## TESTING COURSES

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<td>VERIFICATION TESTER</td>
<td>4 DAYS</td>
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<td>14.09.15 - 25.09.15</td>
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## DESIGN COURSES

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## MAINTENANCE AND INTRODUCTORY COURSES

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01332 343585
enquiries@signet-solutions.com
Have we forgotten the signaller?

It was IRSE past-President Tony Howker who, in a paper presented in 1988, posed the question ‘have we forgotten the driver’? Tony argued that the history of signalling technology has been all about protecting the signaller from human errors, all the while taking it for granted that the drivers would obey signals with total reliability.

Development of the Train Protection & Warning System has largely answered Tony’s concerns. But are we now in danger of forgetting the signaller in the excitement surrounding the Digital Railway?

In May, Network Rail invited me to see the DeltaRail IECC Scalable installation at Marylebone which had recently replaced one of first IECCs to be commissioned. Indeed, a visit to Marylebone in 1991 was my first experience of the new ‘glass signalbox’.

After a demonstration on the full scale simulator of what nearly a quarter century of innovation has produced, we went down to the identical installation on the working floor. And what immediately struck me was the high workload for signallers in this small control room enjoying probably the highest degree of automation on the network.

Phone calls were coming in all the time, from fimmng boxes, User Worked Crossings, technicians seeking short term access to the track. A pie chart on the synoptic track diagram showed the proportion of trains running under Enhance Automatic Route Setting, and even with this well into the 90% range there was still old fashioned entry/exit route setting to be done.

Meanwhile, the latest version of the de-scoped Traffic Management (TM) proposed for Thameslink has been pared down to plan/re-plan with ‘Isolated TM’ providing signallers with revised schedules via Signallers Advisory Display (SAD) screens on their desks. Signallers would then have to implement the revised timetable manually which can only add to the workload - especially if they have not got E-ARS and all the other clever stuff I saw at Marylebone.

Evolution at Marylebone has seen new tools introduced to ease the signaller’s workload on a railway which is significantly busier than it was in 1991. Across the network the demand is for more paths and more trains running at closer headways.

In the enthusiasm to embrace the digital railway revolution have we chased the big picture and forgotten what the 21st Century signaller really needs? At Marylebone, to coin a phrase, I saw the future and it is already working. Effective ARS, engineers’ possessions applied at the drag of a mouse, enhanced Automatic Code Insertion independent of re-platforming, and more to come.

With a collective 35 years in the job, the signallers I met at Marylebone were already exploiting the new technology. And they knew what enhancements they would like to see next. Perhaps the question should be ‘have we listened to the signaller’?

Roger Ford
ECONOMIC SIGNALLING

Economic Signalling Enhancement: Providing Capacity Improvements in a Mixed Traffic Environment

By Akshaya Malaviya
Manager Signalling Delivery
Queensland Rail

and David Sweeney
Signal & Asset Engineering Group

SUMMARY
Coal volumes on the Hunter Valley network (Figure 1) are steadily increasing and have gone up by about 50% in the last six years. The volumes are expected to increase to 200+ MTPA (Million Tonnes Per Annum). Based on the coal volume forecasts, the Hunter Valley Corridor Capacity Strategy (the Strategy) identifies projects to be delivered to ensure the network capacity stays ahead of the demand.

The Strategy includes infrastructure upgrade projects involving track duplication/ triplexion and building of new crossing loops. The Heavy Haul Guidelines, in conjunction with the Australian Rail Track Corporation (ARTC) standards, form the basic framework for the Civil and Signalling designs on the projects delivered by ARTC in the Hunter Valley corridor.

Although track upgrade projects provide the desired capacity increases, recent investigations have established that signalling enhancements, in some situations, can also provide equivalent capacity increases at significantly lower costs.

The Hunter Valley corridor is currently delivering the following economic signalling enhancement projects aimed at achieving capacity increases at significantly lower costs.

1. Kooragang Island Arrival Roads signalling optimisation;
2. Hexham to Kooragang re-signalling;
3. Coded track circuit enhancements;
4. Mount Thorley signalling enhancements;
5. New crossing loops with signalling solution to achieve simultaneous entry functionality.

The coal trains originate from various mines located in the Hunter Valley region and travel up to the Port Waratah Coal Services (PWCS) and Newcastle Coal Infrastructure Group (NCIG) ports near Newcastle. Whilst the single track section north of Muswellbrook is capacity constrained necessitating construction of new crossing loops, the Ports area is heavily congested due to convergence of the entire coal traffic into that region and slow clearance of dump stations and the arrival roads leading up to these dump stations.

This paper first analyses the constraints in the Ports area leading to congestion and shows how these constraints have been overcome by using economic signalling enhancements. The paper then discusses how the crossing transit times at crossing loops can be optimised by using a economic signalling design referred to as Modified SIM entry. Lastly, the paper details the issues associated with the Coded Track Circuit designs and how they can be addressed.

INTRODUCTION
The Hunter Valley Corridor Capacity Strategy identifies the constraints on the coal network’s capacity in the Hunter Valley, the options to resolve these constraints and a proposed course of action to achieve increased coal output.

The fundamental approach of this Strategy has been to provide sufficient capacity to meet contracted volumes on the principles of the ARTC Hunter Valley Access Undertaking, while also having regard to and identifying those projects that would be desirable to accommodate prospective volumes that have not yet been the subject of a contractual commitment.

According to the eighth edition (Consultation Draft) of the above Strategy (2014-2023), the coal volumes are expected to increase from 168 MTPA in 2014 to close to 200 MTPA in 2016 (if prospective volumes are taken into account)

ARTC’s corporate objective for the Hunter Valley corridor is twofold:

- Minimise ARTC impact on coal throughput;
- Ensure network capacity stays ahead of the demand.

The Corridor Capacity Strategy identifies projects to be delivered to augment network capacity by way of:

- Increasing train loads - increase in size of train consists;
- Increasing speeds, especially at the turnouts - use of longer turnouts e.g. 1:18.5;
- Improving operational flexibility and headways - new crossing loops with simultaneous entry facility; additional track;
- Reducing congestion - holding and park up tracks.
Recent investigations have shown that the existing signalling systems at some locations in the corridor are excessively restrictive and operational flexibility and headways can be improved by making small scale changes to these signalling systems. Such changes may provide significant capacity benefits at a very low cost. Although originally not included in the Strategy, Hunter Valley corridor is currently pursuing implementation of a number of such economic signalling enhancement projects.

Various in-house studies have also identified several economic signalling alternatives to the major track/signalling upgrade project designs to achieve comparable benefits. The signalling enhancements/alternatives basically involve:

- Equal speed junction signalling;
- Use of a running aspect instead of a shunt;
- Overlap and signal spacing optimisation;
- Modified simultaneous entry;
- Minimisation of signal clearance delays due to coded track circuits.

This paper provides an overview of the economic signalling enhancements that have been/are being implemented to achieve capacity improvement at relatively low costs. The primary focus is on the Terminal Congestion between Hexham and the Coal Dump Stations at Kooragang Island and the need to reduce crossing times in single track sections in the Hunter Valley. The additional complexities arising due to mixed traffic (passenger, freight and coal trains) in the corridor have also been looked at.

**BROAD DESIGN CRITERIA**

Key design parameters for the Hunter Valley capacity improvement projects are as follows:

### Track

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<th>Item</th>
<th>Adopted</th>
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<td>30 Tonne 60 km/h loaded 80 km/h empty</td>
<td></td>
</tr>
<tr>
<td>Design axle load and speed (Gunnedah basin)</td>
<td>25 Tonne 80 km/h loaded 80 km/h empty</td>
<td>30 T for new infrastructure</td>
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<td>Min horizontal clearance</td>
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<td>Track centres</td>
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<td>Min 7.5 m if infrastructure located between the tracks</td>
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<td>Ports to Ulan Gunnedah basin</td>
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<tr>
<td></td>
<td>Fixed Nose Crossing (FNX) with 50 km/h turnout speed 1 in 18.5 1200R tangential</td>
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### KOORAGANG ISLAND ARRIVAL ROADS

Completion of the Hexham Relief Roads project, the project is the provision of 5 new relief roads on the Up Coal Road will make it possible to re-sequence the coal trains going to the ports and this will greatly help in reducing congestion on Kooragang Island.

To ensure that the benefits of the Hexham Holding Roads Project are maximised, a review was completed on the signalling headways and the type of signalling that exist between Hexham and the Island (Kooragang).

The assessment had three parts (see attached signalling schematic of the section from Hexham to the ports),

- Hexham to Sandgate Junction (mixed traffic);
- Sandgate to Kooragang Island;
- The entrance of the arrival roads to the coal dumps stations.

Kooragang Branch line is a duplicated line with bi-directional signalling up to the departure roads.

The four arrival roads, as the name suggests, are located approaching the dump stations.

### Kooragang Arrival Roads Constraints

Loaded Coal trains are travelling at an average of around 15 km/h between North Fork and signal K3 and then slowing to a shunt speed of around 5 to 10 km/h upon entering the arrival roads (see Figure 2).
ECONOMIC SIGNALLING

If an arrival road is clear all the way to the dump station, a train will still proceed at a slow speed under shunt signal working, as the driver will not have an indication that the track ahead is clear and may not have a clear view due to other trains parked on the arrival roads.

A shunt aspect does not assure the driver that there is an unoccupied berth to enter; a driver must be prepared to stop short of obstructions (ARTC network rule ANSG 606).

Furthermore, when the arrival roads are occupied vision is limited. A driver has to be more cautious when entering the arrival roads under the authorisation of a shunt signal.

Some operators have imposed restrictions because of the signalling and that there have been incidences of rear end collisions in the arrival roads.

Trains travelling at slow speeds into the arrival roads tail back (due to the 1543 m train length) towards North Fork and increase headways. This restricts the number of trains from North Fork to the Kooragang Coal Terminal (KCT) dump stations.

Analysis

To improve the headway times a number of conceptual signalling schemes were developed. The solution chosen was to install running (mainline) signals on the arrival roads and provide drivers with a green aspect as soon as practicable. The design is to include equal speed junction signalling to maintain green signals at the entrance of the arrival roads when the route ahead is clear to the dump station.

By upgrading the shunt signalling to running (mainline) signals at the entrance to the arrival roads the train operators (train drivers) are assured that when there is an unoccupied berth ahead to the dump station the train can operate at track speed.

Shunt signals will be retained and still be used to allow trains to enter the arrival roads during times of congestion (behind trains that were already passing through the dump stations).

The headways and travel times in the existing arrangement are summarised in Figure 3.

Signalling Solution for the Arrival Roads

When drivers enter the arrival roads under a running (main line) signal at proceed (green or caution) the driver is assured that the line ahead is not occupied and that a full service braking and overlap distance is available for the applicable track speed.

The Kooragang Signalling Plan indicated that there was enough braking distance required to upgrade the entry signals to running signals and provide clear (green) indications.

To assist train operators in maintaining entry speed into the arrival roads a second signal is positioned at approximately 1300 m along the arrival roads towards the dump station. The signal is placed in this position to allow a clear (green) signal with equal speed junction signalling at the entrance to the arrival roads. The new signals at 1300 m highest indication is caution signal (yellow).

The new signal that is positioned at 1300 m along the arrival road is also positioned approximately 200 m from the fixed red signals (the stop point).

The train can then move forward to the dump station signal under the authorisation of a shunt signal noting that the view is now unobstructed from the fixed red to the dump station signal.

A set of repeater signals were added to the arrival roads located at the beginning of the curve that leads to the dump stations. This was to ensure that signal sighting would prevent drivers from maintaining track speed.

A desk top review indicated that this may have a headway improvement of about 15 minutes

Signalling Design Considerations

The challenges in the design were as follows:

- The slow unloading speed at the dump stations (approximately at 5 km/h arrival road and dump station occupation of approximately 40 minutes);
- The longest trains are 1543 m long;
- The curved configuration of the physical infrastructure.

New South Wales Signalling principles were applied in the design that included the headway, braking distance and overlap principles. ARTC signalling principles are found in ESD-05-01 Common Signal Design Principles S1 - Signalling Locking and Train Dynamics.
The ESD-05-01 principle section 6.2.3 allows the overlaps under certain conditions to be varied if the following conditions are met: "Where train speeds are permanently restricted due to them departing yards or negotiating turnouts or junctions, then the overlaps beyond the signal may be reduced to 90 m where the speed approaching the signal is restricted to 15 km/h and to 150 m where the speed is restricted to 25 km/h, or reduced to the longest braking distance." The Kooragang Island arrival roads were designed in accordance with this clause.

The design deliverable was to provide Clear (green) signals as early as possible; this was achieved through the addition of the second set of signals (K29 etc.) in the arrival roads (Figure 4) and the reduction of the line speed to 15 km/h at 50 m on the departure of the signals leading up to the fixed red signals to a speed that was achievable and practicable, this allowed the overlap to be reduced to 90 m.
The arrival road track speed is 25 km/h by applying the GW10 braking curve which is the applicable braking curve for a loaded coal train. A distance of 193.1 m is required for braking; a distance of 200 m was designed.

By reducing the line speed to 15 km/h approaching the new fixed red signals the braking distance was reduced to 92 m and the overlap to 90 m for K29 etc. signals (Figure 6).

(The minimum braking distances for loaded coal trains that are described as GW10 trains at a speed of 25 km/h and 15 km/h on level grade are 193 m and 92 m respectively, Kooragang Island is level.)

By reducing the track speed and overlap the signals controlling the entrance to the arrival roads would be able to step up to clear (green) signals earlier (Figure 5).

A number of concepts were developed for the signalling of the arrival roads. One concept relocated the fixed reds to the dump stations. The disadvantage of the fixed reds in this position is that the overlap for the entrance signals (K11 & K13) would have extended through the dump stations, this would have added approximately 40 minutes to the headway.

Another concept removed K39 etc. signals; again this would have extended the Clear (green) headway to the signal in the rear K9.

Both of these concepts were rejected as they would not have met the project objective of providing clear signals for trains to enter an empty arrival road.

Other Considerations
Train management was seen as an important issue in the design of the project. To ensure that the drivers would understand the design and the equal speed junction signalling and maintain track speed a number initiatives were implemented. These included:

- Meeting with the operators;
- Explaining the theory and the design principles to the drivers;
- Risk assessing the design and placement of signal with the operators.

An interesting outcome of the upgrade of the signalling to mainline signalling was that the drivers commented that it will provide a heads-up environment in the cabin, rather than a heads-down environment of sighting ground level shunt signals.

Benefits
The projected benefits from the project are enormous. The headways will be significantly improved. Figure 7 below provides the estimated run times with signalling enhancement completed. The total run time is 20 minutes as against 47 min (cf Figure 4) without the signalling enhancement (Note: K27 Signal has been renamed to K43 etc.). The total improvement is 33 minutes.

<table>
<thead>
<tr>
<th>Route</th>
<th>Train Speed (km/h)</th>
<th>Run Time (min)</th>
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<tr>
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<td>15</td>
<td>8.19</td>
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<tr>
<td>K3 to K9</td>
<td>15</td>
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<td>K9 to K27</td>
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<td>9.62</td>
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<td><strong>Total Time</strong></td>
<td><strong>20.31</strong></td>
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</table>

Figure 7 - Run times with braking distances designed for 60 km/h operation

**HEXHAM TO KOORAGANG ISLAND BRANCH LINE**

**Constraints**
At Hexham, five relief roads are under construction and are to be commissioned towards the end of 2014. The primary objective of the project is to enable re-sequencing of the trains going to the ports, maximising the efficiency of train operations.

Re-sequencing is presently achieved through a number of methods. One method is to hold a train on the branch and use bi-directional running to achieve the correct order, this method delays departing trains from the island.

The signalling between Hexham Relief Roads and Kooragang Island Branch line is designed for mixed traffic: Super freighters, coal trains and passenger traffic.

The track speed for this section of track of the Up Coal is 115 km/h and the braking distance and overlaps designed for the 115 km/h track speed.

The braking distance required for a super-freighter type train (GW40 Braking curve) at 115 km/h is approximately1998 m. For a loaded coal train (GW10) braking curve at 60 km/h is 769 m and the fast passenger train (KPT) at 115 km/h is 693 m.

Braking curves for passenger trains and coal trains braking curves are similar. The GW40 trains (Super-freighters) braking curves have longer braking distances.

Because of the requirement to design for the worst braked train the signal spacing is designed for the GW40 braking curves. This has a major adverse impact on the headways.

**Analysis**
The Up Coal’s primary use is for coal trains (GW10) that travel at 60 km/h and the signalling is designed for GW30 trains.

Headway for 3 position signalling is 2D (braking distance) +S (Sighting) + TL (Train length + O (Overlap): that equals a distance of 6039 m with the train travelling at 60 km/h and provides a headway of 6 minutes and 18 seconds.

If the headway and signal spacing was designed for a GW 10 train a headway of 3 minutes and 36 seconds would be available.

The Hunter Valley Capacity Strategy nominates that headways are calculated on double green headways “on double-track, the headways are calculated on the basis of a ‘double-green’ principle. Under this principle both the next signal and the one after are at green, meaning that the driver will never see a yellow signal. This ensures that drivers should always be able to drive at full line speed” or consecutive greens.

This requirement adds another signal to the ARTC headway calculation to become 3D+TL+5+O/V. In this case the headway would just meet ARTC’s requirement for 8 minute headway for coal trains.

Between the Hexham Relief Roads and the Sandgate flyover and the Kooragang Branch Line there is a mixture of 3 position signalling and 4 position signalling.

It is assumed that the mixture of 3 and 4 position signalling was to compensate for the mixed traffic on this section of line and the increased headway affecting the coal trains.

**Signalling Design Considerations for the Proposed Solution**
From the Hexham Relief Roads, trains will be starting to travel on to the Up Coal and will have an average speed of about 35 km/h from Hexham to the Kooragang Branch Line.
A review of the signalling headways was required due to the slower speeds expected once operations began at Hexham with coal trains exiting the facility.

An outcome of a desktop review indicated that due to the existing signalling being designed for a track speed of 115 km/h and the braking distances being more than double of a coal train the most economical solution was to use the existing signal positions and track circuits and adjust the aspect sequence for a braking distance for a track speed of 60 km/h.

A factor in the decision was the 70 km/h turnout speed at Sandgate for the route Sandgate to Newcastle. After the commissioning of the Sandgate flyover the straight route is now to Kooragang Island and that Super-freighters and passenger traffic rarely use the Up Coal.

**Benefits**

Figures 8 and 9 show the original and improved headway times for differing speeds from Hexham to Kooragang Island. Four different speeds have been used to model the different performance of the coal trains and coal trains departing the Hexham relief roads.

<table>
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<th>Ht @ V2</th>
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**Figure 8 - Existing Headways (Ht in minutes)**

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<td></td>
<td>K9</td>
<td>12.1</td>
<td>8.2</td>
<td>8.2</td>
<td>8.2</td>
</tr>
</tbody>
</table>

**Figure 9 - Improved Headways (Ht in minutes)**

Parameters used in Figures 8 and 9: S = Sighting distance, 200 m; L = Train length, 1545 m, speeds as per table below

<table>
<thead>
<tr>
<th>v = Speed (km/h)</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexham to Sandgate</td>
<td>25 km/h (70% speed reduction)</td>
<td>35 km/h (normal train operating speed)</td>
<td>35 km/h (normal train operating speed)</td>
<td>60 km/h (line speed)</td>
</tr>
<tr>
<td>Sandgate to Arrival Roads</td>
<td>17 km/h (50% speed reduction)</td>
<td>25 km/h (70% speed reduction)</td>
<td>35 km/h (line speed)</td>
<td>35 km/h (line speed)</td>
</tr>
</tbody>
</table>
REDUCING CROSSING TIMES AT CROSSING LOOPS

Constraints

Single Lines require crossing loops and the number of crossing loops set the maximum number of trains that can use the single line.

The capacity of a single line is set by the spacing between crossing loops. In theory and if both directions use the same consists and operating characteristics, crossing loops are spaced generally equidistantly to provide maximum headway for the line.

The NSW standard is that, at CTC crossing loops trains have to stop at home signals when crossing. The transit times taken for crossings are, therefore, quite significant and have severe impact on throughput.

Simultaneous Entry of Crossing Loops.

Simultaneous (SIM) Entry into CTC crossing loops provides an operational advantage in that when trains approach a crossing loop from either the down and up direction, the approaching trains are signalled into the crossing loop up to the starting signals using main line signals and no train has to stop at the home signal.

The SIM Entry into crossing s also provides the additional advantage that level crossing located on the approach to crossing loops will not be blocked during normal operations.

The conventional full SIM functionality requires 300 m of extra track construction with starting signals located 300 m from the clearance point (Figure 10). During the concept design phase the viability of some of the proposed crossing loops was in doubt due to infrastructure constraints. Application of SIM entry loop would not overcome the constraints due to the required 300 m of extra track construction.

To overcome these constraints a review of the SIM entry designs resulted in a new design known as Modified SIM entry (MSIM). This is essentially a signalling way of achieving SIM entry functionality at a low cost.

The proposed MSIM entry loop configuration removes the need for a 300 m overlap in advance of the starting signal as is the case of a full SIM entry loop. MSIM reduces this overlap to 100 m in advance of the starting signal that finishes at the clearance point. Utilisation of 66 m loco recovery allowance reduces it further to only 34 m.

The provision of Modified Simultaneous entry requires only 100 m of extra track construction, instead of 300 m that is required for a full SIM entry configuration.

A 300 m overlap distance for the Home Signal and Loop / Main Home (Second Home) Signal is consistent with the current standards for overlap at CTC crossing loops.

Modified SIM Entry Loops – Signalling Design Considerations

The Signal Principles and Standards requirements for SIM entry loops is found in “ESD-05-01 Common Signal Design Principles S1 - Signalling Locking and Train Dynamics; 6.2.6 Provision of Overlaps for Simultaneous Entry at a Crossing Loop”.

The standard further details the requirement that “the 300 m overlap entirely within the crossing loop and clear of the clearance point for the other path through the crossing loop. This will allow for the clearing of both home signals for simultaneous entry to the loop line and the main line. The aspect sequence is to be appropriate for the path to the stop signal with a 300 m overlap. The points shall be set to direct any conflicting movement to an alternate path.”

Figure 11 shows a Modified SIM (Simultaneous) entry concept for a crossing loop (only one line has been shown in the figure). The additional Home signal, which is a low speed signal, reduces the requirement of 300 m overlap to just 100 m.

ESD-05-01 6.2.2 Overlap Distance

The signal principles specifies the requirement and the length of the overlap depending upon a number of factors, the factors are detailed in the following extract from the signal principles.

The low speed subsidiary signal overlap is specified at 100 m. “The nominal length of the overlap to be provided shall not be less than the minimum distances shown below:

- Low speed subsidiary for route signalling or conditional cleared running signals, 100 m;
- Running signals, 200 m;
- Running signals with a line speed greater than 80 km/h, 300 m;
- If the train density is such that the headway is less than 10 minutes, then the overlap distance is increased by 100 m.”

Other Signalling principles applied:

- SSOS 01 Signals Subsidiary Signals (Low Speed);
- SDS 01 Signals 1.1.3 Subsidiary Signals;
- SDS 01 Signals 1.5.3 Subsidiary Signal Aspect;
- SDS 01 Signals 1.5.3.1 Low Speed Signal.

MODIFIED SIM – HOW IT WORKS

As shown in Figure 12, the MSIM entry loop signalling arrangement will provide a 300 m overlap for the Home Signal controlling the entrance to the main line or loop, this overlap provided by the placement of a signal 200 m on the approach side of the starting signals for the purpose of this paper known as the Loop / Main Home Signals. The Starting Signal will be located 100 m from the clearance point.

The MSIM entry loop configuration removes the need for a 300 m overlap in advance of the starting signal that finishes at the clearance point, as is the case of a full SIM entry.

The 300 m overlap is located between the additional signal (Loop / Main Home Signal) and the clearance point. The 300 m overlap is configured in the following way; 200 m between the additional signals (Loop / Main Home Signals) and the starting signal and 100 m between the starting signal and the clearance point totalling 300 m.

The second home signal (Loop / Main Home Signal) will be fitted with a low speed subsidiary signal and the following principle is applied to the Low Speed Signal “The Low Speed aspect is to be considered a running signal aspect although it may be time approach cleared and not part of the running aspect sequence.”

When a train is signalled into the Crossing Loop to either the Loop or Main to cross, the home signal controlling the entrance to the loop will be provided with a 300 m non-shared overlap between the Loop / Main Home Signal and the clearance point. An overlap will be provided immediately beyond the stop signal to which the warning aspect applies.
This overlap must be vacant for the home signal to clear to caution. When the train approaches the Loop Home/Main Home, the train will be speed checked by approach timing.

### Approach Clearing of the Low Speed Signal

The signal standards and principles are not specific regarding conditional clearing of the low speed signal but does allow for the low speed signal to be time approach cleared and may not be part of the running aspect sequence; approach timing speed checking is to be included in the design.

There are two methods of timing available:
- Short timing approach track circuit to loop home signal;
- Timing the loop berth track occupied.

A short timing track was chosen as it would allow the information to be related to the train driver by the means of a sign stating that timing at began and at what speed.

**Short Timing Track**

The timing sequence requires a timing track circuit 100 m in length that will be located at 250 m on the approach side on the Loop / Main Home (Second Home Signal). This provides 150 m between the end of the timing track and the Second Home Signal.

A sign worded “begin 25 km/h timing” is located at the commencement of the timing sequence track circuit (250 m on the approach side of the Home Signal)

When the timing sequence is complete and the train is proved to have reduced speed to 25 km/h or lower (estimated by the timing track) and the 100 m overlap is vacant the Second Home Signal will display a low speed signal aspect.

**Crossing Trains**

When crossing of trains occur at a crossing loop with modified SIM entry, the sequence of aspects will be:
ECONOMIC SIGNALLING

- Distant Signal -Pulsating Yellow;
- Home Signal Main to Loop –Steady band of yellow lights;
- Home Signal to Main-Caution (steady yellow);
- Loop / Main Second home signal- Red over Red Marker on approach;
- Loop / Main Second home signal -clearing to low speed after timed approach;
- Starting Signal –Red over Red Marker.

These aspects are shown diagrammatically in Figure 13.

MSIM Configuration

The MSIM configuration as adopted in the Hunter Valley is shown in Figure 14.

Benefits

- MSIM entry provides a number of advantages as follows:
  - Removes the prolonged operation of level crossings on the single line sections;
  - Can provide a solution to avoid stopping a train on rising grades;
  - Reduces crossing transit time for both trains;
  - Does not stop trains at the Home Signals as both trains can move into the loop;

- The MSIM entry concept requires an extra 34 m of track construction when compared to a non-SIM loop configuration and reduces track construction by 266 m when constructing a full SIM configuration and,
- All full SIM crossing loops constructed within the Hunter Valley has included the 66 m for Loco recovery as part of the crossing loop (between Starting Signal and Clearance Point) the Modified SIM Entry Loop proposal has included the 66 m loco recovery between Starting Signal and Clearance point reducing track construction.

The estimate below reflects the design and practice to date:

- Track work estimated at $1.5m full SIM entry (300 m of extra track);
- Track work estimated Modified SIM entry $170k (34 m of extra track).

The modified SIM entry configuration requires an extra four signals and four track circuits and four overlay timing tracks.

- $350k on new loops;
- To upgrade an existing loop estimated at $550k.

OVERCOMING THE CODED TRACK CIRCUIT TIME DELAY

Constraint

ARTC have employed Microlok coded track circuits at various locations across NSW to provide an effective method for both Rail Vehicle Detection and signalling control between signalling block sections, such as crossing loops.

The Microlok coded track circuit has an inherent time delay associated with its operation that causes a time delay in the clearing of signals, causing delays to rail traffic.

Design Considerations

Microlok coded track circuits have an inherent time delay in their operation and this delay in operation is unavoidable.

To propagate signalling information through the rails the coded track circuits use a series of low frequency evenly spaced pulses to transmit an electrical representation of a particular code. The Ansaldo Microlok coded track system allows up to a total of 23 different possible codes.

Coded tracks have an operational cycle of 6 seconds independent to the track circuit length, and for an individual code to be accepted that code must be received twice to be recognised as a vital code.
Therefore the changing from one track code to another, depending on the timing of the track code change, may result in a delay in recognising the new track code of up to 18 seconds, and 12 seconds at the minimum per Microlok coded track within the block section.

This delay must be taken into account when designing the signal interlocking controls. Coded track circuits can only send or receive one code at one time

The coded track system may be designed in such a way to reduce the impact of the inherent time delays by using one or a combination of the following options, a combination of both options was used:

- Dual route requesting: Initiate the clearing of the block at both ends of the section: possibly saving up to 50% of the signal clearing times;
- Normally Cleared Block: Have the block section always cleared for one direction or the other when available, generally in the direction of the previous train movement. In some cases this provides no time savings for the clearing of the starting signals if the route is opposing, but provides a benefit for the following train scenarios only.
- Initiate the clearing of the block while the train is still traversing the section. In some cases provides no time saving for the clearing of the starting signals. Greater benefits provided to non-following train movements.

**Watermark Crossing Loop**

In 2012 ARTC engaged ORAH Rail to provide an assessment of the current use of coded tracks in the ARTC network and provide options/recommendations to improve inherent delays.

In 2013 ARTC engaged ORAH Rail to carry out the recommendations of the 2012 report by re-designing the single line section between Watermark Crossing Loop and Breeza on the Northwest Line in the Hunter Valley; the modifications were commissioned in November 2013.

The Watermark crossing loop was commissioned in May 2013 as a new loop between the existing crossing loops of Curlewis and Breeza. The existing interlockings utilised Microlok II and coded track technologies.

**Results of Watermark Implementation**

The determination of the success of the coded track enhancement revolves around assessing reduction of time delays that coded tracks impose on the operation of the signalling system. This implicitly means how long it takes to clear a signal once set and in particular during scenarios where a train is waiting for that signal to clear prior to departing.

Results were obtained via two methods:
1. Simulation.
2. From the actual network using Phoenix playbacks.

The following scenarios were selected:
1. Following trains in same direction.
2. Passing train in opposite direction.
3. Comparison of clearing of signal at Breeza and Watermark.

**Simulation Results**

The simulator is a perfect method of being able to provide simulation between the previous data (without enhancement) and the modified data (with enhancements).

The table and graph in Figure 15 show the result of both implementations (old and new) with the listed scenario of movement between Breeza and Watermark. The enhancements were purposely designed to benefit crossing trains over following trains.

The first four results involve crossing of two trains in different scenarios. The significance of these results provides actual savings in time in the departure of the train that is ready to depart the Loop during a crossing move.

The last two movements are following trains where the improved time is less significant, however following train movements are less likely to benefit from time improvements because

**Benefits**

The Coded Track Circuit enhancements have been completed at Watermark Crossing Loop in accordance with the recommendations from the Consultant (ORAH Rail).

The results of the Watermark trial show that for a crossing train, time saving is in the order of approximately 40 s per coded track in the section. For following trains the time saving are in the order of approximately 10-15 s per coded track in the section.

**CONCLUSION**

Signalling is a key factor in determining the network capacity. The capacity modellings often ignore the signalling restrictions that not only increase headways, but also prevent us from realising the full benefits of track upgrade projects.

The existing signalling systems were designed a long time ago and are relatively conservative. Economic signalling enhancements help in removing these constraints and provide significant capacity improvement at low costs.

In addition, signalling also provides alternative ways to achieve operational flexibility at low costs which would otherwise involve significant investments in track upgrades.

<table>
<thead>
<tr>
<th>Movement (1st then 2nd)</th>
<th>Signal</th>
<th>Old (avg)</th>
<th>New (avg)</th>
<th>Time saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to BA Loop, Dn Main to WK</td>
<td>BA3M</td>
<td>41.7</td>
<td>7.0</td>
<td>35.7</td>
</tr>
<tr>
<td>Dn Main, Up from WK Loop</td>
<td>WK4L</td>
<td>45.3</td>
<td>3.0</td>
<td>42.3</td>
</tr>
<tr>
<td>Up Main, Dn from BA Loop</td>
<td>BA3L</td>
<td>45.3</td>
<td>6.0</td>
<td>39.3</td>
</tr>
<tr>
<td>Dn to WK Loop, Up Main</td>
<td>WK6M</td>
<td>45.0</td>
<td>3.7</td>
<td>41.3</td>
</tr>
<tr>
<td>Dn Main, Dn Main (Following Trains)</td>
<td>BA3M</td>
<td>41.7</td>
<td>31.0</td>
<td>10.7</td>
</tr>
<tr>
<td>Up Main, Up Main (Following Trains)</td>
<td>WK6M</td>
<td>49.3</td>
<td>33.3</td>
<td>16.0</td>
</tr>
</tbody>
</table>

**Figure 15 - Tabular and Graphical views of simulation results**
ERTMS Users Group Adopts Formal Specifications Tool

The ERTMS Users Group (EUG) have confirmed that they intend to use the ERTMSFormalSpecs open source tool as part of its process to manage change requests in the ERTMS specifications.

Under a contract signed with the tool's developer ERTMS Solutions on 13 April, the ERTMS Users Group will make use of the Driver-Machine Interface and Scenario Editor modules under licence, with the company providing ongoing support. The tools will enable EUG to visualise the impacts which any change request would have on the original ERTMS specifications.

ERTMS Users Group Managing Director Michel Ruesen said ERTMS Solutions had demonstrated the value of ERTMSFormalSpecs and its modules through several proofs of concept. "We are convinced that these tools will support our work and the communication with our stakeholders, which will save a lot of time in the implementation of change requests", he explained.

The Users Group has also decided to use the company's ERTMS Academy to train its staff in the use of ERTMSFormalSpecs. Hailing the contract as 'a major step', ERTMS Solutions Managing Director Stanislas Pinte said: "It represents the recognition of five years of research and development to assist the railway community".

Greek GSM-R Network Upgrade

Nokia Networks has secured a contract from Greek infrastructure manager Ergose to upgrade the GSM-Railway (GSM-R) core network for OSE, Greece's national railway operator. Ergose is a subsidiary of the Hellenic Railways Organisation (OSE) and was established to undertake the management of OSE’s investment programme projects and in particular those co-funded by EU Programmes.

The upgraded rail communication system will increase operational efficiency of the Greek national railway to provide safer, reliable train travel in the country. The new system will offer more reliable communications compared with older analogue systems for railway operators and train drivers while also enabling real-time transmission of rail maintenance data.

Additionally, the advanced communication network will enable railway operators to lower operational costs, improve safety and offer more dependable travel services for passengers.

Ergose GSM-R Committee president Ioannis Dimitriou said: "The GSM-R core system modernisation will provide future expandability to meet new European requirements, more up-to-date services to train drivers and traffic controllers as well as assure the maintainability of the system in the long-term."

The deal also includes GSM-R core network, subscriber data management products One-NDS and NT-HLR, and NetAct 8 network management solution. The company will also have turnkey responsibility for network planning, end-to-end system integration and project implementation. The project also ensures compatibility with European railway communication system requirements and enables future network technology evolution.

Nokia Networks Greece country director Athanasios Exarchos said: "This modernisation project will put in place a system for future expansion and integration for Ergose. With this deal, we are not only getting a clear trust message from our customer, we are confirming our position as the leading company in the railways business."

Capacity Boost on Paris RER Line A

Alstom Transport of France has been selected to develop and install Automatic Train Operation (ATO) on Paris RER Line A under a €20m contract awarded by city transport operator RATP, the Ile-de-France region and transport authority STIF.

The introduction of attended ATO that meets Grade of Automation 2 is expected to improve performance and boost capacity on Line A, which is currently carrying around 1.2 million passengers / day. It will allow headways to be reduced and service frequencies increased, while reducing the journey time through the central core between Vincennes and La Défense by about two minutes.

Line A is already equipped with SACEM, which monitors train speed and headways and provides a form of quasi moving block with 'distance to go' cab signalling overlaid on the lineside fixed blocks. This enables drivers to close up behind the train in front at low speed in order to minimise the platform reoccupation time at stations. Retrofitting the trains with ATO would reduce the variability in performance associated with manual driving, and enable RATP to make best use of the available capacity.

The ATO equipment is to be installed on a total of 173 trainsets, including the double-deck M12N units and the M109 EMUs which are now replacing the line’s oldest trains.

Alstom has been commissioned to undertake detailed studies and then develop the prototype equipment, as well as undertaking testing ahead of commissioning in 2018. The work is to be undertaken at the company's facilities in Saint-Ouen and Villeurbanne.

Ana Giros, Managing Director of Alstom Transport France, said the contract ‘demonstrates RATP's renewed confidence in us and illustrates Alstom's ambition to reinforce its position in the signalling market’. As part of this wider strategy, the company is currently awaiting final regulatory approval to complete its acquisition of the GE Transportation signalling business.

ProRail Opens ‘Ultra-Modern’ Utrecht Control Centre

The Infrastructure manager ProRail officially opened a 'robust, ultra-modern and striking' control centre in Utrecht, Netherlands on 4 June 2015.

The 4500 m² structure was designed by de Jong Gortemaker Algra architects and built by Visser & Smit Bouw, with Arcadis as project manager and HOMIJ responsible for mechanical and electrical engineering.

The 1000 m² control floor provides a large open space from which the 100 staff have a view of the tracks and the surrounding area. The equipment is located on the floor below, and the control centre has back-up power supplies and redundant IT systems.

The building is intended to be immediately recognisable as a railway structure. The steel and glass exterior was designed to give a robust and industrial appearance, with its horizontal lines inspired by railway track and overhead electrification structures.

The control centre has triple glazing, hybrid cooling and solar panels. On the north side where shading is not required the louvres have a narrow horizontal profile, gradually changing to broad and steeply-slanted on the south where summer sunlight is blocked and heat is reflected. The gradual change of shape aims to create a dynamic effect which appears to move when viewed from a passing train.
ETCS Level 2 for Barcelona Suburban Network

In early June 2015, the Infrastructure manager ADIF was to send out tenders for the first installation of ETCS Level 2 signalling on the Barcelona suburban network, covering the 56 km between L’Hospitalet de Llobregat and Mataró in Spain.

A total budget of €92.9m has been set for the contract, of which €56.8m would cover the design and installation over 21 months of electronic interlockings, train protection and energy supply systems as well as fixed and mobile telecommunications including GSM-R. Maintenance over 20 years is expected to cost a further €36.1m.

Separately, ADIF is tendering a contract worth up to €10.4m to replace Centralised Traffic Control (CTC) hardware and software at its Barcelona control centre, where problems with the servers caused serious disruption to rail traffic on May 21.

With ADIF giving ‘absolute priority’ to maintaining CTC functionality, work is to be undertaken in a phased programme lasting six months. The contract also includes maintenance over a period of 20 years.

Alstom Acquires Signalling Solutions Ltd

Alstom announced its acquisition of Balfour Beatty’s 50% stake in the Signalling Solutions Ltd joint venture in the United Kingdom on 28 May 2015, giving it sole ownership. The price was not disclosed. Alstom said the business would ‘continue to trade as SSL for the foreseeable future’.

The 50:50 joint venture was established by the two companies in 2007 to supply signalling systems in the UK and Ireland. SSL is now one of the major UK signalling suppliers, with 540 staff based at four main locations offering a range of services from project design to full project delivery.

‘This acquisition is part of Alstom’s signalling growth strategy and enables the company to take full benefit from its worldwide resources and capabilities’, said Pascal Cléré, Senior Vice-President of Alstom Transport’s signalling business. ‘SSL enriches Alstom’s portfolio, both from a geographical and product standpoint’.

Balfour Beatty said that the sale of its stake in SSL was ‘further evidence of the progress we are making as we deliver our Build to Last programme, both in simplifying the group and maintaining a strong balance sheet through self-help. Exiting SSL will allow our rail business to focus fully on its core expert strengths’.

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Experience the Difference
This year’s winner of the Wing Award for Safety is Conway Massam of Bridgeway Consulting. Conway is a lifelong career railwayman of 39 years. During this time he has undertaken a variety of roles at the front line and also within the professional area of rail/construction HSQE. He has supported the development of rail industry safety standards and tools relating to occupational safety. As a valued stakeholder he is often called upon to provide specialist advice on the physical aspects of railway occupational safety. More recently, he has also provided specialist advice on the requirements of the Construction Design and Management (CDM) regulations and was a founder Member (and continues to be) of the Network Rail Principal Contractor Strategy Steering Group.

Significant industry contributions include being appointed as the Safety Recovery Manager for the recovery operations after the Hatfield, Ufton Nervet, Grayrigg and Pontsmill incidents.

Conway received commendations from Railtrack /Network Rail for his work on the above projects. He also conducted the Safety Validation of the Safe Cess for the West Coast Route Modernisation Project.

Conway has a strong can do - will do attitude when it comes to driving through ideas/initiatives that help deliver work safely and productively. He takes great pride in his work and ‘walks the walk’ as well as ‘talking the talk’ and can often be seen on site providing leadership and direction to all those that work with him. Nothing is too much trouble and he is always willing to provide his experience, help and support to his colleagues within the industry – irrespective of who they work for.

Conway received his award from Andrew Simmons at the Rail Safety Summit organised by Rail Media, which was held on the 30 April 2015 at the Royal College of Physicians in London.

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IRSE NEWS is looking for a new Deputy Editor

The position of Deputy Editor of the IRSE NEWS will shortly become vacant, so the IRSE is looking for a volunteer to take over this important post. The Deputy Editor (DE) works with the UK-based Editor and Production Manager to produce each issue of the NEWS.

In general, no actual writing of pieces for the NEWS is involved, but the Editor’s and DE’s task is to review and prepare contributions from others for the Production Manager to assemble into the magazine that members receive.

The task falls into two parts. Firstly formatting and styling each piece to conform with the rules laid down in the IRSE NEWS Production Manual. This determines spacing, how different ‘levels’ of headings are dealt with, presentation of physical quantities, dates and time etc. It also warns about remembering the differences between, for instance, Licence and license. This part of the process may seem somewhat mundane, but the other part needs careful thought and judgement.

It is necessary to ensure that each piece must be easily understood by ALL members throughout the world, remembering that very many do not have English as their first language. Slang and colloquial expressions need to be eliminated, for instance The Tube must be replaced by London Underground. Shortened expressions such as ‘I’m Can’t shouldn’t (sic) be used, but must be written in full. Another important task is to ensure that every abbreviation is properly defined (and subsequently used). Some may be familiar to the DE, but it may be necessary to liaise with the original writer. It might also be necessary to replace obscure words with more usual words, but in general the actual meaning should not be altered without going back to the writer.

When complete the piece would be passed to the Production Manager and discussion might follow.

It is difficult to estimate how much time the candidate will need to have available. A short letter in the Feedback Section would barely need a maximum of five minutes, whilst the occasional ‘difficult’ long piece might well need two or three hours. It follows from this that the position would be ideal for a retired member who would probably have fairly flexible time available, compared with a working member whose available time would be restricted by overtime, night shifts and weekend working!

All files are now held in a ‘cloud’ facility and can easily be accessed by all members of the team, rather than having to send e-mails with large files attached.

Finally, the DE is responsible for the contents and upkeep of the IRSE NEWS Production Manual

So, if you are interested in taking up this important and fulfilling position, please send your details and background to the Editor, Ian Allison, at irsenews@irse.org.
2014 Provided another year of events for the members that included our typical Annual General Meeting (AGM), as well as what is now a signature conference event held at the site of the Toronto Railway Club in December. Further details are given below:

**ANNUAL GENERAL MEETING**

The 2014 Railway Systems Suppliers Inc. (RSSI) exhibition held at the Gaylord Opryland Convention Center in Nashville, Tennessee on 21 to 23 May was the site of the AGM of the North American Section (NAS) of the IRSE. In addition, technical presentations were provided to the RSSI attendees as a service provided by the NAS.

The NAS AGM was held following the closing of the last day of the RSSI exhibition. The AGM hosted the regular business of the Section, and followed the agenda below:

1. Introduction;
2. Safety Moment;
3. IRSE Overview – WJ Scheerer;
4. Remarks from the IRSE President;
5. Council Award presented by the IRSE President;
6. Annual General Meeting: Call to Order / Quorum Count;
7. Approval of minutes of the AGM held in 2012;
8. Voting by Anyone Who has not Voted Prior to the Meeting;
9. Other Matters Arising;
10. Election Results;
11. Adjourn.

The NAS was fortunate to have the IRSE President Christian Sevestre and his wife Nina attending the meeting. IRSE North American Country Vice President WJ “Bill” Scheerer, spoke about the purpose of the IRSE and the benefits of IRSE membership.

Those present were also engaged by remarks from IRSE President Sevestre. He spoke about the challenges facing our industry in the coming years and his commitment to the encouragement of cooperation amongst all the sections to assure the dissemination of information for the betterment of the industry as a whole.

A presentation of the Merit Award was made to NAS secretary Gary Young. The Merit Award is given to an individual who has demonstrated outstanding service to the IRSE. Gary was nominated and found to be a fitting recipient of the award, having been the Secretary of the NAS for the last several years.

During the exhibition hours of the RSSI Product Show, Technical presentations were held within the Innovation Theatre on the floor of the exhibition. Two presentations were made; one by Joe Zerzan concerning Southern California Regional Rail Authority’s (SCRRA) Positive Train Control (PTC) program and its successful running of their first PTC interoperable train, and a second by Richard Moura of GO Transit identifying the challenges of attracting young people to the signalling profession and measures that can be taken to make signalling a meaningful career choice to these individuals.

Joe Zerzan addressed the challenges of interoperability in a corridor where SCRRA operations are mixed with traffic of both the Union Pacific Railroad and the Burlington Northern Santa Fe. He also discussed the fact that the vendor originally tasked with the provision of a new Computer Aided Dispatching platform was unable to meet the requirements of the project which forced SCRRA to go with another vendor.

Richard Moura described an analytical approach to identifying the core talents needed in the signalling industry and further identifying alternative programs, both in the universities and technical colleges that might meet the needs of the industry. He also stressed the importance of mentoring as a means of interesting young people in the challenges of our industry.

Both presentations were well attended and promise to become a popular attraction at coming RSSI exhibitions.

The AGM and Conference meeting room was graciously provided by the Railway Systems Suppliers, Inc, who also provide the NAS with booth space at the annual RSSI Communications and Signal Exhibition and Product Show. Many information packets and book orders were passed out during the two day event, and the members wish to thank the individuals that volunteered their time to man the booth. A special thanks to Vic Babin and Rob Burkhardt for setting up the booth and organising our efforts there.

**TORONTO CONFERENCE EVENT**

On December 6, the IRSE NAS hosted a short series of presentations in Toronto, Canada at the Toronto Railway Club. As has been typical in the past, the event was extremely well attended with only standing room available in the room. The site for this year’s event in Canada was held just prior to the Railway Club’s annual dinner at the Royal York Hotel.
The following agenda was followed:

- Meet & Greet;
- Bill Scheerer – Country Vice President NA Chapter;
- Introduction to The North American Chapter of the IRSE;
- Mandy Kharra, PEng and Mridu Oravakandy, Hatch Mott MacDonald: “Legacy Safety Case Verification for a Signal System in Modern Standards Environment”;
- Greg Fogarty, Railcomm: “Condition Based Monitoring for Mainline Power Switch Machine”;
- Dake Song: “Automated Testing of Railway Signalling Systems”;
- Cory Wogrinc, Canadian Pacific: “Crossing Activation Failure Evaluation and Recommendation”;
- Cameron Fraser, Thales: “Thales Locktrac MT Interlocking, Application to TTC Wilson Yard”;
- Closing Remarks and Group Picture.

The presentations will be available on the IRSE NAS web page for download at: http://bit.ly/1EHJu9z.

The Section thanks John Leonardo for organising this event. It is the third event in this series and we expect to continue with this format in the future. Last year’s meeting was attended by over 90 visitors.

The North American Section (NAS) was formed on May 24, 2002 to support the goals of the Institution in North America. The NAS presently has over 50 members, and is encouraging railroad communication and signal professionals to join. While prospective NAS members must also be members of the IRSE, the NAS Local Committee would be pleased to offer assistance to anyone interested in the applying for the benefits of membership with their application. NAS membership at present is free. IRSE membership is available at several levels, from Associate to Fellow with appropriate membership fees. Information on IRSE and NAS membership can be found at www.irse.org.

North American Section officers are:

- David Thurston, PhD, PE, FIRSE, Chairman NAS Section
  Vice President Rail - Systems
  Atkins North America
  420 Rouser Road, Building 3 Suite 200
  Corapolis, PA 15108
  E-mail: david.thurston@atkinsglobal.com

- Robert Burkhardt, FIRSE, Vice Chairman NAS Section
  President
  ISIS Rail
  6200 Fegenbush Lane
  Louisville, KY 40228
  E-mail: rburkhar_isis@bellsouth.net

In my role as Chairman of the Minor Railways Section it was my pleasure recently to inform the Institution in a news article that the Section had recruited the IRSE’s youngest member: Morgan Cookman who joined the IRSE as a result of attending one of the section’s technical courses.

Members may be aware that the Minor Railways Section runs a selection of courses and events open to members and non-members which include our Signal Maintenance and Inspection Technical Workshop, A Cable Maintenance and Testing Workshop, a Bi-annual Technical Seminar, with a planned telecoms course on the blocks. The Section also organises technical visits in the UK and further afield. With all this positive activity not to mention the “Guideline” documents published by the Section and the wealth of experience and advice available to our members in the Section readers may be forgiven for thinking that the Section was fighting off members with a mucky stick, however, that is not the case and we know that the Institution is not represented on a significant number of Minor Railways.

Our challenge as a section is to work out how best we can get the Institution's message across to all the minor railways in the UK and Europe as there are still some areas we feel we are not fully represented in. We would hope as we attract more members from these “hard to reach undertakings” of any age group that we could then attract the younger members from that group. This however has been a sound idea which has been difficult to put into practice for a variety of reasons. Our appeal to the wider membership is to ask that if you have any ideas on how we may reach individual railways or geographical groupings and please let us know as we would be interested to hear from anyone who may be able to help us increase the Section’s representation across our sector.

As we look to develop younger members and older members on a second career (in retirement) we would be delighted to
hearing from railways that may wish to put on organised work weeks throughout the year so that we may plan CPD activities for members to undertake tasks not available to them on their host railway. This is a win-win for both the railway and the individual.

As a Section with a very good recruiting history to date we wish to continue attracting new members. Can you help us? Please do let me know.

Upcoming events on our calendar are

- 17-18 October: Our Cable Maintenance and Testing Workshop at Signet Solutions, Derby
- 7 November: Our Bi-Annual Technical Seminar this year at Kidderminster, the theme is Projects.

Booking via Mike Tyrell at miketyrrell@btinternet.com, we look forward to seeing you at one or all of our events.

Minor Railways Section AGM and Technical Visit 2015

by Major I Hughes TD, Chairman

The fifth Minor Railway Section AGM was held courtesy of Network Rail at George Stephenson House York, Saturday June 13 2015 attended by 26 delegates.

The meeting started promptly at 10.30 in the state of the art training room with the official business of the day consisting of the outgoing Chairman’s report where Major Ian Hughes presented his two year tour in nine action packed minutes, the result being the general feeling of “how did we fit it all in?” There had been an ongoing programme of events which involved technical visits, two Signalling Inspection and maintenance courses held at Signet Solutions Derby and a cable inspection and maintenance course in March 2014 held at Pickering again run by Andy Knight of Signet Solutions. An interesting fact for this tour is that the section managed to recruit the IRSE’s youngest ever member at the Signalling Inspection and Maintenance course in September 2014. One Morgan Cookman a volunteer on the Ravenglass & Eskdale Railway. An article was published on Morgan in a previous IRSE NEWS.

On conclusion of the outgoing Chairman’s report it was time for our Chairmen to hand over, with Mike Tyrell taking over the reins of the section. Mike’s first task after the presentation of the officer’s papers, reports from the secretary, treasurer and visits co ordinator was to ratify the committee for another two year period. That complete Mike paid tribute to Major Hughes’s travel and achievements as our third section Chairman, detailing the progress of the Section to date and Mike’s vision for the next two year chapter in the section’s developments, which as well as the current ongoings, will include a telecoms element. Mike also informed the meeting of the progress of the S&T Volunteer of the Year award which was now to be run by Colin Porter with John Francis kindly agreeing to chair the selection committee for another year. Mike again asked for volunteers for the committee and the sub committees. Help with the Guidance Notes would be especially well received from Dave Hellwell the lead on this project. If anyone has a spare SPT concentrator that Mike can have for his course that would be appreciated also!

During any other business under the heading of News and History, John Batts reminded everyone that recently a plaque had been erected on the premises of the former radio shop of Bill Trinders at 84 High St Banbury, where in 1951 Bill and Tom Rolt had the meeting that started the railway preservation movement as we know it today, when they decided to rescue the Talyllyn Railway. The rest as John said was history.

The AGM for 2016 will be June 2016, a specific date and venue is to be confirmed. There being no further business raised from the floor the meeting was brought to a close.

With the formal business concluded, Martijn Huibers, a section committee member then gave the meeting a detailed presentation of the operational drive from Network Rail to combine network control functions into 12 Railway Operating Centres (ROCs) throughout the UK, with special focus on the recently opened York ROC. One of the big drivers is to reduce the remaining 800 signal boxes to 12 ROCs, with the resulting cost saving and productivity improvements of bringing train command and control functions under one roof in the regional centres. The presentation detailed the re-control of the various schemes in to the ROC with the template developed at York for interfaces between the ROC building project team and any signalling projects re-controlling to the new ROC being rolled out to other ROC development projects as the start standard.

Traffic management will replace the existing systems in use with a flexible integration of numerous train command and control systems by multiple stakeholders, this will integrate the function of TRUST and upgrade the existing Automatic Route Setting capability which it will supersede. The system will be layered to include planning, regulation and monitoring functions, so disruption and out of course working will be dealt with more effectively. For example as the system makes service changes required during a disruption event it will update passenger information displays on the stations concerned. First commissioning of Traffic Management is foreseen in December 2015 in Cardiff and Romford, which will be a system from Thales, called ARIMIS. Next stage of Traffic Management has been tendered to the three UK suppliers of the system, Thales, SSL and Hitachi, and at the time of writing tenders were being considered for Three Bridges and York re-control.

As well as the ROC alongside has been built a regional training centre which incorporates S&T, PW, Signaller (some of you may remember the frame and one of the NX panels when they were at Leeds training school) and Welding training and OHLE training equipment is scheduled to be provided shortly. The facilities are inside which means that lecturers and planners can cancel the former “wet weather programme” as courses can be run indoors.

The two Chairmen hand over, Mike Tyrrell on the left, Major Hughes on the right.
This is a great step forward to keeping the courses on time especially in the winter. The schools at Newcastle, Leeds and the Old Biscuit Warehouse in York have now closed and the functions transferred to the new facility.

On conclusion of Martijn conducted the group via the station and a lunch bag collection to see the York ROC in live action, less the signalling as this has yet to migrate. The first re-control is currently believed to be the North Lincolnshire scheme, which will move in to a dedicated area on the control floor over Christmas 2015. When the first Traffic Management schemes will be commissioned in York ROC, these controls will be housed on floor three, the top floor of the building. The comprehensive tour was conducted by Mr Andy Graham the Lead Route Control Manager of the ROC. At the end of the tour Major Hughes thanked Andy for allowing us in and providing such a detailed tour and answering so many intricate questions, the section showed its appreciation in the time honoured manner.

The Group then moved to its final destination, the Lancashire and Yorkshire Railway’s signalman’s training layout in the National Rail Museum. A full demonstration was underway for the public lead by Mr Phil Graham who many will know as the leader of the York block class courses. Phil is a former recipient of the Wing Award. Assisting on the day were section members Bob Wright and Charles Weightman. The AGM attendees were invited on to the operating floor to hinder, sorry, assist the regular volunteers and have a go on the frames running the service. It’s not as easy as the regular volunteers make it look I can assure you.

Sunday 14 June saw some delegates assemble at the Derwent Valley Light Railway in Murton, on the outskirts of York, to take a look at the facilities on this little heritage railway, of which is presence is not known to many people even in York. Being the last ½ mile section of the original Derwent Valley Light Railway, it is now part of the Yorkshire Museum of Farming but operated by the independent Derwent Valley Light Railway Society. A diesel train was running on the day and the delegates, and after having visited the station building (an original building for the line although re-located from Wheldrake), a trip down the line was enjoyed. Because there are no run-round facilities at the station end, a second engine will take over for the next trip and the first engine is shunted into the depot sidings. The departure of the train as well as the shunting was overlooked from a good position in the signal box where we could see the workings of the limited signalling on this railway. Having enjoyed the visit, the delegates made their way home having ticked off another heritage railway of their visiting list.

Our thanks to all mentioned in the text and those I have inadvertently forgotten to mention. It would be remiss of me not to mention the section organiser of this weekend, Martijn Huibers, who worked tirelessly to pull it all together and to ensure the excellent two days went off without a hitch, Mike Tyrrell who coordinated the paperwork and Bob Wright who liaised with the National Rail Museum and the Lancashire and Yorkshire volunteers. If you wish to get involved with the section and be included on our updates please email me at ian@greendragon.com. We would love to see you at our events.

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3rd WHEEL DETECTION FORUM
VISIONS AND TRENDS IN TRAIN DETECTION

30 SEPTEMBER - 02 OCTOBER 2015
VIENNA, AUSTRIA

SEE YOU IN VIENNA

Topics WDF 2015

- Visions and Trends in Train Detection
- High Availability
- Software-based Communication
- Level Crossing Solutions
- Wheel Sensor Applications

More than 150 delegates from more than 29 countries.

- System Integrator: 44%
- Operator: 21%
- Manufacturer: 22%
- Authority: 6%
- Consultant: 5%
- Press: 2%

Event language: English

online registration: www.wheeldetectionforum.com
On Saturday 21 March 2015, a group of Younger Members gathered at the Atkins London office to undertake an IRSE exam study day. The focus was on Modules 1 (Safety of Railway Signalling and Communications) and Module 7 (Systems, Management and Engineering).

The day started with an interactive introduction into systems considerations in the rail industry presented by David Nicholson, where the attendees were expected to contribute with their own thoughts and ideas.

Delegates then divided themselves into two groups to review a selection of questions from previous exam papers and were given the freedom to select which module they wished to focus on.

Following lunch, generously donated by Atkins, the delegates visited Warren Street Underground station. The group was asked to consider a past paper question and relate the answer to their practical experiences within the station. This visit showed the attendees how they can use every day experiences to build their answers during the exam.

The day was closed with a final Q&A session based upon previous papers, after which some of the group retired to a local venue for social discussion and chance to review the day’s learning.

Thank you to Atkins who generously provided the facilities and lunch for the day. David Nicholson and Peter Woodbridge who both kindly donate their time and experience towards the development of younger members deserve our special thanks.
Data-enabled virtual railway

In response to the Presidential address, it is my observation that the railway is becoming a data-enabled virtual railway. I say virtual because the systems that are now beginning to control our train movements do not do so directly via hard-wired train detection systems and interlocking logic. Rather, they use an internal map stored within its processing brain overlaid with train movements and infrastructure status based on electronic inputs. And there are many more pieces of data with an increasing variety of ways in which the data can ‘fail’.

Consider today’s Customer Information Systems (CIS) which operate with an internal map along which they track train movements. These generally work very well, but in times of perturbation we see ‘incorrect’ trains arriving at platforms, railway staff manually announcing platform alterations and in extreme cases the CIS being turned off. We cannot afford the same approach when it comes to signalling train movements.

Data comes in one of three principal types:

- Static, typically infrastructure data such as track length, traction power type, routes, permanent speed restrictions;
- Semi-static, typically temporary and emergency speed restrictions;
- Dynamic, typically train location, route availability, lie of points etc.

All data needs to come with a ‘claims structure’ to support the quality of the data being supplied if we are to avoid the CIS problem. Capturing data the first time around is the easy part (relatively speaking). It is managing changes to data that is particularly challenging. Semi-static data can be limited to specific changes that are permitted to ensure that nothing out of course is accidentally instantiated. Changes to static data, especially when signalling schemes are being implemented, or maintenance teams make a minor change will require a robust specification and management process to ensure that changes are measured and implemented properly and co-ordinated with the physical changes on the ground. This is a tough challenge for an industry that still sends out staff to undertake safety-critical roles for which they do not hold the appropriate competence.

I am sure that other railways implementing data-critical systems, such as ERTMS, have faced these challenges and it would be interesting to hear how they have developed them. And railways are not alone in managing critical data. There is much we could learn from other industries such as finance, medical, pharmaceutical and aerospace.

David Nicholson
Chief Engineer, Transportation, Atkins

Re: The IRSE’s Youngest Member

Having just read Martin White’s account in IRSE NEWS May 2015 Feedback, I can not claim to better the early interest record. But maybe set a different one? I was 15 in 1974 when I made enquiries leading to an informal chat with a senior engineer at BR Croydon S&T offices. I too realised more time and effort were necessary before proceeding. For reasons of obtaining industrial sponsorship for my degree, I digressed from railway, starting briefly, believe it or not, in the bus industry, before a career in voice telecommunications.

In 2007 I joined the London Underground signalling environment, and soon applied for IRSE Associate. This was granted in 2008, so might I claim the biggest gap from first interest to joining? No less than 34 years! In 2011 I obtained the necessary relevant IRSE licence, and 2014 transferred to Member. Now my working role lies with the current IRSE President’s finest achievement (page 5 in the same Issue), namely supporting the signal control centre elements of the Central Line Upgrade. It all still works by the way - although the control room console and overview screens are a little more up to date than the image. I am pleased to see IRSE encouraging interest, the industry must promote both professional membership and the Licensing Scheme.

Nick Lawford BSc MIET MIRSE
Systems Engineer Central Line

Gauge

Queensland is by no means the only system in the world to build its main lines to this (3'6") ‘narrow’ gauge”. Not so, and Switzerland is mostly standard gauge, whilst metre gauge is different (if smaller). Principal main lines are 3'6” gauge in Japan, New Zealand, South Africa and its neighbours. Laxey to Snaefell Summit in the Isle of Mann probably does not count as main line.

Re: Centralising Traffic Control

Andy Overton is right to stress the importance of signallers’ familiarity with the area under their control. Even without an emergency, many signallers will not know much more than the railway side of much of their “patch”. A 999 (British for 911) call forwarded to them warning of an obstruction somewhere described by village, road and county names will often mean little. A signaller taking emergency control from the other end of the country would not stand a chance.

John R Batts

Curiosity Corner

Thanks again for putting my contribution in the May issue of the IRSE NEWS. Here is another photograph I took during the recent Convention in Australia.

It shows a railway signal on the side of the main road in Rockhampton, Queensland. The railway track it applies to is actually in the centre of the road, not quite visible in the photograph. It is the “Home Signal” leading into Rockhampton Station. Because of its location, and showing red most of the time, it sometimes does stop the obedient motor driver who keeps waiting there for it to turn green. The sign “Railway Signal Only” on the post may help a bit.

Charles Lung

Opiniones
MEMBERSHIP MATTERS

ADMISSIONS
We have great pleasure in welcoming the following members newly elected to the Institution:

**FELLOW**
- Dupre D IDEM France

**MEMBER**
- Bin Sukairi M H Consultants SDN BHD Malaysia
- Blanc D I Signalling Solutions UK
- Dai S Beijing Jiaotong University China
- Hussain M A Softech India
- James J J Amey UK
- Marin C A O Interfleet UK
- Messer R P Altran UK
- Olleta Balduz E Atkins UK
- Trivedi R Boleh Consulting Australia
- Voorthuizen W EuCoRail Netherlands
- Younis N Thales Saudi Arabia

**ASSOCIATE MEMBER**
- Agrawal M K Crompton Greaves India
- Dobrovits P Sydney Trains Australia
- Enström D Sweco Rail Sweden
- Gulawita R Australian Rail Track Corp Australia
- Kingma J Gronmtij Netherlands
- Malapane A T Thales South Africa
- Murphy M E RIVVAL Ireland
- Nalluri V K E2E Rail India
- Nunnick N R H Amey UK
- Rafi M Amey UK
- Read S L Network Rail UK
- Seavers C Atkins UK
- Van Reenen M ProRail Netherlands
- Wibawa I PT Len Indonesia

**AFFILIATE**
- Archibald A J Kiwirail New Zealand
- Ast M Derby Conference Centre UK
- Balakrishnan N B Self Employed UK
- Barnsley P ALIRE Consultants New Zealand
- Bishop J S Siemens UK
- Cole Liam Carillion UK
- Ellison A Hitachi UK
- Entwistle P A Network Rail UK
- Fotheringham J Network Rail UK
- Gomez S Self Employed UK
- Gupta A India
- Harris J M Network Rail UK
- Harrison C A Carillion UK
- Hart I Retired UK
- Ibbotson C V Carillion UK

**AFFILIATE (CONTD)**
- Joyner G C Retired Australia
- McEwen M Network Rail UK
- Mercer B Self Employed UK
- Pawittrananon P Bombardier Thailand
- Sherhod J Siemens UK
- Singh P P Sehajk UK
- So Y L MTR Corporation Hong Kong
- Thamarai Selvan G Atkins UK
- Wain M Fenix Signalling UK
- Walsh M J Irish Rail Ireland
- Worsfold K Thales UK

**TRANSFERS**
- Crockter N C Network Rail UK
- McFadden P Network Rail UK
- Stafford J RSSB UK

**ASSOCIATE MEMBER TO MEMBER**
- Cassidy C G Siemens Australia
- Dylewski M T Parsons Brinckerhoff UK
- Fareham D M Volker Rail UK
- James A P Network Rail UK
- Jones A M GB Engineering UK

**AFFILIATE TO MEMBER**
- Agutter P Network Rail UK
- Chan C B London Underground UK
- Choy P K Alstom Hong Kong
- Eadie R C Signalling Solutions UK
- Elliott G F Rail Control Systems Australia
- Man K H M MTR Corporation Hong Kong
- Peyyeti Y Cyient India

**AFFILIATE TO ASSOCIATE MEMBER**
- Nistala V Hyder India

**ENGINEERING COUNCIL REGISTRATIONS**
Congratulations to Abdul@Abdul Ghaney H for achieving final stage IEng registration and to Law WHM for achieving final stage CEng registration.

**RE-INSTATMENTS**
Chekkapalli M, Kumar R, Parnasala S and Silva B.

**RESIGNATIONS**

**DEATHS**
It is with great regret that we have to report the death of the following members: Goldsworth MR, Singh DK and Wiggins A.

Current Membership: 5493