

NEW SOUTH WALES NEWSLETTER



ENGINEERS
AUSTRALIA

RTSA

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

MARCH 2008

NEXT RTSA NEW SOUTH WALES CHAPTER MEETING

Wednesday 2nd APRIL

**12.00 in the
CENTRAL STATION - CONCOURSE MEETING ROOM
(next to Lost Property, opposite platform 2)**



DAVID STUART-SMITH, Chief Engineer Electrical Systems, RailCorp will give a presentation on the somewhat esoteric but very important subject of **EARTHING AND BONDING**.

Electrical equipment is earthed to ensure the safety of personnel in contact with equipment and to minimise damage to equipment in the event of a lightning strike or power fault. On electrified railways with d.c. traction systems it is necessary to bond certain components to rail to provide an adequate return path for power faults.

Unwanted outcomes of deploying earthing and bonding schemes can include transferring earth potential rise to unexpected places, damage to the earthing conductors of low voltage installations, or electrolysis damage to buried services. Overbridges and railway stations can present special challenges due to the number of different systems in close proximity.

David will discuss earthing and bonding strategies, common pitfalls, and solutions. This presentation will be of particular interest to those who design railway stations and overbridges for the RailCorp electrified network.

As is the custom sandwiches and light liquid refreshments will be available from 11.30, prior to the formal meeting, allowing both time for 'refuelling' and to meet some of your fellow railway people.

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THE OBSERVATION POST

Sydneysiders were probably not aware of the situation back in the mid 1920's, at the time when electric trains were first introduced to the system, but the city rail network that they knew then would only change marginally in the next 80 years. In the first 15 years or so of the electric network's existence the Harbour Bridge and East Hills lines were 'completed' and Cronulla line built. Other than that there was minimal activity, except for completion of the city circle through Circular Quay (propelled by a rabid desire to expunge trams from the city) for the next thirty years. Then in a rush of something, the Eastern Suburbs line (the first part, but now probably only part) was opened with four new stations – one of which was a city station. The three non-city stations (Bondi Jn, Edgecliff and Kings Cross) are all high patronage stations with two almost certainly among the busiest stations on the network. Then there was a lull until the East Hills – Glenfield line was opened some 10 years later, with just a single low patronage new station added to the network. Another decade later the Airport railway opened, providing five new stations – the two Airport stations (after a shaky start) and Wolli Ck are moderately busy while the other two are rather ho-hum. Mind you this line has always laboured under punitive fares and erratic service frequencies, choked in the peaks by long distance travellers, for this line was really a very expensive expansion of Southern line capacity, just coincidentally serving the airport. Go check the domestic and international air passenger numbers (both double digit millions) and then look at how many find their way into the 'basement de chemin de fer' – a big opportunity for someone tuned in to business rather than money. At the same time the Olympic Park rail line was built as a special purpose line serving what is mainly an events complex rather than for conventional commuter needs. Now, almost another decade further on we are looking at the next new line coming to completion – Chatswood to Epping. This line will add three new stations to the network, two of which could be quite busy (the third is wedged between an industrial site and a cemetery). Unlike the Airport line this new line will not provide capacity relief for the Western line, as was originally envisaged, since only the eastern half has been completed and, like so many other rail projects, will presumably stay that way.

So in a period of almost 70 years (post Cronulla) Sydney has gained 15 new commuter railway stations, almost a third of which are low patronage. Apart from the Eastern Suburbs line, which I would guess would add quite a noticeable number to the annual passenger journeys, the rest of these new stations would represent a fairly minor blip on the big picture view of the network. In fact electrification of existing lines beyond the original suburban boundaries (Sutherland, Liverpool, Parramatta and Hornsby) to areas progressively consumed by the uncontrolled appetite for housing land has undoubtedly contributed far more to the passenger count, offsetting the fall off in inner city use of rail. The reality however is that there has been hardly any real 'reach' added to the network in three quarters of a century. And for the same reason the passenger numbers have been relatively stagnant when measured against population growth, and in fact have been largely static for several decades now.

Perth on the other hand has shown and is showing how these things can be changed as a result of planning, fired by political vision and competence, and coupled with a well chosen project team. (Surely you don't feel depressed at this early stage??)

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Perth had a three line heritage network operated by dodderly old diesel railcars handling passenger numbers of around 10 million p.a. in a good year. This 'un-good' system fell foul of the usual Government deep thinking and the Fremantle line was closed (but not for freight, thank goodness) after which the then remaining two suburban lines looked decidedly threatened. A change of Government at just the right time brought Fremantle back into the network, but more importantly brought a new railway serving the northern suburbs (the Joondalup line) along with electrification of all four lines. The new line was designed for high speed and high frequencies and was mainly located in the centre of a freeway with stations spaced several km apart to allow very fast transit times by Australian standards. Such was the success of this venture that another new line, this time southwards to Mandurah, was conceived – which over time and with some intermediate route changes, has just come to fruition. This new line is over 70 km long yet the trains (every 10- 15 minutes) take just 49 minutes for the journey. Once again the waste land in the centre of freeways has provided much of the route – so much so that Perth now has 50 km of high speed (130 km/h) median strip railway in its rail network.

The measure of success has been growth in passenger numbers to around 40 million p.a. prior to Mandurah, driven by a combination of electrification (comfort, speed, frequency, convenience) and the Northern line with its extension into a new catchment for rail, which in turn has facilitated growth along that corridor.

Early reports from Perth are that patronage on the Mandurah line, which is barely three months old, is running at 40,000 per weekday – equivalent to over 10 million passengers journeys per year – equivalent to the total activity only 20 or so years ago. This is three times the patronage of the former bus routes that rail replaced which suggests that somewhere around 25,000 car trips per day have been diverted to rail almost instantaneously. Assuming that the new Mandurah railway encourages population growth along this extended corridor it is entirely reasonable to assume that Perth rail passenger numbers in the not too distant future may well be double those that were achieved only a few years ago, and may well approach 10 times the numbers that were being carried at the network nadir back only a couple of decades ago.

Perth admittedly had a very small and relatively ineffectual suburban system prior to its Phoenix like revival. As was demonstrated when the Fremantle line was closed the passenger loadings then could be handled by bus, albeit with some emotional damage among the government's constituents. But rather than just follow a simplistic line self destructive policy toward eventual closure, a decision was made to revive and significantly improve the rail system as part of an overall plan to direct the future for Perth as a city. In effect transport infrastructure is now in place to allow relatively efficient city growth and development between the Darling Ranges and coast in an east - west direction (maybe 25 km in a straight line) and between Mandurah and Clarkson in a north – south direction (over 100 km).

Maybe Sydney is 100 years ahead of Perth in urban rail development, with all the necessary infrastructure being in place decades ahead of its time to allow for the ultimate Sydney growth? Maybe Bradfield provided the only driving force for early rail development in Sydney, that simply died with him, rather than being picked up by another visionary? Maybe the culture of limited or

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zero proper planning over many years has allowed the rail network to stagnate rather than being developed as a tool for city enhancement? Maybe Sydney has just become too fat and inefficient (as a city) to continue to grow in to evermore remote pastures on the fringes? For whatever reason urban rail development opportunities have largely been squandered here over many decades, with the result that we now have a rail network that is irrelevant to ever increasing numbers of city inhabitants. In part this situation can be attributed to the depression, an obsession of successive governments to rid Sydney of its trams without thinking through the issue of replacement, and a lack of big picture thinking, but more than anything else it has been the lack of charismatic visionaries able to grab the initiative and persist in ramming through big picture rail developments that would stand the test of time as city shaping infrastructure.

Maybe the time is coming, with little help from the visionless of Macquarie St, where a new paradigm can be launched and implemented in Sydney that at some stage in decades to come will be seen as a pivotal change in Sydney's development. One thing that stands out, at least to me, is that vast expenditure on rail links to fringe paddocks will not be that pivotal change. It has to come in the heart of the city and it has to allow population density growth as an alternative to population area growth if it to make the change in city developmental direction that will allow Sydney to grow sustainably and efficiently. There can be significant rail aspects to this future vision, but up to now they have not been proposed, at least in the public domain. The real rail development for this city has yet to see the light of day – the danger being of course that current and very recent proposals will become entrenched, warts and all, as 'the answer' without anyone really asking what the question is.

We need a robust debate on future directions (plural) for Sydney, complete with appropriate new rail developments, before the scrooge-balls in the Treasury run away with the agenda and impose their own version of vision on this cities luckless citizens.

LAST MEETING: Reporter – Malcolm Cluett

John Youds from Interfleet gave an interesting presentation on the subject "While my Train Horn Gently Shrieks" – an informative session outlining some of the contemporary issues surrounding train horns.

From an environmental viewpoint, there is increasing pressure on railway operators to reduce the noise of their operations. Noise from the railway industry is not a new issue. Train horns are just one area of noise from a railway. Horns are supposed to be attention-grabbing and annoying.

The issue of horn noise can be considered from four aspects:

- **Political**
Legislation & Standards
- **Social**
complaints from lobby groups and residents

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- **Economic**

New homes and/or new railways in close proximity. New stabling yards

- **Technological**

new trains are quieter, better able to quantify environmental input

Trains Horns are supposed to be loud. They are Safety Critical, and used to warn track workers of trains approaching or about to move. They are also used to warn passengers that a train is about to start moving, and particularly to warn road users when approaching level crossings.

One needs to be able to hear the horn of an approaching railway vehicle at 500m distance, (or even 1000m). There should be a safety factor, so that a horn is louder than required, or can be heard from further away than required. As train speeds increase, the time interval of the warning from 'standard' distances decreases.

However it is difficult to measure horn noise accurately above ambient sound levels at a distance of 500m.

Empirical data suggests that railway horns don't need to be as loud as they have been in the past.

Ballast condition and surrounding structures (or other trains on adjoining lines) can affect the measured loudness of a horn under test. The horn noise level is typically measured at five metres, with no near structures or trains and with clean ballast on the track. (The ground impedance effect increases with distance.)

There is scatter in the data due to meteorological conditions. Fog assists the propagation of horn noise.

A railway horn has Fundamental Frequencies and Harmonics. A spread spectrum assists in allowing everyone to be able to hear the horn.

Electro-pneumatic control of the air supply to the horn is better than just manual control of the air supply to a horn (by means of a valve in an air-line). The EP device can automatically provide adjustment of horn loudness depending on speed (louder when faster).

Speed adds to the impedance for the sound pressure level. At higher speeds the static air pressure makes it more difficult for the horn to generate the designed noise level.

Broadband Horns at Level Crossings – these devices broadcast sideways from poles (say on Level Crossings). It is thought that they give a better warning than the train-mounted horn, which is directed perpendicular to the roadway. A chart was shown depicting the sound intensity from train-mounted conventional horns and pole-mounted broadband horns. The sound projection away from the tracks was better with broadband horns.

Depot Warning Devices

In depots, audible and visible warnings (strobe lights) may be better than just the train-mounted warning (when a train commences to move). Such lights and horns may be installed along the whole length of the roads in the shed. Broadband horns could be used here.

Wayside Horns – can be treadle based, or operated by a radio link. These are used to warn track gangs of approaching trains.

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“Quiet Zones” in USA – on level crossings. The traditional North-American approach of having four horn blasts when approaching every level crossing is gradually being replaced with “Quiet Zones” in populated areas. Road signs are added to inform motorists that approaching trains do not sound the horn for this particular crossing. Sometimes the “Quiet Zones” time-based (say 10pm – 6am)

Risk assessment – relates to the testing of horns on trains entering service at a depot - how often does a train horn actually fail. It is just a steel disc that vibrates under air pressure, with a trumpet to amplify the sound. If such a risk-assessment is carried out, the need to test the horn every time a train departs from a depot may not be required, with benefits for the neighbours of the depot.

Questions from the floor

Distractions

Regarding level crossings, many people now wear wearing personal sound equipment. A related issue is the improved soundproofing in motor-cars. With air-conditioning, it is now customary for motorists to drive with the windows up. All of these make railway horns less effective as a warning.

Other Large Vehicles with legislated horn use

Backing horns for trucks, earthmoving machinery, and railway track maintenance machines when changing direction.

Frequencies and Directionality

Police and Emergency Service Vehicles use variable frequency horns, which are more likely to be heard by people with limited hearing/industrial deafness, etc. Two-Tone horns are used on railway rolling stock in the UK.

Sound Measurement

DBa is just one measure of how loud a horn sounds, and maybe not the best measure. For example, a Harley Davidson motorcycle is apparently very noisy to humans, but it meets the noise emission test. The speaker demonstrated the values on various scales of horn noise.

MEETINGS

The list of coming meetings is in tabular form toward the back of this Newsletter. This allows for more information and is more easily updated as events unfold. Basil Hancock has taken charge of this aspect of our services. Anyone with inspirations or bright ideas for future meetings should contact Basil at Basil.Hancock@railcorp.nsw.gov.au . Railways are an integrated mix of technology, operations and business, so potential topics from any or all of these disciplines would be most welcome.

Meetings are on the 1st Wednesday of the month at 12.00 in the large meeting room off the main concourse of Sydney Central (Steam) Station. The venue can be found in the North West corner of the main concourse opposite platform 2, next to the Lost Property Office.

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Late news has come in that the usual meeting room will not be available for our June and July meetings (it has been impressed into World Youth Day service) so we will have those meetings at 477 Pitt St – just a block or two away. Exact location details will be advised nearer the date. Just be careful – if you front at the normal venue in June or July you may find yourself inadvertently ‘volunteering’ for something you know nothing about!

COMING EVENTS

CORE 2008 will be held in **Perth between 7th and 10th September 2008**. Themes will be around high volume bulk freight and the integration of rail as part of the export supply chain, and rail in an urban environment and the issues of integrated planning of land use and transport as the core of successful public transport. Register your interest by going to www.core2008.org. Calls for papers to be presented at CORE 2008 are open until late November, so if you have something interesting that you are involved in or know about now might be the time to think about sharing it with a large group of your peers at CORE 2008. Abstracts must be submitted via an on-line process, located at www.core2008.org.

APPLIED SCIENCE

A major research institution has recently announced the discovery of the heaviest element yet known to science. The new element has been named "Governmentium (**Gv**)."

Governmentium (Gv) has one neutron, 25 assistant neutrons, 88 deputy neutrons, and 198 assistant deputy neutrons, giving it an atomic mass of 312. These 312 particles are held together by forces called **morons**, which are surrounded by vast quantities of lepton-like particles called **peons**.

Governmentium is inert. However, it can be detected, because it impedes every reaction with which it comes into contact. A minute amount of Governmentium can cause a reaction that would normally take less than a second to take over four days to complete.

Governmentium has a normal half-life of four years; it does not decay, but instead undergoes a reorganization in which a portion of the assistant neutrons and deputy neutrons exchange places. In fact, Governmentium's mass will actually increase over time, since each reorganization will cause more morons to become neutrons, forming **isodopes**.

This characteristic of moron promotion leads some scientists to believe that Governmentium is formed whenever morons reach a critical concentration. This hypothetical quantity is referred to as **Critical Morass**.

When catalyzed with money, Governmentium becomes Administratium (**Am**) -- an element which radiates just as much energy as Governmentium since it has half as many peons but twice as many morons.

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FUTURE MEETINGS PROGRAM: Meetings in black are confirmed; in red are tentative.

DATE	SPEAKER	TOPIC	LOCATION	TIME
Wednesday 2 April 2008	David Stuart-Smith Chief Engineer, Electrical Systems RailCorp	Earthing and Bonding	Central Station Concourse Meeting Room	11.30 for 12.00
Wednesday 7 May 2008	Tim Parker, TIDC	Metropolitan Rail Expansion Program	Central Station Concourse Meeting Room	11.30 for 12.00
Wednesday 4 June 2008	Ross Golotta, Interfleet	<i>"The Flinders Flyer"</i> The Leigh Creek Coal Train	477 Pitt St	11.30 for 12.00
Wednesday 2 July 2008	Freightlink	Review of Experience with the Alice Springs to Darwin Railway	477 Pitt St	11.30 for 12.00
Wednesday 6 August 2008	Daniel Thomson, RailCorp	AK Test Cars and Mechanised Track Patrol	Central Concourse Meeting Room	11.30 for 12.00
September 2008	TBC	TBC	Central Concourse Meeting Room	11.30 for 12.00
Wednesday 1 October 2008	TBC	TBC	Central Concourse Meeting Room	11.30 for 12.00
Wednesday 5 November 2008	TBC	TBC	Central Concourse Meeting Room	11.30 for 12.00
Wednesday 3 December 2008		Christmas Heritage Topic	Central Concourse Meeting Room	11.30 for 12.00

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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 have stories, events or developments of interest that could make an interesting item for Sydney Newsletter.

Contact details are –

The Editor, Max Michell, e-mail to samrom@bigpond.com, phone 02 9331 5662 or post to P.O.Box 279, Potts Point, NSW, 1335.

For all other matters relating to RTSA Sydney Chapter contact Bill Laidlaw (Secretary) or Andrew Honan (Chairman) as above.

CPD CREDITS

Engineers Aust 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

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