The BROADCASTER

Newsletter of Telecom Broadcasting

No. 30 November 1994

HAW PHA KAEW MUSEUM

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:

The Editor,

The Broadcaster,

Telecom Australia

PO Box 7407, St.Kilda Rd PO, MELBOURNE VIC 3004.

Editor: Jack Ross

Drafting Support: Brian Turner.

Co-ordinators: Les Rodgers
Barrie Morton
Ken Moore
Rod McKinnon
Murray Fopp
Geoff Jones
Heather McGlade

Published by: Telecom Broadcasting
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EDITORIAL

Having now served as Editor of *The Broadcaster* for 10 years, I feel the time has come for me to put away the typewriter and to bring to a close my association with the magazine.

Little did I realise in 1985 when Leon Sebire suggested I 'volunteer' to be Editor that my role would continue for such a long time.

Although retired for the past five years from active participation in broadcast engineering, I have enjoyed editing the articles for each issue just as much as in earlier years.

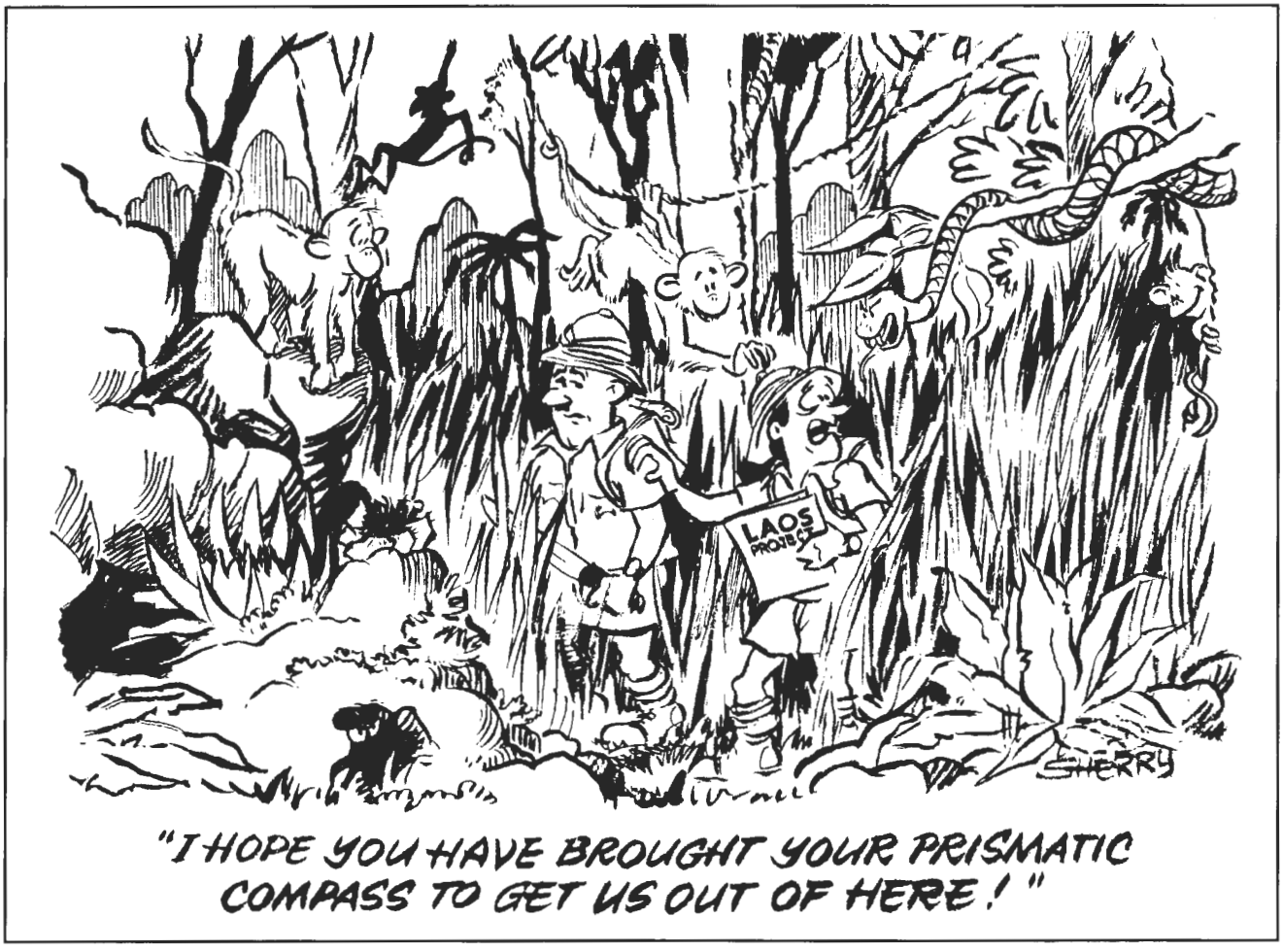
I would like to take this opportunity to thank all those people who have contributed articles, the Co-ordinators and in particular General Manager Les Rodgers and former General Manager Leon Sebire for their wonderful support in ensuring each issue contained material of interest to the many readers of The Broadcaster.

JACK ROSS

Front Cover: Haw Pha Kaew Museum LAOS.

Contributors to this issue:

Les Rodgers	Terry Wooster	Bill Gold
Vic Jones	Graham Baker	Jack Ross
Robin Blair	Ralph Denison	Melbourne
Barrie Morton	Terry Sellner	DBM
Brian Littlejohn	Derek Prosser	Staff



"I HOPE YOU HAVE BROUGHT YOUR PRISMATIC COMPASS TO GET US OUT OF HERE!"

Les Rodgers

JUST BRIEFLY . . .

It is with much regret that I learned of Jack Ross's decision to cease his Editorial role with *The Broadcaster.* Without Jack's guidance and cajoling of recalcitrant contributors (myself included), *The Broadcaster* would never have been issued on time.

Leon Sebire, in choosing Jack as a 'volunteer' recognised Jack's long experience in broadcasting and his bent for writing books and contributing to magazines which placed him in a unique position to edit *The Broadcaster.* It became a magazine of wide appeal and in fact we have revised the distribution list several times in order to keep the number distributed within bounds, because after all, it was primarily meant as a staff magazine.

I know Jack's decision to cease his association with *The Broadcaster* has not been taken lightly. The demands on his time have become much greater recently, because people are becoming busier and busier and the battle to keep the contributions coming in is that much harder. I am very grateful to Jack for the way that he has responded to those increased demands during the short period that I have been more closely involved with *The Broadcaster.*

Jack's decision is something of a watershed for us. A new Editor without Jack's knowledge and background would place demands on contributors which probably could not be met under current circumstances. There is also a changed role for Telecom Broadcasting, certainly since the first issue of *The Broadcaster* was published in 1985, in that we now face competition for government broadcasting business and we have had to diversify our interests. It is appropriate therefore, that this issue not only be the last that Jack Ross edits, but also the last that we publish. I would like to join Jack in thanking all our contributors over the last ten years and for the interest shown and kind letters received from readers.

May I also for the last time in these pages wish all our staff and their families, our contributors and readers best wishes for Christmas and the New Year.

LES RODGERS

STATION ROLL CALL

ABD11 MT SAUNDERS

ABC Television was put to air for people of Nhulunbuy when a transmitter was brought into operation on Mt Saunders on 18 June 1981.

The site is on Gove Peninsula on the north eastern tip of Arnhem Land where a wartime airstrip was constructed and named in honour of William Gove a RAAF pilot who was killed when his plane crashed near the north coast of Australia during the War.

The television service is provided by an NEC TBV 1220 SHTV 100 watt transmitter with the ABC program being supplied via the Intelsat 14 or TVA satellite system. After 1984, the program was taken from Aussat satellite K1, and two years later switched to the K2 satellite.

In 1987, the ABC Regional service was added to the site, joined in 1993 by the 8TAB service. Both these services employ NEC 11KR1 series 100 watt FM transmitters.

The equipment is housed in a small building on the top of a hill called Mt Saunders about two minutes drive from the centre of the town. The aboriginal name for the area is Nhulunbuy. Power to the site is from the town supply operated by the mining company NABALCO.

To attend the site from Darwin, requires a plane flight of two hours, then a 14km drive to the township. Quite often a private charter is needed, as the twice weekly service of commercial flights don't always coincide with transmission failures.

TERRY WOOSTER

8GO NHULUNBUY

Station 8GO is located at Nhulunbuy on the Gove Peninsula which lies on the eastern end of Arnhem Land Aboriginal Reserve in the Northern Territory.

In 1965, an aluminium company was granted a lease covering the bauxite deposits in the central portion of the Peninsula. The company built the town of Nhulunbuy to house the people working on the project. Experts estimate that these deposits contain as much as 250 million tonnes of bauxite. Australia is the world's largest producer of bauxite.

The station was commissioned on 21 December 1974 with two AWA 500 watt transmitters installed in a small brick building and operating on a frequency of 990 kHz. The radiator was a 62m high lattice steel structure and because of the aggressive environment, was subjected to a high degree of corrosion. It had to be replaced in May 1990. The feeder is a buried coaxial cable. A Dunlite 15kVA power plant caters for cases where incoming power is interrupted.

On commissioning of the station, programs were provided over a multi hop tropospheric scatter system via the ABC Darwin studio. Emergency programs were provided by a tape replay machine and an 'off air' receiver tuned to the Katherine High Frequency Service.

In November 1988, the program circuit was transferred to a newly installed broadband microwave link. A further change was made during November 1991 when the circuit was provided via satellite with a receiving system located at Mt Saunders and then by line to the transmitter.

During November 1990, a single Nautel AMPFET 1 transmitter, derated to 500 watts, replaced the original pair of AWA transmitters.

TERRY WOOSTER

DALWALLINU

UPGRADING AND SERVICE EXPANSION

Dalwallinu is a medium sized wheat belt town approximately 250km north of Perth. MF Station 6DL was commissioned on 22 November 1963 operating on a frequency of 531 kHz to fill the gap in coverage between Perth, Northam and Geraldton.

The transmitter comprised a 10 kW AWA main unit which had previously operated at 6WN Perth and a 2 kW AWA standby previously a standby transmitter at 6WA Wagin. Both had originally began operational service during 1953.

During July 1972, a parallel pair of 5 kW STC 4-SU-105 transmitters replaced the AWA 10/2 kW combination. The AWA 10 kW unit was removed and reconstructed in the Wireless Hill Museum at Applecross, while the AWA 2 kW unit was transferred to the Department of External Territories for installation at Christmas Island.

In December 1993, the STC transmitters were replaced by a pair of Nautel ND5 units in parallel with automatic combiner bypassing, to provide 10 kW into the aerial. The project also included the installation of a new emergency power plant and main switchboard, a surge reduction filter and building air conditioning plant.

A second MF service was commissioned on the site in June 1994. It was a Radio National service operating on 612 kHz. MF was preferred over FM because of the excellent coverage demonstrated by the 6DL service which had a 0.5 mV contour some 400 km from the transmitter. This excellent coverage is a result of the fairly flat country and the good soil conductivity over a wide area.

The RN service shares the main and standby radiators with 6DL and this required the installation of new dual frequency aerial coupling units. These have been constructed in aluminium shielded cabinets which reduce the EMR fields to well below the non-occupational limit. These cabinets in conjunction with screened ACU buildings provide a safe work environment, even though it is beside the base of the mast. The 213 metre high mast also supports the local UHF TV transmitting aerial. Isolation of the TV feeder cable is achieved by suspending it on an insulated catenary wire for a quarter wavelength from the mast and then earthing at that point. The shorted quarter wavelength line represents a high impedance at the mast with minimal effect on the aerial tuning. A quarter wavelength at the 6DL operating frequency of 531 kHz is 140 metres. The catenary wire is suspended from three metre high steel poles by insulators. A copper busbar is run from the earth point to provide a positive return path. The quarter wavelength earth point is also connected to two earth radials on either side.

The station area is subject to lightning and high static fields during the summer and the main mast is affected much more than the standby mast. An automatic changeover system has been provided which responds to SWR alarms from the transmitter and switches the transmitters to the standby aerial for a period of about one hour. After this time, the transmitters are switched back to the main aerial. The solid state transmitter control and fast action switches allows changeover to occur in about one second.

TERRY SELLNER

The new 6DL Nautel transmitter installation.

4PB BRISBANE

PARLIAMENTARY BROADCASTING SERVICE

During early 1988, negotiations between the Commonwealth and the ABC were completed to release the provision of Parliamentary broadcasts from the ABC's Radio National service. It was proposed to utilise the spare capacity provided by standby transmitters and standby aerials to provide the public with a separate Parliamentary Broadcasting Service.

The arrangement was to continue pending the establishment of a permanent Parliamentary network.

In Brisbane, the 10 kW STC 4SU11A Radio National standby transmitter was retuned for operation in the newly assigned frequency of 936 kHz. The service shared this frequency with 7ZR Hobart. The standby aerial required a special switching arrangement and matching to allow the Metropolitan Radio and Radio Regional to utilise the aerial should their main aerial fail.

The Parliamentary Broadcasting Service commenced transmission on 22 August 1988 and transmitted only during the sitting of Parliament. Other centres where the service began on the same date were Adelaide, Canberra, Hobart, Melbourne, Newcastle, Perth and Sydney.

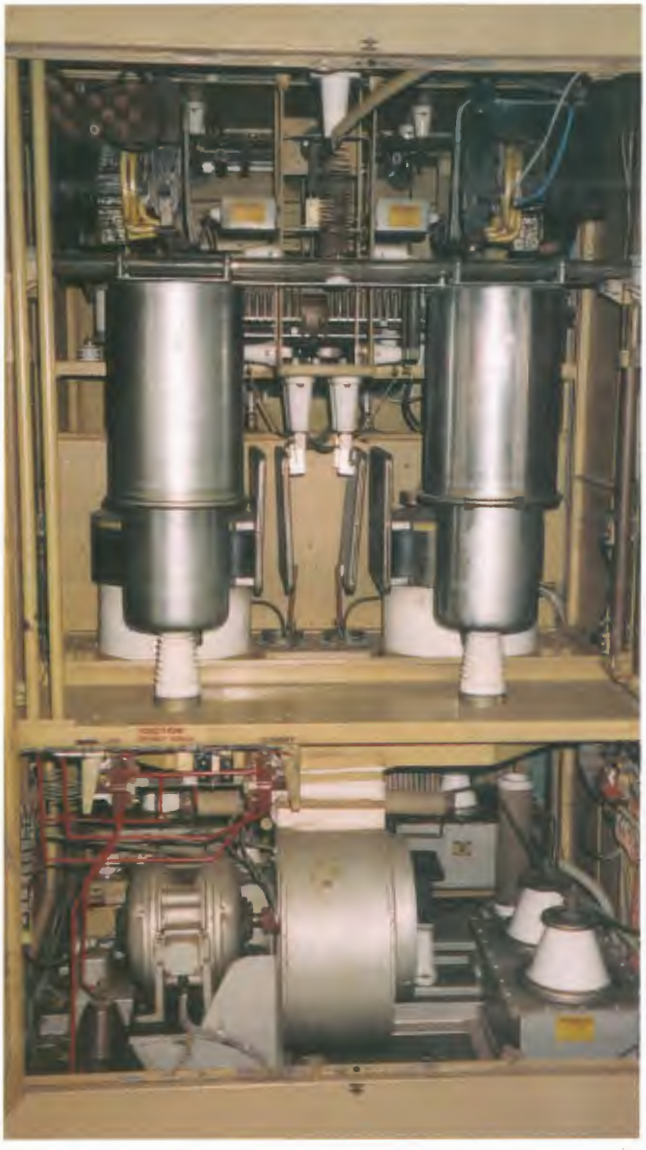
The network stations were provided with their own unique call signs, and in the case of Brisbane, this was 4PB.

The aging STC transmitters will be replaced in December with a single 10kW Nautel and this will complete the replacement of all Brisbane MF services at Bald Hills with solid state equipment.

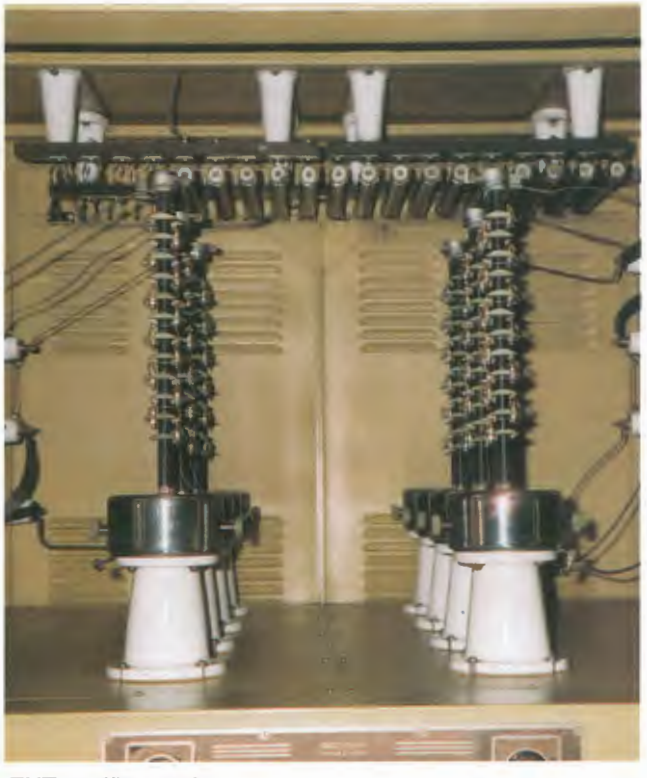
The Parliamentary Broadcasting Service was changed over to a 24 hour service on 15 August 1994. The spare transmission capacity has been utilised by the ABC for a continuous news service when Parliament is not sitting.

BARRIE MORTON

Radiator and ACU building.



Rear of power amplifier cabinet.



EHT rectifier stacks.

CONFERENCE OVERVIEW

On 27 July 1994, the ABC hosted the first industry conference on Digital Sound Broadcasting (DSB) in Australia. I was privileged to be one of the invited guest speakers, a member of a panel addressing the planning, and legislative requirements for introducing DSB into this country. The conference took place at the ABC Radio complex at Ultimo in Sydney.

The conference was timely in that it occurred when a number of issues surrounding the introduction of DSB into Australia are becoming critical. If one looks at how other countries around the world are going about introducing DSB, two very contrasting approaches emerge. In some countries, particularly Canada, the UK and in Scandinavia, there is a very strong commitment from government and industry to provide both the legislative framework and technical infrastructure to introduce DSB with the full support and protection of the existing radio broadcasters. In others, notably the USA, there is strong resistance from the established broadcasters to any technology that challenges the status quo, and indifference by governments to the introduction of these new systems.

At the ABC conference, the Australian position was summarised by Paul Elliott, Parliamentary Secretary to the Minister, and the keynote speaker to the conference. He pointed out that the means already exists to introduce DSB into Australia since both the recent Broadcasting Services Act and the Radiocommunications Act are intended to be 'neutral to technology' and both have means of providing the necessary licences. This approach was reinforced by Tony Shaw from the Broadcasting Policy Unit of the Department of Communications and the Arts, who cited the recent auctions of licences for Microwave Distribution Systems as setting the pattern for the introduction of new services. In effect, these speakers said that it was more a matter for the industry than for the Government to oversee the introduction of DSB into Australia, and that the process would be market driven.

Whilst this may seem to leave the Government position equivocal, other speakers outlined some very significant work being carried out by their agencies. Colin Knowles spoke about how the Australian Broadcasting Authority is at the forefront of setting technical standards. Geoff Hutchins of the Spectrum Management Agency showed how spectrum at 1.5 GHz might be made available. David Soothill, formerly with ABC Radio but now with SBS, explained how Australia has registered a satellite system with the International Telecommunications Union in Geneva to preserve our frequency bands. Ennio Ravanello described how the Communications Laboratory in Canberra is researching radio propagation models. Vic Jones outlined the views of National Transmission Agency.

One of the perceived problems with DSB has been that it is essentially a multi-channel system with each transmitter carrying a number of programs sourced by implication, from a number of program producers. It breaks down the established pattern of, one program, one style, one sound, one radio channel. The point I tried to make in my speech was that this view of the program provider would soon become untenable since the cable networks to be provided by Telecom for video, also have capacity to deliver a huge number of very high quality audio channels. Broadcasters, I argued, have no choice but to migrate to delivery systems with very high quality and a multiple capability. For radiated services, this is DSB.

ROBIN BLAIR

ROLE OF THE NTA

The National Transmission Agency manages the network of transmitters through which the ABC and the SBS bring their numerous services to the Australian Public. We provide the thread which links the national broadcasters, the ABC and the SBS, to their audiences. However, while we provide a range of transmission services, we certainly are not broadcasters. Nor are we regulators.

One role that we do play within the overall planning of broadcasting is to offer advice on the practical implications of policy decisions, and it is in this spirit that I would like to offer a few remarks on those aspects of DAB which most concern the role of the NTA.

Engineering and Policy

Traditionally, engineers have had a fairly high profile in the planning of broadcasting systems and, understandably, they have tended to look at new technology for the purely technical advantages which it may offer. The key issues, however, are what a new technology can provide the public and the industry in terms of improved broadcasting and communications services, including improved access to those services. The NTA's perspective is not simply that DAB is a superior technology and therefore we must have it. We recognise that DAB represents something of a revolution - a chance to start again without many of the constraints which limit our existing sound broadcasting systems, but like any revolution there are significant costs for all the participants (both public and industry) and enthusiasm needs to be tempered with caution.

Standards

We do not know in what form DAB will arrive in Australia; the NTA has no privileged information about the standard - or standards - that will be adopted, about the spectrum which will be allocated to DAB, or any of the other critical decisions which will have to be taken before DAB becomes a reality.

We are all in an unenviable position - program producers, spectrum managers, broadcasting regulators and transmission service providers alike, waiting to the wedding to begin, anxious to see just who our spouse will be; wondering whether we can afford such a marriage; even wondering whether the wedding will take place at all. But as we wait, we would be well to speculate about what this marriage might really be like.

Ownership and Access

The introduction of an IBOC system, which seems unlikely to offer the full range of features or even the CD sound quality of Eureka-147, would not pose any particular operational difficulties for the NTA - although it may pose problems for others.

The more interesting case is that of the European Eureka-147 system, which throws up among other issues, the question of who should own and operate the multi-channel transmitters? Recently, in Europe, there have been suggestions that apart from concerns about local broadcasting, the multiplexing feature of DAB is becoming a critical issue, in fact a concern for non-government broadcasters who may be anxious about their indepen-

dence. In other words, the NAB's message about protectionism has got through.

I am also well aware that, in Australia, proposals for multi-channel DAB systems have induced a mixed response, reflecting concerns about the possible scope for government interference in the right to broadcast and questions about the cost of transmission. I hope it will not come too much of a shock if I suggest that the NTA is not a combination of the KGB and Ned Kelly - if only because we lack the resources - and that the Agency would be well suited to the role of providing transmission services for DAB operators.

Firstly, I want to make it clear that in no sense are we seeking a monopoly position for the NTA. We have every confidence in our ability to compete effectively in the market for transmission services, and to deliver signals to the audience at a high level of reliability. Furthermore we have, in the course of facilitating recent large increases in the availability of broadcasting services and the various channel changes resulting from the Band II Clearance program, significantly increased our own use of infrastructure provided by other parties and gained a great deal of experience in dealing with the practical issues which consumers face in receiving an expanding range of over-the-air services.

Secondly, there are many commercial and community broadcasters who already have installed their transmitters on our sites and their transmissions depend on access to NTA equipment: combiners, antennas, masts and so on. These arrangements have worked well. At the moment, the network comprises some 500 sites from which about 1,000 transmitters broadcast ABC and SBS services to their audiences; but it also accommodates some 450 transmitters owned by commercial, community and self-help operators, and there are more than 330 radiocommunications sharing arrangements. Sharing arrangement involving NTA facilities have made possible the rapid introduction of additional broadcasting services, through the availability of a common platform for the transmission of those services. Sharing a multi-channel transmitter is, I believe, simply an extension of this concept.

The NTA is, of course, acutely conscious that ownership of a transmitter has traditionally been seen by some as a guarantee of independence, and I fully understand that broadcasters would prefer to see ironclad guarantees of delivery of service to their audiences. I suggest that if this is a real concern, the proper course would be for legislative provision to guarantee access, and similarly to ensure that access rates are not discriminatory or predatory.

Abundance and Planning

When Eureka-147 was first being described, the capacity of the technology to use the spectrum efficiently was breathlessly interpreted by some as the dawning of the age of plenty in terms of the number of channels available in any area. Engineers have since explained, with all deference, that while the number of full CD quality channels can be significant, the increase over the number of currently available stereo channels will be modest rather than extravagant, and any increase is dependent on enough spectrum being made available.

At present, the options available for DAB transmission systems are numerous. However, once the system parameters have been defined, the options open to policy makers will be greatly narrowed, and I hope that what determines the shapes of DAB is a set of solid policy decisions which, while they reflect engineering realities are not driven by them, and that the claims of 'engineering determinism' are not heard yet again.

Wide Area Coverage

Currently, the radio transmission facilities provided by the NTA are a mix of AM and FM. Coverage of large rural areas is often achieved through the use of high-power AM transmissions. It will be quite impracticable - and probably undesirable - for such systems to be replaced by terrestrial DAB, even if such new DAB services do eventually displace FM or other services elsewhere, which is by no means certain. This conclusion would be particularly so if DAB is introduced in the 1.5GHz band.

Where DAB is required for wide area service, satellite delivery seems to be the more likely long-term solution for sparsely populated regional areas, at least in terms of radio services which are essentially national rather than local in character.

But satellite delivery requires the existence of a suitable satellite. My question is: who will pay for it?

Mobile and Community Planning

A final thought. The technical planning of broadcasting systems traditionally has been focused on serving communities within established licence areas. The reception of television (and radio to some extent) was seen as static, confined predominantly to the household. When FM transmissions were first introduced, the original planners believed that anyone who intended to listen to FM in a car had rocks in his head.

Of course, mobile and portable reception of FM radio is now accepted as normal, and this form of listening is probably more important than reception at home. This experience alone should sound a note of caution about the capacity of deterministic planning to be a satisfactory basis for the introduction of a fundamentally new service, such as DAB. The development of DAB systems will need to take into account mobile reception much more than prior community-based planning has done. What we need, may I suggest, is planning which recognises the listeners and focuses on accommodating their numerous locations - including, for example, the millions of passengers in cars travelling along major highways. With both AM and FM transmissions, translators offer little scope to improve mobile listening because the frequency of each service must change with location, making it almost impossible for motorists to tune their car radios continuously to a single program service.

But with DAB, a single frequency network allows coverage to be highly tailored, and yet is economical in its use of the spectrum. At the same time, the low power and multi-channel characteristics of the DAB transmitters holds out the prospect of infrastructure costs being minimised, especially by being shared across multiple channels and services. Thank you for this opportunity to express some opinions on the implications of DAB for the future of broadcasting.

VIC JONES
General Manager
National Transmission Agency

RPH SERVICE

4RPH RADIO FOR THE PRINT HANDICAPPED

During late 1989, auctions were held for capital city Frequency Modulated licence conversion for Commercial radio broadcasters operating in the AM bands. In Brisbane, 4BK Austereo was the only successful bid and released its 1296 kHz transmitter facility at Tingalpa to become FM 105.

Radio for the Print Handicapped had been operating for a number of years, using a low power AM transmitter at a disused facility at Murarrie near Tingalpa. With the release of 4BK in April 1990 and the ownership of the facility being transferred to the Commonwealth, the allocation of 1296 kHz was available for the Print Handicapped service. Transmission commenced on 10 September 1990 and was a major boost for the service.

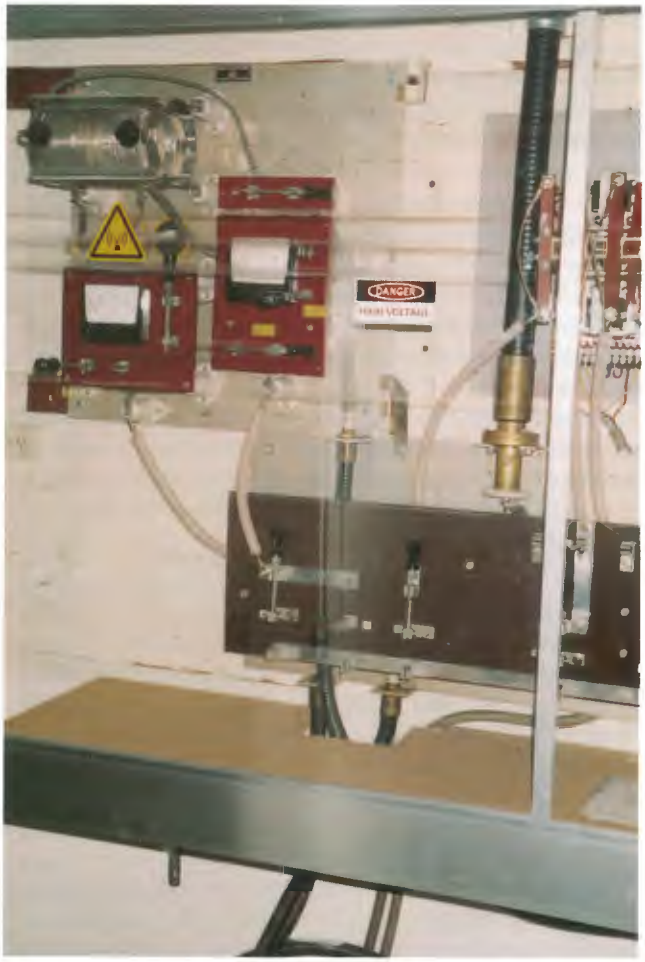
The transmitters are MW10 Harris 10 kW units operating in a main and standby configuration with the transmitters being detuned to 5 kW per unit. The aerial system used a two mast directional array with nulls in the pattern directed towards Wellington in New Zealand and Bendigo in Victoria. Standby power is provided by a Caterpillar 65 kVA motor generator set.

Since the Commonwealth acquired the facility, only minor upgrade of the alarm and program input equipment has taken place.

BARRIE MORTON

One of a pair of lattice steel radiators which form a directional system.

One of a pair of Harris 10 kW transmitters derated to 5 kW.



Aerial switching equipment.

PRESERVING HERITAGE

NATIONAL FILM AND SOUND ARCHIVE

Although the world's first feature film - a one and a quarter hour narrative called 'The Story of the Kelly Gang' - was made in Australia in 1906, the cylinder phonograph, the disc gramophone, and the pianola roll became an Australian obsession, and broadcasting stations mushroomed across the nation in the 1920s, it was not until 1937 that formal steps were taken to preserve Australia's film and sound heritage.

A small archive was established as part of the then Commonwealth National Library. It had a chequered career re-emerging much later as the National Film Archive and Sound Recording Sections of the National Library of Australia.

Growing concern about its future led the Government to establish in April 1984, a new autonomous body - the National Film and Sound Archive incorporating both the former film and sound archives of the National Library. Six months later the Prime Minister opened the Archive's new headquarters in the old Institute of Anatomy building in McCoy Circuit, Canberra.

A National Film and Sound Archive Advisory Committee was appointed in July 1984 to develop planning for the future development of the Archive. The Committee presented its Report the following year.

The moving image and recorded sound heritage includes recorded sound, film, television or other productions comprising moving images and/or recorded sounds created or released within Australian or by Australians, or with relevance to Australians. It also encompasses objects, materials, works and intangibles relating to the moving image and recorded sound media, whether seen from a technical, industrial, cultural, historical, or other viewpoint. This includes material relating to film, television, broadcasting and sound recording industries and fields such as literature, scripts, stills, posters, advertising material, manuscript material and artefacts such as costumes and technical equipment.

The National Film and Sound Archive perceives the moving image and recorded sound media in all their manifestations whether as art, communications, historical record, entertainment, industry, technology, science, cultural and social phenomenon.

The NFSA houses the most comprehensive collection of recorded sound and moving images in Australia, including:

- 50,000 film and television productions
- 300,000 film stills and lobby cards
- 30,000 film posters
- 800,000 sound recordings and radio programs

It also has extensive collections of film, radio and television scripts; newspaper clippings; slides; books; magazines; research material as well as technical equipment associated with films, sound, television and broadcasting.

Australia has already lost the greater part of its screen and sound heritage from the earlier decades of the century. Closer to the present - say over the past 50 years - the statistics become less horrifying although, by the standards of comparable countries, by no means exemplary. The widespread destruction of silent films after talkies arrived in the 1930, the disappearance of countless thousands of radio and television programs, the discarding of huge quantities of publicity and written materials associated with the screen and sound media, are facts of life. The catalogue of losses - whether caused by ignorance, deliberate action or simple neglect - is tragic and endless.

It is the Archive's job to locate, preserve, store and catalogue the scattered pieces of our heritage. The preservation task is particularly urgent. Much of the physical material - the films, tapes, records and cassettes - has only a limited life. Most at risk are the films made of nitrate stock, a highly unstable material with a lifespan of between 30 and 70 years. Until 1951 all professional films were made on nitrate stock, and by the year 2000 most will have literally turned to dust. Not far behind will be many wax and acetate sound recording.

JACK ROSS

National Film and Sound Archive building Canberra.

Chinese manufactured 10 kW MF transmitter.

Lao National Radio Studio-Vientiane.

Telecom HF Radio Telephone Facility Dong Dok, Laos.

LAOS PROJECT

THE PROJECT

As part of a long term, developing relationship between Australia and the Government of the Lao People's Democratic Republic, a contract has been negotiated between Telstra and the Lao Ministry of Information and Culture for Telstra to provide an HF broadcast transmitter, antenna system and associated equipment as an interim strategy to provide a reliable national coverage for the Government operated radio broadcasting network.

The transmitting equipment will be installed at the existing 'km 6' transmitter station near Vientiane, the capital of the country and largest city.

Telstra will provide the equipment, project management services and on-site technical support staff, the Ministry of Information and Culture will provide the building and staff to assist with the installation of the equipment.

It is expected that the transmitter will be installed and placed into operation by end of December 1994.

The HF transmitter to be provided is a Continental 417E rated at 50 kW output. It utilises a solid state power supply/modulator and a 4CV100000C output tube.

The antenna to be provided is a Technology for Communications International (TCI) Model 615-1-50 Short Range Broadcast Antenna.

The antenna is specifically designed for vertical incidence ionospheric propagation, covers the frequency range 2.3-18 MHz and is rated for operation at a power level of 50 kW.

The antenna is a balanced log periodic design with two masts, a central antenna support pole and a section of open wire transmission line which acts as an impedance transformer. A ground screen and protective earthing also form part of the system.

The transmission line to connect the antenna to the transmitter will be of the standard TCI open wire 300 ohm balanced type installed three metres above ground level.

The equipment configuration is substantially similar to that installed in Australia for the Northern Territory HF Service at VL8K Katherine, VL8T Tennant Creek and VL8A Alice Springs.

The antenna and transmission line installation will be supervised on site by Jim Finch and the installation, testing and initial operational maintenance of the transmitter will be supervised by Bob Gilliland.

THE COUNTRY

Laos is different. It is not a bustling, frenetic country rushing to catch up to the developed world like most of South East Asia. It is a tropical land of mountains and thick forests drenched by heavy rains. Rice is the chief product with other products being coffee, corn, cotton, tobacco and livestock.

Laos has been isolated by geography and by choice for many years. It has no ocean access and is bordered to the east by the mighty Mekong River which has only recently been bridged for the first time by the Australian provided 'Friendship' bridge giving direct access to Thailand. To the north is the 'Golden Triangle' and China, and to the east, Vietnam and Cambodia to the south.

It was part of French Indo China for more than 50 years and many buildings in Vientiane reflect the French involvement, including the one in which the Telstra office is

(Continued page 12)

Lao National TV Studios-Vientiane.

Friendship bridge across Mekong River.

Presidential Palace.

located. In 1954, an international agreement recognised Laos as an independent, neutral nation.

The other major foreign influence has been from the USSR and occasionally hammer and sickle emblems, pictures of Marx and Engels and Russian jeeps can still be seen in Vientiane. At the airport is a faded Aeroflot sign showing the route from Vientiane to Moscow. The 150 kW MF transmitter station at 'km 49' was provided by the USSR and it looks like it could have been installed equally as well in Siberia.

Much of the north of Laos is totally undeveloped and some provincial capitals cannot be accessed by road or conventional aircraft, the only access is by boat or helicopter. Many of the jungles are untouched and are being investigated as the last natural refuge for tigers being forced out of their habitat in other parts of the world. Most of the population are subsistence rice farmers. The Laos are proud of the natural resources and beauty of the country.

The streets in Vientiane are not busy, there are lots of motor cycles and 'tuk tuk's' but not many cars. There are many Bhuddist temples in the city, one on every corner it seems, and of course monks walking in the streets all dressed the same with shaved heads and carrying their shoulder bags and black umbrellas.

There are no supermarkets or air conditioned shopping centres, but there are lots of little shops and food stalls.

The Laos are proud of their country and culture, in the past they have chosen to live isolated from the rest of the world, they are now just starting to open up to the outside. Laos is still a peaceful image of how much South East Asia used to be.

GRAHAM BAKER

Program Input Equipment in Control Room.

Statue Outside Wat Mixai-Vientiane.

Wat Mixai-Vientiane.

MOBILE RECEPTION

TRAIN BROADCAST RECEIVERS

The use of receivers in trains for reception of broadcast programs goes back to the early days of experimental broadcasting. Radio Clubs in some States organised regular train trips which were extremely popular. In Adelaide for example, one outing on 16 October 1924 required nine carriages to accommodate the party.

The radio receivers belonged to club members or visitors, and ranged in size from three tubes to seven tubes. Most receivers used loop antennas and others used wires suspended from lampshades or other convenient attachments. In one carriage an observer noted that there were fifteen sets in operation at full volume. Not all were tuned to the same station.

One of the earliest known official installations was fitted to an inspection train which operated for six weeks in mid 1925 on the Port Augusta to Alice Springs line. The receiver was a two tube battery set connected to a multi wire antenna supported by poles a couple of metres above the carriage roof. Good reception was reported from 5CL Adelaide, 2BL Sydney and 3LO Melbourne with signal strength being sufficient to drive a horn loudspeaker.

Although isolated fixed installations were made in State and Commonwealth VIP railway carriages in the 1930's, it was not until 1952 that a co-ordinated program of tests was carried out to assess the reliability of reception on long distance journeys.

Staff of the Commonwealth Railways fitted out a carriage using a war-time National HRO receiver and an antenna suspended just above the carriage roof. Tests on a regular passenger train between Port Augusta in South Australia and Kalgoorlie in Western Australia were very encouraging, and the Railway Authorities asked staff of the Post Officer Radio Section to undertake extensive tests and to provide recommendations on suitable reception facilities.

Tests using RCA AR88 and Hammarlund Super PRO receivers over several return journeys found that reception from 5CK Crystal Brook was reasonably reliable between Port Pirie and Kingoonya and from 6GF Kalgoorlie between Rawlinna and Kalgoorlie. The intermediate section was well served by short wave transmissions from Wanneroo in Western Australia and Lyndhurst and Shepparton in Victoria.

Two German built lounge cars of the Commonwealth Railways were the first to be fitted out for public entertainment. The receiver comprised a seven tube triple ganged type powered by a DC/AC converter feeding a 5V4G full wave rectifying tube. The set was tunable across the medium frequency band and four crystal locked frequencies were provided for short wave reception. The output was fed to 120 watt audio amplifiers which fed a five inch (12.5 cm) Rola speaker in each compartment. The receiver was built in the Port Augusta Workshops of the Commonwealth Railways.

Prior to the installation of radio receivers, news for passengers was supplied in the form of bulletins updated as the train proceeded. A news bulletin was posted just prior to departure from Port Augusta and before the train reached Tarcoola another new bulletin would be phoned through to the Station Manager at Tarcoola who would have it typed up ready for posting when the train arrived. The procedure was repeated at Cook and Rawlinna in South Australia, and by the time the train arrived in Kalgoorlie five bulletins would have been posted.

JACK ROSS

Broadcast receiver and tape deck in lounge car.

OUR BROADCASTING PIONEER

MR W (BILL) DAVIDSON

Following education at Elmore Primary School, Bill Davidson joined the Postmaster General's Department in 1939, as Lineman-in-Training and as part of the course, attended the Linemen-in-Training School as Fisherman's Bend, Melbourne and attended evening classes at the Melbourne Technical College.

The Linemen-in-Training Scheme had only been started in late 1937 when the Department saw the need to train linemen to meet the technological developments taking place in open wire carrier systems and carrier cable, and its responsibilities associated with the National Broadcasting Service.

Bill Davidson.

On completion of the course, Bill was promoted Lineman Grade 1 and joined the newly formed Radio Lines Section in Victoria working on the construction of aerials and transmission lines at RAAF and US Army bases at Laverton, Point Cook, Werribee, Ballarat, Rockbank and Diggers Rest. Included in the work was the operation of a crawler tractor clearing a path for upgrading telephone lines between Cann River and RAAF and Navy bases at Mallacoota and Gabo Island.

In 1943, Bill was transferred to the International High Frequency Transmitting Station (later Radio Australia) Shepparton as Acting Lineman Grade 2 where work was in progress to establish the station. It was a move that determined his career path for the rest of his working period in the Department.

The project included a large team of Linemen including many new graduates of the Linemen-in-Training School. They were under the control of Jack Kyne and Line Foreman Jack Laydon. Like many of the external plant staff, Bill was engaged in the construction of aerial arrays, transmission lines and line switching systems. The facilities included 19 directional arrays supported by 14 guyed lattice steel masts and associated transmission lines, switching systems and control cables.

At the conclusion of the outdoor construction work in 1945, he joined the Transmitter Operation and Maintenance staff as Acting Technician. Bill is one of a small group still alive today, who witnessed the historic occasion when the first transmission took place on 15 May 1944, using the 50 kW RCA transmitter.

When he began work in the transmitter hall, three transmitters were in operation using call signs VLA, VLB and VLC.

The VLA and VLB transmitters were of the same type being jointly manufactured by Standard Telephones and Cables Ltd and Amalgamated Wireless (Australasia) Ltd to the general design of the PMG's Department producing a maximum output to line of 100 kW. Each transmitter comprised a driver unit capable of an output of about 8 kW for driving high power channels; two high power channels, either of which could be driven by the driver unit; a modulator unit which could be employed to supply power to the anodes of the modulator and working high power channel respectively. Cooling equipment was located in the basement, as well as external to the building. The 100 kW channels each employed four Federal type F124A valves in parallel push-pull. The modulator employed two working 4030C valves and two spares.

The third transmitter which was the first to go to air, was a 50 kW model manufactured by Radio Corporation of America. It comprised two complete RF channels from crystal to output, and one Class B modulator unit which could be employed to modulate either of the RF channels at high power. The transmitter was equipped with a control desk carrying a power control panel for high tension rectifier anode switches, an audio control panel, a VU meter and modulation indication meter.

It was the considerable amount of redundant plant built into these initial transmitters that was to allow Bill, in later years, to provide additional transmitters with minimum additional components.

In 1948, he was appointed Technician, followed by appointment as Acting Senior Technician. Having qualified as Senior Technician in 1950, he was placed in charge of one of the Operation and Maintenance Shifts. Promotions to Supervising Technician level followed with appointments as Supervising Technician Grade 1 (Radio) in 1951, Supervising Technician Grade 2 (Radio) in 1952 and Supervising Technician Grade 3 (Radio) in 1956.

In 1957, the station began major expansion to increase the number of transmitters and to provide improved aerial switching facilities. Bill was appointed Acting Supervising Technician Grade 5 (Radio Installation) and spent the next five years in charge of local staff engaged in the project. On completion of the project, transmitter capacity comprised four 100 kW, three 50 kW and three 10 kW models and a large matrix line switching system.

On the retirement of Jack Hargreaves, the first Officer-in-Charge, Bill was appointed to the position in April 1962, with designation Supervising Technician Grade 5 (Radio) and remained in that position until he retired in March 1980.

Shortly after retirement, Bill was awarded a British Empire Medal which he received at a ceremony at Government House, Melbourne.

JACK ROSS

DOMESTIC RECEIVERS

SERVICING EQUIPMENT

Test equipment and tools required by the serviceman to repair and adjust the home broadcast receiver in the formative days of broadcasting were simple indeed.

In the early 1920's, the well equipped serviceman would turn up in response to a call, with perhaps a hydrometer, a watch type voltmeter, a couple of tubes, a selection of screwdrivers and pliers. Even a soldering iron wasn't necessary in many cases as wiring employed solid square shaped busbar attached to the components by nuts and bolts or post terminals.

Tube testers were late in arriving as part of the serviceman's kit. The very early units were designed to test only one tube type e.g. the 199. When the multiple tube testers appeared they were so expensive that many servicemen constructed their own.

Receivers fully powered by the electric mains did not filter into homes until about 1929, so before that batteries were necessary for tube operation. Three different types were required and were designated A, B and C types.

Watch or pocket type voltmeter.

Accumulator voltmeter.

Test unit for 199 type tube.

Serviceman's test instrument.

The A battery provided current for the filaments which consumed considerable power. They were usually accumulator types with voltages generally of 2, 4 or 6 volts. The B battery was constructed of many small dry cells each of 1.5. volts. This type was required for plate or high tension supply. Batteries were generally made up of 30 cells giving an output of 45 volts. Tube plate requirements varied with the type of tube and purpose of use. A tube needing say 135V, would therefore require three 45V batteries. The C battery was a dry cell type with taps 1.5 to 9.0 volts and was used to supply negative bias to the grid of the tube to ensure it operated on the correct point of its characteristic curve.

To properly test the A battery on load, a battery tester specially designed for the purpose was employed. It caused a large current to flow and any shortcomings of the battery quickly became evident. The B and C batteries were tested with a watch or pocket type voltmeter. Some were single scale instruments while more expensive types had 2 or 3 scales with a switch.

About 1932 when superheterodyne receivers were superseding all others, the serviceman's role became more complex because of the wider range of test equipment necessary. Also, with mains powered equipment using high voltage, safety became an important consideration. Components, and tubes in particular, changed dramatically from earlier days. There were then power transformers, chokes, electrolytic capacitors, padders, trimmers and multifunction tubes.

Fault tracing became more difficult and the serviceman needed a well equipped work bench fitted out with such instruments as tube checker, component tester, oscillators for testing radio frequency and audio frequency circuits, loudspeaker test unit, noise test set and perhaps a cathode ray oscilloscope.

The introduction of transistors, integrated circuits and printed circuit boards in recent times has required some specialised test equipment but the reliability of receivers is greater than it was in the earlier days of broadcasting. The author of a book on radio servicing published in 1927 summed up the position in those days as follows:-

"A community which has few radio receivers may be regarded as unprogressive and of low intelligence. Community or family interest in the fundamentals of radio apparatus is an evidence of intellectual progress. The everyday communication of boys and girls, as well as men and women often includes a surprising amount of discussion of radio circuits and auxiliary radio equipment. They want to know how to make them and how to keep them in working order."

How public interest has changed in 67 years!

JACK ROSS

RADIO AUSTRALIA

BRANDON

At the outbreak of the Second World War in 1939, there was no Government owned facility providing an international broadcasting service.

Following Cabinet approval on 18 October 1939, an overseas broadcasting service, known as 'Australia Calling' commenced on 20 December 1939. Programs were transmitted from Lyndhurst and from Sydney transmitters leased from AWA. In April 1940, a transmitter in Perth was brought into service for broadcasts to South Africa. In June 1941, a second Lyndhurst transmitter of 10 kW output was added to the service.

With construction of the Shepparton station, three transmitters were put into operation with a 50 kW RCA transmitter being the first to go to air. By early 1946, two 100 kW units manufactured in Australia by joint contractors, Standard Telephones and Cables, and Amalgamated Wireless (A/Asia) enabled the station to provide three high power outlets. The service became known as 'Radio Australia'.

Since that time, Shepparton has been progressively upgraded and expanded over the years. New stations were established at Cox Peninsula near Darwin in 1969, Carnarvon in Western Australia in 1975 and Brandon in North Queensland.

The Brandon Radio Australia facility which commenced operation on 7 May 1989 is co-sited with the MF station 4QN and provides an effective coverage to the Papua New Guinea and near Pacific region including Federated States of Micronesia, Vanuatu and New Caledonia.

The station uses three 10 kW STC 4 SU 48B type transmitters which were relocated from the Lyndhurst station which closed in 1988. Two units are installed in a day/night frequency change configuration for the Papua New Guinea service and the third unit operates for the Coral Sea service. This transmitter type covers the frequency range 3-28 MHz and employs A3 high level Class B modulation.

The transmitters are fed by balanced 300 ohm transmission lines to curtain antennas, type HR 2/20.4 and HR 2/2/0.6 manufactured in USA by TCI. They consists of four horizontal half wave folded dipoles with aperiodic reflecting screen to produce essentially unidirectional beam. The 150 ohm parallel impedance of the antenna is matched to the 300 ohm transmission line by a three section balanced Chebyshev transformer.

BRIAN LITTLEJOHN

Transmission lines with curtain support structures in background.

Transmitter hall with three 10 kW transmitters.

STC 4-SU-48B 10 kW transmitter.

3RPH MELBOURNE

RADIO FOR PRINT HANDICAPPED

Following representations to the Minister of Posts and Communications, and a study by his Department, the Minister announced on 23 July 1978 that he had approved the granting of radio licences to Radio for Print Handicapped (RPH) groups in Melbourne, Sydney and Hobart.

The stations were licensed under the Wireless Telegraphy Act for operation on or near 1750 kHz, a frequency just off the AM broadcast band.

In the case of the Victorian station, it began regular test transmission during 1981 on 1704 kHz with a 500 watt transmitter. The service was officially opened in December 1982.

In July 1989, the Australian Broadcasting Tribunal carried out an inquiry into the granting of broadcasting licences for Print Handicapped groups. In March 1990 it granted a licence to the Association for the Blind, for a service in Melbourne.

Today, the service operates on 1179 kHz with a transmitting facility originally built in 1956 for 3KZ.

Commercial station 3KZ began operation on 8 December 1930 with the licence being held by Industrial Printing and Publicity Co. In 1932, the licence was transferred to 3KZ Broadcasting Co. Pty Ltd. Following the granting of a licence to operate an FM service, the 3KZ AM facility located at Lower Plenty was transferred to the Commonwealth's National Transmitting Agency which allocated the transmitting facility for use by 3RPH from studios of the Association for the Blind at Kooyong. The transmitter is controlled from the studios using a TFT remote control system.

Transmitters comprise a TBC type AM10KD 10 kW unit derated to 5 kW feeding the main radiator and an STC type 4-SU-55 5 kW transmitter as hot filament standby feeding a standby radiator.

The main radiator is a 135 mm high omnidirectional type erected in 1971. Both radiators are fed by six conductor open wire transmission lines.

A standby diesel power plant installed in 1966 provides emergency power when required.

Melbourne DMB Staff

Main transmitter TBC type AM10KD.

Transmitter building. Power room on left of building.

Main 135m radiator showing base insulator and grounding system.

RADIO AUSTRALIA

COX PENINSULA - A COLOURFUL HISTORY

Cox Peninsula, the site of the Radio Australia broadcasting complex in the Northern Territory is located across Darwin Harbour from Darwin, the major city of the Territory. It is believed that the Peninsula was inhabited by the Larakia and Waigaidi people for some 20000 years. Macassans from the East Indies are known to have been on the shores even before the Dutch visited the area during the 1600's.

When 6000 hectares of land was selected for establishment of transmitting and receiving stations 30 years ago, the vast area forming the Peninsula was populated by only a small number of people, although great hopes had been held 100 years ago for the area to become a great producer of agricultural products.

The early developmental plans came to nothing and although a new lease of life was injected during the years of the Second World War by Service groups and military installations including gun emplacements, observation towers, an antisubmarine boom net across the Harbour and a Radar station near the Charles Point Lighthouse in 1942, it was the establishment of the Radio Australia facilities which has resulted in a steady growth in population following the introduction of electric power, regular marine transport from Darwin, telephone services and a shortened upgraded road to Darwin.

In November 1879, Maurice Holtze, the Government Gardener established a 16 hectare nursery at Fannie Bay to determine the suitability of certain crops for cultivation in the Northern Territory. His work indicated that sugar cane, indigo, cotton, tapioca, rice, ginger, ground nut and others thrived under the climatic conditions. In a report he stated:

"All of these have grown in such luxuriance and have been so completely free from disease or vermin that I have not the slighted hesitation in recommending their cultivation".

In 1875, a company called the De Lissa Company established a sugar cane plantation on a 5000 hectare site at a settlement known as Delissaville (Aboriginal settlement Belyuen). The Receiving station for Radio Australia was subsequently erected not far from the settlement.

In June 1882, the Government Resident reported:

"The canes on the De Lissa Company site are growing vigorously and the growth proves what the land on Cox Peninsula will grow. Messrs Erikson, Cloppenberg, Harris and Head who have taken up land on the Peninsula are all doing well with sugar cane, tobacco, maize, and other produce. As they are rather far from the De Lissa Company mill, there is some hope of them being able to obtain a small mill."

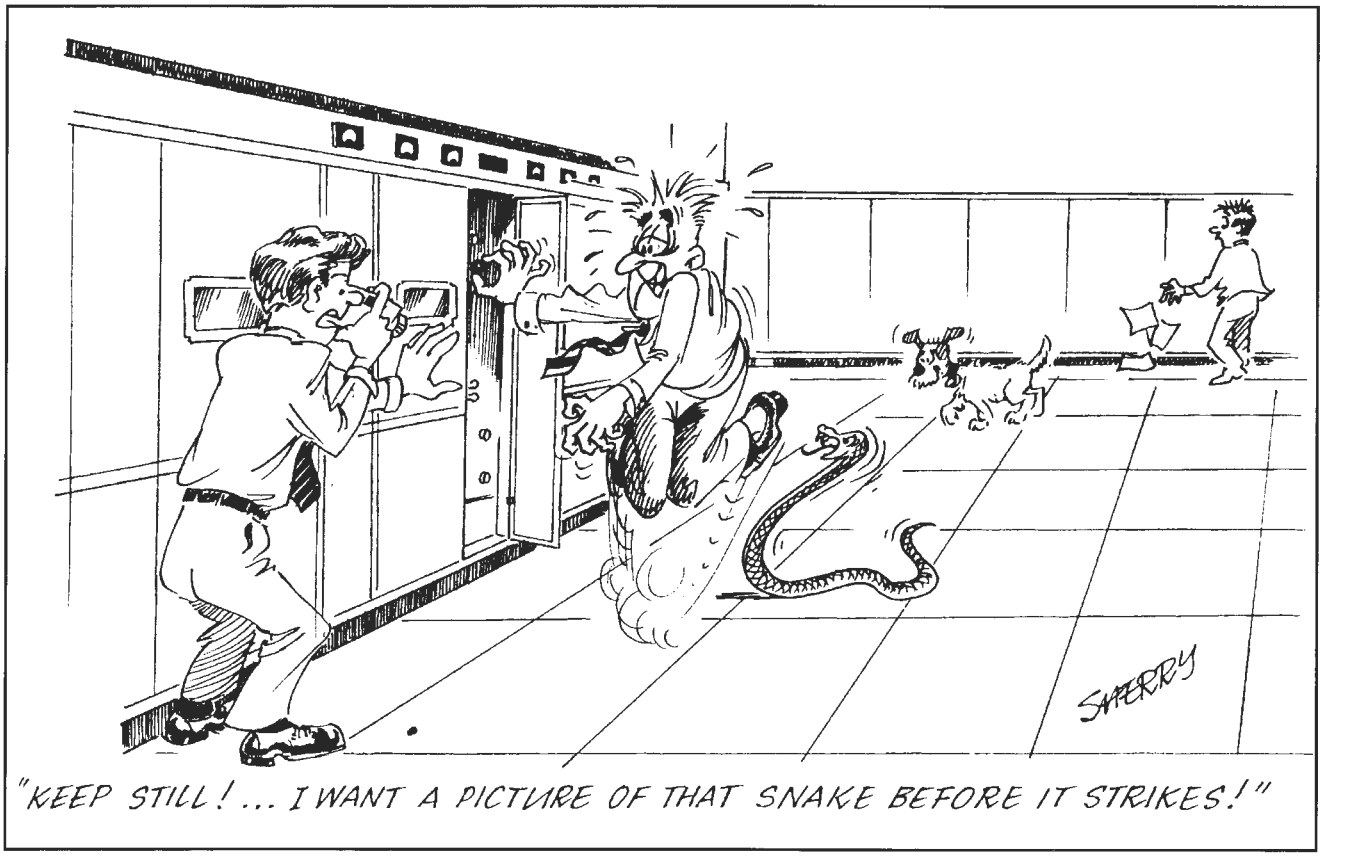
Due to a number of factors, yields were well below expectations and by 1884 the De Lissa Company abandoned the project after having produced only 12 tons of sugar, well below the 400 tons required by the Government for a £5000 grant.

On February 1893, a lighthouse was constructed at Charles Point adjacent to the present Radio Australia transmitting site. For 40 years the light operated with kerosene before being converted to gas in 1933. In 1982 it was converted to electric power following the completion of mains power to the nearby transmitting station. Three houses were erected at the lighthouse site to accommodate staff but the houses were later dismantled and re-erected in Darwin. It was on the site of the residences that the base camp under Jim Finch was established for the construction of the Radio Australia complex.

During the Second World War, three aircraft are known to have crashed on the Peninsula. They include a US Liberator, a US Kittyhawk and a Japanese Mitsubishi 'Betty' Bomber.

Following the establishment of Radio Australia, extensive land subdivision took place and housing development has taken place since. One of the early people to build a home was Ted Notley and his wife. Ted was one of the original Shift Supervising Technicians at the station and still lives there today enjoying retirement.

RALPH DENISON



"KEEP STILL!... I WANT A PICTURE OF THAT SNAKE BEFORE IT STRIKES!"

LETTERS TO THE EDITOR

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

Sir,

In line with widespread practice these days, including the National Broadcasting Service, the 5RN/5AN Pimpala valve transmitters are to be replaced with solid state units.

Besides the wear and tear as a result of over 33 years or operation, there are a number of other reasons why the time has come for modern technology to replace that developed so long ago.

In a large transmitting complex and long delivery times following the placement of a contract, it is necessary to hold many valves as spares. With passage of time, these valves will deteriorate unless subjected to working conditions or simulated working conditions at regular intervals.

In the usual case, this means rotating the stock of values through the transmitter. There are of course a number of problems in this practice and during the design of the Metropolitan Transmitting Centre at Pimpala, it was decided to avoid the necessity of putting the spares through the transmitters.

The Divisional Engineer gave the project, to design, develop and commission a valve conditioner to handle the two major amplifying valves associated with the 55 kW and 10 kW transmitters, to me.

As it was the first such unit developed and manufactured in South Australia, and as far as I can ascertain also the first such unit developed for an MF broadcasting station in Australia, readers of *The Broadcaster* may be interested to see a photograph of the unit as originally installed.

I was one of many people associated with the Pimpala project which involved the establishment of a completely new Metropolitan Transmitting Centre to replace facilities in operation at Brooklyn Park starting from 1926. At the time, it was the largest broadcast transmitter engineering work undertaken in the State. Transmitter call signs were 5CL and 5AN but in recent years, 5CL was changed to 5RN.

The unit was designed to condition the two major amplifying valves originally employed with the STC 55/10 kW transmitters. These were the 3J/261E and 3J/192E. The 55 kW transmitter employed five 3J/261E air blast triodes with three in parallel in the Class C RF amplifier and two in push-pull in the Class B modulator. The 3J/192E was used as an RF driver and a push-pull pair modulation driver in the 55 kW transmitter, and three in the RF power amplifier and two in the modulator of the 10 kW transmitter.

As originally commissioned when I worked on the project, the station comprised 55 kW main and 10 kW standby for 5CL and 10 kW main and 2 kW standby for 5AN. In later years, 5AN was upgraded to 55/10 kW combination.

Due to rising costs and procurement problems, the 3J/261E type was later replaced by Philips TBL 12/25 type and the 3J/192E type was replaced by Philips TBL 7/8000 type. However, the valve conditioner was suitable for employment with these new types following some minor modifications.

The valve conditioner played a major role in maintaining valves to fully operational conditions and will continue to do so right up to the time when the valve transmitters are replaced by solid state units scheduled for the next few months.

BILL GOLD

The valve conditioner unit.

BROADCASTING MILESTONES

6WN (RN) PERTH

In mid 1937, tenders were called to supply a transmitter for a second National broadcasting station in Perth. Originally to be called 6PH, 6WN was officially opened on 12 October 1938. The STC transmitter had an output of 500 watts and operated on 790 kHz.

The transmitter was located on the sixth floor of the Perth GPO with a self supporting 60 metres tower on the roof. The feeder was a rigid coaxial line.

The outbreak of hostilities with Japan in December 1941 led to the removal of the station to a less conspicuous location in bushland at Mt Lawley Golf Course.

By 1946, 6WN was once more on the move, this time to a site near Canningbridge some 6km south of the city, its power meantime having been increased to 1 kW. This move was in line with a proposal to relocate both 6WN and 6WF nearer to the centre of population for the combined Perth and Fremantle areas. New 10 kW transmitters for both services were also proposed.

A new 10 kW transmitter for 6WN did eventuate in 1953 with an AWA J5096 type but further planning changes led to it being co-sited with 6WF about 12 km north of Perth. The trusty STC 1 kW also moved to this site being relegated to standby duties with the commissioning of the 10 kW plant.

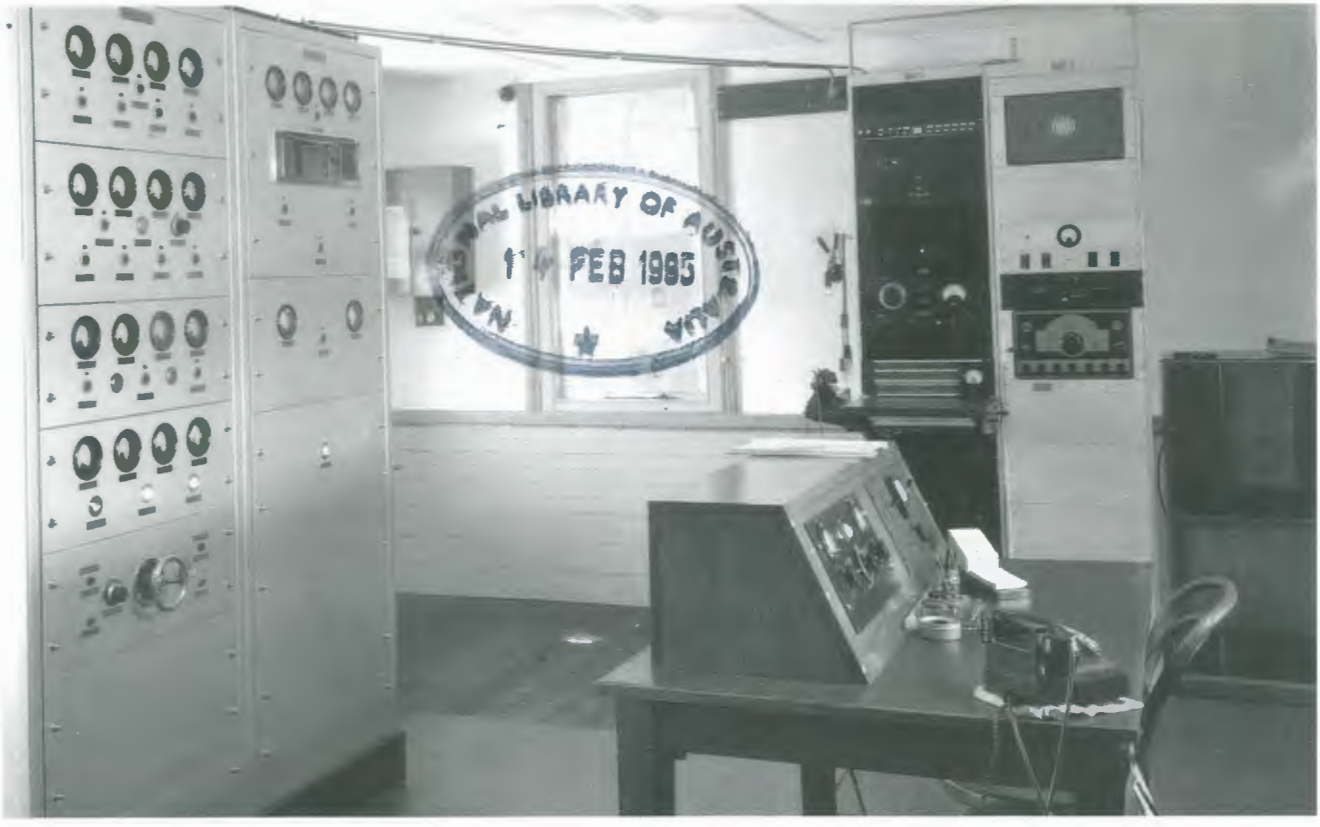
Completion of a 180 m top loaded mast in 1953 once again allowed 6WN to operate into a permanent, efficient aerial. It was joined on this aerial by 6WF (5 kW) in 1956, via a newly designed dual frequency ACU. That same year, the 1 kW transmitter was retired and replaced with a new Philips 2 kW 1656 type.

Further moves were in store for the 6WN transmitter however. In 1960 a new transmitter building was constructed, and in 1962 a new STC 10 kW transmitter 4-SU-64 was installed for 6WN, 6WF being already in the new building. The 6WN 2 kW Philips was relocated to the new building and continued as 6WN standby.

Later, to be identified as 6RN and operating on 810 kHz, the 10 kW STC and 2 kW Philips units have been scheduled for replacement in the near future by a pair of Nautel 10 kW transmitters giving a combined power output of 20 kW.

DEREK PROSSER

Dual frequency radiator shared with 6WF.



Installation at Canning Bridge circa 1950.