, McFarlane and Waratah, and Messrs Woodland, Tyson and Read (of Reads' Rare Bookshop).

Outside broadcasts were made from the churches, racecourses and theatres as a regular feature, and many interesting special events were covered. Permanent lines were connected to those venues where frequent broadcasts were made. By 1930 some 75 private lines were rented.

It is interesting to note that the QRS, the Australian Broadcasting Company and the Australian Broadcasting Commission all used the Brisbane GPO private mail box 293E up to 1983 when the Australian Broadcasting Corporation was created and a new box number obtained. The arrival of Hinkler at Bundaberg and Kingsford Smith at Eagle Farm were highlights. The Melbourne Cup was relayed via short wave as no interstate lines were available for program transmission in those days.

The visit of the Duke and Duchess of York (later King George VI and Queen Elizabeth) and highlights of the Royal National Association show were covered, and during 1928/29 a Test Match between England and Australia was broadcast from the 'Gabba cricket ground.

At one time special time signals were broadcast to assist the field staff of the Surveyor General.

In 1929 station staff helped to equip a Qantas plane, the "Atalanta" with radio before its search for the missing aviators Anderson and Hitchcock. Stevens the chief Engineer went along as radio operator. On its next search for the airmen Moir and Owen missing in the Northern Territory on route from England, the QRS Director Robinson went as operator. The pilot on these flights was Capt. L. Brain.

However, the halcyon days of State Radio were numbered and already in December 1928 the Commonwealth was considering the acquisition of all "A" class stations and began negotiations with the Queensland Government early in 1929. It was proposed to buy the technical equipment, but the studios and other accommodation would be leased.

By July 1929, the Queensland Government was exchanging correspondence with a commercial firm, The Australian Broadcasting Company Ltd of Sydney through S. F. Doyle its managing director. This company had been formed by Sir Benjamin Fuller and C. F. Marden was its general manager. It was proposed that this company should take over all program provision in the A class stations and at the same time the Postmaster General would take control of the technical aspects of the stations.

Lists of equipment and valuations were prepared and the Broadcasting Company took control of the studio operations on January 31st, 1930.

At the same time the Postmaster General assumed control of the technical services and the National Broadcasting Service was officially inaugurated.

According to a report in the magazine "Wireless Weekly", the new service began with messages by the Postmaster General (Hon. J.H. Lyons), the Premier of Queensland, (Hon. A.E. Moore) and the Chairman of Directors of the Australian Broadcasting Company, Stuart Doyle. A musical program was presented by the National Broadcasting Orchestra and the A.B.C. Mouth Organ Band. Hilda Lane, Harry Collins and Cecil Woodland entertained with songs and comic sketches. Finally the Brisbane Trocadero Dance Orchestra played until close down at 11PM.

On the following afternoon the B.A.T.C. race meeting was broadcast from Albion Park and a Sheffield Shield match was described. In the evening there were descriptions of racing from the speedway and the velodrome. At night listeners were entertained by comedians Monument and Harrow, Dorothy Sanders and Hilda Lane sopranos and comic sketches by Harry Humphreys and Harry Borrowdale.

On the Sunday there were church services, band recitals from the Botanic Gardens and Wickham Park and in the evening a piano recital by Hilda Woolmer.

Officers of the Transmission Section of the PMG Department in Brisbane took over the operation with A.J. (Arthur) Clark as the first Foreman Mechanic in charge. J.R. (Jim) Hutchison was the Divisional Engineer and S.J. (Sam) Ross the Supervising Engineer.

For the next 12 years the station remained in the State Government Insurance Building (which became in 1933, the State Taxation Building) and during this period many PMG men spent time on the maintenance staff. The list is long and may not be complete, but the following are known to have served there: Vern Kenna, Bill Rohde, Bert Cowling, George McFarlane, Vince Henderson, Jim Todd, Snow Hendry, Blue Hamilton, Hughie Thain, Nat Gould, Ralph Bongers, Harold Oxford, Dan Baxter, Gordon Booker, Geoff Beetham, Reg Baker, Jack Loth, George Carrier.

Some time after the takeover, major modifications were made to the transmitter. The four MT7A air cooled triodes of the power amplifier were replaced by a single water cooled high power triode type 4220C. The installation was performed by Roy Fergusson and George Olsen. Some other minor changes were made to give better modulation depth. The reason for these changes is obscure, but it is likely that availability of MT7A valves may have prompted the move. The cooling water for the 4220C was contained in newly installed tanks on the roof and the Brisbane PMG Workshop supplied the distilled water which circulated at the rate of about 5 gallons a

minute. Visitors to the station were often entertained by the arcs which could be drawn by a pencil held in the hand and touched to certain metal parts of the transmitter.

The frequency of the master oscillator was rather unstable and required frequent correction using a wavemeter as a reference. Control of frequency by quartz crystal had not yet come to 4QG.

A Research Laboratories Test Report, No. 26 of November 1931, records calibration checks on a Cambridge wavemeter No. L13544 from 4QG. With care, it was possible to read the frequency with no more than 150 cycles uncertainty.

By the mid 1930's it was apparent that any new, possibly high powered transmitter for 4QG should be installed out of town, and to this end a site at Bald Hills, 11 miles north of the city was selected in 1935 by a survey team from the PMG Research Laboratories Section, Melbourne. The site remained undeveloped until the early 1940's when the military situation required the transfer of transmitters out of the city.

Meanwhile 4QG studio and transmitter continued to operate from George Street.

The Australian Broadcasting Company had the option of a 3 year term, but in the end their national monopoly did not run for the full time. In May 1932 the Government enacted a bill for the creation of the Australian Broadcasting Commission and the new organization began operations at 8PM on Friday 1st July 1932.

The bells of Sydney GPO chimed out on relay to 4QG and the 11 other National stations, and the announcer Conrad Charlton said "This is the ABC".

In the middle 1930's there were only about fourteen people on the ABC studio staff in Brisbane. Harvey Humphreys, later a Studio Supervisor, recalled that when he joined as a messenger in those days Monty Anderson was Chief Announcer, Bob White was Assistant Manager and Huck Finlay was State Manager.

By modern standards, 4QG in the thirties was of comparatively low power with a somewhat inefficient aerial, but it had a respectable service area never the less. Other stations were few in number and man made electrical interference was low, so that even a small signal was useful.

There are records of two field strength surveys made in those days. H.R. Adam's Research Laboratories' Test Report of April 1934 gives eight spot measurements made by Arthur Bensley in the Brisbane suburbs. The exact sites are not identified precisely, only the suburb, distance and direction being given. The mean of these readings gave a field strength of 340 millivolts per metre at 1 mile with an estimated power of 3.4kW in the aerial. This would give a figure of merit of 206 which seems high for this aerial. The operating frequency was not stated but may have been 760kcs.

The second recorded survey was made in July 1936 with 4QG on 800kcs. The Research Labs Test Report No. 488 was written by Alex McKenzie who presumably made the measurements. Commercial stations 4BH and 4BK were included in the survey, which was done primarily to determine the ground conductivity in the Brisbane region. The aerial current was quoted as approximately 10 amps and the plate input to the final as about 3,000 watts. It is known that the aerial resistance at 800kcs was 22 ohms, so the aerial power was about 2kW.

Eight measurements were made close to the transmitter, between one and three miles, and the mean field was 212 millivolts per metre at 1 mile. This gives a figure of merit of 150 which seems to be a more realistic value for the aerial.

The field strength set for the second series of tests was an STC model with a loop aerial mounted on the roof of a car.

The average value of conductivity in the Brisbane region was then calculated from the survey readings as 5 milli-Siemen metres, expressed in the report as 0.5×10^{-13} E.M.U., the style in vogue at that time. This compares well with the presently accepted value of 4 to 5mSm derived from many detailed modern measurements. Some field strength values in millivolts per metre measured in 1936 were:

Beenleigh	6.10 mV/m
Coolangatta	0.71
Caboolture	1.30
Ipswich	4.30

Gatton	0.56
Warwick	0.17

The audio frequency response of 4QG overall was not very impressive, being 6dB down at 50cps and 4.5dB down at 5kcs. At a modulation depth of 80% the distortion with an input of 400cps, was about 7%. Routine tests began in 1939 with the acquisition of a noise and distortion measuring set.

Towards the end of the thirties, 4QG's metropolitan monopoly was broken and a new national station joined the NBS in Brisbane. It was proposed that this station would be a regional relay for the Sydney originated National program and would have the call sign 4BR, no doubt for "Brisbane Regional". This was changed to 4QR by the time of opening and the relay proposal did not eventuate.

A studio with control room was set up in the South Brisbane School of Arts Library building next to the old dry dock and local programs originated here.

The official opening of the new station was held at the Belle Vue Hotel in George Street, on the evening of Friday the 7th of January, 1938. At 8PM the Postmaster General, Senator McLachlan spoke from Melbourne, then W.J. Cleary the chairman of the ABC gave the opening address from the Belle Vue. This ceremony was also broadcast on relay by 2BL and 3AR.

The official table in the sun room of the Belle Vue was decked with roses and featured as a centrepiece, a model of the new 4QR tower with a red light at the top.

Several ABC officials had come from Sydney for the occasion, including the General Manager C.J. Moses, the Controller of Productions F. Clulow, the Federal Superintendent of Broadcasts T.W. Bearup, the Federal Controllers of Music W. James, Talks B. Molesworth and Programs Dr. K. Barry.

Queenslanders present included the ABC Queensland Manager A.N. Finlay, Mr and Mrs Jose, the Robert Dalley Scarletts, Archbishop Duhcg, L.D. Edwards the Director of Education, Professor Alcock and J.B. Chandler.

Musical programs were presented by the Mastersingers' choir and the ABC (Brisbane) Orchestra, the former from the School of Arts Building in Ann Street and the latter from St. Luke's Hall in Charlotte Street. The pianist with the orchestra was Hilda Woolmer.

The transmitter had been ready for use by 24th December, but due to the Christmas holidays, the opening was delayed until January. The installation had been done by Roy Fergusson and Jack Loth.

The transmitter was of STC manufacture and in its fully developed condition was capable of 2kW output. Initially it came on air with 500 watts into the aerial.

The RF lineup was a 6C6 crystal oscillator followed by a 4061A 1st separator, a 4242A 2nd separator, a push pull 4242A grid modulated stage and a final linear amplifier using four 4279A triodes in push pull parallel.

The audio chain comprised two 6C6 pentode stages driving a 4242A triode modulator. Six 872A mercury vapour rectifiers gave a final high tension of 3,000 volts.

A sample of the modulated output was rectified and applied as feedback to the cathode of the 1st audio amplifier.

The performance figures of this transmitter were very creditable with a distortion of 2.5% at 96% modulation depth and an overall audio frequency response of +/-2.5db from 35 to 10,000cps.

Overmodulation was prevented by the use of two gas filled diodes in the anode circuit of the modulator. In 1938, the 4279A triodes were the largest air cooled valves in use in Australia.

Until its removal to Bald Hills, 4QR ran at 500 watts on 940kcs. The output to the aerial was carried on an 80 ohm coaxial cable.

The 4QR aerial was a vertical self supporting lattice steel tower 182 feet high, erected on the roof of the Central Automatic Exchange building in Elizabeth Street. A PMG schedule for the tower was issued in 1937 but the maker is uncertain. A similar tower for 5AN Adelaide was manufactured and erected by one Miller, working to STC drawings prepared in England. It has been suggested that Sidney Williams erected the 4QR tower but this

has not been confirmed. There is a Johns and Waygood drawing for some modifications to the base steel work dated 4.11.37 but this company has no records relating to this tower.

After 4QR was moved to Bald Hills, the tower was dismantled in 1942. It was re-erected in 1949 by Frank Hickey and carried microwave radio parabolas for the Brisbane to Southport trunk telephone system. In 19 it was again removed and re-erected at Point Lookout on Stradbroke Island where it supports radio telephone aerials.

The transmitter at Central Exchange was unattended with PMG technical staff available from the new metropolitan studios in Penneys Building in Queen Street, as required. Vince Henderson frequently attended to the morning manual start up procedure.

In 1940 a mains voltage regulator was fitted and in 1941 a 3-phase alternator direct coupled to a Ford Model B petrol engine was installed as an emergency mains supply. This was similar to one installed in Penneys for the studios.

The new studio in the South Brisbane Library was used initially for 4QR programs, but on the installation of facilities in Penneys, the 4QR control was transferred and the South Brisbane studio used for music and Drama only. The first broadcast of the Queensland Studio Orchestra under its conductor W. Nelson Burton was made from the large dance hall adjoining the studio and this hall was to be the home of this orchestra for many years.

Both QG and QR continued to operate from their city locations until, as previously mentioned, both were transferred to Bald Hills during the war. The desire to remove the tall masts from the city apparently arose from the establishment of General Macarthur's HQ in the AMP building in Queen Street, when it was thought that the towers could be used as markers in any possible aerial attack by the enemy.

Vern Kenna, Divisional Engineer of the Broadcasting Installation at that time, received urgent instructions to prepare for the early move of both stations, and with Alf Howard of the Brisbane Drafting Section immediately began the design of a vertical aerial for erection on the National site at Bald Hills.

A quantity of steel pipe used for the casing of artesian bores was found in a city warehouse and a 262 feet high pipe mast was erected by radio linemen early in 1942.

The pipes were 18 to 20 feet long and were screwed together. The lower sections were of 8 inch diameter, while the upper sections were 6 inch. The complete aerial was assembled and laid out horizontally and attached to a vertical jury mast of ironbark, 70 feet long. The anchor blocks for guys had already been installed and carefully the whole aerial was erected and the guys secured. The mast was guyed in four directions at six levels with the top 22 feet unsupported. Erection time was about four hours.

This aerial was lit with two red lights at the top for aircraft warning. The base insulator was about 8 feet above the ground at the top of a steel frame. Within this frame was a metal cabinet to house the coupling components. At 940kcs, the mast was just over a quarter of a wavelength high. Its earth system consisted of 120 radials each 260 feet long. The base resistance at 800kcs was 28 ohms.

Within a short time the first stage of a new main transmitter building was ready for use and at that time arrangements to lease an old broadcasting site, building and aerial from commercial station 4BH, (Broadcasters Australasia Pty Ltd) were completed, at a place known as Fischel's Jam Factory on the Brisbane side of Bald Hills. The broadcast site was obviously adjacent to the factory.

The old 4BH aerial was a T structure i.e. a vertical wire with a horizontal top. The type and dimensions of the earth mat do not seem to have been recorded. The supports were wooden, with four guys at each of three levels. The single wire down lead was constrained with a rod insulator with two anticorona rings, anchored to ground just outside the transmitter building. The resistance at 800kcs was not recorded, but was 18 ohms at 940kcs. A large white, stepped, porcelain insulator led the transmitter output through the wall to the base of the down lead. The building as seen in contemporary photographs, was of wood and sheets of asbestos cement.

This site was to house a locally constructed 500 watt transmitter which was to operate as 4QG and at times, 4QR, after both stations had been moved out of the city.

This 500 watt transmitter used two spare triodes type MT7A in the final stage, and was eventually used as the driver for the 5kW stage built later. This used two water cooled triodes, probably 4,220C at 3,000V from six MR7A rectifiers.

The scene was now set for the proposed moves.

The 4QR 2kW unit had to be dismantled, trucked to Bald Hills and reassembled as rapidly as possible to minimise off air time. Accordingly a careful schedule of actions was drawn up by Arthur Clark and all involved had an assigned part to play.

As the last bars of the National Anthem died away on the 23/3/42, the main breaker was pulled and the man with the safety key inserted it in the transmitter door lock ready to open the cabinets. As the key was turned it twisted off in the lock to everyone's dismay. A.J.C. was not a man to see the humour of the situation and the staff set to to remove the doors by other means.

The dismantled cabinets were lowered from the top floor of the Exchange via the equipment cathead to the truck waiting below in Arcade Lane behind the Commonwealth Bank. In the new building at Bald Hills the transmitter was reassembled and wired for action. Permission had been obtained to be off air until midday on the 24th, but actually the equipment was ready and could have been on air for the beginning of the morning session.

A very difficult operation had been successfully performed, and 4QR was now operating at 500 watts into the new vertical pipe aerial.

4QG's transfer could be taken at a less hectic pace, as the homemade transmitter at the Jam Factory site was made ready first. The transfer of operations from the city transmitter was made on 16th April, 1942.

Both city towers could now be dismantled.

Claude Faragher, Deputy Director PMG Department Queensland, advised the Under Secretary of the Department of Public Works on 21st May 1942 that M.R. Hornibrook Pty Ltd was dismantling the old 4QG towers, but that it was proposed to keep the transmitter functional for emergency use and erect two small pipe masts about 50 feet high as an emergency aerial. It does not appear that this proposal was proceeded with and it is believed that parts of the transmitter were used to build a 5kW linear amplifier to increase the power at the Jam Factory site. The fate of the old 4QG towers is not known, but as mentioned previously, the 4QR tower was stored for future use.

People involved in the shift from the city and the construction of the 500 watt and 5kW units included Arthur Clark, Jim Todd, Dan Baxter, Otto Burmester, Bert Williamson, Arthur Burton, Tommy Tucker, Vince Henderson, George Richards and Cec Morris. The pipe aerial was more efficient than the T and as 4QG was considered to be the more important transmitter, the stations were interchanged. 4QR on 940kcs was operated on the 500 watt transmitter at the Jam Factory site and 4QG was given the pipe aerial and an increase in power to 1kW on 800kcs at the main centre, Bald Hills.

A survey by Col Elworthy and Neil Scott in July 1943 showed that the pipe aerial had a figure of merit, at 800kcs, of 175 millivolts per metre at one mile for a kilowatt input, while the T aerial at 940kcs had a figure of merit of 120.

When the 5kW linear amplifier was built at the Jam Factory site, 4QG was returned to this transmitter on 7th September 1943 and 4QR resumed at Bald Hills on 1kW. The power of this STC transmitter was finally increased to 2kW on 25th October 1944. The transmitter was connected to the pipe aerial via 380 feet of armoured, air dielectric coaxial cable with a characteristic impedance of about 80 ohms.

All powers quoted for the STC transmitter are RF output power. The 5kW locally built unit had an anode input of the final stage linear amplifier of that power, but the RF power to the aerial was less than this.

An emergency engine generator set of 22H.P. was installed at the Jam Factory site late in 1943, an operation in which Clarrie Boettcher was involved.

When 4QG was eventually transferred permanently to the main Bald Hills building in 1948, no further use was made of the old site and the lease was terminated in December 1949. Before this transfer to the main building was possible, considerable installation work was necessary.

As a preliminary, the 4QR 2kW STC was moved across the floor to a central position, leaving space for a new 10kW transmitter between it and the south wall, just outside the Supervising Technician's office. The new unit was expected to be 4QG.

This new transmitter was made by STC with the type number A880D. The separate units were delivered by road transport, so avoiding costly packing. This would probably have been one of the last of the 880 series as the next 10kW Bald Hills transmitter delivered in March 1948 was a completely new type, 4SU-11A, featuring high level anode modulation of the final stage.

The valve complement of the A880D was crystal oscillator 4061A pentode, amp 4061A pentode, 1st buffer 4282B tetrode, 2nd buffer 4282B, mod amp 4282B, 1st RF linear 4279Z, final amplifier two parallel connected water cooled triodes type SS1971. The EHT rectifier used mercury vapour diodes type 4078. The audio section comprised two 4046A pentode stages driving a 4212E modulator which provided low level anode modulation to the mod amp.

Two pumps in an adjoining room supplied pure cooling water for the final valves. The average life of these water cooled valves was found to be 4,500 hours. This transmitter went into service as 4QR, the new unit 4SU-11A being given to 4QG. An A880D was also in use at 2BL Liverpool and its operators there were dissatisfied with its distortion performance. Problems were evident in the drive to the final stage and after considerable experiment, the penultimate linear driver was converted to a cathode follower. There is no evidence that a similar modification was done to 4QR.

A great deal of installation work was being done in these years and it is difficult to determine accurately who were involved in particular installations. However it is known that the following were involved at various times: Geoff Beetham, Otto Burmester, Bob Browne, Mick Pike, Clarrie Boettcher, Bill Graham-Wilson, Arthur Burton, Bill Grambauer, Ian Byrnes, "Doc" Hadley and Dave Laing.

In May 1947 an estimate for the provision and installation of the new 10kW was prepared, and the transmitter, type 4SU-11A was delivered by STC in March 1948, by road transport.

The colour scheme was a departure from the traditional black and silver grey. It was an orange colour known as "Corio Sand" and this proved to be the standard STC livery for many years.

The factory tests were made in Sydney by Vern Kenna, Divisional Engineer Broadcast Installation Brisbane in October 1947 at a frequency of 940kcs, as at that time it was still intended to use this transmitter for 4QR.

The valve lineup for the 4SU-11A was crystal oscillator 6V6G, isolator 6V6G, buffers 807, driver two TG10's in push pull (later changed to 5T30) and final stage a push pull pair of air cooled 3J221E triodes (Later changed to TBL12/25). The audio section was push pull throughout using 6J7G, 6V6G, 3C/150A, TG/10 (later changed to 5T30) and 3J221E (later changed to TBL12/25).

Minor HT used 872A mercury vapour diodes and the 12,000 volt EHT used 4078Z mercury vapour diodes. These were later changed to stacks of silicon diodes. This transmitter remained in use as 4QG and the A880D continued as 4QR until a new 10kW transmitter type 4SU-64 was installed for 4QG in February 1963. The watercooled A880D was removed and 4QR operated on the 4SU-11A until a new 50kW 4SU-38 was ready in May 1963.

Both 4QG and 4QR began operation on 1st September 1948 using the new dual frequency vertical radiator. This was modified in 1963 to allow 4QR to go to 50kW.

In July 1960, an STC 2kW transmitter type 4SU-16C recovered from 4QN Clevedon, was installed by Gordon Gilbert at Bald Hills and 4QR operated from this unit for some weeks while extensive rewiring of the 4SU-11A took place. The original rubber insulated wire had deteriorated due to heat.

The final arrangement of transmitters is 4QG on main 4SU-64 with the 2kW 4SU-16C as standby, and 4QR 50kW main 4SU-38 with the 10kW 4SU-11A as standby.

The valve lineup of the 4SU-64 is 6V6G's for isolator and buffer, 807's for second buffer, a pair of 4-125A triodes for RF driver and three triodes type 3x2500A3 in parallel in the final. The audio section is push pull, EF37A first audio, 4-125A first driver, 4-125A second driver and a pair of 3x2500A3 triodes for the modulator. The EHT

rectifier is silicon diode. The valve lineup of the 50kW was 6V6G's and 807's for isolator and buffers, 3C/150 and 3J/192E for drivers, with three 3J261E's in parallel in the final. The audio is push pull throughout and uses 807's 3C/150A's, 3J/192E's and a pair of 3J261E's for the modulator. EHT is from a silicon diode stack.

In 1981 the modulator and P.A. values were changed to TBL12/25, a readily obtainable and lighter weight Philips type. These have proved very reliable and effective. It had been hoped that 4QG would have been increased to 50kW also, to match 4QR, but current policy is not to operate any further stations at this high power level.

On 28th July 1985, a barbecue and open day was held at Bald Hills to mark the occasion of the 60th anniversary of the opening of 4QG by the Queensland Government in July 1925. Two old timers, Harold Oxford and Leo McCarthy who joined the service in 1926 were present as well as more recently retired officers such as Gordon Hall, Vince Henderson, Col Hattersley and an ABC retired studio supervisor, Harvey Humphreys who had joined in 1934.

4QR and its standby were modified in February 1987 to operate with stereo modulation although so far the ABC program has been derived from a synthetic stereo unit rather than a fully stereo equipped studio.

4RK GRACEMERE

Although the Queensland Government had obtained a licence in 1924 to build a station in Rockhampton, it had not accomplished this before the formation of the National Broadcasting Service had removed the Government from further active interest in broadcast station operation.

In fact the station was built in 1931 by staff of the PMG Department in conjunction with the equipment suppliers Standard Telephones and Cables, as by this time the Postmaster General was responsible for all stations of the new National network.

This was the beginning of STC's involvement with the NBS, an effective association which was to last for the next 50 years with the supply of some 40 transmitters to Queensland and Papua New Guinea.

The siting of the station on a low hill at Gracemere 6 miles west of Rockhampton is sight of the city seems obvious enough to the casual observer, but was no doubt the result of a field investigation by officers of the Melbourne Research Laboratories of the PMG Department. Part of the historic Gracemere cattle station had been subdivided in 1920, and a 12 acre block was bought for the new station.

The transmitter building was in typical Queensland style, a low set bungalow of timber with a tiled roof. It was set back from the road nearer the crest of the hill at the end of a gravel drive. At the front gate a house for the Foreman Mechanic was erected, also in timber. Both buildings are still in use, the latter having been occupied by station staff since the beginning. The transmitter building however, is not quite in its original form, some additions and internal modifications having been made over the years.

The T type aerial erected adjacent to the building was suspended between two tapered self-supporting steel towers 128 feet high. These were supplied by STC and had been designed by C.F. Elwell of 197 Queens Gate Road, London on a drawing dated April 1930. The towers were assembled on the ground and erected by jury.

The horizontal part of the T aerial was 60 feet overall and consisted of four parallel wires spaced 6 feet apart.

The earth mat for this aerial was composed of 95 parallel copper wires spaced 3 feet apart, each 180 feet long, buried below and at right angles to the flat top.

The base impedance at the original frequency of 910kcs was 12ohms and the transmitter supplied between 1.5 and 2kW to this aerial.

The STC transmitter, one of the first in this country to be crystal controlled, was installed by PMG Department staff with contractor supervision. The installation team was Les MacDonald, Harry Conway, Fred Emerson, Roy Ferguson, George Coley, Bert Jack, Ian (Blue) Hamilton and Nat Gould. The STC representative was Claud McQuillan.

This equipment represented an intermediate stage in the development of large broadcast transmitters, with direct current for filaments and anodes supplied by motor generators rather than the more conventional transformers and rectifiers. The transmitter was mounted within a metal cage about 8 feet square with black, polished front panels on which were meters, adjustable controls and switches. The motor generators were installed in an adjoining room which also contained the motor driven pump supplying cooling water for the valves of the power amplifier.

Filament supply at 24 volts DC and grid bias of 250 volts DC was obtained from a single motor, two generator set, while the high tension supplies at 800, 1600 and 4000 volts DC were obtained from another single motor two generator set with the double wound armatures connected in series. Two complete suites were provided for main and standby operation. This room was known as the "machine room".

Low level program amplifiers were rack mounted in the "amplifier room" with their batteries in a "battery room" next door.

A small repair room was also provided and an equipment spare parts store. There was no office or staff room, although the repair room was used later as an office.

Water supply was from rainwater tanks. The crystal controlled oscillator operating at 910kcs used two valves, 4102D and 4012A. This was followed by a class B separator 4242A, driving the modulated amplifier, a class C 4212D. Heising choke anode modulation was obtained from a class A modulator, 4212D driven by a speech amplifier 4211D (or MC1/75).

The mod amp was followed by a class B linear stage of two 4212D in parallel, and this drove a parallel pair of 4228A water cooled triodes giving 2kW for the aerial. A sample of the modulated output was rectified by a 4211D to provide audio monitoring.

All valves were triodes with DC filaments. To equalize emission, the direction of current flow in the filaments of the final valves was reversed daily.

A control desk equipped with a General Radio modulation monitor was situated facing the transmitter, and in the amplifier room with its three racks of audio and test equipment, was a studio desk fitted with a microphone and two turntables. The electric "pick ups" were Western Electric oil damped units using steel needles. It is not certain whether the control and studio desks were provided on installation or somewhat later. Existing photographs show a type 633 microphone which is certainly not of 1931 vintage. If a microphone was supplied initially it would probably have been an early condenser type in a wooden box with a 4102D amplifier, as this was typical of studio equipment at that time. It is believed that the GR mod monitor, type 731A, was installed in 1935.

Opening day finally arrived and at 8PM on Wednesday 29th July 1931 the great event took place.

It was held in the School of Arts and the official program for the evening shows that the local Musical Union Choir, assisted by the Rockhampton City Band, sang the National Anthem and "Advance Australia Fair", to open the proceedings.

Sir Benjamin Fuller, Vice Chairman of the Australian Broadcasting Company introduced the speakers - Hon. A.E. Green, Postmaster General; Hon. Frank Forde local M.H.R. and Minister for Customs and Alderman T. Lee the Mayor of Rockhampton.

Others present included Harry Brown the Director of Posts and Telegraphs, J.J. Verney of the Chamber of Commerce and the Anglican Bishop of Rockhampton, F.L. Ash. Vocal and instrumental items were presented by Reg Robertson, R. Cruickshank, George Gardiner, C. Bibby, T. George, Edward Streeton, son of the choirmaster, E.N. and E.H. Symons and Mrs F. Oswald.

The program was relayed to stations of the Australian Broadcasting Company's "network" in other states.

At 10PM, 4RK crossed back to the Brisbane program line and closed at 11PM.

4RK was the first station in Queensland outside Brisbane, where 4QG was operating. In July of the following year, commercial station 4RO was opened in Rockhampton which became the first Queensland town to have two stations.

After some catastrophic events related to accidental high line levels causing damage to valves in the early days, the station settled down to routine operation. In those times with no audio limiters and only one transmitter, station staff lived in constant fear of disaster. Even the depth of modulation could only be roughly gauged by observation of the onset of grid current in the modulator valve. The first officer in charge was Harry Conway who stayed until 1936. In this period, the station surroundings were improved and an avenue of pine trees was planted between the street entrance and the transmitter building. Half a century later, they are a fine sight and a monument to those early station operators.

In November 1933, H.R. Adam, an engineer of the PMG Research Labs in Melbourne, visited 4RK and made a series of field strength measurements to determine the polar pattern produced by the T aerial. The shape was irregular, thought to be due to the steel aerial support towers and the rocky nature of the surrounding country. His Research Labs Report is No.257.

Due to the direct connection of the aerial at the transmitter output, some instability due to the high RF field was troublesome at times, and when a new transmitter was installed, the aerial circuit was altered to permit the

location of the aerial tuning equipment in a metal box at the base of the down lead and to feed this by a transmission line from the transmitter.

An emergency power supply for the station was obtained from a three phase alternator of 33.6kW rating, driven by a petrol fuelled Gardner engine. It may have been installed in 1931, but this has not been confirmed. It was mounted in the machine room but was moved to the north west corner room of the building in 1948.

During 1948 a new transmitter was installed to replace the original STC. This was a 2kW AWA type 4J 5129R, Serial No.7. The valve line up was oscillator 42 pentode, followed by a three stage amplifier using type 807, buffer push pull 805, final parallel push pull 833A. The audio submodulation used two stages of triode connected 6J7G followed by a mod. driver 8003. The modulator used four 833A in parallel push pull. High tension rectifier was six mercury vapour diodes type 872A.

Geoff Beetham supervising technician, with Bill Graham-Wilson and Col Crick went to 4RK in July 1948 to install this new transmitter and dismantle the original equipment.

The old STC transmitter and its motor generators was removed and the emergency engine generator repositioned. This Gardner engine was very large and its shift to the new area in the north west corner of the building was a difficult operation.

The holding down bolts were cut and the engine jacked up and placed on rollers. Using crow bars as levers it was rolled into the new position and jacked up. Then with the aid of some wallaby jacks borrowed from the local line depot the engine was slid sideways along greased wooden beams. The jacks worked against one wall of the building and great fears for the stability of the whole structure beset the 4RK OIC Bert Cowling. However no damage was done and finally the engine was lowered onto its new bolts and secured to the concrete bed block.

The AWA transmitter was installed where the Gardner had been and was connected to the aerial by a run of coaxial cable. For the first time, a coupling box was mounted below the aerial and the coax matched in this with a simple L-C network. This removed the problems which had been present with the direct feed from the original STC transmitter. The old "machine room" floor was built up with concrete and made ready for a new STC 10kW transmitter. The installation team unpacked this but did not install it as no aerial was available at that time for a 10kW output.

This new transmitter had been ordered for the proposed new Longreach site at Cramsie, but was diverted to Gracemere as Longreach was not likely to be established for some time due to various delays with property and building plans.

Proposals to enlarge the scope of 4RK included a vertical radiator and earth mat to go with the new 10kW transmitter, so additional land was required. Two blocks totalling 38 acres adjacent to the site were acquired from John Gilmore and William Thorsen, giving a neat 50 acre rectangular site large enough for the new aerial system. The acquisition was noted in Commonwealth Gazette No. 241 of December 1947.

The station operating frequency was changed in September 1948 from the original 910 to 940kcs.

About this period in the late 1940's, building alterations were made and the present office added on the eastern side. The old battery room area was modified to provide a staff lunch room.

To augment the rain water supply, a bore was sunk in October 1949, 75 feet deep and 8 inches in diameter. Water was tapped at a depth of 50 feet. This supply was in use until 1971 when silting and corrosion rendered it ineffective. A new bore was drilled by "Drill Engineering and Pastoral Co." of Rockhampton and remains in service, although town water was connected in 1978. In 1951, equipment was installed in the recently completed control room and is described in a report by engineer Frank Sharp. The equipment was a mixture of AWA, STC and locally made items and included a new control desk with microphone and gramophone turntable. The installation was ready for use in December 1951.

The new radiator was erected by Johns and Waygood using 5 men, between 6th April and 15th June, 1954. It was sectioned with an inductor at 320 feet with, at the top, at 420 feet, a 30 feet diameter top loading armature, giving an electrical height of 0.56 wavelengths. The base resistance was 86ohms. Frank Sharp adjusted the radiating system.

An earth mat laid by Radio Section line staff, comprised 120 radials each 420 feet long of 200lb per mile hard drawn copper wire.

The figure of merit of the new radiator and the field survey to determine the service area were subject to an investigation by Doug Sanderson and Maurice Palmer in September and October 1954.

The new transmitter was installed by Gordon Gilbert, Ian Byrnes and Col Williams and was put into service on 15th September 1954.

On the 1st September, the station frequency had been changed from 940 to 840kcs, the readjustments being made by Ralph Bongers, supervising technician and Bill Rohde, divisional engineer of the Brisbane office.

As the new transmitter used a 200ohm 6 wire transmission line, a matching unit and switch for the AWA 2kW transmitter was built so that it could operate into either the new aerial or the old. The transmission line to the old aerial was a length of 70ohm coaxial cable.

The valve line up for the 10kW transmitter was oscillator 6V6G, isolator 6V6G, buffer two 807 in parallel, driver push pull TG10 and final high level anode modulated stage of two 3J221E triodes in push pull. The audio chain was push pull throughout. First audio 6J7G, second audio 6V6G, third audio 3C/150A, driver to mod TG10 and modulator 3J221E. The EHT rectifier used six 4078Z mercury vapour diodes, giving a DC supply of 10,000 volts.

These valve rectifiers were replaced in 1975 by silicon diodes. The bias and 2600 volt supplies had been converted to silicon diodes in 1969.

The original rubber insulated wiring of the power amplifier stage deteriorated quickly and was replaced by Gordon Gilbert in March 1962, the unit being at that time about 14 years old.

This large impressive transmitter was painted in what was the standard STC colour at that time, a creamy orange known as "Corio Sand". In October 1963 a 2kW STC transmitter, type 4SU-14C recovered from 4QN, was installed in the transmitter hall and replaced the AWA as a standby. The latter then went to 4QB Pialba which already had a similar unit.

The RF exciter of the 14C used 6V6G and 807 valves, a driver of 3C/150A and a push pull pair of large glass envelope triodes 4279Z. The first two audio stages were 6J7G and 6V6G, followed by a 3C/150A amplifier, 3C/150A driver and 4279Z modulator. All audio stages were push pull.

These two transmitters operated until 1988, with a final frequency change to 837kcs being made in November 1978.

In 1980 the main transmitter TG10 valves were replaced by 5T30 as the TG10's had become hard to get. The large, heavy and expensive 3J221E valves also became scarce and were replaced by a lighter Philips made TBL12/25 in 1984, much appreciated by the operating staff.

4RK remained fully staffed from opening to June 1988.

When the station was established, a studio was built in the Rockhampton Post Office on the top floor. The equipment was similar to that used for emergency purposes at the transmitter. There were two gramophone turntables and a condenser microphone. The amplifiers were battery powered. At that time there were two news services daily with cattle sale information from the Gracemere saleyards. George Gardiner was the announcer. Subsequent moves took the studios to their present location in Quay Street.

A recent event of some importance was the Golden Jubilee of the establishment, held on 29th July, 1981. The local ABC staff were enthusiastic and gave the event much publicity. A Children's competition for the design of a 4RK birthday card was held and on Jubilee Day refreshments were dispensed to visitors to the studio. Records of the early days were played and the staff dressed in old style costumes.

It was open day at the transmitter also, and a barbecue was held that night. ABC and Telecom staff attended as well as several retired officers who came from as far afield as Brisbane. Bill Rohde, Frank Nolan and Ern Venables were present, all having served at 4RK in the past.

A decorated iced birthday cake featuring the old T aerial masts had been prepared by Shirley Sanderson, wife of Senior Engineer Broadcast operations, Doug Sanderson, and families and friends enjoyed an evening of reminiscences. The station had been started that morning by David Long and the other staff members were present at the festivities. They were Merv Hixon, OIC, Don Anderson, Jim Gray and Ray Coombs.

Forty one signatures were recorded in the station visitors book that day.

A good will message was broadcast by John Norgard, Chairman of the ABC. Rockhampton Regional Manager for the ABC at the time was Ralph Elphinstone.

All things change with time and within seven years from the 4RK jubilee, circumstances at the station had changed dramatically. A Broadcast Service Centre was to be set up in Rockhampton and the Mount Hopeful TV site and 4RK were to be operated unattended. The 10kW STC transmitter installed in 1954 and the building erected in 1931 were both showing signs of age and it was decided to replace them. In 1988 then, a small Logan type building was erected behind the original, and a new 10kW Nautel transmitter, type Amphet 10, serial number 235 was installed.

As the new building was adjacent to the terminal tower of the main 6 wire transmission line, a short connection from the new transmitter was possible. At the same time a new coaxial cable was laid from the Logan building to the coupling box below the old T aerial standby, and the matching network renewed. To reduce the high base reactance of the original T, the top loading wires were increased in length. The new base impedance at 837kcs was now $13 - j54\text{ohms}$ and a L-C network was installed to match from the 50ohm coax.

An emergency engine generator was provided in the end room of the Logan. It was a reconditioned Lister diesel which had seen service in the Ascot telephone exchange. The directly coupled Dunlite generator was rated at 35kVA giving a comfortable margin for the two room airconditioners and the 10kW transmitter.

So 4RK in its 57th year has moved into new quarters and its fifth transmitter and is set for another long run, operating now 24 hours a day.

4QN

CLEVEDON. "OLD QN".

The expansion of the NBS into Queensland country areas began with 4RK Rockhampton in 1931 and was followed by 4QN Townsville in 1936.

Little is known of the survey team who drove out along the sandy track winding its way between clumps of pandanus and skirting the tidal salt flats. Somewhere between Clevedon railway siding and Cape Ferguson and clear of the open wire phone line to the Cape Cleveland lighthouse, they set up a portable transmitter with a small engine-generator set and a T aerial on two wooden poles. The transmitter power is not known but the frequency used was 600Kcs, which was the frequency on which 4QN eventually opened.

If the idea was to give reliable broadcast coverage to Townsville, Charters Towers and Ayr - Home Hill with at least reasonable daytime service to Proserpine and Cairns, then the coastal area between Townsville and Ayr was the logical choice. Bearing in mind that the maximum available transmitter power at that time was no more than 7 kilowatts, geography dictated the site, and the open, low lying coastal plain between the Mount Elliott ranges and the sea was the inevitable choice.

The decision to use Clevedon was made with considerable misgivings and the survey team would have preferred a more civilized area just north of the small sugar town of Ayr where mains electricity at least, would have been available. But to serve Townsville from there would have required the then unheard of power of 40 or 50 kilowatts in the aerial.

Other stations down south such as 2CR Cumnock and 3WV Doon were to be established around that time with no Commercial electricity either, so Clevedon it was and the decision resulted in one of the most interesting stations ever to be built in Queensland.

The unusual nature of the Clevedon site was due to several factors, mainly:

- a) its physical isolation from centres of population.
- b) all staff members lived in close association on the station property.
- c) power for the station community was generated locally.
- d) it was close to excellent fishing and crabbing spots and the long white beach of Bowling Green Bay was a mere 3 miles away through the bush.

The first two factors were not always conducive to harmonious relations, but the fourth factor was a great compensation for those obliged to live in this isolated place.

Work began on the new station in 1935. A block of ground of 30 acres was obtained from a local grazier named Carty, three miles north of the Clevedon rail siding along the ill defined "road" to the Cape Cleveland Peninsula. It was part of Portion 4V, Parish Etrick, County Elphinstone.

The site was flat with sandy soil and at the rear of the mast paddock only just above the high tide level of mangrove lined Crocodile Creek. The eastern frontage along which the station buildings were erected faced into a low scrub of wattle, eucalypt, banksia and pandanus which continued unbroken to Salmon Creek and the main beach.

The "road" continued on northwards four miles, winding around bogs and across salt pans to the base of the high rocky hills of the Peninsula. Here the sandy beach fronting the coastal plain ended in rock edged bays abounding with oysters and fish. For reasons now impossible to determine, the favourite spot frequented by off duty 4QN staff became know as Ticklebelly Bay, a name which unfortunately has not penetrated to the drawing offices of the National Mapping Authority. Here, 50 years later the Australian Institute of Marine Science research station is set up and the area is known correctly but unimaginatively as Cape Ferguson.

The then Department of the Interior arranged the design and erection of the main transmitter building, garage block, two houses for married staff and one for single men. These occupied the eastern edge of the property and when later coconut palms and street lights were added, Coconut Drive became the main street of the settlement.

Those prewar houses of a more spacious age were generously proportioned low set timber structures with wide verandahs. The brick walled transmitter building was set on a concrete base with a wide, covered patio on three sides. The roofs were of corrugated asbestos cement.

The transmitter building accommodated the transmitter, control desk, program input equipment in a separate screened room which doubled as an emergency studio, battery room, store and the engines and switch board.

A small adjacent brick building housed the radiators and fans for the engine cooling water.

The transmitter was supplied by STC and was rated at 6.25 / 7kW. If operated at a carrier power of 6.25kW the modulator was capable of developing 95% modulation depth, but if the carrier power was raised to 7kW, modulation depth could not exceed 90%.

The valve line up in the RF department was crystal oscillator 4033A, isolator 4211E, push pull buffer 4211E, push pull modulated amp 4211E, push pull first linear 4015A and push pull final linear 4220B water cooled triodes.

The modulator was 4015A, with Heising modulation to the anodes of the mod. amp.

All valves were triodes, the 4015A being a large glass football sized bulb.

The high tension of 12,000 volts was derived from a group of three water cooled high vacuum rectifiers type 4222A. The 5,000 volt supply for the first linear was produced by a bank of selenium rectifiers as were other low voltages.

The 12,000 volt high tension supply was protected by a fuse in a large porcelain fuse holder. When operated by an overload, this fuse sounded like a rifle shot and was guaranteed to galvanize any late night shift technician into instant action.

The final amplifier was duplicated and knife switches enabled a rapid changeover in the event of failure of the working stage.

The cooling water was fed to the water cooled valves via a coil of porcelain tubing, necessary to insulate the high potential anodes. In subsequent models of water cooled amplifiers, the rather fragile porcelain was replaced by rubber hoses.

The filament supply for the final amplifier was derived from a pair of Scott connected transformers giving 41 amps at 22 volts to each filament, 90 degrees out of phase in order to minimise hum.

A 600ohm water cooled artificial aerial load was supplied and could be switched to the transmitter output for testing.

Heising choke modulation was used in this transmitter.

The Brisbane - Townsville program came to 4QN on open wire, and suitable audio amplifiers were mounted on racks in the emergency studio. The desk in this room was equipped with a gramophone turntable and a microphone, the electric pick up for the 78rpm gramophone records being a heavy oil damped Western Electric, common in the National service in those days.

An audio test oscillator STC type 74013A was provided and mounted on a rack in the emergency studio. The transmission line from transmitter to aerial was of 600ohm impedance and was a balanced 2 wire feeder on wooden poles.

The aerial was unusual. It was referred to as a 3 wire conical and consisted of 3 wires supported by a 500 feet high steel lattice mast. The RF was split in the coupling hut at the base of the mast to feed the 3 aerial wires. Each wire ran from the hut horizontally to a point some 200 feet out, then upwards at a steep angle to the top of the mast where it was insulated. The horizontal runs were equally spaced in azimuth.

The mast was of triangular section, guyed in 3 directions at 4 levels and weighed 30 tons. The guy insulators were large egg type and the guys were clamped rather than spliced. There was an internal climbing ladder and the mast rested on a group of 5 cylindrical porcelain insulators. However these were bypassed by a heavy earth strap.

A winch was provided within the mast near the base and this controlled the 3 steel wire halyards which ran up the mast and over pulleys and connected to the top of the 3 aerial wires. This allowed adjustment of the aerial wire tensions and facilitated the lowering of the wires for inspection if required. Those steel wire halyards had to be greased occasionally and it was a messy, tiring job which had to be done after station close down late at night.

Johns and Waygood erected the mast in November 1935 with foreman Charlie Prince in charge.

Mast lighting chokes were housed in a wooden box between the mast and the tuning hut.

The electrical contractor for the station lights etc., was W.T. Conn of Townsville.

The copper wire earth mat was ploughed in by PMG linestaff to a depth of about 12 inches and consisted of 144 radials each 510 feet long.

Installation of equipment began in the last quarter of 1935. The PMG installation team was lead by foreman mechanic Reg Baker whose staff included Fred Bloxom, Gordon Hall, Bill Gibbs, Tom Knott, Bert Jack and labourer Bert Scott. The STC representative was F.M. Hynes.

Equipment was still being received and installed early in 1936 and the carriers truck often became bogged in the muddy track between Clevedon siding and the station.

In February, severe flooding isolated the station and staff were obliged to supplement their diminishing rations with wallaby shot locally. Supplies eventually came by boat. This was a foretaste of problems due to bad roads and floods which were to plague the station for its entire life.

With no prospect of commercial power mains serving the station, two engine generator sets were installed by the PMG team under the supervision of Bill Gibson, a Ruston and Hornsby man, later R & H Queensland manager. The engine beds were of concrete, the slabs being 17 feet long, six feet wide and six feet deep, insulated from the building floor with blocks of cork.

The original proposal for engine cooling was a drip tower, but this was changed to a closed system with fans and radiators possibly due to an expected shortage of good water in the dry season. The tower was actually built and shows in early photographs dated January 1936. The subsequent change to the fans and radiators necessitated the construction of a small brick cooling building and this delayed the completion for several months, so that it was November before the grand opening of the 16th National station in Australia was possible.

The diesels were six cylinder Ruston and Hornsby type 6VCR, designed for 180 horsepower at 600rpm. They had been built in England in 1934 and were similar to those installed at Cumnock, Dooen and Wagin. They were direct coupled to Brush Electrical Company 3 phase 415 volt alternators type NS72 rated at 133.5kVA, built at the Falcon Works, Wolverhampton. The exciters were by the same company, type 70S, capable of supplying 1.6kW at 81 volts.

Compressed air at 300 pounds per square inch held in two 11 cubic feet cylinders was required to start the diesels. The compressors for this air supply, one to each engine, were belt driven from the main shaft.

A small auxiliary 7 horsepower Lister was provided to run the mast lights, street lights and the after hours domestic load in the staff houses.

In 1937 the main engines generated 300,000 kilowatt hours while the auxiliary provided 5,000kWh.

As the installation drew near completion, STC engineer Claud McQuillan and PMG supervising engineer Sam Ross came up for the commissioning. The man selected to be the station's first foreman mechanic had already arrived. He was Les MacDonald, who stayed at 4QN for its first six years. In the Townsville "Daily Bulletin" on Thursday 26th November 1936, the opening of 4QN was heralded as "the event of 1936". The Theatre Royal was the venue and the station was opened by Harry Brown the Director of Postal Services on behalf of the Postmaster General, Senator A. J. McLachlan.

The ABC's Brisbane Concert Orchestra opened the program at 8PM with a performance of the overture to the Merry Wives of Windsor.

Representing the Commission was the Queensland manager, E.J. Lewis, and Charles Moses, General Manager.

A musical evening followed and the artists included Dan Foley, Tenor, Kathleen Dallon, Mezzo-soprano, J. Robertson, trumpet, Alan McCristal, piano, the Appollo Quartet and George Randall and Bebe Scott.

The program was relayed to southern stations.

A local Townsville studio was installed by Jack Loth on the top floor of Thorpe's Building towards the east end of Flinders Street and early announcers there were Keith Kennedy and Reg Peach. This studio was moved to the AMP Building about 1942 or 43 by Geof Beetham.

The opening ceremonies over, the staff settled into the routine of operating the station.

First of all, survey work to see if the station was fulfilling the designers expectations.

The best time to do field work in North Queensland is in the winter when little rain falls and the ground is dry underfoot. Accordingly a field strength, aerial figure of merit and fading survey was made by Vern Kenna and Bill Rohde in June and July 1937.

The figure of merit was measured as 220 millivolts per metre per kilowatt per mile, a value thought to be rather high for a conical radiator of 4QN dimensions.

Fading observations showed the 50% fading contour occurred around the 1.7mV/m ground wave value, and good reception was reported from Charters Towers, Bowen and Innisfail. Fading at night was experienced at Proserpine and Cairns as would be expected.

About this time the station frequency was changed from 600 to 630Kc/s and Alex McKenzie came up from the Research Labs to supervise. A few towns were rechecked using a different field strength set. Results were reasonably in agreement with those of the main survey. The report on all this field work, No.659, was prepared and issued by Alex McKenzie of the PMG Central Office Research Laboratories Melbourne in November 1937.

Right from the start the problems of too much water in the summer months and too little in winter and the poor state of the road from the Clevedon rail siding became obvious to the inhabitants. Water needed to be carted to the station in dry seasons and flooding often caused isolation during the wets. The station relied on rainwater, as underground supplies were brackish and unsuitable for household use.

As the years passed, problems with water storage tanks, drainage, termites and roads came and went depending on how much money was available at any given time to effect repairs.

The war years brought changes. For security the mast lights were turned off and only used when requested by the aviation authorities. The station buildings were camouflage painted in 1942. Secret code words were issued to stations so that in the event of hostilities certain equipment could be destroyed on receipt of the signal. Shortages of goods of many kinds caused problems. When an alarm clock was needed by the early morning shift staff, a special government form foolscap sized "Application for authority to purchase an alarm clock" had to be filled in and sent to the Commodity Control Division of the Department of Supply and Shipping. It was months before a shipment was expected to arrive from overseas and the meagre file records which have survived from those days do not record whether 4QN ever got its clock. Fuel for the engines was brought in those days by rail to Killymoon siding and by truck from there to QN by Kellocks Forwarding Agency. It was stored in four 1,500 gallon tanks. Before the "wet" it was customary to add an extra 2,000 gallons in 40 gallon drums. This total of 8,000 gallons was sufficient for eleven weeks of operation. By 1945 there were three corrugated galvanized iron tanks with a total capacity of 8,000 gallons and the station had acquired its own fuel tanker - a 1942 Chev 3 ton, 29.4HP truck fitted with an 800 gallon tank. It was delivered in 1944 and was able to bring diesel oil from Townsville.

Over the years the station equipment performed well and gave little trouble. In winter it was found that the engine cooling water was too cool in the early morning and in 1940 bypass taps were fitted to the radiator lines to allow

the water to heat quickly to the preferred operating temperature. In 1942 the auxiliary Lister had a failed con rod and the engine was replaced. A bearing failed in 1947 and a complete overhaul was done in 1949.

The main engines worked well. New cylinder liners and pistons were fitted in 1948, supplied by J.N. Kirby of Camperdown, NSW. Routine overhauls were made by the resident diesel mechanics.

A cyclone in March 1946 forced water into the transmitter hall and damaged the E.H.T. transformer. The station ran on low power, using the first linear RF amplifier only for some time until the big transformer was dried out and returned to service. To minimise the possibility of outages due to any failure of the main transmitter, a 2kW unit was installed in 1947. The installation team was Doug Sanderson Senior Technician and two Technicians, Ian Byrnes and John Talty. As there was no room in the single men's quarters, tents were set up nearby in an enclosure known as Bindii Estate due to the prevalence of these thorny weeds. The transmitter was an AWA type IJ50551 Serial No.3, housed in a neat, grey painted steel cabinet with significant meters along the top, and double doors below giving access to control panels, indicator lamps and minor metering. The modulator and power amplifier stages used 833A triodes and high tension was supplied by 872A mercury vapour rectifiers.

This transmitter was installed in the adjacent engine cooling room, a fortunate circumstance for 4QN as things later turned out.

A line impedance matching unit and changeover switch was mounted in a box on the wall in the main transmitter hall, to convert the 80ohm AWA output to 600ohm balanced for the main transmission line. The winter weather was delightful, the fish and crabs plentiful and the installation party enjoyed their stay in this remote and interesting place.

In 1957 some special equipment was installed in the control room. An experiment was being set up to observe the effect of operating two widely separated medium frequency transmitters on the same frequency and 4QN and 4QS Dalby were chosen as the stations to be synchronized.

Two very stable oscillators were designed and built by the Standard Time Division of the Research Laboratories using DT cut quartz crystals oscillating at 105kc/s. This was multiplied up to 630kc/s. Observations on drift showed an average of 0.02cps per 24 hours. A rack of this equipment was installed at each station and provided drive for the transmitters. 4QS was on 10kW and normally on 760kc/s but was to operate on 630kc/s for the trial.

However, before the synchronizing experiment could be put to the test, disaster struck at Clevedon. About 3.30AM on the morning of Saturday 26th May 1951 the station OIC Geoff Beetham was awakened by the noise of a fire in the nearby transmitter building. It quickly became beyond any hope of control and the building housing the transmitter, control room, storeroom, engine room and engines was completely destroyed.

A fire brigade party from Townsville attended and prevented the fire spreading to the diesel oil fuel storage area and to the engine cooling room. The fire was out by breakfast time.

When the fire was first discovered, Doug Baker the Townsville Group Engineer was alerted by phone and was able to see the fire from his house in Townsville, 15 miles away in a direct line. Later on Saturday he was able to borrow an engine generator from Peters Arctic Delicacy Co..

Mick Hall the Supervising Engineer, Broadcasting, flew up and brought some essential audio equipment and QN was back on air on Sunday morning, using the 2kW AWA which was unharmed in the cooler room. At the time of the fire, one of the main engines was down for routine overhaul and a 25kVA unit was on loan from the RAAF. This machine, which was standing in the engine room, was destroyed with the rest of the power equipment. The borrowed Peters' set was not in good order and required some attention, a matter which delayed the return of the station to air. It has been said by those present at the time that transmission could have been resumed sometime on Saturday had a good engine been available. However, the Sunday start was very creditable after a disaster of such magnitude.

Additional engines were obtained and soon a new engine room was built. The final assembly consisted of two Ruston and Hornsby diesels, 4VSH, driving 30kVA General Electric alternators at 1,500rpm; a Southern Cross BGC with a 20kVA Southern Cross generator at 1,000rpm, and a 7 and a half horsepower Ruston and Hornsby driving a 6kVA G.C. Martin generator at 1,500rpm, for the after hours load.

In 1960 when QN had moved to Brandon, the Southern Cross machine and the 6kVA set were transferred to the PMG Townsville Engineering Division. The new engines required a new fuel and 2,000 gallons of distillate were

railed from Brisbane in drums in September 1951. By early 1952 a 500 gallon elevated tank was provided by C.O.R. Co. (Commonwealth Oil Refinery) the contractors for fuel at that time. Additionally, 3 months supply was held in drums.

The heavy fuel oil previously used was sold back to the Shell Co. There were 35 tons at Clevedon in drums and bulk. The bulk oil was returned to Townsville by the 4QN tanker, while the drums were taken to Killymoon siding for railing to Townsville. This operation was in November 1951. After the fire the AWA transmitter was used full time and to minimise possible problems, more spares were obtained, from 2NR Grafton, in June.

Later in the year arrangements were made to divert two new STC 2kW transmitters type 4SU-14C from a current contract and to install them at Clevedon. Their serial numbers were 32281 and 32282. They were installed in the cooler room where the AWA and the Auxiliary Network high frequency transmitters were. A control room was made by partitioning, and little space was available for all this equipment. In fact, the AWA was removed before long, to make room for the second STC, and on 23rd April 1952 it was loaded on a truck and began its journey to Canberra where it operated as 2CY until 1982. Installation staff for these various works were under the supervision of Frank Sharp, engineer. Staff were Otto Burmester, Maurie Palmer, Alec Barron and Les Naumann. Geof Beetham's station staff assisted when necessary and included Ron Pyers, Eric Lake, Trevor Mead and E. Ellis, the two latter being the station diesel mechanics.

And so 4QN returned to normal operation, while plans were made to move to a new site at Brandon near Ayr.

A new high stability oscillator was built to replace the one lost in the fire and the 4QN-4QS synchronizing experiment proceeded as previously planned. The new oscillator was installed in February 1953 and later in the year when stability had been achieved, observations of the system were made in various places in Queensland during the period October to December. The Radio laboratory in Brisbane fitted out a panel van with receivers, field strength set, tape recorder and cathode ray oscilloscope. The field observations were made by Frank Brownless, engineer from Central Office, and Doug Sanderson. West Hatfield from the Australian Broadcasting Control Board came up to observe in the Townsville to Hughenden area. The results of the observations were written up in PMG Radio Section Report No.30 by Brownless, in 1955.

Life at Clevedon continued as usual, with a water shortage in late 1952 necessitating supplies being brought from Stuart and when the rains came, more trouble with the road to the rail siding.

The Auxiliary Network equipment previously mentioned comprised a 200 watt AT14 high frequency transmitter and a 35 watt AMT150. These with dipole aerials operated to Brisbane with the call sign VL4EK on the 5, 9 and 13 Mc/s bands. This network was installed in many places in the State to give Post Office communication when an emergency closed the normal lines. 4QN was a main centre, with the Townsville Post Office being fitted with a small transceiver only.

The AT14 was the high frequency model of the Australian made Thom and Smith line, which also produced the BC200 medium frequency transmitter of the type used at the first 4QL Longreach. The AMT150 was the AWA version of the U.S. Signal Corps TW12. It was rated at 50 watts CW and 12 watts speech, with a pair of 807's in parallel in the output stage. The years passed with very little technical change and with Brandon installed, old QN ceased transmission at 11.30PM on Sunday the 14th June 1959, after almost 23 years of service.

The sad business of dismantling and disposing of the old QN equipment now began.

The two smaller engines went to the Townsville engineering area. One of the 30kVA sets had broken a crankshaft a little earlier and with its companion was available for local disposal. No details are known of their fate.

Of the two STC 2kW transmitters, one was returned to Bald Hills where it became the 4QG standby and the other went to the Radio Installation depot at Perry Park, Brisbane. It was never again used as a transmitter but is believed to have been converted to an RF heating device for use in the Bulimba PMG Workshop.

The possibility of using the mast at another site was considered and some interest was shown by 4AY Ayr in its possibilities, but it was decided eventually to sell it for removal and a contract was let in December 1959 to C.J. Flynn of Aspley. This was cancelled and a new buyer appeared in early 1960, M. Marcor of Townsville, who dropped the mast on 23rd January. Roy Wightman, Townsville Divisional Engineer, observed the operation.

All recovered material arrived back in Brisbane in May, 1960, having been dismantled and packed by acting Senior Technician, Les Eliason. The owner of the adjoining property at this time was K. Pope, and it is believed that the 4QN block and remaining buildings were purchased by him.

BRANDON. "NEW QN"

After the fire of May 1951 at Clevedon, serious consideration was given to the future of 4QN. The Australian Broadcasting Control Board had indicated that a 50kW transmitter would be provided and the decision to be made was whether to remain at Clevedon or move to a site near Ayr in a district known as Colevale.

A visit to the Colevale area was made in October 1951 by Vern Kenna, Divisional Engineer, Radio Installation, West Hatfield, an engineer of the A.B.C.B. and Dick Pring a Buildings Officer of the PMG Brisbane Buildings Branch.

After consideration of the traditional disadvantages of Clevedon -poor road access, isolation affecting staff and families, local generation of power, and water problems - it seemed obvious that a new site where these aspects were virtually eliminated, was highly desirable. Consequently the sites selected on the original survey in 1935 as alternatives to Clevedon were again considered. The general area was examined by Fred Percy in November 1951 to gather flood data. The proposed sites appeared to be satisfactory in this regard. In July 1952 the PMG Director General advised that the A.B.C.B. had approved the transfer from Clevedon. A further visit in September 1952 by the Buildings Branch Properties Office, with Kenna and Dean of the Department of the Interior ascertained that a 78 acre site on "Windsor Park" owned by F. Burke, being part of sub 1 of Por 535, parish Jarvisfield County Gladstone would be available for purchase and this was subsequently done. The purchase by compulsory acquisition was notified in Commonwealth Gazette 75 of 9.12.54 .

In November 1952 two officers of the Radio Section, Fred Percy and Duncan Russell-Hall made test bores on the proposed site to determine the sub-surface soil conditions and A.E. Clayton & Son of Ayr put down a 3 inch test bore to 33 feet for water which proved on analysis to be very satisfactory. In February 1953, Ray Myler of the Brisbane Drafting Survey section prepared a contour plan of the site.

The preparation of building plans was undertaken by the Department of Works and these were available in June 1955. Site and building planning proceeded and at one stage a proposal to move two of the existing staff houses from Clevedon to Brandon was examined. This was not done and two new staff houses were built. The builder for these, the main building and two tuning huts was T.F. Woollam and Son of Brisbane. The main building was of brick and concrete and the houses were timber framed. Local Townsville bricks being considered unsatisfactory for face work, better quality supplies were obtained from a Maryborough brickworks.

The buildings were completed in July 1958.

Because the nearest Post Office was at the small town of Brandon, it was agreed that the term Colevale should be discontinued and the station be referred to as 4QN Brandon. The main transmitter was an STC 55kW, type 4SU-38 with a 10kW STC type 4SU-36C as a standby. Some consideration had been given to the provision of a pair of 25kW transmitters in parallel with no separate standby but the idea was dropped.

The contract for the main transmitter was let in 1956 and the unit was received in the PMG Brisbane stores in November 1957. In March 1958 it was taken to Townsville on John Burke's ship "Waiben" and trucked to Brandon by Poultney and Co. of Townsville. In July the 10kW left the STC factory and travelled to Townsville on the motor ship "Kanimbla".

Installation of the radio equipment began in the first half of 1958 as soon as the building was sufficiently advanced. Mick Pike was in charge initially with Bill Graham- Wilson continuing in the latter half of the year, until completion in June 1959.

In February a cyclone struck the area and a considerable quantity of rain water entered the building causing some damage to the equipment. At the same time the telephone pole route between Townsville and Ayr was badly damaged and the overall effect of the cyclone was that the opening of the station was somewhat delayed.

The new aerial system used a steel lattice mast 650 feet high with a top capacity "hat" 70 feet in diameter and a loading inductance in the mast at a height of 520 feet. The effective operating height was set at 0.57 wavelengths by adjustment of the loading inductance.

The contract for the supply and erection of the mast was let to Johns and Waygood Ltd of South Melbourne in August 1957. In April and May of the following year the concrete mast foundations and guy anchor blocks were

installed by Haunstrup and Co. Mick Pike took the samples which were tested for strength at the University of Queensland.

In June 1958 the steel for the mast left Melbourne on the ship "Manoora" for Townsville and the erection began in August. The mast was completed in October. It was painted, but no aircraft warning lights were required.

The cyclone of February caused some distortion of the mast and the guys had to be retensioned to remove it.

A standard six wire transmission line was built by the Radio linestaff and a conventional earth mat of 120 radial wires, 0.4 wavelengths long was laid around the mast. Coupling equipment was housed in a small brick building at the base of the mast. Aerial matching was done by Brian Robinson.

When considering the new 4QN installation, the Broadcasting Control Board decided that sufficient emergency generating capacity should be available to run the main transmitter at full power, and so two engine generator sets were planned, each of 100 kVA. A contract was then let in March 1956 to Marine and Industrial Power (N.S.W.) Pty Ltd of South Brisbane. The engines supplied were Dorman type 6KA giving 130BHP at 1,500rpm. The serial numbers were 65235 and 65236. The directly coupled alternators serials 6267 and 6268 were supplied by Northern Electric Pty Ltd and built at Salisbury, Brisbane. Synchronizing equipment was supplied by the same firm. The engines were mounted on individual concrete blocks in the engine room annex and their fuel was held in elevated tanks outside with a capacity of 3,000 gallons.

The airconditioning system for the transmitter hall and control room was installed by Carrier Air Conditioning Pty Ltd and a "Minerva" fire detection system provided by Wormald Bros. (Qld.). The Brandon station took over from Clevedon at the beginning of program on Monday, 15th June 1959 and the official opening ceremony was held at 8PM that night. Recorded speeches by the Postmaster General and the Chairman of the A.B.C. were played from the Townsville studio and some reminiscences of the early days of 4QN Clevedon were given by Fred Bloxson of Townsville who had assisted with the original installation.

Geof Beetham continued as OIC having moved to Brandon from Clevedon and occupied the first staff house.

During the following month a field strength survey of the new station was made by Leo Moloney, engineer, with Graham Christie and Les Rodgers, technicians of the Broadcast section.

In the next few years most of the action at Brandon centred around the aerial system.

The contract for the initial red and white painting of the main mast was let to Johns and Waygood who subcontracted to D. Tincknell. While the mast was being painted, the top hat spokes were folded down and the section coil short-circuited. This was to allow the painters access to the top hat and to permit them to climb past the coil with the mast energised. Leo Moloney adjusted the aerial coupling to this temporary condition. The work was done in July and August 1959.

In November 1962 a standby radiator was erected by the Radio linestaff, 200 feet high and made of 8 inch diameter steel pipe. About this time the top insulator of one guy of the main mast was damaged by lightning and RF arcing, and Johns and Waygood contracted to make repairs. On 19th February 1963 at 10AM while this operation was in progress the mast collapsed, leaving only the lower 350 feet standing. Flying guys of the main mast cut guys of the standby radiator and the top 80 feet of it broke off and fell to the ground. The falling steel damaged both transmission lines but missed the coupling huts.

An hour and a quarter later 4QN was back on air with low power from the standby transmitter feeding into a rhombic aerial with very low efficiency. The field strength in Townsville was only 2 millivolts per metre where it was normally 35, but at least 4QN was "on air".

Some energetic work by local staff resulted in the transmission lines being repaired, both stub masts cleared of debris and the coupling units realigned to the new mast conditions. Full power from the main transmitter was put to air at 6.30am on the following morning.

Subsequently the remaining portion of the pipe standby was fitted with top loading wires to improve its efficiency. It was then decided to rebuild the standby in a new location further from the main mast. By June a temporary "Kismet" mast had been erected between the staff houses and fed from the 10kW transmitter via a 70ohm coaxial cable.

Such of the steel members of the main mast as were considered reusable were taken to Townsville for straightening by Evans Deakin Ltd and Johns and Waygood began the re-erection in May 1964. The old structure was dismantled down to the first guy level and rebuilt from there. By August the work was completed and the mast once again in service.

The permanent standby radiator was finally erected by Peter Ryan's Radio line party in September 1966. It was a "Skillfast", 150 feet high with umbrella wire top loading. The matching used was a stub made by a continuation of the 6 wire transmission line, and it was adjusted by Noel Bolton and Gordon Hall, the latter being by that time the OIC at 4QN. The concrete samples from base and guy blocks were tested by the North Australian Cement Co. Ltd of Stuart.

In early 1967 cracks were detected in the main mast base insulator and Duncan Russell-Hall and his lines team replaced it in May.

Aerial efficiency, or "figure of merit" measurements were made on main and new standby aerials in November 1967 by Terry Aldridge and Ian McBryde of the Radio Laboratory. A discussion with results and horizontal polar diagrams is given in Queensland Engineering Report QB259 of May 1968.

Although no aircraft obstruction lighting had been required initially, the Department of Civil Aviation advised in 1969 that new regulations made provision necessary and the lights were installed in September. An inspection of guys in 1969 revealed that some insulators showed cracks and required replacing, and as an immediate safety measure the loading coil was bypassed with steel angle iron leg members to increase the rigidity of the mast at that point should a guy fail. The coupling unit was adjusted for this condition and power reduced to 40kW. Such a situation resulted in the radiator being less than optimum in effective height, but the safety of the structure was of greater importance.

It was not until May 1974 that a set of new guys with an improved type of insulator was supplied by Electric Power Transmission of Sydney. These guy wires were made by the Australian Wire Rope Works at Newcastle, the metal sockets by Davies and Baird and the insulators by Nilsen Porcelain Pty Ltd. The section loading coil was restored to normal and the coupling unit readjusted by Doug Sanderson and Paul Chippendale.

Since then the aerial systems have performed quietly and with no fuss.

Both transmitters have been well behaved. In the interests of cost and reliability, the mercury vapour rectifiers in both transmitters have been changed to stacks of silicon diodes. Due also to increased cost and difficulty of procurement, the modulator and power amplifier valves have been changed in the main transmitter from 3J/261E to Philips TBL12/25, a valve in current production and cheaper in cost.

The 55kW transmitter used 6V6 and 807 valves in the crystal exciter followed by a 3C/150A buffer, a 3J/192E RF driver and 3 parallel connected 3J261E triodes in the power amplifier. The audio line up was EF37A and 6V6G in the push pull exciter, followed by a push pull pair of 3C/150A's, a push pull pair of 3J/192E's and a modulator with push pull 3J/261E's. The 10kW RF exciter used 6V6G's and 807's, an RF driver of two parallel 450TL's and a power amplifier of three parallel connected 3J/192E's. The audio side was push pull throughout, the sequence being EF37A, 6V6G, 3C/150A, 3C/150A and a modulator of 3J/192E's.

The original EHT rectifiers in the 55kW were 2V/561E and in the 10kW were 4078Z, both types mercury vapour.

Initially the program line was on the Townsville to Ayr open wire trunk route. In addition an emergency voice quality link was installed in May 1959 by Mick Pike, in the VHF band, between Townsville and Brandon. Since 1978, the Townsville to Brandon route has been by broadband radio to Ayr then UHF radio to the transmitter. Within recent years, a considerable part of the 4QN program has originated in the ABC Townsville studio, to supplement the normal Queensland Regional program which is generated in the Brisbane studios.

Installation staff who worked on the station during 1958 and 1959 were Bill Graham-Wilson, Mick Pike, Les Naumann, Cec Plaistow, Bernie Hogue, Trevor Linton, Graham Crozier and Bob Wheelan. Engineering oversight of the installation was by Jack Ross and Brian Robinson. Otto Burmester was office Supervising Technician. Officers in charge of the maintenance of 4QN have been Geof Beetham 1959-63, Don Guthrie 1963-64, Gordon Hall 1964-76, John Holland 1976-79 and Jim Heath from 1979 to 1988. The station is now unattended and maintained by staff of the Townsville Broadcast Service Centre, OIC Graham Stead.

4QS DALBY

4QS was provided as part of the progressive expansion of National country broadcasting planned in the thirties. Rockhampton had come on air in 1931 and Townsville in 1936 and a Queensland South station was obviously the next step, designed to cover Toowoomba, Warwick, Stanthorpe, Goondiwindi and on the western downs, the railway towns of Miles, Chinchilla and Roma. Some of these were obviously outside the night time primary service, but in those years the listeners were grateful for any reasonable level of reception and night time fading was not of great concern. As it turned out, all these towns were within the half millivolt per metre field strength contour, which in most seasons in the country provides reasonable daytime reception.

The Darling Downs west of Toowoomba is predominately flat, and although extensively farmed for wheat has much uncommitted land. A block of 48.5 acres was selected 3.5 miles north east of Dalby adjacent to the Bell road, on a property known as "Hayfields".

Earth samples were taken by Dalby Line Foreman Nissen and in December 1938 a contract was let to Johns and Waygood of Melbourne for the supply and erection of a 711 feet high steel lattice mast. At the proposed operating frequency of 760kcs this was a little over half a wavelength. This was the first use of a vertical half wave radiator in Queensland and the result was a very efficient aerial. Indeed, no aerial since built in this State has equalled 4QS in efficiency. A figure of merit measurement was made by Dave Snowden in 1964 and the value was 259. See Queensland Engineering Report QB175. A contract was then let with STC for a 10 kilowatt transmitter and that company supplied an Australian built unit, type A513, to a design by Charles Strong of their London office. It was to be similar to those supplied to 2FC, 2CY, 3LO and 3AR.

Modulation was applied at low level and the 10kW output power was developed in two stages of linear amplification, the final amplifier being two parallel 5kW units using 4220B water cooled valves. Two of these valves with a spare were used in each cabinet. The driver stage was a pair of 4270A air cooled triodes. High tension of 12,000 volts DC was produced by a bank of six 4078A hot cathode mercury vapour rectifiers in a fullwave, three phase arrangement.

A rectifier in the final stage provided demodulated audio which was applied as feedback to an input audio stage, giving much lower distortion and improved frequency response by comparison with earlier high powered transmitters. This was the first application of envelope feedback in national transmitters.

By the middle of 1938 plans for the transmitter building were under discussion between the Department of the Interior's Works Branch in Canberra and the PMG Central office, and it was decided that in addition, a "cottage" for the officer in charge should be built similar to one designed for 2CR Cumnock. The main building was to have a concrete slab floor, timber framing, brick exterior and a galvanized iron roof.

By October the building was sufficiently advanced to have a foundation stone laid. It is a block of sandstone and reads:

Hon. J.A. HUNTER M.P.
10th OF OCTOBER 1938
75th ANNIVERSARY OF ESTABLISHMENT OF MUNICIPALITY OF DALBY

By February 1939 the roof was on, and the building was ready for equipment installation by the end of April although it was not yet painted or plastered.

The garage, cottage and tuning hut were almost finished in May, but rain delayed work and it was August before all was complete.

The mast had been completed in January 1939 but the Randwick Electric Company did not finish the electrical wiring of mast and buildings until July.

In July the Downs Plumbing Co. of Dalby had put down a bore and erected a wind pump and a 2000 gallon tank for a general water supply.

Many years later, during 1965, the Department of Works examined the bore at the station. It was 90 feet deep and tests showed that a flow of over 300 gallons an hour was possible. Town water mains were not connected until 1970. By the end of August all contractors had completed their work and left the installation team in peace. The installers included Arthur Clark, Tom Knott, Eric Nissen, Bernie Duggan, John Wheller, Fred Emerson, Toby Marcus and Bert Williamson. Nissen, Emerson and Tibby Scholes became the first maintenance staff with Harry Conway as the first Foreman Mechanic. Fred Lubach later joined the team. Engineers associated with the project were Vern Kenna and later Mick Hall. Jim Hutchison was the Supervising Engineer.

The transmitter output impedance was 80ohms designed to connect to an 80ohm above ground coaxial transmission line. This was built locally by Bill Stoddart of the Brisbane PMG Workshops. The outer copper tube was 3-1/4 inches in diameter with a tubular centre conductor 7/8 inch diameter supported at intervals with three-legged porcelain spiders. The line was mounted on concrete pillars 2 feet high, and because of the considerable length, 900 feet, expansion boxes were provided at intervals. The aerial base resistance was 78ohms so that a simple series inductor was all that was necessary for a match to the 80ohm coax feeder. In actual fact a small airspaced capacitor was also incorporated in the matching network.

The earth mat may have been laid by local linestaff but it is not known for certain. It is somewhat different from subsequent installations. 75 wires radiate out from the mast for 250 feet, then 150 wires continue from here generally to the site boundaries about an additional 400 feet.

Shortly after the mast was completed, the local Dalby newspaper reported that four intrepid citizens had climbed the mast one weekend when the installation staff were absent. The erection of the security fence soon after prevented any further sightseeing by the public.

The day before the scheduled opening, the mast base insulator was found to be cracked and a hasty replacement was made. No further problems have occurred in the subsequent 49 years.

By early October the equipment was ready for testing to air and trial broadcasts were made. Reports of reception were received from Perth, New Guinea and New Zealand, no doubt by skywave propagation at night. The official opening was at 8PM on Tuesday, 17th October, 1939. It was held in the Toowoomba Town Hall in the presence of the State Governor, Sir Leslie Wilson and the Toowoomba Mayor, Alderman D. Annand and his wife.

The Postmaster General, E.J. Harrison spoke by land line from Sydney and A.N. Finlay the ABC Queensland Manager welcomed the guests. Music was provided by the Queensland Studio Orchestra conducted by W. Nelson Burton.

The first program broadcast was on relay from the Melbourne studios, a play "Horatio's Last Act" by G. Warren-Smith.

At 10.30PM, 4QS went local and broadcast dance music by Ryans Band from a charity ball at St. Joseph's, Dalby. Cap Randall and Bebe Scott entertained and the Mayor of Dalby, Alderman T. Jack and Mrs Jack were present. The station closed at midnight.

The regular broadcasting times were 6.30 to 8.15AM, and 10AM to midnight.

The opening was reported in the Dalby "Herald" on Friday 20th October, 1939.

The first sign of unusual local conditions was an urgent request for the transmitter building to be insect screened, as flying and crawling invaders were playing havoc with the high tension supplies. The weather had already been recognized as a hazard, and protection for the water cooling equipment had been provided to minimize the effects of the very cold morning conditions which could freeze the water in the system.

On 24th November, the first Foreman Mechanic Harry Conway, moved into the "cottage" and the station settled down to business. Harry stayed at 4QS until 1942 when Les MacDonald came to take charge.

During the war years when there was some thought of enemy invasion, special code words were advised to broadcast stations so that in an emergency, on receipt of the code, staff could take whatever action the code indicated to render the station useless to the enemy. Fortunately no code was ever sent in emergency or in error and 4QS survived the war intact.

Dalby district black soils are not very stable with changes of season and before long cracks became visible in the building's plaster. Over the years however this was recognized as being of no great moment and from time to time some plaster of Paris and a little paint effected cosmetic repairs.

Early in 1941 a Central office drawing was prepared showing the field strength contours of 4QS but who made the survey is not known. The mast lights were switched off during the war unless required for a particular purpose, but controls were relaxed in 1944 when lights were again required from sunset to sunrise.

In February 1951 the frequency was changed from 760 to 750kcs, and another change was made in 1953 in conjunction with the 4QN synchronization experiment.

A rack of high stability oscillator equipment was installed at 4QS by Maurie Palmer, Jim Plunkett and Ian Byrnes, and during the period 30.9.53 to 11.1.54 the station operated on 4QN's frequency, 630kcs. A large copper tubing single turn loop was mounted on the building so that signals from 4QN could be received and compared with the oscillator at 4QS.

During this phase, the opportunity was taken to survey the extent of the 0.5 millivolt per metre field strength contour. The measurements were made by Doug Sanderson and George Barr.

The precision oscillators had been installed some time before this, but the Clevedon set was destroyed in the 4QN fire of 1951. New matched crystals were obtained and proved very stable during the tests. The average drift over 24 hours was only 0.02cps.

The synchronizing experiment is fully described in Central Office Radio Section Report No. 30 by S.F. Brownless, 1955. In all these early years, no standby transmitter was available, and no emergency engine generator either. However in 1955, a 2 kilowatt STC transmitter which had been in use at Bald Hills, became surplus to requirements there, and was installed at 4QS. This was the original 4QR transmitter built in 1937 and first used at the Central Telephone Exchange in Brisbane. This transmitter, of no known type number continued to operate as the standby at 4QS until 1967 when it was removed from service and disposed of.

The RF lineup was 6C6 oscillator, 4061A first separator, 4242A second separator, push pull 4242A's as grid modulated amplifier and four air cooled triodes 4279A in push pull parallel as the final linear amplifier.

The audio section used two resistance capacity coupled 6C6 stages followed by a 4242A modulator. Main HT rectifier 3KV, used six 872A mercury vapour diodes. Minor HT rectifiers were 83V.

Envelope feedback from output back to first audio was used with a 6A6 as RF demodulator.

At this stage, an ex Army V8 petrol engine driving a 25kVA Hodson and Gault alternator was installed and was used to power the 2kW standby transmitter during commercial mains failures.

During this installation the program input equipment was rearranged and for the first time, an audio limiting amplifier was provided to give transmitter overload protection. Some measure of protection had been provided in the 2kW transmitter by the use of neon tube diodes in the output of the modulator which flashed over when the level rose above a preset value. Staff involved in these installations were Bob Browne, Bill Graham-Wilson, Greg Grant, Frank Sharp, Bernie Duggan, Col Crick, Jim Plunkett and Reg Stern.

The next noteworthy event was the repainting of the mast for the first time since its installation. A contract was let to G.M. Lovett of Toowoomba and the painting was completed in June 1959.

In this year, mains electricity was supplied via a new line from Toowoomba and the Dalby council power house was closed.

In 1960, Les MacDonald retired after 18 years as officer in charge, and over the next four years Don Brownlie, Don Guthrie and Bob Browne spent time at the station. In 1965, A.G. (Geof) Bucknell moved in.

A new garage, steel sheeted in "Kliplok" was erected in February 1962.

During 1963, a 10kW transmitter type 4SU-64 was supplied by STC as a replacement for the watercooled unit, and an estimate prepared for its installation. It was planned to have the work finished by April of the following year. It had been originally intended to use this transmitter as a replacement for 4QR. Installation did not

proceed however, and in February 1965 the transmitter was sent from Banyo Stores to Laos in South East Asia. The ultimate 4QS installation was made in 1967 with a pair of STC 4SU-55BS units with a combiner. Their serial numbers are 78106 and 80284. The factory test report is dated 25.3.66.

An installation party with Bob Hansen and Jim Plunkett worked from January 1967 on the new transmitters and they were ready for use in May. The old 10kW and 2kW units were then dismantled and removed. The engineer in charge of the new installation was John Searle.

On the failure of one transmitter, the output of the other is automatically switched clear of the combining unit to line so that the output power of the station is reduced by 3db only.

The transmitter output impedance was 200ohm, and as at that time the transmission line was a temporary eleven wire system of about 100ohm impedance, a matching unit was installed at the output of the combiner.

The valve lineup of the 4SU-55B/S transmitter was oscillator 807, buffer 807, driver 4- 125A, final 3 x 2500F3 air cooled triode. The audio side was push pull throughout. First stage EF37A, second stage 4-125A, cathode follower driver 4-125A and class B modulator 3 x 2500F3. The 5000 volt high tension voltage was produced by stacks of silicon diodes.

Shortly after the new installation, Noel Bolton installed a 35kVA Dunlite diesel alternator and removed the old petrol set which was subsequently sold to M. Reithmuller of Dalby. The new generator was not capable of carrying the total station load, and it was arranged that only one transmitter would be connected to the emergency supply.

The temporary eleven wire transmission line mentioned above had been installed early in 1966 as a replacement for the original coaxial tube feeder. Due to movement of the supports in the black soil, many of the internal porcelain insulators had broken, allowing the centre conductor to sag and at times contact the outer tube causing short circuits.

No modern coaxial cable was on hand and as the matter was urgent, the simple eleven wire line was built. Wooden poles and crossarms were used with long skirt trunk telephone insulators. Large diameter holes for the poles were drilled by Cramer Bros. of Dalby and the poles set in sand in an attempt to minimise movement. Radio linestaff did the installation. The engineer in charge was Doug Sanderson. Full details of this line are given in Queensland Engineering Report QB230 by D. G. Sanderson. The line operated successfully until it was replaced in 1968 by a standard 6 wire line of 200 ohm impedance.

1968 was another busy year for 4QS. New program input equipment was installed in February and Radio linestaff erected a standby radiator in August. This was a triangular steel lattice mast 125 feet high, supplied by Edmondstons of Marrickville, NSW. Fitting of insulators and terminating guys was done by Rex Robinson and Sons Ltd, of Fortitude Valley, Brisbane. Duncan Russell-Hall and Peter Werder installed and adjusted the coupling unit. A standard 6 wire, 200 ohm line was built to the new mast.

During the year Wormald Bros. (Aust.) provided and installed a booster pump for fire fighting at the station.

Two high frequency receiving dipole aerials were erected during the year for reception of the Brisbane short wave stations VLM4 and VLQ9. At a time when the program line from Brisbane was largely in open wire construction, outages were not uncommon and the ability to receive and rebroadcast the ABC Regional program was useful.

Following the provision of broadband microwave radio from Toowoomba, through Dalby and onto Roma, there was considerable discussion as to whether 4QS would be operated unattended and a maintenance group established at the Dalby Microwave terminal in town. The matter was of some interest, as the 4QS building was in need of considerable maintenance, and if it were to become unattended, there was the possibility of constructing a new and much smaller transmitter building. Nothing came of the suggestions and various repairs and rearrangements were carried out on the main building in due course. No further proposals to coordinate the broadcasting and microwave maintenance activities eventuated and 4QS remained a staffed station until the formation of the Dalby Broadcast Service Centre in 1988.

One of the rearrangements was the resiting of the toilet from the original location outside, to a new amenities area within the building. At the same time some upgrading of the engine room was undertaken.

The land around 4QS is very flat and at times of heavy rain water does not drain away rapidly. Early in 1981 a period of wet weather resulted in the floor chases becoming flooded and water around the building reaching a depth of about 2 feet. The main power cable in one of the flooded chases exploded due to a leaky sheath and the station had to use the emergency generator for some time. As a safety measure, the mains were reconnected to the building with overhead wires rather than underground cable.

Because of the apparent increase in flooding due to drainage works elsewhere in the district, the floor of the fire fighting pump house was raised in 1984. The possibility of a flood proof bund wall around the building has been discussed in recent times, but no construction has begun.

In common with most regionals, the program for 4QS originated mainly in Brisbane, with a small but ever increasing component generated in a "local" studio. The local for 4QS was in Toowoomba. A fairly simple studio in Margaret Street built in 1940 served for many years, but in 1961 a modern installation was made in the new ABC premises in the SGIO Building also in Margaret Street. Jim Plunkett and John Bopf did the installation under the supervision of Engineer Ron Tolmie. This studio was large enough for live artist performances, solo or group, as well as general purpose single announcer sessions.

4AT ATHERTON

Five miles east of Atherton and about midway between Yungaburra and Malanda, the road crosses Gwynne Creek. Close by, on a 60 acre low lying block of ground described as sub 1 of portion 306, parish of East Barron, country Nares, lies 4AT.

4AT is an unusual national station, as it began life as a commercial owned by Atherton Tablelands Broadcasters Pty Ltd in 1938.

Early in the second world war the Commonwealth Government acquired the station from its owners for reasons believed to concern national security at the time. The date of takeover is uncertain, most likely late 1940. Earliest surviving correspondence dates from early 1941.

The land was leased from Beattie Bros., but the Government paid compensation to the commercial company for the station building and equipment. In the Commonwealth Government Gazette No. 211 of 1st November 1945 it was announced that the land had been bought also. Arrangements were made to enable D. E. Beattie to operate a grazing lease on the property for his cattle and to continue to cultivate part of it which did not affect the aerial earth system.

A site plan was drawn up dated June 1941 which revealed that the station occupied half a house with office, studio and equipment room. The wooden studio floor was double with a sandwich of 4 inches of sawdust, to improve sound insulation. A 500 watt AWA transmitter type J4825 serial No.1 was installed, feeding a 365 feet high steel pipe aerial via a two wire 600 ohm impedance transmission line. A conventional earth mat of 121 wires each 796 feet long was buried in the paddock which was grassed with clover and paspalum for the benefit of Mr Beattie's cows.

The transition from balanced feeder to unbalanced aerial was achieved with an RF transformer comprising two flat spiral coils separated by a Faraday screen of parallel vertical wires.

The transmitter valve complement was oscillator 42, oscillator amplifier 807, RF amplifier 807, buffer 805, modulated amplifier four 805 in parallel push pull. Monitor diode was an 84. EHT volts 1250 from six 866A mercury vapour rectifiers. The audio was push pull throughout. 1st audio 6A6, second audio two 6A6 parallel push pull, sub mod four 2A3 parallel push pull and modulation four 805 in parallel push pull. Anode modulation of the mod. amp. was used.

The operating frequency was 680kcs.

Aerial efficiency and station service area were not measured until 1952. Queensland Engineering Reports QB47 and QB48 by George Barr and Doug Sanderson of the Radio Laboratory were issued to record this data. The figure of merit of the aerial was 180 millivolts per metre for 1kW at 1 mile, a reasonable value for this quarter wave radiator.

Just prior to this the whole aerial system had been overhauled and repainted by private contractor. New obstruction light fittings were necessary as rusting was severe. During the war years the mast lights had not been used at night unless specifically requested.

In January 1954 the station frequency was changed from 680kcs to 600kcs by Vince Griffin and Ralph Bongers.

When taken over, the station had no emergency engine generator, but in early 1944 a shed behind the house became the laundry and engine room. A Ford V8 petrol engine driving a 10kVA, 3 phase, 415 volt alternator made by D.F. Skelley of Melbourne was installed. It had arrived at the Yungaburra railway yard in an open wagon and had been wet by rain on the way. No permanent harm was caused by the water however. Three years later a Braybon automatic voltage regulator was obtained to improve the performance of the emergency supply.

The first permanent OIC was Alf Walker who was at 4AT from 1941 to 1945. Bill Mellish and Doug Macaulay had been on site initially.

Over the years improvements were made to the audio facilities, test equipment was provided and emergency record playing facilities were upgraded. This latter equipment was found most necessary when the station was off program line during the cyclone of 1956.

A report of this cyclone by the OIC makes interesting reading.

"EFFECT OF CYCLONE AT 4AT

Programme Line: The programme line was broken south of Townsville on 5.3.56 at 7.57p.m. No further programme was received via land line until 3.25p.m. on 10.3.56 when a telephone channel was supplied. A broadcast channel was provided at 6.30p.m. the same day. Whilst the programme line was cut, programme was maintained by rebroadcasting radio pickup of short-wave stations transmitting the correct programme. When reception conditions were unfavourable, records were played locally.

Commercial Power: High winds caused many faults on the high tension power lines on the Tableland on 6.3.56. Our emergency power plant was in use from 7.20a.m. to 12.53p.m. this day. Commercial power was available at 4AT throughout the remainder of the cyclone period. The alternator of the emergency plant was not giving full output voltage whilst it was in use but this did not affect 4AT transmission. The alternator output voltage was 370 volts instead of the normal 415 volts.

4AT Radiator: As the velocity of the wind rose, 4AT radiator was seen to be flexing. On the morning of 6.3.56 for instance, I estimated the top of the mast was being displaced 8 feet or more from its normal position. Our nearest neighbour, Mr D. E. Beattie, rang me on 7.3.56 to advise me that the top of the mast was flexing greatly. After the wind subsided it was found that the mast had retained a permanent set below the cross-trees. 4AT transmission was unaffected by this condition.

Damage to Installations: No major damage was done to the buildings or other aerials in the grounds. Minor damage was done to ornamental structures and trees.

Emergency Short-Wave Communication: On 8.3.56 we were called upon to provide a morse circuit from Atherton telegraph office to work via short-wave transmission to Brisbane. Telegrams were transmitted and received on 8 and 9.3.56. Also 8.3.56, radio contact was made with Cairns Flying Ambulance and Wairuna homestead in the Mount Fox district as fears were held for the safety of people at that homestead and adjoining properties.

Overtime: A total of 17 and one quarter hours was incurred by 4AT staff as a direct result of the cyclone. This was used in manning the short-wave communicating equipment, attending the emergency power plant, and clearing broken tree branches from the guys of one of the small masts.

(K. W. Bytheway)
Supervising Technician 4AT,
Yungaburra."

Staff movements occurred from time to time. Alf Walker left in 1945 and Gordon Andrews came for a year. Eric Gough was OIC from 1947 to 1949 and was followed by Ken Bythway who stayed from 1949 to 1956. Jack Barden was in charge from 1956 to 1965, then Ernie Long spent two years in residence. The last O.I.C. was Errol Black, from 1963 to 1973, after which the station became unattended and was maintained by Radiocom staff from Cairns.

During the 50's, the PMG emergency radio network was extended to 4AT. A Temco 200 watt HF transmitter was provided, with two AR7 receivers. This gave emergency voice contact with Brisbane. The call sign was VL4EW. This set was removed from service in 1964 and a 50 watt SSB transceiver was installed in the new building. With the conversion of the station to unattended operation, the emergency equipment was removed and the aerials dismantled in 1975.

In 1957 the old Skelley generator was replaced by a Ford V8 petrol engine driving a Hodson and Gault 25kVA 3 phase alternator. The recovered set was transferred to Cairns Division for use elsewhere. This new machine survived until 1966 when a 30kVA Lister type 127HAG14 driving an Electric Construction Company generator was installed in the new transmitter building. The Hodson and Gault set was sold locally to J. Cole of Mount Garnet.

Line Foreman Cyril Hayward and his team of radio linemen installed a rhombic aerial in November 1957 for use in receiving the Brisbane high frequency transmissions from VLQ9 and VLM4 for emergency rebroadcast purposes. While there, they examined the main aerial and reported on its limited life expectancy. It was cleaned and repainted, but plans were soon being made for its replacement. It was an interesting structure. To a height of 260 feet the mast was 8 inch diameter steel pipe. The top 96 feet was 6 inch diameter. At the transition level a system of cross trees provided stabilization for the top section. There were seven sets of guys below this, in four directions.

Brisbane PMG Workshops fabricated the fittings for a new 200 feet high, 6 inch diameter mast which had been designed by Ron Tolmie, Engineer of the Installation Division and Clyde Manuel, mechanical designer of the Brisbane Drafting Section. This pipe was galvanized and pole steps were fitted. The old mast had to be ascended in a bosun's chair.

The removal of the old mast was under taken by Duncan Russell-Hall in June 1961. All guys on one side were replaced by temporary wires and terminated with one attachment at an outer anchor block. When this was cut with any oxy-acetylene torch, the mast collapsed, generally in the opposite direction, although fragmentation occurred and lengths of pipe fell in unexpected areas.

The new 200 feet long pipe was screwed together on levelling supports and raised from the horizontal using a 70 feet long wooden jury pole. Due to the excessive length to diameter ratio, the lifting of this mast was a very delicate operation.

The lines team were Duncan Russell-Hall, Albert Ray, Percy Crouch, Tony Scott, Alan Elvis and George di Bondi.

During this time 4AT's transmission was maintained with the use of a rhombic aerial, rather inefficient, but not required for very long. The old coupling box was refurbished and soon the new mast was in service.

In mid 1961 the Minister approved a power increase for 4AT, from 500 watts to 2kW and a pair of STC transmitters, 4SU-55A/S, each capable of 2 and a half kW was ordered. They were to operate as main and standby in a new building, plans for which had been approved in late 1960.

The valve line up for these transmitters was oscillator 807, buffer 807, driver QB3/300, modulated final amplifier 3x2500F3. The audio side was push pull throughout. 1st audio EF37A, 2nd audio 807, driver 807 and modulator 4/1000A. High tension supplies were from silicon diode rectifiers.

A contract was let in August 1962 with N. A. Kratzmann (N.Q.) Pty Ltd for this new transmitter building, and it was ready for installation work in mid 1963. The structure was of brick with a galvanized steel "Kliplok" roof.

At this stage, the new transmitters arrived in Cairns on the ship "Burnside" and the installers with Jim Plunkett in charge began work. The system was ready for use on 20th April 1964, with a new 200 ohm 6 wire transmission line to the aerial and a new coupling unit.

A field strength survey of the station on its new aerial and power was made later in the year by Ken Hobson, technician of the Radio Laboratory.

Within two years, approval was given for 4AT to operate on 4kW by day and 2kW by night and Jim Plunkett's team installed an STC combiner type 792SU-3B. In July 1972 approval to use 4kW day and night was given and both transmitters were permanently operated into the combiner.

Engineer John Searle was responsible for the transmitters and combiner installations in the new building.

Anticipating the future unattended operation, a Siemens and Halske time clock was installed to switch the transmitters on and off. Unattended operation was actually begun in 1973 after the installation of Cutler-Hammer "Interscan" remote control equipment, with its control terminal in the Cairns Radiocom Office at Hartley Street. In 1986, control was taken over by the staff of the new Broadcasting Branch Depot in Cairns.

A standby aerial was provided in 1968. It was a steel lattice triangular section mast of 2 feet side dimension. This was one of three supplied by R. W. Edmondston of Marrickville N.S.W., and was 125 feet high. Eight top loading wires were connected, 71 feet long at 45 degrees. Part of the main earth mat was removed in the vicinity

of the standby and replaced with a restricted 60 wire mat. Engineer John Searle was responsible for the provision and commissioning. Radio line staff erected the structure and built a 6 wire transmission line.

In May 1972 the frequency was changed to 720kcs and before long complaints of reduced signal in the outer regions of the service area were made. The local commercial 4AM frequency 560kcs had the advantage of a lower frequency, 460kcs, and a directional aerial which gave signals a boost in some directions, so that 4AT showed up badly by comparison.

Advice was received in September 1973 that the Australian Broadcasting Control Board had approved the replacement of the 200 ft. aerial with an antifading mast and the full time operation of 4AT on 4 kilowatts.

The design for the new aerial was worked out at Broadcasting H.Q. in Melbourne and consisted of a 455 feet high lattice steel tower, top loaded with a coil and a number of sloping "umbrella" wires, to give an effective electrical height of about a half wavelength. This was designed to minimise radiation at high angles and reduce night time fading on the limits of the service area. The mast was supplied by Good Engineering Pty Ltd of Healesville, Victoria.

The mast was of 1 metre triangular cross section, guyed in three directions at six levels. After final tests, the top loading wires were set at 100 feet each and the top coil adjusted to give a node height of 120 feet. Six top loading wires were used with a small amount of top coil.

Checks on fading in the Innot Hot Springs area 30 miles from 4AT showed very little night fading.

Radio linestaff under John Wright dismantled the 200 feet pipe and erected the new Hardinge mast in its place. Electrical adjustments were made by engineers Paul Chippendale and Doug Sanderson, assisted at times by Dave Laing and Garry Waite, technicians. Queensland Engineering Report QB431 was prepared to cover the installation and adjustment of this aerial. The coupling equipment was upgraded by technician Bob Perkins.

The figure of merit of this radiation was measured and found to be 208 millivolts per metre at one mile for 1kW. This is little better than a good quarter wave mast but consistent with short, top loaded aeriels. The high angle radiator however, appears to be small, which was the desired result. In January 1979 a field strength survey of the station's service area was made by Peter Tilley, technical officer of the Broadcast Operations staff. A contour map QK2672 was prepared.

Telecom obtained permission in 1982 to use the 4AT site as one end of a high frequency radio telephone circuit to Mornington Island. Two log periodic aeriels were erected by Radio Section line staff, one for receiving and one for transmitting, and a 100 watt transceiver was mounted in the transmitter hall.

After the station became unattended, the residence was occupied by Telecom staff employed in Atherton, but eventually the Department of Communications agreed that it was becoming a maintenance liability and should be sold. This was done and the building was removed from the broadcast property and reerected by the buyer on his property nearby in 1986.

4QL LONGREACH POST OFFICE SITE

Following on a decision, possibly made before the second world war, to provide a high powered National regional in the central west, a temporary low power installation was made at Longreach in 1947.

The work actually began in 1946 when Eric Gough, a senior technician of the broadcasting staff and Dave Laing, technician, cast three concrete engine beds in a small galvanized iron shed in the Post Office yard. A somewhat larger fibrocement sheeted timber framed building was in use as a line depot on the opposite side of the yard with an empty front section suitable for a transmitter hall. This building with the Post Office, the technicians office, carrier equipment building and the engine room, formed a hollow square where mail contractors, linemen's trucks and technicians' vehicles came and went frequently. The entry was from Magpie Lane just round the corner from Duck Street. Behind all this was the Shire hall and the town water tank incorporated in a concrete tower 120 feet high.

In this transmitter room Eric and Dave placed the two Tasma BC 200 transmitters and some equipment racks. No further work was done that year.

Early in January, 1947, Dave Laing and Doug Sanderson, Senior Technician, began installation again and were soon joined by Ian Byrnes and Tom Goford. At that stage the wartime aeradio group was being disbanded and John Talty, Alec Barron and Fred Stewart who had been installing equipment at the Longreach airport were transferred to the PMG Department and came to assist with the installation of 4QL. Late in January a line party comprising Messrs. Robinson, Martin and Haywood arrived to erect the aerial system. No conventional earth mat could be laid due to the restrictions of the site, but a counterpoise was erected comprising 16 poles about 18 feet high with a wire from each converging to an insulated attachment mounted on the main centrally situated steel pipe mast which was the main support for the L type aerial. This 2 inch diameter pipe was 73 feet high, insulated at the base. The counterpoise was earthed at the coupling box which was mounted on the side of the transmitter building. The aerial wire went vertically up from the coupling box to the top of the pipe mast, then continued up an angle to the top of the Council water tower. Total length of aerial wire was 290 feet which was just under a quarter wavelength at the operating frequency of 690kcs. The resistive component of the aerial impedance was 13.5ohms.

The transmitters were Australian made by Thom and Smith and used two 813 pentodes in parallel in the output stage. They were obtained from army disposals and were of a type used extensively with the troops overseas. One of the units had the name Balik Papan written inside, indicating service in Borneo.

The RF transmission line to the coupling box was 73ohm solid dielectric coaxial cable, type Uniradio 17.

Considerable difficulty was experienced with RF feedback to the audio input due to the proximity of the aerial and it was necessary to place sheet copper under the linoleum between the control desk and the program input racks and also to bond together all the sheets of corrugated iron on the roof of the building. Due to the excessive summer temperatures this work was done at night when the portable lights used attracted swarms of flying insects. People at the weekend dance in the adjacent Shire Hall found the scene most entertaining.

The Longreach commercial electricity supply at that time was a centre tapped 440 volt system giving consumers a choice of 220 volts DC either positive or negative to earth. Consequently 4QL was built to run on its own generators. Three Onan petrol engines type WC4.5S driving 5kVA 60 cycle 110 volt generators were delivered by rail to Longreach and man handled onto the engine beds in the engine shed. A 500 gallon petrol tank was buried just outside. Again, due to the heat, the hole digging was performed at night and early morning by pick and shovel. Bedding sand was brought from Dingo Creek on the other side of the Thompson River. The trenches for the conduits and power cables across the yard were also excavated with hand tools.

Visits by "Snow" Hendry, Supervising Technician Installations and Arthur Clark, Engineer, were made as the station neared completion, and a week prior to the opening, Ken Bytheway, who was to be station OIC, arrived in Longreach. Vern Kenna, Divisional Engineer and Sam Ross, Supervising Engineer came up for the official opening on 19th March. The opening ceremony was broadcast from the Shire Hall at 8PM. The ABC announcer was Clive Harburg. He introduced the chairman of the Longreach Shire Council, E.R. Edkins, who spoke briefly.

Messages from the chairman of the ABC R.J. Boyer, the Postmaster General Senator Cameron, and the Minister for the Navy and member for Kennedy W.J. Riordan had been recorded on disk and were played from the transmitter. Next the acting manager for the ABC in Queensland, E.J. McCann spoke from the hall, followed by the deputy chairman of the Longreach Shire Council, M.M. Ramsden, and a representative of the citizens of Longreach, W.G. Clarke.

At 8.20PM the station crossed back to the Brisbane line for normal regional program.

As frequently happens, there were still various jobs to be completed even though the station was on air and a depleted installation staff tidied up the loose ends in the next few weeks. A new field strength meter, RCA type 308A, arrived and Talty and Sanderson made field strength measurements on the main roads out of Longreach, to Winton, Windorah, Barcaldine and Blackall.

Cec Morris went to Longreach in June of 1947 as a representative of the Radio Service Division and while there, measured the figure of merit of the aerial. The polar pattern was slightly elliptical with the long axis in line with the sloping top of the aerial wire. The figure of merit was 87 millivolts per metre at one mile for a kilowatt radiated. The actual average value of field strength at one mile from the station was 40 millivolts per metre. Ground conductivity on the inland plains is very good and this small station with a rather inefficient aerial had its half millivolt per metre contour at a distance of 60 miles.

4QL continued to operate on the Oman engines until new generators were commissioned at the Longreach power house in mid 1948 giving a normal 50cps A.C. distribution which the station could use. On 1st September 1948 the station frequency was changed to 540kcs and Sanderson went out to make the alterations to the transmitters and aerial coupling.

No further major changes occurred at the Post Office site and the new 4QL was established across the river at Cramsie in 1954 with the closure of this first, temporary, station.

4QL CRAMSIE SITE

On one of his visits to Longreach, the Divisional Engineer Vern Kenna had examined two possible sites for the new high power station. One of these was just out of town on the Jundah Road near the rifle range reserve. It was a barren site and unattractive, with the heavy black soils characteristic of the area which become very difficult to traverse in wet weather. The low lying Gin Creek region between town and site was also a potential problem in the wet season.

This site was not finally chosen.

The other site was west of the Thompson River adjacent to the rail siding of Cramsie on the Longreach to Winton main line. It also was likely to be difficult to reach in flood time although the railway was less flood-prone than the road and in addition, the Shire Council had a motor boat for emergency river crossings. The actual site area was mostly of red stony sand and was thus a better wet weather proposition. In addition, being near the river and away from the goats of the town common, quite a lot of trees and shrubs existed and provided some relief from the empty plains so common on the town side of the river.

All things considered, Cramsie seemed the better site and application was made to the Shire Council for transfer of a suitable area of Portion 9, Parish of Kateroy, adjacent to the town of Cramsie, originally surveyed by H.S. Cottrell in October 1894. Cramsie, originally known as West Mount Cornish was first occupied in 1871, probably as an outstation of the Mount Cornish pastoral property. The town never developed, since when the railway had reached Longreach, the settlement grew up there and as the need for teamsters declined, Cramsie became merely a cattle and sheep trucking rail siding.

It is interesting to note that commercial station 4LG occupies what was originally surveyed as the Cramsie School reserve quite close to the 4QL site.

Aviation clearance for a high mast on the Cramsie site was obtained and in March 1948 foundation test bores on the new site were made around the proposed mast location.

Because of the flood isolation problem it was decided to build several staff houses as well as the main transmitter building.

In July 1948 news of the frequency change down to 540kcs came through and application was made for more land due to the increased size of the earth mat required for this lower frequency.

As it now appeared that there would be some delays in getting the site and buildings ready, it was decided that the STC 10kW transmitter on order for 4QL should be diverted to 4RK where it could be put into early service. The main 10kW unit finally used at Cramsie was an AWA BTM10, type J56700, Serial No.3.

Considerable time elapsed while land acquisition was in progress and it was not until June 1949 that agreement in principal to the transfer was forthcoming from the Queensland Government pending a full site survey by the Department of the Interiors' Property and Survey Branch. This survey was complete by October 1950 and the acquisition notice to acquire the land for "telephonic purposes" appeared in the Commonwealth Gazette dated 4th January 1951.

Electricity supply for the proposed station was no problem as the Council had extended its 6600 volt mains from the town pumping site beside the road bridge on the Thompson, to commercial station 4LG situated close to the 4QL site in 1950.

Building progress was slow however, Plans were submitted in 1951 but due to shortage of money and materials they were not approved by the Interdepartmental Committee on Works until early 1953. Tenders were immediately invited and a contract arranged in April with K.D. Morris and Sons of Grey Street, South Brisbane for the erection of the building. There had been suggestions that prefabricated houses would be used for staff quarters, but in the end, conventional timber framed houses were built. There were four of these. The transmitter building was completed in June 1954.

The electrical contractors were local, Murray and Schoermer of Eagle Street, Longreach.

By July 1954 the site had been cleared and the coupling hut for the first aerial, a four pole Delta, was erected.

The Delta aerial which was intended as an interim radiator until the main half wave vertical was installed, consisted of four wooden guyed masts each 80 feet high set in a square formation of 132 feet a side. A square ring of aerial wire was attached to the pole tops and from each corner, a wire was brought down to a point just outside the coupling hut. The aerial was in fact, a square pyramid standing on its apex. The copper wire conductors were formed into a four wire cage to give lower reactance and to reduce the possibility of corona with the proposed 10 kilowatt input. This aerial continued in full time service until the main half wave vertical was ready in August, 1959. It was then kept as a standby until 1978 when it was replaced by a new steel mast, the wooden masts by then having deteriorated.

The Delta base resistance on 540kcs was only 2.8ohms so that the input current was about 58 amps.

The Delta design was written up in PMG Report No.4 by S.F. Brownless, one time engineer in the Central Office Melbourne, and recommended as an economic standby aerial for a 10kW station.

The figure of merit of this aerial was determined by Sanderson and Palmer in February 1955 (Queensland Engineering Report QB82) to be 143 millivolts per metre at one mile for 1 kilowatt input.

The earth system for this aerial consisted of 60 radial wires each 450 feet long.

The transmission line was a conventional 6 wire supported on steel pipe poles.

The 1978 replacement for the old Delta was a steel lattice mast of triangular cross section, 2ft a side and 200 feet high. It was top loaded with 9 wires each 120 feet long at 45 degrees. At 540kcs this system was close to resonance, with a base impedance of $12.2 - j0.6$ ohms.

Duncan Russell-Hall's line staff dismantled the old Delta and erected the new vertical.

Commissioning the new aerial was done by Tom Wedderburn-Bishop, engineer, and Gordon Gilbert STO of Broadcast Operations. Early in 1954 the racks of equipment for the new installation were being prepared in Brisbane at the Perry Park Assembly Depot and when the AWA transmitter was delivered, installation began at Cramsie.

The project at Cramsie was under the control of Gordon Gilbert, Supervising Technician, assisted by Bernie Hogue and others. Brisbane office supervision was by Bernie Duggan, with Frank Sharp the installation section engineer.

The new station came on air on 6th December, and the original equipment at the Post Office site was dismantled and removed. The fate of this equipment is not known. The RF valve line up of the AWA BTM10 was 807 oscillator, 2 parallel 807's in the buffer, 833 triode driver and three parallel connected BR191 triodes as final.

The audio section was push pull throughout using 807's and 813's driving a pair of BR191's as modulator.

Minor H.T. rectifiers were 872A mercury vapour. The main 5KV H.T. rectifiers were 5563 gas thyratrons, but these were changed in April 1968 to General Electric A27P controlled avalanche silicon diodes. Tony O'Brien and Lou Herman made the change.

In 1956 a standby 2kW, Philips 1656, was delivered and installed by John Holland. The installation engineer at that time was Greg Grant. This unit was arranged for automatic changeover in the even of a main transmitter failure.

The valve complement was 6V6GT's in the oscillator and isolator stages, 807 and QB3/300 as RF amplifiers and four TB4/1250 triodes in parallel in the final.

The audio section was push pull throughout and used 6V6GT's, 807's and four TB4/1250's in push pull parallel as the modulator.

Three 872A mercury vapour rectifiers provided 3000 volts H.T.. As with the main transmitter, the H.T. supply was subsequently converted to silicon diodes.

This Australian made Philips transmitter was ready for service on 10.5.56 .

Water supply at Cramsie was a continuing problem. Several sources were considered in 1954, surface and underground. An artesian bore was thought to be too expensive and had no guarantee of quality as the Longreach town bores were quite unsuitable for drinking, being chemically loaded and mixed with occasional burst of evil smelling gas. One radio officer boasted that he could set fire to his bath water!

The second proposal was to draw water from the Cramsie lagoon while the third and finally accepted scheme was to take water from the town river pumping supply. Accordingly a 1.5 inch galvanized iron pipe was run from there to the station. This was untreated water so a filtration and chlorination plant was set up at 4QL. It gave reasonable service, but low pressure to the houses was frequently a problem.

In 1957 agreement was reached with the Longreach Golf Club at Cramsie to tap water from the 4QL line and this further complicated the operation.

Meanwhile the Longreach Council had converted the 4QL feed to main town supply via an old pipe to the river pumping station, but when this became leaky and difficult to maintain, it was abandoned at the end of 1962. As a result of this, a completely new line was laid at broadcast expense, from Longreach to the river in 3 inch diameter asbestos cement pipe, following the railway line. In 1968 the old GI pipe from the river to 4QL was replaced with a new 4 inch A.C. main which gave the station a good supply.

However the Cramsie stock trucking yard was allowed to tap off this new line and in 1969 the Council requested permission to take water for the new saleyards. Also in the dry weather of this year a local property owner R. V. Barnes, fearing that the Cramsie lagoon on his property was about to go dry, obtained permission to use the water supply. Another user in the early 70's was the contractor building the new railway bridge across the Thompson.

All these other customers had adverse effects on the supply of water to 4QL, and with meter readings and charging problems for supply and maintenance, constituted a continuing burden on the OIC.

In 1977 approaches were made to the Longreach Council to see if they would take over the line, but they would not agree to. Shortly after, the Council built a large earth dam at the saleyards and pumped from the Cramsie lagoon. This alleviated the 4QL supply difficulties to some extent, but as the station was by now mostly unattended, the water problem diminished.

As by 1985 four staff houses had been sold and removed there was no need for other than rainwater storage at the transmitter building, and the troublesome pipeline passed into the care of others.

The next event at Cramsie was the erection of the new vertical radiator. The contract went to Johns and Waygood of Melbourne and was signed in April 1955. However the company was busy with masts at Brandon and Mackay and the first steel did not arrive at Cramsie until January 1958.

Concrete foundation work for the mast base and guy anchor blocks was begun in May by the sub contractor J.J. Brooker and Sons of Rockhampton. The PMG inspecting officer was Ken Lund who took samples of concrete for testing.

Later in the year the main earth mat was laid by PMG radio line staff. It was conventional, being 120 radials of copper wire, each being 0.4 wavelengths long.

Johns and Waygood staff arrived in November to begin erecting the mast. It was almost mid summer and temperatures were so high that the steel became difficult to handle as the day progressed. Generally working hours were 5AM to 1.30PM to avoid the oppressive afternoons, and the mast was complete by February 1959. A local contractor installed mast lighting and line staff completed the 6 wire transmission line. Bill Graham-Wilson with trainees Bob Wheelan and Graham Crozier installed the aerial coupling equipment and after all electrical and mechanical checks were made, the new aerial system was put to work on the last day of August 1959.

The mast was 650 feet high, 8 feet a side triangular section with 3 guys at each of 4 levels and a sectionalizing insulator and inductor at 530 feet. Top capacity loading consisted of a horizontal circular armature 60 feet in diameter, and the coil at the section was adjusted to give the mast an effective height of 0.53 wavelengths.

Engineers Ron Tolmie and Brian Robinson measured and adjusted the coupling equipment. The figure of merit of the new mast was determined in January 1960 by Des Fulton, engineer of the Radio Service Section, and found to be 218 millivolts per metre per kilowatt per mile. This was rather lower than would be expected for such a structure, but comparable to similar section coil loaded masts at Brandon and Gracemere. Energy loss in section loading coils and adjacent steel work is the price paid for this type of construction. Reduction in physical mast height is achieved at the expense of reduced efficiency. However if this results in an improved ground wave to skywave ratio and an increase in the fading free service area, the overall situation is satisfactory.

As is customary at high powered broadcast stations, an emergency power supply was installed to minimise off air time in the event of failure of the commercial power mains. The first engine generator in 1954 was a Ruston and Hornsby 30H.P. diesel, type 4VRO, driving a 26kVA Brush 3 phase alternator. This was barely sufficient to carry the unmodulated main transmitter even with all other facilities switched off, but as the station was fully staffed, suitable power reduction of the transmitter was readily made, or the 2kW standby was used.

In 1974 a replacement set of much larger capacity was installed. A six cylinder 80H.P. Lister diesel coupled to a Dunlite 45kVA generator provided ample power to take the normal station load. When 4QL became unattended in 1976, there were therefore no complicated transmitter changes needed when using the emergency power.

So that the emergency set would not be called on to supply the small mast lighting load after hours if the mains failed, a 5HP Lister with a single phase 3kVA Dunlite generator was installed in 1973.

The original engine for the fire fighting pump was a 10HP Ford "Prefect", but this was updated some years later to a 24HP Southern Cross diesel, and the pump room was enlarged. Nine thousand gallons of water in 3 tanks constituted the fire fighting supply. Arrangements had been made when the station was installed for the Longreach fire brigade to attend 4QL if required, and an alarm was extended to the fire station. No fire emergencies have occurred at 4QL so far, although a lightning strike on the main mast in December 1974 severely damaged the coupling equipment in the tuning hut, necessitating its complete replacement. At the same time, a new mast section coil was installed, as the original had become unserviceable. This coil carried the mast lighting mains wiring and was built of "Pyrotenax". The insulation of the internal wiring had deteriorated due to moisture. An "Austin" transformer was used in the tuning hut to couple the 240 volt mains to the mast light wiring. This was a special low capacity transformer designed for use with medium frequency masts.

Engineer Paul Chippendale readjusted the mast tuning and loading. The current node was established at a height of 150 feet above base.

Flooding of the Thompson River has presented problems over the years. In flat country such as that bordering the river, extensive shallow flooding often occurs and can cover large tracts of land. Major floods actually reach to the edge of Longreach town, two miles from the river, and prevent travel on the Winton Road out to Cramsie.

All major floods have inundated part of the 4QL property and in 1955 the water was two feet deep at the site of the main mast. Consequently the base insulator is on a block three feet high to minimise interruptions. The station buildings and staff houses are on slightly higher ground and have never been invaded by flood water.

There were major floods in 1891, 1922, 1950 and 1955 and no doubt there have been others. To assist travellers who have a real need to cross the river and its adjacent channels in flood time, the Council has provided a motor boat ferry. Guide markers for this service were white painted branches of trees which stood above the flood waters.

The access track from the main Longreach - Winton road was frequently a problem. Any rain caused difficulties as several gullies had to be crossed. In wet weather the best road to Muttaborra was via Cramsie and heavy vehicles caused havoc to the access to 4QL. In dry weather there was considerable traffic to the saleyards and cattle trucking area adjacent to the station and the staff at 4QL suffered from the dust produced. Lengthy discussions with the Longreach Council were frequently necessary in an endeavour to minimise the nuisance.

The original program line to 4QL in 1947, and for many years after, was of 5kcs bandwidth and used a physical pair on the Rockhampton-Emerald-Longreach open wire trunk route. Later a general move throughout the network to 10kcs bandwidth necessitated the use of program carrier equipment and later, in 1978, part of this Telecom route was abandoned in favour of a sound channel on the Emerald -Longreach 2Gcs bearer which had been provided at broadcast expense for "phase 7" TV stations along the route. This bearer has its limitations, as early morning propagation fading occurs occasionally around sunrise, rendering the channel unsuitable for

broadcast use. Local taped music is available at the transmitter for such an emergency, however, and the Longreach ABC studio can take over if it is staffed at the time.

Until 1952 there were no ABC studio facilities in Longreach, but in that year in September a studio was built in the Shire hall, and some limited local program was produced. On 31st October 1958 a fire seriously damaged the Shire Hall which was later demolished and a new Civic Centre built. The studio was not touched by the fire, but due to the rebuilding it had to be moved, and space in the School of Arts building was provided.

A permanent ABC studio was eventually built in Duck Street in 1964, and at the time of writing it generates a large component of the 4QL daily program.

John Bopf was responsible for the equipment installation at this studio.

At Cramsie a double doublet receiving aerial was erected and two war time vintage Kingsley valve receivers type AR7 provided rebroadcast cover in the event of loss of the program line. Reception of Brisbane short wave transmitters VLQ9 and VLM4 was usually adequate for rebroadcasting speech or any essential services. Reception quality was usually inadequate to allow fine music to be rebroadcast, however. In recent times, the receivers have been replaced by a solid state Racal receiver type RA7915, and a rhombic aerial erected.

At one stage during the 1970's it was proposed to remotely control 4QL from Emerald 4QD using a Digitran type 63B system. This did not eventuate and the transmitter is switched on and off each day by a local timeclock. Urgent alarms appear at the Longreach Telephone Exchange where the technical staff are responsible for 4QL maintenance. The situation has now changed with the establishment of the Emerald Broadcast Depot and the Rockhampton Broadcast Service Centre, and the ultimate installation of automatic alarm telemetering over the normal telephone switched network. Beginning in the late 1940's high frequency radio transmitters and receivers were installed at selected post offices and some national regional stations throughout Queensland, to provide an emergency communications service within the PMG Department. The equipment provided at Cramsie was a 50 watt Racal SSB transceiver, type TRA55B with dipole aerials to permit operation on 9165 and 5390 kcs. The call sign was VL4KX and regular test transmissions were made to VL4EA in Brisbane. Over the years, as security of communications in the telephone network improved, the importance of the Auxiliary Radio Network as it was called, declined, and VL4KX became of little use following the removal of permanent staff from 4QL.

In 1977 another miscellaneous service was established at Cramsie, this time for telephone subscribers' VHF radio concentrator operation. A 200 feet high guyed mast was erected on the property with a small building for equipment at its base. VHF aerials were mounted on this mast for receiving and transmitting. Some minor distortion of the horizontal radiation pattern of the main 4QL mast was caused by this structure which was erected on the edge of the main earth mat.

When the last permanent OIC, Jeff Cirson, left 4QL in 1983, the problems of maintaining the property became obvious. At unattended stations small maintenance matters quickly become larger and without constant attention, a stage can be reached when it is not economic to retain all the facilities. Three staff houses were sold for removal and in 1986, faced with a major overhaul of the main transmitter building, it was decided to replace it. Approval was given for the erection of a small building behind the main structure, and to install in it a single 10kW new transmitter to replace the ageing BTM-10. This work was undertaken in 1988.

It is intended that the old building and the remaining house will be removed when convenient.

The new building is similar to that provided at 4RK, a Logan unit, but on stumps to avoid any possibility of flooding. The existing garage is now the emergency engine room, using the engine from the old installation. The new transmitter, a Nautel Amphet 10, Serial No. 236 has an output impedance of 50ohms, and via a J.N.S. TF10 50 to 200ohm matching unit, is connected to the 6 wire 200ohm transmission line at the terminal tower just outside the building.

A new coaxial cable has been laid from the transmitter to the standby radiator. This will obviate the awkward standby feeder connection previously made to the main line and will enable the main line to be freed for maintenance at any time. Panel mounted knife switches in the Logan building connect the transmitter to the coax line when required. The line is laid in conduit and is Andrews Heliax type LDF6-50.

A 50ohm test load supplied by Radio Transmission Engineering of Guildford NSW, is mounted on a bench adjacent to the transmitter and connected as required via a knife switch.

The officers in charge, both appointed and acting, at 4QL have been:

1947 - 49	Ken Bytheway
1949 - 53	Pat Albion
1954 - 58	Don Guthrie
1959 - 62	Keith Smith
1962 - 63	John Holland and Don Guthrie
1963 - 67	Bill Beeson
1967	Russ Dahl
1968	Ian Turnbull
1969 - 76	John Holland
1976 - 80	Allan Abbott, Dave McLeod (Caretakers from Longreach Exchange)
1980 - 83	Jeff Cirson
1983 - 88	Longreach Exchange Staff
1988 -	Rockhampton Broadcast Service Centre staff.

Many other staff have served at this rather remote but very important station. Living conditions in the Central West are frequently uncomfortable due to the location and the climate. In summer it is the excessive heat, in the Wet it is mud and floods and at most other times, flies. Nevertheless the station has been operated effectively for over 40 years and continues to serve the inland communities as it was originally intended to do.

4QB PIALBA

With Rockhampton and Townsville served by regional transmitters and the Dalby station under construction, attention was turned in the late 1930's to the Maryborough district.

Once again site investigation was the responsibility of the PMG Melbourne Research Laboratories, and a party made tests at two sites, probably in 1937. The test transmitter was believed to have been rated at 500 watts and a T-aerial supported by two 60 feet masts was used. The sites were Pialba and Oakhurst, the latter being about 5 miles west of Maryborough. A field strength map was prepared showing the two service areas, but no power or operating frequency was indicated.

No further progress was made and the war intervened. However the matter was not forgotten and from the survey evidence, Vern Kenna, the Divisional Engineer of the Radio Installation group, selected the present Pialba site during the early 1940's.

In 1944, Col Elworthy, an Engineer of the Radio section, went to the Pialba site with a surveyor of the Department of the Interior and took test bore samples with a hand auger to determine the nature of the ground so that the anchors and base block for the proposed mast could be properly designed. Queensland Engineering Report QB4 describes this work.

In October of that year a contour survey of the site was made, probably by Ray Myler of the Drafting Section, and a site plan was prepared showing the mast location and the layout of the earth mat. Negotiations for the purchase of the property had been going on for some time and acquisition was advised in the Commonwealth Gazette on 26th April 1944. The property was obtained from W. Skillington and was described as Resub A of Sub 4 of Por 4, Parish Urangan, Country March. The area was 54 acres, 3 roads, 3 perches. It had been used for a limited amount of agriculture but on acquisition was lying idle.

The opportunity was taken to lease a house and land known as "Seaby", from Mrs Fairlie, situated across Long Street from the main block. At the expiration of the lease in 1953, the "Seaby" property was purchased for the Commonwealth. This house became the transmitter building, and a 2kW AWA transmitter type 4J5129 was installed in it. The valve complement of this transmitter was oscillator 42 pentode, buffers 807, drive 805, power amp four 833A triodes. 6J7G pentodes were early stage audio amps, followed by an 8003 driver and four 833A triodes in the modulator. High tension rectifiers were mercury vapour diodes 872A. A cathode ray tube was mounted on the front of the cabinet displaying a trapezoid modulation depth pattern. The installation began in 1947 with Otto Burmester in charge. His team comprised Ian Byrnes, Jim Plunkett, Les Nauman, Dinny Lorrigan, Fred Emerson and A. Dorwood. Vern Kenna was Divisional Engineer responsible for the installation and Geoff Beetham assisted with planning in the office and on site.

The call sign was 4QB and the operating frequency allotted was 560kcs.

A steel lattice mast 250 feet high and guyed at two levels was erected by contractors Johns and Waygood in August 1947.

The transmission line 1026 feet long was of 6 wire, 200 ohm impedance and the coupling unit, L-C type, was housed in a metal box which was part of the line terminating tower at the base of the mast. A single turn loop about 10 inches in diameter was inserted in the feeder between coupling hut and mast, to provide some extra impedance to lightning currents.

The earth mat comprised 120 radials of 200lb copper wire, buried 6 inches, each 720 feet long. In addition a circular copper mesh screen was laid around the base of the mast to a radius of 38 feet. It was woven of 100lb wire into a 1.5 inch square mesh. This screen was installed to observe the improvement in efficiency due to the lower loss in the ground near the aerial base.

The figure of merit of the system was measured before and after the installation of the screen. The values were 163 and 170.4 millivolts per metre per mile per kilowatt. Considering the cost of installation, the screen was scarcely worthwhile, and the experiment has never been repeated. The aerial resistance without screen was 11.8 ohms and 10.1 ohms with screen. Col Williams made the field strength measurements, and Vern Kenna reported the results in Queensland Engineering Report QB8.

Mast obstruction lighting was provided with choke feed in the coupling hut. Two engine generating sets for emergency power were installed in a garage behind the transmitter house. They were a Southern Cross diesel driving a 30kVA Braybon generator, and a Lister diesel type 38-4, Serial 60/11701, driving a 27kVA Mawdsley generator.

The station was opened on 14th January 1948 and transmitted the ABC Regional Program, carried by PMG landline from Brisbane.

The official opening was held in the Maryborough School of Arts at 9.15PM when a recorded speech by Senator D. Cameron was played. The Federal Member for Wide Bay, B. Corser had also recorded a speech for the occasion. The ceremony was attended by the Mayor of Maryborough, alderman R.D. McDowell and the ABC was represented by its chairman R.J. Boyer. G. Glenister the ABC'S assistant Queensland Manager, B. Wright the Queensland news editor, and announcer Ted Sheppard had also come up for the occasion.

Entertainment was provided by the Maryborough Federal Band under the baton of J.J. Kelly. Agnes Tait at the piano and Harold Hodgkinson baritone also performed.

A report of the opening was carried in the Maryborough "Chronicle" in its issue of 15th January.

For local broadcasts, a studio was later installed in the School of Arts building, where the first ABC Regional Officer was Hugh Peddie. This was not completed until November 1950 however.

The first OIC of the station was Gordon Andrews who enjoyed the Pialba holiday resort until 1964. He was followed by Keith Ross and in 1976 Russ Dahl took over and is still in occupation.

560kcs was an interim frequency, and in a major shuffle of wavelengths in Sept 1948, Pialba was given 910 kcs. This resulted in the aerial operating at a quarter wavelength and a new figure of merit measurement was made by Doug Sanderson and Maurie Palmer in March 1953. The new value was 194, and considerable improvement over the old figure of 170. However the higher operating frequency suffered greater attenuation and the service area was reduced in size, the field strength on average falling at least 6db.

This brought renewed requests for "something to be done for Maryborough" and in 1953 there was a proposal for a power increase to 10kW. A building layout was prepared, but the project was not advanced at that time. A 10kW transmitter with a 2kW standby was proposed.

Ten years later, a second 2kW transmitter was installed, giving the station staff greater peace of mind. A single transmitter installation was always a source of staff anxiety. This transmitter was similar to the existing unit, and had been recovered from 4RK.

Noel Medlin an engineer from the Australian Broadcasting Control Board visited many areas in Queensland during February and March 1959 and made recommendations for improved broadcast services. This plan for the Pialba service area envisaged a directional array for 4QB to improve the signal in Maryborough and Bundaberg and a 10kW transmitter inland in the Abercorn district operating in synchronism with 4QB on 910kcs.

This plan formed the basis for the ultimate arrangement of a 10kW station at Eidsvold, omnidirectional, and a directional two mast aerial system at Pialba also operating at 10kW.

During 1963 plans for a new transmitter building at the corner of Halcro and Long Street, in the north east corner of the main property were under discussion and were finalized in November of that year. A contract was let in April 1964 to Hug Brothers of Maryborough for the building erection and it was available for installation in January 1965.

Two STC 5kW type 4SU-55B transmitters, serial numbers 64472 and 64475, with a combiner type 792SU-ID were installed in the new building.

John Searle was the engineer in charge, and his field OIC at Pialba was Jim Plunkett who was assisted by Les Nauman, Col Huddy, Jeff Adams and Ron Sergeant.

A new emergency engine generator was also provided, a Lister HAG diesel driving a 30kVA three phase 415 volt alternator. This was an Electric Construction Company RF17 KG-5 machine. An underground 400 gallon fuel tank was installed with a 45 gallon internal tank refilled by hand pump.

To provide the directional characteristic required by the original Medlin plan, two vertical lattice steel masts were supplied and erected by the Electric Power Transmission company. The triangular section masts were 8 feet a side, and 450 feet high. To give additional electrical height a 70 feet diameter top loading frame consisting of six arms with fill in wires was provided. The masts were 270 feet apart and on a 79 degree true bearing.

A combined earth mat was laid, each section containing 120 radials, the longest being 730 feet.

These new masts were erected on the site of the original 4QB radiator and as this was removed before the new masts were built, a standby aerial was provided as an interim measure. It was of 8 inch diameter steel pipe, 150 feet high and matched to the 200 ohm 6 wire transmission line with a tapped inductor. Its base impedance at 910 kcs was $12.2 - j 115$ ohms.

A limited survey of its service area was made by Keith Ross in March 1965.

This standby radiator was erected in the south east corner of the site and it was necessary to clear the Paper bark melaleuca trees from the area. This was done by W. Miller of Nickenbah in September 1964, supervised by lineman Robin Bell.

The directional pattern of the new installation was roughly cardioid with a small lobe towards the east. The power division and phase control components were mounted in the coupling hut of the east mast.

Coaxial cable for the transmission line had been considered at one time, but 200 ohm open wire 6 conductor line was eventually used.

Obstruction lighting equipment was provided on the new masts but was not required until April 1971. The masts were however, painted in international orange and white. The original mast had been lit and had proved to be of value to fishermen in Hervey Bay. When the new masts were found to be unlit, the local Chamber of Commerce lodged complaints, but it was some years before the Pialba fishermen's beacons were again seen across the Bay.

As the service was to be synchronized with the new Eidsvold transmitter, very high stability crystal oscillators by Sulzer of USA were provided. Extensive measurements were made by Central office Research Section staff, to determine the audio delay to be inserted in the Maryborough to Pialba program line at 4QB to ensure the correct phase relation between the audio inputs at the Pialba and Eidsvold transmitters. This phase relationship was important as it minimised the distortion experienced by listeners in the zone around Biggenden where the carriers were of almost equal strength. As the control oscillators were maintained slightly off exact synchronization, the carriers drifted into and out of phase over the common reception area, at a rate of approximately once in every 1 and a half minutes. Distortion was most evident at the time when the carriers were out of phase.

Measurements of the characteristics of the program lines were made by the PMG Research Laboratories staff and suitable delay equalizers designed. The work was described in Research Lab. Report No.6088 by Subocz and Yelverton. A.J. Gibbs designed the equalizers at the Research Labs.

At this time, the program to both stations was fed from a common point at the Maryborough Exchange and open wire lines were in use. Over the years, these lines were changed and cable carriers and broadband microwave routes were used. Audio delay of a fixed amount was no longer attainable and reception in the carrier overlap zone deteriorated somewhat resulting in much public complaint. The problem was compounded by the use of 910 kcs which, being twice the usual intermediate frequency of superheterodyne receivers, resulted in a whistle being heard in most sets when tuned close to the frequency. This was a nuisance until the frequency was changed to 855 kcs in November 1978.

The new transmitters were put on test in October and early November and went to air officially on 8th November 1965.

The old 2kW transmitters were recovered, one going eventually to Christmas Island, while the other was used by the Wireless Inspector in Brisbane to test candidates for Broadcast Operators Certificates. This one eventually went to the Technicians Training School in Hesketh House, Elizabeth Street, Brisbane where in 1986 it still was.

The transmitters were refurbished at the Radio Installation Assembly Shop at Perry Park, Brisbane by Tony O'Brien, Gerry vanderhoven and Jim Weeks.

The old Lister engine generator was sold.

The Southern Cross set had previously been removed and installed at the Brisbane Metropolitan Studios, then at Alice Street, in the city.

In October 1966 a field strength survey of the combined stations Pialba and Eidsvold was made by Doug Sanderson and in July 1967 a figure of merit and polar diagram check was done by engineer Ian McBryde. After the frequency was changed to 855 kcs by Sanderson, Gordon Gilbert and Garry Waite, another polar pattern check was made. While adjusting the current sampling loops half way up the masts, staff were attacked frequently by magpies which had nests in the mast.

The design report for the Pialba aerial tuning system was prepared by Ken Endacott of Central office in 1964. All the components were assembled at the Perry Park Installation Depot, the large inductors being manufactured by Brisbane PMG Workshops.

"Other staff" activities at 4QB have been the installation of a small guyed mast and the provision of a single channel VHF radio telephone system for Orchid Beach on Frazer Island, and the building of a PMG Line Depot on part of the north west corner of the broadcast site, fronting Halcro Street.

As staff retire or move from the station, 4QB will eventually become unattended and be maintained from a proposed Maryborough district Broadcast Service Centre probably located at Childers.

4QY KAMMA

4QY the National Regional station for the Cairns district, went to air on 20th January 1950, providing an effective service in an area hitherto relying on an indifferent signal from 4AT Atherton.

A station for Cairns had been under consideration for many years and a propagation survey had been undertaken by the Melbourne Research Laboratories of the PMG Department in 1937. Tests were conducted from a site known as Green Hill about 4 miles north east of Gordonvale.

The outbreak of war in 1939 put a stop to plans for the Cairns Station, although some relief was obtained in 1941 when the Commonwealth Government took over the Atherton commercial station 4AT, and converted it to national status. The signal in Cairns was only 300 microvolts per metre with possible fading at night, so that a more powerful local transmitter was badly needed.

In November 1944 Vern Kenna, Divisional Engineer, Broadcasting in company with a Properties Officer of Department of Works, named Harrison inspected several likely sites in the Gordonvale area and recommended one 3/4 mile east of the railway siding of Kamma, 3 miles north of Gordonvale.

The district is devoted to sugar cane cultivation with very little unused land. However the 32 acre property at Kamma was unsuitable for cane and was covered with small and medium timber, and was available for purchase from its owner, Giovanni Piacentino, at a price much less than sugar cane land. The property description: part of Sub 3 of Portion 175, parish Trinity, county Nares.

The purchase was finalized and notified in the Commonwealth Government Gazette in January 1946.

Shortly after this, in March 1946, a contour survey of the site was made by Department of the Interior surveyor J. E. Stevenson and this enabled details of mast guy lengths to be calculated.

As the site was on the aircraft route to Cairns some discussion took place with the relevant authorities as to the allowable mast height, and this was finally decided on as 135 feet. For the expected station frequency of 890kcs this was a very short mast, but the field strength subsequently produced in Cairns was adequate at that stage of the city's development.

The mast was of triangular cross section and guyed at one level only. The structure did not need to carry aircraft warning lights and was not required to be painted.

A contract for the supply and erection of this mast was let with Johns and Waygood who completed the structure in April 1948. At this stage the site had been cleared only to the extent necessary for the mast erection and it was not until early 1949 that the remainder was cleared to allow laying of the earth mat. This was of the type now normally used, 120 radials each about 0.4 wavelengths long. This work was done by Radio Section line staff, who also built the RF transmission line, the first 6 wire type to be used by the National service in Queensland.

Plans for the transmitter buildings had been under discussion since mid 1945 and by December of that year the Department of Works and Housing had finalized a plan. A contract was let in December 1947 to Kyneston and Andrews of Cairns and the building was completed in December 1948.

Equipment installation began early in 1949 with Bill Graham-Wilson, John Talty, Alec Barron and Zig Fergus. Some preliminary work had been done by Ian Byrnes and Bob Britten, but they did not continue.

The main station switchboard however, was not built and installed until November due to restrictions and post war material shortages. The board was built by a contractor in Brisbane and railed to Cairns.

The transmitters supplied for 4QY were STC 2kW output, type 4SU-14. Two were obtained and operated as main and standby. The valve line up in these transmitters was crystal oscillator 6V6G, isolator 6V6G, buffer 807 (2 in parallel), driver 3C/150A, power amplifier push pull pair of 4279A triodes. The audio chain was push pull throughout. 1st audio 6J7G, 2nd audio 6V6G, 3rd audio 3C/150A, cathode follower driver 3C/150A, modulator 4279A. The high tension rectifiers were mercury vapour 872A.

The 4279A valves eventually became obsolete and STC produced a slightly modified version, the 4279Z. These valves were then used in all 4SU-14 transmitters without modification. An emergency engine generator set was installed. It was a reconditioned Ruston and Hornsby VSO/3 diesel driving a Bayley and Grimster 415 volt 15kVA alternator.

A Coventry Climax fire engine and pump was installed in a separate shed and later 4000 gallons of fire water was held in two tanks.

The lengthy installation time of one year was due to post war shortages of material and also to prolonged electricity and rail strikes, but by January 1950 all was ready. Final testing and commissioning of the station was done by Arthur Clark of the Brisbane office of the Radio Installation Division.

The program line from Brisbane in those days was on the open wire route, with an audio bandwidth of 5kcs and it was not until 1967 with the provision of improved PMG facilities that a 10kcs bandwidth was available.

4QY was officially opened at a ceremony held in the Cairns City Council chambers with 80 invited guests present. It was reported in the "Cairns Post" of 21st January 1950. On Friday night at 6.53PM on 20th January 1950, recorded speeches were played over the program line from Brisbane, by the Postmaster General H.C. Anthony, the Chairman of the ABC, R.J. Boyer and the Member for Leichhardt, T.V. Gilmore. This part of the program was taken on relay to other ABC stations.

Following the regional and national news bulletins a program of local entertainment was held for the guests, presided over by the Mayor of Cairns, Alderman W.H. Murchison. Between 7.30 and 8.30PM the following artists performed: Eleanor Morris (piano), L. Roberts (baritone), W. Hughes (viola), Mrs A. Roberts and Mr L. Wynne (duet) with Joan Wilmett as accompanist.

Eric Sholl the Queensland ABC manager said that it was hoped to establish a studio in Cairns soon, and that accommodation was being leased for that purpose. The local studio was actually installed some years later at the corner of Abbott and Shields Streets and operated there until 1965. By then the ABC had assumed technical control of studios and the new equipment was installed by ABC staff in the State Government Insurance Office on the corner of Shields Street and the Esplanade.

The first officer in charge of 4QY was Eric Gough who spent seven years there.

Although discussions had been held between the relevant Government Departments as early as 1948 and preliminary plans drawn up, no residence for the OIC was available until November 1954, almost five years after opening. A modest low set house was built next door to the transmitter building on the eastern side. The contractor was A.L. Underwood, of Cairns.

Aerial efficiency measurements were made in March 1950 by Doug Sanderson of the Radio Laboratory and detailed in Queensland Engineering Report QB24. At the operating frequency of 890kcs the figure of merit of this short mast was 134 millivolts per metre at one mile for one kilowatt.

In July 1952 a field strength survey of the station's coverage was made by George Barr of the Radio Laboratory staff and the results recorded in Queensland Engineering Report QB48.

The first major operating change occurred in September 1953 when the frequency was changed to 940kcs. This had the effect of increasing the electrical height of the aerial and the efficiency of radiation improved, giving a figure of merit of 153. The station was to operate on this wavelength until January 1971 when it moved back to 800kcs. In November 1978 another round of changes occurred when the 9kcs carrier spacing rule came into effect. 4QY was allocated 801kcs at this time where it remains at present. The figure of merit at this frequency has not been measured but is probably not much better than 100.

During 1956 an automatic fire alarm system was installed in the transmitter building and connected to the Gordonvale Fire Station.

Eric Gough left in 1957 and Gerry Elliott took charge for a year until Don Guthrie arrived and stayed for the next 10 years.

The last OIC of 4QY was Ern Long who saw the end of full time staffed maintenance in 1973. The station then became unattended and was serviced by staff of Telecom's Cairns Radiocom and Broadcast Centre until the formation of the new Queensland Broadcasting Branch's Cairns Broadcast Service Centre in 1986.

When the station became unattended, it was made more secure against possible cyclone and storm damage with strengthening of doors and the provision of mesh across windows and ventilation intakes.

Not long afterwards, in February 1977, the now uninhabited residence was sold to D.M. McDougall and Co. of Edmonton and removed.

Life passed peacefully enough at 4QY during the 1950's, although a severe cyclone in 1956 cut the electricity supply to the district and the station ran on the emergency engine generator for four days. Eric Gough's report on this cyclone is interesting.

Cyclone - 6th March, 1956 - 4QY Report Damage: There was no damage done to any of the 4QY technical installations. The only building damage was one blind blown down and one water tank overflow pipe blown down at the station building.

Commercial Power: The commercial power supply was interrupted at 6.40AM on Tuesday 6.3.56. It was restored at 9.15AM on Friday 9.3.56. There was also a 9 hour interruption on the following Saturday, and a 2 hour interruption on the Sunday.

During all of the above periods the station's emergency diesel generator was operated. No trouble was encountered with the emergency power supply.

Programme Line, Brisbane - Cairns: The programme line was lost south of Townsville at 7.40PM on Monday 5.3.56. Substitute service was provided, but all lines were lost south of Townsville 18 minutes later. The programme line from Townsville to Cairns was lost at 9.00AM on Tuesday 6.3.56. On Saturday, 10.3.56, a carrier channel was restored at 3.30PM, a 5kc line was provided at 4.30PM, and the programme line was restored from Townsville to Cairns at 6.35PM.

During all of the time that there was no programme from Brisbane reaching Cairns by land-line, the normal programme was broadcast with the aid of the 4QY receiver.

Local Broadcasts: Although the normal programme and the programme patch lines were lost between Cairns and 4QY from 9.00AM on Tuesday until 12 Noon on Saturday, 4QY was able to use one of its two cable pairs to the Cairns Trunk Room.

All the scheduled sessions from the Cairns Studio were broadcast by 4QY. In addition, a couple of urgent police messages from the Cairns Studio, were also broadcast.

Emergency Communications: At no time was Kamma out of communication with Cairns. Although 4QY had lost its programme and programme patch lines to Cairns, there were still 2 cable pairs operating. 4QY was able to use one of these pairs for telegraphic communication to and from Cairns Telegraph Room.

It was noted that 4QN could work a transmitter and a receiver on his outstation network, and at the same time operate a transmitter and a receiver on his Brisbane circuit. 4QY was able to operate one transmitter and one receiver on the emergency network at any one time. Accordingly, 4QY contacted 4QN and noted that he could work Innisfail and Cooktown successfully. 4QN then handled the essential traffic from these stations. VL4EW, Atherton, was also able to be of assistance with Cooktown and Innisfail.

4QY then concentrated on handling traffic from the Cairns Telegraph Office to the Brisbane Telegraph office. This circuit was closed down at 7.00PM on Friday 9.3.56.

In all, approximately 1000 telegrams and 2000 words of press were either sent or received through 4QY's emergency communication.

E.W. Gough Supervising Technician. 4QY, Cairns. During the 50's the PMG Department had set up a network of high frequency transmitters and receivers in remote areas so that emergency communication could be maintained between Post Offices and major centres. The equipment for the Cairns district was installed at 4QY. The first unit was an ATM 150 transmitter for low power C.W. working and later a 200 watt AT 14, with the call

sign VL4ER. These old units were replaced in 1962 by a 60 watt Racal transceiver designed for single side band voice operation.

Regular tests were made from zone centres such as 4QY to the control centre in Brisbane, with its receivers at Capalaba and transmitters at Hemmant. The main frequencies allocated for this emergency service were 5390, 9165 and 12210kcs. Dipole aerials cut for these frequencies were erected at all centres. Other aerials installed at 4QY were for receiving the Brisbane Inland HF stations VLQ9 and VLM4 for use as an emergency program source in the event of program line failure. In the early days when the long open wire route was in use from Brisbane to Cairns there were occasional failures. One double doublet high frequency aerial and a rhombic were provided for this service.

Some additional aerials were erected in 1965 when a private high frequency link was installed to work between Weipa and the Comalco office in Cairns. The equipment a 500 watt Racal was owned by the company, but PMG radio staff installed it. Two log periodic high frequency aerials were erected and to make room for these, the 4QY rhombic was removed. There was space however for the erection of a Vee aerial as a substitute for the rhombic.

By 1971 the Weipa system was no longer required and the company sold its radio equipment. The log periodic aerials were bought by the PMG Department and subsequently used for a private radio link from Cairns to the manganese mine on Groote Island. This service ceased in 1979 and one log periodic was dismantled. The Vee aerial, no longer used, was also removed at this time.

Just prior to this, small National and Commercial TV translators were installed in the 4QY building, and each mast of one log periodic was used to support one of the TV aerials.

In 1966 the Mulgrave Shire Council extended the water supply mains and 4QY was connected to "town" water for the first time.

No standby aerial was provided for 4QY until 1968 when a 100 feet high mast was erected some 315 feet to the west of the main radiator. This new mast was supplied by R. Edmondston of Marrickville and was erected by broadcast linestaff. Eight top loading wires, each 60 feet long at 45 degrees were provided to give an increased electrical height, and some rearrangement of the earth mat was undertaken, extending out to the west site boundary.

A coaxial feeder was laid of 71ohm impedance, and a network to match this to the transmitter output of 200ohms was provided. The aerial was matched to the coax with a tapped inductor.

Neil Howard was the engineer responsible for this standby installation.

Early in 1969, some 20 years after installation, the program input and test racks of equipment were replaced. Ken Vinton was the man in charge on the spot assisted by Peter Chew and Ron Cook. Neil Howard gave engineering supervision and Otto Burmester supervised the technical details. A new control desk was installed also, and the emergency engine room given an updated control cubicle.

The old Ruston diesel was eventually replaced by a new Dorman diesel driving a 35kVA McColl alternator, about 1973.

At this time plans for the operation of 4QY as an unattended station were being made and a remote control system was installed with the control centre at the Hartley Street Radiocom Terminal which was fully staffed. Engineers Dave Ellis and Paul Chippendale supervised the planning and commissioning of the system. The control equipment, a tone signalling system called "Interscan" was supplied by Cutler Hammer Australia Pty Ltd, and at this stage all maintenance staff were withdrawn from 4QY. Most were moved to the Radiocom Centre to form the nucleus of a broadcast maintenance staff responsible for 4QY, 4AT and 4MS.

With the formation of the Broadcasting Directorate within Telecom and the establishment of Broadcasting Branches in all States, operation and maintenance of 4QY is now in the hands of a purely broadcasting group with headquarters in Cairns. The OIC of this new depot is Bob Sullivan, whose staff travel widely in the Cairns district and are responsible for MF stations as far afield as Weipa, Thursday Island, Mossman and Atherton, and the many TV and FM stations in this large area.

4QA MACKAY

This regional station came on air in early 1951, but the possibility of such a service had been under discussion for some years before that. There is a Central Office Melbourne drawing dated June 1945 showing the estimated service area of a transmitter at Mackay using 2kW on 1160kcs into a quarter-wave vertical radiator.

Positive field work began in early 1948 when a survey of possible sites was made by Wes Halstead, Radio Survey Officer. Five likely areas were listed, west of the town at Erakala, south at Dundula and north along the road to Slade Point Road. The final decision was made by Vern Kenna, Divisional Engineer Radio Section for a site just inland from the Mackay Outer Harbour fronting Slade Point and this was obtained.

There were two blocks in the transactions, one undeveloped, owned by P. O'Loughlin, and the other containing a house, tank and windmill owned by J.H. Dalrymple. The house had been built in 1944.

Preliminary discussions with site owners had been held by T.B. Payne a property officer of the Department of the Interior, and Morrie Unwin OIC of the Rockhampton telephone district.

The survey check of the two properties was made by surveyor A.G. James in July 1949 and the purchases were finalized in September of that year.

A local PMG Department technician, W.B. Graham, occupied the house until December, when arrangements were made with a neighbour Mrs Bernard to keep an eye on the property until installation staff were on site.

A PMG Drafting Section surveyor, Ray Myler, made a contour survey of the property in October 1949 and plans were completed for the station layout.

The property was mostly low lying land, some of it tidal swamp but the area where the house stood was elevated and suitable for the transmitter building. A stand of melaleuca trees occupied the northern part of the low lying area, but the remainder of the property was clear. The permanent main transmitter building was not provided initially and the equipment was installed in three small wooden garages erected on site in 1950.

Two STC 2kW transmitters type 4su-14c, serial numbers 32279 and 32280 were obtained and installed in the temporary buildings. Only one was fully commissioned at the time, the second one not being ready for service for some six months afterwards. These transmitters were similar to those installed at 4QY Cairns in 1950, and are still in service 38 years later. The operating frequency was 720kcs.

The installers Maurie Palmer, John Talty and Alec Barron under the control of Bill Graham-Wilson arrived in 1950 and after the Radio linemen with Foreman Don Hall had poured concrete foundations, erected the three stations buildings which were available in kit form.

These wooden precut buildings were popular at that time as a low cost garage used at PMG lineyards. They had been promoted by Claude Faragher, one time Deputy Director Queensland PMG Department.

The lines team then turned their attention to the aerial system. An 8 inch diameter steel pipe mast was erected on the flat below the station ridge and connected via an L-C network to the transmitter with a buried coaxial cable. This was steel wire armoured, probably type AS26 of 100 ohm characteristic impedance to match the transmitter output.

The earth mat comprised 120 radials each 190 feet long of 200lb per mile copper wire.

The pipe mast was mounted on a steel frame about 3 feet high as the area was expected to be inundated in the wet season occasionally. The coupling hut was similarly raised. The precautions were justified, as heavy rain just before the opening date, 37 inches in 74 hours raised the water level alarmingly and staff had to wade in and recover the coupling components. The coupling cabinet and base insulator were submerged and the property remained a swamp for many months. Regular flooding has been a continuing feature of 4QA over the years and precautions were taken when the permanent aerial system was installed seven years later.

The mast was guyed in four directions, at three levels, and eight top loading wires each 106 feet long were installed at 45 degrees from the mast top. This gave a base resistance of 8 ohms. No copper wire bonding was used, as the pipe sections were screwed.

The figure of merit of this electrically short mast was measured in September 1952 by Doug Sanderson and came out at 124 millivolts/metre/mile/kW.

Each transmitter had its own building and it was intended that the third unit would accommodate an emergency engine generator. However as this was not provided initially, the building was used as a staff room and office. The Engineer responsible for this installation was Frank Sharp, and the Divisional Engineer for installations was Mick Hall who took a keen interest in the proceedings and was present for the flood and the commissioning.

The program line from Brisbane in those days was open wire and the bandwidth was 5.5kcs. No local studio was provided in Mackay until some years later.

Program transmission began at 6.55PM on Thursday 18th January 1951 and the official ceremony was held in the Mackay Masonic Hall at 8.15PM, and relayed to interstate networks.

The Mackay "Daily Mercury" reported the action in its issue of 19th January.

A recorded speech by the Postmaster General H.L. Anthony was played to 100 guests. The local member C.W. Davidson also spoke. Senator I. Wood extolled the virtues of the local commercial station 4MK which had been the mainstay of broadcasting in Mackay for so long. However the balance was restored by Claud Faragher, the Director of Posts and Telegraphs, Queensland, who praised the work of the Radio installation team who built 4QA.

The ABC was represented by the Chairman R.J. Boyer, Eric Sholl the Queensland manager, the program director J.P. Wallis and the announcer Graham Webster.

Hilda Woolmer played two piano pieces and soprano Joan Pascoe, Florence Pollock mezzo and Peter Lettice tenor, entertained.

And so another empty space in the national radio coverage map of Queensland was filled in.

The permanent maintenance staff who took over after the opening were George Marshall OIC, Ian McManus, Bill Beason and Bob Moffat, technicians.

The station was fully staffed for the next 20 years. When Marshall left for 2CR Cumnock in 1956, he was succeeded by Don Oliver. Between 1961 and 1969 Ern Venables was in charge and the last OIC was Keith Byrnes. Of the original technicians only Bob Moffat remained at 4QA until his retirement, when permanent staffing ceased.

In 1971, station supervision was in the hands of staff at the nearby Mount Oscar Radio communications centre, who used a Telscan control system for surveillance. When the Broadcasting Directorate was formed within Telecom, a broadcast service centre was set up at Mackay with Arthur Naylor in charge, and the operation of 4QA reverted to Broadcasting Branch control in 1986.

But, back to the early days.

In September 1952 the station service area was measured by George Barr of the Radio Laboratory, who assisted Doug Sanderson with the determination of the aerial efficiency.

Preliminary sketches for the permanent building were begun in 1950 and revised in 1951. An estimate was prepared in 1952 but even by 1954 the plans were still under review. It was not until May 1957 that a contract to build was let to D. Pratt of Wood Street, Mackay and the work was completed early in 1958.

A fourth garage type building was erected by Premier Builders of Mackay in 1956 to house the first emergency engine generator which was installed in March 1957. It was a 25kVA Hodson and Gault 3-phase alternator driven by a Ford V8 petrol engine.

The contract for the station's main aerial was let to Johns and Waygood in early 1955. Some steel was delivered to the site in September 1956 but rain prevented a start.

Test bores and soil tests had been made on the location of the mast by Fred Percy and Greg Grant in 1954. Water was present not far below the surface and this made concrete anchor block installation difficult. Pumps were required. Bearing tests on the soil were done using a 500 gallon water tank mounted on a lever system to enable the desired tests loads to be applied.

A local contractor under J. and W. supervision began on the concrete work in October 1956 and despite rain, all concrete was complete by December. 1957 was a wet year and the mast erection did not begin until October. It was complete on 17th November 1957.

The new mast was 170 feet high, a steel triangular lattice of 6ft. side, guyed at 135ft. with a six arm 50ft. diameter capacity top. The mounting block was 6ft. high to avoid floodwaters.

The earth mat was conventional, 120 copper wire radials 547 feet long. It was installed by contractors, Redhead Bros. of Mackay.

As the transmitters had an output impedance of 100 ohms, a 9 wire unbalanced transmission line was built. There were 5 earthed wires and 4 active wires with a single wooden crossarm and conventional telephone type insulators on each pole of the line. This had a characteristic impedance of 103 ohms.

The aerial coupling box was also mounted above flood level, or so it was thought at the time. (It had subsequently to be raised even higher in the flood of 1977). The coupling unit was a simple L-C type to match the line to the 16.4 ohm aerial.

Brian Robinson was the engineer responsible for the aerial commissioning and the removal of the two transmitters from the garage buildings into their new home in 1958- 59. He was assisted by technician Maurie Palmer in May 1959 in checking the new enlarged service area resulting from the higher efficiency of the new aerial. The coastal strip was covered from Bowen in the north down to Flaggy Rock in the south and inland up the Pioneer River as far as Netherdale at the foot of the Eungella Range.

Some concern had been expressed at the odd shape of the radiation pattern and this was investigated by Ralph Bongers and Doug Sanderson in September 1960. It was found to be due to the original pipe mast acting as a parasitic radiator and the effect was eliminated by disconnecting the coupling unit from the mast.

The rather bare sandy ridge on which the station was built was gradually improved by the planting of cypress pines and coconut palms. These latter came from Coconut Avenue at old 4QN, Clevedon and were planted by Ian McManus.

Because of the frequent and sometimes long time immersion of the guy anchor blocks, the steel began to show signs of serious corrosion and to alleviate this, the concrete was built up so that the protruding anchor steel would be above normal water level. New anchor steel was built into the extended blocks and the guys were shortened. This work was done by the Radio linestaff in June 1966 and in November Johns and Waygood sent their Mr Carlson to adjust the guy tensions. The mast was guyed in three directions, at one level only.

The anchor block most frequently affected by swamp water eventually showed considerable erosion of the concrete at ground level and repairs were necessary in 1986.

In 1967 plans were prepared for a new engine room and this brick building was completed by the end of the next year. A new 6 cylinder Lister diesel driving a 35kVA Dunlite alternator type LADMF was installed by technical staff Ron Harris, Les Nauman and Jeff Laidlaw. It was commissioned by engineer Neil Howard. The old engine was sold by PMG Supply Branch in 1970.

About this time there was a general move to replace mercury vapour diode rectifiers with silicon diodes and the 872 and 5U4G mercury units were retired in August 1967.

The next major change occurred in 1970 when the program input equipment was replaced, the new items being installed in what had been until then, the office of the officer in charge. At the same time the station was prepared for unattended operation. Equipment to allow supervision and control from the Mackay Radiocommunications Centre at Mount Oscar was installed. It was a system known as "Telscan" made by Electric Control and Engineering.

Permanent staff were withdrawn from 4QA and by 1971 the station was unattended with control and maintenance as required, exercised from Mount Oscar, the headquarters of the Radiocom staff in Mackay.

In May 1972 the operating frequency was changed from 720 to 760kcs, the retuning being effected by Mount Oscar staff. The next change, to 756kcs was made in November 1978 when Australia changed to 9kcs carrier spacing.

About this time, town water was connected to the station but not to the residence. Rain water tanks and a bore had sufficed up to that time, but as tanks and bore had deteriorated it was economic to change to town supply. Various Telecom staff rented the residence until early 1976 after which it lay idle. In May 1980 the Postal and Telecommunications Department agreed that it was no longer required, and in November 1981 it was sold for removal to H. Ryan of Mackay. Only the concrete base remains today of what was in its time, a very attractive two storey country residence.

Investigations of the local drainage have been carried out at various times but very little can be done to minimise the collection of water on the property. Since the station was built, great local changes have taken place, with the building of a sugar storage terminal between 4QA and the sea, and the filling in of adjacent low lying land for industrial use.

In 1979 a narrow strip of the site fronting the Slade Point Road was transferred to the State to allow a new railway line to be built between the industrial area and the rail siding of Erakala.

Lightning damaged the old coaxial cable to the standby aerial in May 1983 and it was replaced with 50 ohm Andrews LD5-50, a move which necessitated the rematching of the mast and the transmitter output feed to the standby. Senior technical officer Chris Russell and engineer Kent Lechmere attended to this.

Early in the life of the station, a transmitter type AMT 150 and a receiver were installed to form part of the PMG Department's emergency network. This system was capable of working to Brisbane and had aerials for 5, 9 and 12 Mcs. It remained in use until the station became unattended in 1971.

Due to fears that floods in the Pioneer River might sometime damage the cables in which the 4QA program was carried, a VHF transmitter in the 160 Mcs band was installed to connect the local studio in Mackay to the transmitter. It does not seem that it was ever required and it was removed several years ago.

In 1986 station maintenance was taken over from the Mount Oscar Radiocom staff by the newly formed Mackay Broadcasting Service Centre with Arthur Nayler as officer in charge.

4GM GYMPIE

In 1867 James Nash discovered gold beside the Mary River at a place known as Gympie. It proved to be an exceedingly rich goldfield. The surface material first found had been shed from reefs of quartz and the mining of these kept the field active for over 50 years.

One of the reef mining areas was at Monkland in the hills on the southern outskirts of Gympie and it was here that 4GM was built in 1951. An old partly filled and covered in shaft on the property is today a reminder of the hectic days of the gold rush, and some corroded Chinese cash coins once found on the site, an indication that Chinese miners were at Gympie in the early days, as they were on most goldfields. Today the only ore crushers are in the Monkland mining museum and the area is residential and light industrial.

The first documentary evidence that a radio station was being considered for Gympie is a PMG Central Office drawing of an estimated service area for a station. This drawing CN392 of 29.8.45 was amended to CF44 several years later and the original specifications were erased. All that can now be seen is a faint note that a T aerial was proposed. A faint outer field strength contour for 0.5 millivolts per metre would indicate that either a low frequency or a high power was contemplated. Neither were to eventuate, the station finally being 200 watts on 1540kcs.

In November 1945 the Director General PMG Department, instructed Queensland staff to select a site and suggested that one south of town would best serve the small railway communities in the area. Brisbane office engineering staff inspected the district and early in 1946 asked the Property and Survey section of the Department of the Interior to inquire into and value a likely site. This was "Fairview" at the corner of Noosa Road and Fairview Street, Monkland, a small property owned by the Misses Cahill.

The property was on Fairview Hill at an elevation of 280 feet and its area was 9 1/4 acres. It constituted Portion 136 of Gympie Parish in the County of March. The area was largely overgrown except for an area around the owners' home fronting Noosa Road. The house was estimated to be about 60 years old at that time.

The property was for sale and negotiations continued until late 1949 when the acquisition was gazetted. The gazette noted that the land was now Commonwealth Government property to a depth of 1500 feet, presumably to safeguard against a possible renewal of mining.

In October 1947 Ray Myler a surveyor of the PMG Drafting Section, Brisbane, contoured the site and Wes Halstead, Buildings Branch Properties officer took test borings to determine foundation conditions.

The owners vacated the property in April 1950 but a year elapsed before any broadcast work began.

A local contractor built a small timber transmitter building and an emergency engine room and two AWA 200 watt transmitters type 2J51316 serial no.s 10 and 11 were installed with a 25kVA single phase 240 volt Dunlite alternator driven by a Ford V8 petrol engine.

Conventional high level anode modulation was used in the transmitters with a pair of 828 pentodes modulating an 810 triode. The high tension rectifiers were originally 872A mercury vapour but were replaced in recent years by solid state diode stacks.

The 120 feet high steel lattice guyed mast aerial was erected by the Deeco Steel Construction Company of Granville, NSW, who had a contract for the supply and erection of similar type masts at Lithgow and Port Lincoln.

The earth mat for the radiating system consisted of 120 copper wires laid radially, each 257 feet long, buried 6 inches in the ground and spaced at 3 degrees in azimuth. At the operating frequency of 1540 kcs this was a radial length of 0.4 wavelengths. As the ground was very rocky in places, the 6 inch depth was a somewhat arbitrary figure!

The RF output from the transmitters was conveyed to the aerial via a 200ohm impedance 6 wire line. The aerial coupling unit was an L-C network mounted in a weatherproof copper box. Both coupling box and aerial were enclosed by a wooden picket fence.

Duncan Russell-Hall installed the transmission line and the earth mat and Les Nauman was responsible for the engine installation.

It was intended that the transmitters would operate as main and standby with automatic change over on failure. As the station was to be staffed only part of each day, a very comprehensive control system devised by engineer Ed Powe, was installed which could be operated from the Gympie telephone exchange. The general arrangement was to staff the station by one man during the morning and another in late afternoon and evening leaving the middle of the day unstaffed.

The installation proceeded during the first half of 1951 and the station was ready to go on air in August.

A test broadcast of recorded music was played on the evening of 13th August and the official opening took place from the Gympie Town Hall on Friday 17th August at 7.15PM.

The opening was performed by the Postmaster General, H.L. Anthony in a recorded speech. This was followed by addresses from the ABC chairman R.J. Boyer and the Federal member for Fisher, C.F. Adermann. Other speeches during the proceedings were the Mayor, Alderman R.N. Witham, the acting Director Queensland PMG Department L.A. Morrison and E.K. Sholl the ABC Queensland manager.

80 Gympie citizens were among the invited guests, and entertainment was provided by local artists and the choir of the Gympie Musical Union.

At that time Vern Kenna was Divisional Engineer Radio Installations and Frank Sharp was the Group Engineer responsible for the installation. Technical staff involved with the installation and testing included Ian Byrnes, Bob Cook, Cec Plastow, Leo Moloney, Bob Britnell, Jack Barden, Ken Stratton and Don Brownlie. Don was left in charge of the station immediately after the opening.

The first OIC of the new station was Max Francis who took up residence with his family in the house on the property later in the year. His technician was Ernie Foster and both men continued to operate the shifts until mid 1964 when staffing arrangements were varied. Francis moved to Mount Goonaneman T.V. station and Foster joined the Gympie Telephone Exchange staff. Supervising Technician Ralph Tinney of the exchange became responsible for station operation. From then on, 4GM was maintained by Exchange staff who visited the station periodically for tests and general housekeeping. Tinney moved into the residence in January 1965 and lived there for several years.

A field strength survey to determine the service area of the station was made by George Barr and Doug Sanderson in May 1952 and in March 1953 the figure of merit of the aerial was measured by Maurrie Palmer and Sanderson. By this time the operating frequency had been changed to 1570kcs. The figure of merit was determined as 188mV/m per mile per kilowatt, close to the expected value.

As the years passed it was found that in good seasons there was an unmanageable growth of grass and in 1956 the first grazing lease was negotiated with a Mr Betts for a 5 year term. The remainder of the site fencing was completed at this time. Grazing was continued with a Mr Simpson taking the lease from 1960 to 1975. Since then there have been no offers to graze cattle and Gympie Exchange staff arrange mechanical grass cutting when needed.

With the establishment of the Gympie airport, 4GM's mast was considered to be a possible hazard and in 1960 it was painted in the standard white and orange colour bands.

Technically the 60's passed uneventfully, the only changes being the provision of exhaust fans in the engine room to keep the heat down, and the removal of the old garage and the building of a new one.

After 20 years operation various equipment replacements and additions were made. In August 1971 several of the original STC equipment racks were replaced by Barry Neilson and Gerry Vanderhoven and in the following year a tape player was installed to replace the disk machine originally provided when the station was staffed. 4QS Dalby has always been available as a source of program for use when the Brisbane line fails, using a fixed tuned receiver, but the tape machine was a useful back up and could be operated remotely. In the same year the old wooden picket fence round the mast and coupling box was replaced by Morton Welding and Agents for Nambour with a chain wire structure.

The big event of 1972 was the replacement of the old petrol electric emergency generator with a new 3 cylinder air cooled Lister diesel driving a 15kVA Dunlite 3 phase alternator. At the time it was hoped to increase the power of 4GM to 2kW, hence the large generator. This came to nothing and no power change has been made, 4GM remaining at 200 watts.

The following year the old original control desk was replaced by a new emergency program console, the installation being made by Jeff Laidlaw and Gerry Vanderhoven. Also in 1973 the electrical wiring of the transmitter building was renewed and a new switchboard installed by Pringle Electrics of Gympie.

Minor changes to the supervisory system were made in 1975 by Doug Frith and Chris Howard. In the same year a long needed emergency light was installed in the engine room.

A minor frequency change occurred in November 1978 from 1570 to 1566kcs. This was due to the 9kcs Australian carrier frequency spacing plan. The new oscillator units were installed and the transmitter tuning adjusted by local Exchange staff.

In 1978 approval was given for a telephone pole storage rack for Gympie Telecom Lines to be built on the site and this was done behind the engine room. Telecom used the site again the following year when a Primary Works party was operating in the district on a large cable job. Some caravans for staff use occupied the site and the empty residence was used as an office.

It was obvious about that time that the old residence was of no further use and as it was usually unoccupied it was recommended that it be removed. Consequently in 1980 the Department of Communications gave approval for its disposal and in due course it was sold to Caloundra Demolishers and removed in 1983.

The transmitters underwent a major overhaul in 1981 when Ian McManus and Ian Bielenberg completely rewired both units. The transmitters were by then 30 years old. They are at present in good working order and are capable of the same performance as when they were commissioned in 1951.

This station was provided to serve the city of Gympie and its immediate surroundings and it is still performing this duty. The local population has not varied greatly and the signal of about 30mV/m over the built up area is still quite adequate. There have been rumours at times of a new station of higher power nearer to the coast but nothing positive is known at the time of writing. Certainly an improved national signal is needed in the Maroochy - Noosa coastal region, but this may be dealt with by other means. The present signal in Gympie must be maintained and it is unlikely that a medium frequency transmitter serving the coastal strip would also serve Gympie.

The future of 4GM as it now is, seems assured for some time yet, although the age of the transmitters must limit their life expectancy.

4SO SOUTHPORT

4SO is situated adjacent to Peerless Avenue, Mermaid Beach, in the heart of the Gold Coast. It is only a few hundred yards from the beach and comprises a 5 acre block of pure Gold Coast sand.

Discussions in 1950 between the PMG Department and the Australian Broadcasting Control Board resulted in a decision to establish a station in the Southport area, and the Director General instructed Queensland PMG staff in October of that year to prepare plans for a station.

Site survey work was performed in November and December 1950 by Doug Sanderson and George Barr using a 150 watt transmitter mounted in a left hand drive war surplus GMC van. Vehicles of this type had been used as mobile broadcasting stations during the war, and the Federal transmitter type BC325-B was capable of operation in the medium and high frequency bands. While stationary, the van engine could be coupled to a generator which supplied power to the transmitter. A tubular pipe 45 feet high was used as an aerial in conjunction with a simple earth system laid on the surface. The test frequency was 1530 kcs. Four sites were tested, three near the coast and one inland towards Nerang. The hinterland here is rather low lying and flood level inquiries were made. The site finally selected was flood free and best served the coastal strip where most of the residential areas were concentrated.

The station proposal was for 200 watts on a frequency of 1590kcs and an area of 5 acres was required. The land was part State Government Scenic Reserve, and part owned by the Roman Catholic church. Negotiations for purchase began in 1951 and the acquisition appeared in the Commonwealth Gazette on 28.2.52. The address was Peerless Avenue, Mermaid Beach.

Pegging of the site for the various installations was done by Fred Percy of the Drafting Section, assisted by Neil Howard of the Broadcast Section.

The Commonwealth Department of Works and Housing prepared plans for a small wooden transmitter building with a separate emergency engine room, and a contractor named Stubbs began work late in 1951. The main building was completed and equipment installation begun in May 1952.

Interior electrical work was done by contract and the City Electric Light Company ran in a single phase mains connection.

As the site when cleared was mostly bare sand it was decided to erect the mast first and defer the laying of the earth mat until some grass cover had been established. It was feared that the steady coastal winds would quickly erode the bare surface, so grass seed and soil top dressing was applied.

The radiator was designed by Clyde Manuel of PMG Brisbane Drafting Section and was a 6 inch diameter steel pipe in screwed lengths, 107 feet high. The assembled mast was laid out on temporary supports and all guys and lifting tackle attached. A wooden pole 30 feet long was used as a pivoted jury and the mast was winched upright. It was guyed at four levels in four directions.

The first sets of guy wires were replaced in 1959 due to heavy rusting and this second set lasted until 1967 when plastic coated wire was installed. This was not very effective and as the condition of the wire inside the plastic coating could not be ascertained, plain wire guys were fitted in 1976 and are still in reasonable condition. At the operating frequency this mast was 0.18 wavelengths long and had a base resistance of 18ohms. No aircraft obstruction lighting was required but the mast has been painted white to minimise corrosion from the salt spray from the beach. To aid in inspection and maintenance, pole steps were fitted some years later.

The earth mat was conventional, 120 radial copper wires, 255 feet long which was 0.4 wavelengths at the operating frequency.

The RF transmission line was a buried coaxial cable of 75ohm impedance but of unknown type. It was replaced in 1960 by a 51ohm coaxial cable type PT81M. A spare was laid at the same time.

Coupling between the cable and the mast was by L-C network housed in a copper box at the base of the mast.

Duncan Russell-Hall was responsible for the erection of the aerial, the laying of the earth mat and the installation of the armoured feeder cable from the transmitter building to the mast.

Unlike 4GM Gympie, this station was designed to operate automatically when not staffed and the design of the necessary control circuitry was done by Eddie Powe, an engineer of the Radio Installation staff. The installation work on site was supervised by Bill Graham-Wilson who had the services of Les Nauman, John Talty, Alec Barron, Jim Plunkett and Maurie Palmer. The Divisional Engineer responsible for the project was Vern Kenna.

At the Brisbane Royal National Assn. show, the "Ekka" of 1952, the PMG radio display featured the new Southport station. Each year at that period, the PMG part of the ABC exhibition studio was devoted to some topical work currently under installation. Large photographs depicted staff engaged on office design, field survey, installation and testing and a scale model was built to show the layout of the site with aerial, earth mat and buildings. The Brisbane Drafting Section was responsible for the artwork of the display.

The engine generator installed by Les Nauman and Duncan Russel-Hall was a Studebaker straight 8 petrol engine driving a 3 phase, 415 volt, 15kVA generator. This was much larger than was needed for the station, but the set had become available from the metropolitan studios at Alice Street, having been replaced there by a diesel engine. A 1000 gallon water tank was placed adjacent to the engine room to provide cooling water for the engine. It was kept full with a float valve tap connected to the town water mains. This was fine until a severe drought in 1953 caused the local council to severely ration water. As a safeguard, a spear with pump was installed by a local contractor, T.M. Pidgeon, and a good supply of fresh water obtained.

All was now ready and 4SO went on air on 11th October 1952.

The finished building was quite attractive, low set and resembling other houses in the area, with a sealed drive-in flanked with flower garden beds.

The two 200 watt Philips transmitters type 1648 serial numbers 101 and 102 stood in the centre of a spacious transmitter hall, and in an adjacent room was the control desk and the audio and remote control racks. A glass panel afforded a view of the transmitters from the control desk.

The transmitters were conventional with a single stage anode modulated final using a QB3/300 tetrode. These valves are used in the push pull modulator as well. All other stages, both RF and AF, use the beam power 6V6G tetrode. The high tension rectifiers were 866 mercury vapour originally, but have been replaced with solid state diode assemblies.

Although the station was designed for unattended operation, it was for the first eleven years of its existence under the daily care of a senior technician. Trainee technicians often spent time there as well. The officers who had charge of 4SO in that time were:

1952 - 53	Errol Suttor
1953 - 54	Ken Stratton
1955 - 56	Chris Jeffrey
1956	Ron Buglar
1957 - 58	Keith Smith
1958 - 63	Gerry Elliott

After this, the station became fully unattended, receiving fault and maintenance attention from the staff of the Southport Telephone Exchange and more recently from the Surfers Paradise Exchange. Technical staff from the State Broadcasting Branch Brisbane now visit 4SO quarterly for a full scale overhaul as well.

The service area of the new station and the efficiency of the aerial system were determined shortly after the opening by George Barr and Doug Sanderson. Due to the very poor conductivity of the sandy site, the ground losses were high and as a consequence of the modest power, short aerial and high operating frequency of 1590kcs, the service area was not very extensive. It did however, at that time adequately cover the town of Southport and the populated coastal strip extending down to Coolangatta. Since those days, the population of the Gold Coast region has expanded north and south and inland so that much of this new built up area is poorly served.

As time passed various minor changes were made. In 1955 the engine room was extended to make a small store for larger items such as lawn mowers, hoses etc.

In 1961 the old Studebaker was retired and a new Petter AVA2 diesel driving a 6kVA single phase Magnicon generator was installed. It was new, having been supplied on a 1958 contract. The cooling water tank was therefore no longer needed, and when it became rusty it was removed. The spear pump was likewise redundant and as the station became unattended in 1963 the need for garden and lawn water was greatly reduced.

During the 1960's, a PMG Line Depot was established on the site but was removed in 1988. Large quantities of cable and conduit were often stored on the site when the Primary Works Section had major works in progress on the Gold Coast. The facility was known as the Mermaid Beach Primary Works Depot.

There was a local proposal in 1969 to use a recovered STC 2kW transmitter from Adelaide at 4SO, but no approval was obtained and the work did not proceed.

With the Australia wide change to 9kcs carrier spacing, the frequency of 4SO was changed in November 1978 to 1593kcs. A new crystal oscillator was all that was required with minor returning in the RF stages and the aerial coupling unit.

Because of its age, the program input and control equipment was modified from time to time and eventually it was decided to replace it completely. To this end a simplified rack of equipment was installed in 1984 as a temporary measure, but before the replacement of the old racks was begun, it became know that major changes to 4SO were being contemplated. A survey of all Commonwealth Government property was taken and the value of the 4SO site was recognized. The Department of Communications considered a new site in the Merrimac area but the possibility of replacing the station with an F.M. service transmitting from Mount Tamborine was also likely. Various works such as the renewal of the building roof were deferred as was the replacement of the audio equipment.

Eventually, in 1987, the decision to close 4SO was made, and a site for an FM transmitter was sought on the Beachmont Plateau overlooking the entire Gold Coast.

4MI MOUNT ISA

The growing mining town of Mt. Isa had by 1958 a population approaching 15000 but radio reception was virtually non-existent. The nearest stations in the medium frequency band were 4QL and 4LG at Longreach, 350 miles away. Few people were aware of, or listened to the Brisbane short wave stations VLQ9 and VLM4, so that there was considerable interest in the announcement that the Postmaster General had approved a station for Mt. Isa in January 1958.

The Queensland Radio Section of the PMG Department was advised of the minister's decision and asked to select a suitable site for the proposed station which was to have an aerial power of 200 watts, and operate on a frequency of 1080kcs.

Frank Sharp an engineer of the Radio Section and Stan McLennan a properties officer of the Buildings Branch went to Mt. Isa in March 1958 to look for sites, and came back with six likely spots marked on their map. As with all sites, consideration had to be given to access, power and water supply, proximity of air fields, the extent of the radio coverage required and the topography of the area.

As a result of this selection survey in March 1958, one site was recommended and after clearance by the Department of Air and Civil Aviation, was approved by the Australian Broadcasting Control Board in February 1959. The call sign 4MI was also allocated at that time.

As the local mining company had plans to develop an area known as the Northern leases a few miles north of Mt. Isa, and as the station power was small, a compromise was necessary so that the site would serve the residents of the proposed new area as well as the existing town.

The site selected was adjacent to the Lake Moondarra Road, some 3 miles north of the town. It had an area of just over 34 acres and was Crown land, part of Occupation Lease 434. The surface was flat with a few low shrubs and some spinifex.

By April 1959, the Queensland Lands Administration Board had given "permissive occupancy" so site work could begin.

PMG Drafting Section surveyor Ray Myler pegged out the site and measured contours.

Tenders were invited in June for the building but none were received. K.D. Morris and Sons of South Brisbane were then invited to quote and in due course obtained a contract to construct a transmitter building and a power room for the emergency engine generator. The buildings were available for the installation of equipment in April 1960 and in that month the land acquisition was listed in Commonwealth Gazette No.28 of 21.4.60. The land was described as portion 33, parish Haslingden, county Rochedale.

A contract had been let with Commonwealth Electronics for 200 watt transmitters, but when it became likely that delivery would be delayed, arrangements were made to transfer two Philips type 1648 transmitters from Armidale where they were awaiting installation. Some thought had been given to using the 200 watt Tsmas recovered from 4QL Longreach, but in the end this was not necessary. The two Philips transmitters were similar to those installed at 4SO Southport and bore serial numbers 111 and 112.

The transmitters were received in Brisbane in May and tested at the Perry park installation depot.

The valve lineup of the Philips transmitters was 6V6GTs oscillator, buffer and RF driver, with a QB3/300 triode as an RF final stage. The audio chain was push pull with 6V6GTs in the 1st amplifier and driver, and a pair of QB3/300s in the modulator. The main high tension rectifiers were 866A mercury vapour, but due to high operating temperatures, these were later changed to xenon filled 2G/402A rectifiers. Some years later, 1974, the QB3/300 valves were changed to Eimac 4/125A which were found to have a longer life. The xenon rectifiers were subsequently replaced with silicon diodes for greater reliability.

Permission to install an aerial up to 140 feet high had been granted by the Aviation authorities, provided it was painted orange and white. No lighting was required. It was decided then that a steel pipe radiator would be economic and plans for this were drawn in the Brisbane office of the Drafting Section. Installation engineer Ron Tolmie arranged for the pipe to be hot dip galvanized inside and out, and it was taken to Mt. Isa and erected by the falling jury method by Radio Section linestaff under the supervision of Duncan Russell-Hall. One copper

bonding wire was used from top to bottom. Pole steps at 1 foot spacing were attached to the mast. The earth system comprised 120 radials each 210 feet long of 200lb copper wire.

An emergency engine generator set, a Lister 12.5 kVA, single phase, was installed, and served the station for many years. However in 1974, in expectation of a station power increase, a new Lister 35 kVA, 3 phase with Dunlite generator was installed by Buildings Branch. By this time there were other transmitters in the building for the Mt. Isa to Macarthur River high frequency radio telephone circuits, but the hoped for National transmitter power increase did not eventuate.

The station was designed to be unattended and although generally automatic in operation, alarm and status information was required at the Mt. Isa Telephone Exchange. In many respects the system was similar to that previously built into 4SO Southport.

In May electricity was connected to the building and equipment installation began. Senior technician Ken Lund was in charge with the assistance of Bernie Bischa, Don Olsen and Trevor Linton. The engineer associated with the design was Brian Robinson.

Program line provision was in hand, and the regional program was to come via Townsville using carrier channels of the J12 open wire system. Col Crick rearranged the network switching equipment in the ABC's Townsville studios to give a separate outlet for 4MI if required.

The station was tested out and ready for service in July 1960 and the official opening was on Monday the 11th at a ceremony in Mt. Isa's Henderson hall.

The Chairman of the ABC Sir Richard Boyer introduced the member for Kennedy, Mr. W.J. Riordan who opened the station. Also present were Mr. D. Felsman ABC Manager for Queensland, Mr. E.C.A. Brown Director Posts and Telegraphs Queensland, Mr. Alex Inch, and Mt. Isa Mines General manager Mr. J.W. Foots.

For the first two years the station was staffed by a Senior Technician on day shift only. Geoff Backnell stayed until September 1960 and was followed by Bob Whelan. In April 1961, John Holland took over and in August 1962, maintenance of the station became the responsibility of the OIC Mt. Isa Telephone Exchange. Staff visited the station for adjustments or faults only..

In July 1971 the responsibility for the operation of 4MI was transferred to the Mt. Isa Radiocom centre which had been established following the construction of the Townsville to Mt. Isa microwave telephone route. By this time also it was possible to obtain a program circuit of 19kcs bandwidth over the new route. The previous circuit was of 7kcs bandwidth from Townsville to Cloncurry on the J12 carrier, but was degraded between Cloncurry and Mt. Isa by the use of a 5.6kcs physical circuit.

In the days of open wire lines it was not uncommon for the program to be of poor quality or not available due to line faults. To cover such eventualities, high frequency radio receivers were supplied at 4MI, and rhombic aerials directed towards Brisbane enabled to short wave stations VLQ9 or VLM4 to be received. If the quality was acceptable, the program could be rebroadcast. Later, tape recorders were used so that recorded music could be broadcast during program line failures. Staff to determine the quality taped music was instantly available and could be connected automatically.

The average annual rainfall at Mt. Isa is only 15 inches and initially three 2000 gallon tanks were supplied to catch roof water. However soon after opening, town water was connected to the site and when later the tanks were removed due to corrosion and damage by shotgun blasts, they were not replaced.

Despite the high temperatures in the building, the equipment performed well, but in 1976 an upgrade of the program input equipment was undertaken by Jeff Laidlaw and Bob Hudson. Very little work has been necessary on the transmitters.

Due to the sparse and erratic nature of grass growth in the district, maintenance of the site has not been a problem. Some shrub regrowth has been removed occasionally and an informal agreement has permitted a few horses to graze at times. No formal grazing leases have ever been let for this site.

In 1976 the aerial circuit was checked for tuning and required only a very small adjustment to the loading coil to restore original conditions. The dummy aerial loads were also checked and found to be unchanged since installation. Queensland Engineering Report QB296 describes the tests.

The RF transmission line is buried coaxial cable, type PT81M with a characteristic impedance of 50 ohms. No problems have been recorded with this line, so that the spare cable, provided initially, has never been required.

500 watt single sideband transmitters operating in the 3, 5 and 9 Mcs bands have been installed as part of a radio telephone system giving the Mt. Isa Mine communication with its remote mining site of Macarthur River in the Northern Territory. Four 100 feet lattice steel masts were erected to carry the transmitting and receiving aerials for this service. The effect of these masts on the polar pattern of 4MI has not been checked.

The maintenance responsibility for 4MI in terms of periodic major inspections and adjustments now resides at the Broadcast Service Centre at Townsville, with local Telecom Mt. Isa staff available for emergency repairs.

4QD EMERALD

Following a visit to Central Queensland in March 1959 by Noel Medlin, an engineer of the Australian Broadcasting Control Board, the Minister approved the proposal to install a 50kW transmitter in the Emerald district. An earlier A.B.C.B. proposal to operate the Emerald station at 2kW, synchronized with 4RK Rockhampton and with a directional aerial, was not further considered.

It had been determined that atmospheric noise levels were less severe at the high frequency end of the medium frequency band than at the low frequency end hence the frequency approved for Emerald was 1550kcs. This was also a clear channel, and it was hoped that the rather large skywave signal produced at night would be used by listeners in other parts of the State where reception was generally poor. The primary purpose of the new station was to serve Springsure, Emerald, Clermont and Blair Athol. At that time no coal mining towns to the north east had been established so the planned arrangements appeared to be adequate for the district.

In September 1961 the Engineer in Chief asked that a site be selected for the Emerald station and in July 1962, Ed Kennewell, an engineer of the Brisbane Radio Section, arranged a test transmission from a site four miles north of Emerald. He used a modified AT14 transmitter giving 365 watts into a 50 feet high pipe mast with a few short earth radials. Field strengths were measured at several places along the radial roads from Emerald and the site location appeared to be satisfactory. The test was made on 1580kcs.

Staff on the survey were Ralph Bongers, Bruce Ziebell and two trainees. The proposed site was on grazing land on a property known as "Emerald Downs". Several areas in the vicinity were suitable although part of one may have been subject to occasional flooding from Retreat Creek due to back up water from the Nogoa River.

The property owners were Robert Robertson and Ian Murray and negotiations were begun with them by the Department of the Interior.

The Departments of Air and Civil Aviation were approached and no objections were raised to the proposed mast. In June, Doug Sanderson of the Radio Section with Bill Latham of the Building Branch went to check the sites, and two surveyors from the Drafting Section, Nichols and Healy took site contours and earth auger tests. 3 feet depth of black soil was found to cover the site.

Progress towards site acquisition was slow and as a safeguard, Sanderson and a Building Branch Properties Officer Wes Halstead, went to Emerald in December 1963 to look for an alternative site. A suitable area was found a few miles west of Emerald adjacent to the highway, but as agreement on the "Emerald Downs" property was reached early in 1964, no further interest in other possible sites was needed. The acquisition of the "Emerald Downs" site was noted in Commonwealth Gazette 19 of 11.3.65 and the transfer was settled in March 1967.

Tenders for the transmitter building were called in April 1964 and the successful tenderer was T.F. Woollam and Son of Newmarket, Brisbane. The building was accepted from the builder in July 1965.

A contract for a residence was let in November 1964 to Rossiter and Craft, builders of Longreach.

The transmitters selected for this station were obtained on contract from STC of Sydney. The 50kW 4SU-38J serial number 69896 was tested and accepted at the factory in November 1964 and shipped to Brisbane on the Burns Philp vessel "Bulolo". The standby transmitter, a 10kW 4SU-48A serial number 70131 was accepted in May 1965.

A contract for the main radiator was arranged with Electric Power Transmission (EPT) of Sydney in May 1964. The mast was to be 310 feet high, sectioned at 163 feet above base. EPT were behind in their mast production however, and a new mast was obtained from the Utility Tower Company of the USA. It was a type 340 and arrived in November 1965. The agents were the Collins Radio Co. of Melbourne, who arranged for the mast to be erected by M. A. Michael of Perth and this was done at the end of the year. This contractor also poured the mast foundation and guy anchor blocks, and samples were tested by Main Roads Department, Rockhampton.

The standard type earth mat of 200lb per mile hard drawn cooper was laid by the Radio Section line staff with Ray Beutel in charge. A tractor to pull the wire plough was lent by the PMG's Rockhampton Engineer Division. The work was done in July 1965.

The main mast transmission line was coaxial cable, Andrews HJ8-50A, buried in a trench from the transmitter building to the aerial tuning hut. A trenching machine hired from the Emerald Shire Council was used.

Coupling equipment in the hut was obtained from STC.

The mast base block was sheeted with copper which was extended out about 7 feet from the base underground and connected to the earth radials. Measurements showed an improvement in figure of merit from 248 with no sheeting to 254 with the final arrangement.

The measured impedance at the aerial current meter in the coupling hut was 150- j290ohms. This was the value with the mast operated as a half-wave structure with the section insulator short circuited.

Roadworks around the station and to the mast were the responsibility of the Emerald Shire Council.

As it was desired to achieve the maximum possible fading radius and ensure that Blair Athol was not subjected to unacceptable night fading, a design for a centre fed mast was proposed. A great deal of work was done on methods of feeding power to the mast at the section point and details of components were finalized. It was hoped that centre feeding would minimize the high angle radiation always present with a base fed radiator, and so reduce the downcoming skywave in the outer regions of the service area 60 to 70 miles from the station. Although the ground conductivity was good in the Emerald area, the high frequency used, 1550kcs, precluded a large field strength in this outer area. The skywave of course, is independent of ground conductivity and some fading was expected.

With the delay in production experienced by EPT and pressure for an early opening, the opportunity was taken to cancel the mast contract and buy a very thin radiator from overseas. As the current distribution on a thin mast was expected to be somewhat similar to that designed for the centre-fed thicker EPT mast, it was decided to employ conventional base feeding of the new mast and this was done with the section insulator short-circuited, and the mast operating at an electrical height of 0.53 wavelengths.

Reports on the proposed centre feeding were prepared by Don Grey, Engineer of Broadcasting H.Q. Melbourne.

The transmitters were taken to Emerald by PMG transport in July 1965 and unloaded by a crane hired from the Emerald Farmers' Centre. The Supervising Technician Bernie Bischa was on site to supervise, but general installation work did not begin until the beginning of September. Brian Robinson, Engineer of the Brisbane Radio Installation Division was in charge and Lindsey Birch was the Divisional Engineer at that time. Much office planning and sketching was done by Bill Graham-Wilson, Senior Technician. Otto Burmester was the office Supervising Technician.

Staff installing at Emerald included the following: B.M. Bischa, R.J. Beutel, B.J. Clancy, C.N. Goff, F.A. Heritage, J.N. King, W.J. Krebs, R.P. Lacey, A.F. O'Brien, B.W. Pickers, L.P. Rennick, B.E. Robinson, K.D. Steiner and V. Suosaari. It had originally been proposed to use 200ohm 6 wire transmission lines, but when it was decided to employ 50ohm coaxial cable it became necessary to alter the output impedance of the transmitters. Accordingly A. G. Rolph from STC came to Emerald and fitted the necessary components to achieve the change. This was in mid December 1965.

The valve complement of the 50kW transmitter was crystal oscillator 6V6G, isolator 6V6G, first buffer two 807 in parallel, second buffer 3C/150A, driver 3J/192E, power amp three 3J/261E in parallel. The 9000 volt high tension supply used six mercury vapour diodes type 2V/561E.

The audio section was push pull: 807, 3C/150A, 3J/192E and 3J/261E modulator.

The valve rectifiers were subsequently replaced by banks of silicon diodes and in October 1983 the modulator was changed to triodes TBL12/25 as these were lighter, cheaper and of a current make. The power amplifier was also converted. The 10kW unit had a transistor equipped crystal driven exciter with only two stages of valves in the RF line. The driver was a tetrode 4/250A and the power amp a parallel pair of triodes, 3 x 2500A3. The 4800 volt high tension rectifier consisted of silicon diodes. The audio side was push pull, beginning with transistors 2N915, followed by two stages of 4/250A and finally the modulator 3 x 2500A3.

The 50kW unit was similar to those installed at 4QN and 4QR. At Emerald for some time after going on air, trouble was experienced with occasional arc-over in the power amplifier valves and corona rings were fitted. Opinions differed as to the source of the trouble, some believing that a faulty batch of valves was the most likely

cause. However, stray arcing from final anode to earth has occurred many times since then, even after the 3J/261E valves were replaced by TBL12/25s.

In January 1966, Bischa left the service and was replaced on the installation team by Jim Plunkett.

Opening date was set for the 4th February and at 6AM the station began using the ABC Regional program. The official opening was relayed that evening with speeches by the Postmaster General, Alan Hulme; the Federal member for Kennedy, W.J. Riordan; the Emerald Shire Chairman, R.C. Morton and the chairman of the ABC, Dr. J.R. Dowling.

The pleasure of building and opening a new station was short lived. At 7.41AM on the 10th February the base insulator of the mast failed, caught fire and 4QD went off the air.

When the smouldering fragments of the insulator had been extinguished the station OIC Frank Nolan, assisted by duty technician Rennick and trainee Ryan, ran out a quarter wavelength of copper wire for an emergency aerial. Plunkett's installation team, who were still on the station for minor finishing, arrived for work and the emergency wire was suspended between a receiving aerial pole and the corner of the main tuning hut. After matching, it was possible to run the 10kW transmitter into this at reduced power by 11.40AM. The signal was only a few millivolts per meter in Emerald but 4QD was back on air.

At this stage, the standby radiator had not been erected so a windup Hills tower was taken from Brisbane by truck and erected 200 feet north of the station buildings. On 12th February, this was wound up to 100 feet and fitted with six 50 feet long top loading wires. Fifteen copper wire radials were laid out each 100 feet long and a simple coupling network was fitted in a small metal box. A length of old armoured coaxial cable had been located in Brisbane and this was used as a 50ohm transmission line. As its rating was not known, the power of the standby transmitter was restricted to 3kW. With this low output, the driver for the power amplifier was very unhappy and its anode ran red hot.

Tests showed the system to be within tolerance so it was put to air at 6AM on 13th February. Doug Sanderson flew to Emerald to supervise this emergency radiator work. See Queensland Engineering Report QB216.

The standby aerial installation progressed and it was ready by the end of the month. On 2nd March the main radiator had been restored using spare epoxy insulators and went into service again at 10kW only as a precaution.

The sequence of events during the failure is not known. Whichever insulator collapsed first, the mast, (or its top section) would have fallen vertically about 12 inches, and the jar would have broken the remaining insulator. As it was, the top section of the mast narrowly missed total collapse as, after its section insulator disappeared, it became caught against the top of the lower mast section and remained in this precarious position. Some tricky work with a pump and hydraulic ram was necessary to enable a replacement insulator to be inserted at this section point. The verdict of the PMG Research laboratories was that the epoxy material of the insulators was not an ideal medium for this purpose, although it had presumably been in use overseas and was supplied with the mast.

Both epoxy insulators were replaced later in the year with conventional porcelain types and no trouble has been experienced since. Power restored at this stage to 50kW.

In an endeavour to determine the merit of operating such a thin mast at various electrical heights, a series of measurements was planned, to observe fading at various distances. It was proposed to compare the signal from the main mast with that from the short standby operating on a close frequency of 1625kcs.

The standby was a 72 feet high, 10 inch triangular cross section Deeco mast with top loading wires, and it was assumed that as the vertical radiation pattern of a short mast is well known, it would give a reference standard at the fading test points against which the main mast could be judged. The electrical height of the main mast was varied during the tests by adjusting the inductance of a loading coil inserted at the section point.

Tony O'Brien was involved with the fading measurements and the adjustment of the main mast. The work was done during 1967.

The results were inconclusive, random skywave reflections being received from night to night. The problem appeared to be the lack of uniformity in the ionospheric reflection zones, and no useful data resulted from the

tests. The mast was to have been checked for fading when fitted for feeding at the section point also, but this was never done although a base inductor was constructed. The mast has remained in service as an unloaded 0.53 wavelength radiator with the section insulator short circuited.

Another disaster struck the station at the beginning of 1967 when the tuning stub of the standby mast was destroyed, apparently by overheating. The standby had been top loaded with "umbrella" wires to present a parallel input resistance of 50ohms to match the feeder and to permit the negative reactance to be cancelled with a short circuit stub of coaxial cable. The problem causing the damage was never solved as the stub current was apparently well within the cable ratings. However the mast was rematched with a conventional L-C network and has given no further trouble.

At installation, the stations' water supply was from roof catchment and was held in tanks. The station being fully staffed and with the desire to beautify the surroundings with shrubs, grass and flowers, it was soon evident that natural collection of water was going to be inadequate. Town water at Emerald was a little too far away and a bore on the property was decided upon. This was drilled in early 1969 and a good supply of 400 gallons per hour was obtained at 425 feet. It was rather alkaline and not suitable for drinking but was adequate for other domestic purposes.

This water supply was augmented in 1983 by connection to a main which had been built along the highway by the Dampier Mining Company. It was known as the Gregory Coal Mine Pipeline and was supplied from the Selma Weir on the Nogoia River, controlled by the Queensland Water Resources Commission. The station is supplied with an emergency engine generator of 60kVA capacity. A Rolls Royce SF65 "Falcon" diesel drives a Petbow 3-phase alternator. This plant will run the 10kW standby transmitter but not the 50kW.

With the Australia wide change to 9kcs carrier spacing in the medium frequency band, 4QD was moved from 1550 to 1548kcs in November 1978.

4QD has been staffed since opening and the OIC's have been Frank Nolan 1966, Keith Byrnes 1966-68, Ern Venables 1969-78, Don Clark 1978, John Siganto 1979-84 and Jeff Cirson 1985. The station is now part attended only, as an output of the Rockhampton Broadcast Service Centre where Cirson is the officer in charge.

4QQ EIDSVOLD

The opening of 4QB at Pialba in 1948 provided some limited improvement to the inland areas between Monto and Gayndah, although nothing approaching half a millivolt per meter was obtained. The signal at Gayndah was just over 300 microvolts, while Monto was measured at barely 100.

As a result of an investigation of reception conditions in this area by Noel Medlin, an engineer of the Australian Broadcasting Control Board, in 1959, a decision was made to establish a 10 kW transmitter, and the general area half way between Monto and Eidsvold was suggested.

In 1961 the Board suggested that a site at Abercorn south of Monto should be investigated and in mid 1962 transmission tests were made from the Langley Flats area near Abercorn. The test transmitter was organized by engineer Ed Kennewell who was assisted by technical officer Ralph Bongers. On this expedition, tests were also conducted at Mundubbera and Eidsvold.

After consideration of the results, the A.B.C.B. decided that the final site should be at Eidsvold and so in September 1962 Kennewell and a Buildings Properties officer A. J. Ryan interviewed owners of likely sites in the area and made some recommendations. At the same time the Departments of Air and Civil Aviation were advised of the intention to build a possible tall mast.

Block No. 831 owned by Mrs. M. Hartwig was chosen and negotiations to buy it were begun in January 1963. Further transmission tests were required by the A.B.C.B. and in April a modified AT14 transmitter capable of operating at 350 watts into a 100 feet high wind up steel mast was prepared by engineer Des Fulton and operated from Eidsvold by Bruce Ziebell and Des Erbacher. Doug Sanderson supervised the field operation.

Field strength surveys were then made by Noel Medlin of the A.B.C.B., Peter Kelleher, engineer of the PMG Brisbane Radio Laboratory and technicians in training Harry Weatherhead and L. Foran. The transmitter was mounted in a large motor van and driven by a 1-1/2 kVA diesel alternator. This transmitter used a parallel pair of 813 tetrodes in its power amplifier.

Later in the year Ray Myler of the Brisbane Drafting Section took contours of the site and the Buildings Branch made test bores.

Consideration was being given to the means of providing program to this station, which was to operate in synchronism with 4QB Pialba. Audio phasing was important to minimise distortion in the equal signal strength zone and it was thought that a VHF radio link between Pialba and Eidsvold might be effective. A general survey of possible paths was undertaken by Sanderson, Wightman and Bacon (of Central Office) but no path profiles were prepared. In the event, land lines from Maryborough to Eidsvold were used. The required delay and equalizing equipment was designed by the Central Office Research Labs and measurements were made of line characteristics by Subocz, Craig and Wilcox.

In May 1964 a contract for the construction of the brick transmitter building was let to P.J. Bryant of Gayndah and in December the residence contract was arranged with A.N. Jensen of Maryborough. Both buildings were completed about June 1965 although access for the installation staff was available in April.

The main radiator was 450 feet high with six top loading spokes each 35 feet long. This gave an effective height of 0.53 wavelengths at 910 kcs. It was erected by Electric Power Transmission Pty Ltd and completed in August 1965.

At the same time a standby mast 102 feet high was installed. It was made by Deeco Constructions of Lidcombe, NSW.

Ray Beutel and his Radio Lines team laid the earth mats for the aeriels, 120 radials of 200lb wire in each case, 540 and 350 feet long respectively. Two standard 6 wire 200 ohm transmission lines were also installed.

Tractors for use in laying the earth wires were hired from local owners A. Shultz and R. Drinkwater. The main mast was wired for obstruction lighting but this has never been required.

The supervising technician for the installation team was Bernie Bischa, assisted by Tony O'Brien, Ken Self, Brian Clancy and Des Allen. Engineering supervision was by John Searle.

The transmitters installed were a pair of STC 5kW type 4SU/55B/S with a combining unit type 4SU 74B. These were similar to those at 4QB Pialba being installed at the same time.

A 30kVA diesel electric plant was installed in the engine room which was part of the main building. A Lister HAG diesel drove an Electric Construction Company 3 phase 415 volt alternator type RF17-KG5. It was wired for automatic start up on mains failure, but as the station load was in excess of the generator rating, one transmitter only, was connected to the emergency supply.

The original fuel tank was buried, but over the years it became corroded and leaky and in 1977 this 500 gallon tank was replaced by a new 250 gallon unit, mounted at ground level just outside the engine room. For protection, a brick enclosure was constructed around it.

The station was ready for operation in November 1965 and some test transmissions and field measurements were made with the transmitters on 920kcs. This was necessary as 4QB was operating on 910kcs and the service areas were overlapping.

The delay and equalization equipment for the program feed was installed at 4QB and final adjustments were made as a result of listening tests by Lindsay Birch, Noel Medlin and Kev McKerral of Central Office in the Biggenden and Dallarnil areas, as here the signals from 4QO and 4QB were about equal strength.

The station RF oscillators were adjusted to provide one beat every 90 seconds, although this was not a critical figure. To check this, tests were made at Mount Goonaneman TV station each Sunday and if required, minor frequency adjustments were made at Pialba to restore the relationship. A receiver with a chart recorder giving indications of the AVC voltage produced by the composite signal from both stations was used to show the frequency difference.

4QO went on air with ABC Regional Program on 29th November 1965.

The first OIC of the station was Russ Dahl who watched over its first year of operation. He was followed at the end of 1966 by Bill Beeson who stayed until he retired from the service in 1979. Mark Little and Ned Kerr filled in for a time until John Musa took over in 1980. On 1st April 1983 the staff were withdrawn and 4QO became unattended. Technical staff at the Mundubbera Telephone Exchange took over supervision of the station at this stage.

A full field strength survey of the combined stations was made in October 1966 by Radio Section staff and this is documented in Queensland Engineering Report QB237 by Sanderson.

In November 1978 the frequency of 4QO and 4QB was moved to 855kcs with no apparent change in coverage or performance. No figure of merit measurements were made of the 4QO aerial at the time of installation, but some limited checks were made in September 1979 by Sanderson and Bruce Williams which gave a figure of 248.

This synchronizing experiment has not been without its problems. The stability of the station oscillators has been good, but over the years, changes have occurred to the program feeds and the carefully adjusted phasing has been disturbed, resulting in increased distortion in the equal signal zones. The original open wire lines to Pialba were eventually replaced by a cable carrier system and in time the Maryborough to Eidsvold lines were dismantled and microwave broadband systems installed. It thus proved impossible to maintain an optimum phase relationship between the audio inputs to 4QB and 4QO, and some reception deterioration has had to be accepted in the Biggenden district. Suggestions have been made for the installation of a low power transmitter to serve Biggenden and more recently the possibility of an FM station at Mount Goonaneman TV site carrying the regional program used by 4QO. By the end of 1987 no firm decisions had yet been made for improved reception in the overlapping primary service areas of 4QB and 4QO.

4QW ST. GEORGE

The decision to build a regional station at St. George was reached only after considerable field work in south west Queensland, designed to locate a site best suited to serve the very large area concerned.

Over the years frequent complaints about poor reception in the south west part of the State had been made by shire councils and members of graziers' associations, and in December 1958, Noel Medlin, an engineer of the Australian Broadcasting Control Board went on a tour of investigation in the area. He interviewed many people, individually and at public meetings, and made measurements of field strengths, fading and noise on those transmissions, however poor, which were normally used in these remote districts.

Due to heavy afternoon and evening static frequently marring reception on the medium frequency band, some use was being made of VLQ9 the Brisbane National High Frequency Inland Service, but as few receivers were tunable on lower frequencies, the superior reception of VLM4 could not be appreciated by most listeners.

After observing the situation at Roma, Charleville, Quilpie, Cunnamulla, Bollon and St. George, Medlin came to the conclusion that a 10kW transmitter could most usefully be employed from a site near Bollon. However there were other likely options.

Some time later, in April 1961, ministerial approval was given for a 10kW station to operate on 710kcs in the area, and a decision was required as to the best site. Accordingly the PMG Department and the Control Board considered tests which would give the answer.

At that time the Australian Broadcasting Commission favoured Cunnamulla and the PMG (Queensland) believed St. George would be best. As 7NT Kelso in Tasmania also used 710kcs, a directional system was required and various suggestions were made as to possible patterns of radiation. A Cunnamulla station would serve Quilpie and Charleville but not Roma and St. George. An increase in power of 4QS Dalby to 50kW was proposed. A St. George site would serve Roma but not Charleville and Quilpie so that low power transmitters would be required at those places. In September 1961, the Board decided that a series of propagation measurements should be made from test transmissions at St. George, Bollon and Cunnamulla so that an engineering decision could be made.

A Test transmitter was prepared by Des Fulton, an engineer in the Radio Section, using a modified AT14 converted for 710kcs and with a high efficiency final stage giving some 500 watts of RF output.

This was installed in a GMC van which had been acquired from wartime disposals some years before and was very suitable for the purpose, having an on board 110 volt alternator driven by the vehicle engine.

A wind-up Hills Teletower 100 feet high was obtained and fitted with an inductance at the top with a 20 feet whip to gain some additional effective height. In the field the mast was guyed with steel wire at the lower section and nylon line at the upper levels. An earth system of 12 radials each 300 feet long was used at each site and the unattenuated E x D valves were measured to be 47 millivolts per metre at a mile from St. George and Bollon, and 60 at Cunnamulla. The latter site was on good black soil and obviously had lower earth losses.

Two field parties were equipped with RCAWx2D portable field strength meters and with the transmitter successively set up at St. George, Bollon and Cunnamulla, measurements were made over the whole S.W. area, from which ground conductivities could be determined.

The surveys were conducted during October and November 1961 by Doug Sanderson, assisted by Trevor Linton and Bruce Zeibell technicians, and trainees T. Moore, R. Hobson and N. Bolton. Frank Sharp the Queensland A.B.C.B. engineer observed the tests being made from St. George.

Results of this survey were presented in Queensland Engineering Report QB141.

From these tests the decision to build the station at St. George was finally made by the Control Board in October 1962 and the PMG Department was asked to find a suitable site. Stan McLennan the assistant properties officer from PMG Queensland Buildings Branch went with Doug Sanderson to St. George in December and three likely blocks within a few miles of town were selected. By March of the following year the Board had decided to use

one of the sites fronting the Moonie Highway, part of "Moolabah" a Perpetual Lease Selection No.2069 owned by H.C. Kemp, some 6 miles north east of St. George. Details of the proposed sites were given in Queensland Engineering Report, QB157.

Negotiations for acquisition were conducted by the Department of the Interior during the latter part of 1963, and permissive occupancy was obtained.

A contract was let with Electric Power Transmission for the erection of two steel lattice masts for the directional aerial system. They were to be 680 feet high with capacity hats and so spaced and fed that the pattern would have greatly reduced radiation in the direction of 7NT Kelso. This would minimise the effect on 7NT reception which may otherwise have been degraded by the nighttime skywave radiation from St. George. The pattern being symmetrical, there was a corresponding null in the direction of Dalby, but listeners in that direction were adequately catered for by 4QS.

The masts were erected in the period June to December 1965. Robin Bell of the Radio linestaff supervised concrete sampling, and testing of the cylinders was done by the Main Roads Department in Brisbane. Prior to this, the site had been cleared by a local contractor, test borings made to assist in mast foundation design and the earth mats laid for main and standby aerials. Duncan Russell-Hall supervised this latter linework and Line Foreman Ray Beutel made the final inspection of the completed main masts. The standby mast was erected by radio staff,

The main masts were painted and lit to conform with aircraft obstruction requirements, but the lower height standby did not require this and was left plain galvanized as supplied.

Six wire transmission lines of 200ohm impedance were used. Power dividing and phasing units were housed in the first tuning hut and the output taken to the second tuning hut by a run of six wire line. The line to the standby mast was continued on past the mast in the form of stub tuning.

The standby mast was a light duty Deeco lattice steel structure, 120 feet high with inclined wire top loading adjusted to give the mast a parallel base resistive component of 200ohms. The reactive component was cancelled by the transmission line stub.

A contract was let to J.M. Kelly Constructions Pty Ltd of Toowoomba in June 1964 for the transmitter building, and to W. H. Kennedy of St. George for the official residence. The main building was available for installation of equipment in March 1965 and the residence completed two months later. The OIC of the PMG installing staff, Brian Reich, occupied the residence during the station installation.

The transmitting equipment was supplied by STC on contract 28941 and comprised two 5kW high level anode modulated transmitters type 4SU-55B/S, serials 66913 and 66915, with a combining unit type 792SU-ID, serial 66292. The valve line up was oscillator 807, isolator 807, buffer 807, RF driver 4-125A, power amp 3 x 2500F3 triode. The audio side was push pull throughout using EF37A and 4-125A in the first two amplifiers, 4-125A in the cathode follower driver and a pair of 3 x 2500F3 in the modulator. The high tension rectifier was a silicon diode assembly.

Program input equipment racks were assembled and wired in the installation depot at Perry Park.

At the time of installation, the program line was open wire via Roma and the station normally took the same program as 4QS. The local Toowoomba studio was however, wired so that St. George could be given a separate program if required. The bandwidth at that time was 5kcs only, but after the installation of the so called "phase seven" microwave television bearer from Roma to St. George, a 10kcs channel became available on this bearer, and this is the present arrangement. Some early morning fading occurs on this route, but otherwise the reliability is high.

Initially aerials were erected to receive 4QS and the Brisbane high frequency VLM4 in case rebroadcast was needed, due to normal line failure.

When transmitter power became available in March 1966, Len Mor, an engineer of the Radio Section began the adjustment of the directional aerial system. Up to that time Brian Robinson had exercised engineering supervision of the installation and had written Queensland Engineering Report QB194 on the calculation of polar patterns such as the one required for the St. George array. The original design was prepared by Ken Endacott, an engineer of Central office. Mor's report is QB250.

To aid in the adjustment to the desired pattern, extensive pegging was installed out to 5 miles and field strength readings taken to determine the effect of power and phase adjustments.

The correct pattern was achieved and the station went on air at 6AM on 7th April, 1966.

The St. George newspaper "The Balonne Beacon" reported the opening briefly. A recording was played at 6.15PM during which the Federal member for Maranoa, W.J. Brimblecombe acting on behalf of the Postmaster General Alan Hulme, declared the station open. The chairman of the ABC, Dr. J.R. Dowling also spoke.

Notice of the impending opening had been placed in the newspaper on 24th March. No editorial or other comment appeared in print despite the importance of the event.

The mast phase and current sampling loops were Collins type 564A mounted well up each mast in the vicinity of a current maximum. Indications were transferred by coaxial cables of equal length to a Nems Clarke phase monitor in the first tuning hut.

The emergency engine generator installed by Les Nauman, was a Lister diesel type HA6 with an Electric Construction Company (Wolverhampton) brushless alternator type RF17KG/5, 3 phase, 415 volts, of 30kVA rating. The equipment was supplied by McColl Electric Works of Springvale, Victoria. An internal day tank and an external, underground 500 gallon tank were installed for the diesel fuel. The normal electricity supply was from the N.S.W. grid. Due to corrosion and water entry, the underground fuel tank was replaced in 1975 by an elevated model of the same capacity.

As the average annual rainfall at St. George is only 20 inches, it was decided to provide an earth dam to collect surface water to augment the roof catchment tanks. An excavation about 100 feet square was provided and fenced but over the years it did not prove very satisfactory and the supply was eventually boosted by the provision of a pump at the nearby Balonne River with a pipeline to the dam.

Due to the muddy nature of the dam water, a filtration plant was installed in 1972, but the whole system was plagued with problems and when the station became unattended in 1978 the need for this extra water supply diminished and arrangements were made to abandon it.

It had originally been intended that the grazing licence would require the dam water for stock, but this was never taken advantage of, although the fence was occasionally pushed in by cattle and sheep attempting to get at the water.

Apart from the highway frontage, the 4QW site was never fenced and grazing rights were held by H.C. Kemp and Mrs. Kemp until 1977. For the next five years rights were held by B. Barr of St. George and since 1982 by C.J. Lindores.

The dam will no doubt hold water intermittently in future, particularly after rain, but it is not required for 4QW use. Due to its being topped up with river water in the past, it supports a population of small fish and a species of freshwater Unio mussel. Water tortoises have been seen at times and water fowl frequent the area.

After the station opened, the first OIC was John McCulloch. In 1967 Claud Singleton came for three years, followed in the next triennial by Bill Smallegange. The last five years during which the station was staffed saw Errol Black as officer in charge. By 1978 however, the technical staff had diminished due to transfers and eventually only Black remained, attending the station on day shift. With his resignation in August 1978, the days of permanent staff at 4QW came to an end, and the oversight of the station was transferred to the OIC of the St. George telephone exchange, with Roma Radiocom staff responsible for periodic visits of inspection and testing.

The only significant equipment changes at 4QW since its opening have been an upgrading of the program input racks in 1984. Tests on the radiated aerial patterns have shown no appreciable change in the position or magnitude of the nulls. The 1978 frequency change from 710 to 711kcs was effected by a change of oscillator crystal only, and no power division or phasing adjustments were made in the aerial circuits.

Since the residence was sold and removed in 1984, the water system has been reorganized, and storage for firefighting and washroom is now dependent on roof catchment only.

An interesting development has been the construction of nests under the building eaves by large numbers of swallows, now undisturbed due to the absence of staff. The mud nests have been removed occasionally, but have been rebuilt next season so that it now seems pointless to try to keep the building clear.

Maintenance responsibility for 4QW now lies with the Broadcast Service Centre based at 4QS Dalby with Bob Horsley as OIC.

4HU HUGHENDEN

Before the establishment of the local ABC Regional transmitter, the railway and pastoral town of Hughenden had only 4QL Longreach as a national program source. The daytime signal strength was 2.5 millivolts per metre, adequate in winter, but being 180 miles from the transmitter, nighttime reception was inevitably marred by skywave fading.

Approval to establish a station at Hughenden was given by the Minister of the day on 17th October 1969, and it was to operate on 1570kcs into a short aerial with a power of 50 watts.

Two STC solid state transmitters type 4SU-85C, serial numbers 33099 and 33104 were delivered in July 1971 on Contract 40194. They were capable of 130 watts output but were cut back to 50 watts for this installation.

Hughenden was a demodulating station on the Telecom Townsville to Mount Isa microwave trunk route, and on the site in McLaren Street a 250 feet self-supporting steel tower and microwave repeater building were used for broadcast aerial support and equipment housing. The aerial was a single wire about a quarter wavelength long, supported by the microwave tower at the upper end, and secured at a small coupling box well out from the base of the tower making the aerial 12° off vertical. A 50 ohm coax ran back to the repeater building and the transmitter. A few copper wire radials were laid on the surface.

National Regional program was obtained via open wire landline from Townsville as no demodulating equipment was in use at Hughenden at that time on the microwave route.

4HU opened on 1st October 1971, giving excellent service to the town and its surrounding homesteads.

Just before opening day, extensive tests were made to determine what interference, if any, was being caused in the microwave bearers or to the 50 watt LGT television transmitter installed in the same building and operating on Channel 9. While the broadcast carrier did cause some measurable noise on some telephony channels it was not serious and no interference to the TV picture was caused.

When the new telephone exchange building was constructed on the site it became necessary to move the broadcast coupling unit, and Engineer Des Fulton devised a new aerial with its coupling box near the base of the tower. This aerial system was a form of folded monopole using the tower as the central earthed section. The input section was of wires supported by standoff rod insulators up each leg of the tower.

Possibly because the tower was not bonded for RF, aerial tuning was unstable and frequent returning was necessary. As supplied, the transmitters used final stage semiconductors which had little margin to cope with the detuning caused by aerial variations and many output transistors were destroyed. STC however supplied new heavy duty Motorola Transistors and these have given greatly improved reliability.

This folded monopole proved to be an obstruction to lineman working on the tower, and in addition there were frequent breaks of standoff insulators.

The monopole was abandoned and a new aerial fitted similar to the original, a quarter wavelength of 100 lb copper wire suspended from a timber beam on the tower with a small coupling box beside the radio building. Gordon Gilbert installed this new system.

This arrangement functioned until Hughenden became a demodulated centre and an automatic exchange was installed. At this stage it was decided to move 4HU to another site.

A new site was selected 3/4 mile distant from the microwave building, on the western edge of town, opposite the hospital.

The Department of Administrative Services began negotiations with the Flinders Shire in August 1978 and finalized the transaction in August 1980.

The site was small and gently sloping towards the west. It was square and 210 feet a side.

Linestaff under Duncan Russell-Hall installed the aerial and earth mat at the end of 1980 and with installation complete, service began from the new location on 12th March 1981, on 1485 kcs and 50 watts, the frequency having been changed in November 1978.

The equipment building was a small ARK hut on the concrete slab.

Because only local service to Hughenden was required, high efficiency of aerial and earth system was not essential and only 30 earth radials were installed with an average length of about one eighth wavelength.

The aerial and guy system was designed by Central Office Structures and is of 5 inches diameter galvanized steel pipe, 86 feet high. It is guyed in three directions and 30 feet of each of the 3 top guys is connected to the aerial to act as umbrella wire top loading.

The aerial is physically one eighth of a wavelength, and a run of impedance across the broadcast band shows that the values are almost identical with a 6 inch diameter pipe aerial at 4SO Southport, 106 feet high. It appears then that the top loading is equivalent to an extra 20 feet of height.

A short length of coaxial cable connects the transmitter to the aerial coupling box mounted on the inside wall of the building behind the transmitters. The feed to the aerial goes through the wall from inside the coupling box so there are no exposed RF feeders inside the buildings. The aerial is quite close to the building and the feeder is a short length of copper tube with two 5 inch diameter lightning choke turns. The aerial mast at the rear of the building is enclosed by a man-proof fence.

The aerial coupling is of the single coil type, tapped for a line input of 50 ohms.

Aerial impedance is 4HU frequency is 13 - j73 ohms and normal aerial current is 1.9 amps.

As operation in those days was not 24 hour, the station was started and stopped by a time clock.

Audio and carrier monitoring was performed by a Racal receiver type RA 7913 at the telephone exchange, and after hours alarms were extended from here to the Townsville Radiocom centre at Yarrowonga. A peak lopping room airconditioner was installed to cope with the high Hughenden summer temperatures, although the transmitters were rated to 50°C.

An aerial figure of merit and general field strength survey was conducted in October 1981 by Doug Sanderson assisted by Technician Bill Syratt. (See QLD Engineering Report QB 443) The figure of merit was 152 mV/mile/kw.

The field in Hughenden outside the Post Office was measured at 32 millivolts per metre, a value well able to provide good day and night service even in summer to the 1800 inhabitants.

The rolling downs and level country around Hughenden proved to have a very good effective conductivity. The 1 mV/metre contour was located 26 miles west of the town, a remarkable result with a transmitter power of 50 watts. The field strength contour map is drawing QK 6217.

First-in maintenance for 4HU at that stage was the responsibility of the local telephone exchange staff with overall supervision from the Mount Isa Radiocom depot. However, since the establishment of a Broadcast Division within Telecom and in particular, a Broadcast Service Centre at Townsville, maintenance responsibility is now vested in this latter development.

It has been said that with 4JK Julia Creek and 4QL Longreach both giving a field in Hughenden at about 2 mV/m there is no need for 4HU, but this ignores the nighttime fading from both stations and the requirement for a large signal to compete with summer static. For the people at Hughenden, 4HU is an essential service.

4MS MOSSMAN

Until the establishment of 4MS in 1973, Mossman and district were without an adequate National service.

Listeners there, relied on signals from 4AT Atherton and 4QN Brandon, neither of which exceeded 200 microvolts per metre. The transmitter at 4QY south of Cairns did not serve the Mossman area either.

In May 1968 the Australian Broadcasting Control Board asked the PMG's Department to conduct a field survey in the Mossman area with a view to selection of a site for a station.

Accordingly John Crossingham, Engineer, assisted by technicians Brian Clancy and Tony O'Brien set up a test transmitter in the area between Mossman and the coast in August 1968.

A windup Hills tower 115 feet high with some top loading wires was fed with 35 watts of RF at 970kcs derived from a modified STC exciter unit. This was powered by a portable engine generator.

From the results of the field strength readings taken, it was clear that this general area would serve as a suitable permanent transmitter site and several likely blocks of land were marked for investigation.

Land around Mossman is devoted to sugar cane growing and all areas are strictly assigned for this purpose. Consequently land sales are not lightly made and properties change hands at high prices. Suitable land for the proposed station was found, however, part of a public camping reserve under the control of the Douglas Shire Council. The Council had no objections, and an area of 28 acres was transferred from State to Commonwealth ownership. The block was described as portion 347, parish Whyanbeel, county Solander. It was part of reserve R44, adjacent to the Cook Highway about 3 miles north of Mossman.

The site was heavily timbered and low lying in parts with acacia, melaleuca and eucalyptus trees predominating.

Negotiations with the Shire Council were carried on by Lindsey Birch, Divisional Engineer Radio Installation, and Deegan, a properties officer of the Department of the Interior.

The survey of the required area was made in November 1970 by Department of the Interior surveyor P. Regnault.

In April 1971 permissive occupancy of the site was granted and final settlement made in March 1972.

PMG Brisbane Drafting Section surveyor Ray Myler ran a contour survey of the block in February 1972 and found several areas under water. With an annual rainfall of some 92 inches, it seems that the camping reserve was not an ideal spot for camping. Subsequent improvements in drainage have minimised water problems however.

Ministerial approval for a 1kW, 600kcs station with a 200 feet high aerial was given in October 1969 and two AWA 500 watt transmitters were ordered. These BTM-P5 transmitters, type 1J61650 were to operate in parallel via a combiner type 2J63736.

The valve complement of the BTM-P5 is: RF oscillator 6AK5, buffer 5763, driver 6146, final amplifier a pair of 4-250A in parallel. The audio chain is push pull, audio driver 2E26, modulator 4-250A. The high tension rectifier used a pair of 872A mercury vapour diodes.

The clearing of timber from the site was done by the Douglas Shire Council after the wet season, in June 1972. Radio line staff then laid the earth mats and erected the main and standby aerials.

A contract for the transmitter building was let to T.F. Woollam and Son, of Newmarket, Brisbane, and this was available for equipment installation in November 1972. The structure was of brick with a galvanized steel roof.

The main aerial at 200 feet and the standby at 100 feet were of similar "Skillfast" triangular section steel lattice of 2 feet a side. Both were top loaded with sloping "umbrella" wires. The earth mat was restricted to 120 wires 450 feet long which was only 0.28 wavelength at the 600kcs operating frequency. Conventional 6 wire transmission lines were built to the small aluminium coupling huts at each aerial.

At this time the engineer responsible for 4MS was Neil Howard with Senior Technical officer Frank Nolan, and the field staff for the installation were Brian Clancy, Jim Weeks and Gary Waite.

The emergency power supply installed was a 15kVA 3 phase Davey Dunlite alternator driven by a Lister air cooled diesel.

4MS came on air on 26th February 1973 and initially was staffed by day only by Jim Weeks. Soon however, Cutler Hamer Interscan remote control equipment was ready and the station was controlled by staff of the Cairns Radiocom Centre. Jeff Cass and Ken Howard finalized the installation of this equipment.

A field strength survey and figure of merit measurement was made in August 1974 by technicians Bob Sanders and Gary Waite. It was found that the sugar cane lands of the Mossman district were within the service area of the station although the heavily forested ranges constituted serious screening for valleys in the Daintree region.

On 23rd November 1978, 4MS changed frequency to 639kcs, the retuning being done by staff of the Cairns Radiocom Centre.

Mossman has no ABC studio, the program being under the control of the Cairns studio which feeds Mossman, 4QY Cairns, 4WP Weipa, 4AT Atherton and 4TI Thursday Island with Regional program containing local Cairns content.

Station maintenance is now solely the responsibility of the Cairns Broadcast Service Centre.

4JK JULIA CREEK

Although the Julia Creek district had been receiving reasonable reception from 4QL Longreach since the opening of the Cramsie site in 1954, the area to the north extending to the Gulf was poorly served.

Accordingly the Australian Broadcasting Control Board asked the PMG Department to make a field strength survey based on Julia Creek such. Such a survey was set up in September 1968 from a test site a mile west of the town.

A Hills windup mast 100 feet high was used in conjunction with a locally built transmitter of 66 watts output on 760 kcs, and due to the excellent ground conductivity, measurements could be made as far afield as Mount Isa, Normanton, Croydon and Hughenden. Results of the survey, conducted by engineer John Crossingham are given in Queensland Engineering Report QB 265. *FOR/ DIXON. JEFF CARROLL - BA and CASEY.*

From this information, the Board recommended to the Minister the establishment of a station at Julia Creek, and this was approved in October 1969. Early in 1970 the Board issued the technical specification which required the station to be of 10 kW rating, with a two mast directional aerial system operating on 570 kcs. The pattern was to be cardioid with the minimum towards the south east.

Some likely sites were selected by officers of the Queensland Radio Section and one was approved by the Board in June, 1970. It was on leasehold land run by the Argyle Pastoral Company and was described as Portion 43, Parish Hilton, County Eddington, and had a frontage to the main road some 5 miles east of Julia Creek. Permissive occupancy was granted in October 1971.

The site was 114 acres, flat and treeless, with heavy brown soil.

A contract for the masts was let to Ascom (Qld) Pty Ltd, and the site was surveyed and positions pegged by engineer Neil Howard of the Radio Section and H. W. LeStrange, surveyor from the Department of the Interior, in November, 1971.

The contractor poured the mast base foundations and guy anchor blocks before Christmas and began the erection of the masts in May 1972. The PMG representative on site during these activities was K. Mansfield, Radio Section lineman. The masts were painted orange and white bands and were lit at night for aircraft warning purposes by a small 6 kVA generator temporarily located at the base of one mast.

On completion in June, the masts were checked for verticality by Terry Holmes, PMG draftsman.

The masts were 640 feet high, spaced 432 feet apart on a bearing of 345 degrees. A spoked capacity "hat" of 70 feet diameter loaded the masts to an effective height of just over half a wavelength. Guy insulators were made by Nilsen Porcelains (Aust) and the base insulators by Osaka Togyo Kaisha Ltd of Japan.

All concrete samples were tested by the Main Roads Department depot at Cloncurry.

The subcontractor for the installation of the mast lighting wiring and fittings was Norris Electric Pty Ltd of Townsville.

In October 1972, linestaff laid the earth mats and contracts were placed for the building and the emergency engine generator.

The main building and the two aerial tuning huts were built by J. Scott Pty Ltd of Rocklea, Queensland, and access to these was available by May 1973. They were brick with sheet steel roofs. As the station was to be unattended, no residence was needed.

The transmitters were supplied by STC Sydney and two 5 kW units were used, type 4SU-105F, with a combiner type 792SU-3F, giving 10 kW into the 200 ohm line of standard 6 wire construction.

The RF exciter in these transmitters was transistorised, only the driver and final being valves. The driver was a 4/125A triode and the final a 3CX2500F3 triode. In the audio side the first amplifier used two 2N915 transistors, the second a pushpull pair of 4/125A triodes, the modulator driver a pushpull pair of 4/125A triodes, and the modulator a pair of 3CX2500F3 triodes. The high tension supply used silicon diode rectifiers.

Power splitting and phasing equipment was installed in the first tuning hut and the output for the second mast was conveyed by a connecting length of 6 wire transmission line.

The adjustment of the main directional aerial system was made by engineers Paul Chippendale and Dave Ellis and reported in Queensland Engineering Reports QB290 and QB291.

Other aerials erected on the site were two receiving rhombics for VLQ and VLM high frequency transmissions which could be used for emergency rebroadcast, and a 4JK standby mast. This was 202 feet high and top loaded with sloping umbrella wires. These aerials were installed by Radio Section linestaff.

The emergency engine generator was supplied by Pye Industrial Sales (Davey Dunlite Division) of Adelaide and comprised a Lister HRS6, 1500 rpm, 80 hp supercharged diesel driving a 3 phase, 45 kVA Dunlite alternator.

An "Isgus" time clock was provided to start and stop the transmitter daily. Installation staff at Julia Creek were Barry Nielsen, technical officer, with technicians Jeff Laidlaw and Geof Maconachie. Engineering supervision was by Neil Howard with Lindsey Birch as Divisional Engineer.

After the station opened at 6 am on Tuesday, 31st July, 1973, technician Gerard vanderHoven was employed as day shift maintenance man for the next two months. Towards the end of the year Cutler Hammer telesinalling equipment was installed at 4JK and the Townsville Radiocom Centre at Yarrowonga, to provide alarm and control facilities. Technical staff involved in these works were Jeff Cass, Ken Howard, Robin Kilgour, Garry Waite and T. Combine.

The local Telecom technical staff of Julia Creek were appointed to the "first in" maintenance responsibility, with the Radiocom staff at Mount Isa dealing with major problems. During the day the alarms were extended to Mount Isa and at night to Yarrowonga, the Townsville Radiocom centre.

In early 1976 some modifications were made to the supervisory equipment at Townsville, Julia Creek and Mount Isa and the staff involved from the Brisbane Radio Section were Doug Frith, Bob Perkins, Bob Hudson and Jeff Laidlaw.

4JK shared the frequency of 570 kcs with 2BH Broken Hill and 2YA Wellington, New Zealand. In November 1978 the frequency was changed to 567 kcs when many changes were made to accommodate the new 9 kcs carrier spacing plan.

The principal problems at 4JK have been environmental. Shortly after opening it was found that the building was not proof against the entry of a local insect commonly referred to as a "gidgee bug". Countless thousands of these invaded the equipment room and caused some transmitter outages. Improved screening soon minimised the problem.

The high temperatures of the inland have also taken their toll of transmitter components, despite the continued use of air conditioners in summer.

4JK broadcasts the ABC Regional program. Initially program came from Townsville to Mount Isa via the Telecom broadband microwave route and was sent back to Julia Creek on an open wire carrier system. In 1983 equipment became available to recover the program from the broadband equipment at Julia Creek, and the previous arrangement was abandoned.

Present responsibility for the operation of 4JK is vested in the Broadcast Service Centre, Townsville, where the officer in charge is Graham Stead.

4WP WEIPA

Until the establishment of 4WP at Weipa, medium frequency broadcast reception was almost non-existent there. Radio Australia and some inland high frequency services of the ABC such as VLQ, VLR and VLH could be received by those sufficiently interested, but the daytime broadcast band was dead. The opening of 4WP on 1st July 1975 was, therefore, a welcome event for the people of Weipa.

This town, about 150 miles south of Cape York on the west side of the peninsula was established by the company Commonwealth Aluminium Corporation Limited (Comalco) for the purpose of mining the aluminium mineral, bauxite. The population at the time of the building of 4WP was about 2500.

Weipa as a potential broadcasting station site was first considered around 1970 when it was expected that the Minister would approve its provision. It was thought that a small 50 watt transmitter would probably be recommended, but no approval was given at that time.

By the end of 1971, the Australian Broadcasting Control Board was planning on a 100 watt station on 1040 kcs, but in September 1972 the final plan appeared, for a 500 watt transmitter.

Broadcasting Headquarters in Melbourne accordingly ordered two AWA 500 watt transmitters, type BTM-PS, for a main and standby installation.

Dave Ellis, engineer of the Brisbane Radio Installation Section went to Weipa in January 1973 to discuss sites with the Comalco people, and selected a 24 acre block about a mile from the town centre. It was portion 38 of Special Bauxite Mining Lease No.1.

Approval for the erection of a 150 feet high aerial was obtained from the Department of Civil Aviation, with the proviso that it be lit and painted, being on the approach path to the Weipa Airport. This applied until 1982 when lighting was no longer required. The Department of Services and Property proceeded to negotiate the sale of the leased land to the Commonwealth.

In September 1973, Terry Homes from the Brisbane PMG Drafting Office surveyed the site and pegged out the positions for the aerial, the building and a receiving rhombic.

It was decided to use a transportable 1000 line telephone exchange type building, and to fit it out as fully as possible in Brisbane. This was done, with the two transmitters at one end with the program equipment, and a 15 kVA diesel generator set for emergency supply, at the other end.

The building thus equipped was taken on a low loader to Cairns with Ron Harris driving the escort car. From Cairns it went by sea to Weipa, where it was collected by Comalco staff with a crane and placed on its stumps on the 4WP site.

Radio line staff had already erected the aerials and laid the earth mat and the 50 ohm coaxial cables. Two cables were laid and two identical coupling units, supplied by AWA were installed with a changeover switch.

The main aerial was supplied by A.G. Miers Pty Limited of Burwood, Victoria. This was of triangular section, 2 feet a side, and 152 feet high with 9 sloping top loading wires each 78 feet long, at 45 degrees. This gave a base impedance of 30 - j35 ohms.

The earth mat was conventional, 120 radials each 400 feet long.

The coaxial cables were Andrews HJ5-50.

A rhombic aerial for receiving the Brisbane high frequency station VLQ9 was provided to obtain rebroadcast program in the event of a main program line failure, but over the years it has not often been of sufficient quality for such use. A tape recorder with ABC announcements and music has mostly been used during program line outages.

The station was installed at Weipa by Peter Werner, Jeff Maconachie and Gerry Vanderhoven with oversight by Ron Harris. Paul Chippendale gave engineering support, and the aerial system was commissioned by Doug Sanderson.

The station went on air on 1st July, 1975, with ABC regional program via the studio in Cairns.

A figure of merit measurement and a field strength survey was made in August 1975 by Bob Sanders and Gary Waite, Radio Section technicians. The figure of merit came out as 189 millivolts per metre at one mile for one kilowatt and the service area proved to be limited in this poor conductivity country to a radius of about 15 miles. With almost the entire population concentrated on Weipa, the service area is satisfactory.

As 4WP was designed to operate unattended with local supervision by the Weipa Telephone Technician, a remote control and monitoring system was installed. It was a Cutler Hammer "Interscan" with the Cairns end at the Radiocom Centre. Final installation of this equipment was done by Ron Harris and Ken Howard later in 1975.

Responsibility for the station now lies with the staff of the Cairns Broadcast Service Centre.

4TI THURSDAY ISLAND

Thursday Island, just north of Cape York, was named by Captain Bligh in 1789. It is a small, waterless, hilly island known as Waiben to the local Torres Strait Islanders, and T.I. to everyone.

Despite its small size and lack of permanent water supplies, it became the chief settlement in the north, as the anchorage was safe. It was a regular port of call in the steamship era and the centre of activities in the pearling days. Today there are cultured pearls farms in the area, but the pearling luggers have gone.

There is no airstrip on T.I. and travellers arrive on nearby Horn Island and reach their destination by bus to the wharf and ferry to the Thursday Island jetty.

Modern day communication has been until recently UHF radio telephone links from Milman Hill on T.I. to Bamaga, the aboriginal community town near Cape York, then by open wire telephony down the Peninsula. The route has now been modernised and there is a Telecom broadband microwave facility all the way to Cairns.

Until the installation of 4TI, broadcast band reception at Thursday Island was almost non-existent. The nearest station was 9PA Port Moresby, 350 miles away across the Coral sea. Radio Australia and the Brisbane H.F. Inland service on VLQ9 were sole providers of radio news and not very high quality music. By way of variety, the keen listener could tune to the short wave services from Port Moresby and Indonesia.

Background to Establishment: As early as 1971 the then Australian Broadcasting Control Board proposed a 50 watt broadcast transmitter for Thursday Island and revised the plan to 1000 watts in December 1971. However, ministerial approval for the installation was not given at the time.

Little more was heard until in early 1975 the A.B.C.B. advised that it proposed to use a 2000 watt installation housed in the Overseas Telecommunication Commission building on Thursday Island, and to share the OTC long wave vertical radiator. This decision brought an immediate reaction from OTC and Telecom - neither finding anything of merit in the proposal. However all engineering objections to the plan - remoteness of the site for expert maintenance, complexity and high cost of equipment required for sharing, possibility of difficult cross modulation problems, complete absence of engineering appraisal of alternative sites (e.g. Bamaga) - were overruled and no further discussion or investigation was permitted. OTC eventually approved the operation in principle but reserved the right to reject the station if unresolvable problems persisted or were discovered in the first six months of trial operation.

With this unique background, station planning began. Because of the unusual nature of this installation, more detail is given in what follows than in other station chapters.

Provision of station: Ministerial approval was given in August 1976 but no funds were available from Treasury for the 1976/77 financial year.

In October 1977 a technical officer from the Cairns Radiocom Centre (Des Allen) went to Thursday Island and measured the OTC vertical radiator for base impedance at frequencies of interest. Later that month John Robertson Eng Class 3 Central Office, Doug Sanderson Engineer Class 3 Radio Section Brisbane, Alan Timmins State Engineer of Posts and Telecommunications Department Queensland, and Ray Beutel Line Inspector Radio Section Brisbane went to Thursday Island to examine the OTC facilities and to make some test transmissions using a portable 100 watt transmitter on 950kcs from the OTC vertical radiator. From the limited field strength measurements made it was concluded that the radiator efficiency was satisfactory. There is considerable top loading in the form of 4 horizontal wires attached to this radiator. Other observations suggested that there could be a need for wavetraps in the receivers at the OTC receiving site some half mile from the transmitters. The line inspector reported that some guys were in need of replacement, some insulators chipped and the mast bonding corroded and in need of renewal. The OTC building showed evidence of considerable dust ingress from the adjacent unsealed island ring road and in view of this and the proximity of the sea it was concluded that airconditioning would be essential for the broadcast equipment. The cost of airconditioning the OTC building was deemed excessive and plans were made for a type 521 telephone exchange type building to be airconditioned and used as a transmitter and program input equipment building.

Two STC 1kW transmitters with combining unit originally intended for Kununurra, W.A. and provided as Item 25 of Contract 44953 were transferred to Queensland and were retuned to 1062kcs, the final revised frequency for Thursday Island.

Various items of program input equipment supplied as item 43 of the contract were selected where appropriate. None of the remote control equipment was used.

It was agreed that emergency power for the station would be available from the OTC diesel engine generator set. As space in the 521 type building was limited, OTC agreed to the installation of a 3 phase mains regulator in their emergency engine room.

Engineering design and oversight of the project in Queensland was by Doug Sanderson. Others working on the installation at various times were Tony O'Brien, Barry Neilson, Dave Laing, Bob Perkins, Peter Curtis and Gerry Vanderhoven. Rod Thompson, Engineer Class 3, from Headquarters, provided assistance with the coupling unit design and testing in the field. The 521 type building made by Telecom in the Brisbane workshops was equipped in Brisbane with the transmitters and program equipment, and taken by low loader to Cairns. The rest of the journey was by ship and the building was placed on its concrete slab on the OTC site in March 1979.

As a precaution against RF heating and rectification, the internal aluminium wall sheeting was spot welded between adjacent sheets.

It had been agreed that the design of the coupling unit to permit operation into vertical radiator on 488.5, 500, 512 and 1062 kcs would be undertaken by the Broadcast Construction group in Central Office, Melbourne, and to facilitate this, another series of radiator impedances was made by the Cairns Radiocom Staff (Mike McGuire) in August 1978. The final design of the coupling unit involved a number of large RF inductors and their manufacture was undertaken by the Brisbane Telecom Workshops. Sundry ceramic and vacuum variable capacitors had to be obtained from overseas. This coupling equipment was mounted on benches in a type 511 transportable exchange building.

Agreement was reached that OTC could, if equipment failures caused problems with OTC transmissions, remove the broadcasting equipment from circuit. The OTC original coupling equipment cabinet was incorporated in the new coupling building and only required the operation of two knife switches to place it in circuit free of the broadcasting equipment. The national transmitters would of course be turned off in this situation, but could probably operate into an emergency aerial not associated with the OTC mast.

The new coupling building was mounted on a concrete slab adjacent to the base of the OTC vertical radiator.

Operation of the normal long wave frequency changing controls at the OTC receiving station causes contactors to operate in the coupling building, switching the appropriate matching units into circuit.

Because of delays in receipt of components for the coupling unit, it was decided by P and T Department to put the station to air using a temporary radiator. A light duty Hills tower 105 feet high was therefore erected by the Radio Lines staff near the transmitter building and tuned for 1062kcs. Base input impedance was measured as 26 - j260 ohms. The resistive component was very high for a one eighth wavelength radiator but was no doubt due to the very poor earth mat used. OTC stipulated that their main earth mat was not to be used with the temporary NBS radiator, so six short radial wires were run out on the surface. The transmitters were successfully operated into this temporary system and began radiating the National Regional program on 18.6.79.

During the preceding week test transmissions of music and requests for reception reports were broadcast during the day and for an hour in the evenings.

Program Line: At the time of opening 4TI, Brisbane program reached Cairns by conventional microwave bearer circuits. From there to Bamaga about 500 miles of open wire line were used with a program carrier. The Bamaga to Thursday Is link was by UHF radio, terminating on Milman Hill. Demodulated audio was available here and fed over cable via the exchange to the OTC site.

Rebroadcast and emergency program: To cover the occasional long disruption of program which could be expected during each wet season, a reel to reel Teac tape recorder with 10 inch reels was supplied. This machine has reversal facilities and will play continuously with ABC recorded music and apology announcements.

Two Crystal locked Racal 7915 receivers were also provided, operating in parallel diversity from two sloping V-aerials arranged for reception from the South. They were fitted for reception of the Brisbane high frequency stations VLQ9 and VLM4, and the regional stations 4QN Brandon and 4QD Emerald.

At the transmitter a small operating table fitted with a gramophone turntable and a microphone was provided in accordance with standard practice. It could be connected to the audio equipment via a patch cord.

Design Philosophy: Because of the remote location (500 miles from the Cairns Radiocom Centre) and the limited staff and equipment at Thursday Is, every effort was made to simplify the circuitry.

The main aerial coupling equipment was well engineered with high quality capacitors and heavy duty inductors. Two generously proportioned coaxial feeders were provided as main and spare with simple knife switch changeover at each end.

The transmitters are in parallel with a combiner. Either transmitter can be put to air clear of the combiner by operation of a simple knife switch in the combiner cabinet.

Two heavy duty Sandhurst externally mounted air conditioners specially designed for salty and humid atmospheres recirculated air in the transmitter building. The transmitter cooling air is recycled within the building, so that little or no make up air is introduced from outside.

Two temperature sensors are mounted on the front face of the program input equipment rack. One operates when the room temperature reaches 90 degrees F (on air conditioner failure) and sends an alarm to the exchange. The second is set to operate at 110 degrees Fahrenheit and switch off both transmitters. They can only be restored by manually operating a switch associated with the temperature relay. The room normally operates at about 80 degree F and after air conditioner failure, some 45 minutes elapse before transmitter shut down occurs.

Main Aerial Coupling Equipment: The 4 channel coupling equipment circuit was designed in the Broadcast Construction Section in Central Office Melbourne. Since OTC operates its 2kW transmitter regularly on 488.5, 500 and 512kcs, three separate coupling channels were provided for these, and one for the NBS transmitter on 1062kcs. It was desired that no OTC channel in use would significantly alter the tuning of the NBS channel and that there would be no significant cross modulation either way. The initial agreement between OTC and Telecom also specified a maximum allowable OTC power loss in the coupling equipment of 1.5dB.

The initial design provided theoretically for no more than 0.6dB loss in any OTC channel and 0.9dB loss in the NBS channel.

The first attempt to align the equipment was made in Oct 1979 by Thompson and Sanderson, assisted by Vanderhoeven. Because the impedances inside the hut were considerably different from those previously measured at the base of the mast, the L/C ratios of the coupling elements were not optimum and power losses exceeded the allowable amounts. Assumptions had been made as to the expected values of impedance inside the hut and the circuit designed accordingly. However due to stray capacity and inductance introduced by changes to the earth system, the placing of the ARK coupling hut adjacent to the mast and the removal of the original OTC coupling box, the design was not optimum for the new conditions. Losses were unacceptable and the experiment was terminated.

After office redesign using the actual measured values, a second attempt at alignment was made in November with Dave Laing, Tech, Radio Lab, assisting. After some 8 days of concentrated effort it was accepted that considerable layout changes in the hut were necessary if the system was ever to function correctly.

The ARK511 coupling hut is lined with aluminium sheeting with all sheet junctions spot welded to form a continuous electrical screen. This inner screen is connected to the earth mat. The original OTC coupling box is mounted on a steel frame bolted to the floor just inside the door. A shelf for the NBS coupling equipment runs along one wall and meets in a corner of the room the three shelves of OTC coupling equipment which line an adjacent wall. Because of the quantity and size of the components, spacing between coils is small but coupling effects have been minimised by mounting adjacent coils mutually at right angles. Due to restricted finance and poor availability of suitable RF contactors, some surplus contactors were obtained from South Australia Radio Section and used for switching the OTC coupling units. It was necessary to mount these in the middle of the OTC benches and run busbars to either end. These busbar runs adjacent to coils in the rejector circuits caused loss of

Q and increased stray coupling so that there was insufficient rejection of NBS signal back into the OTC transmission line. This caused unacceptable crosstalk. In addition, due to a previously unknown output power control circuit associated with the OTC transmitter, the NBS induced voltage caused a reduction in output power of the OTC transmitter.

It was decided to rearrange the contactors and the layout of the middle OTC coupling bench, and line each bench with copper sheet in an endeavour to reduce stray couplings. While measurements were being made, the temporary NBS aerial had to be isolated from earth so that mutual coupling effects into the main OTC radiator would not effect its impedance. However it was not possible to similarly isolate the OTC standby aerial as it was in very frequent use, and measuring problems arose accordingly. Static from tropical storms was also high and transmissions from ships in the area caused interference to bridge measurements.

A great deal of information about the complexities of this system was obtained during this period, but as no solution could be found with the existing physical layout, it was decided to return at a later stage when the rearrangements had been made.

Consequently Thompson and Sanderson returned to Thursday Is in March 1980 with technician Perkins and put the earthing and screening material into place. The four benches were lined with copper sheet and all connected together with extra runs of 2 x 1/8 inch copper strap from the main earth radial ring conductor surrounding the coupling hut and mast. Some coils were repositioned to minimise couplings and the changeover contactors were removed and mounted on the hut walls at each end of the benches to minimise long runs of busbar. Two additional contactors were used, one Multronics and one Johnson which had been made available from spare stocks in Brisbane.

These changes altered the Q and inductance of all coils and complete readjustment of all circuits was required. Fortunately sufficient disk ceramic capacitors were on hand to cope with the changed values required. As stray coupling was now eliminated, it was possible to adjust all circuits, and excellent matching and inter-station rejection was achieved. The circuit was tested to air and both transmitting systems performed well in terms of loss and VSWR. However although bridge and voltmeter measurements gave very high values of rejection when tested statically, excessive cross modulation was apparent when program modulation was applied from the 4TI transmitter.

Discussions with Jack Ross, South Australia Radio Section, revealed that excessive cross modulation in dual frequency coupling units at Reynella, 5AN-5CL, had been traced to the use of variable vacuum capacitors in common paths. The high voltages varying at modulation frequencies apparently caused mechanical variations resulting in audible effects and small but significant capacitance variations.

It was decided therefore to replace the variable vacuum capacitors with fixed ceramic disks and on a visit in June 1980 this was done. Prior to making any changes, tests for cross modulation were made and it was found that there was negligible audible effect. No positive reason for the change was ever found. However at this stage extensive upgrading of components was made by OTC staff working on a low frequency transmitter and it is possible that previous cross modulation may have been occurring in the OTC transmitter due to high level NBS fields surrounding the building and equipment. The state and extent of the OTC building earth could not be ascertained. It is well known that cross modulation effects can be produced by faulty earth contacts at high power dual frequency installations. At the same time the switching was rearranged to allow the use of one rejector group in the OTC system instead of the three previously used. This was done by placing the Multronics contactors so that the OTC circuits could in turn, feed into the input of the single rejector group. As the switching is done with OTC power off and as the selective NBS rejector group is not switched on the aerial side, contactor sparking was eliminated. These mains operated contactors, however, have no manufacturers' guaranteed life, and as OTC operations are numerous it was though desirable to convert to vacuum contactors which are low voltage DC operated and have a guaranteed life of 2 million operations. This was later done by Harvey Ferrall and no further problems were encountered.

As the voltages measured across the parallel and series coils of the rejector system did not agree with those expected on consideration of the actual tuned circuits, it was suspected that coupling between coils was occurring. The series components were therefore moved to another bench, and more consistent results achieved.

It is the current opinion of Central Office Research Labs that there is no virtue in silver plating large inductors. The commercial plating processes leave the surface in a finely granulated state and employ various additives in the baths which can reduce the surface conductivity below that of pure copper. To avoid corrosion it was

recommended that the copper tubing be cleaned with fine abrasive paper and painted with Watty Incralac. This was approved as having excellent dielectric properties. After final coil clamp positions were found, the coils were cleaned and coated. It had not been possible to obtain high purity copper tubing for the inductors and ordinary plumbers grade was used. Coils are Q3 and Q4 type, made in the Brisbane Telecom Workshops to drawings QR658 and QR2679.

Aerial Impedance: A frequency/impedance run was taken at the aerial knife switch adjacent to the aerial ammeter. The important values are:

488.5 kcs		4.65 - j57 ohms
500	"	4.95 - j50 "
512	"	5.30 - j41 "
1062	"	259 + j800 "

At the OTC frequencies, the large amount of top loading of the radiator resulted in low negative reactance but very low resistance. In fact, first resonance occurred at 550kcs where the resistive component was only 6.5 ohms.

Standby radiator: Because of the shared use of the main radiator, a standby aerial for 4TI was provided.

A short sloping wire was erected between the transmitter building and a 70 feet high steel tower nearby, giving a length of 100 feet. This aerial had a very low resistance and a very high reactance, and at 2kW severe corona occurred at the top and the porcelain feed out insulator on the wall of the transmitter building was destroyed.

Several attempts at series coil loading were made, but although the aerial was eventually considered usable, the high RF field in the adjacent OTC building necessitated a change in location.

The final arrangement was a sloping wire about 200 feet long using another 70 feet steel tower well away from the OTC building. This wire had an input impedance of 22 - j50 ohms at 1062kcs. It was necessary to provide corona rings on the end insulator adjacent to the tower, but when this was done the system was stable with full power input and no interference was caused to OTC equipment.

Because of the congested nature of the island, no formal aerial efficiency tests were made and only spot field strengths were measured around the island and at the Horn Island airport.

Although the field strength is small at many of the outlying islands, reception has been considerably improved in the Torres Straits regions.

To improve the usefulness of the station, daily 2 hour local programs were begun in 1985 from a studio owned by the Torres Strait Islanders Media Association. These sessions are produced and presented by local Thursday Island people.

Because of the long land line involved, the 4TI program was sometimes interrupted and in this case tape recorded music was substituted. Since the Aussat satellite has become available, ABC program can be received at the Thursday Island TV station where access to the satellite's transmission is available. Equipment was installed in May 1986 so that this reliable program can be used for rebroadcasting by 4TI in the event of a normal program line failure.

4TI is in the Cairns Broadcast Service Centre district, but immediate fault clearance can often be arranged by the local Telecom technical staff on the island.

4CH CHARLEVILLE

Charleville on the Warrego is a major pastoral centre some 700km west of Brisbane with a town population approaching 4000.

For many years the only reliable medium frequency reception has been from the local commercial station 4VL. Poor to fair signals from 4QL Longreach provided the only daytime National listening available, although VLQ9 and southern states domestic high frequency services were also used by those sufficiently interested with suitable receivers.

Sporadic agitation for a local National station has occurred over the years, and in 1967 a draft proposal from the then Australian Broadcasting Control Board listed a station for Charleville synchronized with 4QL Longreach. By mid 1972 approval was expected so that the station could be open by the end of 1974. No approval came.

In July 1982 a Department of Communications plan was released with the suggestion for a Charleville station synchronized with 4QS Dalby on 747kcs. This was opposed by the ABC for reasons concerned with programming. Another plan for using 1062kcs was put forward but the use of this comparatively high frequency was not favoured.

A firm request from D.O.C. was received in March 1984 for a site to be selected for a station using either 585 or 603kcs, 10kW, with a two mast directional aerial system. This was followed soon afterwards with a decision to use 603kcs and to move 7ZL from that channel to 585kcs. It was suggested that the site should be to the south or west of Charleville and accordingly in May 1984 Doug Sanderson, Engineer of the Queensland Broadcasting Branch, went with Steve Fennell to the area and selected some possible sites. (Queensland Engineering Report QB455). In October the plan had been changed and the requirement was now for a site north of Charleville.

Sanderson and Mike Collins then located a suitable site in a disused State Government Camping Reserve 19km north, adjacent to the Augathella road. This site was accepted by the Department and negotiations were begun for a suitable area to be made available for the proposed new radio station. The site was flat and sandy with a medium cover of cypress, eucalypt, erymophylla and other western shrubs and was held on a grazing lease by a nearby property "Gowrie". As the radio site was not to be fenced, no inconvenience was expected to the cattle. Kangaroos and a few rabbits also frequented the area.

In October 1985 levels were taken over the site by Drafting Branch surveyor Alan Banham assisted by Doug Sanderson and Greg Anderson. A Telecom Broadcasting Directorate headquarters decision was made to order a solid state 10kW transmitter, type Amphet 10, from Nautical Electronic Laboratories of Nova Scotia, Canada, via the Australian agent JNS Electronic Industries of Melbourne.

It was decided that a modern 400 line telephone exchange portable building would be ideal for the transmitter, and a smaller ARK511 building on hand as surplus at the Broadcast Installation Depot would suit as an emergency engine generator room. Two small 40 line RCMX exchange buildings acquired from Telecom were to be used as mast coupling huts.

During 1986 the transmitter and program input equipment were installed in the 400 line building at the old Broadcast Installation Depot at Peel Street, South Brisbane.

Building's Engineering Services (Telecom) took the smaller building to their depot at Salisbury and fitted it out with a reconditioned diesel generator set. This was an English Electric Dorman 6DA engine direct coupled to a Dunlite 35kVA three phase alternator type D.A.D.A.B./MF.

Both transmitter and engine buildings were later taken by road to the Charleville site and mounted on concrete stumps.

The South West Queensland Electricity Board provided a short spur into the station from their 22KV Charleville to Augathella feeder.

Earlier in 1986 Grant Beaumont went to the site and pegged out the area to be cleared. The contractor arranged by Housing and Construction Department was B.R. Buchan of St. George.

By July the clearing was complete and the access road laid down and the first load of coaxial cable, earth wire and other hardware was delivered. The Broadcast Linestaff then installed the concrete mast bases and guy anchor blocks for the two 90 metre steel lattice masts. These were made by Andrew Antennas of Melbourne. The guys and insulators were assembled by A. Noble and Son (Qld). Radio linestaff plowed in the earth radial wires and erected the masts.

Most of the mast sections were delivered in October 1986 with some components not being available until May 1987.

During May the time consuming task of adjusting the system for the correct operating conditions was in progress. Measurements were made to determine the mutual impedance between the masts and hence the coupling components necessary.

The specification for the station supplied by the Department of Communication detailed the current ratios and phasing for the aerials. It was decided to mount the power dividing and phase control component in the transmitter building and to run a separate buried coaxial feeder to each mast. An L-C coupling network was then installed in each coupling hut at the mast bases and the whole system adjusted to produce the desired field pattern. This comprised a lobe of radiation towards the east and one to the west with minimum radiation on bearings of 8 degrees T and 162 degrees T to give skywave protection to future stations in Papua New Guinea and Tomerong in NSW.

As the operating frequency of 603kcs was a clear channel by day, pattern adjustment, which involved a good deal of field work with field strength measuring equipment, was able to be undertaken in daylight.

4CH went to air on 5th June with the ABC Regional program via the Longreach studio. No formal opening ceremony was arranged, the announcer merely adding 4CH to his list of call signs - "RK, QD, QL and CH", surely the quietest opening of a major country regional station ever.

Staff involved with the installation at various times were, on the technical side, Tony O'Brien, Grant Beaumont, Peter Cusack, Paul Lamprechet, Paul Davies and Mark Williams. Radio linestaff were Dave Southby, Vern Berry, John Stevens, John Kirkwood, Kerry Williams, Michael Fenney, Michael Anthony, Steve Rover and Terry Byrne.

Project engineer was Doug Sanderson.

The new Broadcast Service Centre at Dalby was given maintenance responsibility for this station with the Charleville Telecom Exchange technicians available for emergencies.

Program for 4CH is that used at 4QL and arrives at Charleville Exchange via Telecom radio bearer. The route to the transmitter is currently open wire but a cable from Charleville to the site is being planned.

Because of the extensive use of solid state devices in the transmitter and program input equipment, lightning surge suppressors have been fitted in the power mains and program lines.

Automatic supervision of 4CH is provided by electronic equipment which signals faults to a monitoring centre in Brisbane, using the Telecom phone system.

VLO - BRISBANE - VLM

In 1941 the property which was to become the Brisbane Metropolitan Broadcasting site at Bald Hills was in the process of acquisition. Its first station was to be in the high frequency band designed to carry the ABC program to inland Queensland.

Headquarters drawings prepared during 1941 for the design of the aerial supporting structures refer to "the Brisbane HF transmitting station" which was to be of 5kW rating.

On the site the existing farmhouse and other buildings were being removed and by October 1941 the new transmitter building was being built.

By January 1942 the plan had become firm for a 10kW transmitter and a contract was let with STC of Sydney for manufacture.

The type produced was an A880A suitable for broadcast use. This was the third unit of the type constructed, the first two being A880B units for the Royal Australian Air Force, a 14kW for Laverton and a 20kW for Ballarat, probably for telegraph use.

When completed, the transmitter was brought to Brisbane by truck. Vern Kenna who was the Divisional Engineer for Broadcast Installation at the time recalls that the vehicle was powered by producer gas derived from burning coke. The shortages of petrol during war time had resulted in many vehicles being converted to this gas fuel. The transmitter was originally expected to operate in the 3, 6 and 9Mcs bands on 6070, 9635 and 3330kcs and aerial drawings were prepared for this. In fact the station never radiated in the 3 and 6Mcs band, two frequencies in the 7Mcs and one in the 9Mcs band being finally used. The aerials were half wave horizontal dipoles, and four hardwood poles were erected in a line oriented to give an angle of fire of the radiation of 310 degrees true to suit the inland Queensland target area. The poles were 66, 110 and 44 feet high, supporting in line the 7, 3 and 9Mcs aerials. All aerials were fitted with reflectors.

Transmission lines were 600 ohm impedance, two wire balanced.

Installation proceeded during 1942 with Arthur Clark in charge. Clarrie Boettcher installed the pipe work for the water cooling system required for the final amplifier valves. The pumps, supplied in duplicate, were by Thomas Engineering and were driven by 2 3/4HP three phase 2900rpm motors. Only one set was in use at a time. These pumps supplied water to cool the anodes of the power output valves at the rate of 6 gallons per minute. A fan cooled external radiator was mounted nearby and distilled water was required. As the anode voltage was 12000 volts it was important to use pure low conductivity water and a still was installed to ensure a supply.

The valve complement of this transmitter was crystal oscillator and oscillator amplifier - both 4061A pentodes, first and second RF buffers and modulated amplifier - 4282B triodes, first and second speech amplifiers - 4046A pentodes, modulator 4212E triode, 1st RF amplifier 4251A triode and two triodes, type SS1971 in parallel as the final linear power stage. Minor rectifier 83V, medium voltage rectifiers 866A and extra high tension rectifiers type 4078A, mercury vapour, six mounted in a row with a seventh as spare and known locally as the "seven dwarfs". In later years, all valve rectifiers were replaced by silicon diodes.

Modulation was applied to the anode and screen of the modulated amplifier.

Four crystals could be mounted in the oscillator which was an untuned Pierce. Subsequent frequency doubling, depending upon operating frequency desired, was achieved in the first buffer stage. The transmitter was capable of 10kW output in the range 3 to 20Mcs.

The output impedance of the transmitter was 80ohms and a bridge L-C network was used to match to the 600 ohm impedance of the transmission lines.

The transmitter and program equipment were ready at the beginning of 1943. Aerial tuning was effected but not without the production of some very loud modulated arcs due to the prevalence of insects and occasional mistuning. All was well in the end and the station went to air on 17th February 1943.

Early monitoring notes made at 4QS Dalby show that the initial 7Mcs frequency was 7250kcs but this was changed soon to the final figure of 7240kcs. Early testing in the HF bands sometimes shows unexpected

co-channel interference and it is likely that this was the case. The station settled into a routine running VLQ2, 7215kcs, from 6AM to 10AM, VLQ3, 9660kcs from 10.15 to 6.15PM, then VLQ, 7240kcs, from 6.30PM to midnight. Fifteen minutes was allowed for the frequency retuning.

The frequency schedule existed until about 1947 when the 7Mcs band was vacated and transmission became fixed on 9660kcs. Despite changes in the solar cycle, no other frequencies were ever used by VLQ. A new transmitter operating on 4.9Mcs, VLM, came into service in 1949 so some frequency diversity was available from then on.

VLQ continued to operate until in 1968, a new 10kW unit, STC type 4SU-48B was installed. Old faithful was put into standby service, but was again on full national program schedule between December 1973 and May 1976 during which time the 48B was engaged on a Radio Australia service to Papua New Guinea.

As the SS1971 valves were becoming hard to get and more expensive, tests were done in February 1973 on the STC replacement 3Q213E and these were found to be satisfactory. When the supply of SS1971's ceased a few years later, the 3Q series were used regularly.

The contract for the new transmitter was let to STC in April 1967 and unit number 92176 was ready for factory test by PMG engineer John Searle at the end of November.

The installation was done by Bob Hansen assisted by Tony O'Brien and Bill Krebs and the transmitter was ready for service in 1968.

The valve line up of the 48B was crystal oscillator 6AMG pentode, isolator 6146 tetrode, first and second harmonic generators 6146, output two 6146 in parallel, RF drive amplifier two 4-250A tetrodes push pull, and power output two 3x2500A3 triodes in push pull.

The audio side was push pull throughout. 1st audio EF86 pentode, 2nd audio 4-250A tetrode, and cathode follower drive 4-250A tetrode and modulator 3x2500A3 triode.

No valves were used in the rectifier circuits. High tension was 4800 volts.

As mentioned above, the transmitter was on Radio Australia service from 1973 to 1976. It was operated on 11880kcs using a rhombic aerial.

From 1976 to the present, the 48B has operated full time as VLQ9 on 9660kcs.

In 1949 a contract was let to STC for a new 10kW transmitter for a service to be operated with the call sign, VLM.

As it was required to begin the transmission as soon as possible, presumably to hold the allocated frequency, a temporary service was begun on 7th September 1949 using a 200 watt AT14 transmitter, feeding a long inclined wire which ran from the transmitter building to an attachment on the MF pipe radiator. At this time, no main aerial for the operating frequency 4917.5kcs was available, but soon afterwards the old VLQ 3Mcs aerial was removed and a delta matched dipole put in its place to carry the new 10kW transmitter. This was a 4SU - 12A in the new "corio sand" colour, an orange-biscuit shade.

The valve complement was oscillator, isolator, 1st and 2nd harmonic generators, all 6VGGT; Buffer 807, buffer amplifier, push-pull 813 tetrodes; driver, push-pull TG10 triodes; power amp push-pull 3J/221E triodes.

The audio line was push-pull throughout. 1st speech amp 6J7G pentode; 2nd speech amp 6V6GT beam tetrode; 3rd speech amp 3C/150A triode; mod driver TG10 triode; modulator 3J/221E triode.

The rectifiers were main HT 4078Z, six valves; minor HT 872A's.

The rectifier valves were later replaced by silicon diodes and in 1981 the 3J221E was replaced by a Philips valve TBL12/25, much less expensive and very much lighter in weight.

The installation was completed by January 1951 and operated into the new dipole. Site work was under the control of Supervising Technician Otto Burmester.

On 1st June 1953 the frequency was changed to the present one of 4920kcs.

Because of reports that VLM was causing night time interference to VUM Madras in India, the power was reduced to 5kW after 11PM each night. This was in June 1956, but the aerial had already been lowered to 50 feet in August of the previous year. Whether these expedients improved the Indian reception or not was never revealed to the operators at Bald Hills. The matter appears to have been forgotten and the nightly cut back of power was discontinued in December 1966. The aerial height was not restored, however, and has not been to date.

In 1966, wiring in VLM had deteriorated and for about 3 weeks, while Gordon Gilbert rewired the faulty sections, VLM operated again at 200 watts using an AT14 transmitter.

In July 1966, both VLM and VLQ were put on similar 3rd network program so that either station could be used by country regionals as a source of emergency rebroadcast material.

The usefulness of these high frequency transmissions in Queensland has declined with the ready availability of new medium frequency stations, and their future is uncertain. It seems they will be turned off as was VLI in Sydney and VLR and VLH in Lyndhurst, which would bring to a close an era which began 45 years ago when Bald Hills was new.

The A880A old VLQ transmitter is a very significant historical engineering relic, as it is probably the only surviving specimen of this very interesting short wave transmitter type. The design by STC dates from the late 1930's. This equipment should be retained if at all possible, as a broadcasting heritage exhibit.

METROPOLITAN RADIO CENTRE - BALD HILLS

This chapter deals with the site and the facilities at the Centre which are common to all the transmitters operating there - 4QG, 4QR, VLQ and VLM. The history of these transmitters is dealt with in individual chapters.

The National Broadcasting Service in the middle 1930's was restricted to Brisbane, Rockhampton and Townsville and it was planned to try to give some cover to the rest of Queensland by means of high frequency, "short wave", transmissions.

Accordingly in 1937 a site survey in the outer Brisbane metropolitan area was made by officers of the PMG Research Laboratories, and consideration was given to the Capalaba, Cleveland and Bald Hills districts. Bearing in mind that such a site would most likely be used for medium frequency stations in the future, it was considered that the Capalaba and Cleveland areas would provide the best coverage, particularly towards Gympie. At that time there were height restrictions on towers in these areas because of aviation requirements, and consequently the Bald Hills area was accepted with the problem of the Gympie district being solved in the future with a local low power transmitter. Such a transmitter was provided for Gympie, but not until 1951.

Several sites were examined in the Bald Hills district, some being in the vicinity of the Strathpine railway station. A final decision was made about a mile north of the Bald Hills settlement, adjacent to the Sandgate/Bald Hills road. The block of land was flat, 114 acres in size with a little agriculture but probably used mostly for dairy cattle grazing. It was owned by Samuel Hawkins and the improvements were an old house in poor condition, a tennis court, garage, outbuildings and a windmill. Two small blocks which apparently had once formed part of the main property and had been sold out of it, faced the main road. Each had a house and the owners were W.S. Thompson and J. Grantham. It was not considered that the loss of these two small areas would prejudice the planned use of the main site for broadcasting purposes and negotiations for the purchase of the property were begun in 1940.

By this time the owner was J.W. Guy but the sale proceeded with no trouble and notice of acquisition appeared in Government Gazette 69 of 3.4.41. All legal matters were completed by July 1943. The property description is resub 2 of sub 2 of portion 37, Parish of Nundah.

Now the country was at war and plans for the installation of the high frequency station were pushed ahead. In January 1941 the Director General of Works, Department of the Interior, was asked to contour the site and prepare drawings for a suitable building. This was done and in July the building contract had been let to T.F. Woollam of Days Road, Wilston.

The site was surveyed by F.H. Burcher, and inquiries made as to the possibilities of flooding. Two major floods were considered, the 1893 and the 1931. In neither of these was the central western frontage in danger, although the east side of the site had been covered with floodwater due to backup from the Pine River into a shallow gully which traverses this part of the site. The building and the high frequency aerials were therefore sited on the western road frontage. In fact, no site flooding has been experienced in the ensuing 45 years.

All buildings on the site were removed and by October the walls of the new structure were up, the garage was almost complete and the HF aerial site was being fenced. Works Department had proposals for connecting the windmill to a new high level water tank to supply the station. By January 1942 the main building was ready for installation of equipment.

In March, electricity was connected, and as the vertical pipe mast was now complete, the 4QR transmitter was moved from the Central Telephone Exchange in the city to its new home at Bald Hills.

Towards the end of the year the high frequency transmitter VLQ was built and brought from Sydney to Bald Hills by road for installation in the new building. The H. F. aerials for VLQ were erected and this transmitter began operation early in 1943.

Vince Henderson recalls that during the Japanese threat of the war years, staff slept at the building overnight, as there was no official residence and the site was rather remote.

Staff in those years with Harry Conway as OIC were Vince Henderson, Bill Mellish and Alf Jackson at the Jam Factory site.

A contract had been let during 1942 with a firm in the USA for the supply of a 130HP engine generator set and plans were prepared for an engine room with blast resistant walls and two 500 gallon underground fuel tanks. The entry of the U.S. into the war prevented this contract from being fulfilled and it was some years before Bald Hills got its emergency power supply. In the meantime further plans were prepared for a building extension which was to include space for an emergency engine. Once again, nothing eventuated and as proposed additional transmitters were found to be larger than originally expected, the engine space was utilized for them.

In 1942 a request for a house for the Foreman Mechanic was made and in January 1944 Works Department drew up plans for an official residence which was built just south of the main building. The first OIC of Bald Hills was Harry Conway and he and his family moved in and were to live there until 1963.

The building extension referred to above was constructed in 1945-46 and the main switchboard was upgraded to take the load of the new 10kW 4QG and the expected second high frequency transmitter VLM. The electrical contractor was Burleys Electrical Workshop Pty Ltd of Charlotte Street, Brisbane.

Plans were prepared for a new vertical radiator to serve 4QG and 4QR, and a contract was let in August 1946 with Johns and Waygood of Melbourne for the supply and erection of a lattice steel mast just over 660 feet high. Test borings to determine the soil conditions had been made in January 1945 by Vern Kenna and Eric Gough, so that the contractors could design foundations.

Johns and Waygood began steel delivery in the latter part of 1946 but the mast was not completed until late December 1947. At this time the only obstruction lighting available was provided by two red glass hurricane lanterns on top of the mast, a not very effective aircraft warning system. Early in the new year however the electrical firm Burleys began the installation of the main obstruction light system and completed this in April. The coupling hut was also completed about this time.

The mast, which is still in use, is a triangular section lattice steel structure of 8 feet sides, guyed at four levels in three directions. There is an internal climbing ladder and four rest platforms. It is painted in orange and white bands for aircraft obstruction warning. The single porcelain base insulator has to support 80 tons in still air, and 145 tons under full wind loading.

Because of the possibility of flooding, the mast was built on a triangular concrete block about six feet high.

Near the top of the mast is a sheet copper cabin to house a large inductor and capacitor in parallel, forming part of the adjustable electrical loading. In conjunction with a 60 feet diameter circular disk armature or "hat", these components enable the adjustment of effective height of each of the two transmissions of 4QG and 4QR which share the mast, to optimum values of just over a half wavelength at each frequency.

A standard earth system was employed, 120 copper wire buried radials, each 668 feet long.

The transmitters fed energy to the mast over separate 6 wire lines, each 1,550 feet long.

As well as line and aerial matching units, the coupling hut contained rejection networks to minimise cross coupling between the transmissions. The building ground floor was used to store spare mast hardware and all coupling equipment was on the first floor.

As good copper tubing was scarce, a quantity of recovered refrigeration piping was obtained and annealed and straightened in a fire beside the lagoon on the station, and then drawn down to size with a winch and a steel die. The Brisbane PMG Workshop then wound the tuning coils and prepared the aluminium clad steel front panels of the coupling units.

The general design of this type of dual frequency structure resulted from work by Alex McKenzie of Central Office, and the actual adjustment of the Bald Hills system was done by Vern Kenna and West Hatfield an engineer from Central Office. Others assisting were Tom Curtis, Col Williams and Doug Sanderson.

An interesting paper on this work done by McKenzie, Kenna and Hatfield appeared in Proc. IRE Aust., in January 1955.

This new system with both 4QG and 4QR on 10 kilowatts went to air on 1st September 1948.

The components in the top cabin proved to be susceptible to damage by lightning, and it was necessary to replace a failed capacitor by an air-spaced variable mounted in a tank of transformer oil. This was largely self healing after any internal discharge, due to natural circulation of the oil.

Overall, the dual frequency system operated satisfactorily.

Plans for the long awaited external emergency engine room were prepared by Works and Housing in September 1948 and the building was completed and the engines installed early in 1950.

The equipment consisted of two sets which could be synchronized if required.

The engines were by Ruston and Hornsby, six cylinder diesels, class VCB, 204 BHP at 600rpm. The serial numbers were 253277 and 253278. They were direct coupled to Brush Electrical Co. alternators rated at 133kVA with Brush exciters. The serial numbers were 36596 and 36598. A compressor and two air receivers to store 11 cubic feet at 300lbs each for engine starting were also installed. The compressor was driven by a single cylinder Ruston and Hornsby petrol engine of 2 and a quarter BHP. Three external, elevated fuel tanks each 1,000 gallons were installed nearby.

As the station is staffed, the emergency engines were manually started, but converted to auto start in 1988.

With the passing of the years, improvements and additional facilities were installed. In 1955 an automatic fire alarm system was provided by O'Donnell Griffin and Co. A canopy for weather protection was built over the front entrance porch and town water was connected in 1960.

About this time planning for a further building extension was in hand, as new transmitters were in view. At the same time consideration was given to new enlarged power boards, modifications to the main tuning hut and plans for a new dual frequency standby tuning hut to go with the re-insulated pipe mast which had been standing idle for many years. It was also planned to move the control room with its program input equipment to the proposed extension.

A contract was let in December 1961 to Almar Constructions of Fortitude Valley for the building extensions which were completed in April 1962.

Alterations to the power switchboards were completed by the end of 1963.

In 1962 the new standby coupling equipment was installed in the new hut and connected to the main building by two 6 wire transmission lines. Brian Robinson was the engineer responsible for this work. This enabled the standby pipe mast to be used for both transmitters at full power of 10kW each.

About this time, in anticipation of the provision of a 50kW transmitter for 4QR, a redesign of the main mast coupling equipment was put in hand. Some changes had been made by Frank Sharp in 1957 to reduce side band attenuation which was inherent in the original design. The new arrangement envisaged 4QR's equipment being relocated on the ground floor, a move necessitated by the greater space needed to accommodate the higher power components.

Preparations were made and the 10kW 4QG and the 50kW 4QR were ready by May 1963 to use the new coupling equipment. John Searle, Brian Robinson and Bernie Hogue adjusted the system.

In March 1964 one of the three large insulators supporting the top hat on the main mast was found to be cracked and was replaced by Radio section line staff. Some years later, in July 1970 the feed through insulator from the top cabin to the hat was also replaced due to cracking. Further work was necessary in this area in 1972 when it was decided to cut an inspection porthole in the steel boxing of the hat central support and treat the interior for rust.

The relocation of the control room from the front of the building to one of the new areas now available at the rear, near the 50kW 4QR, was put in hand in 1968. New racks, desk and equipment were provided. Ron Harris handled this operation. After the equipment was removed, the old control room was remodelled to become a staff lunch room.

Prior to the construction of the Bald Hills section of a new main highway, a small area of the south west road frontage of the site was resumed in 1970. The minor road fronting the property was renamed Kluser Street and was fenced off from the new four lane highway.

Another property adjustment was made in 1980 when 7 and three quarter acres at the south east corner of the site was sold by the Commonwealth. Part of this was bought by the Queensland State Government and part by a property developer, Girvan Bros. Projects Pty Ltd. There were no broadcasting assets in this area.

A block of land as large as the Bald Hills site has some potential for stock grazing and an application to use the land for this purpose was received in 1942 from R. A. Pringle. A lease was arranged. The rights were sold soon after to Mrs. A. Weitemeyer and later resold to J.F. Boland. He held the lease to 1946 when it was taken out by S.I. Denning who held it to 1952.

From 1952 to 1957, B. O'Donnell held the lease which was now available for 5 year terms. The leases since then have been Muir, Eaton, O'Hara, Chinn, O'Hara and Mahoney.

A major radio centre such as Bald Hills, inevitably becomes a suitable location for special engineering activities, and one such was a series of observations on night time propagation of long distance medium frequency signals. These observations were requested in June 1972 for a Study Group of the Asian Broadcasting Union.

Some preliminary observations were made in July at the PMG receiving station at Capalaba on the following stations: Thailand 725kcs, Singapore 790kcs, Philippines 1140kcs, Japan 1178kcs and Thailand 1580kcs. Transmissions from some Australian stations on the same or adjacent frequencies made reception of the three latter channels impossible, but good signals were received from the others. Accordingly a long wire Beverage type aerial was erected at Bald Hills in August 1972, about 1,400 feet long, 10 feet high and on a bearing of 315 degrees. Engineer Des Fulton was involved in this. By the time the equipment was ready, some additional stations had been added to the list, including 4QA Mackay and 4QD Emerald. Japan (Akita) on 770kcs and 500kW was also to be observed. The signals were chart recorded.

A paper on the work was prepared by Don Rodoni, engineer of Central Office, for presentation at the IREE 1973 convention.

Observations of the Queensland stations ceased in February 1974, but the overseas stations were monitored until the end of that year. Monitoring was also done at the Radio Australia receiving centre at Darwin and by the Australian Broadcasting Control Board in Melbourne.

In the early years at Bald Hills, high frequency receivers were used to tune the Victorian sporting results for the Brisbane studios use, and three communication receivers, RCA AR88, were used with a variety of aerials in a space diversity system. Later when the Capalaba receiving centre was established, this function was removed from Bald Hills.

In September 1973, the Government's intention to begin a special Radio Australia high frequency service to Papua - New Guinea was advised, to coincide with the introduction of self government to that country.

It was proposed to use the recently installed "new VLQ" transmitter for the service and to return VLQ9 to the old water cooled unit. Operation for several hours a day was envisaged in the 25 metre band and possibly the 49 metre band also. Accordingly a pair of nested rhombic aerials aligned on New Guinea were erected by the Radio linestaff with engineer Des Fulton as project supervisor. The supporting masts were steel lattice and the termination was a dissipative line of stainless steel wire, common to both aerials.

The program was received by landline from the Radio Australia studios in Melbourne, and transmission began on 1st December 1973 on 11880kcs. Due to adjacent channel interference, the frequency was later changed to 11885kcs. No transmission was ever needed on the low frequency band as transmissions were only made from 4.30pm to 8.30pm daily.

The service continued until May 1976 when the transmitter was returned full time to the VLQ9 inland transmission.

The rhombics have been used occasionally since then as standby aerials for VLQ.

The HF aerial was 61 feet high, 307 feet long with a tilt angle of 67 degrees, while the L.F. one was 112 feet high, 400 feet long with a tilt angle of 65 degrees. Both aerials used the same set of four masts, built on a bearing of 340 degree true.

Two other engineers Dave Ellis and Paul Chippendale were also involved with the project, as were technical staff Ron Harris, Barry Neilson and Col Hattersley. There is at the Radio Centre at Bald Hills a standard Commonwealth of Australia, PMG Department visitors book with the first entries for visitors to 4QG dated in 1939. This is very likely the first book of this type to be used at 4QG. It was in use at the George Street site until the move in 1942. There follows then a gap and the next entries were made in 1953 and the book has been used since then at the Radio Centre Bald Hills. It would seem that the book lay forgotten and unused for many years. The first name in the book is that of S.J. Ross the then Supervising Engineer Transmission and the second is A. Bensley an engineer in the same section. Since Bald Hills became operational there have been four permanently appointed officers in charge. They are Harry Conway 1942 to July 1963, Gordon Andrews January 1964 to April 1969, Col Hattersley May 1970 to August 1984 and George Marshall who took up office in 1985 and retired in February 1988. Vince Henderson and Bob Knight filled in as acting OIC's in the gaps in this sequence. Nev Cole is currently OIC.

FREQUENCY MODULATION BROADCASTING

The first regular FM broadcasting began in Brisbane on 6th October, 1953, and used the 4QR program.

This was an experimental service and similar stations operated in Sydney, Melbourne and Adelaide.

The services were closed on 30th June 1961.

The site chosen for the transmitter was the Taylor Range at Mirrimbul, on a knoll overlooking Brisbane, near where the present Channel 2 National Television station is built.

The Brisbane City Council at that time controlled the area and they agreed that a 100 feet high self supporting wooden tower could be built to carry the FM aerial. A small wooden building was designed and erected on site by the Commonwealth Department of Works. The tower was designed by PMG drafting staff and fabricated at the PMG workshops. The Department of Works arranged the tower erection and all was ready for station installation by May 1950.

The transmitter operated on 91.1 Mcs with an aerial power of 1 kW. It was a Radio Engineering Laboratories, REL 518 D/DL unit employing an Armstrong dual channel phase shift modulation system with maximum deviation of 75 kcs. An armoured coaxial cable, AS26A of 100 ohm nominal impedance conveyed the output tower. This aerial was a halo type of folded dipole, giving horizontally polarized waves. It was adjusted by Doug Sanderson and Ted Dennis of the Radio Laboratory in July 1953 (see Queensland Engineering Report QB61).

A program line equalized to 15 kcs was provided from the 4QR ABC studio and transmission times were 11 am to 11 pm.

In 1953, an emergency engine generator set was bought from Army Disposal and installed on site. It employed a Ford V8 engine driving a 25 kVA 3 phase alternator.

To obtain information on the usefulness of the site for future high power FM and Television transmitters, a field strength survey was made in the period November 1954 to January 1955. This was done by Ken Holson, Maurice Palmer and Doug Sanderson of the Radio laboratory using an RCA WX-1A UHF field strength set mounted in a van. Measurements were made at a height of 30 feet with the test dipole on a quickly erected aluminium pole.

Extensive spot checks, about 300, were made in the metropolitan area and at 40 country centres in South East Queensland.

Little use was made of the service with only a few enthusiasts buying or building receivers. A typical domestic receiver was only mantle model size and the wide band advantages of the service could scarcely be appreciated with such equipment. Some models featured a centre zero milliammeter as a tuning aid. The circuits were conventional superheterodyne with ratio detectors.

The service was discontinued in 1961 and 20 years were to pass before Brisbane again had a frequency modulation station.

The fate of the R.E.L. transmitter is unknown, but it was probably dismantled and sold for scrap metal. No relics of this service remain, but the tower is still in use for aeriels of VHF and UHF mobile services housed in the old transmitter building.

The new era of stereophonic FM broadcasting began in 1980 with the installation of a 10 kW Nippon Electric Company (NEC) transmitter type FBN-7150E in the National Television building at Mirrimbul. It was equipped for stereo operation and the aerial array produced a horizontally polarized signal. The array was supported on the television tower and was a side mounted CO-EL type CO-7FM. The service was opened on 31.8.80. No distinctive call sign was allotted and in common with subsequent stations, was known as 4ABC-FM. The majority of the program was five music, originating in the ABC's Adelaide studios. Frequency was 106.10 Mcs.

In October of the following year, a similar system was opened at the Rockhampton Television site at Mount Hopeful on a frequency of 93.70 Mcs.

Townsville followed in June 1982. In this case the FM signal shared the Television aerial which was Channel 3. The FM frequency was 101.50 Mcs.

A year later, the service was extended to the Darling Downs and Toowoomba from the Television tower on Mount Mowbullen. The aerial here was arranged for circular polarization and the NEC transmitter was of 20 kW rating. The frequency was 107.90 Mcs.

The Maryborough district received stereo FM in November 1983 with the provision of a service similar to Rockhampton on a frequency of 92.50 Mcs.

A somewhat lower powered system was installed at Mount Isa in July 1984 on 101.7 Mcs and Cairns received stereo FM from the transmitter at the Bellenden Ker Television site in February 1985 on a frequency of 89.1 Mcs. This service was vertically polarized.

Many small monophonic FM services have been installed in recent years and more are planned. These are to distribute the ABC Regional program to towns which receive poor signals from medium frequency transmitters. In the case of towns receiving good coverage of the Regional program, these FM units provide the National service. Program is usually obtained from satellite transmissions.

At the time of writing, early 1988, FM has not been provided for Mackay as the National Television transmitter at Mount Blackwood operates in the FM band.

So thanks to FM, the ABC sound programs can now be received by a large proportion of the State's population, many of whom had once suffered poor reception of the AM based regional service.

CAPALABA AND HEMMANT

Both of these outer suburban radio sites featured for many years in the life of Brisbane Broadcast staff.

The sites were established during the Second World War and used by United States forces as high frequency transmitting-receiving areas. Large numbers of rhombic aerials were erected by PMG linestaff, having been pegged out by Brisbane Drafting Section officers.

After the war, in December 1946, properties were acquired for the PMG Department and used initially for the emergency radio network. Capalaba became the receiving centre and Hemmant remained as it had been, a transmitter site. A single brick equipment building had been erected on each site but Hemmant had a separate emergency engine room, and in this room was a very large diesel generating set made by Buckeye of the United States of America. This had been necessary as a number of 10 kW high frequency transmitters had been in use here.

The Buckeye was not required for the modest transmitters of the emergency network and was eventually sold and removed.

At Capalaba the United States forces had provided a Cummins diesel generator, a 60 cps 208/120 volt 3 phase model which did not suit Australian equipment. It was replaced by a 50 cps unit.

The emergency network was established between Brisbane and country Post Offices, and some National Regional Broadcast stations, during 1947, and Capalaba was staffed daily for testing and routine message handling. At least 5 rhombics were in use, with 2 double doublets and a variety of wartime receivers such as Kingsley AR7, RCA AR88, STC 3SU-3D and Hammarlund Super Pro SP200. Some frequency shift telegraph receivers were also in use. Fred Lubach was the technician here for many years.

In 1952 Capalaba was set up to provide in addition, facilities for the reception of ABC HF transmissions from Melbourne which were used for rebroadcasting when interstate landlines failed.

Over the years, the usefulness of these sites has diminished and only a few services remain, such as a Brisbane to Birdsville HF radio trunk circuit and some low power Telecom equipment used for mobile communication by travelling Telecom staff. For some years now, the sites have had no National broadcasting component and are operated by Telecom.

PORT MORESBY - 9PA, VLT, VLK

The National Broadcasting Service was not represented in Papua New Guinea until 1944 when 9PA was opened in the medium frequency band.

Prior to this there had been a small low power transmitter, 4PM, at Port Moresby on 1360kcs operating mainly in the evenings to 8PM and believed to have been owned by AWA. It was converted after Japan entered the war, to operate for the army on 3.6 and 4.9Mcs, communicating with "coastwatchers".

The radio entertainment field was thus vacant, and as Port Moresby was a major centre for troops, a National station was planned.

A Philips 500 watt transmitter type KUFH/500/59 was obtained and installed by PMG Department staff from Brisbane, in rather primitive Army style buildings, on a hill at Wonga, near the old 4PM site. Installing staff were Cec Morris, Geof Beetham and Frank Nolan with engineering supervision by Col Elworthy. Fred Sorenson, a Line Foreman from Rockhampton came up and supervised the erection of a T aerial with wooden poles 90 feet high.

As there was no commercial electricity available, the Army provided two engine generators each of 25kVA capacity, to operate the transmitter and studio equipment.

The transmitter was of Dutch manufacture, and as the Netherlands had been invaded and the Eindhoven factory destroyed during the war, no makers' information was ever available when needed in later years. The frequency in use was 1250kcs. The station went to air on 26th February, 1944 and Charles Moses of the ABC came up for the occasion. General MacArthur opened the station which was to be jointly staffed by Australians and Americans. The first ABC manager was Robin Wood and Michael Eisdell was senior announcer. Fred Warren was PMG OIC, on loan from Army Signals.

About a year later, the station was taken over by the Army, but was returned to ABC control on 1st July 1946.

With such low power, the 9PA service area was very limited, so a 2kW high frequency service, call sign VLT, was introduced on 28th June 1948 using a new STC 4SU-14B transmitter. Two frequencies were employed, 7280 and 9520kcs each with a "Delta" matched dipole.

This transmitter was completely valve equipped, the line up being: oscillator 6V6GT, isolator 6V6GT, two harmonic generator stages each 6V6GT, buffer 807, driver 3C/150A and a pair of 4279Z in push pull for the anode modulated power amplifier. The audio was push pull throughout, 6J7G, 6V6G, 3C/150A, 3C/150A and a modulator using a pair of 4279Z. The high tension rectifier used three mercury vapour diodes 872A.

Vern Kenna and Col Elworthy came up for the opening of this service which was installed at the "5 mile" site as the Wonga district was commonly known by the locals.

By 1953 it was considered that one single lower frequency was all that was needed and VLT was operated on 6130kcs. Later, in 1960, two frequencies were again found to be required and the station changed from 9520kcs by day to 6130 at night.

Over the years the old Army engine generators were replaced by a 27kVA Ruston and Hornsby diesel type 4VRO and a 28kVA Ford V8 petrol engine set.

In those days much material for broadcast was recorded from other radio transmissions and in 1956 a new recording room was fitted out. The equipment originated in the Radio Installation depot in Brisbane and was shipped to Moresby on the "Shansi".

Recording must have been a popular activity at 9PA studios, as a second recording room was installed in 1960.

In the early 1960's, plans were prepared for new studios and a new transmitter site. The studios were to be at Wonga and the transmitters at Maigabu. 103 acres were acquired for this latter purpose as several high frequency transmitters were contemplated, with rhombic receiving aerials as well as a main and standby aerial for 9PA.

Construction at the new site began in late 1961 and continued during 1962. A pair of new STC transmitters 4SU-55A serial numbers 56404 and 56405 each 2.5 kW, were provided for 9PA and standby. Radio linestaff under Norm Peterson erected an 8 inch diameter pipe mast for 9PA, 208 feet high and a 6 wire, 200ohm transmission line. The new transmitter went on air on 28th December 1962. The fate of old 9PA is not known.

The valve line up was oscillator 807, amplifier 807, driver QB3/300, power amplifier 3x2500A3. The audio was push pull in all stages, EF37A, 807, 807, 4/1000A, and the high tension rectifier used three mercury vapour diodes 872A.

Installation at Maigabu continued, and in late 1963 two new 10kW high frequency transmitters were available for VLT and a new service to be known as VLK.

Acceptance tests were made at the STC factory in Liverpool NSW by engineer Brian Robinson in November 1962.

These transmitters were STC 4SU-48B serial numbers 62575 and 62576. The valve complement was oscillator 6AMG, buffer 6146, two harmonic generators each 6146, amplifier two 6146 in parallel, driver push pull 4/250A and power amplifier push pull 3x2500A3. Audio as usual was push pull in all stages, EF86, 4/250A, 4/250A, and modulator 3x2500A3. In these transmitters the high tension supply utilized silicon diodes.

These high frequency transmitters were provided with aerials cut for 3925, 4890, 9520 and 11880kcs.

VLK aerials were designed for vertical incidence on 3925, 4890 and 9520kcs, to give good coverage out to at least 200 miles in all directions.

The VLT system was designed for a lower angle of fire and was intended to cover territory between 200 to 600 miles from the station.

All aerials were of the 3 wire folded half wave dipole type giving an input impedance of about 600ohms which facilitated connection to 600ohm open wire balanced feeders.

In all, eight steel pipe masts and 64 anchor blocks were used for these aerials.

The hardware for the arrays was shipped to Port Moresby on the MV Anking.

The performance of the system was checked in 1966 when Doug Sanderson and Ken Howard travelled to eleven towns in Papua New Guinea including Lorengau, Kavieng, Rabaul and Kieta on the off shore islands and spent some three days monitoring VLT and VLK at each place. By careful selection of frequencies it was apparent that listeners in the designed service areas could receive satisfactory results.

Engineer Brian Robinson was responsible for the design and commissioning of this high frequency system and technical staff were under the control of W. L. Shaw and John Bopf. Others involved were Ron Tolmie and Otto Burmester.

Drafting officer Bob Wadley visited Maigabu in September and October 1963 to provide assistance with layout of the HF arrays.

Three receiving rhombics were erected for use with rebroadcast receivers if required, and designed for reception of stations in Brisbane, Lyndhurst and Shepparton.

Although the new 10kW units were ready for service, both did not go on air as planned in June. Some troubles with the RF exciters necessitated the holding of one of the new units as a standby, with the old 2kW remaining in service. The Maigabu H.F. arrays had not been completed at that time, either.

In January 1967, a third HF transmitter similar to those already in service, was installed. John Siganto and Bob Hansen had assisted Brian Robinson just prior to this with the provision of an unusual standby aerial for 9PA. Two of the masts of the high frequency aerials were used. These were 150 feet high and 50 feet apart. Their tops were joined by a copper conductor. One mast was earthed and the other insulated and base fed. The whole structure formed a type of folded monopole. The input impedance at 9PA's frequency was 122-j236ohms.

The 2kW remained operational at the old site until decommissioned in November 1963. It was later moved to Maigabu and installed as a spare in April 1971. Meanwhile the new studios at Wonga were taking shape.

Announcers desks were built in the Brisbane PMG Workshops and wired in the Perry Park assembly depot, as were the various equipment racks.

D.C. Watkins Ltd. were the studio builders.

In 1963 John Bopf and his team installed the equipment and the studios were opened on 5th September 1964. There were three studios in the group, 901, 902 and 903 each with its own control booth, working into a main switch room. In the emergency plant room was a 50kVA engine generator.

The opening function was held in the foyer of the new building and at 6PM the Administrator introduced the Postmaster General, Hon. Alan Hulme who officially opened the studios. Mr Simogun Peta, member of the House of Assembly, then spoke in Motu and the broadcast continued from the main studio, 901. Ron Tolmie and Alan Poulsen of PMG Radio in Brisbane were also present.

The ABC studio manager at that time was Doug Channell.

A plaque recording the opening was mounted in the entrance hall, with a native carved head mask.

In addition to English, at that time two lingua francas, Pidgin and Police Motu, were used over 9PA so most of the listeners in the Moresby district were catered for. However the high frequency service reached out to distant parts of the country where local languages predominated, so the Administration was keen to begin local broadcasting in these areas.

Thus in 1969 we find the number three HF transmitter in use on 11880kcs by the Department of Information and Extension Services (D.I.E.S.) with the call sign VL8BM and in November of that year a regular D.I.E.S. news service began. In March 1971 several new aerials for this transmitter were erected, including one for 3290kcs.

About this time the old 2kW HF transmitter was brought from Wonga and installed at Maigabu as a standby unit.

In late 1973 the new Broadcasting Commission of Papua New Guinea took over all National assets, although PMG staff continued to operate the transmitters for another six months until May 1974, ending 30 years of National broadcasting.

9RB RABAU

The problem for radio in Papua New Guinea and the surrounding islands was that there were several hundred different languages in everyday use throughout the area. Although Moresby transmitted in English, Police Motu and Pidgin, the audience receptive to these was limited principally to those living in the Moresby district. The high frequency service benefitted mainly the European population scattered throughout the country. Consequently the Administration came to believe that what was wanted was local radio using local languages for the indigenous people.

One such area with a considerable population was the Gazelle Peninsula where, in 1960, some 38,000 Tolai people resided. This peninsula is at the north east end of the large island of New Britain and is roughly 50 miles square. It is in a volcanic region and heavily forested. The only town of any size is Rabaul with a mixed population of Europeans, Chinese and Tolais.

Daytime medium frequency radio in the area was at that time non existent and the 2kW VLT high frequency transmitter at Moresby did not provide satisfactory reception.

Early in 1959 the Minister for Territories sent a proposal to the Postmaster General for the establishment of a broadcasting station in the Rabaul area to provide educational programs to the indigenous population. It was proposed that the station would be operated by staff from the Department of Territories.

Following meetings of representatives of the Department of Territories, the Australian Broadcasting Control Board, the Australian Broadcasting Commission, the Administration of Papua New Guinea and the Postmaster General it was decided to establish a 2kW medium frequency transmitter in the Rabaul area. The station was to be able to accommodate an ABC National service at some future date, and a suitable site was to be determined by the Postmaster General's Department.

For a first hand look at the situation C.M. (Mick) Hall Supervising Engineer of the Radio Section and Doug Sanderson engineer flew to Port Moresby on 16th July 1960 and after discussions with the local ABC manager D.C. (Doug) Channell and L. Newby the Chief of the Division of Extension Services, they flew to Rabaul. The District Commissioner Mr. Foldi described the situation in the Gazelle Peninsula and Tom Pearson, local Posts and Telegraph's Department engineer arranged transport to inspect two likely broadcast sites, one at Kurakakaul near Rabaul and the other at Vunakanau 10 miles away.

It was decided that a full scaled radio survey would be necessary to assist with a selection and this was undertaken by Doug Sanderson and Ralph Bongers a Supervising Technician of the Radio Section.

At that time the Department had in Brisbane a 500 watt HF Federal transmitter mounted in a GMC van with a power take off driving a built in alternator. This was a wartime amenities unit having seen service with the U.S. forces in the Pacific. It was designed to feed a sectionalized tubular vertical radiator. The lowest frequency tunable on this transmitter was about 1500kcs and for the Rabaul survey a frequency of 1542.5kcs was used. With the 60 feet high vertical aerial and six wire radials each 100 feet long, about 100 watts was radiated. The big left hand drive van, painted PMG red was shipped to Rabaul on the Burns Philp "Malekula" in September 1960, and was an object of great interest to the local inhabitants.

The transmitter was set up at each of the two sites and after determining the unattenuated $E \times D$ value for the installation, a field strength survey was made using an RCA WX2D field intensity set. As the driver of the car supplied for this work by the P. and T. Department spoke no English and neither radiomen spoke local pidgin, the survey occasionally had its difficulties. However once it was discovered how to stop, start and turn round all went well.

Physically the Vunakanau site was ideal for a station, being a disused wartime airstrip (Japanese) in a clear area on a plateau about 1000 feet above sea level. However extension of power mains largely across native occupied land would have been difficult and the site was 11 miles from Rabaul.

On the other hand road and power mains were readily available at Kurakakaul although the site was rather irregular with some steep gullies. It was on a small rise about 50 feet above sea level and close to Talili Bay. A church mission was adjacent. The area around Rabaul is volcanic and there was activity in the 1930's with

Matupi erupting and showering ash over the Rabaul area. The sub-soil consists largely of volcanic ash and a nearby road cutting showed up to 30 feet of solid glassy ash. The ground conductivity for radio frequency was consequently extremely bad, the best values measured in one or two areas being 1mS/m and the worst as low as 0.01mS/m. The ground was effectively an insulator rather than a conductor.

The test van was returned to Brisbane on the Burns Philp "Bulolo".

After considering the results of the field tests written up in Queensland Engineering Report QB130, the Australian Broadcasting Control Board decided on Kurakakaul as the site early in 1961.

Site details were clarified with the Territories authorities during a visit in March 1961 by W.C. (Bill) Rohde Supervising Engineer and W.C. Halstead PMG Properties officer. An area of 17 acres was selected for the station which was to operate on 810kcs. About 10 acres was Administration land and the balance was to be obtained from the Vunakakambi property of the Sacred Heart Mission.

During 1961 plans were prepared for buildings and site layout and possible staffing requirements considered.

It became obvious during this year that extension of the power line for the few miles required would be delayed due to difficulty with right of way, and during 1962 it was decided to provide an interim service at a temporary site in Rabaul town.

Accordingly a visit by F.A. Jones ABC Port Moresby Acting Manager and Eric Gough, Supervising Technician 9PA, to locate suitable temporary premises was made in March 1962. An empty steel and wood framed ex army building 100 feet by 40 feet with concrete floor was found at the corner of Bay Road and Malaguna Road, owned by Messrs Thurston and Dowling and available for renting. The remainder of the property was large enough to erect a guyed mast and lay a reasonable earth mat.

The building with some internal alterations eventually housed the studio, transmitter, news room, record library and essential staff. A 4SU-55A STC 2.5kW transmitter serial no. 60134 was installed and fed a 100 foot Kismet mast via a 75ohm coaxial cable type UR57. Part of the three top guy wires was used for loading and the input impedance on 810kcs was 7-j120ohms.

Receiving aerials for rebroadcast purposes were erected so that news or other programs could be obtained from Port Moresby, Brandon and Lyndhurst.

The equipment was installed by Jim Plunkett and John Bopf with Brian Robinson providing engineering oversight. Leo Moloney Engineer of Radio Service Division and Paul Hayden accepted the equipment on completion of the installation.

9RB Rabaul and studio 906 were put to air at 4.15PM 15th December 1962 with Ran Weir as resident Supervising Technician. The official opening was at 7.30PM.

A useful signal was reported at Kavieng on New Ireland, 140 miles to the north across the Bismark Sea.

Phil Maguire of the ABC Port Moresby office came over for the opening, and Graham Taylor took up duty as Rabaul Manager. Three European and three indigenous announcers were employed and the operating hours were 6AM to 12.40PM and 5PM to 11.30PM daily.

Work was resumed at the permanent site at Kurakakaul in September 1963, when the Rabaul branch of the Department of Works engaged a surveyor J. C. Williams, to survey the site and take levels so that a site layout plan could be prepared in Brisbane. Brian Robinson went up for the survey.

A 2.5kW transmitter for the new site was tested at the STC factory in April 1964. It was a 4SU-55A/V serial number 66503, similar to those at 9PA, with 71ohm output impedance.

In June 1964, the line party under John Wright, comprising K. Krogh, P. Keong, and J. O'Rourke arrived to erect aerials and transmission lines. C. Mann joined the team later. Equipment arrived on various ships including the Malaita, Matupi, Anking Rhodes, Aros, Anslum and Soochow. Duncan Russell-Hall, Ron Tolmie and Bill Graham-Wilson from the Radio Section inspected the site.

There was some excitement in August while the line party was clearing part of the site. While away for lunch they had left a heap of debris to burn and a piece of wartime ammunition exploded. No harm was caused to anyone, but the site was treated with caution until local Works Department checked it and declared it safe. Live shells had been found in the grass.

The main MF radiator was of 8 inch diameter steel pipe, 200 feet high, guyed in four directions, with a base input impedance of $15.7 - j82\text{ohms}$. The coupling unit was a single coil tapped for 71ohms to match the coaxial cable feeder, type PT29M. Eight and a half miles of 100lb copper wire were laid for the earth mat.

All cement for the job was bought from Burns Philp and the aggregate from Rabaul Quarries.

By November 1964 the external plant work was complete and the line party departed.

The construction of the transmitter building progressed, but there was still delay in the extension of mains electricity to the site.

The building was of steel frame and sheet steel construction with a separate emergency engine room, a car port and rain water tanks. Although the contract had been let to A.M. Jennings and Co. in June 1964, the work was not complete until March 1965.

No further work was done at the Kurakakaul site that year.

In February 1966 the transmitter arrived in Rabaul on the "Wanlui" and in March electricity was finally available at the site.

The broadcast installation party arrived in April, Ken Lund in charge with Des Allen, Ken Vinton, Vic Suosaari and Les Naumann. The Engineer for the work was John Searle.

It was found that some of the cases of equipment which had come up on the "Nordkil" were affected by sea water and much of the contents badly damaged. The installation proceeded without further incident and transmission began from Kurakakaul at 4PM on 12th July 1966. The staff then began the removal of the MF transmitter from the temporary town site out to the new site.

For some years prior to this, the Administration's Department of Information and Extension Services (D.I.E.S.) had been operating a low power high frequency service designed for the indigenous listeners. Now, with the establishment of a fully equipped National site agreement was reached to install a new 10kW H.F. transmitter at Kurakakaul, this equipment to be supplied by the Administration.

The transmitter, an STC 4SU-48B, arrived from Port Moresby on the "Bulolo" in March and was installed by Ken Lund's party. It went to air in September using a 3 wire folded dipole 0.2 wavelengths above ground on 3385kcs, call sign VH9BR.

The 60kVA emergency generator had arrived from the Dunlite suppliers in Adelaide on the "Tenos" in April, a Lister HA6 diesel, 1500rpm, 224HS615, with a Dunlite LADAMF, serial 66203 generator, but as the McColl control equipment was not then available, it could not be commissioned. Another installation party completed the installation in August 1967.

A second frequency for the HF service became necessary and 5985kcs was allotted. The aerial for this was erected with a 600ohm transmission line by Robin Bell and Kev Krogh of the linestaff and Noel Bolton and Les Naumann installed the aerial changeover switch and readied the transmitter for the new frequency. Engineer Len Mor commissioned the new system which was ready for use by January 1968.

The transmitter was also in part time use by the ABC for daily School Broadcasts, with the call sign VH9RA.

Due to heavy end of year bookings, no air transport back to Brisbane for Len Mor's party could be arranged and berths were obtained on the Dominion Line ship "Francis Drake", Rabaul to Sydney. The group then returned to Brisbane by air.

High frequency field strength was measured by Ed Kennewell, Engineer of the Radio Section, in May 1968, when he visited New Britain, New Ireland and Bougainville. He reported that the Rabaul transmissions were generally better than VLT by about 6db.

Operating staff at 9RB over the years of PMG control were Ran Weir, Martin O'Sullivan, Frank Early, Frank Dowse, Don Guthrie, Grant Beaumont and Wayne Bignell.

The ABC assumed technical control of the studio in 1964 and in November 1973 the newly formed Broadcasting Commission of Papua New Guinea took over all assets of the National Broadcasting Service although staff of the PMG remained at the station until May 1974.

From the beginning of the NBS in Rabaul, there had been plans for permanent studios. They were to have been on Namanula Hill, overlooking the town and Simpson Harbour, where the old hospital was built and where some 80 years earlier the Governor of German New Guinea had his residence. The hill had been occupied by the Japanese army during the war and some underground tunnels still remained. Nothing was ever built although at one time in 1964 the Radio Section had begun office planning.

And so after 14 years, a colourful and interesting episode in the history of the NBS ended, and the "haus wilus", (Pidgin for "Radio Building") passed into other hands.

LAE, MADANG, GOROKA AND WEWAK

Although these stations had a very short life as units of the National Broadcasting Service and had scant time to accumulate any significant history, their establishment should be documented.

One of the recommendations in the 1966 report on the development of broadcasting in Papua and New Guinea by Alan Poulsen, an engineer of the Queensland Radio Section, was that national medium frequency stations be built at certain major centres of population such as Lae, Madang, Goroka and Wewak.

It was also recommended that the Port Moresby high frequency station VLT be raised to 50 kW to better serve the outlying districts, but this was not done during the remaining years of the NBS in that country.

General agreement on the contents of the report was reached by the Co-ordinating Committee members comprised representatives of the Department of Territories, the ABC, the PMG, the Australian Broadcasting Control Board and the Papua New Guinea Administration. A "working party" with representatives from the PMG, ABC and the Administration was formed in 1967 to prepare action plans.

The report postulated that the Moresby studios should supply the program material either by terrestrial lines or by high frequency transmissions on VLT and VLK. Because of its importance for road, sea and air communications at the outlet of the Markham Valley, it was recommended that Lae be provided with a studio for local program which could also be relayed to the other three MF centres identified in the report.

A suggestion that the Overseas Telecommunications Commission's long wave vertical radiator be shared by the proposed Lae MF transmitter was considered in 1967 but was not proceeded with. One major reason was that the aerial was already in use on at least three frequencies and a complex coupling network would have been necessary.

At Goroka it was considered that the hilltop site of the Administration HF transmitter was unsuitable for MF and that a new site should be located. There was no room at the Administration's sites at Madang or Wewak either, so new sites were needed at these places also.

Consequently, in October 1967, Lindsey Birch and John Searle, Divisional Engineer and Engineer respectively of the Brisbane Radio Installation group visited T.P.N.G. for a preliminary look at the areas, and to discuss broadcasting matters with the staff of the Administration and the Department of Posts and Telegraphs.

At Lae, sites were inspected along the Markham River Valley and three likely areas noted. In Lae town a search was made for a studio site.

Goroka is situated on a plateau surrounded by high mountains. It was considered that almost any site on the plateau would serve the district out as far as the mountains. An area at Himetove was thought to be the best available, on the property of the Department of Agriculture, Stock and Fisheries, and the choice was accepted by this Department in March 1968.

Madang is the centre of a populous coastal district with high mountains only a few miles inland. Several sites were inspected on Lutheran Mission land in the Nagada area.

The initial impression gained at Wewak was that it would be difficult to find a site, as the Army and Airforce had taken over large likely areas for receiving purposes during disturbed relations with Indonesia.

After this preliminary survey, no action ensued in the following year, although contracts for steel masts were let late in 1968 with R.W. Edmondston of Marrickville, New South Wales.

A closer look at the possible sites was had in early 1969, when Neil Howard, Engineer, and Duncan Russell-Hall of Radio Lines visited Lae, Goroka and Madang.

At Lae discussions were held with the acting District Commissioner, Mr. Bunting, and with John Hughes the resident officer in charge of the Bubia Agricultural Station. An area at Bubia of about 61 acres adjoining the Wau Road seemed the best available. On the Portion 202 of the Milinch of Lae, 25 acres were cleared but the

remainder was rain forest. The area was low lying with springs and would require draining. It was about 1 and a half miles from the Markham River and 7 miles north west of Lae aerodrome.

Madang was visited next. Here the District Commissioner, Clifton Bassett, arranged for a patrol officer, one Noblett, to accompany the party, and John Schultz the manager of Nagada Plantation, identified the areas previously noted by Birch and Searle.

The site at Himitove was also inspected and contact was made with a private surveyor, J. Roberts, anticipating future site survey on Portion 188, Milinch of Goroka.

Wewak was not visited. The P & T Department had a receiving site there, but it was not large enough for the proposed MF station.

In September 1969 permission to work on the Lae, Bubia site was given and the Commonwealth Department of Works began to clear and drain in January, 1970.

Morobe Constructions undertook the building of a studio in Lae and a transmitter building at Bubia and these were completed later in 1970.

At Madang, a studio in town was built and completed in June 1970, by Madang Contractors.

Tenders for the transmitter building and caretaker's lodge at Goroka were let in December 1970 and a similar contract was let in Madang to Madang Contractors in June of that year.

The AWA BTM-2M transmitters, 2.5 kW, type 8J60110 with 200 ohm output and complete with dummy loads were expected to be ready in 1970.

Another visit to the sites was made in March 1970 by Howard, Birch and Russell-Hall. Discussions with the Electricity Commission were held about the provision of power to the proposed stations.

In Madang area, the Mission had agreed to sell the site and clearing was begun in April at Amron, on Portion 68, Milinch of Krankit.

Hardware for the outdoor plant became available in May 1970 and was shipped to Lae on the "Nimos". Fourteen tons of equipment arrived at Lae and Robin Bell and Morrie Hartshorn of Radio Lines supervised the unloading. They arranged with Highland Motors to move the Goroka consignment, some 6 tons, to its destination. A Toyota Landcruiser was part of the cargo and was used by the linestaff during their construction work.

Dave Southby and Kev Mansfield joined the others from Brisbane Radio Lines, and the earth mat, transmission line and 200 feet radiator were installed at Himitove.

Some trouble was encountered during the laying of the earth radials when the plough became impeded by tangled sweet potato vines. Portion of the earth mat was laid on the adjoining Goroka golf course.

For communications with the PMG staff at Port Moresby, a single sideband transceiver was sent up and was used frequently on 12210 kcs with the callsign VL8BQ/1. Messages for Brisbane were then relayed by radio from Port Moresby Radio Centre at Maigabu on VL8BQ.

During the work in May, an inspection visit was made by Don Rodoni an engineer from Radio Headquarters in Melbourne, Lindsey Birch and Noel Medlin an engineer from the Australian Broadcasting Control Board, Melbourne. Their visit included Wewak and they were also considering operating frequencies for the stations about to be provided.

More equipment for Goroka arrive at Lae on the "Island Chief" in June.

Ron Harris, Supervising Technical Officer from Brisbane Radio Section arrived that month and went to Goroka to check progress.

Considerable rain fell at this time and on one occasion in Lae, Robin Bell described the proposed site as "a duck pond". The site was being cleared with some difficulty as a result of the rain so characteristic of Lae and other coastal towns in the islands.

Outdoor line plant destined for Madang arrived in June and in this month Neill Howard spent some time with a surveyor pegging out the Amron site at Madang.

In August a line party under Line Foreman Ray Beutel began work on the transmission line, earth mat and 200 feet radiator at Amron. At the same time the technical group, Brian Clancy and Bob Sanders began work on the studio and completed this by the end of September. Next month Beutel and his team began erection of the mast at Lae with parts of the site submerged.

The AWA transmitter for Madang, serial number 39, arrived on the "Salamoa" in November. Wayne Bignell and Sanders left Lae for Madang and were joined by Tony O'Brien and Peter Brooke to attend to the transmitter installation.

Tim Howard in the lineparty at Lae was hurt in an accident while using the tractor to plough in earth radials. The tractor's petrol tank exploded and Tim was burnt, requiring some time in the local hospital.

On 9th November 1970, a severe earth tremor of strength 7.1 caused building damage in Madang and the Commonwealth Works Department staff were diverted for emergency repairs away from the Amron transmitter building. Another tremor occurred three days later with a reading of 6.5.

In March 1971, the transmitter, serial 40 arrived at Lae on the "Slembe", destined for Goroka.

In April the Wewak transmitter was ready in Sydney but was not despatched as the site had not been determined. The difficulty was still that the army and airforce had reserved the most desirable areas and the Administration did not favour an approach to acquire any further locally owned land.

The MF installations at Lae, Madang and Goroka were ready for use in June 1971 and Dave Ellis an engineer from Brisbane Radio Section commissioned them.

The program input equipment had been assembled in the Brisbane Installation Depot and was similar at each station. Details of the transmitting equipment are as follows:

- 9LA Lae: AWA transmitter type BTM-2M, serial 41, 2.5 kW, frequency 670 kcs. Aerial 200 feet lattice steel mast with 9 top loading wires each 100 feet long at 45 degrees. Aerial base impedance measured at output of coupling hut with static drain coil connected was $21 + j41$ ohms. An L-C coupler was used.
- 9GR Goroka: Similar transmitter, serial 40, frequency 900 kcs. Aerial 200 feet steel lattice mast with 3 top loading wires each 100 feet long at 45 degrees. Base impedance $51 + j198$ measured at Lae L-C coupler.
- 9MD Madang: Similar transmitter, serial 39, frequency 860 kcs. Aerial 200 feet steel lattice mast with 9 top loading wires each 100 feet long at 45 degrees. Base impedance $63 + j181$ ohms measured as at Lae L-C coupler.

The earth system in each case was 120 radials 0.4 wavelengths long. Conventional 200 ohm, 6 wire transmission lines were used at each station.

The valve lineup of the BTM was crystal oscillator 6AK5 pentode, isolator 5763 pentode, first buffer QE08/200 tetrode, driver QE08/200 and final RF amplifier 5762 triode. The audio side was pushpull in three stages, 6BK8 pentodes, 6146 pentodes, and 4-1000A tetrodes as modulator.

The high tension was 5000 volts and the rectifier consisted of silicon diode stacks.

About the time these stations were put to air, microwave links had been established between Moresby and the East coast, so that program from the Moresby studios was available. Short wave reception from the high frequency transmitters VLT and VLK was used only as a backup program source. No local program material was generated at the new stations.

After some considerable delay a suitable site was found for the Wewak transmitter, at Boram Bay close to the airport. The property description was Lot 9, Town of Wewak, East Sepik District and was 1.903 hectares. As a

result of its proximity to the airfield, the mast height was restricted to 150 feet and warning lights and painting was necessary. The mast was completed at the end of October , 1973.

Grant Beaumont and Wayne Bignell installed this transmitter, an AWA BTM-2M on 1520 kcs. It had arrived on the "Slembe". Final testing and putting to work was done by Ron Harris and Peter Brooke.

9WK was opened on 30th November, 1973 and carried the Moresby ABC program, obtained by microwave broadband link. This was the only day the station was on air as part of the National Broadcasting Service, as the Papua New Guinea Broadcasting Commission came into being the following day and assumed responsibility for all medium frequency stations at Moresby, Rabaul, Lae, Goroka, Madang and Wewak.

The NBS had functioned in Papua New Guinea for just two months short of 30 years.

The Papua New Guinea Department of Posts and Telegraphs engineer, R.T. (Tom) Pearson took a keen interest in provision of sites and services from the time of the 9RB Rabaul establishment in the sixties, up to the close of PMG activity in the seventies, and all who worked with him had a high regard for his enthusiastic assistance.

None of these stations had permanent staff and the maintenance was the responsibility of the local Posts and Telegraph Department officers.

METROPOLITAN STUDIOS - BRISBANE

The first Brisbane broadcast studio was provided in the Executive Building in George Street when the Queensland Government installed the first low powered transmitter, 4QG, in 1925.

Studios in those days were very elementary, being merely a heavily curtained room with a microphone on a stand and a gramophone with a microphone placed in front of the sound box. It was some time before electrical pick up direct from the record was introduced.

When the "new 4QG" was completed on the roof of the State Government Insurance Building at the corner of George and Elizabeth Streets, a fine set of studios was incorporated.

These studios served the State Governments' Queensland Radio Service until 1930, then the Australian Broadcasting Company until 1932 when they were taken over by the newly formed Australian Broadcasting Commission.

When 4QR came on air in 1938 a new studio was built for it in the South Brisbane School of Arts Library building in Stanley Street, next to the Brisbane Dry Dock.

At the beginning of the 1940's, the ABC began to set up office and studio space on the 6th floor of the building known as Penneys which ran through from Queen Street to Adelaide Street. Two main studios were installed with associated control booths and were used for 4QG and 4QR. Other studios on this floor were provided for small musical groups and drama. The South Brisbane studio was then used in conjunction with the orchestra.

After the move to Penny's, studio activity ceased in the George Street location and in fact the 4QG transmissions were removed to Bald Hills shortly afterwards.

In 1944 a new studio block for 4QG - 4QR was begun in Alice Street beside an old house facing the Brisbane Botanic Gardens. It was of concrete, and designed to be reasonably secure against bomb blast as this was wartime. The installation was completed and 4QG and 4QR began operating from studios 400 and 401 on Wednesday 12th December 1945.

The Alice Street studio block was partly underground and known to staff as "the dungeons". It contained a small ABC general office, the two studios, two control rooms and a switch room (or master control).

Upstairs the old house was converted for office space and record library. In time a third studio and control room was installed and two Presto disk cutting machines transferred from Penneys. These cutters had been acquired at the time of the fall of Singapore when the "Mariposa" was diverted to Brisbane with equipment destined for S.E. Asia.

An extension of the old house, probably originally a kitchen and servants quarters, was converted to an ABC/PMG locker and lunch room annex. A small room in this block was used as a store and assembly room for outside broadcast equipment required for races, church services and other events frequently broadcast in those days.

Harvey Humphreys took up duty at Alice Street as Studio Supervisor with Mrs Costigan as Record Librarian. The News Department with Mr Wright, Mrs Delalande and Mrs Willis was also established in the old house. Other young ladies associated with the Alice Street operation were Kelly, Haren, Dyke, Beal, Grobman, Vowles, McIvor, Sherrin and Rosendorff.

PMG staff involved in the installation were Divisional Engineer Vern Kenna, Arthur Clark, Dan Baxter, Otto Burmester, Jack Plunkett, Frank Nolan and trainees Ian Byrnes, Ken Mann and Doug Sanderson. Senior staff in control room were Nat Gould, Harold Oxford, Bert Taylor and Jim Todd.

Womens Session announcer at that time was Rita Humphress and duty announcers were Graham Webster, Ted Sheppard, Joan Hockey, Sybil Willey and Bramley Graves.

In Penneys, one of the vacated control studios became 403, the sporting studio, used extensively on Saturday afternoons. Clive Harburg was a frequent announcer here.

The Penneys studios had an emergency engine generator in case of power failures, installed in a room near the lift house on the roof. It was a four cylinder Ford petrol engine driving a 3 phase 6kVA Skelley alternator.

No emergency engine was provided initially at Alice Street but when a Southern Cross engine and a 30kVA, 3 Phase Braybon alternator became surplus at 4QB Pialba in December 1952, they were installed in a separate room behind the studio block. In the early 1950's a studio was installed in the Science Hall at the Brisbane Royal National Association's Exhibition grounds. This was studio 417 and it operated during Show week each year. Comprising studio, control room, tape recording room, newsroom, office and front counter, it gave the public their first view of a modern broadcasting system.

The large open area adjacent was used each year by the PMG to display some interesting feature. In 1952 a large model was set up showing the plans for the new station 4SO, photographs depicting the various aspects of station design, and a model of the aerial system.

For emergency power, one of the 5kVA single phase Onan generators with Ford engine recovered from the first 4QL Longreach, was installed in 1953.

This studio was in use annually for about ten years, when the rented space was surrendered in 1964.

On February 1960 a news studio situated in the new TV building at Toowong became 405 and was operated for sound as a remote studio controlled from Alice Street.

In the late 1950's the ABC acquired a property on the banks of the Brisbane River at Toowong just opposite the railway station. This historic site with its old house "Middenbury" had been established by one Rogers in the 1870's and was subsequently the home of Thos Finney the draper, the Murray-Priors and the O'Sheas. A new brick sound studio block was built adjacent to the old house which was used as office space. The new home for 4QG - 4QR was ready for use in July 1962 and took over from Alice Street. The installation engineer was Ron Tolmie with Bill Graham- Wilson leading the technical staff. These studios are in current use.

In 1963 a new studio was built in Finance House in Elizabeth Street. Office space was available on ground level and a large auditorium on the first floor. The area was leased by the ABC for use by the orchestra. An adjacent control room was built with a view of the studio. The building had originally been the theatre Royal.

As special effects were expected to be required for music or drama, a reverberation unit was provided with adjustable reverb time. This was in the form of a large steel plate and was installed in Studio 419, Penneys Building on the 6th floor and remotely controlled from studio 429, Finance House. A program line loop was therefore required between studio and Penneys. The nameplate on the unit was EMT but details are not known other than that it was of German provenance. It was eventually removed and stored at Middenbury but its fate is not known.

A new orchestral studio was built at West End across the river from the Toowong Studios in 1978 and the Finance House premises were no longer required.

Concerts in the Brisbane City Hall were original broadcast using outside broadcast (OB) equipment set up to the right of the stage on a small table. This was a rather public and inconvenient location, so during the 1950's a small studio was constructed behind the gallery seating, with an inconspicuous window enabling a view of the stage. Brian Cleary and Jim Plunkett did the installation with Brian Robinson as engineer in charge. The exact date is not known although surviving drawings are dated 1955.

ROCKHAMPTON STUDIOS

When 4RK transmitter was installed in 1931, a local studio was provided on the top floor of the Rockhampton Post Office.

At this stage, the programs were the responsibility of the Australian Broadcasting Company which preceded the formation of the Australian Broadcasting Commission.

The equipment was supplied by STC of London and was similar to that provided for emergency operation at the transmitter.

All amplifiers were battery operated and used STC triode valves types 4102D and 4205D. The microphone was a condenser model and with its amplifier valve, was housed in a polished wooden box.

Two gramophone turntables equipped with Western Electric oil damped pickup arms were available and were generally operated by the control room technician.

One of the earliest announcers was George Gardiner. Two news services a day were broadcast and the graziers of the district no doubt welcomed the stock reports from the Gracemere cattle saleyards.

The longest serving announcer and later, Regional Representative, was Charles Beck.

In 1940, Dan Baxter and Ken Ebeling, Radio Section technicians, replaced this old style equipment. Photographs of the emergency studio desk at the transmitter around that time show a Western Electric moving coil microphone type 633, so it is likely that this type would have replaced the original condenser at the studio.

Some years later about 1946, the equipment was modernized and rooms in the School of Arts were used, one studio, number 460, and one control room.

In 1958 a completely new studio was installed in the National Mutual Building in Denham Street by Mick Pike with Brian Robinson providing engineering supervision. Due to a slight miscalculation, the new control desk could not be brought up the stairs and had to be partially dismantled.

The final move in the Rockhampton studio saga was made in 1964. A new studio, 461, was installed in a building in Quay Street, facing the Fitzroy River. This had been the premises of the Mount Morgan gold mining company at an earlier date and the control room was installed in what had once been a bullion vault.

Again, Brian Robinson was the engineer concerned.

TOWNSVILLE STUDIOS

After the installation of 4QN in 1936, a local ABC studio was built in Thorpe's Building, towards the seaward end of Flinders Street, Townsville. It occupied the whole top floor of this attractive three storey building, now known as the Queensland Building.

Jack Loth, and possibly other 4QN installing staff, was involved with the establishment of this studio.

In 1942 the equipment was moved to the A.M.P. Building and modernized with equipment designed by Vern Kenna who was at that time an engineer in the PMG Research Labs in Melbourne. Geof Beetham who was in charge of the installation recalls that Kenna came up to Townsville for the commissioning of this new studio. Local lineforeman Peter Smith and his gang moved the heavier hardware from Thorpe's to the AMP.

This studio served Townsville until 1964 when a move was made to the new ABC premises in Wickham Street which was the new television centre. Brian Robinson and Ron Tolmie were the engineers responsible for studio design and installation here. Bernie Bischa, Bob Hansen and Dick Hazel were engaged on the technical side.

Two of the early ABC Regional Representatives were Keith Kennedy and Reg Peach. They were followed by Hugh Peddie and Ralph Taylor. Hugh later went to the Maryborough office of the ABC and Reg Peach spent time in the Brisbane Studios.

MARYBOROUGH STUDIOS

About two years after the opening of 4QB Pialba in 1948, a local studio was built in Maryborough in the School of Arts.

Only limited local broadcasting was done from this studio, to 4QB and 4GM when the latter was opened in 1951.

The School of Arts studio served until in 1965 a new studio was opened in the State Government Insurance Office building in Kent Street. Brian Robinson was the project engineer for this installation.

The ABC Regional officer and announcer for many years was Hugh Peddie.

LONGREACH STUDIOS

Although 4QL was established in Longreach in 1947, it was not until September 1952 that a local studio was provided.

Space in the Shire Hall was made available and normal small studio equipment was installed by PMG radio staff.

In those days a new regional studio was a matter of some importance and an opening ceremony was held.

Senator Cameron the Postmaster General spoke on line from Sydney as did R.J. Boyer of the ABC head office and W. Riordan the Member for Kennedy. E.J. McCann the ABC's acting manager for Queensland was present at Longreach with Councillor Edkins the local Shire Chairman.

The opening was compered by announcer Clive Harburg.

The studio was used to insert local news and views into the regional program normally relayed from Brisbane via the Rockhampton studio, and so a greater local and western regional participation was achieved.

On Friday night, October 31st 1958, the Shire Hall caught fire and suffered considerable damage. Fortunately the studio was untouched and remained usable until a decision was made to demolish the old hall and rebuild.

The studio was moved to temporary quarters in the School of Arts building in Eagle Street and remained there until the present studio and regional office was built in Duck Street in 1964.

CAIRNS STUDIOS

Although 4AT Atherton was acquired in 1941 and 4QY Cairns opened in 1950, no local studio was built in Cairns until the mid 1950's. Until this time, special Far North material was produced in Townsville and inserted into the program line to 4AT and 4QY at the Townsville studios.

The first Cairns studio was installed in a building at the corner of Abbott and Shields Streets and operated there for about 10 years.

A new studio was built about 1965 in the State Government Insurance Office at the corner of Shields Street and the Esplanade overlooking Trinity Bay. The PMG installers were Peter Chew and Ron Cook.

Maintenance of the studio was done by Cairns Telephone Exchange technicians until 1972 when the ABC assumed responsibility.

MACKAY STUDIOS

Although 4QA was opened in 1951, it was not until 1956 that a local studio was built. This first studio was installed on the first floor of a building above Chandler's store in Sydney Street. The technical staff involved were John Holland, Bernie Hogue and Brian Cleary.

After some years a new studio was established in the State Government Insurance Office building in Victoria Street, and this is the current location.

MOUNT ISA STUDIO

Although 4MI was established at Mount Isa in 1960 all program came over Telecom lines until 1986. At this stage the ABC acquired a property in Mount Isa and built a studio. With this, a local breakfast session is provided for 4MI and 4JK Julia Creek. The remainder of the program is derived from satellite reception of the ABC's general regional service.

PART 3

RADIO ACTIVITIES OTHER THAN NATIONAL BROADCASTING

The following are examples of the many and varied works undertaken by Broadcasting staff in addition to their normal duties of installation, operation and maintenance of studios and transmitters of the National Broadcasting Service.

PUBLIC DISPLAYS

Brisbane Exhibition: Probably one of the first major activities, other than broadcasting, engaged in by the early broadcasters of the National Broadcasting Service was associated with that great annual event, the Brisbane Royal National Show. In the prewar 1930's the PMG Department had a large stand in the main pavilion with one of the most mechanically fascinating displays ever seen at the Show. It featured communication by road, sea and air with cars and trucks traversing streets with traffic lights, ships departing from wharves and model aircraft carrying mail from one country to another.

The vehicles were moved by a complicated arrangement of magnets under the display, and the lights in them were powered by induction from a master oscillator. The electronics were the responsibility of the radio men.

Associated with this great display was a court room scene where the actors were old style candlestick telephones, a spectacular creation of the telephone exchange staffs. Various minor attractions such as voice pattern displays on a cathode ray oscillograph were also very popular. Contingents of school children were brought along for previews of these marvels, and shouted into a microphone feeding the CRO. Later, essays had to be written at school, describing the wonders seen at the PMG display.

Where the funds came from for all this is not certain, but it is rumoured that the costs of maintaining automatic telephone exchanges in Queensland were much higher than in other States at that time.

No further broadcasting displays were seen at the Show until the early 1950's when a model was displayed based on the new Southport regional station then under construction. By this time the ABC had a studio in use during showtime in the Hall of Science, and an adjacent area was available for Radio Section displays. These were not always related to broadcasting. Early Muirhear-Jarvis picturegram equipment operating over a light beam was included one year and the wonders of the new microwave communication equipment were featured on another occasion.

Eventually the ABC discontinued the Exhibition Studio and the opportunity for NBS broadcast publicity in this area vanished, as the space used was part of the ABC leased accommodation.

WORK FOR THE A.B.C.B.

Commercial Inspections: In its early years, the Australian Broadcasting Control Board had no facilities in the States for performing tests on commercial broadcasting stations, and for many years during the 1950's and 60's regular inspections of these stations were made by officers of the PMG Radio Section. Full studio and transmitter tests were required each year at station licence renewal time and these were done by an engineer and a supervising technician. Neil Howard, Leo Moloney, Jack Ross, Des Fulton, Doug Sanderson, Ralph Bongers, John Wheller, Gordon Gilbert and others were involved in this sometimes interesting, often uncomfortable series of tests, studios by day and transmitters and aerials in the small hours.

Surveys: In addition to the inspection routines, special tests were requested from time to time, and between 1950 and 1960 some 33 field strength surveys and figure of merit measurements were made by Leo Moloney, Doug Sanderson, John Wheller, Ralph Bongers, Maurie Palmer, Ken Hobson, George Barr and various technicians in training. The work done in those years has formed the base on which ground conductivity data for various parts of the State has been accumulated.

Propagation: An interesting experiment was conducted over a 2 year period from July 1954 to May 1956 to observe what variation if any occurred in daytime field strength of medium frequency stations over the full range of annual climate changes. Field strength readings were taken at midday each week at the Capalaba receiving site of signals from 4IP Ipswich on 1010kcs, 4GR Toowoomba on 860kcs and 4QS Dalby on 750kcs. The seasonal variation was found to be small. The work is recorded in A.B.C.B. Technical Services Division Report No. 20 written by J. Dixon, 1960. The regular Queensland observations were made by staff of the Brisbane Radio Section Laboratory.

Papua New Guinea Planning: To assist the A.B.C.B. in the long range planning of broadcast facilities in P.N.G., Alan Poulsen, a Divisional Engineer in the Radio Section, researched and prepared a plan for this in 1966. To determine the coverage provided at that time by the high frequency transmitters of VLT and VLK at Port Moresby, a field strength and listening survey was made by Doug Sanderson and Ken Howard in April and May 1966. They visited and observed at eleven towns in Papua New Guinea, New Ireland, New Britain and Bougainville. At this time the Queensland administration of the PMG was responsible for operation of these National broadcasting facilities in Papua New Guinea. This plan formed the basis for the subsequent installation of new medium frequency stations at Wewak, Goroka, Madang and Lae and a number of high frequency transmitters at Daru, Kerema, Popandetta, Milne Bay, Lae, Goroka, Mendi, Mount Hagen, Kundiawā, Madang, Kavieng, Kimbe, Rabaul and Kieta.

M.F. Synchronized Operation: In 1955-56 the transmitters at Dalby and Townsville, 4QS and 4QN, were operated in synchronism on 630kcs in an experiment to determine whether any improvement could be made to night time secondary coverage in the area between the stations. Very stable oscillators were prepared in the PMG Research Labs and fitted at each station.

The field survey work was conducted by Frank Brownless a Divisional Engineer from Central Office Broadcasting Section, assisted by Doug Sanderson of the Radio Lab in Brisbane. They travelled through Queensland as far as Hughenden and Charters Towers observing the night skywaves with equipment mounted in an old panel van with aging retreaded tyres. They were joined for part of the survey by West Hatfield, an engineer of the A.B.C.B. Some special tests in Brisbane and Dalby were made by Vern Kenna and Bill Rohde of the Brisbane Radio Section. The work and results are described in PMG Radio Section Report No. 30 by Brownless.

Hemmant and Capalaba: When the American armed forces arrived in Queensland during the 2nd world war they required communication with their headquarters in the USA and in other places, and two radio centres were set up near Brisbane.

The one at Capalaba was designated a radio receiving centre and PMG staff provided rhombic aerials and a building to house the banks of conventional and radio teletype receivers required. The US Army provided a Cummins engine generator of 28kVA capacity. It was a 3 phase, 208/120 volt, 60 cycle unit and was acquired by the Commonwealth for 200pounds in 1946.

Several miles away at Hemmant, an aerial farm of transmitting rhombics was installed. In the transmitter building was a fine array of high frequency transmitters for speech and teletype. These were brought from the USA and were typically 10kW watercooled types. An emergency diesel generator was also installed, a huge "Buckeye" in its own engine room. It was a 6 cylinder of 350 horsepower coupled to a 250kVA 3 phase alternator made by Ideal Electric Co.. The US Army installed the unit in 1942 and it was acquired in 1946 by the PMG Dept for 1600 pounds.

The two establishments were retained after the war by the PMG and used for years as headquarters for an emergency radio network extending to remote parts of the State. Although some of the single sideband transceivers were installed in Post Offices, several remote staffed NBS stations had a set and made regular contacts with the staff at Hemmant and Capalaba. The call signs were in the VL4 series, VL4EA being one of the Hemmant transmitters.

Early installations used Australian Army No. 11 transceivers, AWA communications type receivers and a few AMT150 transmitters. Later Racal SSB 60 watt transceivers were obtained, with considerable improvement to the service. At one time the original 200 watt AT14 high frequency transmitter at Hemmant was converted to a linear amplifier for SSB. Ken Stratton was largely responsible for this.

Fred Lubach spent many years as the receiver operator at Capalaba.

One surviving wartime transmitter, too large for the modest emergency network, a watercooled 10kW Federal was reputed to have been tuned up on the 20 metre amateur band one day into a rhombic and provided the largest VK4 signal ever heard in the USA.

With the improvement in PMG services to remote areas, the importance of the auxiliary network declined and for some years now no use has been made of it as far as NBS stations are concerned. In more recent times a radio telephone service has been provided by SSB transmission to Birdsville and the Brisbane ends of the circuit were installed at Hemmant and Capalaba.

The Capalaba centre was used for many years by the Wireless Inspector's staff in the days when that function was within the PMG Department. Frequency measuring equipment and general off air monitoring receivers were employed.

Although used for many years by PMG and later, Telecom, the Capalaba property does not belong to this Commission, being considered today to be an asset of the Department of Communications.

OVERSEAS

South East Asia: In January 1966 Roy Wightman, a Divisional Engineer of the Radio Section, visited South Vietnam, at Ban Me Thuot, to do an acceptance test on a 50kW broadcast transmitter which had been supplied by the Australian Government as part of the Colombo Plan aid to South East Asia. The transmitter had been supplied by STC and was a type 4SU-38. Transmitter, emergency power supply and vertical radiator had been installed by STC and others.

The emergency power supply comprised a Blackstone diesel driving a 220kVA General Electric alternator, and the radiator was a top loaded type, probably an effective half wave.

A similar installation at Khon Kaen in Thailand was next tested. This had been supplied as part of the SEATO (South East Asia Treaty Organization) Aid Plan.

Later in 1966, in November, another similar installation was checked at Korat in Thailand.

The following year in December, a 10kW 4SU-48A was inspected at Ban Me Thuot. This had been provided as a standby unit with its own aerial, as guy insulator problems had occurred on the original main mast such that transmission had been stopped pending repairs.

New Hebrides: Following a visit to the New Hebrides by Bill Rohde, Divisional Engineer of the Radio Section to examine broadcasting needs in those islands, a high frequency system was provided in 1971. Two AWA transmitters were installed by local staff of the New Hebrides Radio Communication Department and in November and December of 1971, Dave Ellis, an engineer of the Radio Section Brisbane, and a line party erected two high frequency aerial arrays with their transmission lines for operation in the 3 and 7Mcs bands. This system was designed for day and night coverage of the island group from Port Vila.

Funds for this project were provided by the Dept of Foreign affairs under the South Pacific Aid Program. New Britain: In August 1966 the Radio Lines and Installation staff installed a 10kW high frequency transmitter 4SU-48B with its aerial system, at Rabaul for the Posts and Telegraph Department of P.N.G.. The NBS site of 9RB at Kurakakaul was used for this service, which enabled transmission of indigenous educational programs by the P.N.G. Department of Information and Extension Services, D.I.E.S. for short. John Searle, engineer, was responsible for overall supervision of this project. The transmitter callsign was VH9RA.

Many other installations for the D.I.E.S. were made by Brisbane staff in P.N.G..

MISCELLANEOUS

Hospital Cardiograph: In the early 1940's, broadcast staff constructed a large electro cardiograph unit for use in the Brisbane General Hospital. Several racks of equipment with large cathode ray oscilloscope tubes were installed in a screened room.

R.A.A.F. Low Pressure Chamber: During the second world war, the Air Force installed low pressure chambers for testing aircrew at simulated heights, and PMG radio staff were involved with the communication equipment between the observers, pump operators, medical officers and the airmen being tested.

The chamber was in the form of a cylinder about 10 feet in diameter, with seats along either side for 14 men. In Queensland one was in use at the RAAF training airfield at Kingaroy and after the war this equipment or similar, was installed at the new air base at Amberley. Engineer Kev Burke of the Radio Installation Division was responsible for equipping and commissioning the communication equipment in this chamber during 1952.

Post Office Ball: In bygone years, the annual Post Office Ball was held in the Cloudland Ballroom at Bowen Hills and many interesting gadgets were produced by the Radio Section staff for the entertainment of guests. One noteworthy machine was a walking, talking robot, largely the work of Supervising Engineer Mick Hall and Engineer Brian Robinson.

Ionospheric Prediction Service: In the early days of Ionospheric Sounding, a transmitting and recording station for the Prediction Service was operated in the Brisbane suburb of Indooroopilly and the wooden poles and aerials were erected by Radio linestaff in 1947. Photographs show the poles being erected by several men with the then common linemans' pikes.

Palm Island: Off the North Queensland coast between Townsville and Ingham lie the Palm Islands. The main island, Palm, is home for an aboriginal community while a nearby island Fantome was the site of a hospital for lepers. The hospital was staffed by a group of French Canadian Roman Catholic nursing sisters.

During 1947 the hospital was moved to the opposite end of the island and its radio transmitter and receiver, used for communicating with Palm Island, was sent to the Radio Section in Brisbane for refurbishing. The transmitter was AWA, of 100 watt capability and used a frequency just above the high frequency end of the M. F. band.

Doug Sanderson who at that time had just completed the installation of a second transmitter at old 4QN Clevedon, was sent to Palm to reinstall the upgraded equipment at the new Fantome Island hospital site.

The old site had a T aerial supported by a pair of 80 feet high black iron pipes, and it was intended that these be moved to the new site. As the labour supplied was a dozen Palm Island men and an old landing barge, only one pipe was dismantled and shipped to the new site. Here it was erected on the side of the hill beside the sisters' quarters, using the boom of a lugger as a jury. A long sloping wire was suspended and led to the new transmitter room. The only sister who spoke English well was instructed in operation of the equipment and communication was again established with Palm Island. Power for the transmitter was supplied by a cantankerous old diesel generator which had to be started by hand cranking. The station call sign was VKR3.

Oil drilling at Morella: In 1950 the Shell Company was drilling for oil at Morella north of Injune and to provide radio telephone communication a high frequency link was installed. The frequencies used were in the 9Mcs band by day and the 5Mcs band at night.

The equipment at Morella was installed by AWA and consisted of a 400 watt transmitter type IJ50904. The Brisbane terminal was at Hemmant, using a 250 watt RCA transmitter type ET4336/H. When the service was no longer required, Doug Sanderson went to Morella to assess the value of the equipment at that end with a view to purchase by the PMG Department. The weather was wet and Carnarvon Creek was in flood, providing some interesting crossing episodes.

Radio on Trains: Prior to the 1950's Queensland's premier train was the Sunshine Express operating between Brisbane and Cairns, over 1000 miles. The locos were steam driven and the carriages wooden.

However a new train was at the planning stage with all steel coaches. It was to be called the Sunlander and the Queensland Government Railways were considering the possibility of enlivening the long journey with radio in the carriages.

The PMG Radio Section was approached on the subject and it was decided to make a practical test of the proposition. One of the Sunshine Express carriages was fitted with a long aerial on its roof and any steel fittings were bonded to the chassis. DC operated fans were electrically suppressed and one normal sleeping compartment reserved for the operators and their equipment.

So in April 1951, Ian Costello of the Railway Dept and Doug Sanderson made the trip to Cairns and back, listening and logging on an RCA AR88 receiver, and at stops, making field strength measurements of any station within range. The field strength receiver was an RCA WX2B.

Alas, although there were long stretches where good reception of National or Commercial stations was possible, the QGR did not proceed with the idea and has never used radio re-broadcast on any of its trains.

Forestry Radio: In 1955 an investigation was made of high frequency transmission and reception problems being experienced by the Qld Forestry Department in their pine tree plantations at Imbil, south of Gympie. The transmitter problems were soon corrected and some interesting receiving tests made from Forestry vehicles in the rugged country around Imbil. The station call sign was VL4FT and the frequency 2.84Mcs.

Skywave Observations For C.C.I.R.: Between 1971 and 1974 staff at the Bald Hills Radio Centre made a series of chart recordings of skywave signals from several distant MF stations to gain information for the Asian Broadcasting Union study group on night propagation over great distances. This was part of a CCIR program designed to minimise interference from high power transmitters in neighboring and distant countries.

A long wire Beveridge aerial was erected, 1400 feet long, 10 feet high on a bearing of 315 degree T and chart recordings were made at the output of a Racal RA7915 receiver.

Observations were made on a Japanese station at Akita, 770kcs, 500kW, and a Thai station at Ban Phachi, 1580kcs, 1000kW. In addition night signals were recorded from 4QD Emerald, 4QA Mackay and 6DB Derby. Akita was occasionally logged by staff at 4AT Atherton. Observations were also made by PMG staff in Darwin and Australian Broadcasting Control Board staff in Melbourne of several distant stations as part of the same program.

Des Fulton was the engineer in charge of the monitoring project and Gordon Gilbert and Col Hattersley prepared the equipment.

END OF DOCUMENT