NEWSLETTER No 6/2004

RTSA
Railway Technical Society of Australasia
SA Chapter
Engineering House, Bagot Street
NORTH ADELAIDE SA 5006

JUNE 2004

NEXT MEETING

*** NOTE DIFFERENT DAY ***

WEDNESDAY 30th JUNE AT BAGOT ST, NORTH ADELAIDE (Institution of Engineers) - at 17:30.

RAILWAY COMMUNICATIONS:
IS ONE COMMON NATIONAL SYSTEM POSSIBLE?
The German Railways Experience.

The RTSA is proud to present the 2004 Eminent Speakers:

- **Hans Bier**, DB Netz AG, Director of International Telecommunication/GSM-R Cooperation; and
- **Dr. Manfred Sedello**, Partner of Quattron Management Consulting.

The Deutsche Bahn Network comprised many different, non-interoperable, technologically antiquated analogue radio systems and yet today is well on the way to implementing the solution for one common and standardised digital communications system platform throughout Germany.

The speakers will present German Rail's migration approach from analogue to digital train radio. They will highlight the advantages of GSM-R (GSM for Railways) and will also explain economical, legal, and technical reasons justifying the conversion to GSM-R.

Rail remains the most reliable and cost-effective freight and passenger link connecting major European cities, remote communities and neighbouring nations. As speeds increase – high-speed rail lines travel at over 300 km/h – voice and data communications is assuming a new significance in ensuring safety, security, stability, efficiency, and inter-railway interoperability. Europe's 14 different railway communications systems are being converted quickly to a common communications platform based on 21st century digital wireless technology.

Based on first-hand operational experience acquired since the commercial launch of the high-speed Cologne-Frankfurt line in 2002, Bier and Sedello will highlight the advantages GSM-R delivers to railway operators. This line was the first in revenue service that relied solely on GSM-R for communication from train and track. There were many lessons learned and insights gained. This is an opportunity to hear not only about the success of GSM-R but also about the engineering and operational challenges that were overcome in the process.

Australia's problems with different track gauges are well documented and the conversion of its railways to a standard gauge is being progressed. However, and just as important, there are a variety of communication systems being operated within Australia and in some cases within each state. Most are incompatible with each other and require different equipment and training methods for their use. As an example, the NR Class locomotives operated by Pacific National have approximately 5 separate radio and 8 different communication systems to enable them to operate Australia wide. As with track gauge, it is clear that a single system would provide a more efficient operating regime and improved safety. Does the GMS-R system provide the solution?

Don't miss this unique opportunity!

FUTURE MEETINGS

20th to 23rd June: CORE2004 in Darwin – a not to be missed event. An update item is included later in this newsletter.

30th June: Eminent speaker, Hans Bier, Project Director of GSM-R Communications in Germany will talk about communications upgrade for the DB (German Railways).

5th August at Bagot St.: Malcolm Owens of ARTC will present on CORE2004 revisited – a précised version of papers presented by South Australians at CORE2004.

2nd September at Bagot St: a joint meeting with PWI hosted by RTSA at Bagot St, Nth Adelaide will have Keith Charlton and Daniel Martucci giving a presentation on concrete sleepers on the Trans Adelaide network.

7th October at Bagot St.: a presentation by Dean Phillips on TransAdelaide's experience in outsourcing railcar maintenance

4th November at Bagot St.: Subject to sufficient progress having been made we will hear about the new Port River rail bridge.

30th November at a Very Pleasant Location: the annual dinner with AGM attached.

This program is, of course always subject to the vagaries of life and may therefore change as the year moves on. Newsletters (or at the very least a flyer) will

be sent out before each meeting with confirmed details of the up coming meeting and up to date version of the future program.

LAST MEETING

At the last meeting, which was held as a joint meeting with The Permanent Way Institution South Australian Section Inc., Neil Orange described in brief the history of the NSWGR "AK" Track Inspection Cars and then described in detail the features, capability and operation of the current track inspection car set. A modified version of Neil's paper follows.

THE "AK" TRACK EVALUATION AND INSPECTION CARS

1. History of the AK Cars

The New South Wales Government Railways have owned and operated a number of loco hauled Track Evaluation and Inspection Cars continuously since 1926. The current cars are the third in the series. This paper briefly describes the history of the cars and includes a more detailed description of the current cars and the measuring systems that have recently been fitted to them.

The cars have all been given the coding AK in accordance with the system set up for passenger carriages by the New South Government railways since its origin (with the first car having the number 1). The two letter coding for these towed vehicles was derived from A for a "Special Car usually with Sleeping Accommodation" and K for the special class of car that was the "Track Inspection Car". Since the commencement of the running of the AK cars and with the advent and development of a wider range of measuring systems, the emphasis has changed in recent times from track inspection to track evaluation. Car number 417 was the first of the AK cars, commencing operation in 1926. It was originally built in 1890 as a First Class side door compartment passenger car, it was timber bodied and fitted with elaborate features such as inlaid metal ceilings. In 1926 it was modified to form the Chief Civil Engineer's Track Inspection Car. The modifications included fitting it with a Hallade Recorder and making it self-contained. The car was generally towed at the rear of a passenger train. It was withdrawn from service as the Track Inspection Car in 1966 after suffering a fire in one end. It still exists in a dilapidated condition in the Thirlmere Rail Transport Museum.

The second car to be used as a track inspection car was car number 812 after it was converted in 1966. It had been originally built in 1926 as a First Class saloon car (sit up cubicles with a side corridor) and coded MBX. The car was wooden bodied with a steel riveted frame. It was recoded to MBE in 1939 following the fitting of electrical heating and then to AK 812 when it became the Chief Civil Engineer's Track Inspection Car. The modifications included making it self-contained with three bedrooms, a dining area, separate kitchen, shower and toilet. An observation area with sufficient room for up to seven people was constructed at one end of the car. The Hallade recorder was transferred from AK 417.

In 1979 AK 812 was fitted with an Electrologic Inertial Ride Quality Measuring system and the Hallade Recorder was removed. AK 812 continued to run until 1995 when it was replaced by the current set of cars. It also was generally towed behind passenger trains up until approximately when 1990 from when it ran with its own locomotive. The car is now a heritage item at Eveleigh Workshops.

The third consist and current cars to be known as the AK cars are cars numbers 2382, 2383 and 2384. These three cars are stainless steel ex sleeper carriages built in 1970 as FAM sleeping cars for the Brisbane Limited. Two were acquired in 1994 and a third in 1996 for conversion initially to their role as a multi-disciplinary inspection and testing vehicle. The cars were identical (except for side skirts) to those supplied by Commonwealth Engineering to the Commonwealth Railways for the Indian Pacific service. The cars are 24 metres long and weigh 48 tonnes (12 tonne axle loads). They are rated for 115 km/h running.

Photo – The "AK" Track Inspection Cars

Two factors led to the replacement of AK 812. Firstly, there had been an amalgamation of the separate civil, mechanical and electrical engineering sections into one engineering division (as was the trend at the time). This led to the proposal for a single multi-disciplinary testing vehicle which could provide for a range of testing / inspection needs. Secondly, the introduction of new XPT trains displaced relatively modern stainless steel sleeper FAM carriages from the Brisbane Limited with the result that the sleeping cars became surplus to the NSW Government Railway's requirements. Two cars

(2382 and 2383) were obtained in 1994 by the Engineering Division and extensively modified to provide a testing platform for vehicle and electrical testing as well as fulfilling the tasks as Track Evaluation and Inspection Cars. They were recoded to AK 2382 and AK 2383. The modifications to the two vehicles were carried out by the NSW Government Railway's workshops at Bathurst and included:

i) Construction of a Computer Room
ii) Installation of a 100KVA generating set to provide electrical power
iii) Construction of observation areas from each end of the car including monitors to view system outputs
iv) Construction of cable ducting and a conditioned electrical supply throughout the train
v) Construction of a kitchen and eating area
vi) Installation of a Pacific Real Time Inertial Ride Measuring system

One of the observation ends was set up to also provide meeting/conference amenities, mainly for management to have an available a suitable on board, multipurpose facility that was used in conjunction with track inspections. Three bedrooms were left intact. After a period of testing, the new AK Cars replaced AK 812, which was then withdrawn from service in 1995.

In 1996 a third carriage (AK 2384) was added to provide additional accommodation as the three bedrooms soon proved inadequate. The year 2000 saw a very significant step for the AK cars. Two factors combined to provide justification to broaden the range of measuring systems fitted to the cars. Firstly, the RVX4 Track Recording Car (a Plasser EM120) was 20 years old and in need of upgrading or replacement. Secondly, Rail Services Australia (RSA - the maintenance arm of the NSW Government Railways) had in 1998 won a five-year contract with the Australian Rail Track Corporation (ARTC) for Track and Rail Condition Monitoring. This contract required RSA during the course of the contract to introduce new technology to replace the equipment owned by ARTC but operated and maintained by RSA for the first two years of the contract. This resulted in a quantum change to the nature of the AK cars with a much greater emphasis on the track evaluation aspects. This is in keeping with the current trend with the Australian States leasing track to organisations such as ARTC with the coincident requirement for regular monitoring and evaluation of the asset condition. During 2000 the following measuring systems were fitted to the cars:

i) A Laserail non contact inertial track geometry measuring system (ImageMap/Pacific Real Time)
ii) Rail cross profile measuring system (ImageMap/Pacific real Time)
iii) Rail corrugation system (Pacific Real Time)
iv) Ride measuring system (Pacific Real Time)
v) Overhead catenary wire measuring system (Pacific Real Time)
vi) Video recording system (Pacific Real Time)

To accommodate the systems some additional modifications to the cars were required and these were carried out by RailFleet Services and included:

i) Enlargement of the Computer Room to AK2383
ii) Additional display monitors fitted to observation areas
iii) Effluent tanks fitted to all cars to hold all grey water
iv) Construction of an office in the Accommodation Car AK2384

The modifications were completed in January 2001 and following the installation, testing and commissioning of the measuring systems, the cars commenced production runs in August 2001. Thus a new era for track evaluation began in Australia.

The three cars are currently configured as follows:

i) Computer car (AK 2383)
   a. A total of 14 PC's and terminals
   b. Measuring equipment (laserail beam, pantograph, accelerometers etc)
   c. Two bedrooms
   d. Observation end with serial port outlet, monitors, printer
ii) Accommodation Car (AK 2384)
   a. Eight bedrooms
   b. Office with mobile phone
   c. Store room
iii) Facilities Car (AK 2382)
   a. Generating set (100 KVA) in soundproofed room
   b. Kitchen and eating area
   c. Workshop/Storage area
   d. Observation end as for Computer Car

From the outside the cars are virtually identical except that at the trailing ends, the two end cars have larger side windows and clear panels to facilitate a clear view of the track from the rear of the consist.

2. Description of Measuring Systems

2.1 Overview

The onboard systems are being progressively integrated to allow operation of the car to be undertaken by one person. All of the onboard systems have been designed around the ROAMES software package that has been developed and supplied by Sydney based Pacific Real Time. ROAMES is both a data recording and processing system. It allows inputs from a variety of systems or transducers (eg track geometry, ride, corrugation and overhead wire measurement) to be analysed and output reports to be generated both in real time or playback (of raw data) modes. Output reports can be produced in a multitude of user selectable formats (hard copy, electronic copy, video display etc).

2.2 The Location Output System

The Location Output System Terminal (LOST) provides a central location system that will eventually control all the onboard measuring systems from a single terminal. Currently LOST controls location and the control of geometry, cross profile and the corrugation measuring systems.

The AK cars location is currently determined using an encoder fitted to the end of an axle and calibrated to give a known number of electrical pulses per track kilometre plus an operators input via a keyboard.

A GPS based computer system is currently being developed to control location as well as the input of features. The system utilises the inputs from a Differential GPS system and a shaft encoder and is designed to operate continuously accommodating GPS dropouts such as in tunnels etc where a GPS signal is not always available. This type of automation will greatly enhance the accuracy and repeatability of the car's outputs as well as the freeing up of operators.

2.3 Laserail Track Geometry Measuring Equipment

This equipment was supplied by ImageMap (Chicago, USA) and is state of the art technology. It is a non-contact inertial system with no moving parts. A fabricated beam housing the equipment is attached to one of the bogies under the Computer Car. The beam is located as closely as possible behind one of the wheel sets to enable measurement of the loaded profile as much as possible. The beam sits approximately 150 mm above the rail. Brushes have been fitted around the perimeter of each laser/camera pair to prevent sunlight interfering with the imaging system. The system has proven to be robust and reliable and it yields very repeatable results.

A pair of cameras and lasers is fitted at each end of the beam such that they are located over each rail. The lasers shine a thin bead of light around each rail. Four cameras digitise the image of the bead of light. The cameras and lasers are aligned so that the head of the rail, the upper part of the foot and most of the web of the rail are picked up, the under head of the rail and top of the web being in a shadow. The inertial package that is fitted in the centre of the beam contains two pairs of accelerometers and solid state (fibreoptic) gyroscopes. The inertial package measures the movement of the beam and hence provides the geometrical vertical and horizontal reference planes whilst the camera/digitising systems measure the vertical and horizontal locations of the left and right rails in relation to the beam. All the outputs are combined to calculate the vertical and horizontal geometry of the left and right rails.

The outputs from the Laserail system are input into the ROAMES software to produce the various output reports as required by customers. The data from the Laserail system is sampled at 0.5 metre intervals. The ROAMES system allows parameters to be output that can emulate chord systems. This allows for seamless transitions when transferring from say a superseded track recording car with a chord based system to an inertial non contact system, standards previously developed for the chord measuring systems can continued to be used.

2.4 Rail Cross Profiles

Pacific Real Time Pty have developed a powerful rail cross profile system which utilises the digitised images of the rail used for the track geometry measurement. These can be recorded at user-defined intervals (currently five metre intervals on curves and ten metre interval on tangent track). The software allows for in playback mode, a "new" rail template to be overlaid on the measured profile. Outputs from this overlaying process include as well as a line diagram the following (where applicable for each rail):

i) Headloss
ii) Vertical wear
iii) Gauge face wear
iv) Rail cant
v) Gauge
vi) Crosslevel
vii) Curvature

NEWSLETTER No 6/2004

RTSA
Railway Technical Society of Australasia
SA Chapter
Engineering House, Bagot Street
NORTH ADELAIDE SA 5006

JUNE 2004

2.5 Rail Corrugation Measurements

The system uses accelerometers mounted on the axle box of an unbraked wheelset to measure the vertical movement of each axle box. The system is based on the theory is that the axle box follows the longitudinal profile of the rail. Speed compensated data is output using software filters. A number of output parameters covering a range of corrugation wavelengths are available depending on the customer's requirements. Pacific Real Time Pty Ltd is currently fitting a similar system to five Track Recording Cars run by the Ministry of Railroads in China (these cars are also fitted with the Laserail Track Geometry Systems).

2.6 Ride Quality System

This system is designed to measure and report the vertical and lateral accelerations of one of the AK car bodies. Two accelerometers are attached to the floor of the AK Computer Car above a bogie. These accelerometers measure accelerations in the vertical and lateral directions. Two different methods are used to view the outputs as well as to generate exceedence data. An ISO based system analyses data in the 1 to 2 hertz range for the lateral accelerations whilst in the 4 to 8 hertz range for vertical accelerations. A second method is based on the British rail method and analyses data within a 0.1 to 100 hertz range for both vertical and lateral accelerations. User definable threshold levels can be set to identify exceedences.

2.7 Overhead Catenary Wire Measurement

An instrumented pantograph is fitted to the Computer Car to measure the wire stagger and wire height on electrified track. The pantograph uses a series of conductive pads fitted across the head of contact beam. The system measures car body roll and reports the catenary wire position relative to a point between the rails.

2.8 Video Systems

A number of video cameras have been fitted to the Computer Car to record images such as the track (from the front of the locomotive as well as under the Computer Car), rail and wheel interaction and Overhead Catenary Wire. The images can be viewed from the observation areas and recorded on SVHS Pal videos. Track location is superimposed on the images.

3. Operation of the Cars

The Cars are operated on track with a supervisor plus two or three operators depending on the nature of the work.

The cars currently record the standard gauge interstate mainline track between all mainland capital cities. A recent six monthly run conducted for the Australian Rail Track Corporation, WestNet Rail, BJB Joint Venture and Works Infrastructure (Leigh Creek Line) covered approximately 15,000 kms in 26 days through NSW, Victoria, South Australia, Western Australia and the Northern Territory. This demonstrates the efficiency of the system with the cars averaging on this run 650 km/day taking into account a number of rest days.

The cars are travelling approximately 100,000 km per annum and are nearly fully utilised (approximately 80%).

4. Conclusion

The current AK cars have proven to be able to provide an efficient, reliable and repeatable means of measuring track geometry and other related parameters. The state of art systems fitted form a stepping-stone from which on going developments can be formulated and implemented. The cars have provided track owners with a valuable tool to enable accurate assessment of their asset to be measured and monitored.

THE DRIVERS SEAT

Recently I spent a bit over a month in Italy and France, mainly meandering medieval fortified towns of Umbria, walking the Cote d' Or wine region of Burgundy and enjoying the culture and charm that is Paris. The trip was not rail free – as everyone knows railways are a far more important part of European life than they are here, and in any case I was interested in what goes on over there.

A fortnight spent in Todi, a medieval Umbrian town around 150 km north of Rome, was enlivened by day trips to nearby towns (such as Perugia, Assisi, Spoleto and Orvieto) making use of the local bus and train services. The local private railway, the Ferovia Centrale Umbria (FCU), runs around 90 km both north and south of Perugia with Todi being around 50 km along the south line. It connects at Perugia and Terni with the state railway, Trenitalia. All services are run by railcars in one, two or three car consists, and there are around 10 services per day. A local small bus links Todi town with the trains in deference to the 250 metre elevation difference between the two (fortified towns tend to be on

tops of hills for strategic reasons). There are no freight services although a couple of bleached wooden wagons remain as a memorial to earlier times.

The FCU is reported to be struggling financially and it recently de-manned their stations. Despite this the line is equipped with good track, some concrete sleepers and a CTC operating system as well as at least 7 tunnels. The surprise in all this is the work in hand to electrify the line (with only around 10 km to go to complete Perugia to Terni), along with platform reconstruction and limited duplication (or more properly extended crossing loops). As far as is known the FCU do not own any electric rolling stock and their 10 year old railcars are in good order (so much so they regularly run services for Trenitalia out of Terni and Perugia) and quite some time from normal replacement.

It is not easy to communicate about the finer details of train running and operation when there is a language gap, but it would seem that the Umbrian regional 'government' is likely to have funded these capital improvements, even though FCU is a private company, as part of general support for public transport in their region. Presumably Trenitalia gets support from the same source for its local services – I have a Trenitalia ticket clearly marked "Tariffa Regionale UMBRIA' which suggests the region do have a significant role in local transport provision. Of course there is a question of where does Umbria get its public transport funding from, and it would seem in among all the normal sources there is EU money in there somewhere. Even this simplistic overview should be enough to indicate that there are many more ways of providing and funding public transport, even in this car mad country, than just the simple commonwealth-state recipes that we keep hearing about.

Paris has two 'underground' rail systems – the RER, which is SNCF heavyweight stock and generally running longer routes to the outer fringes of the city, and the Metro that is mainly located in the inner part of the city. The latter run two types of trains on their 16 lines – rubber tyred trains on 5 lines and steel wheeled stock on the other 11. Trains are short (mainly 5 or six cars) and operate at incredibly close frequencies. The guillotine mechanism, now but a memory in its original configuration, has been adapted to operate the train doors – traveller beware … chop. There are a couple of odd lines, the most unusual being 7bis (roughly 7A) which has three car trains with three and two axle cars that appear to have steering axles and ac traction (despite the low voltage third rail power), and line 14 which is rubber tyred and fully automatic (driverless).

The critical issue when navigating the Pris Metro is to know which line and the end station on the line in the direction you want to go. Our first acquaintance with the Metro was on arrival at Gare de Lyon (after a 900 km non stop run in a double TGV that originated in Italy). With some difficulty we located line 1 then the platform for La Defense, just in time to see a train departing as we approached the platform. 'Oh bother' (or something similar) says I, fully expecting to wait some minutes. Not so, the next train was pulling in before the previous one was out of sight. The one station run to Bastille, via some screaming curves did not take long, and once we had alighted and sorted which of the multitude of exits to take the next train had also arrived and departed. Despite the frequency (I would say around 1.5 minutes) the trains were well loaded with passengers so that the stations were always alive with people and activity. Bastille station (the original Bastille has long gone but the name remains) is served by three Metro lines while there are another three lines underground nearby that do not stop, a five or six lane roundabout on the surface is fed by at least eight major roads and through this three dimensional conglomeration a canal meanders in a two km long Napoleonic tunnel.

One quiet day (a public holiday when trains dropped back to a 5 minute headway) I went out with the aim of travelling on part of all 16 lines without backtracking or using any more than once, as a way of proving a point. I not only did it but was back at our Bastille home base in less than three and a half hours – that is sixteen trains and fifteen interchanges or less than 7 minutes an 'event'. The longest wait was five minutes (for the unusual line 7bis train) while the shortest was nanoseconds before the guillotine was applied. As a side issue there were four piano-accordions, one violin and three ranters on several of the 16 trains, all looking for 'donations'.

The Paris system is an excellent example of the value of frequency and connectivity. No train at any time I was in Paris was anywhere near empty, and many were loaded to the point where it was standing all the way, highlighting how a well designed and run metro railway can become part of the fabric of the city rather than stand aloof from it as is mainly the case here. The Paris Metro system has none of the purely radial structure that we are so familiar with, and they claim that no part of central Paris is more than 500 metres from a station.

One evening at Beaune (351 km from Paris, around 40 km south of Dijon on the old main line between Paris and Lyon) I went to see what might be going on at the station. The double track is timber sleepered, electrified, auto signalled with refuges for overtaking moves in both directions. In 80 minutes 22 trains went

through ranging from a strange EMU that had three aging trailers being pushed by a cranky sounding motorcar to a 160 km/h Corail express. But the main action was freight trains – 16 of them. Most were northbound and ranged between 13 wagons and a reasonably respectable 42 wagons. In fact northbound trains averaged less than six minutes apart for the whole 80 minutes I was there with as little as three minutes between successive freight trains. All but a few freights went through at between 110 and 120 km/h so that the next train even when only three minutes behind, was running under full green signals. Four wheel wagons and three axle articulated car carrying wagons were all part of the high speed freights. Even the odd diesel freight ran at similar speeds. Which all goes to highlight that capacity can be achieved by running trains at fast and consistent speeds on well-aligned track. A subsequent short period at St Denis in the northern part of Paris saw Eurostar, Thalys, TGV, loco hauled Corail and loco pulled or pushed double deck trains running on the main line from Gare du Nord at as little as 2 minute intervals, once again under full clear signals (although only just in a couple of cases) – a quite different mix of trains but making good use of the same capacity principle.

In Italy it is quite obvious that they are not afraid of either bridging or tunnels for rail or road. Between Perugia and Florence (170 km) we encountered 22 tunnels, with a further 33 through to Bologna (100 km). In many places the 'tunnel – bridge' sequence was continuous; out of one onto the other etc. On another day there were 24 tunnels between Milan and Genoa (within a distance of around 60 km) with no less than 55 tunnels in the 150 km of coastal line between there and the border with France at Ventimiglia, including one estimated at up to 10 km long with the underground San Remo station half way though. SNCF, not to be outdone have 22 more tunnels in the 60 km to Cannes including an underground Monaco – Monte Carlo station. Maybe there is something to be learned from the Europeans in this regard, including the release of high value land to fund alignment improvements (which is how San Remo came to be underground)

In the interests of ongoing research, planning is already underway for a 2005 European tour ☺.

A FURTHER POINT

For some years there have been low numbers of locomotives and rolling stock actually being acquired new (as against being rebuilt or resurrected from older equipment). The tide seems to be turning and a quick headcount would suggest that the there is a reasonable number of locos and rolling stock currently being delivered or on order (i.e. exclusive of orders that have been completed, and also rebuilds)

Locomotives: 56
Passenger Cars 617 mainly suburban
Freight Wagons 1463 mainly bulk coal and ore

The value of these orders would be in the order of $1.6 billion.

CORE2004

The biennial Conference on Railway Engineering, CORE2004, starts on Sunday 20th June in Darwin. Organisation for this conference is mostly complete, all delegate and exhibitor positions have been filled, there is an excellent list of technical papers to be presented and the social events should be outstanding. This will be a conference that will be well remembered.

The support of our sponsors has been fantastic and we are very grateful for their assistance.

Major Sponsors: ARTC, FreightLink, Northern Territory Government

Gold Sponsors: iQR, Norgren

Silver Sponsors: OneSteel, John Holland, Barclay Mowlem, Bradken Rail, United Goninan, RTAA, Hansen

The participation of sponsors and exhibitors is vital to the success of the CORE conferences.

CORE is recognised as the forum where the latest and most informative Technical papers are presented and debated.

CORE2004 will see a total of 54 technical papers presented plus an in depth plenary session on the planning and construction of the Alice to Darwin railway.

You can check for further details at:
www.core2004.on.net

For those that can't attend the Conference, Malcolm Owens will be giving a presentation at the August RTSA meeting summarising the papers presented.

NOTICE TO MEMBERS RECEIVING RTSA NEWSLETTER BY EMAIL

Members receiving this Newsletter by email should note that all future Newsletters will be sent in a PDF format prepared using Adobe Acrobat Version 6. To ensure that the Newsletter is decoded correctly it is recommended

that members update their copy of Adobe Acrobat Reader to Version 6.

Version 6 of Adobe Acrobat Reader may be downloaded free of charge from the Internet at www.adobe.com.

Alternatively, Adobe Acrobat Reader 6 is generally included on the CD ROM attached to most computer magazines.

KEY RTSA CHAPTER COMMITTEE CONTACTS

Rob Schweiger	8238 3412	Chairman
George Erdos	8218 2209	Treasurer
Roger Wyatt	8344 6939	Secretary
Malcolm Menadue	8270 2873	N/L despatch
Max Michell	8390 3300	N/L Editor

Articles or editorial comment for Newsletter are very welcome. We have over 100 members locally some of whom must have stories, events or developments of interest that could be reported in 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.

Send copy to the Editor, Max Michell at samrom@bigpond.com or fax to 08 8390 3772

Electronic despatch of Newsletter is undertaken by Malcolm Menadue – contact Malcolm on mmenadue@ozemail.com.au if you have any problems receiving Newsletter electronically or in hard copy. Note that electronic subscribers will get their Newsletters and flyers as soon as the editorial stuff is done, while the hard copy mail will of course be some days slower.

For all other matters relating to RTSA SA Chapter contact Roger Wyatt (the Hon Secretary) at e-mail januseng@chariot.net.au or by phone on 8344 6939.