The BROADCASTER

Newsletter of Telecom Broadcasting

No. 26 July 1993

PARLIAMENT HOUSE, CANBERRA

THE BROADCASTER

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

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

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

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EDITORIAL

An article of particular interest to Broadcasters in this issue, is the four mast directional aerial system commissioned in July 1992 for Commercial broadcasting station 3EE at Werribee,operated by AWA Media Pty Ltd.

The directional aerial system for MF broadcasting using vertical radiators was a late arrival on the Australian scene, compared with the USA where it had been employed since the mid 1930's. The first system commissioned in Australia was installed for 4BH Brisbane and put into operation in 1957. Strange as it may seem, horizontal systems using a reflector were in use with some Commercial stations many years earlier. Today, there are many directional systems in use, but the 3EE system is the first to use four radiators. The aerial designers were faced with a tight specification,calling for the need to cover Melbourne as the service area; provide protection for existing stations at Brisbane, Streaky Bay and Sydney; a group of planned stations in New Zealand,and limiting the field strength into nearby Geelong. A number of designs were studied in detail, with the final solution being the employment of four radiators.

JACK ROSS
Editor

Front Cover: Parliament House Canberra

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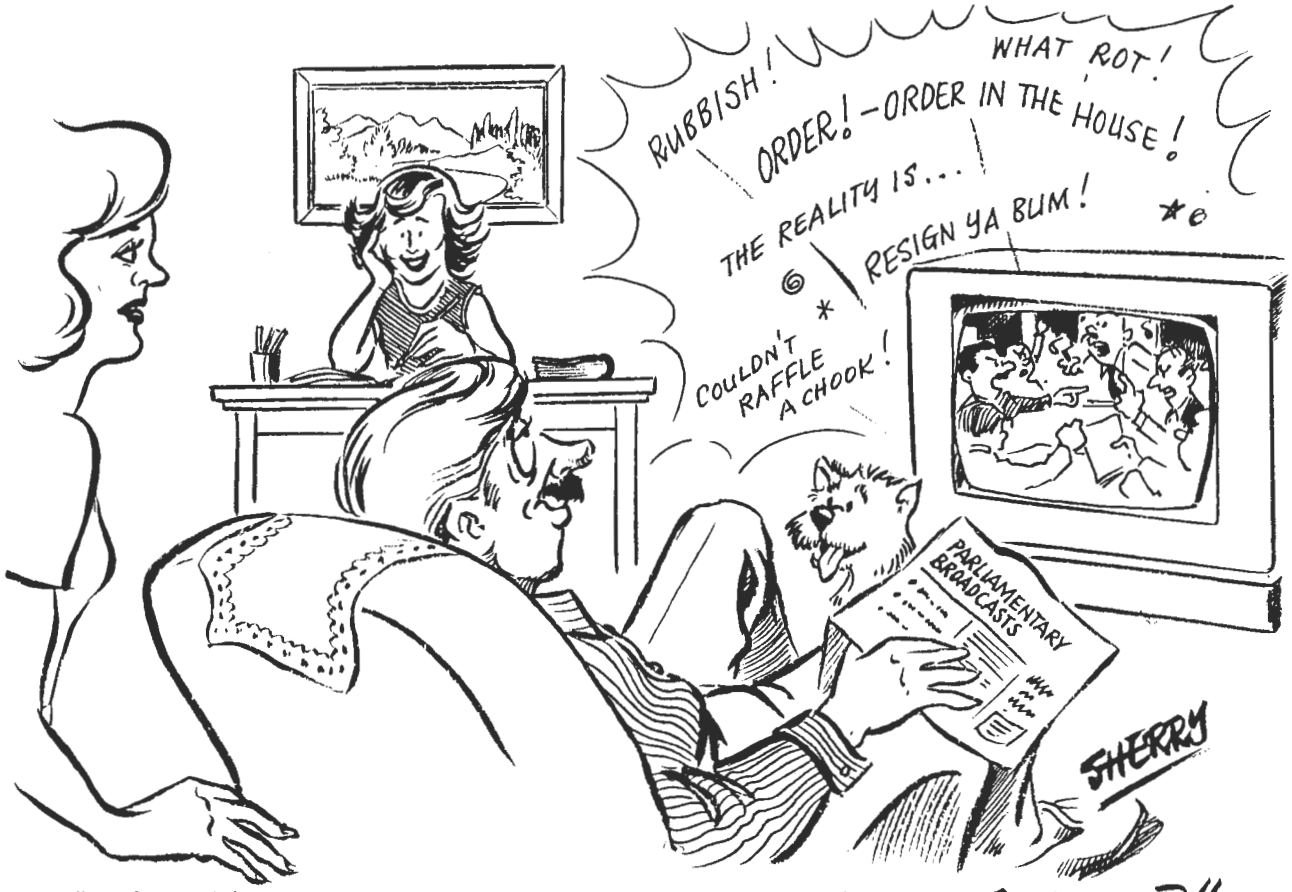


"DADDY, WHAT TIME DOES PARLIAMENT START?"

Les Rodgers

JUST BRIEFLY . . .

Leon Sebire has been a giant figure in broadcast transmission in Australia and indeed internationally over the last several decades. He has been responsible for many innovations in the broadcasting industry in Australia and has been the leader of Telecom's Broadcasting unit since inception as a discrete business unit in 1983. He has decided that it is time to turn his abilities to other interests, and after enjoying some well earned leave , will officially retire from Telecom Broadcasting early in 1994. An article detailing his achievements and career highlights appears elsewhere in this issue of *The Broadcaster*.

Meanwhile, business continues with ever increasing complexity as Australia grapples with such issues as micro economic reform and enterprise bargaining.

I was fortunate enough to be able to visit NAB 93 at Las Vegas in the United States during April. Clearly, the introduction of digital broadcasting over the remainder of this decade had an influence on the huge attendance,and there was great interest both in equipment displays and technical lectures. High definition television was one of the dominant themes. The emphasis in systems development has shifted almost completely from analogue to digital. Analogue systems could offer HDTV only via satellite, whereas digital systems can use both satellite and terrestrial broadcasting.

Very high values of digital compression are being achieved using MPEG-2 which seems likely to become a world standard. Additionally, orthogonal frequency division multiplexing using a number of carriers in a single channel, is undergoing rapid development. In conjunction, these techniques will allow HDTV or multi-channel pay TV to be broadcast terrestrially in the existing bands and channels. These interesting new developments will be implemented in Europe and America during the remainder of this decade. This new technology holds a great challenge in the years ahead.

LES RODGERS

STATION ROLL CALL

ABNQ9 BELLENDEN KER

Fifty kilometres to the south of Cairns and separating the narrow coastal plain from the Atherton Tableland is a range of high mountains. Mt Bartle Frere at the southern end,at 1622 m,is the highest peak in Queensland. Next highest, at 1561 m is Bellenden Ker. Situated on this peak is a major broadcasting facility with the ABC TV transmitter ABNQ9 as the prime service.

The advent of aggregation,necessitated remodelling the interior of the two story steel framed and cladded building, the upgrading of the emergency power plant and modifications to the steel lattice tower. The tower legs were strengthened and three stabilising guys added. The addition of a UHF antenna now brings the total height of the structure to 100 metres.

Any major installation work undertaken at this site presents unique difficulties,because the only access, except for emergency helicopter, is by means of an eight passenger cable car.The single track rope of 5.2 km length is suspended on nine towers. The design and construction of this cableway and parallel 22 kV power line over 20 years ago,was a major engineering feat and was the responsibility of the Commonwealth Department of Works.

The facility supports three Commercial TV channels as well as the ABC TV and three ABC 20 kW FM services. In addition, there are microwave telecommunications and CAA air-ground communications. This is a far cry from the original shared Phase 4 installation which commenced transmissio at the end of 1972. With the introduction of the integrated control and maintenance centre in Cairns during 1973, the station became remotely operated from Cairns and more recently from Brisbane.

RAY KING

4AT ATHERTON

Station 4AT Atherton has an unusual background as it began operation as a B Class or Commercial station. It was established by Atherton Tablelands Broadcasters on 15 February 1939 with an AWA 500 watt transmitter on 680 kHz and a quarter wave vertical steel pipe radiator. A small building on the site in Malanda Road housed the transmitter, studio and office.

During the Second World War, 4AT together with three other B Class stations throughout Australia was closed down for national security reasons. In the case of 4AT, it was closed down on 8 January 1941 and recommenced operation as a National station on 27 January 1941. Although it was hoped that the station would provide a broadcasting service for Cairns, a large coastal town and key defence centre, the signal strength was not adequate for the tropical environment so Cairns had to wait until after the War for a local station. However, the Atherton Tableland was also an area of major military significance and the station provided much needed entertainment for the troops. Over the years, major changes have been made to the station facilities.

It currently operates on a frequency of 720 kHz with a pair of STC transmitters providing a combined output of 4 kW into a 140 m guyed lattice steel radiator with top loading. Plans are in hand for replacement of the valve transmitter with a solid state version. The original wooden building was shifted from the site and a brick building now houses the transmitter.

Program for the station is provided via the ABC Cairns studio. Remote control of the transmitter began in 1973 and is currently maintained by the Cairns Broadcasting District staff.

RAY KING

RETIREMENT

LEON SEBIRE - GENERAL MANAGER

Leon Sebire was born at Wandin Yallock in Victoria in 1932. He started his working career in radio in 1947 on the production line at Radio Corporation (Astor) at a wage of 19 shillings ($1.90) for a 5 1/2 day week. This was substantially less than the cost of lodgings and for the first year he augmented his income by working night shift stacking timber for a softwood importer at South Wharf.

Leon eventually obtained a more lucrative position with Steanes Sound Systems in West Melbourne, where, at age 16, he was promoted to run the microphone manufacturing and repair area of the business. He commenced night school at Melbourne Technical College (now RMIT) and eventually completed a 7 year Radio Engineering Diploma, a 4 year Management course and additional studies in Commercial Law and Accounting.

Mr L. D. Sebire AM

During the course of his studies, Leon moved through a number of radio manufacturing and service organisations. He obtained a First Class Commercial Wireless Operators Certificate from the Marconi School of Wireless and served briefly at sea as a Wireless Operator in the Bass Strait trade.

Leon was appointed as an Engineer to the then Department of Defence Production during the Korean War where his duties were concerned with the development of high reliability electronic components and environmental testing equipment for Services radio equipment. In 1956 the Department was absorbed into the Department of Supply and the staff transferred to Canberra whereupon Leon moved to the Head Office Radio Section, PMG's Department at Jolimont.

Initially working in the MF Construction Division, his early tasks were concerned with the power increases to 50 kilowatts of major regional and capital city stations, antenna system design and the development of a new range of low power stations operating for the first time on an unattended basis.

Moving to the radiocommunications area in the early '60's, his most notable projects were the establishment of the Alice Springs HF Radio Subscriber Network and the Darwin - Gove tropospheric scatter radio system. This latter system was initially intended to be provided by submarine cable but after considerable research and persuasion, Leon was able to convince his superiors of the merits of the radio alternative. He worked in the Brisbane to Cairns Microwave Radio Relay development team and also developed a range of low-cost compact single channel VHF radio subscriber systems some hundreds of which were subsequently installed. In conjunction with two North-Americans, he participated in the development of the cellular radio theory for mobile communications. He unsuccessfully tried to convince the Department of the potential for automatic mobile radio telephone systems and it was to be almost 20 years before Telecom finally decided to adopt the facility, foregoing substantial revenue in the meantime.

Transferring to television activities in the late 60's, one of Leon's major contributions was the development of the 'Thin-Line' microwave system and associated low power TV stations installed in Western Queensland under Phase 7 of the National Television Development Plan.

In 1976, he was promoted as head of the then Broadcasting Branch of Telecom. He converted the organisation to a largely free-standing business Directorate in 1983, becoming its first Director until 1988 when it was restyled a Business Division and he became General Manager.

Over the years Leon has been very active in international broadcasting forums where he has delivered more than 100 papers and lectures on broadcasting subjects of topical interest. He is well known and highly regarded for his activities within the Commonwealth Broadcasting Association and the Asia-Pacific Broadcasting Union.

In 1991, his contribution to the development of telecommunications and particularly broadcasting, was recognised with the award of Membership of the Order of Australia.

I have known Leon since 1956 when he joined the Postmaster General's Department to become involved in broadcasting.I also worked closely with him on radiocommunications projects when he worked in that field,and in particular,the development of the SSB radio telephone subscribers network in the Northern Territory and the Darwin-Gove (Nhulunby) tropospheric scatter radio system. I am sure these projects must have been a great satisfaction to him,as in their day, they were state-of-the-art technology. With the establishment of the Broadcasting Directorate Leon was the driving force behind having *The Broadcaster* published on a regular basis and suggesting I volunteer to be Editor and to arrange publication and distribution. The magazine is now in its ninth year of publication and he has been a regular contributor from day one. Without his full support,and the long periods of his precious time he set aside for discussions with me on editorial matters, the magazine would not have lasted as long as it has.

In my capacity as Editor,I want to say ' Thank you Leon' and on behalf of the readers,to wish you and Mrs Sebire a long, happy retirement.

JACK ROSS

NTA CONTRACT

TELECOM BROADCASTING WINS $8 MILLION CONSTRUCTION CONTRACT FOR NORTHERN TASMANIA

As part of the Government's implementation of policy to bring competition into Broadcasting, the Government's agency, the NTA called for tenders for the equalisation upgrade project in Northern Tasmania. The Request for Tenders brought bids in from Broadcast Communications Australia Ltd, a subsidiary of Broadcast Communications New Zealand; Clough Engineering; Hydro Electric Commission, Tasmania in association with National Transcommunications Ltd of the United Kingdom and Connell Wagner.

Against the stiff international competition provided by those companies, Broadcasting was successful, based on experience gained from equalisation work in the eastern states of mainland Australia.

The contract calls for:

- A high power UHF TV antenna system
- A Band II circular/plane polarised FM/TV antenna system
- Radomes to protect the above
- Building upgrade
- Main and standby power upgrade
- A new UHF TV transmitter for ABC programs
- Simulcasting of channel 3 and the new channel 32 services
- New FM transmitters and combiners for ABC FM & RR

One of the more challenging aspects of the Mt Barrow upgrade will be the removal of the existing radome covered Band II antenna system and its replacement with a new shared Band II cross polarised FM/TV system and radome. On top of this new antenna system will be mounted a four sided UHF array, again covered by its own radome system. Assembly of the antenna units will be carried out in Australia.

The Mt Barrow work will be particularly challenging because of the severe weather conditions that exist on the site. Statistical predictions have been carried out using all available weather data to identify the best time of the year to carry out the work. Readers of *The Broadcaster* will already be aware of weather problems at the Mt Barrow site when details were given in the July 1990 issue of damage to the timber and fibreglass radome structure following a massive lightning stroke and the difficulties faced by workmen in the cleaning up and repair operations. High winds and long periods of ice and snow were experienced over a long period of time.

Additional to the main site, there are 10 translators to be developed at existing and new NTA sites along the northern strip of Tasmania. These are located at Binalong Bay, East Devonport, Lileah, Montumana, Penguin, Savage River, St Helens, St Marys, Ulverstone and Wynyard.

Putting the bid together was the first example of Broadcasting utilising people on a national basis to constitute a multi disciplinary team towards the completion of the tender documentation. This involved a number of staff from the Melbourne and Brisbane offices.

Material is already starting to arrive ready for early installation. Target completion for the project is March 1994. Project Manager, John Hodgson said that winning this contract showed that Telecom Broadcasting was able to beat the best in the world and would continue to be a strong market leader in the broadcasting construction business in Australia.

JOHN HODGSON

"MUST BE MY LUCKY DAY ... IT MISSED THE BILLY CAN!"

RADIO AUSTRALIA DARWIN

PROGRAM INPUT EQUIPMENT AND CONTROL ROOM UPGRADE

As part of the project to install two new 250 kW HF transmitters at Radio Australia Darwin, additional program input and monitoring equipment was required. This additional equipment was to be installed with a minimum of disruption to the station transmission schedule.

The existing PIE racks were fully occupied and it was decided that the most expedient course of action was to install new racks and migrate the existing equipment to them.

Because of the existing control room equipment layout, it was necessary to relocate control and monitoring functions for the antenna selector switch matrix and a.c. power supply from a control desk to a new rack and the new PIE racks were installed in place of the redundant control desk.

The PIE racks consist of eight racks, one each for five transmitters, a program selection rack, a monitoring and testing rack and a rack for spare equipment.

Program selection is normally computer controlled to meet schedule requirements through an audio matrix switch, program to each transmitter is fed through a CRL MBL 100 limiter and audio processor, monitoring is arranged through Harris AM 90 modulation monitors and the transmitted waveform is displayed on a CRO screen.

Input Program Fail alarms are provided as are output program and carrier fail alarms.

A new control desk houses the station alarm system computer, field arc detector interfaces, CCTV monitoring and fire alarm mimic. In addition. an emergency 'off' button, demodulated output VU meter, status indicators and feeder isolate switch controllers are provided for each transmitter on the desk. Facilities to select audio to monitor speakers are also provided. On either side of the desk is a computer terminal for the display and selection of station transmitter alarm summaries and schedule control. A dynamic station overview is displayed on a large computer screen above the desk.

Each transmitter has a dedicated computer terminal in the control room which displays detailed transmitter status information and provides facilities to control the transmitter when it is not operating under automatic schedule control from the main station computer.

Apart from coordinating the relocation of equipment for operating transmitters the most difficult task was the relocation of steel wire armoured control cables used to carry signals to indicate the status of the main a.c. power supply system.

Installation work was undertaken by staff from BSC Adelaide led by Greg Kinnear. Staff involved in the installation were Alan Mattiske, Peter Tsuolous, Paul Pyatt and Bruce Combe.

GRAHAM BAKER

Paul Pyatt and Bruce Combe removing a section of desk

New control desk. Original Ramtek monitors have been replaced by PC's. Computer terminals for three Collins 250kW transmitters at end of room.

WORKING TOWARDS AS3901

In December 1992 the General Manager, Broadcasting committed the organisation to the introduction of Total Quality Management. The Broadcasting Quality Council was formed and the Quality Policy established and published. A Quality Assurance Manager was appointed with a task assigned to bring the organisation to an accredited standard of quality by January 1994. Since that time a considerable amount of work has been going on "behind the scenes" preparing the way for the introduction of Australian Standard Quality practices into the organisation.

The orderly planning for the introduction of TQM principles into the organisation had to be hurriedly adapted early in 1993 because of contract conditions in the first competitively tendered project by the National Transmission Agency. This was the project for the redevelopment of Northern Tasmania, or Contract NTA 002 as it has now become known. In that Contract the customer called for a Quality Assurance Plan in accordance with Australian Standard AS 2990. Telecom Broadcasting was the successful tenderer for the project.

Standard AS 2990 is a precursor for the Australian Standard AS 3900 series and in particular calls for many quality elements to be addressed in a similar manner to the target standard AS 3901. The obligation to rapidly adapt to AS 2990 was a valuable introduction into Quality Assurance practices for the Engineering and Construction section of the business .

A number of dedicated people in the organisation have been actively contributing to the quality program with a large component of work being absorbed initially in the NTA 002 Quality Plan. Running in parallel with this has been the development of the Quality Policy and Quality Manual for AS 3901 together with the drafting of what is termed "Process Descriptions" which describe the way Broadcasting will go about providing products and services to the customer. Telecom Quality Services consultants have also been assisting in the task.

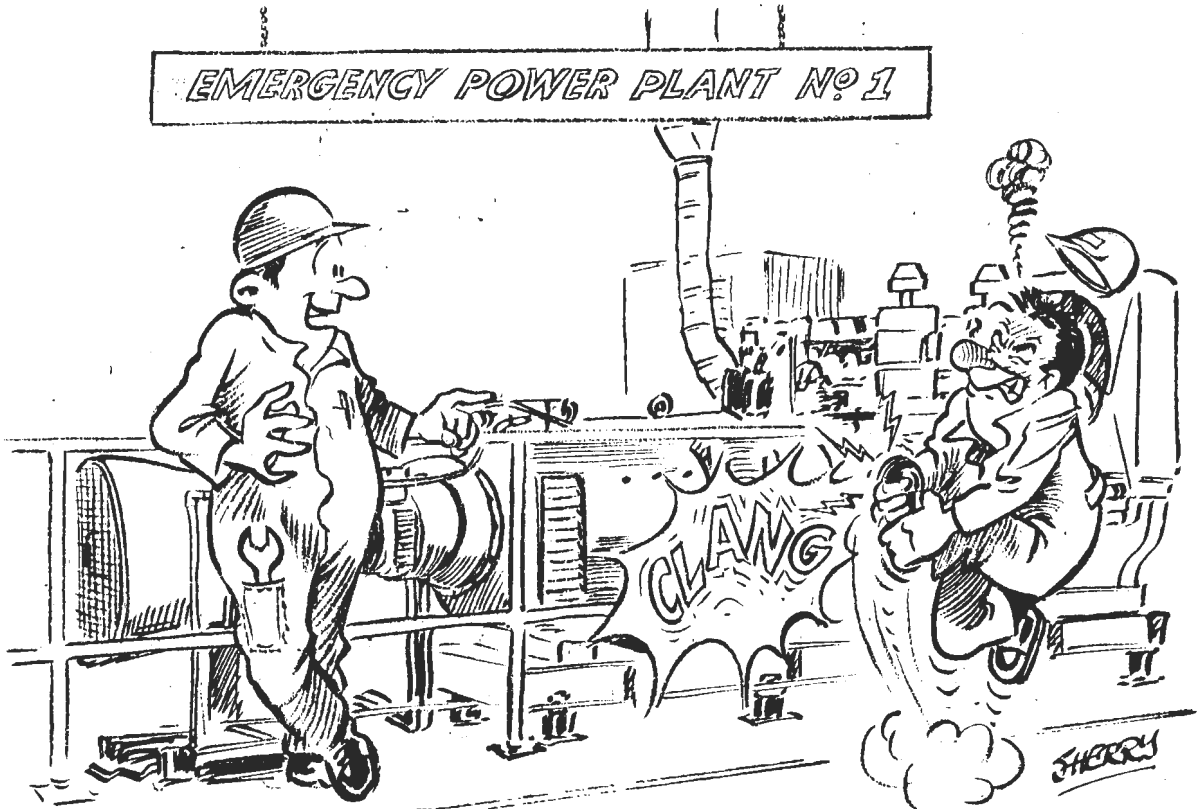
The eventual outcome of this work will be to produce a comprehensive set of documents on issue to all functional centres and work groups. These documents will be controlled, that is, individually accounted for in a master list and subject to periodic update. Localised copying will be illegal, but any need for additional copies will be readily serviced from the central distribution point.

The documents in their fully assembled form will be known as the Broadcasting Quality System, and will be arranged in a tiered format. At the top of the tier will be the Quality Manual, which will set out the quality policies, quality objectives and philosophy, the general quality system, the organisational structure and responsibility levels. The next tier will comprise the Quality procedures' manuals that will be a collection of the Process Descriptions appropriate to that work group, detailing the purpose and scope of the nominated processes and identifies who does what, how, when, where and why.

The lowest tier will be the set of instructions that relate to specific services or equipment and provide an operator with sufficient information to perform the task to a required standard. These are titled "Reference Documents" which do not come under the discipline of the controlled document system. They will comprise such existing documentation as Site Safe Working Practices, Site Radiation Folders, Manufacturer's Equipment Handbooks, Regulations, Codes of Practice, Telecom Technical Publications and other similar publications.

Comprehensive staff training in the form of induction into Quality Practices is planned for later in 1993. The training will introduce Broadcasting staff to the fundamental cultural change required in work practices to ensure Quality success. Once the documentation is in place the real task of putting the principles into practice will begin.

BRIAN HEY



HF TRANSMITTER

MARCONI 500 KW HF BROADCASTING TRANSMITTER

As a former Broadcaster who worked on the rehabilitation of Radio Australia, Cox Peninsula and currently a Department of Defence employee on posting to Marconi Radar and Control Overseas (Ltd) in the United Kingdom, I am sure readers of *The Broadcaster* would be interested to know something of the Marconi 500 kW HF transmitter type B6128. The transmitter is a Pulse Width Modulated type having an inherently high efficiency. Many factors affect the actual efficiency of a HF transmitter. The component losses in the transmitter, especially in the final RF stage will vary across the band of frequencies used and alter yet again,when replacement valves are fitted. Probably the biggest influence on the basic efficiency of a given installation is that of the ambient temperature range at the transmitter site. This will in turn determine the size of the associated heat exchanger and therefore the power consumption associated with it. The radio frequency stages of the transmitter are based on a concept which has been born as a result of over four decades of high power short wave transmitter design.This concept is based on high power RF contacts which:

- Do not move on power
- Are water cooled on both sides of the contact
- Are held together under pressure.

The efficient form of modulation employed with the transmitter depends upon a switched modulator. The switching rate is high compared with the maximum audio frequencies involved and the duration of the 'on' periods is varied in sympathy with the amplitude of the incoming audio so that a high amplitude produces long 'on' periods. A modulator of this type can be used in series (with a low-pass filter to convert the pulsed waveform to a varying DC) with the HT supply to the final RF amplifier. Since the losses in the modulator are low in both the 'on' and 'off' state, the pulse width modulator reaches a very high level of efficiency.

In 1980, the Marconi Company patented a unique system of pulse width modulation (PWM) and gave it the name PULSAM. The heart of the pulsam system is the low-loss, low-capacity grid-deck on which is mounted the final modulator valve. This grid-deck is the main component in the ADVANCED PULSAM system used in the transmitter. The Advanced Pulsam Modulator utilises a single valve whose size and cost is smaller than any other PWM series modulator of comparable output.PWM signals are created in an encoder and fed to the grid-deck via fibre optic links. The radio frequency output stage uses a tetrode which, although physically small, has an anode dissipation rating far in excess of that required when the stage is fully modulated. This is achieved by 'Hypervapotron' cooling the anode. Dissipation per unit area of the grids can also be much higher than for conventional valves by using pyrolytic graphite grids. These are formed by oriented graphite and provide an unusually high heat transfer to the support structure. Mechanically, the grids are robust, improving their strength as the grids warm up. Their secondary emission is lower than that of wire grids and the relatively lower working temperature reduces primary emission due to deposition of the cathode material. The tuning inductors are of novel construction and are formed from lengths of straight copper tubing folded into an ideal mechanical arrangement for each circuit. The fixed contacts of the off-load switches appear on one face of the folded inductor. The inductor section beyond the fold is only active for the lowest frequency range.

RON FALKENBERG.

Marconi 500 kW transmitter B6128 (Courtesy The Marconi Co Ltd)

OUR BROADCASTING PIONEERS

MR W E (BILL) BEARD

Bill Beard received his secondary education at Melbourne High School at which time he took up radio as a hobby, haunting second-hand shops for components and building radio receivers insofar as his limited means would allow. He won a Free Place to Melbourne University where he studied electrical engineering,graduating in 1947 with a BEE Degree.

Bill entered the PMG's Department Research Laboratories in December 1946 where he worked on many

Bill Beard

interesting projects including Primary Frequency Standards for the Australian Time Service, UHF radio propagation measurements, radio telephone services across Bass Strait, ionospheric and tropospheric scatter research and others.

In 1961, just as plans were approved to expand National and Commercial television services into regional areas,he transferred to the then Radio Section to head a Division to participate in the works program. The Division assumed responsibilities for the specification, design analysis and procurement of the antennas, towers and masts, and cable systems for some 33 high power television stations established over about 5 years in the early-mid 1960's.

Later, the Division was requested to take on board technical responsibilities for the design and procurement of HF antenna systems for the Radio Australia Booster Station being established in Darwin. Log-periodic antennas were chosen. Thus began a saga-the original design supplied by the contractor proved inadequate and involved his team in the urgent development of a then original computer model to establish the design parameters for a modified antenna system. He maintains that the successful development of the computer model and its application,was at the time,the finest piece of radio design engineering hitherto undertaken in the Section,and he pays full tribute to his colleagues Don Rodoni and Lionel Parker for their inspired efforts.

All during this time, he was concerned that the APO HQ technical activity for the NBS was spread over three Sections according to the then fashionable philosophy-the functions of design, plant procurement and service operations for all radio services being separated with inadequate inter-Sectional technical co-ordination for the NBS. At the time, the Radio Branch's historical function to establish and operate the NBS technical facilities had been diluted by the transfer of all studio engineering to the ABC and the deflection of resources and top management attention towards the rapid expansion of the microwave trunk radio bearer network. So gradually, he began to assume Head Office technical responsibility for, firstly all Radio Australia transmitting facilities and functions, then by degrees, the MF transmitting network. And so 1970, saw him responsible for all the HQ technical functions relating to the NBS and NTS transmitting services. Eventually, in 1973, the de facto situation was formally regularised by the establishment of the HQ Broadcasting Branch with him as its first Supervising Engineer. This was a start in the right direction but suggestions at the time to go further-to set up the National Broadcasting function as a self contained business within the great Australian Post Office were refused. This had to wait for a later time. The Branch has now evolved into the present Telecom Broadcasting organisation.

In 1976, Bill left Telecom to take up the position of Director of Engineering in the ABCB. Here he directed broadcasting system and station technical planning, the setting of technical standards and technical regulation of all domestic broadcasting services.Also, in response to ITU plans,and after appropriate negotiations with the New Zealand authorities,he directed the co-ordination of changes to the MF broadcasting channelling plan from the 10 kHz spacing to the present 9 kHz spacing. Nearly all Australian stations changed on the one day, to an internationally set timetable.

The Control Board was abolished at the end of 1976, after which its technical responsibilities were assumed by the then Department of Communications. Bill remained in charge of the Broadcasting Division. This period saw the beginnings of Public Broadcasting services, the introduction of Commercial FM broadcasting and the establishment of the Government Task Force to enquire into the possibilities of a National Communications Satellite service. He was appointed the Department's representative to the Task Force. As such, he prepared and presented the Department's submission on the status of the broadcasting and television service and the potentialities offered by a communications satellite to extend and improve broadcast coverage.

Bill's last major assignments before retirement in March 1982 were to appear before the Parliamentary Public Works Committee to defend the re-establishment of the Radio Australia station at Darwin, and to lead the Australian delegation to the 1980 CCIR Study Group meetings in Geneva.

JACK ROSS.

PARLIAMENT HOUSE

THE SOUND AND VISION OFFICE

Plans for the building of the new Parliament House, Canberra were set in train on 26 August 1975 with the formation of the Joint Standing Committee on the New and Permanent Parliament House.

The opening of the new building was set for 1988 to coincide with Australia's bicentennial celebration of European settlement, leaving just eight years to design and erect the complex building.

The original cost estimate in 1978 for the bare building was $220 million. The final cost including fitting out expenditure exceeded $1000 million at 1988 rates.

The Department of the Parliamentary Reporting Staff's 'Sound and Vision Office' (SAVO) may not ring many bells,but the service it provides certainly should.SAVO is Federal Parliament's own production house providing the nation with a comprehensive radio and television coverage of Parliament. Around 4000 hours of broadcasting, ranging from Royal and Presidential visits to prime ministerial statements is disseminated from the office annually, making SAVO one of the largest television/radio studio complexes in Australia.

The Office is responsible for the planning, operation, repair, maintenance and installation of sound and vision equipment located within Parliament House, Canberra. Staff engaged in the service cover a number of disciplines. As well as staff involved in repair, maintenance, installation and commissioning of the technical equipment and facilities, there are staff engaged in equipment operation in a production operations environment. The operational team is responsible for production of radio and television production activities in alive to air and pre-record environment and also the production of high quality audio recordings of events involving the use of multi channel recorders and mixers etc.

The origins of the office date back to 1984 when the Australian Broadcasting Corporation was awarded the challenging task of designing a broadcasting complex exclusively for the New Parliament House. Their brief, governed by technical complications and Parliamentary restrictions, was to develop a facility that would provide continuous broadcast quality radio and television coverage of both Houses of the Federal Parliament, and support 22 other major communications systems.

Four years and $50 million later, the English Vinten company in conjunction with several other broadcast engineering companies including Bosch, Hitachi and Grass Valley, had devised and implemented a highly involved broadcasting infrastructure based around a revolutionary remote controlled broadcasting system.

This ultra modern facility is activated by an audio operator the moment that a Senator or Member with the call, stands to speak. Using a mimic panel, the operator opens that speakers individual microphone which triggers two of the eight cameras, mounted on remote controlled heads in the chamber walls, to a predetermined shot of the Senator or Member.The Microsoft computer which co-ordinate the system also ensures that the corresponding graphic is recalled automatically. Vision operators in an adjacent control room then make minor framing adjustments using a joystick, before switching the vision to air.

Using this method,SAV0 currently produces around 1800 hours of television annually, with 1150 hours being dedicat-

HOUSE of REPRESENTATIVES, Vision Control Room
(Vinten Remote Camera Pan and Tilt Head Joysticks in Foreground)

ed to chamber proceedings. The balance can be attributed to the broadcasting of Parliamentary Committees, press conferences and other special events using a combination of the automated Vinten Microsoft system and manned cameras. Each of the nineteen committee rooms is equipped with its own microphones, mixing desk and sound reinforcement system. This enables broadcast and/or Hansard only recordings to be made of committee hearings. In addition, each committee room is also equipped with the infrastructure to allow the rapid installation of television cameras when required.

Most of the television material produced is used exclusively for the inhouse monitoring service, although the national networks are authorised to link into the system and may rebroadcast most proceeding

Understandably, Question Time has tended to generate the most interest with alternate chambers broadcast live across Australia on the ABC with a replay of the other chamber late at night. In addition, major prime ministerial statements and special events are also often broadcast in full by networks and include occasions such as Budget speeches and replies, Presidential and Royal visits and the 1991 Premier's Conference.

The audio arm of SAVO's operation is governed by slightly different broadcasting guidelines. Of the 2000 hours of chamber and committee proceedings and press conferences broadcast annually, around 630 hours are transmitted across the nation via the Parliamentary Broadcast network comprising 2PB Sydney, 630 kHz; 2PB Newcastle, 1458 kHz; 2PB Canberra, 1440 kHz; 3PB Melbourne, 1593 kHz; 4PB Brisbane, 936 kHz; 5PB Adelaide, 1539 kHz; 6PB Perth, 585 kHz and 7PB Hobart 729 kHz. This service is coordinated from SAVO's radio studio complex which is fully equipped with a 24 track audio mixing console, AMS 'audiofile' digital editing system, DAT editing system, broadcast 'Cart' facilities, professional 1/4 inch record/replay facility, CD replay facilities and various audio processing units.

Details of the original sound broadcast facilities installed in the Old Parliament House in 1946 were outlined in the November 1992 issue of *The Broadcaster*.Designers of the New Parliament House facilities were able to take advantage of the many years of experience obtained in broadcasting and recording parliamentary proceedings.

Archiving the proceedings in the House of Representatives and the Senate is a major requirement of the Office. Thousands of 2 1/2 hour tapes have been recorded and stored.

In addition to radio and television coverage, SAVO also provides support for a number of other vital communication systems within Parliament House. These include a House Monitoring System with the capacity for 49 television and 33 radio channels, a teletext service, a CCTV security camera network, a theatrette fully equipped with 35 mm and 16 mm cine projectors and a Talaria video projector, language translation facilities, a pocket paging system and a new system to assist the hearing impaired using a combination of FM transmitters and induction fields.

The operation is technically complex, but far from being complacent, SAVO is constantly striving to ensure that new and innovative services are provided. It is this commitment that not only guarantees House Monitoring services are provided to the Parliament but that broadcast quality coverage of events what help shape our nation are provided to the public.

BRUCE SHARP

Sony BVE910 based Videotape Editing Suite

BROADCASTING IN YE OLDE APPLE ISLE

My experience in broadcasting in Tasmania, includes 26 years with Commercial station 7HT and 21 years with ABC-TV and it is interesting to look back on the facilities available a half a century or more ago, and recall names of people who built and operated them. I graduated from the Melbourne Technical College's Radio Technology Course in December 1936,and immediately set about looking for a job in my chosen field.

I met Gil Miles who worked at 3AW and learned that he was about to establish a new station to be called 7HT in Hobart. I had already decided to move to Tasmania,and when Gil offered me a job as a Technician on the project,I was ecstatic to say the least. On my way to Hobart, I called in at Launceston and found there were two stations operating in the area. One was 7NT,the ABC Northern Regional and the other was Commercial station 7LA where Val Sydes operated a 500 watt AWA transmitter from his home at Prospect Hill, about 4 km from the Post Office.

Arriving in Hobart, I found the city to be a charming backwater compared with Melbourne and struggling to come out of the effects of the years of the Depression. A few cars, horse drawn carriages and double decker trams were evident.Local radio stations comprised National station 7ZL and Commercial station 7HO.

The 7ZL transmitter was on a hill referred to locally as 'Keens Curry' because of painted white rocks which spelt out the words. My first visit was somewhat of a cultural shock as I gazed at a breadboard layout of what surely must have been the rediscovered ruins of Noah's Ark. Wilf Jarrett was my guide. In the following 56 years it has been a great pleasure to witness the evolution of the 7ZL dinosaur to the current solid state facility.

A few days later, I visited station 7HO in Findlay's Building, Elizabeth Street. The second floor of the building housed the studios and control/transmitter room with the aerial supported by twin masts and the counterpoise earth system being located on the roof. The 100 watt transmitter was locally built by Chief Engineer Bill Nicholas and Consultant Rudolph Buring. The transmitter featured a TB2/250 valve as linear amplifier and two TB2/250 valves in push-pull final stage producing the 100 watts to the aerial.

When Gil Miles arrived in Hobart,our first task was to install the studio on the second floor of Clebourne House in Murray Street. The studio technical facilities were announcer-operated as at that time there was no control room,and level adjustments had to be carried out at the transmitter. The facilities included twin Garrard 78 RPM turntables, twin 33 1/3 RPM turntables, an RCA ribbon microphone for the announcer and a GR microphone on a stand for interviews. Other types were subsequently purchased.

The transmitter arrived just before completion of the studio work. It was manufactured by Transmission Equipment Pty Ltd of Melbourne, a business owned by Ted Ashwin and Rudolph Buring from Hobart. It was the first transmitter to come off production and although it proved reliable and gave many years of good service,its finish left much to be desired. Their second transmitter was supplied for installation at National station 7ZR a year later and was beautifully finished.

The transmitter was sited at Rosny Hill on the eastern shore of the Derwent River and a rough track was made to the top of the hill to haul up the wooden shack and the equipment.

The twin bay transmitter employed Philips valves throughout with the line up being PEO5/15 crystal oscillator, PEO5/15 buffer, TCl/75 RF driver, twin TC2/250 in push-pull final amplifier, twin TC1/75 in push-pull audio driver, twin TC2/250 in push-pull modulator, a pair of 866A rectifiers for RF and audio driver power supplies and three DCG2/lO00 rectifiers for final amplifier and modulator power supplies. The initial power into the aerial was 250 watts but was increased to 500 watts one year later. The station building comprised four rooms in a wooden shack comprising transmitter room, bedroom, kitchen/shower room and a store-room/ workshop. The bedroom included a twin speed turntable and pick-up, a collection of records and a Reiss microphone for emergency purposes.

The aerial system was a quarter wave vertical radiator-suspended between two 36.5 m masts and fed via a 600 ohm open wire transmission line. About 16 copper radials from a 1.6 m copper plate provided the earth mat. The whole site was bounded by a 1.2 m high stone fence topped with barbed wire constructed by a group of unemployed men.

Station 7HT commenced transmission officially on l9 April l937 with the transmitter being staffed by Gil Miles and Norm Stone who also undertook outside broadcast and other duties.

During this period,7HT began to claim a large share of the listening audience so rival station 7HO prepared to meet the opposition.

In late 1937, 7H0 moved from their city based transmission site to the top of Mount Nelson. Chief Engineer Bill Nicholas rebuilt the original transmitter to produce 500 watts into a vertical wire quarter wave radiator suspended between two masts.

In 1941, Gil Miles left 7HT for work with CSIRO on a cloud seeding project and Bill Nicholas transferred from 7H0 to 7HT as Chief Engineer John Dodds became Chief Engineer of 7H0.

With the Second World War in progress,it became difficult to obtain Philips valves and Bill Nicholas changed the transmitter format to use 810 and 807 types in lieu. He had previously undertaken similar work at 7HO.

The 7HT studios were moved from the original Murray Street site to McCann's Building Corner Elizabeth and Melville Streets. This was a great improvement in that the studio equipment was now located over two floors and included a large theatre on the ground floor for live shows. It was a very busy period and built much good will with the local community.

About 1951, Bill Nicholas and Dave Hildyard left to form, together with Ron Hope and John Dodds, Commonwealth Electronics at Derwent Park Munitions Annexe.

Bruce Klein from the PMG's Department took up the Chief Engineer's baton. During his reign,a number of changes took place including the establishment of a new remotely controlled transmitting station at Droughty Point to replace the Rosny Hill facilities. The new transmitter was an AWA 2 kW model and fed a quarter wave lattice steel radiator.

In 1962, I left 7HT after an association of 26 years and joined the Production Facilities Department of the ABC-TV where I worked until retirement.

NORM STONE.

RECORDING OF BIRD SOUNDS

The technique of recording bird sounds goes back to the last century well before the development of today's high fidelity portable recording equipment.

One of the earliest known recordings,was of the song of a cage bird, an Indian Shama,cut on a wax cylinder of an Edison Phonograph by a youth in Germany in 1889.

The advent of Emile Berliners Gramophone,and the mass production of discs or records in 1900, opened up an avenue for commercialisation of wildlife sound recording.

The first commercial disc of the song of a bird was issued by HMV in England in 1910. It was a single sided 80 RPM disc 10 inch in diameter. It was a recording of a captive nightingale. One of the first Australian recordings was 'The Song of the Lyre Bird' made in 1931 on a 10 inch 78 RPM disc. It was still available in record shops 30 years later.

Vic LePla in the field with parabolic microphone and recording equipment

The nucleus of an Australian collection of bird sounds was formed in 1962 in the sound laboratory of the Division of Wildlife Research of the CSIRO.It began as a by product of the Division's research interests in vocal behaviour in birds, but it was rapidly augmented by numerous donations of recorded calls by ornithologists throughout Australia. At the International Ornithological Congress held in Canberra in 1974, members were able to listen to some 323 species in the Australian National University's language laboratory. The collection consisted of fourteen reels on which the birds were introduced by number and scientific name. For each species,the duration of each cut was given accompanied by brief notes including location where the sound was recorded, date and name of recordist.

Today, there are also many substantial private collections of recorded bird sounds.

The path of the wildlife sound recordist leads to many interesting places, including tranquil rain forests, mountainous country and open forests. It is often arduous,and requires travelling hundreds of kilometres to find the 750 species of Australian birds. If high fidelity reproduction of bird calls is required,the choice of equipment is most important. Professional grade equipment is preferred but can be very expensive for the average enthusiast. Before embarking on a recording session the recordist should have some knowledge of particular birds, their habits and habitats.This information can be readily obtained from the many excellent bird books that are now available. The preferred recording equipment consists of low distortion low noise types using reel-to-reel tapes. Such machines include NAGRA, STELLAVOX, SONY model 510 and TANDBERG.

A variety of good quality microphones is required to cater for different location conditions. One of the most useful is the parabolic microphone which consists of a dynamic microphone facing into a parabolic dish. This is a very directional unit with a narrow acceptance angle. However, to obtain a wide frequency response, the diameter of the dish must be very large for the low frequencies and the diameter of the microphone must be small for the high frequencies.

Because most bird calls occupy the middle and upper frequencies of the audible spectrum,a small diameter dish is very satisfactory by producing a natural roll-off of the lower frequencies, thus eliminating a considerable amount of unwanted noise without affecting the frequency range of the call. The dish should be made from non resonant material such as fibre glass or plastic and the back of the dish covered with a sound absorbent material such as plastic foam to prevent sound entering from the rear.

It is not possible to get close to some bird species without disturbing them. In this case, a suitable radio microphone may be set up close to the bird's habitat and the recording made some distance away.The best recordings are made close to or at ground level. Birds that frequent the higher branches of trees are usually the most difficult to record due to the higher background noise created by wind in the canopy of the forests. In addition to field recording equipment, post recording equipment is required for the editing and transfer of tapes. For best results this should include a Real-time Spectrum Analyser and Graphic Equaliser so that frequencies outside the range of a particular call can be filtered out.

The use of automatic level controls and limiters is not recommended because they tend to reduce the dynamic range and increase background noise. The secret to good recording is to place the microphone as close as possible to the source of sound and adjust the recording level accordingly.

Bird calls I have recorded over a period of many years are currently being broadcast by the ABC over the 2KP Kempsey and 2TR Taree transmitters on the mid north coast of New South Wales from the ABC Kempsey studios. These bird call segments have been a feature of Saturday morning programs for the past two years.

VIC LePLA

POWER PLANT

SHEPPARTON-EMERGENCY POWER PLANT CLOSES

In May 1943, PMG's Department staff witnessed the first historic broadcast from the new Australian high power transmitting station located at Shepparton in Victoria. The construction and operation of the station during war time had been the result of a tremendous effort by Departmental, AWA and STC staff. Australian built 100 kW HF transmitters and high gain slewable antenna arrays provided many challenges for those involved with the design, installation and commissioning.

A very important part of the new station was the provision of a reliable electrical supply. This included the commissioning and operation of large heavy diesel emergency engine generating plant.

Primary electrical power was supplied from the State Electricity Commission grid at 66 kV, and stepped down to 6.6 kV within an on site Zone Substation. Distribution was via a large paper insulated lead covered oil filled cable to the transmitter building main Oil Circuit Breaker (OCB). Transmitter supply was then via individual 6.6 kV OCB's. In 1942/3 the new installation was seen as one of the larger industrial electrical installations in country Victoria.

Emergency supply for the two water cooled 100 kW and one 50 kW transmitters came from two PCT/6 six cylinder Crossley heavy engines operating as a synchronised pair and fitted with 6.6 kV/400 kW Brush alternators. Total power output from both sets was 800 kW which was ample to supply the three transmitters and ancilliaries under full transmitter modulation conditions.

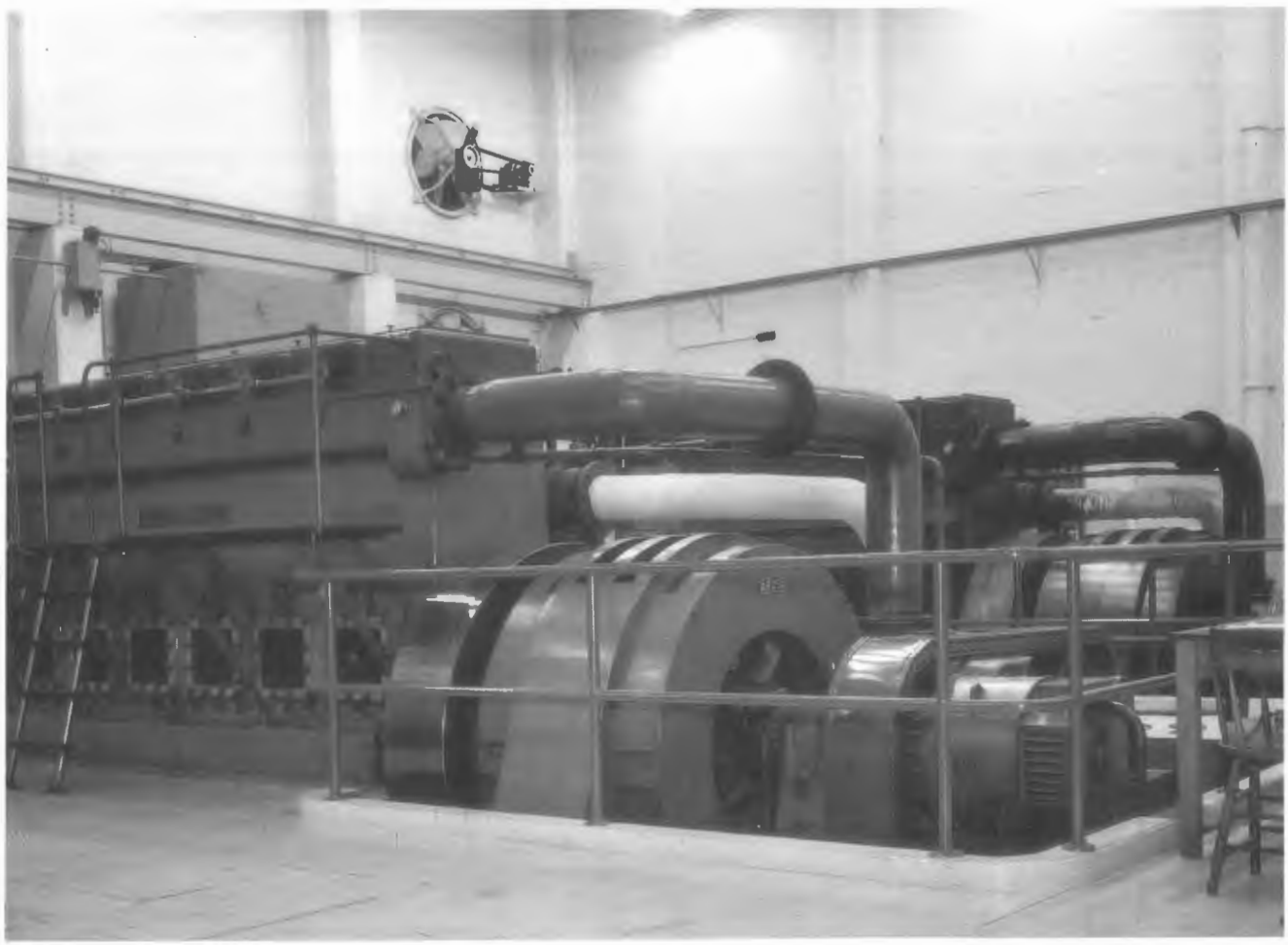
Those who have a place in their heart for heavy machinery will be keen to know that each engine was rated at 800 HP at a speed of 375 RPM and used heavy residual fuel oil at the rate of 28 GPH when operating on full load.Both engines were fitted with a Roots blower to improve engine aspiration and a 6 ton fly wheel to improve regulation under heavy transmitter modulation.

In recent years, the Shepparton EPP had started to show signs of age. Water pumps, cooling towers, circuit breakers, internal wiring and engine cooling were the source of many problems. An engineering review of the total plant and ancillaries confirmed major deterioration. After 49 years service, the difficult decision was taken. The heavy diesel EPP was closed down.

Richard (Dick) Cox operated the plant up until 1955 when his assistant Brian Bingham took on the job. Brian retired in 1986, and Keith Dahlberg took over the helm of what is now known as Broadcasting Engineering Services. Keith commenced work at Shepparton in 1960 and was previously employed at the Victorian SEC. Keith retired in January after 32 years of service at Shepparton. He lovingly nursed the old EPP along in its final years of service.

The days of low speed heavy engine plant as the motive force for the generation of emergency power have now gone. However, the low frequency thump of the old EPP will be missed by both electrical and technical staff. The old Crossley sets provided nearly 50 years of sterling service and a link with the golden years of radio. They will be fondly remembered and talked about for years to come when old radio buffs get together.

BRUCE WILSON

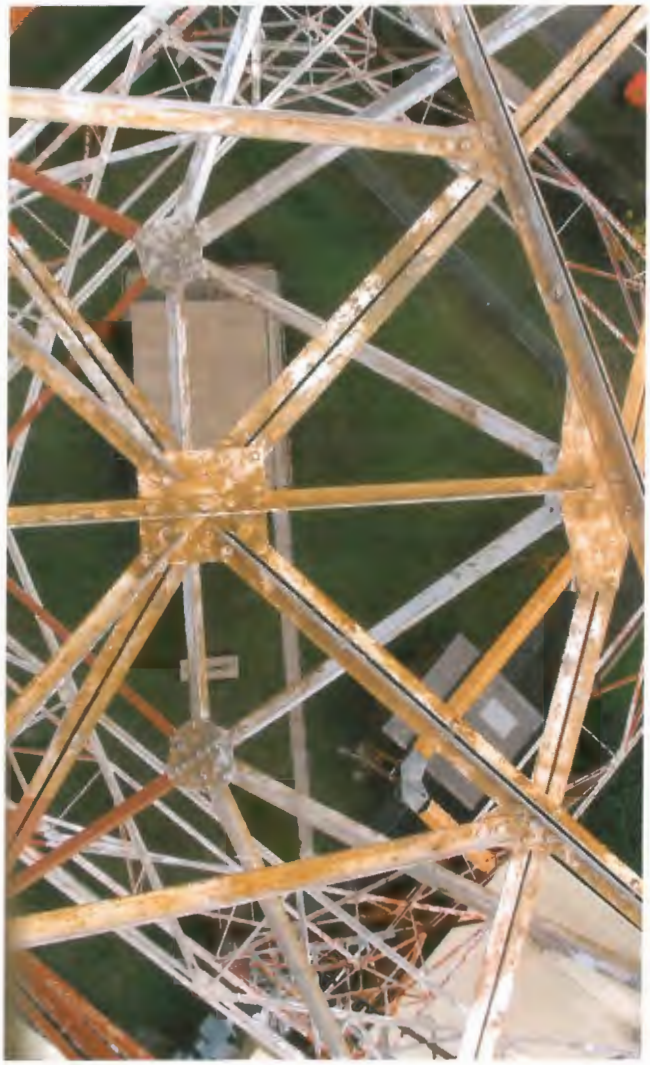


The two original Crossley engine sets coupled to Brush alternators

GORE HILL TOWER- UPGRADING AND MAINTENANCE

The Gore Hill tower was designed, fabricated and installed in the Sydney suburb of Gore Hill by the British Institute Calender Company as the main support structure for ABC television broadcast service ABN2. The service commenced on 5 November 1956 in time for the Olympic Games held in Melbourne during that year.

The tower originally supported an eight stack Marconi designed and manufactured Supergain antenna type BD773B and associated rigid copper line feeders, complete with necessary expansion joints to allow for change in



Typical corrosion on members. The rate at which a zinc coating weathers away varies primarily with the degree of corrosivenes of the atmosphere.

lengths of the rigid feeders between winter and summer temperatures. Today, the tower supports not only Channel 2 television,but also SBS UHF, FM radio and miscellaneous antennas. It is 152 m high and is constructed from bolted hot dipped galvanised steel angle members.

In common with the practice at the time, the tower was initially painted in red and white colours primarily for aircraft warning purposes. It was repainted in 1975 after the paint had badly deteriorated.

As no comprehensive maintenance work has been undertaken on the tower since that time,it is now exhibiting signs of corrosion that range from mild loss of galvanising to isolated , severe loss of ferrous material.

The west face of the tower is more severely affected,probably due to prevailing westerly winds carrying the acidic effects of suburban industrial pollution.

The National Transmission Agency embarked on a program of restitution of the tower and antenna system to provide a relatively maintenance free life of at least 15 years with Telecom Broadcasting being contracted to undertake the replacement of the major antenna systems on the structure as well as the refurbishment of the tower above R.L. 102.1 metre height.

Below this level,there are some localised areas of advanced corrosion with loss of structural steel that is becoming significant and require immediate attention. This refurbishment work is to be undertaken by subcontract through the Australian Construction Services. The economic benefits of replacing or restoring corroded members is

Corrosion at the base of the cylindrical column at the top of the structure.

dependent largely on the labour time involved in thoroughly undertaking each exercise. The structural capacity of tower members in the antenna column area is presently not affected by the corrosion severity.

The primary tower structural members between 102 m and 132.9 m are to be cleaned back to remove corrosion products and painted with a dual pack epoxy paint finish.

In order to maximise the durability of the new paint system,it is essential to thoroughly clean the steel surfaces of corrosion products Where possible, a power wire brush or similar is preferred to the hand effort in areas of significant corrosion.

In order to safely undertake the work, a shrouded external descending work platform was designed to enable workers to have free access to the tower face and protect the public/environment below from fallen debris or spillage. From site reports, the system appears to have worked well.

BRUCE COOK.

AERIALS

40 YEARS OF AERIAL MEASURING EQUIPMENT.

My first MF aerial measurement was made in 1947 at 4QL Longreach, and my last at Bald Hills in 1987 on a standby radiator. Over this 40 year period, several different impedance measuring devices have been used for NBS aerial work.

The model in use at the time of the 4QL installation was known simply as the 'aerial impedance meter'.It had been designed many years previously in the PMG's Department Research Laboratories. It was basically a valve operated oscillator and detector, comparing the aerial with an adjustable internal LCR network. The instrument gave very good R values but only an approximate indication of reactance.

If an ACU happened to be in a tuning hut several metres above the earth mat , unbalanced devices measuring aerial impedances gave various readings, depending on equipment type. So, to obtain a reading nearer the 'truth', the added resistance method was employed.A transportable 50 watt oscillator was very loosely coupled to the aerial, and a variable resistor inserted in series with the aerial current meter. This resistor was increased from zero ohms until the indicated aerial current was reduced to 50%. The value of the R required for this was then equal to the aerial R component at that point.This method gave no indication of aerial reactance and relied on the coupling being held constant as the resistance was added. Loose coupling and small current was required, hence the high power test oscillator

Next followed a General Radio series reading bridge with a battery operated GR oscillator and a communications receiver. This gave reliable R and X readings. A smaller MF receiver using 1.4 volt valves was built locally. It was enclosed in a screened box and contained an RF stage, BFO and headphones. It gave the operator full information as to what was coming out of the bridge.

Parallel bridges came next. Muirhead and Wayne Kerr were typical of those in use. Some operators loved them but others preferred the series answers of the GR bridge,thus saving the irritating parallel to series conversions. Very rarely did one need to know the parallel Z at the aerial meter.

In time, the old GR bridge was replaced with a newer model, the type 1606. It was user friendly with the accuracy and precision of adjustment which was the hallmark of GR equipment.

When 24 hour station operation became common place, it became difficult to make an aerial measurement without interference and a useful device called the 01B by Delta and known as an 'Inline Bridge' became available. This was inserted in series with the aerial and transmitter power applied. A newer instrument, the Delta RG4 has given good service as a combined oscillator and receiver used in conjunction with a bridge. It features key pad frequency selection and a synchronous receiver to ignore other signals. It has visual and audible indication of bridge output.

Recent attempts to use a state-of-the-art network analyser, like Hewlett Packard 8753,encountered the same problems as were met when trying to use a vector Z meter, Our old enemies - myriads of stations always on the air. So it seems the old reliable series or parallel bridges are still the most useful tools for aerial work.

DOUG SANDERSON.

CARNARVON

FROM SPAN TO TV

Today, Broadcasters associate the site at Brown Range near Carnarvon in Western Australia as the centre of one of Radio Australia's high power transmitting stations. However, it also accommodates television transmitters for ABC and GWN services for the local area.

The site was originally developed as one of a number of centres in Australia associated with space flight programs conducted by NASA of the USA. Many buildings and a range of facilities were accommodated on the site and included telemetry and control, radar installation, self-contained scientific satellite tracking equipment, command and voice communications, solar proton alert network observation equipment and electric power generation.

The building which later became the TV building after the space activities had ceased on site during 1975, originally accommodated the Solar Proton Alert Network (SPAN). It was one of three stations around the world at the time, provided to monitor solar disturbances.

Large flares on the surface of the sun can affect the earth by disturbing long distance high frequency radio-communications and also,by emitting radiation which is a potential hazard to astronauts. The radiation includes gamma, ultra-violet, infra-red, visible, x-ray, and some times,photon radiation as well as radio waves. Some of the solar radiation hits earth and is absorbed in the upper atmosphere

Flares begin rapidly with explosive velocities and may last up to five hours. They arrive in the earth's vicinity about one to two hours after the onset of a flare. The main equipment used for SPAN was an Optical Telescope and a Radio Telescope.The Optical Telescope was situated in a dome on the top of the building. It included TV camera and a 35 mm camera which automatically photographed the sun every 30 seconds. The telescope followed the sun automatically.

The Radio Telescope was located under a white Radome alongside the building. It tracked the sun and measured the intensity of three different frequencies of solar radio emission.

Television for the residents of Carnarvon was provided by ABCNW7 on 30 June 1972 using a transmitter located in the local telephone exchange. The transmitter comprised a Rohde and Schwarz modualtor/ exciter feeding an Elit 50 watt power amplifier. An omnidirectional aerial was located atop a 35 m tower adjacent to the exchange. This arrangement provided a good service to the township but reception in the outlying plantation areas was marginal.

By 1985, a new exchange building was planned some distance from the existing tower which by this time was severly corroded. During planning for the establishment of a regional Commercial television service, it was decided to relocate the ABC transmitter and co-site both services at the Radio Australia site at Brown Range.

A directional aerial with one panel facing towards the town and one towards the plantation area was erected at the 95 m level on tower one of the Radio Australia HF array. A suitable transmitter building existed in the form of the ex NASA SPAN building. This building was refurbished during October 1986. The ABCNW7 transmitter was relocated and transmission of both ABC and GWN services commenced from the site. The ABCNW7 transmitter was subsequently upgraded to 100 watts when a NEC TBV1220 series replaced the original unit in May 1988.

LES FANCOTE

L to R. NTA dish, GWN dish, SPAN building with old Optical Telescope pedestal on roof, tower No 1 Radio Australia aerial system.

FOURMASTER

MF DIRECTIONAL AERIAL USING FOUR MASTS

It has been long recognised that Metropolitan Melbourne is not an easy service area to cover on the medium wave broadcast band. Escalating levels of man made electrical noise make reception impossible in many locations. The fact that Melbourne Commercial stations, with the exception of 3UZ, are all located towards the high frequency end of the MF band, does not help either.From time to time, Melbourne AM licensees have banded together in an attempt to address the issue.

In 1991, when AWA Media purchased the licence and hardware of 3XY Pty Ltd which was in liquidation, it did so on the understanding that it would be allowed to close the station down for a period, and relaunch it as 3EE operating on 693 kHz, one of the last available low frequency channels on the MF band for Melbourne. It was no easy task to find a suitable site from which to cover the Melbourne service area and provide the required protection for 4KQ Brisbane at 37 degrees; a group of planned New Zealand stations at Dunedin, East Bay of Plenty and Palmerstone North at 100 degrees; 5SY Streaky Bay at 298 degrees -all on the same frequency-and adjacent channel protection for 2BL Sydney on 702 kHz at 55 degrees, as well as limiting field strength to 3.0 mv/m in Geelong at 205 degrees.

After exhaustive investigations into possible sites at which to locate the station, Don Macdonald of AWA Research Laboratories prepared a report in June 1991 in which he concluded that the most suitable site for a station to serve Melbourne and operating on 639 kHz would be in a triangle between Werribee, Derrimut /Stephens Roads running generally north from there, the Western Freeway east of Rockbank and the Princes Highway.

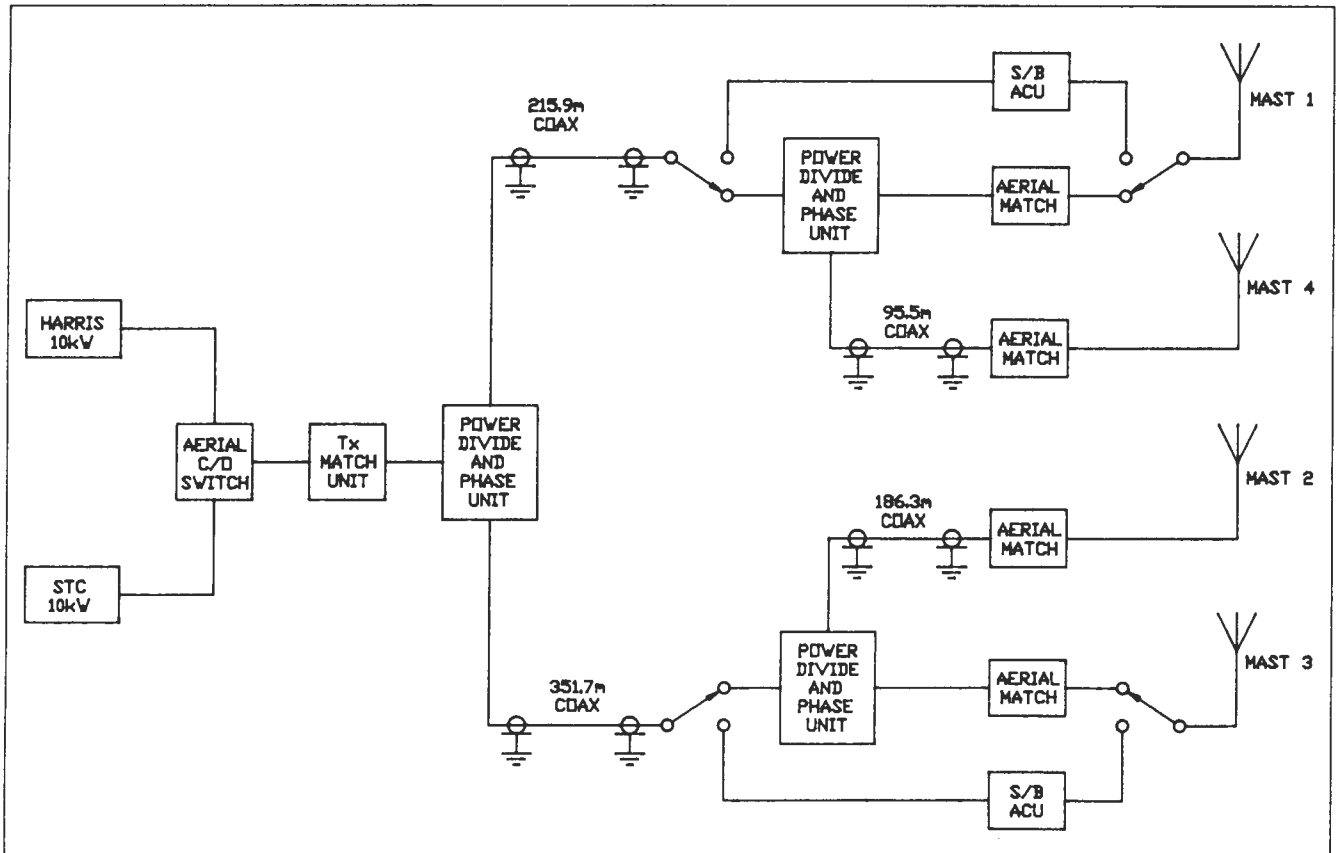
His studies indicated that a two element array was unlikely to be more than minimally satisfactory to meet the directional characteristic criteria and that a separate study be undertaken in order to determine a satisfactory array of more than two masts for use at the recommended site.

David Morris of AWA Defence was commissioned to carry out the study and he concluded that a four element array was required to achieve the required results.

Significant delays were experienced during the process of re-establishing the old 3XY as the new 3EE. Since early 1991, 3XY had been operating on 2000 watts on a temporary aerial installation from a site in Altona. Commercial power was provided by two portable diesel generators. In September 1991, The Australian Broadcasting Tribunal approved the closing down of 3XY with the proviso that AWA Media would aim to re-open the station as 3EE on 693 kHz by 1 February 1992. Local objections to the proposed aerial installation north west of Werribee culminated in an ABT hearing in March 1992.

No contracts could be let until April, after the Tribunal ruled in favour of AWA Media's application. The company was under enormous pressure to get the station to air as soon as possible, thus taking advantage of the AFL season which was part of 3EE's program format. The initial deadline was 26 June. Contractors performed miracles to complete the erection of four 90 metre masts including the laying of some 70 km of copper wire for the comprehensive earth mat,and commissioning of the entire installation to go to air at 7 a.m. on 3 July 1992. Much credit is due to 3EE's Chief Engineer, Paul Taylor who spent most days and nights of May and June at Mt Cottrell.

JOE OOST



RF TRANSMISSION BLOCK DIAGRAM. 3EE.

LETTERS TO THE EDITOR

Sir,

I always enjoy reading '*The Broadcaster*' cover to cover. The article on page 13 of the November 1992 issue on Vacuum Capacitors intrigued me. $46 000 for a capacitor which gives only 900 hours of service!

Surely, there is enough, know-how in Australia to design a similar unit at lower cost which delivers longer life. Perhaps Telecom Broadcasting could run a competition for engineers to invent one. Suggested prize - a new CVTW-1600-70X Variable Vacuum Capacitor OR $46 000 cash. Thankfully, our 100 watt NEC-FM transmitter on Dunk Island does not employ one of these capacitors !!

AL KIRTON
General Manager
Coastal Broadcasters Pty Ltd

Sir,

I look forward to receiving a regular copy of *The Broadcaster*. I enjoy reading the interesting mix of broadcasting as it is today, and its history in Australia.

Leon Sebire's article about 2CO Corowa (November 1992, page 12) touched a nerve. I've also had an involvement with this station, albeit only in recent years.

Higher power MF transmitters in country areas of Australia frequently offer a service to people living beyond the normal limit of coverage. This is of special benefit to those who live in sparsely populated areas where they would otherwise have no radio. 2CO fills such a need for many people in New South Wales and Victoria.

The ABC has been touched by Leon's article. 2CO Corowa will be retained. We'll even leave it at Corowa so as not to upset a fine history.

But we will make one change. As of about March 1993, we will program it with NSW Regional Radio primarily from our Wagga Wagga studios. Currently, it carries Victorian based programming from Albury studios We will make at least one concession to its unique border location by continuing to carry the VFL in winter rather than the Rugby League I can see 2CO continuing as an important ABC transmitter for a long time, although perhaps not for another 61 years.

DAVID SOOTHILL
National Communications Manager, Radio.

Broadcast engineering heritage saved. Original building and aerial commissioned 1931 and still in service today. It was the first high power MF station installed in Australia following establishment of the National Broadcasting Service in 1929.

Rice growing, a major industry in the 2CO service area

Griffith, one of the major towns served by 2CO

BROADCASTING MILESTONES

2TR TAREE

Station 2TR Taree which serves the Manning Valley area on the mid north coast of New South Wales commenced operation on 11 November 1948 from a site 1.5 km from the central business area using a 200 watt AWA type 2J51316 transmitter feeding a flat top aerial and transmitting on a frequency of 720 kHz.

On 25 July 1975, a new facility was established 10 km out of town employing two AWA BTM2.5 transmitters producing 2 kW into the aerial in an automatic Main/Standby mode on a frequency of 760 kHz. The frequency was later changed to 756 kHz with the introduction of 9 kHz carrier spacing.

The aerial system is a directional type consisting of two 92 m guyed lattice steel masts fed by an underground FHJ5 coaxial cable and providing nulls in the pattern in the directions of Mackay, Wangaratta and Auckland.

The original driver stage of the transmitters employed six standard transistors which failed on a number of occasions until the stage was modified to use power MOSFETS. The reliability of the transmitter has increased greatly since installation of the MOSFETS in 1981. Program for the station is sourced from the ABC Kempsey studios which also feed 2KP Kempsey with local news, weather and boating information.

Taree which derives its name from the Aboriginal word 'Tareebit' meaning 'Fruit of the wild fig' was settled in 1831 when a retired Royal Navy Officer was granted a large parcel of land by the Colonial Secretary.Cedar was at the time the most important commodity to be found in the area and by 1934 large quantities were being shipped south.

In 1913, the railway line was extended to Taree and this had a major influence on development of the area.

Today, Taree sponsors the annual Manning River Aquatic Festival which is known as the 'Bathurst of speedboat racing'. The Festival also includes sailing, rowing, motor cycle racing, bowls and a surf contest.

PETER VINE.

One of the two 92 m masts. Transmitter building in background.

AWA BTM2-5 transmitters installed 1975