

SYDNEY NEWSLETTER



Railway Technical Society of Australasia
Sydney Chapter
Mail: PO Box 6238, Kingston, ACT, 2604

MARCH 2006

NEXT MEETING

Thursday 6th April

A joint meeting with IRSE, but at our usual venue at Milsons Point

17.30 for nibbles (finger picking good!) and networking prior to Presentation at 18.00

**HARRICKS AUDITORIUM, ENGINEERS
AUST,
118 ALFRED ST, MILSONS POINT
(200 m north from station)**

CHANGES IN RAIL SAFETY MANAGEMENT

A presentation by Gareth Topham, Safety Change Manager, RailCorp

Gareth will provide an overview of the whole issue of railway safety management, hopefully with some case studies of local and overseas experience and events that have led to the existing position and the developments that are taking place. As most people will be aware events such as Waterfall tend to engender a response that is basically a 'quick fix' type response, so how do we get a safety management structure and process that will largely prevent such events, but if they should happen will still stand up as an effective safety regime? Come and be informed.

Before each of our meetings at the Harricks Auditorium (fear not, it is just a theatre where the syllabus item can be effectively presented) there is a range of finger food and hot drinks provided by the association in order to bolster blood sugar reserves for the evening. The meeting generally finishes by around 19.30 so attendees can still get home at a sociable hour.

COMING EVENTS

We are participating in a family day at the **Illawarra Light Railway Museum** at Albion Park on **Sunday 19th March**, where a section of the picnic area will be set aside for RTSA visitors. This is a special event day for the ILRMS with four steam locos plus a wide range of other railway equipment running. Come and see NSW's most comprehensive collection of narrow gauge industrial railway equipment in action. The day will include rides (all included in the entry fee), demonstration trains and unique photo opportunities. Kiosk and souvenir shop available. Wood fired BBQs available (subject to any fire bans).

There is no need to pre book – just turn up. Entry fees, payable at the gate on arrival, will give access to all rides and activities on the site during the day :-
Adult \$20
Pensioner & Concession \$15
Child \$10 (16 and under)
Family \$40

By public transport, take the hourly train to Albion Park and then a 15 minute walk down Station Road and into Tongarra Road. If you have a problem with walking give Bill Laidlaw (see last page) prior advice and he will organise transport between the station and site.

RTSA is running a **STORE (Study Tour on Railway Engineering)** to look at and understand the grain business and how it relates to the regional rail network. This tour will depart on **Wednesday 22nd and return on Saturday 25th March**, covering a long circuit from Sydney through Parkes, Griffith, Wagga. Costs will be \$360 twin share all found, with RTSA providing the bus charter. There are a number of places left so if you are interested get in touch with Bill Laidlaw (see last page) or Andrew Honan at (a_honan@pacific.net.au) as soon as possible. This tour promises to be most interesting with rail, grain industry and other agri-business contacts and presentations, as well as a few extracurricular items such as wineries and rail 'museums' (no, not the working one!)

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LAST MEETING

Introduction to TETRA radio systems

(Your fearless reporter is not an engineer, let alone literate in the intricacies of modern communications, so this report of our last meeting should be regarded as a civilian view of the proceedings. If you are an interested technocrat then Alcatel is the place to go: Editor).

The presentation was by Phil Harley, Senior Product Manager, Rail Communications, Alcatel Australia.

Alcatel is a worldwide rail communications company primarily centred in Europe.

TETRA (TErrestrial Trunked RAdio) Digital Radio Systems are one of the newest and most common technologies now being deployed in metropolitan rail networks. The system actually originated as an emergency services comms system, but has since adapted to a number of other domains where its particular attributes are of value – particularly applicable where communications are internal - ‘among ourselves’ - rather than being focussed externally. The system supports mobile telephony, data and radio communications, including simultaneous voice and data.

TETRA does everything that GSM can do. It has rapid call establishment (as little as 0.5 seconds), has emergency call establishment as part of its 16 layer priority system, can be combined with GPS to facilitate fixed and mobile grouping based on the location of the mobile ‘unit’ and has multi-layered grouping (e.g. driver, guard, signaller, and at the same time but independently driver and guard of all nearby trains). TETRA units can be used hand held to hand held ‘direct mode’ to facilitate local needs of moving users (a very railway attribute), and it can deal with short data services such as might originate from on board condition monitoring devices.

Every carrier has 4 channels (voice and data) and each occupies only 25 khz of bandwidth leading to considerable spectrum economy. The European spectrum 380mhz to 1 ghz) is not available here for this system so local applications will need to be adapted to the local frequency allocations. Message trunking can be applied (channel is only used during a call and released back to the ‘pool’ when finished) to further expand the system capacity. TETRA has been designed to suppress background noise (the ‘emergency’ thing again) which is also appropriate for

mobile and outdoor rail use. It is suitable for both high and low density systems and can be clustered (e.g. a metro railway) or a long line system (e.g. trans-continental railway) with a capacity able to be scaled down to single sites. Existing comms systems have had a life of up to 27 years. TETRA is expected to be able to at least equal this.

FUTURE MEETINGS AND EVENTS

RTSA Sydney Chapter meetings are mainly held on the first Thursday of each month from February to November, normally at the Harricks Auditorium (lofE at Milsons Point) but from time to time at alternative locations. Later in 2006 the lofE will be moving to new premises in Chatswood (adjacent to the station) and our meeting location will move with it. The new facilities will be more amenable to a variety of presentations and activities than at the current location. Prior advice will be given when the change is imminent.

From time to time joint meetings will be held with kindred organisations, such as PWI or IRSE, in which case the venue (and date) will depend on the hosting organisation. In all cases (normal or joint meetings) prior advice will be given via the newsletter.

Key rail conferences during 2006 are CORE in Melbourne from 30th April to 2nd May, and AusRAIL in Brisbane between 21st and 22nd and November (note revised date for AusRAIL)

Annual General Meeting.

The AGM will now be held in conjunction with the June meeting. All the proper notices and formal stuff will be sent out before the due date, but in the mean time if there is anyone out there who would like to be involved in running the local Chapter please give Bill Laidlaw a call (see last page for contact details)

We still have need for a volunteer who might be prepared to take on the role of Event Coordinator, responsible to keep a list of all the potential meeting topics, a diary of those settled for upcoming dates, and to follow up so that the presentation aids are to hand on the night.

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Understanding Engineers - 1

Two engineering students were crossing the campus when one said, "Where did you get such a great bike?" The second engineer replied, "Well, I was walking along yesterday minding my own business when a beautiful woman rode up on this bike." She threw the bike to the ground, took off all her clothes and said, "Take what you want." The first engineer nodded approvingly, "Good choice; the clothes probably wouldn't have fit."

WHY RAIL MAKES A SUSTAINABLE CITY

This special article derives from a presentation by Peter Newman – Professor of City Policy, Murdoch University and (now former) NSW Sustainability Commissioner to a meeting sponsored by TransAdelaide held in Adelaide on 1st December 2005.

Stephen Townsend compiled this report on the presentation for the S.A. Chapter Newsletter, and it is with his kind help that we are able to reproduce it here.

It is indeed a pity that we did not have Peter in to give a talk before his tenure with the NSW Government was terminated. He is one of the most articulate and informed protagonists for public transport that we have in Australia; a very valuable ally indeed. It is perhaps no accident that Peter, and the feisty Alana McTiernan (Minister of Infrastructure in WA), are both from Perth, a city that understands the value of a rail based core urban transport network – something that is very evident when looking at the pre 1990 rail network and the network that will be in operation from around 2008. Even more startling is the huge growth in patronage – up from around 8 million to around 40 million in a little over 10 years which is a fairly emphatic statement in favour of fast and frequent rail services. Now read on.

Peter Newman is the author of "Cities and Automobile Dependence".

Although Peter was addressing Adelaide his comments are just as or more applicable to Sydney - which makes it even more disappointing that the Government here no longer has the vision to retain Peter's services.

History of City Development

The presentation was about sustainability and in order to understand sustainability the following definition was offered:

Sustainability – Reducing Ecological Footprint while simultaneously improving Quality of Life.

The history of the development of cities may be categorized into approximately the four following periods:

- i) Walking cities – Up until approximately 1850, the size of cities was limited by the practical limitation of the distance one could walk in a given time. The cities were therefore relatively compact and densely populated.
- ii) Transit cities (1850 – 1940) – The development of powered transportation systems allowed the development of public transportation systems. These systems, mainly based on rail transport allowed the cities to grow both in population and area. Population densities remained relatively high due to the need to remain close to the public transport systems.
- iii) Automobile cities (1940 to the present) – The development of the motor car and with it affordable private transport allowed the development of cities to extend beyond the previous city boundaries into new areas without the need to be related to any public transportation system. These new suburbs covered large areas and had low population densities. The size of these cities are now reaching a stage where traffic congestion, environmental and resource factors and the increasing cost of private transport, both the direct operating costs and the costs of providing the support infrastructure, are limiting the further growth and prosperity of the cities.
- iv) Nodal cities – The prediction is that future cities will be nodal cities with discrete medium to high population density nodes or city centres being linked by quality transport.

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The Development of City Centres

Every Australian city has a development plan based on nodes or centres. For example in Sydney, city centres have been developed at Parramatta, Chatswood and Kogarah. For centres to work, they must have efficient transport systems between the centres. The development then must be transit orientated. A transit-orientated development must include:

- i) Centre plan – Where are there suitable locations for centres.
- ii) Rail Plan – Experience has shown that the rail system must be electrically powered.
- iii) Development Mechanism – A development mechanism is required that must be state based but with intervention by Local Government.
- iv) Financing Mechanism – A Public/Private funding mechanism is required in order to build the electric railway.

Why should development be based on Centres? The main reasons are:

- i) To enable efficient service provision
- ii) Public transport needs centers to become viable
- iii) Centres are essential for new economy jobs. People need to meet.

To be viable, Centres need to be of a minimum size. Experience suggests that viable sizes are:

- i) Local Centres – Have an area of approximately 1km radius and have 35 people and jobs per hectare. A minimum cut off point is approximately 10,000 people per square kilometer.
- ii) Town Centres – Have a 3 km radius or 3000 hectares with 100,000 residents and jobs.

Investment in rail transport makes centers work. A rail transport system attracts and anchors the developments by:

- i) Creating pedestrian traffic and a walking environment.
- ii) It has the capacity without requiring large areas for car parks.
- iii) Bus systems have been tried but have produced a reduced level of service, are susceptible to congestion in the city centre and are limited in their capacity to transport the required numbers of passengers.

Benefits of Rail Based Transport Systems

The experience in the USA has shown that rail systems work. They add value to a center and increase investor returns. As a result over 100 new projects are being developed. Centre development with rail-based transport has been shown to attract global city jobs and stop urban sprawl.

The City of Portland was the first to successfully use this concept. Many others have followed. In the city of Denver land values around stations have increased rapidly.

In WA the new Southern Railway out of Perth is being planned with developments around the stations. Private investors are keen to develop these areas as they have found that they can achieve a 15% increased return on investment compared with similar developments away from railway stations.

European experience has shown that cities with well-developed rail based public transportation systems are wealthier. Research shows that on average a car-based city spends 12.15% of its GRP on transport. By contrast rail based cities spend approximately 8%.

The research shows that there is no proven correlation between car use and wealth. An examination of Australia cities supports this.

Wealthy Australians are generally found in the inner areas of cities and as a result spend less on transport. Conversely the poorer residents live in outer areas and spend up to 40% of their income on car-based transport.

The increasing emission of greenhouse gases, high levels of road based transport deaths and increasing congestion support rail.

An examination of the various land transport options available show that not only does rail provide the maximum capacity, it also requires the smallest area of land. The capacity of the various modes is:

- i) Heavy rail corridor – 50,000 per hour
- ii) Light rail corridor – 20,000 per hour
- iii) Busway – 5,800 per hour
- iv) Freeway – 2500 per hour plus parking costs

The issue of parking is one that is gaining prominence because of the area required to park cars but also cost both in the cost of parking and in the provision of

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parking infrastructure. Developers of inner city housing have come to realize that they can save approximately \$40,000 for each car park that does not need to be provided.

The actual cost of operating a car is not fully appreciated by most owners. Generally the cost of fuel only is considered. Fuel is in fact a small proportion of the full cost of operating a motorcar. The Tax office, which is not known for giving anything away, allows a rebate of 64c/km for business use. In reality the actual cost for driver only cars is most likely around \$2.00 per person km.

Unlike cars, rail has the advantage of using electricity, not oil. World peak oil production is possibly occurring now and will soon begin to decline. Demand will continue to rise rapidly. The prognosis is that the availability of oil will decrease and its price will escalate. In 50 years, oil may not be available. For further information on the future of oil, reference is made to a program broadcast recently on the ABC Catalyst Program.

Rail Transport in Perth

The city of Perth in WA is a good example of what happens when various transport modes are implemented. In the late 1970's the Fremantle rail line was closed and buses replaced the service. The road lobby predicted a substantial increase in patronage. In fact the opposite occurred with a 30% immediate drop in patronage. This situation continued until a change in government reopened the line. Immediately the line reopened the patronage figures returned to their original levels. With electrification and upgrading, the Fremantle line now carries a level of patronage far higher than was thought possible back when it reopened.

New urban centres are being developed as a result of the improvements to the rail line. The latest one is at Subiaco.

The development of the Northern Suburbs Railway has been a great success. It is now carrying a passenger load equivalent to an eight-lane freeway.

As mentioned above, the New Southern Railway is currently being built at a cost of \$1.8 Billion. It is a dual track system 80 kms long with a design speed of 130 km/hr and a one-way journey time of 48 minutes from Mandurah to Perth. When complete, the Perth rail system will have a route length of 280km with 72 stations; all built in 20 years.

In achieving this substantial result, political leadership was everything. In Perth, marginal seats were won on a policy of railway development. This has shown that investing in rail is good politics.

Development Requirements for Rail Based

Transport Systems

Urban Centre and related transport developments require a statutory plan/development process to ensure development continues. Such developments cannot be left to Local Government. A wider vision is required and this means a regional planning resource.

Transport developments require a financing mechanism. The private sector has found way to find funds for other infrastructure developments. The rail industry can develop similar mechanisms that can provide a financial return and therefore be attractive to investors. These mechanisms can source funding from both the public and private areas and together in Public/Private partnerships.

With respect to the planning in Adelaide the situation is as follows:

- i) A Centre Plan exists but is not fully defined.
- ii) A Rail Plan has been proposed, it is currently weak but has potential.
- iii) No Statutory Development Process has been developed.
- iv) No Public/Private finance mechanism has been determined.

The current light rail initiative presents an opportunity to kick start major rail development plan.

Adelaide is well known for its bus based OBahn system. While it works reasonably well, it does have its issues. Some of these relate to congestion on the approaches to and within the city, limited future capacity and the cost of building further routes, which is similar to that of light rail. Further buses do not attract the private investment that is necessary to make future developments succeed.

While proponents of the OBahn system point out that passengers do not have to change transport mode to complete the journey to the city, the Perth experience has shown that, if a quick comfortable high quality alternative is provided, passengers are more than willing to transfer to rail.

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Summary

Experience in Australia and overseas has shown that:

- i) People prefer rail transport for its comfort and speed
- ii) Investors prefer rail transport related developments – they provide greater returns on investment
- iii) Rail transport has the capacity to meet future requirement
- iv) Rail based transport improves the environment and the sustainability of our cities
- v) Rail Transport is good politics
- vi) Quality fast rail transport makes urban centre development work

Adelaide now has the opportunity to invest and realize these benefits.

Understanding Engineers - 2

To the optimist, the glass is half full. To the pessimist, the glass is half-empty. To the engineer, the glass is twice as big as it needs to be.

THE OBSERVATION POST

In recent times the issue of *capacity* has risen in a number of contexts. There is the Connex (Melbourne) issue where the western and northern lines, long orphans in the Melbourne network, are claimed to have reached something of a crisis of capacity. There is the inter-capital east coast route between Sydney and Brisbane which has reached capacity for freight trains of 1500 metres. And of course there are the various NSW and Queensland coal lines and ports which have received more than a passing mention recently. In each case there are a series of factors and indicators at work that point to capacity constraint.

In Connex's case the overfull electric trains, multiplication of inter-urban trains on the Geelong, Ballarat and Bendigo lines and lack of paths in the inner city area all point to an imbalance of demand and capacity. On the NSW North Coast line the combination of limited freight paths and curfews between Sydney and Newcastle combined with irregular spacing of 1500 metre loops north of Newcastle limits the throughput.

The coal lines issue is one of continuous and rapid demand growth straining both the rail network and ports despite continuing work to enhance capacity.

The fundamentals of capacity on rail come down to just two elements that matter – how many trains can the infrastructure reliably handle and how much can each train carry. There are NO other basic issues that matter.

In the case of the Melbourne suburban issue the number of trains able to be handled on the inner part of the network is the key issue. Trains are of fixed length and lengthening them for higher capacity would involve rolling stock, platform and track modifications that would be very costly. Increasing capacity by going to double deck trains (as is the case in Sydney) not only involves a new train fleet but also is partly self defeating in that the DD trains have demonstrably long dwell times (if you doubt this check out Sydney's sadly slow suburban train times). The problem in this case requires a largely infrastructure solution – enhanced track and signal capacity in the inner area to match the capability of the sum of the outer limbs, with the whole aligning to realistic future demand change and growth.

The NSW North Coast line could take more freight trains provided that they ran at commercially unattractive times and / or that they run to a shorter maximum length (1200, 900 or 750 metres depending on pathing). However on this line the trains timed for 1500 metres are on average running considerably shorter than this (at last look it would be around 1200 m) so there is additional available capacity in the existing trains. However in the current competitive climate this capacity will be overlaid with a number of constraints that could loosely be defined as 'never give a sucker an even break'. Despite this the dominant inter-state operator (Pacific National) has enough overall control in the freight market to fully utilize all their spare capacity (which is after all comes at a very low marginal cost) if they were of a mind to. As far as infrastructure goes a relatively low investment in full length loops that will 'infill' the gaps in the existing spacing, coupled with some cooperative action between ARTC and RailCorp in RailCorp territory can significantly increase long freight train capacity between Sydney and Brisbane. This is the core of the current ARTC North – South enhancement plan.

The coal capacity issue is best understood by looking at the ARTC Hunter Valley Coal Capacity Improvement Strategy which is on the ARTC web site (www.artc.com.au). This follows through a process of identifying all the capacity constraints over the whole

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coal network and relating these to projected demand – in particular by ‘smoothing’ capacity so that line sections have compatible capacity throughout their length. It is understood that ARTC will have a new version (version 5) of the strategy up on their web site in the near future. The situation in Queensland is similar, although in their case large parts of the coal network is (more or less) dedicated to coal.

One small scale coal haul that rarely gets in the limelight is the export of southern coal through the Port of Brisbane at Fisherman Islands. Not all that long ago this mainly originated from the West Moreton coalfields in the Ipswich area (on the western boundary of Brisbane). However a combination of high coal prices and large reserves has resulted in an almost total shift of production west to the Darling Downs some 200 km west of Brisbane. The narrow gauge railway (the ‘main line’ in old parlance) between Brisbane and Toowoomba has two very difficult range sections which involve 1 in 50 grades on curves down to 100 metre radius on single track (double track on this route is restricted to the easier sections between the range sections). The end result is a line with limited axle load (15.75 tonnes axle load), limited clearances (containers to 8’ 6” max under sufferance), slow running times and little scope for additional crossing loops or duplication. There is a well documented proposal for a completely new high speed deviation to by pass the range sections, but at a cost that is variously quoted at \$700 million or more it is not high on the agenda right now.

As a simple capacity issue there are a number of capacity enhancements that could be undertaken to enable more coal to be handled, although not all are realistic in physical, political and /or financial terms. In fact the extent of improvement to this route is in the end a matter of vision – long range and the new high speed line would get up, but short range and the options are all about bandaid fixes.

The existing route has a twice weekly passenger train, fuel, cotton, container, livestock and grain freight as well as the coal business so there are a complex mix of issues that are relevant to the line. However as far as coal goes there are a number of possible choices, among which are –

1. continue to prop up the existing line as primarily a coal and grain railway, with intermodal (a lot of which is boutique grain and cotton industry output - lint, seed, cotton), fuel, livestock and passenger being progressively phased out.

2. the existing line could be upgraded for higher axle loads (but it would have to be full length Redbank to Toowoomba and beyond to the coal mines, approx 200 km) and loading outline (mainly the little Liverpool and Toowoomba range tunnels) at quite considerable cost which would allow capture of some of the additional coal opportunities due to more efficient train loading (more tonnes per wagon) but would be unlikely to increase the number of paths available over the line.

3. additional to item 2 above, work could be put in hand to increase paths on the existing line by partial realignment or additional loops and /or partial duplication (all very hard and likely to be at high cost) – which might allow capture of all additional coal opportunities but at ‘existing line’ costs.

4. closure of old line beyond Rosewood (end of electrification and the outer metro passenger service) and handover of much of the freight task to road - in this case the coal business would collapse while the grain would be seriously constrained and some might be diverted south to an improved Newcastle grain port. The biggest loser would be the Port of Brisbane which would potentially lose most of its regional bulk traffic.

5. closure of the old line but provision of a link between the Darling Downs to Gladstone (either Everal Compton’s plan between Wandoan and Moura, or the Tarong proposal extended via Kingaroy or Monto to the Qld North Coast line) so that coal and grain would be siphoned off to Gladstone with some of the southern grain roaded to Brisbane or railed to Newcastle. The remaining general freight and passengers would be abandoned to road, as in item 4 above.

6. construction of ‘cheap’ range bypasses, to improve alignment and capacity, by using grades and curves rather more demanding than the high speed route proposals but better than the existing route alignment (i.e. a ‘low vision’ solution)

I have no idea what costs would be involved in any of these options but anecdotal evidence suggests that QR reckon on a high cost for 2 and 3 while retention of any of the inadequate parts of the existing line would result in increased maintenance out of proportion to the added traffic task.

While the price of coal is high it will move via even quite inefficient routes and might even have enough in reserve to provide the critical mass to get a link to Gladstone and/or the high speed Toowoomba railway on the agenda.

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Grain on the other hand has little in reserve and is increasingly being handled in boutique (i.e. less than hatch load) lots in containers. So even a poor quality railway will continue to handle coal as long as the price remains high but other traffics are likely to progressively fall off (although the capacity created could be taken up by coal).

The difficulty with this approach is that the gap between the existing freight capacity from the Darling Downs (maybe 5-6 million tonnes?) and the critical mass of coal that would inspire a commitment to either the Gladstone link or new Toowoomba railway (maybe >10 million tonnes?) means that there is no easy strategy of growth until a new link or line is built. For this to happen there will have to be an act of faith - that coal prices will stand up over time, that the coal producers can economically exploit reserves for a long period, that coal markets will continue to favour Darling Downs coal for many years and that the port will be able to expand for increased volumes while avoiding show-stopper environmental or social issues as tonnages more than double.

The great railway conundrum is this issue of finite existing capacity not matching to new higher capacity, thereby creating a gap which the railway (and transport department) economists and planners have not yet managed to bridge. The road people seem to succeed in similar situations as a matter of course, so is there a fundamental flaw in railway thinking and logical processes?

I leave you to ponder, and hopefully to contribute to the resolution.

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CONTRIBUTIONS TO THE SYDNEY NEWSLETTER

Part of the function of RTSA is to keep members in touch with what is going on in the industry and with each other and to that end we are only too happy to publish items of interest. Articles or editorial comment for Newsletter are very welcome. We have several hundred members locally some of whom must have stories, events or developments of interest that could make an interesting item for Sydney Newsletter.

Send copy to the Editor, Max Michell, by e-mail to samrom@bigpond.com, phone 02 9241 2675 or post to 806/129 Harrington St., The Rocks, NSW, 2000. For all other matters relating to RTSA Sydney Chapter contact Basil Hancock (Secretary) or Bill Laidlaw (Chairman) as above.

CPD CREDITS

Members who attend RTSA meetings and events will qualify for CPD credits as per the Engineers Australia criteria. Members are responsible for recording their own CPD for audit.

NOTICE TO MEMBERS RECEIVING RTSA NEWSLETTER BY EMAIL

Members receiving this Newsletter by email should note that all Sydney Newsletters will be sent in a PDF format prepared using Adobe Acrobat Version 6.

Version 7 of Adobe Acrobat Reader may be downloaded free of charge from the internet at www.adobe.com. Version 6 still seems to read pdf's written in v.7 so maybe there is no urgency about upgrading.

If you should receive this Newsletter by post but would prefer to get it by e-mail (quicker and more reliable) then please let the Secretary know. E-mail saves time for you, and costs for RTSA, which in the end can only mean better service to our members

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