# OTVA NEWSLETTER

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### THE OVERHEADS

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## Coming Events

### NSW SEPTEMBER EVENT

13 September at the Telstra Museum, Kitchener Parade Bankstown at 10:30am

Followed by lunch at the Bankstown RSL. There is need to know numbers fairly accurately. Please advise David Richardson (d_s_richardson@yahoo.com.au), 9487 1985 or Henry Cranfield – (henrycra@aapt.net.au) or 9534 1526

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### BOOK IN NOW –

### Noon on 17 November, 2006

#### THE OTVA GOLDEN JUBILEE CELEBRATION

Bring your partner and help celebrate the 50th Anniversary of your Association.  This will be a grand affair and used to launch a DVD of the Association's history.  Full details in the next issue but note the date in your diary (Midday, 17 November, 2006) **DO IT NOW  There is a limit on attendance and bookings must be completed (ie you pay when you book!!) by 20 October.**  Bookings to Will Whyte, will.whyte@optus.com.au  or  Peter  Bull: Peter.Bull.NOC@optus.com.au  or  Henry – (henrycra@aapt.net.au) or 9534 1526

If Bob Dentskevich can come halfway round the world, you should be able to make it too.

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**THE PRESIDENT'S MESSAGE:** We look back on the 50 years since our foundation, grateful for the leadership and efforts of those who brought us to today!  Immense changes have

come about in all our lifestyles, brought by the changes in electrotechnology, the speed of change and changes to our way of life and economic rationalism. The organizations, then participants in Australia's international communications are no longer in existence but our organization remains and looks confidently to the future.

Though numbers were down, a successful AGM was held in June and we welcome two new members to our committee in Brian Curran and Bob Murray. We look forward to their contributions in the coming year. Sadly, Eamon Fitzpatrick had to resign, due to illness and we extend to him our sincere thanks for his past efforts on our behalf and wish him a speedy and healthy recovery.

OTVA's success in the coming years depends on the participation of all our membership in its activities, whatever they may be and to the degree of their involvement. All must have tales to tell of their working days, the technology they were or now are working with, plus the humorous day to day events that occurred in their workplaces, or photos. Thus may they contribute to our Newsletter.

Our Newsletter is the personal history of the contributions made to our nation's telecommunications with the world which began in 1872 with the opening of the telegraph from London, UK to Adelaide, S.A via the submarine telegraph cable to Darwin and Todd's Overland Telegraph line to Adelaide. We have much to write about and where else is it written in such a personal format? We are open to suggestions for functions in the coming year and look for your ideas. We have planned a visit to the "Southern Cross" Fibre Optic Cable head at Alexandria for the spring of 2007. A most interesting experience, as the committee just found!!

Let us look to the future in a positive light, enjoy our forthcoming "Golden Jubilee Function " as a celebration of success and the bringing together of those with whom we shared so much and the remembrance of those who are no longer here to share our memories.

Sincerely

Henry

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**50TH NSW AGM REPORT**, held at the CTA Club, Friday 16th June, 2006.

**Members present:** Ernie Anthoney, Tom Barker, Ted Bastow, Brian Callaghan, Mick Callaghan, Gordon Cupit, Brian Curran, Henry Cranfield, John Eades, Allan Hennessy, Mrs Judy Holland (Scottie Hamilton's daughter), Rev. Angus Holland, Ray Hookway, Kim Hopkins, John Hughes, David Izatt, Col Kelly, Bob Lions, George Madren, Graham Markey, Noel Martin, John Mattes, John McDermott, Peter Mills, Don Montgomery, Bob Murray, Paul Naggar, Stuart Pengilly, David Richardson, Peter Skinner, Tony Stuart, John Tar, Doug Temperley, Ken Theaker, Jim Tresidder, Robin Tuckfield, Cyril Vahtrick, Ernie Wan, Will Whyte, Don Withers, Brian Woods.

**Apologies:** Jim Anderson, Jim Keenan, Ross Beaumont, Peter Bull, Wal Donald, Jeff Hinwood, John Hibbard, George Kennedy, Bernie White, David Bourne, Bruce Collett, Eamon Fitzpatrick, Pam Helps, John Hibbard, David Izatt, Fred Kannard, Ron Lukin, George Maltby, Paul Naggar, Bryan Nell, Bob Pearson, John Phillips, Darrel Savage, Ron Lukin, Gareth Thompson, Bob Rawkins, Jim Simpson, Jim Tresidder, Bernie White, Mick Willden.

**Welcome:** The President welcomed those present and posed the a question, "Did members remember where they were on the 17th July 1956 when the first OTVA AGM was held.?"

**Presidents address:** Starting in 1955, a group of staff members from AWA, OTC and C& W, met to found our organization. On the 17th July 1956, they adopted a constitution and elected office bearers for the coming year. Thus began our Association. The details of this are available in our newsletters and on our website. The most contentious item in the constitution was "The qualifications for membership" which were set at '25 years service in International Communications' by a plebiscite of members some weeks later". Today our requirements are "are serving or have served in international communications",

brought about by changing circumstances in the industry.

Associations in other states followed, Melbourne in 1957, Brisbane, South and West Australia in the early 1970's. Mention must be made of the support given by the then G.M, Harold White and the work of Charlie Carthew and Gordon Cupit to spread the association to these states at that time. Over the years, numbers have dwindled and today South Australia and West Australia have annual functions, Melbourne meets twice per year and Brisbane no longer functions.

Over the past 50 years, we have seen immense changes in communications and electronic technology. We are today, in a time of "Economic Rationalism and the instant interconnected world." with little time for social niceties.

Our organization has survived despite these changes, together with the demise of AWA and OTC whilst C& W has limited presence. To our officers and members, who we salute today with much gratitude, go thanks for their continuing efforts! Perhaps the loss of support on the merger of OTC with Telecom, now known as "Telstra", was our biggest hurdle! Today we are financially viable, publishing 4 issues of our Newsletter each year and still enjoy socializing with those whom we worked.

Our historical artefacts are packed and in the Telstra Museum in Bankstown and all printed records are held by the National Archives; a large undertaking under Ray Hookway to whom we extend thanks and appreciation. The microphone and pen set from the opening of the Sydney Harbour Bridge, donated to us by the late Phillip Geeves, are now held by the "Power House Museum" in Sydney. The contribution of the staff of Telstra's Bankstown Museum is also acknowledged.

The engraved foundation stone from the opening of OTC's Doonside Transmitting Station has been donated to the Vet's, thanks to Kerry Adams who was approached by its present owner. Our thanks to Kerry for his effort and we will receive same shortly.

We held only 3 social functions this past year, as our proposed visit to Paddington was cancelled as "Reach" could not agree to it. *(The alternative function at the Oaks, attracted 5 members including Jim Simpson in some of his rare time off from domestic duties. Ed)* David Richardson has maintained the standard of our social functions aided by Eamon Fitzpatrick. At Christmas we even received a few accolades. We are most conscious of the need to keep prices down. Perhaps one of the cost items that is not generally known is "Room Hire;" for example, today's cost is $250.00. The greater the number' the cheaper this cost is? We also have to pay for the minimum number we specify for those who "accept" but fail to attend. Some thought must be given to charging those who "accept" and fail to apologise or attend.

Our "Golden Jubilee Social Function" on 17th November, which will cost $30.00 per head is under the stewardship of Will Whyte and Peter Bull. The organisation for same is going well and we will have final details in the next Newsletter. Numbers will be limited so may I suggest early bookings! like today! There is parking under The Bowlers Club for a special rate of $10.00, we ask you to please book with them; also a lift and wheelchair access for those who find stairs a problem. We have a few surprises in store for all who attend and when booking we ask you to please advise your partner's name, if attending, for "name tags ".

It was proposed that we put together "A History Book". Martin Ratia readily accepted the task of editor and spent a large amount of time at Telstra going through every Transit and Contact magazine etc in the archives. He also looked at the OTVA Newsletters and I must agree with him that to write a book, rather than a report, from the available material was not a valid proposition and there were problems reproducing some photos. It must be said that our Newsletters are an excellent source of reference material and we have had a number of requests for information, from New Zealand as well as Australia. Gordon Cupit wrote "A short OTVA History" which appeared in the Newsletter recently. We now have all issues to date of the OTVA Newsletter on CD, thanks to Peter Bull who

scanned them all. Our query is "Who would like a copy". The indexes for each volume were compiled by Gordon Cupit; to whom goes a most sincere vote of thanks, not only for this, but also for his flow of Newsletter material and critical comments. We are trying to compile the indexes for each volume into a Master File" but this, too, is fraught with formatting problems.

Your committee has worked well and tirelessly and to all its members goes a sincere vote of thanks. Our treasurer, Bernie White, survived Ken Theaker and Tony Farrugia's Audit and we thank them for their efforts which are covered later in the financial report. Bernie's astute control of our finances means that we do not have to increase our annual fees for this coming year.

Will Whyte has provided us with an excellent committee meeting venue and to him we owe thanks for this and his secretarial activities. Once again Bob Lions and the "Distribution Committee" of Allan Hennessy and Bernie and Evelyn White have put out 4 excellent issues of our Newsletter, now with photos. However, we still need anecdotes, photos or whatever. Allan also maintains our data base and seeks your help in maintaining all Email and postal addresses.

Our website has been upgraded by Joe Collister to whom we give thanks and appreciation for his work this past year. To Jeff Hinwood and Kim Hopkins we also give thanks for their assistance in this regard.

What of the future many ask?

My personal view, which is shared by others, is that we must do several things,

Our cause will be lost, if we do not encourage an influx of the younger members on to our committee to bring fresh ideas and lead us forward. Look around and you see that most committee members are suffering from the ailment known as "AGE".

We must find activities that bring interaction and participation of all members and so bind us together and are of interest to the younger members. The activities at La Perouse were an excellent example of this. Social activities, alone do not encourage people to join. There must be an "Interest factor?"

To the Presidents and Secretaries in Victoria, West and South Australia and our membership nationwide, go especial thanks for your continuing support, it is much appreciated. We extend best wishes to you all for the year ahead, may it be a "Golden One"

It has been my personal privilege and pleasure to have presided this past year. To all our members I extend my personal thanks and appreciation, for your support and contributions. Let us now go forward, ever mindful of those who originated our association, together with those who contributed along the way to ensure its ongoing success!

Our future lies with you, the members and to your degree of participation!

**The Treasurer's report**: Was presented in Bernie's absence by Allan Hennessy and showed, once again that young Scrooge had been very careful with our money..

**Newsletter Editor's report:** Bob Lions once again urged every member to jot down their story which would provide enough material for many subsequent editions of the Newsletter.

**Re election of office bearers:** Cyril Vahtrick took the chair and after declaring all positions vacant, took nominations for the following positions which, as usual were filled by acclamation:

President: Henry Cranfield.

Vice President: Bob Lions

Secretary: Will Whyte

Treasurer: Bernie White

Auditors: Ken Theaker and Tony Farrugia were reappointed.

New Committee members: Bob Murray and Brian Curran

Committee in total: Henry Cranfield, Brian Curran, Peter Bull, Allan Hennessy, Jeff Hinwood, Ray Hookway, David Richardson, Bernie White, Bob Lions, Bob Murray, Kim Hopkins, Will Whyte.

**Golden Jubilee:** Will Whyte presented a report on the planning of our Golden Jubilee to be held on Friday 17th November.

**General Business**: Tom Barker thanked the president and committee for the team effort during the year.

A visit to the Southern Cross Cable Station will be arranged in the new year. (2007)

Bob Murray mentioned that he still possessed many copies of the OTC communications history books. He proposed that we give them away at our Golden Jubilee function.

The formal meeting closed at 1:10pm and we then adjourned to the important task of talking to old friends and colleagues over a few drinks.

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**REPORT ON SA AGM**, 25th May 2006, at the old McLarenvale Pub, Noon to 2:30. Attended by 8 members, John McGregor (Pres), Harry Stone (Sec), Dave Herbert (past Pres), Max Lang, Dick Inwood, Ern Barrett, Harro Klause & Mike Howard

Apologies from Paddy Wilkinson & Max Smith.

After a short discussion, the positions of President & Secretary were retained respectively by John McGregor and Harry Stone for the ensuing twelve months.

The next Xmas gathering was also discussed with the possibility of the venue and date being talked about, with a very good proposal of holding it at the old OTC VIA Coastal Radio station on a Saturday or Sunday, to be advised later, (good turkey & plonk from the old firm of Harro & Mike).

I have just recovered from a visit to son John who lives on the coastline of Clearwater Bay, Saikung, adjacent to Hong Kong and am trying to shed the extra stone I've put on.

Any of the old Beamers left who worked in SOR operating centre may be interested to know that Ross Herrington and wife Margaret are still alive and kicking but suffering the inevitable onset of old age. Margaret is now installed in a very good Aged care centre only a few blocks from Ross's home near Glenelg and he visits her daily. I go down to visit them every weekend and have a few jugs with Ross and recount the various humorous episodes that occurred to us in the "good old days".

The other OTC vets all seem to be battling along ok healthwise and we all send greetings & 73s from us to you all out there around Australia.

Cheers , beers and 73s from Harry Stone.

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**MELBOURNE AGM**, Thursday, June 15, 2006

We were expecting 28 to attend, but only 24 rolled up and we had an apology list of 25. Total invites 128.

Attended: We had some welcome new faces namely Ed Willingham, Dimi & Helen Krisa, Robert Van Gestel, along with our regulars John Caulfield, Denis Chambers, John Davey, Noel Dennis, Joan & Cyril Ferne, Jim Fes, Vance Findlay, Les Foley, Arthur & Robert, Judith & Robert Hall, Mervyn Jessop, Gerard McCarthy, Robert Symes, Mary Tancheff, Brian Williams, Ray & Dorothy Birch.

Sadly we have lost two Members this week, James Cameron Kennedy, and Ivan Amey, both aged 77

Due to renovations not finished at Legacy, the meeting was held in church hall, cnr Lt. Lonsdale & Swanston Sts. It was ok but will be better next time.

Regards to all, Robert Hall,

Hon. Secretary/Treasurer Melbourne

### A FEW PICTURES FROM THE MELBOURNE AGM



Judith Hall, Vance Findlay, Robert Hall



Gerard McCarthy, Brian Williams

Les Foley, Cyril Ferne, Denis Chambers

The following message was sent to Henry after the Melbourne meeting, just prior to the NSW AGM, showing that our communications still miss sometimes!

"Dear Henry Cranfield,

President OTVA (NSW).

On behalf of our newly elected President, Mr Vance Findlay, and all our Members and Friends we wish you and all your Members and especially those attending your AGM gathering today a fruitful and joyous occasion.

Henry, I believe that you are retiring from the position of President. I personally would like to thank you for your loyal leadership, co-operation and advice when needed and on behalf of all our members we wish you a long and healthy life.

My wife and I look forward to meeting you and many other former colleagues I have had contact with over many years, as we are intending, and hoping to be able to attend your 50th Anniversary function, also a welcome invitation to your members, to attend our function is extended, details to follow at a later date."

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(For those who remember George Magnus, his wife Penny passed away on Saturday 17th June 2006 Aged 86. Funeral was on Friday 23rd, St. Francis Xavier Catholic Church, Cnr Dorking and Whitehorse Roads.)

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### REF THE PHOTO ON PAGE 102

The personnel in the photo of the turnoff of the last transmitter at Fiskville in the last issue were noted as unknown. One of our correspondents has identified them, left to right they were; Bill Jenvey, Keith Parker Vince Joiner and Tom Lang

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### BEAM OPERATING PROCEDURES — 1927-1940 - C.R.O. SYDNEY – (Part 2 )

### (By QPee,)

### Outward Circulation.

When all Counter action was complete the cables were then passed to the Outward Circulation Clerk. This clerk had in front of him a bank of pigeon holes, where cables were sorted into different classifications and destinations.

Traffic was divided into - Urgent - Full Rate - Letter Telegrams - Daily Letter Telegrams and Press. Rates to London for example were Urgent 3/4d per word, Full rate l/8d per word, Letter Telegram ( LC ) 10/d per word and Daily Letter rate (DLT) 13/1 Id for 25 words. Urgent and Full rate were given priority, LC guaranteed to be delivered within 24 hours and DLT within 48 hours. LCs were processed after Full Raters and DLTs followed the LCs, but were held over the office of destination for the full 48 hours.

All cables for the British Isles, and Europe was sent to London ( Call signs of London stations being GNH and HNY ). American traffic sent the San Francisco. We also had direct circuits to Manila and Shanghai. Pacific Islands, Papua/NG and ships at sea were serviced by the Island Radio and Coastal Radio Services of AWA, also based in the Central Radio Office, York Street.

Traffic for Africa, South America, and the East were lodged by most clients direct with Cable and Wireless situated in Spring Street. Beam clients could leave such traffic at York Street and we would send it to the Cable Office by messenger.

Traffic sorted into class and destination by the Outward Circulation Clerk into pigeon holes was then treated in order of priority, i.e. Urgent, Press, Full Rate, LC and DLT. Each cable was then given a circuit number e.g. in the case to London SB for full rate, KSB for LC rate and LSB for DLT cables. The numbers were originated from a numerical sheet and on this sheet the counter number was

placed. The Counter number was written on the sheet where the SB or KSB number etc was entered. This provided a simple double number entry system. The London office kept a similar system and would advise immediately if any numbers were missing.

A similar system was kept for traffic received and an hourly situation message was received which was checked by the Supervisor against the records at this end. This ensured that no traffic was delayed or lost for more than an hour. A similar system was universal and guaranteed that no traffic was lost or unduly delayed.,

**Preparation For Transmission.**

Telegraphists took bundles of sorted traffic and prepared a perforated tape on a typewriter type machine which perforated the letters or figures into Morse code. These were then given to checkers who were seated at a transmitter (not connected to a circuit) which had a sounder attached. This telegraphist checked the sounder tape for errors which was corrected before transmission. He was also provided with a book of Error Forms. All errors were debited to the perforating telegraphed who was asked to explain his mistake. Should a telegraphist receive 12 of more of these notices in a 12 month period, he would find that he would not get his annual increment. As perforating telegraphists were averaging at least 40 words per minute, this system some very good and accurate typists.

Mistakes in cables can have some devastating results, e.g. One case , I remember was an error in the size of steel framed windows for the Hardie Building. Hundreds of windows and frames were imported which were too small. To obviate such errors, all figures and odd words in cables are repeated at the end and the receiving telegraphist is required to check this. It is called the collation.

Initially clients were allowed to use 10 letter code in the cables, but it was found that clients were using a number of 5 letter code books and joining up two words. Subsequently 10 letter codes were banned world wide. 10 letter codes were difficult to type and many mistakes were a result. 5 letter code was much simpler to prepare.

Completed and checked tapes were then passed to a Senior Telegraphist who were used to man the circuits. These were sent on a transmitting head and after sent were noted in a circuit log and each message was timed. It had also been timed previously by the perforating telegraphist. Traffic on being sent, the tapes were rolled up and the actual clients message pigeon holed then bundled. All messages and tapes were kept for two years before destruction. This allowed for evidence in a legal case.

In the CRO was a patchboard where all circuits in and out could be connected to he transmitting and receiving stations. All London traffic was routed though the Melbourne CRO to the Ballan and Rockbank stations. When conditions were good the Melbourne office patched these stations direct to Sydney which had direct control of the circuits. When conditions were bad or when there was little traffic, the Melbourne CRO took the traffic on tape, and transmitted when appropriate. When conditions were good it was called ZSO working. When conditions deteriorated, it was necessary to send tapes two or three times. This was termed ZST or ZS3. At the receiving end the traffic was received on an undulator slip. This slip was gummed to a sheet and each transmission stuck under the previous one. This way, it was usually possible to get the full message. When it was not possible to read the slips, transmission was stopped.

At that time radio theory was that transmission would not penetrate the Ionosphere and this fact was used in the Beam system as a reflector. In the case of the Beam, High Frequency signals were beamed to the ionosphere and bounced back to earth. Under usual conditions transmission was eleven hops between Australia and London. It was not until space exploration, that it was found that in fact the ionosphere could be penetrated by very high frequencies.

It was found that signals were better during night periods for the majority of the route. Normally transmission was on the short route, that is via China and Russia. At other times it was found better on the Long route, i.e. via the

polar region. Should both of these not be suitable, the route was via a relay station at Barbados. Later on relay stations were opened in Colombo and Nairobi.

The Government operated an Ionospheric Prediction service, which forecast sunspot and any other conditions which affected the Ionosphere. It was found that this operated on an 11 year cycle, and had the effect of lowering the Ionosphere. It was then necessary to operate on higher frequencies and use more hops. Sometimes the Beam service was out of action for a few days and at this time all traffic was diverted to the cable companies, of course, at a cost.

Stations were also established at Pennant Hills and La Perouse in Sydney and these were used for traffic to San Francisco, Shanghai, Manila, Papua/NG, Pacific Islands and to ships at sea.

*(Don't worry, there is more to come in the next issue!  Ed.)*

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### The Era:

*(Dennis Grant)*

Trying to maintain at least a modicum of fitness, Marita and I walk around the tree lined streets of Wahroonga from time to time. We have passed on several occasions now a small memorial on a street corner commemorating the first wireless transmission in 1918 from Carnarvon in Wales to a temporary site near this memorial location in Wahroonga. The Wales site was under the supervision of the Marchese de Marconi and this end was set up by Ernest Fisk. A truly historic event but of course predated by several years by direct cable transmissions.

We have been witnesses to tremendous development of transmission technology, from alternating between cable and radio and fantastic feats of engineering in constructing massive lengths of cable and stringing it along the ocean floors or along stringybark poles across Australia or latterly, under ground, as we roar across deserts and plains in bulldozers. Counter that with the rocket technology to lift two tonne satellites 35000 km and add to all that the ability to build repeaters be they microwave as in satellites, valve and solid

state as in cables, capable of operating, without maintenance, for 20 plus years in extremely hostile environments.

Consider also the brute force of the HF juggernaut transmitters pumping out hundreds of thousands of kilowatts. And then the grunt of the earth station HPAs running 12 to 15 kW TWTs and Klystrons. A couple of snippets to come.  *(These should be in the next Newsletter.  Ed.)*

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### THE BROADCAST IN AUSTRALIA OF THE CORONATION OF KING GEORGE VI – June 1937.

*by Henry Cranfield*

Having been given a rather bedraggled volume of the "Telecom Journal of Australia" (Feb1937 to June1940) by Terry Hume, (Ex Paddington) who now lives in Brisbane, I came upon many interesting articles for an Ex PMG man like myself.  An article by the late Harry(A.H.) Kaye, describing the rebroadcast of the BBC coverage of the Coronation of King George VI shows how greatly time and technology have changed.  This is an extract of the major points from his article.

The programme was broadcast from the BBC's transmitters in Daventry, UK, for 5 hours and 30minutes from 7.00 PM to 12.30 AM (AEST), on a range of frequencies with 16.00MHz band providing the best direct service and 10.00MHz from Hong Kong on relay.

Of the actual 5 Hours 30 Minutes coverage;

157 minutes were received direct
74 minutes were relayed through Canada
32 minutes were relayed through USA
116 minutes were relayed through Hong Kong

In order to provide the best coverage, 8 receiving site were selected and the resources of both the PMG's Department and AWA were utilized, with the programme material being pooled.  Reception centres were located at La Perouse and Middle Head in Sydney; Mont Park (2) and Rockbank in Victoria; Sommerton in South Australia whilst Queensland was fed from the Sydney site and Tasmania from Melbourne.  From time to time it was found that fading could be overcome by

combining the signals from La Perouse and Mont Park. A total of 20 changes were made over the 5 1/2 hour period.

A central control centre was set up in the city West Exchange in Melbourne, where the best quality circuit was selected and distributed; the ABC being responsible for its network and AWA for all the commercial stations. All the equipment at the City West exchange was duplicated.

West Australia proved a difficulty for the commercial stations as there was only one telephone circuit available between Adelaide and Perth. A local receiving station was set up using 4 receivers and this programme was far better than that in the Eastern states initially but later failed at 10.00PM. AEST. A total of 96 stations participated in the programme nationwide.

It must be mentioned that on the previous nights, sunspot activity was very bad and the ABC had prepared a special programme for use in the event of this occurring on the actual night but this was not needed. It was generally agreed that the programme was satisfactory and "adequate justification for the somewhat elaborate precautions."

All this took place 69 years ago. There was no TV, transistors or printed circuit boards and microchips, satellites, fibre optic cables and co-axial cable systems were still in a developmental stage. Having survived all this, one must take ones hat off to those pioneers who made it happen. . That was "Steam Radio" at its best

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## HF days at Doonside.

*(by Dennis Grant)*

OTC had had built some 10 kw transmitters, one of which had an unstable final stage and so this had been bypassed and a short transmission line led from the output of the 2kw driver stage directly to the main transmission line to the aerial exchange and then on to the aerial. The short bypass line was just the two wires inside the cabinet where the final tube would normally reside. This was of course protected by a gate switch. One of our class members, one Paul Black, noticing that

the wires were somewhat bent and untidy thought how good it would be to show some initiative and smooth the wires into a neat parallel curved line from top to bottom. Being a trainee he did not realize that the TX was operating and opened the doors. The gate switches did not work and so Paul grabbed a fistful of RF through both hands. The burns took many months to heal.

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## THE SLIDE RULE - A FORGOTTEN TOOL.

By Erik Bachmann

The slide rule was developed and improved over a long period. For more than 300 years it was an invaluable companion of scientists and engineers, and engineering design and construction would have been impossible without its help. Nevertheless few, if any technological objects have seen the sudden fall of the slide rule, following its meteoric rise. It disappeared practically overnight in the early 1970s, following the availability of cheap electronic pocket calculators.

### History.

In pre-historic times the lack of development of numerical notations, as well as the poor understanding of mathematics, mitigated against the mechanisation of calculation. In general, calculations were limited to counting using pebbles, sticks, etc. In historic times, counting boards were used by merchants in ancient Rome and the abacus in China. At some stage, however, astronomy, navigation, artillery and land surveying started to require more sophisticated calculation methods.

The forerunner of the slide rule was the sector, the initial invention of which is generally attributed to Galileo Galilei about 1597. It consists of a hinged pair of rulers with graduated numbers which may be added or subtracted with the help of a pair of dividers (the modern configuration uses logarithmic graduation). It took a number of steps by a number of people to develop the slide rule.

The crucial foundation was laid by four Englishmen early in the 17th century. The seminal invention, which eventually via a number of steps led to the modern slide rule was the invention of the natural logarithm by

Lord John Napier (1550-1617), a Scottish landowner with an interest inter alia in mathematics. He published a book in 1614, in which a table of logarithms was shown, which made it possible to reduce multiplication and division to addition and subtraction. The "Napier's Bones" calculator came in the shape of a number of rods marked with numbers, which allowed multiplication to be done by the addition of numbers (1617).

About 1616, Henry Briggs (1561-1630), Professor of Geometry at Gresham College near London, explained the advantages of the base 10 logarithm, relative to the natural logarithm. Briggs visited Napier in 1616, during which he probably showed Napier the tables he had developed, using base 10 logarithms.

Edmund Gunter (1581-1626), Professor of Astronomy at Gresham, converted logarithms into distances along a straight edge, introducing the "Gunter Scale" around 1620. In 1618 Gunter introduced a quadrant device for determining the hours of the day and the azimuth. Improved Gunter Scales were used by sea captains and ships' pilots to the end of the 19th century, when the modern technical slide rule had established its ascendancy. Gunter also introduced a mechanical interpretation of a logarithmic scale in both linear and circular forms. Initially the linear scales were held against each other by hand, while on the circular rules dividers were pivoted at the centre of the discs.

The Reverend William Oughtred, mathematics teacher, is often recognized as the inventor of the slide rule. In 1631 he published "The Circles of Proportion and the Horizontal Instrument", describing a circular slide rule. The original design had two discs with concentric logarithmic scales which rotated against each other. It was implemented by Elias Allen, an instrument maker in the Strand in London, who reduced Oughtred's two "Circles of Proportion" to a single disc.

Among others, Edmund Wingate has been credited with the introduction of a slide to a fixed body in 1626 to produce his so-called "Rule of Proportion" by drawing log scales on two rules which were capable of being placed in juxtaposition. In 1654 Robert Bissaker introduced a slide between fixed stocks, thus producing a form which was very similar to the modern slide rule.

**Brief Theory.**

The use of logarithms for the slide rule is fundamental. By representing distances on the scales by the logarithm of the figures marked on the scales, it becomes possible to carry out multiplications by adding figures on the scale, and divisions by subtracting figures:

$\log (AB) = \log A + \log B$, and

$\log (A/B) = \log A - \log B$.

By the middle of the 17th century the slide rule had established itself, following which it continued to be gradually developed. Its advantages of speed and sufficient precision (2 to 3 places) were quickly recognized, and many slide rules were implemented, both for general and specialist uses. In particular increased accuracy of the marking of the graduations led to great improvement in the accuracy of calculations. The functionality was also improved, for example the importance of the introduction of the log-log scales should be mentioned. It was first suggested by Peter Mark Roget to the Royal Society in London in 1815, and the increasing calculation requirements in the areas of thermodynamics, physics and electrical engineering led to its re-invention with improvements in 1881.

**Types of Slide Rules.**

The common forms are the rectilinear and the circular ones, the latter with circular and spiral scales. The earliest standard for rectilinear slide rules is the French Mannheim rule, which was first manufactured in about 1955. It was the first standard rule to be supplied with a cursor. It has the following scales:

Scale A: a two-cycle logarithmic scale placed on the bottom edge of the gap in the stock;

Scale B: an identical scale on the top edge of the slide;

Scale C: on the bottom edge of the slide there is a scale running from 1 to 10; this is a single-cycle logarithmic scale used for most calculations;

Scale D: an identical scale below Scale C on the top of the bottom of the gap.

Until about 1930 most slide rules had only these four basic scales. Since then this arrangement has been found to be limited in scope and over the years it has been supplemented with a multitude of additional scales, including square roots, squares, cubes, sines, tangents, reciprocals, and log-logs.

Specific technology areas require their own specific mathematics and hence specific function slide rules. Special rules have been made for electrical engineers, mechanical engineers, nuclear physics, gunnery, radio, navigation, commerce, surveyors, chemists, and many others.

Despite being the shape of Oughtred's original design, the circular slide rule has never been very popular. Its main advantage is that it can provide high accuracy, relative to its size and that it can therefore be made to fit into a pocket. The long scale disc rule is an attempt to provide greater accuracy on a flat format by using spiral scales. Because of its helical scale the tubular rule achieves an extremely long scale and therefore an extremely high accuracy.

**Use of the Slide Rule.**

In spite of certain common limitations, before the 1970s the slide rule was the undisputed symbol of engineering. As it did not provide the place of the decimal point in calculations, the user had to estimate the order of magnitude of the result. This promoted a feel for the calculation, for example that the product of 0.128 and 0.8365 was about 0.12, not 0.012, 1.2, or 12.0! (While the more accurate answer is 0.1198720, because one of the inputs is known to only 3 decimal points, the answer must not be reported with more than 3 decimal points; it would be prudent to report the answer as 0.120).

In other words, the slide rule was instrumental in teaching the user two important things about his or her engineering or science:

– magnitude comes from a feel for the problem and does not come automatically from calculating machines;

– answers are approximations and should only be reported as accurately as the inputs are known.

**The Electronic Calculator.**

For many years both mechanical and electronic calculators existed in parallel with the slide rule. In 1972 Texas Instruments started to manufacture cheap and reliable electronic pocket calculators, and price breakthroughs came as early as 1974, ringing the death knell for the slide rule. Already by 1975, 50 million electronic calculators were made and soon just about every engineer and scientist had one. Slide rules are now to be found only in museums. *(Or in the Editor's garage! See a later article, probably next issue.)*

**The Computer.**

The supremacy of the calculator, however, did not last long. Within some 10 years, the next development had arrived, and the powerful computer is now an indispensable partner in any design process. More calculations can now be done very quickly and with very high accuracy, but it is precisely because of its immense power that the computer can also be a source of over-confidence! A generation of engineers and scientists has now been educated using electronic calculation, i.e. without ever having used a slide rule, and we are now seeing some bad effects of this. For example, it may be tempting for an engineer to take on design work outside his area of expertise simply because a software package is available. There may also be a tendency to design structures in which every part is of minimum strength and weight (designing "on the knocker"), as this undoubtedly produces the most economical structure. Such extreme optimisation, however, means that the safety factor has to take up not just any uncertainty, but also any error, whether in terms of manufactured parts, execution of the design, or the computer calculations. In this regard, there have been cases where structural failures were attributed to such computer optimisation.

*Museum for the permission to publish the article. Erik Bachmann)*

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*(This story stirred my mind and I wrote a supplement which I will have to hold over till the next issue since I an running out of space! – Ed.)*

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## VALE

**Tom Murphy** (probably Friday 24 February, 2006)  a short extract from an email from his daughter, Cath:

Dear friend of my father

I am writing to tell you of Dad's sudden illness and subsequent passing this morning at 3:50am NSW time in Tweed Hospital.  Dad suffered an unexpected heart attack on Monday last just after completing the mowing of his beloved home. In the ambulance on the way to Tweed Hospital he had a massive stroke.

For those of you who know my mother Marie, please know that she is grieving with dignity and tremendous resilience. Over the coming weeks and months we will be comforted knowing that Dad is enjoying a painfree time and catching up with his old mates for a quick rum or two.

(Message from Alf Ricketts)

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**Gerry Zwanenbeek**, ex Sydneyradio, died last week.(Learnt on Tuesday, 4 April, not sure of the date).

Informant Kon de Vos, also ex VIS.

(Message from Arthur Major)

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**James Cameron Kennedy** passed away Saturday 10 June 2006

No other details at this time ,

(Message from Robert Hall)

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**Ivan Frederick Amey.** passed away Friday 9th June 2006

Privately Cremated with a celebration service at the Pioneer Chapel, St. Andrew's Anglican Church, New Street, Brighton on Wednesday, June 14th 2006.

(Message from Robert Hall)

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**Wilf O'Donnell**, Wednesday, 12 July 2006, after a long illness

(Message from Bernie White.)

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**Keith Edward Crossley,**  Passed away on July 13th 2006 aged 80, Ex – MOR, Retired due to ill health in 1982

(Message from Robert Hall)

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**Dave Meldrum**, about Thursday, 27 July 2006

Dave passed away in Darwin Hospital  a few days after suffering a stroke.

He was enjoying his favourite past time when the stroke occurred  at the Darwin Bowls Club where he was  often found and a very active committee member.

Karl Warchot and I attended the service and passed on condolences from his  coast radio colleagues  to Michelle and Sarah.

(Message from Brian Morgan

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THE LAST WORD:   Putting this Newsletter together is sometimes a joy but often frustrating.  **We have about 250 members and if EACH one could put down ONE STORY** of an incident and send it to me, I would have sufficient material for several years.   Our present content comes from an alarmingly small number of regular contributors whom I thank profusely.

I dare any member of the Vets to attempt to deny that he had never been party to anything funny, either as the perpetrator, the recipient or an observer.  While some stories cannot be told for various reasons, our life in OTC was so different, the humour and the can do attitude marked us as an elite organisation.

If you can't think of a funny story, what about the customer you or someone else went out of the way to help?  This is your newsletter.

Get off your b---ts and send in a story!