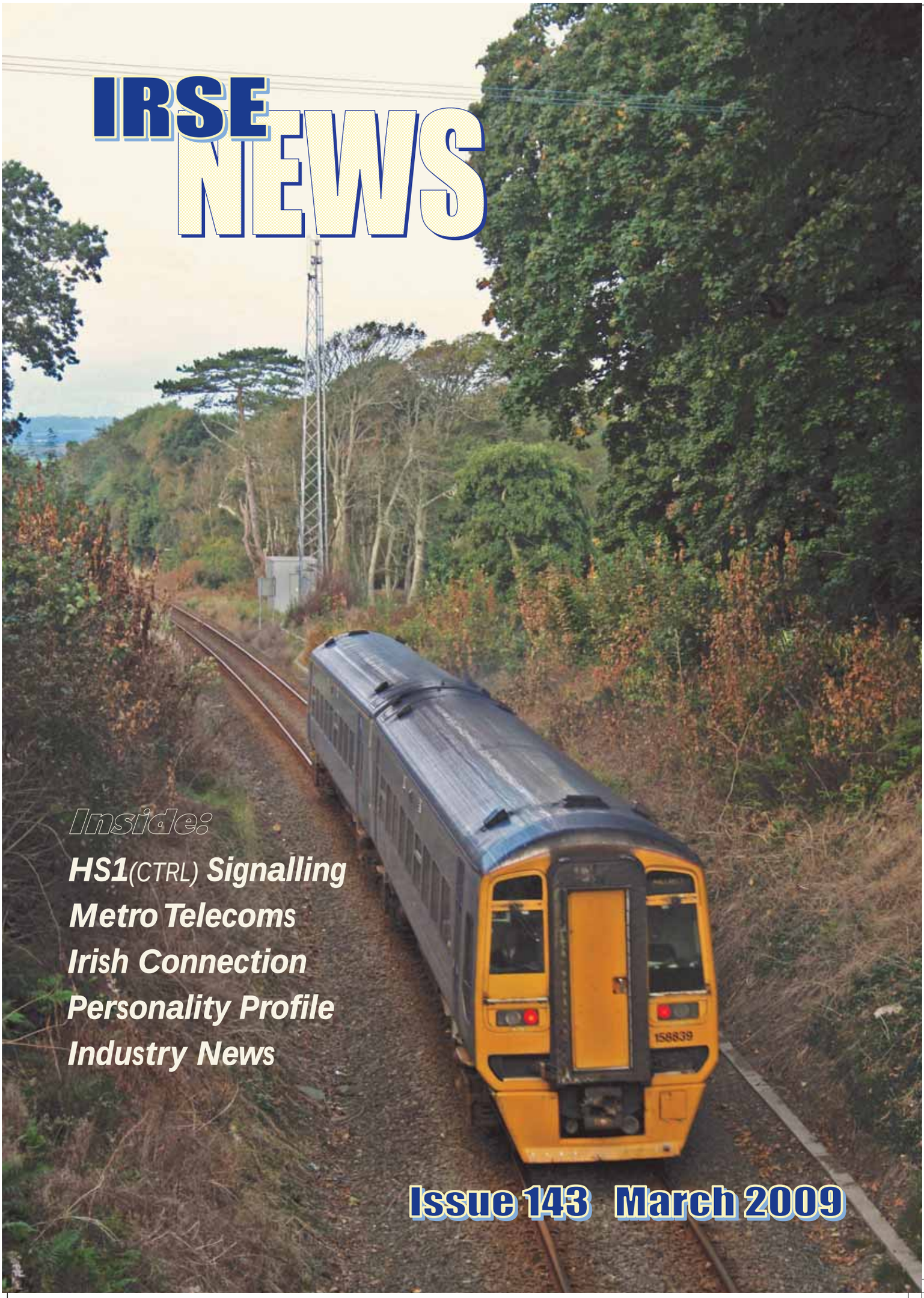
IRSE NEWS



Inside:

HS1**(CTRL) **Signalling
Metro Telecoms
Irish Connection
Personality Profile
Industry News

Issue 143 March 2009

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Editor
Ian J Allison
31 Bainbridge Road,
Loughborough, LE11 2LE, UK
Tel: +44 (0) 7891 067350
e-mail: irsenews@btinternet.com

Deputy Editor
Tony Rowbotham
36 Burston Drive, Park Street,
St Albans, Herts. AL2 2HP, UK
e-mail: irsenews@aol.com

Assistant Editors (Overseas)
Tony Howker
e-mail: ahowker@bigpond.com

(Younger Members)
Nigel Handley
e-mail: nigel.handley@Irrail.com

Advertising
For advertising rates and deadlines call Christopher Bean at Ten Alps Publishing
Tel: +44 (0)20 7878 2415
Fax: +44 (0)20 7379 7118
e-mail: Chris.Bean@tenalpspublishing.com
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London Office
IRSE, 4th Floor,
1 Birdcage Walk, Westminster, London,
SW1H 9JJ,
United Kingdom.

Enquiries
Membership or of a General Nature
Tel: +44 (0)20 7808 1180
Fax: +44 (0)20 7808 1196
e-mail: hq@irse.org

Professional Development
Tel: +44 (0)20 7808 1186
e-mail: training@irse.org

Licensing
Tel: +44 (0)20 7808 1190
e-mail: licensing@irse.org

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IRSE NEWS

Contents

In this Issue ... **Page**

We plan to include part 2 of the HS1 signalling article, and the London March Paper in next month's edition.
There will also be a fuller report on the forming of the IRSE Indian Section
(see STOP PRESS on page 31)

Front Cover:
A Class 158 passing the GSM-R base station near Criccieth in the UK. The Cambrian Line has been operated without traditional lineside signalling since the introduction of RETB; the section of line between Harlech and Pwllheli is currently scheduled to be the first portion of the Early Deployment Scheme to be brought into operational use and will thus be the first opportunity to travel under ETCS Level 2 in the UK.
Photo: Peter Woodbridge

Newsview: Modern Technology

I have just been sitting in my study down here in Australia listening to a pod-cast recording of the Question and Answer session that was held at the end of Rod Muttram's paper "Is Independence an Overrated Virtue?" This had been arranged by Wim Coenraad as a test to see if it was feasible and in the future perhaps, put the whole of the Sessions onto the IRSE web-site including video so that members who cannot attend the paper could see and listen to the presentation.

It is often the Q&A part of an IRSE presentation that really brings the paper to life and I for one, thoroughly enjoyed this opportunity to hear the various comments and questions plus Rod's responses. I look forward to the day when the IRSE has the ability to make every paper and presentation including the Q&A session available to all members around the world at the click of a button.

All this got me thinking on how the tyranny of distance has been tamed by modern communications over the past 30 years. How did we manage as individuals to keep in touch without the development of computers and e-mail? When I was transferred (transported?) to Australia in 1975, we had the mail and telephone (no direct dialling – book a call with the operator!), companies had a tele-printer service followed shortly by fax machines and that was it. Eventually we moved to personal fax machines and personal computers and then e-mails with the ability to attach documents and photographs. The addition of the mobile telephone and the digital age completely changed the way we now communicate (even if some of us do use the mobile for speaking only and '*don't do texting*'). I certainly would not be able to fulfil the role of Overseas Assistant Editor without these modern communication systems.

It is the same in railway signalling, especially in the USA, Australia and other countries with spread out and remote railways to control. Modern Communication systems have changed for ever the way that railways are controlled and managed. More and more railways are changing their methods of control from paperwork systems and phone lines to computer based communication systems including the use of Global Positioning Systems (GPS) to track the trains. Here in Australia we are looking forward to the roll-out of such a system on the Australian Rail Track Corporation which provides and maintains the main country freight infrastructure throughout most of Australia. Train positioning and control of long and heavy freight trains will be carried out using modern digital communication systems complete with Positive Train Separation (PTS – ATP to our European friends) and a speed up of transit times between major centres will eventuate.

So, modern communication systems have changed the way we carry out our role as engineers who safely manage the operations of our railways. What of our own professional Institution? There is no doubt that the way we communicate between our members has got better. We have an IRSE NEWS now 11 issues a year and for us members who are spread around the globe, we even now get our copies by air-mail. Australia has for some time now produced CD-ROMs of the proceedings of major conferences including presenter's slides, and now we are experimenting with Pod-casts of London papers, hopefully to include video soon. What of the longer term future? We all (well mostly all) use e-mail to connect with colleagues and friends. Various rail authorities now put out reports such as accident reports on their web-sites and long distance learning in our industry is now carried out using electronic media – the tyranny of distance really has disappeared. Perhaps it won't be too long before you can read your copy of the IRSE NEWS as a downloaded file from the main web-site and not just the first page (or even go back and down-load a copy that was published last year), after all there are at least three weekly railway magazines that I now read here in Australia that are only published on a web-site and I can remain really up to date with railway happenings and technical information sometimes within a day of the event that I used to get via magazines that took eight weeks from publishing to being read. The only down side as I see it, one cannot read them in a private area away from one's computer without printing them off first! Food for thought!

Tony Howker, Overseas Assistant Editor

The Signalling System on HS1

Part 1

by Gilbert Moens

CTRL Signalling Project Engineering Manager

The High Speed 1 (previously known as Channel Tunnel Rail Link – CTRL) is fully operational since November 2007.

The purpose of this article is to describe the signalling system implemented on this line, from the operational constraints up to the implementation itself. It will not describe the terminal part of the line - St Pancras – as previous articles have already been published on that subject:

- Virtual Reality Signal Sighting at St Pancras (Issue 99 November 2004);
- Signalling at the St Pancras CTRL Terminal (Issue 120 December 2006/January 2007)

THE PERFORMANCE REQUIREMENTS

The CTRL is a double track line designed to handle:

- high speed passenger trains (8 trains per hour each way), running at 300 km/h;
- the high speed CTRL Domestic Services (8 trains per hour each way), running at 225 km/h;
- freight trains, hauled by Class 92 locomotives and running at 140 km/h.

The line speeds are 230 km/h from St.Pancras to the junction with the Waterloo connection at Southfleet and then 300 km/h to the connection with Eurotunnel, except for an area around Ashford where the line speed is 270 km/h.

The control centre for the route covering both signalling and the traction power supply is located in the Ashford signalling centre that also controls the classic line network in Kent.

SIGNALLING PRINCIPLES

For the drivers' point of view, the system used on the CTRL is a fixed block continuous transmission system (TVM 430) already in use and proven on the high-speed lines in France, Belgium, Korea and also on the Eurotunnel railway. The reasons for the choice of this TVM430 system were:

- The Eurostar trains are already fitted with this cab signalling system;
- Eurostar drivers are familiar with this system;
- For most of the line between London and Paris, the driver receives cab signalling indications from this TVM430 system, except for the St Pancras lineside signalling area (15km) and for the lineside signalling area from Gonesse (end of the North high speed line in France) to Paris Gare du Nord.

Operationally, the same basic rules are applied as on the high speed lines on the continent. Some minor changes have been developed in the CTRL Signalling Principles to meet the needs of a mixed traffic line; however the key approach was that train crews should not have to reflect on which part of the TEN (Trans European Network) they are operating, particularly in an emergency situation.

For the Signallers' point of view, the system has been developed keeping in mind that the CTRL signallers have the knowledge of the British Operating rules and in particular the Interlocking Principles (GK/RT0060).

As a consequence, the CTRL Signalling Principles are a combination of British and French practice, summarised as follows.

For the routes, in addition to the known Main, Warning, Shunt and Call-on classes of routes, a new class – Auxiliary - has been created to deal with:

- Engineering possessions system (described later in this article);
- Isolation of electrical sub-sections;
- Degraded situations, track circuit failure for example.

Particular arrangements, already existing on the French High Speed lines or within Eurotunnel, have been implemented to deal with degraded situations:

- Local release of signalling controls, which can be used in case of track circuit failure locking a set of points, and which releases this locking to allow one movement of the set of points;
- Manual Operation of points, with the use of a key specific for each set of points, and interlocked with the signalling system;
- Automatic Overhead Line Equipment (OHLE) protection which does not allow the clearance of a signal or a marker towards an area without traction power supply;
- Emergency Replacement switches at the trackside. Due to the train high speed, it is not practicable to use a Track Circuit Operating Device in emergency.

CAB SIGNALLING

The Cab Signalling system gives indications to drivers of the speed to be obeyed for the train to remain within the extent of that train's current movement authority.

The Cab Signalling system is a combination of fixed infrastructure (block sections and transmitted codes) and on-board equipment (which converts the transmitted code to a speed display depending on the type of rolling stock).

Block sections

The route is divided into block sections. The length of a block section is dependent upon line speed and gradient, and should:

- Enable the driver to respond to an announcement of a reduction in speed within the available distance to the commencement of the reduced speed (n.b. for some classes of train it may be necessary for the reduction to extend over two block sections);
- Enable the train to come to a stand within the length of the current movement authority with an appropriate brake application consistent with the characteristics and conditions of the train, and passenger comfort;
- Maintain the timetable headway, including a perturbation allowance.

On Section 1 where the line speed is 300 km/h, on a level gradient the average block section length is 1500 m, and on Section 2 where the line speed is 230 km/h, the average block section length is 950 m.

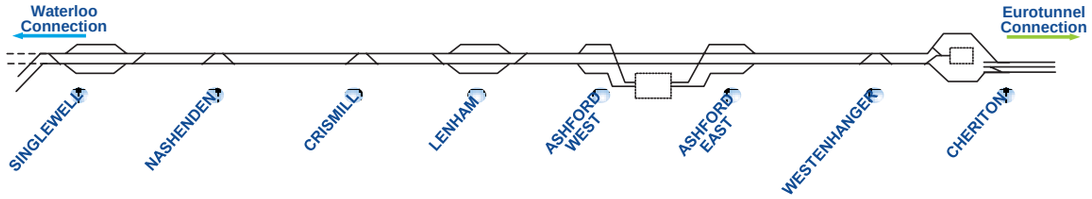
A marker is provided to separate each block section. These block section markers consist of a yellow triangle on a blue background forming an arrow indicating to which line it is applicable.

Block section markers are either 'absolute stop markers', which can be considered as similar to controlled signals, or 'stop and proceed markers' which can be considered as similar to automatic signals'.

Absolute Stop Markers are provided mainly in interlocking areas for signalled routes. They are similar to controlled signals.

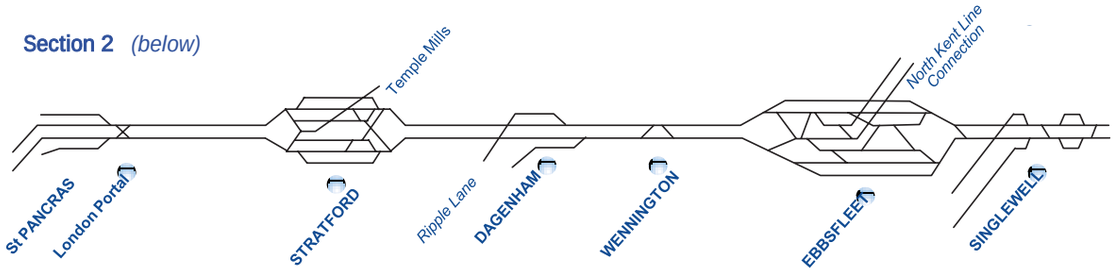
Block Section Markers: A marker is provided to separate each block section. These block section markers consist of a yellow triangle on a blue background forming an arrow indicating to which line it is applicable.

Absolute Stop Markers *(left)* are marked "N" (non-passable) and are provided with an auxiliary signal. Stop-and-Proceed Markers *(right)* are marked "P" (Passable). A driver is authorised to pass a closed Stop and Proceed Marker on his own at 30 km/h maximum (proceed on sight), if it is safe to do so.



Section 1 *(above)*

Section 2 *(below)*



At certain locations where a route origin other than an Absolute Stop Marker is required, a Shunt Marker is provided (mainly for turn back movements).

Emergency Replacement Switch positions are marked by a red triangle.

A driver is not authorised to pass a closed Absolute Stop Marker without authorisation given by the Signaller either by the control of the Auxiliary signal or by a specific procedure.

Stop and Proceed Markers are provided at the entrance of block sections where there is no need to have an Absolute Stop Marker. A driver is authorised to pass a closed Stop and Proceed Marker on his own at 30 km/h maximum (proceed on sight), if it is safe to do so.

Absolute stop markers are fitted with:

- a plate marking them as "N" (non-passable);
- an auxiliary signal;
- an identification plate.

Stop and proceed markers are fitted with:

- a plate marking them as "P" (passable);
- an identification plate.

At certain locations where a route origin other than an Absolute Stop Marker is required, a Shunt Marker is provided (mainly for turn back movements).

Shunt Markers consist of a white chevron on a violet background, the tip of the chevron indicating to which line it is applicable. They are fitted with:

- an Auxiliary signal;
- an identification plate.

The Auxiliary signal, when operated, is formed of two lunar white flashing lights at 45°, flashing in synchronism and in the same phase. The clearance of the Auxiliary Signal authorises the train driver to proceed and obey the Cab signalling.

The Auxiliary signal is provided to authorise a train to pass an absolute stop marker or a shunt marker when the on-board cab signalling displays a stop indication to the driver, due, for example, to:

- Engineering Zone Protection having been granted;
- Overhead Line Subsection de-energized;
- Track circuit failures.

Cab signalling indications

The Cab speed display indicates either an execute or line speed not to be exceeded in the current block section or an announcement speed to be achieved by the train as soon as possible. The Cab speed display may be flashing to advise the driver that the indication in the next block section is more restrictive.

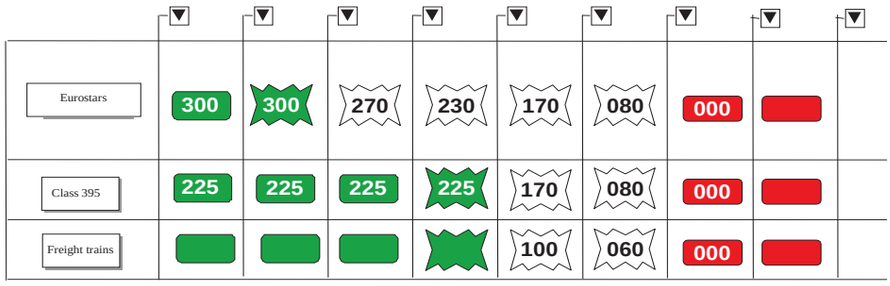
The speed indication is controlled so that, in the case of a speed restriction, an increase in speed is not indicated until the whole of the train has cleared the limits of the speed restriction.

Except in emergency, reductions in speed are only indicated at the transition between two adjacent block sections. Indication of an increase in speed may, however, be given immediately the conditions are appropriate.

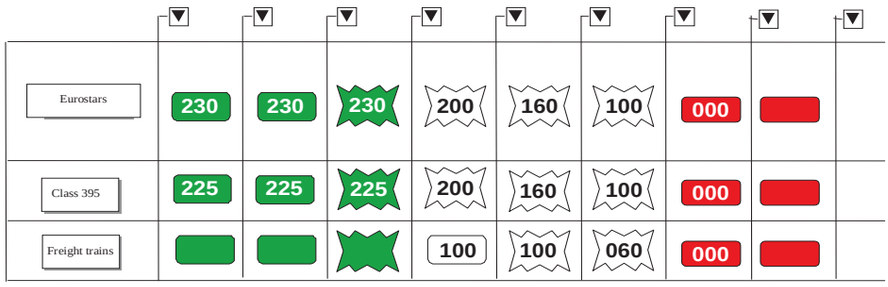
270	**Steady line speed indication for normal running** (white characters on green background): the displayed speed is the maximum operating line speed.
270	**Flashing line speed indication for normal running**: it indicates that the next block section requires a decrease in speed denoted by a lower speed band display.
160	**Steady announcement indication** for a speed restriction (black characters on white diamonds on a black background): the driver must comply with the speed displayed as soon as possible.
230	**Flashing announcement indication** for a speed restriction: the driver must comply with the speed displayed as soon as possible. The display indicates that the next block section also requires a decrease in speed denoted by a lower speed band display.
160	**Steady execute indication** for speed restriction (white characters on a black background): this display indicates to the driver the speed he must not exceed within the current block section.
160	A **flashing execute indication** for speed restriction displays to the driver the speed he must not exceed within the current block section. The next block section will also require a decrease in speed denoted by a lower speed band display.
000	**Stop indication** (black characters on white diamonds on a red background): the driver must stop at the next absolute stop or stop and proceed marker or signal encountered.
	Proceed on sight indication (three red squares) is normally displayed after a stopping sequence when an authority to pass a closed marker or a signal at danger has been given. It is also displayed when the track-to-train transmission has failed.

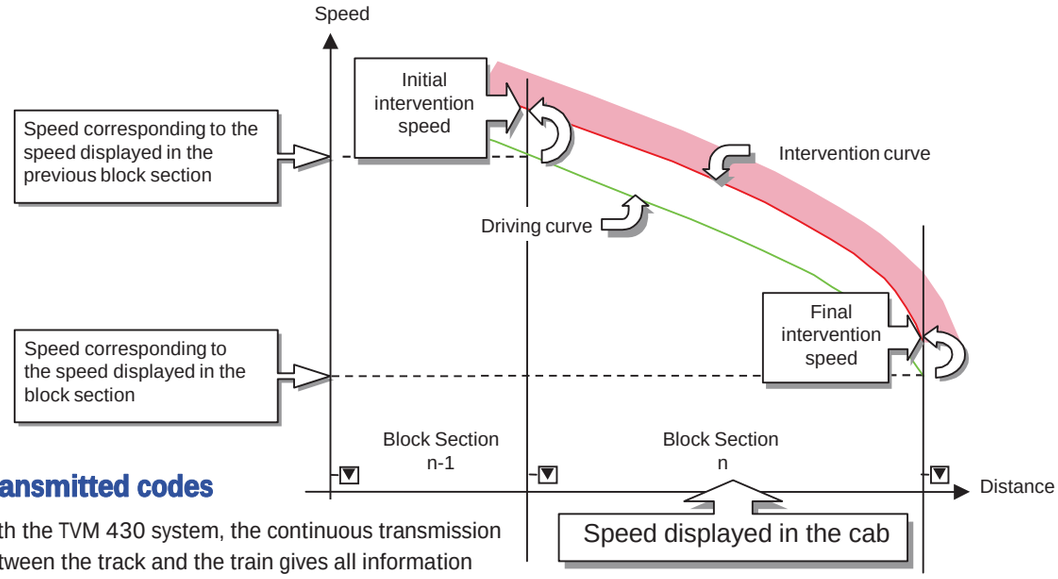
Speed bands display (illustrative)

An example of a cab signalling sequence for the Section 1 is shown below:



And another example for section 2:





Transmitted codes

With the TVM 430 system, the continuous transmission between the track and the train gives all information needed by the on-board system, to determine the relevant speed band to be displayed and to calculate the associated intervention curve for the Automatic Train Protection (ATP) system.

The following data is transmitted:

- Network code which gives the information of the network the train is running on;
- Block section length;
- Average gradient within this block section;
- Speed code.

This speed code allows the on-board system to determine the speed band to be displayed and the speed parameters to be taken into account with the block section length and the average gradient for the calculated intervention curve of the ATP system.

In fact, for each set of data transmitted, the on-board system chooses the tables to be applied (distance, gradient and generic speed codes) thanks to the network code and for freight trains, the type of train keyboarded by the driver.

Intermittent information

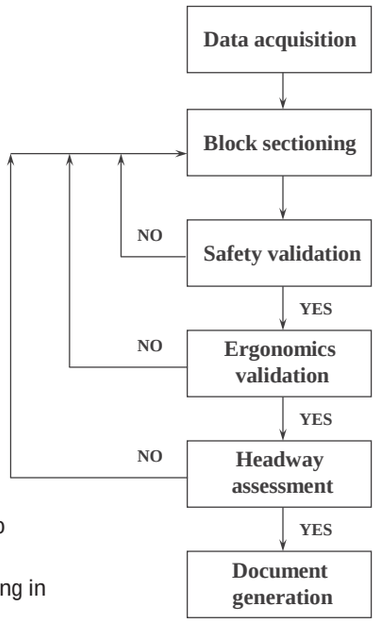
Intermittent Transmission Loops (ITL) are provided to transmit additional TVM information to the train:

- Train Stop function: to trigger an emergency braking in the event that a driver passes a marker without authority;
- To operate automatically the open circuit breaker process when passing a neutral section, and to give the associated display in the driver's cab;
- When a train crosses from the 'up' line to the 'down' line or vice-versa such that the on-board TVM system selects the other track circuit receiving frequency;
- To warn the driver of the approach to an area where a power change over is required (e.g. 25 kV a.c. to 750 V d.c. or 25 kV CTRL to 25 kV Eurotunnel);
- Automatically arming/disarming the on-board TVM system;
- Automatically arming/disarming the UK AWS/TPWS system.

Block Sectioning Study

For this design phase, a specific computerised tool, named DESI (DEcoupage et SImulation), has been used.

The block sectioning design includes the following phases:



Data acquisition: train characteristics, track layout, signalling data, cab signalling sequence data,

Block sectioning: calculation of the optimum length for each block section,

Safety validation: the system determines the worst stopping point if the emergency braking has been triggered and checks that this stopping point is not beyond the protected point,

Ergonomics validation to check that all the speed restrictions required can be achieved by the driver for each block section and each type of train,

Headway assessment to ensure that the headway performances required have been met,

Document generation: Block Sectioning File, Block Sectioning Safety Validation File, Headway Validation File,

Eurostar at Ashford *photo: Colin Price*

TECHNICAL PAPER

SPECIFIC CTRL PRINCIPLES

Emergency Replacement

Emergency replacement facilities are provided at the Route Control Centre (RCC) and at the trackside.

From the RCC the signaller is able to control an emergency replacement for an interval or for an interlocking area. On the CTRL the term 'interval' is defined as the section of line between the outermost Absolute Stop Markers/controlled Signals of adjacent interlocking areas.

Emergency Replacement Switches (ERS) are provided at the trackside.

The area protected by an ERS corresponds to a block section in the normal running direction.

These switches can be used both for emergency purposes and for creating a safe area in relation with the Engineering Zone Protections in intervals.

A specific display is provided at the RCC so that the signaller is informed when one of the ERS is in the operated position.

A visual indication of the switch status is given to the person who operates it at the trackside.

A sign with a plan showing the limits of the area protected by the switches is provided at each switch location.

Each ERS location is marked up by a sign showing a red triangle on a white background.

The emergency replacement control from the RCC or by an ERS, when operated, forces the RED indication in the Cab display, within the appropriate area, in both directions when bi-directional working is provided. This immediately issues a stop instruction to the Driver whose train is running within this area and may initiate an ATP controlled brake application.

An appropriate stop sequence applies approaching the first marker or signal in rear of the area concerned by the replacement in which the emergency replacement control has been operated. Should a train be within this sequence when the emergency replacement is operated, an ATP controlled brake application may arise depending on the train speed.

Engineering Zone Protection

The line is divided into Engineering Zones Protection (EZP) areas. When an EZP is granted by the signaller, only an auxiliary class of route can be set towards the area concerned.

It is possible to set an auxiliary route and clear the associated auxiliary signal into an area where an EZP has been taken. This is for the purpose of moving an engineering train into a possession.

Within interlocking areas, EZP switches are provided at the lineside to allow maintenance staff to take the necessary complementary protection of an area of track to carry out maintenance.

Within intervals, the complementary protection is provided by using the appropriate ERS.

A switch (EZP or ERS) used for the purpose of this protection is provided with:

- A padlocking facility used to maintain these switches in the operated position;
- A visual indication of the switch status to be given to the person who operates it;
- A sign with a plan showing the limits of the area protected.

The technician operates the EZP switch or the ERS with agreement from the signaller. The TVM will then transmit a RRR indication and initiate caution sequences to the protecting approaches. This sequence will include a buffer section.

A specific display is provided at the RCC so that the signaller is informed when one of the EZP is in the operated position.

Local Release of Signalling Controls

To enable point locking arising from track circuit failure to be released, local control points are provided which allow the track circuit locking to be released locally by a competent person.

The signaller is provided with an override facility within the Control Centre (RCC) which, when operated, can release the relevant local plunger.

On site, a release plunger is provided for local operation and a diagram showing the extent of the associated track circuit(s) is provided at the plunger apparatus.

Emergency Replacement Switch Location

Engineering Zone Protection Location

To move points which are locked by a failed track circuit, the signaller manually releases the routes concerned then gives an authorisation for in-situ locking cancellation. The operation of this release is indicated by illumination of an indicator light placed close to the plunger.

Under the instructions of the signaller and when the RCC release is operated, the person on site operates the plunger once he/she is satisfied that the area, covered by the failed track circuit, is clear of trains.

The person on site examines the area in question to check that there are no obvious obstructions in the area covered by the defective track circuit, prior being authorised by the signaller to operate the release plunger.

The operation of both the RCC and local release cancel the sectional route locking held by the failed track circuit, and enable one operation of the points only.

The operation of the points can be performed:

- Either by the setting of a route;
- Or by the individual control.

Manual Operation of Points

To reduce delays to trains arising from point failures including those where the failure is caused by track circuit failure or a route setting or a point calling failure, facilities are provided to enable local operation of point switches and swing nose crossings manually by a competent person.

To operate a set of points manually, an operating device specific to this set of points is held within a local instrument mounted at the trackside. Manual operation of the points is achieved by a local operator withdrawing the operating device from the local instrument when authorised by the signaller. The act of withdrawing the operating device from the instrument disconnects the point detection circuit and the power supply to the motor.

Once the manual point operating equipment has been used and the points confirmed to be in the desired position, the manual point operating equipment is replaced in the local instrument when authorised by the signaller. Once the point operating device is correctly restored to its normal position, the power supply to the point motor(s) and point detection circuit(s) is restored.

On each release device, the numbers of the points concerned are identified.

Part two of this article, including a description of the signalling system itself, will appear in the next issue of IRSE NEWS.

Plungers are provided for the local release of the points locking in the event of track circuit failure.

Facilities are provided at trackside to enable the manual operation of the points.

Telecommunication Networks for Metro Railway Systems: A Practical Perspective

by Yog Raj Bhardwaj, IRSSE (retd.), MIRSE

This paper describes various options available in setting up a Telecommunications Network, at Backbone & Access Layer level, required for Metro Railway Systems. Different types of interfaces used in setting up an optimal Telecommunications Network for a Metro Railway System have been described. Rather than discussing individual system functionalities, emphasis has been laid on components of the Backbone & Access Layer along with types of interfaces of various sub-systems required in setting up a typical Telecommunications Network for a Metro Railway System.

Introduction

Telecommunication Systems though do not run trains directly in a Metro Railway System or for that matter in any Transport System, but they act as a lifeline to all important sub-systems involved in running of trains. Telecommunication systems are therefore responsible for Operation of some important systems and Networking of other systems as detailed below:

Operation	Networking
Public Announcement (PA) Systems	Automatic Train Supervision (ATS) System
Public Information & Display (PID) Systems	Supervisory Control & Data Acquisition (SCADA) System
Closed Circuit TV (CCTV) Systems	Baggage Handling System (BHS)
Private Automatic Branch Exchange Telephone (PABX) System	Automatic Fare Collection (AFC) System
Radio Communication System	Signalling System
Master Clock System	Tunnel Ventilation System (TVS)
	Lifts

Evolution and proliferation of Internet Protocol technology (IP) in all fields has also had its effect on the way Telecommunication services are being provisioned in Metro Railway environment. Systems which were earlier being interfaced using 9.6 kB/s discrete analogue channels are now being interfaced with IP interfaces. These changes are therefore paving the path towards use of an integrated IP network to cater for all networking requirements of Metro Railway Systems.

Telecommunication Networks required for a Metro Railway system would broadly consist of following major components:-

- Optical Fibre Cable (OFC) backbone;
- Leaky Cable (LCX);
- Radio System;
- Access (Distribution) Network;
- Extension of wireless coverage for Commercial Operators (Underground sections);
- Interface with various Systems.

Optical Fibre Cable (OFC) backbone

OFC Network

The Fibre adopted in the system would be dependent on applications to be supported by the Network along with the fact that whether the Telecommunication Network is to be commercially exploited by the Railway Operator or not. Due to perennial scope of expansion of Telecommunications Services, Dark Fibre is always in heavy demand by Telecommunications Operators (Telcos) & Cable Operators (MSOs) in Metro cities. Further, laying of ground Fibre in city areas particularly in Metro cities, is relatively more difficult and also a very expensive proposition primarily on account of large restoration charges levied by local municipal authorities. In addition, OFC laid along the Metro Railway Route is inherently more secure & stable and therefore Telcos. prefer leasing of Fibre on these routes to cater for their requirements & at times are ready to pay a premium also.

Accordingly, depending on individual project considerations, a minimum of 48-core fibre should be laid for use by the system. Alternatively, if a decision for commercial exploitation of Telecommunications assets is taken, then a minimum of 72- or higher core Fibre can also be considered, considering the fact that incremental cost of a higher core OFC is relatively low. Further, depending on the scope of commercial exploitation, laying of additional HDPE (High Density Polyethylene) pipes on the route can also be considered for future use.

In addition, if the Railway Operator is also in the business of bandwidth leasing, then setting up of a high capacity CWDM/DWDM (Continuous Wave Division Multiplex/Dense Wave Division Multiplex) network can also be considered. However, if a decision to install a CWDM/DWDM system is taken then it is worthwhile to consider OFC to G.655 standard or else G.652 standard would suffice.

Ring Configuration

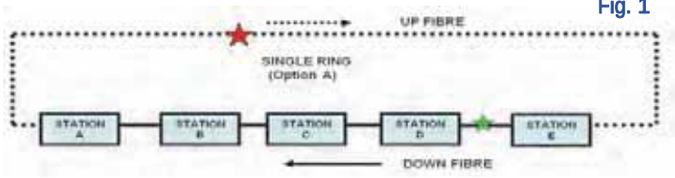
The OFC constitutes the backbone of the Communication network. Considering criticality of various applications running on the OFC backbone, the OFC should be laid on each (both) side of the track to enable formation of Ring configuration of the Fibre. It is possible to configure the fibres in either Single or Multiple Ring configuration as described below.

Single Ring Configuration

Option A

In this mode the fibres are connected to the Optical equipment to form a SNCP (Sub Network Connection Protection) Ring (Fig. 1). In this mode, Fibre of either direction (UP or DN) is terminated to the Equipment at the stations. Fibre of the other direction is spliced through all the stations (End – End) & terminated at the end equipment to form a Ring. This configuration however has a disadvantage that the straight Fibre, across the complete section, forms one path with no means of monitoring. Any fault in this path is difficult to isolate and may result in high down time. This mode is therefore normally not adopted.

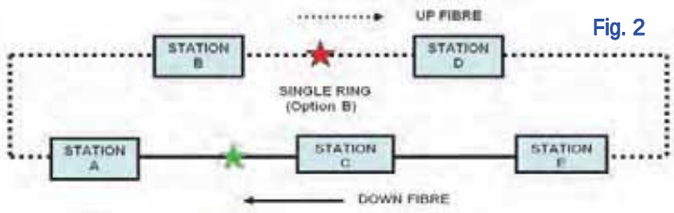
Fig. 1



Option B

To overcome the disadvantage discussed in Option A, both the Fibres (UP & DN) are terminated to the equipment at alternate stations (Fig. 2). This will ensure active monitoring of both the Fibres and will result in easier fault monitoring/isolation & faster restoration.

Fig. 2

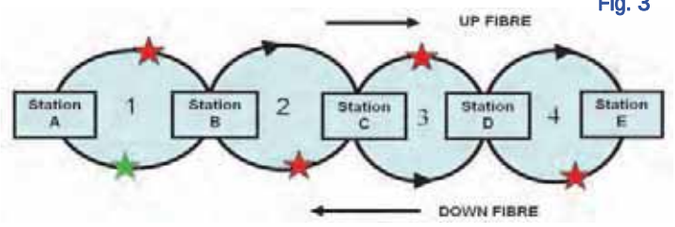


Further, the Single Ring configuration, by its inherent nature will be resilient to a maximum of only one failure in the transmission backbone and the 2nd failure would result in disruption/failure in the network. Failures under a practical scenario are not limited to complete disruption (cut) but can also be due to a high loss in any of the paths (Transmit (Tx) or Receive(Rx)) which are difficult to isolate..

Multiple Ring Configurations

Unlike main line trunk routes where a ring is formed using OFC on different routes, in a Metro Railway environment, a linear ring is formed by using OFC laid on either side of the track. This enables connection of both the Fibres (UP & DN) to each of the Optical Equipment at the stations (Fig. 3). This configuration will result in formation of multiple rings in the system and thereby will be more resilient to failures.

Fig. 3



In this configuration, the intermediate Optical equipment will however be required to be provisioned with additional Line (aggregate) Cards (2 off) for fibre connectivity. Provisioning of inter-station circuits across the system will utilize the D/I (Drop/Insert) feature of the Synchronous Digital Hierarchy (SDH) equipment resulting in resilience to multiple failures in the OFC transmission system. Typically resilience in a multiple ring scenario vis-à-vis a single ring would increase by a factor of '**N**', where N = number of rings formed in the system. The multiple ring system would tolerate 'N' number of failures across the complete system. However, in a particular sub-section (ring), only one failure would be tolerated.

This mode of configuration should normally be adopted, as it results in a more resilient OFC backbone network with minimal cost implications. However, as the Metro Railway Systems traverses relatively small inter-station distances and its jurisdiction is much more secure (not prone to outside inter-ference), the OFC network in Metro Systems are inherently more secure and therefore more stable as compared to main line OFC networks which are more prone to outside inter-ference. Accordingly, pros & cons of both the configurations on individual project basis may be considered, before finalising on the mode of Fibre configuration, Single or Multiple in the OFC network.

Leaky Cable (LCX)

Leaky cables (LCX) are used in the system to extend the coverage along the Tracks particularly in underground sections (tunnels & stations). Two sets of Leaky cables are used to extend coverage of the following systems:

- The Operational Radio System (TETRA);
- Commercial Telecoms Operators & Emergency Services.

The LCX used in the system should have broad-band characteristics to accommodate all the Radio bands i.e TETRA Radio (380 –400 MHz), Commercial Radio Operators in GSM- 900/1800 MHz, CDMA-800 & 3G as also Emergency services (Police & Fire).

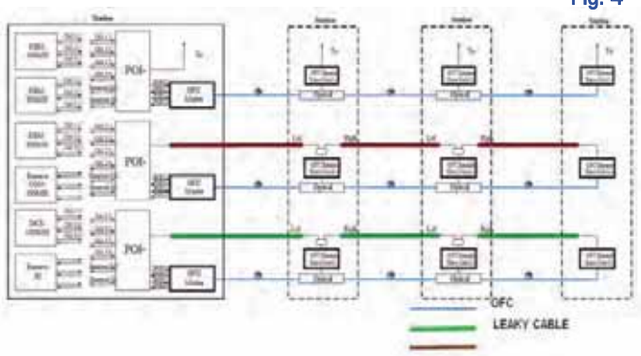
There is however a school of thought for utilizing LCX for extending the Radio Coverage in open sections (both via duct & grade) also. This is primarily to ensure guaranteed coverage along the track sections without any possibility of any interference. This solution would also not require Frequency authorization & siting clearance from SACFA (Standing Advisory Committee on Frequency Authorisation) of WPC-DoT (Wireless Planning & Coordination wing of Department of Telecom-munication) authorities for erection of Radio towers etc.

However, considering the high cost of LCX vis-à-vis the Radio solution, a cost benefit analysis and actual site conditions (availability of space required for erection of Radio Towers etc.) may be considered on individual project basis before a decision to this effect is finalized.

Extension of Coverage for Commercial Operators in Underground sections

So as to enable seamless use of cellular phones & emergency services in tunnels & underground stations, arrangements for extension of wireless signals of Commercial Telecom-munications Operators (GSM (Global System for Mobile Communications), CDMA (Code Division Multiple Access), 3G) and Emergency services (Police & Fire) in these areas is also required to be made. A typical arrangement for such an arrangement is shown in Fig. 4

Fig. 4



The underlying principle for providing such an arrangement is to provide Point of Interconnect (POI) to the Telecommunications Operators through their BTS (Base Transreceiver Station) equipment installed in underground stations and connected to the Combiner Equipment for extension of their signals in the tunnels through Leaky Cables. To avoid every Telecommunications Operator making arrangements for powering up their BTSs, a common integrated Power Supply arrangement can also be provided.

While LCX is used for extending coverage in Tunnels, coverage in underground stations can be achieved either by also extending the LCX in station areas, or by providing Indoor Building Solution (IBS). Decision on use of either LCX or IBS for extending coverage in Underground station areas can be taken on case by case basis.

Further, while two sets of LCX have been advocated for extending coverage of Tetra Radio & Commercial Operators in underground stations/sections, to save on cost, a wide band Leaky Cable which can function for all the bands of frequencies i.e TETRA, Commercial Mobile Services & Emergency services can be utilized, so that only one set of LCX can serve the requirements of both Train Operations as well as Commercial Telecommunications Operators, without compromising on reliability issues.

This solution will result in extension of signals from all the systems in the underground sections using only one set of LCX instead of two sets, thus resulting in cost savings.

Radio System

Use of TETRA Radio Trunking system (380-400 MHz) for Metro Railway Networks, for its Train Radio communication requirements, has more or less been accepted as a standard. The other radio system developed for Railway applications i.e GSM-R has been propagated only for Main Line Railway networks, mainly on account of GSM-R supporting ETCS /ERTMS signalling applications which are normally advocated for Main Line sections only. For Metro Railway applications, Automatic Train Protection/Automatic Train Operation applications are adopted, which use Train/Track communication & does not require GSM-R carrier. Further, non-availability of GSM-900 MHz spectrum (particularly in Indian scenario) in city areas is also a major handicap for adopting GSM-R systems in Metro Railway systems.

In conclusion, Tetra Radio is adopted in Metro Railway systems, while GSM-R systems are advocated for Main Line sections where ETCS /ERTMS systems are normally adopted.

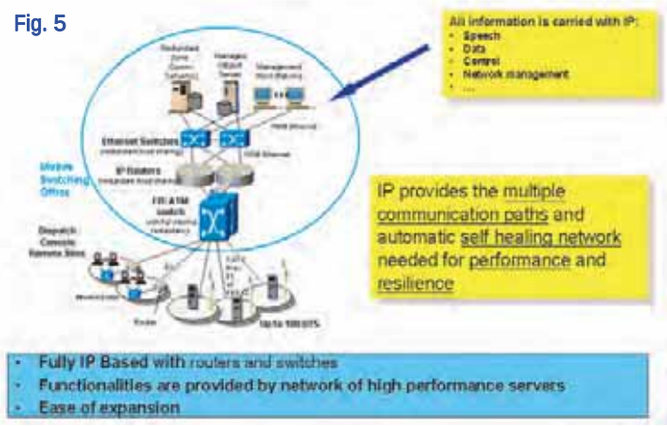
The TETRA system has the advantage of high availability, as it can operate in different modes under various failure scenarios:

Failure	Working	Remarks
No Failure	Trunking mode	-
Master Switch Centre Failure	Local Mode	Subscribers within the BTS can communicate normally.
BTS Failure	Direct Mode	Subscribers within radio range can communicate with each other.

The Radio system in a Metro Railway environment provides the following broad functionalities:

Function	Remarks
Train Radio Communication	Voice Communication between Cab Operator, Controllers & Ground staff
Data Communication	
(a) with Automatic Train Supervision (ATS) System	Correlates the TSID (Train Service Identification),TN(Rake Number), Radio ID (Identification) & Location (Track Circuit-TC).
(b) with Train Management System	Transmits Train performance data from the Cab to ATS

Fig. 5



Provision of an interface of the Radio System with following systems should also be provided to enable integration with these systems:

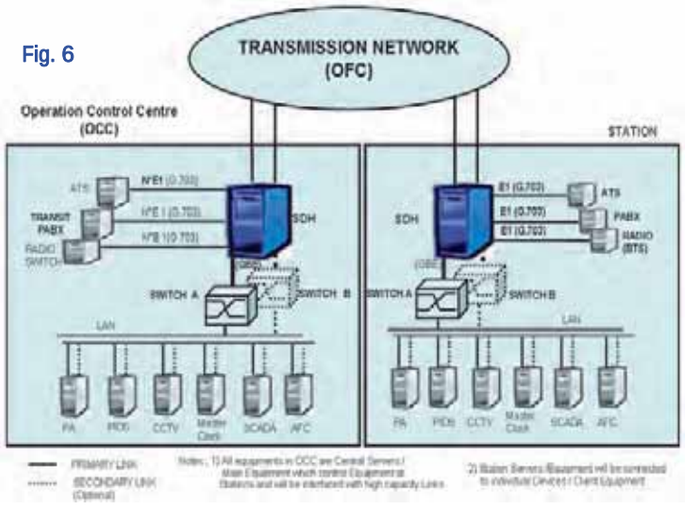
- Telephone Network;
- Adjacent Radio Systems.

If integration with adjacent Radio systems is an essential requirement of the project, it is advisable to have both the Radio Systems of the same make, to avoid interface issues during integration. Finally it is again reiterated that an IP based Radio system should be adopted for ease of integration & interface with other networks.

Access (Distribution) Network

Depending on the capability & reliability requirement of the system, there are a number of variants possible in configuring the Access network. The access network is connected to the communication backbone using various types of interfaces namely Ethernet (IP), E1 (G.703) & Discrete channels. Typical system connectivity with various sub-systems will be as indicated in Fig. 6.

Fig. 6



IP (Ethernet) Interfaces

In today's world, most of the equipment is IP based requiring Ethernet interfaces and function on an integrated (shared) network basis. All systems requiring Ethernet interfaces can be integrated with the communication backbone are indicated in Fig. 6.

The Ethernet output from the SDH should preferably be a GBE (Giga Bit Ethernet) Interface to cater for bandwidth requirements of all the applications. The Layer-3 switch used in the network should have VLAN (Virtual Local Area Network) functionalities to enable various networks function independently without possibility of any interference between them. Further, for ease & flexibility in IP address planning of various networks, the Layer-3 switch should also support VLAN functionality with same IP addresses.

The Ethernet interfaces should also support QoS (Quality of Service) feature to enable priority management of various interfaces.

In addition, it is also to be seen whether the GBE interface from the SDH supports a Hub connection feature. If not, then each station will have to be provided with two separate GBE interfaces one for each direction to configure the VLAN functionality.

With the above configuration it shall be possible to interconnect LANs (Local Area Network) of all the systems at various stations with Servers at the OCC (Operation Control Centre). The inter-station Ethernet links can be configured either in Shared (Omni bus) or Point to Point mode.

Improved Reliability configuration

It is seen that the Ethernet Output from the Transmission network in the above configuration has inherent resilience by way of ring protection of the OFC network. However, for the Access layer, service delivery to all applications is dependent on an un-protected connectivity from the SDH to the Layer-3 switch which may fail if either the switch goes defective or the path gets disrupted. To avoid such a scenario, it is suggested that the Layer-3 switch is duplicated as indicated in Fig 6.

Both the switches should be fed by independent GBE interfaces from the SDH equipment. So as to serve the two interfaces, this configuration would require two LAN cards in every Central & Client server (equipment). With this, the system connectivity would be available concurrently from two paths (an Ethernet ring) for seam-less changeover in eventuality of any failure of Switch or any one of the two Ethernet interfaces/paths.

As this would involve additional capital expenditure towards cost of the additional Layer-3 switch and LAN functionality in each Server (Central/Client) a conscious decision to this effect will have to be taken on a case-by-case basis for adopting this configuration.

Primary Multiplexer (P-Mux)

The P-Mux is primarily catered for systems requiring 64 kB/s or sub-E1 Data interfaces. However, with proliferation of Digital networks and IP technology it is noted that P-Muxes can be avoided resulting in cost savings and increased reliability. System providers should therefore be encouraged to provide IP (Ethernet) or E1 (G.703) interfaces in their equipments. This would result in a Telecomm network, without P-Muxes, which would be much more reliable when compared to a network equipped with P-Muxs.

E1 (G. 703) Interfaces

During system analysis it is noted that while very few systems require discrete channel interfaces, systems requiring E1 interfaces namely PABX systems, Radio (TETRA) system are also very few. The SDH system can be configured to provide the E1 interfaces for these systems. The E1s (G.703) interface cannot be shared & therefore would have to be configured either in Star or Mesh topology depending on individual system requirements. In case of channelised E1 interfaces, though E1s can be shared, a virtual Star or Mesh network at 64 kB/s channels level would have to be configured. Typical configuration of E1 interfaces with the Telecommunications backbone would be as indicated in Fig. 6.

Interface with Other Systems

All systems associated with operation of the Metro Railway would be interfaced/integrated with the communication backbone. Broadly systems mentioned in Paragraph-1 above will be required to be interfaced with the Communication backbone.

Ethernet (IP) only Interface System

From the above discussions, it is seen that while only a few systems require discrete channels or E1 interfaces, the majority of the systems require Ethernet (IP) interfaces. If during the design stage all the systems are planned with only Ethernet (IP) interfaces, then an IP Telecommunications backbone with much more reliability & flexibility can be designed and planned.

A Telecommunications backbone network serving only Ethernet (IP) interfaces can be configured using Layer-3 switches with optical ports and can do away with requirements of all SDH components in the backbone. The backbone fibre (UP & DN) will now be connected directly to the Layer-3 switch to form multiple rings as shown in Fig. 7.

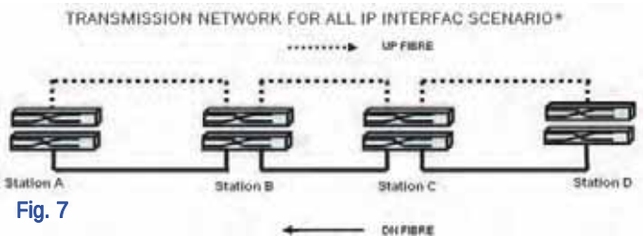
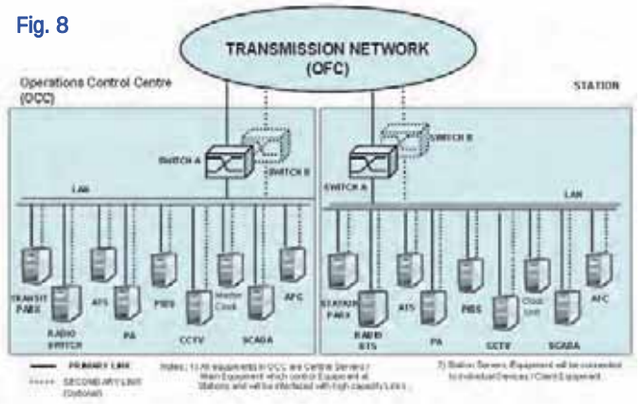


Fig. 7

The access network will also consist of only Ethernet interfaces as indicated in Fig. 8.

Fig. 8



From the above it can be seen that the IP based network, both at Backbone and Access level, with reduced network components, would be much more reliable and resilient than a traditional SDH (TDM -Time Division Multiplex) based network.

Conclusion

Based on above discussions, following is recommended for setting up a reliable & resilient Telecommunications Network for Metro Railway systems:

- Use of Fibres (G.652) on both sides of the Track i.e UP & DN side;
- CWDM/DWDM network with G.655 fibre - for commercial exploitation;
- Use of Multiple Ring configuration for Fibre connectivity;
- Channel level & E1 (if possible) interfaces should be avoided;
- Ethernet Interfaces with all associated sub-systems;
- Fibre based IP network using Layer-3 switches;
- Layer-3 switches used in the network should support VLAN functionality with common IP addressing & Quality of Service;
- IP based TETRA Digital Radio System.

The views expressed in this article are solely those of the author. Comments are welcome at yog_raj@hotmail.com

Personality Profile

Quentin Macdonald
Our Dinner Secretary

By Robin Nelson

Ancestry; is he Scottish, English or Canadian? You have a choice as does Quentin with his legitimate claim to all three. Admittedly, the Scottish link is somewhat tenuous going back nearly 200 years to Captain Macdonald of the Isle of Skye lower case "d" Macdonalds. On being paid off after the successful outcome of Waterloo – the battle, not the station – the Captain headed for Canada, settling in the up and coming town of Toronto. A few generations on one of his descendants, Albert Macdonald, emigrated to England where he married Lila Hanson. Two sons were born, one in Welshpool and the other in Weston super Mare before the decision was made to return to Toronto. In 1913, Quentin's dad Archie was born and, had grandpa not been a victim of the stock market crash of 1929, the Macdonalds might have remained in Canada. However, Archie reckoned that there were better opportunities in the UK so he became the next generation emigrant of the family. He settled in Baldock, not far from the East Coast Main line, where he married Quentin's mother. By the time of Quentin's arrival in 1939, they had moved to the village of Iver on the Great Western main line. There, he contracted a severe bout of railways being taken by his governess, as she was so grandly titled, to watch the trains go by. By this time there was a war on and Archie joined the Canadian army as an encryptor of data in Canada House in London. It's a task that control table enthusiasts would feel comfortable with.

A second son, Adrian, was born in 1941. By the end of the war, the urge to cross the Atlantic became overwhelming and the family boarded the Queen Mary for the journey. Not in luxuries as she was still very much a troop ship. They settled first in Toronto and then on a farm near Hamilton where Quentin's sister was born. History repeating itself?

Quentin says that "the Little House on the Prairie" is an apt description of life over the next five years. School was at Ligny with only 20 pupils and the enormously long steam hauled freights passed near the farmhouse. It's on Google Earth if you want to find out more. Canadian citizenship was granted in 1947 and he retains it to this day. Once again, the Macdonalds might have remained in Canada long term but as with grandpa, an unexpected event changed everything just as Quentin had started his secondary education at Milton Public School. An uncle's untimely death resulted in Quentin's mother becoming the ward of the children resulting in a move from Hamilton back to England.

Now school was in Baldock then Hitchin Grammar School. The next move was soon to follow when home became Solihull and education was Solihull School. Stability enabled him to complete secondary schooling there. Railways became a strong feature of life whilst at school. Like most lads of the time, he joined the gang at the station complete with their Ian Allan abc books. There was, however, a professional side as British Railways had started a scheme to attract school leavers to a railway career. Through the Public Schools Appointment Bureau, he was able to attend a week's course in Civil Engineering and, a year later, an S&T Engineering course in York. Here, he saw the brand new OCS signalling systems at Newcastle and York. From school, he went to Bristol University to study electrical engineering.

Following graduation in 1961, he discovered that British Railways coupled the attraction of an interesting engineering career with the best salary on offer to graduates. An interview at BRB headquarters was successful and he was despatched to the Southern Region only to find that the Chief S&T Engineer Jack Tyler said that he, not the BRB, would decide on Quentin's suitability. Whatever it was that Jack was seeking, Quentin seemed to have and so his S&T career got under way. A particularly rewarding experience was assisting with the testing of the SGE geographical interlocking at Rugby.

In 1968, he moved to Basil Grose's track circuit engineering group in BR headquarters. Three years later, he arrived in York as Outdoor Assistant on the major projects team. There were numerous re-signalling schemes being undertaken – Darlington, Peterborough, Scunthorpe and Kings Cross. Kings Cross is not fondly remembered. It was one of these commissionings that most of us have suffered once in our career when things don't go as intended and trains don't run as intended on the Monday morning.

His popularity at York consequently suffered a temporary setback and Dick Hardy who had responsibility for career development recommended transportation to Botany Bay. Actually, it turned out to be a marvellous experience with Transmark on the Brisbane re-signalling.

Returning to BR, he became Maintenance Engineer for the Eastern Region. In 1992, British Railways introduced an organisation based on the nature of the business conducted. Quentin was appointed S&T Engineer for the Train Load Freight business but it was to be a short lived appointment. Privatisation in 1994 changed everything again so he decided enough was enough and formed his own consultancy business. For several years, he flew endlessly round Europe co-ordinating the EC project which published the ERTMS Class 1 specifications in April 2000.

He has never fully retired, continuing in the industry since 2001 as an Associate with Atkins. Currently, he is involved with the signalling system of Britain's newest railway, the narrow gauge West Highland line in North Wales. It won't have ERTMS but the WHR does have a flat crossing with Network Rail's Cambrian Coast line that, one day will be the UK's first ERTMS fitted line.

Quentin met his wife Jenny at Bristol University. Her career was in teaching but unfortunately a sporting injury to her spine whilst still at school triggered a sequence of events that led to

kidney problems which were to affect the rest of her life. She died tragically young in 1989. Dialysis enables people with kidney problems to have a longer life but is always associated with a very constrained life style. Not so for Jenny and Quentin. There was a world to be seen and they were going to see it regardless of the equipment that would have to accompany them or would have to be sourced in far flung places with less than co-operative officials. Around the world carting your own dialysis clinic is a book still to be written and here's hoping that Quentin will produce it soon. At home in Poppleton, Jenny had her very own REB fully fitted in the back garden, this enabling jaunts away of up to three days unencumbered by chemicals or the need to seek out a hospital.

They had a son and a daughter, their son working in the theatrical business on the automation side. It's a variant of signal engineering ensuring that the complicated props and effects function to schedule and do not result in collisions of expensive devices. His daughter is married and lives in the York area with her daughter.

Politics had always held a fascination for Quentin. He joined the newly formed Lib Dem party in 1981 and, in 1995, decided to enter local politics. It was time of major change to local government resulting in him being a Harrogate District Councillor for one year before the Poppleton ward became part of York City Council. In 2003, the Lib Dems took over the reins for the City and he found himself immersed in the hard work of running a council. He was appointed Executive Member Resources with responsibilities finance, budget, investments, council tax, IT and property. Four years later, the ungrateful inhabitants of Poppleton decided that they preferred the candidate offered by the Conservative party. Politics continue regardless in the Macdonald home. Margaret-Ann is a Councillor with both Harrogate district and North Yorkshire. Lib Dem, of course!

Despite all these time consuming interests, Quentin has been one of the Institution's invaluable helpers over the years. Chairman of the York section in 1993, eighteen years on the examination committee and now, the task really associated with his name, Dinner Secretary for the bash that follows the AGM. He's been doing it since 1992 when a mere 239 members would sit down reasonably peacefully to dine at Savoy Place. But privatisation of BR had its effect on the Institution with the rapid increase of companies appearing in the industry and all wanting to be seen at the dinner though not necessarily at the AGM. So, it was over the Strand to the up market hotels and their dining room managers who cannot be persuaded that someone with a career in interlocking is more than able to deal with the logistics of seating 500 would-be diners near their pals.

Quentin wears his years lightly and, who knows, that he will yet return to political life finishing up as Lord Mayor of the City of York. Here's hoping he does. In full regalia, what a photo opportunity for IRSE NEWS!

Industry News

New Associate Member of UNISIG

In December 2008, the UNISIG Consortium (ALSTOM, Ansaldo, Bombardier, Invensys, Siemens and Thales) was pleased to announce its acceptance of an application for Associated Membership from AZD Praha s.r.o to commence on 1 January 2009.

AZD, a longstanding Czech supplier of railway signalling equipment, thus becomes the first new Member of UNISIG since its formation in 1999.

At a signing ceremony in Brussels, Mr Zdenek Chrdle, Executive and General Manager, AZD Praha s.r.o, said "*I am very proud that AZD has been accepted as the first new Member of UNISIG, especially as my company comes from one of the newer Member States of the European Union. We are ready to help in creating and supporting the European interoperable railway network*".

Klaus Mindel, Chairman of the UNISIG Steering Committee welcomed AZD as UNISIG's first additional Member and said that "*the UNISIG partners are looking forward to working with experts from the company in various UNISIG activities next year*".

The signing ceremony, which was witnessed by invited guests from the European Commission, the European Railway Agency and the European Parliament as well as representatives from UNIFE, CER, EIM and the ERTMS User's Group, was followed by a Reception at the Czech House in Brussels.

UNISIG was founded in 1999 at the request of the EU Commission with the task of drafting the technical specifications for ERTMS/ETCS. It has always been a purely technical body first working in close co-operation with the AEIF (the European Association for Railway Interoperability) and, since its formation in 2005, with the European Railway Agency. The same six companies now known as ALSTOM, Ansalso, Bombardier, Invensys Siemens and Thales have worked together since 1999. They look forward to working in the future with the new Associated Member AZD Praha.

AZD Praha s.r.o is the most significant, exclusive Czech supplier of transportation, signalling telecommunications, automation and information technology. Due to its long tradition and history, dating back to 1954, the Company has gained a leading position among the suppliers of this technology in the Czech market. AZD Praha today has about 1700 employees and provides solutions in the fields of railway traffic, underground operation and plant transportation, telecommunications, information and radio systems, telematic applications, signalling and parking systems, new phone and public address systems for railway traffic control and passenger information, a number of other products.

East London Line Maintenance Contract Awarded

Carillion, has been awarded a seven year, £80m contract for maintenance of the East London Line for Transport for London (TfL).

This maintenance contract is an important milestone in TfL's preparations for the new London Overground service, which will run from Dalston Junction to West Croydon and Crystal Palace. The £1 billion East London Line extension is due to open in June 2010 and will link with the wider London Overground network in north London in January 2011.

Carillion will provide the management, technical resources, plant, equipment and labour to maintain the new railway.

John McDonough, Carillion Chief Executive, said: "*Winning the maintenance contract for this important new rail link, which has been built by a Carillion joint venture, further enhances our position as a leading supplier of infrastructure services in the UK. We look forward to working with Transport for London and to supporting them in delivering a first class service to passengers.*"

WESTLOCK DELIVERED TO PORTUGAL

Teams from Westinghouse Rail Systems and Dimetronic Signals, both part of Invensys Rail Group, have successfully commissioned a new WESTLOCK interlocking installation at a trial site in Portugal. The companies have been working with REFER , the Portuguese Infrastructure Authority, for nearly 20 years, having commissioned Portugal's first electronic interlocking - a Solid State Interlocking (SSI) at Campanhã, the main station in Oporto, in 1990.

Given the extensive use of SSIs in Portugal, (second only to the UK in terms of the number of units installed), evolution to WESTLOCK was a natural choice for REFER. Its state of the art technology delivers a high integrity system on a modern platform, providing high system reliability and availability. WESTLOCK is compatible with existing SSI infrastructure and track equipment and its flexible design permits the interlocking to be connected in a variety of ways, to provide the most appropriate architecture for each situation.

The architecture of WESTLOCK has been designed with high-speed data link capability at its core. Its network communications ability and processor capacity enable faster communication with a range of control centre solutions, trackside equipment and with ETCS/ERTMS Radio Block Centres.

Westinghouse, Dimetronic and REFER signed a protocol in 2007 to carry-out tests and validation, with Coruche selected as the test site by REFER. In the south east of the country, around 60 km from Lisbon, Coruche was one of the earliest SSI sites - in 1994 two SSIs were commissioned there, covering five stations over a 30 km area of electrified 25kV a.c. single track line (Vendas Novas Line).

The joint Westinghouse / Dimetronic team for the Coruche project drew heavily on experience gained from the trial of WESTLOCK at Leamington Spa in 2007; exactly the same trial strategy and protocol was used in Portugal that proved so successful in the UK. Having successfully completed site functional and through testing, the installation was commissioned on 2 November, 2008, with the existing SSI retained as a fall back solution over the six month trial period.

Westinghouse Project Manager Vince Dade, said: "*Final commissioning is scheduled for April 2009, at which point the fall-back SSI will be recovered and we expect to receive full WESTLOCK product approval from REFER for implementation of both base-band and long distance schemes. The signalling principles and operational requirements of Portuguese railways are much different to the UK, and the application of WESTLOCK demonstrates the versatility of the technology to meet multiple operational requirements*.

"*Portugal has always been a catalyst for innovation, new technology and forward thinking and this project has provided yet another opportunity to demonstrate Invensys Rail Group's capability for the successful delivery of innovative solutions. Once again, REFER have been impressed not only with the Group's technical solutions, but also with the approach, delivery, commitment and expertise of the Westinghouse and Dimetronic teams*".

Maintenance of the WESTLOCK installation will be carried out by Dimetronic, as part of the current contracts that the company has with REFER.

Signalling Contract Won for Haparandabanan Line

On 16 January 2009, Cactus Automation AB of Sweden confirmed it has won a subcontract for supplying CTC systems according to European Rail Traffic Management System (ERTMS) Level 2 at Haparandabanan. The main contractor is Ansaldo STS Sweden.

The contract includes development and adaptation to the specific conditions of the Swedish rail network according to the Swedish National Rail Administration - Banverket. This gives Cactus valuable opportunities as the Swedish rail network is progressively being upgraded to ERTMS.

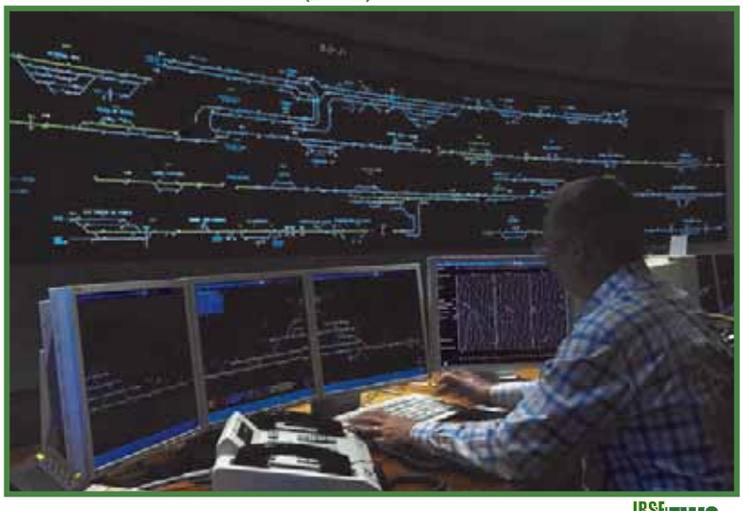
Haparandabanan is a railway line from Boden to the Finnish border that connects the Finnish and Russian rail networks with the Swedish and Norwegian systems. This is particularly important as the line will ultimately provide a unique access from the Eastern hemisphere to the port of Narvik in Norway, for shipping of goods to the rest of the world.

CACTUS®

The SSI interlockings for Coruche, near Lisbon are being replaced by the latest WESTLOCK units.

Photos: R Smith/Westinghouse Rail Systems

Control is from Setubal (*below*)



New Safety Communication System for Network Rail

Direct, secure and even safer communication between train drivers and signallers came closer with the announcement at the end of January 2009 that Network Rail is investing £24m to fit state-of-the-art in-cab radios in the majority of the British train fleet over the next three years.

Network Rail is installing the new Railway Communications System (RCS) across the whole British rail network. This will see the current analogue systems replaced by a high-specification, digital system.

Passengers will benefit from increased safety and reliability. The Railway Communications System will allow the driver to contact a signaller within seconds, which could prove vital in emergencies. Better communications will also enable train operators to recover from delays more quickly while keeping passengers better informed.

Consistent on-time performance benefits have been demonstrated during extensive testing near Strathclyde. This testing has been running since October 2007, with over 200 cabs fitted as part of a trial which will run until Autumn 2009. This has progressed well with strong support from First ScotRail.

The first batch of these new radios – designed and manufactured in the UK – will be delivered to Network Rail in July this year with DB Schenker, First Great Western, London Midland and Virgin Trains being some of the first train operating companies to benefit from the new technology.

Network Rail, the Association of Train Operating Companies (ATOC) and Siemens have worked together for the last three years developing this equipment to meet the demands of the train operators and passengers.

Jon Wiseman, Network Rail's programme director (RCS), said: "*This deal is good news for the railway and the economy. It is a sign of commitment and a major step forward by the industry in delivering the Railway Communications System. This new system will be up and running within five years and will make our railway even safer. Extensive testing is also beginning to show real performance benefits that will improve trains services for passengers and freight users.*"

Michael Roberts, chief executive of ATOC, said: "*We welcome the large order for GSM-R train radios to a specification developed in close consultation with train operators. ATOC looks forward to further work with Network Rail on a range of key GSM-R issues, but today's announcement is a vital step towards timely deployment of the project for the benefit of all users*."

Digital Railway Communication System to be implemented in Tunisia

Société Nationale des Chemins de Fer Tunisiens (SNCFT, Tunisian Railway) has chosen Nokia Siemens Networks to modernise and maintain its railway communications system as it aims to increase safety.

Nokia Siemens Networks is to deploy its Global System for Mobile Communications for Railways (GSM-R), a digital communications solution that mobilises and unites digital communications for railways by carrying signalling and operational information directly to train operators, enabling faster speeds and greater traffic density.

Commenting on the announcement, Tunisian Railways said, *"this project is part of our commitment to provide a safer and more reliable transport network with highly technological real time communications system specially dedicated for railway allowing better performing railway and better services for customers."*

Under this turnkey contract, Nokia Siemens Networks Nokia Siemens Networks are to supply an end to end GSM-R solution, including hardware such as base stations, base station controllers, dispatcher equipment, and hand held devices. They Nokia Siemens Networks will also provide a package of services that includes project management and will support a fast and cost-efficient deployment without any interruption to service.

High network performance and operations will be achieved through a tailored network design that ensures optimum coverage, capacity and minimum network problems. Highly skilled and experienced engineers with in-depth product and planning knowledge will capture relevant information for trouble resolution and technical query services, saving SNCFT time and effort. The project commenced in late 2008 and implementation will be completed by 2010.

Commenting on the announcement, Michael Dickmann, Head of SNCFTthe Customer Team for Nokia Siemens Networks said *"a digital communications solution like GSM-R significantly improves the security, reliability and safety of rail services. For example, since it is based on proven GSM mobile technology, it ensures uninterrupted communication. We are proud to be selected by SNCFT to roll out such a solution in Tunisia."*

Nokia Nokia Siemens Networks are one of the GSM-R platform's founding partners and its global leader with 22 commercial projects and five test networks in 15 countries. Nokia Siemens Networks GSM-R networks serve railways in Switzerland, Sweden, Italy, the Netherlands, Spain, the UK, Belgium, Finland, Greece, India, China, Saudi Arabia, Turkey and Norway's entire rail network.

STS Signals changes name

Since STS Signals was acquired in April 2004 as part of the STS International Group, the current owners have continually invested in new facilities, processes and products to improve the business.

STS International Limited has already changed its name to 'Key Technologies plc' reflecting its plans to acquire companies with distinctive brands outside the established "STS" brand name. As part of this ongoing business improvement strategy, with effect from 8 December 2008, STS Signals Ltd has been re-named as STS Rail Limited.

The new name more accurately reflects the nature of our business and the products that we manufacture and will also assist in the future development of the company. We will continue to use the STS Signals branding for the immediate future but will over time move to a new logo on our products and literature to reflect the new name. All other aspects of the business including the personnel, products and addresses remain the same.

STS Rail Limited is a leading supplier of specialised and approved products for the railway industry. The company designs, manufactures and supports a range of solutions including specialised telephone concentrator systems, BR930 type miniature signalling relays, TPWS/AWS systems and TYER electric key token instruments.

WESTeX Commissioned in Finland

Following the successful conclusion of trials at Skogby station halt for Ratahallintokeskus (RHK), the Finnish Rail Authority, Westinghouse Rail Systems has commissioned a WESTeX GCP3000 Level Crossing Predictor (LCP) system into operational service at Praskintie, close to the town of Vaasa in the North West of Finland, on the Vaasa to Seinäjoki line.

Located in a remote area of the country, the specification of the crossing at Praskintie featured a standard arrangement of barriers, LED warning lights and audible alarms at both sides of the crossing - with a complex logic controller providing a full range of alarm functions. The crossing alarm itself is connected to a Tarmo unit which is co-located with the WESTeX GCP3000 in the location cabin, from which any fault reports are sent to a central monitoring point via GSM; engineers are also able to use GSM to dial into the system remotely for monitoring and event logging purposes.

Commenting on the project, Westinghouse's Project Manager, Vince Dade said: *"Naturally we were delighted to have received approval from RHK and to then to receive instructions for Praskintie. WESTeX GCP3000 provides a low cost, elegant and efficient solution for open level crossings such as these - providing motorists with flashing LED units and an audible warning as well as barriers, if required, to stop at the level crossing in the event of a train approaching.*

"The scheme was initiated, designed, manufactured, delivered, installed, tested and commissioned in the space of just five weeks, all in accordance with the new Finnish Level Crossing Specification. This would be quite an achievement in normal circumstances, but given the remote location of the site and the extreme weather conditions that we faced, it was an extraordinary accomplishment".

Using train detection functionality to operate level crossings in a fail-safe manner, the GCP3000 reduces the amount of on-track equipment required to a minimum, whilst maintaining absolute integrity of train detection. All that is required is a single unit at the level crossing, and termination shunts between the rails at the strike-in point. Through the use of audio frequencies, the LCP is fully compatible with most standard forms of train detection, and provides a complete level crossing solution in one package.

Unlike traditional level crossing systems, WESTeX GCP3000 is capable of predicting the time at which a train will pass over the crossing, taking into account its approaching speed, and is therefore able to provide consistent warning times, reducing the period for which the crossing needs to be closed and, therefore, motorists' waiting times.

Photo: Bill Butler

OPO System Design and Deployment

OPO = One Person Operation

Telent announced towards the end of 2008, that it had been awarded an eight year multi-million pound contract by Metronet Rail, now owned by Transport for London, to provide an innovative new passenger safety surveillance system on the London Underground.

The drive for enhanced passenger safety and security is being driven by the scheduled introduction of modern, faster rolling stock on the Metropolitan, District, Circle, and Hammersmith & City lines.

Telent will design, implement and commission a microwave-based system which will take images from up to eight high quality CCTV cameras on each platform and, using sophisticated video processors, transmit a combined view of the train's exterior to the driver via a microwave radio link. This will allow drivers to see every door on their train, regardless of whether the platform is straight or curved. It is the first time microwave-based technology has been applied in this way in the UK.

Telent has already successfully deployed a similar wireless track-to-train system in Hong Kong and the equipment supplier for Metronet's system, Ogier Electronics, has installed microwave radio for an identical application, also in Hong Kong. Telent is offering Metronet a tried, tested and cost-effective solution to meet its need for increasing passenger safety and security.

Commenting on the major award, Mark Plato, Telent's Chief Executive Officer said, *"We're delighted at the confidence Metronet has shown in our ability to deliver what will be a leading-edge passenger safety system, the first one based on microwave technology to be introduced in the UK. With over 30 years experience in metro and rail, Telent's domain knowledge and technical expertise is unrivalled in this sector."*

John Coomber, Executive Vice Chairman of Pension Corporation and Chairman of Telent, commented: *"Following the Thameslink contract win earlier in the year, this agreement with Metronet Rail is further evidence of Telent's unparalleled expertise in the rail sector. I am delighted that we continue to strengthen our position in our existing markets and at the same time have successfully expanded into new ones."*

Telent is currently working, in partnership with Amey, to upgrade and modernise over 100 London Underground stations on the Northern, Piccadilly and Jubilee lines, under a 13 year contract awarded by Tube Lines in 2005.

WESTLOCK Commissioned at Glasgow Central

Following an intensive 120 hour blockade over the Christmas period, Westinghouse Rail Systems successfully commissioned WESTLOCK as the new interlocking solution for Glasgow Central at 03:35 on 30 December 2008.

The programme of work involved the commissioning of two WESTLOCK interlockings - which now cover the Glasgow Central Renewal area - as well as the re-control of eight remote relay rooms in the surrounding district, all of which are now controlled from the new West Scotland Signalling Centre at Cowlairs in the North of Glasgow.

Representing one of the largest signalling renewal projects to be undertaken so far under Network Rail's Type A Framework agreement, all works were commissioned and handed back on time, with train services commencing as planned.

Commenting on the project, Westinghouse Rail System's Regional Director, Alistair McWhirter said: "*Naturally we are delighted to have delivered this major programme on time and to budget for Network Rail, representing the latest in a long line of projects that we have successfully completed together. The final commissioning was the culmination of two and half years detailed work and a real determination to succeed by the whole project team.*"

"*This was also a very significant milestone in the development of WESTLOCK – representing the first time the system has been commissioned into full operational service in the UK - and at one of the busiest terminal stations.*"

WESTLOCK is a high capacity, computer-based interlocking solution, with each unit providing three times more capacity than a Solid State Interlocking – allowing headroom for future expansion and delivering significant cost savings compared to conventional technology.

Photos: Allison Railways

Glasgow Central: the old and the new

Newsflash: TST

Track Safe Telecom Ltd (TST) was successful in early February 2009 in achieving a Network Rail Principal Contractors Licence (PCL), with zero non-conformities. This accreditation will allow them to directly contract to Network Rail for multiple activities and widen their opportunity base.

TST will be able to engage in construction activities as Principal Contractor throughout the UK on Network Rail Infrastructure. They have invested heavily in their safety culture and this award is proof of the commitment and their high standards.

This award will elevate TST above those competitors who have only achieved Link-up or only have basic health & safety systems.

Mr Phil Owen, Managing Director said "*This is excellent news and I would like to extend my thanks to everyone who helped make it happen. I would like to single out our Head of Assurance, Tommy Cooper, for special praise as he has been instrumental in achieving the accreditation.*"

Product News

Channel Punch

How often do you find the need for an old fashioned channel punch (designed for punching the holes in channel rodding for mechanical points) in the course of signalling installation work and then waste time having to beg or borrow one from whoever you can find who has still got one?

GM Rail Services have got round this problem by commissioning Bigent Precision Engineering Ltd, an engineering firm located in Smethwick, to produce them as shown.

Bigent have obtained Link-Up accreditation for the supply of S&T equipment to the Railway Industry and would be happy to accept orders for further punches from other railway engineering companies.

Please contact Chris Ward – Operations Manager Bigent on +44 (0) 121 525 3427 or by Email to ***cward@bigent.co.uk*** for further information.

GM Rail Services Rugby Training School

Having last written in the IRSE NEWS one hundredth Edition four years ago about GM Rail's Signal Engineering School in Rugby, we thought it would be worth updating readers on progress since the article was published.

The main change has been the complete relocation of the Company's Head Office, along with the Training school into much larger premises on the same Trading Estate on the North side of Rugby in September 2006.

The main driver for the move was to create extra classroom space, which has increased from one room to five, and to provide further floor space for more equipment. The move also gave us more office space for our Headquarters Finance and Administration team.

In planning the move we used the experience gained training in the previous building to improve the layout of the school so that students would be better able to use the equipment, and also to gather around to afford the best view of equipment under instruction.

For example, at the end of each set of points there is a clear standing area around the switch end, so that students can watch the trainer without having to step onto ballast and the post heights for the main aspect signals were reduced to afford easier access to the signal heads.

We can happily report that most of the industry's consultants, contractors and operators are using the school for one use or another and we are keen to work with those few not already using the site. The school has also been used to assist the development of industry standards.

Network Rail have had access to the equipment to help develop their Supplementary Drive course and other initiatives that have included risk based maintenance and investigations into AzLM Axle counters.

The site has also helped support London Underground contractors in the introduction of supplementary drives and detectors onto the LU network.

Perhaps a reflection on the current focus of the industry is that most of the training undertaken in the past two years has been on points, supplementary drives, AzLM axle counters and Signal Works Testing modules. Additionally signalling appreciation courses and workplace assessments have kept the school busy.

We have two full time and two part time trainers who deliver a wide range of courses, supported by a part time trainer who is used when peaks occur in the workload. Also as the workload for the school has grown we have trained several of our team leaders so that they can instruct/assess but still remain "hands on" with the working railway and are familiar with current operating protocols.

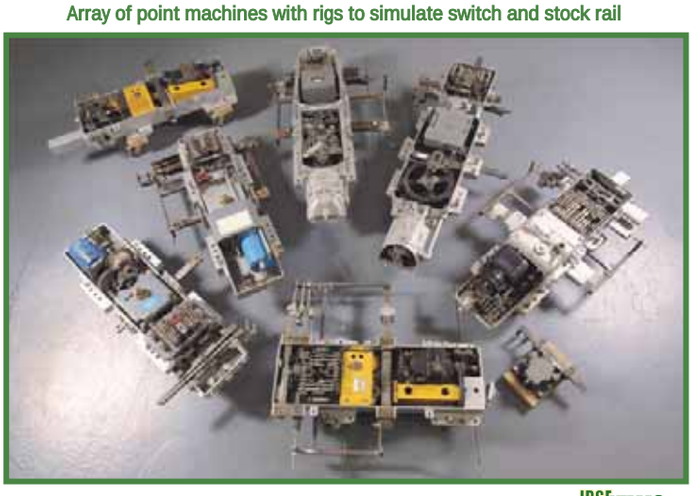
Looking ahead, development of the school will be split between introducing equipment to meet client requirements and in plugging gaps in existing technology at the site.

In an effort to maintain a cross section of signalling equipment, some heritage equipment has been introduced:-

- SGE Type GA combined lever lock and circuit controller;
- Westinghouse Style L combined lever lock and circuit controller;
- SGE Type GF Gravity Lock;
- Several circuit Controllers and catch Handle contacts.

We feel the industry is gradually losing the skill and ability to carry out traditional railway signalling work, both installation, and testing minor renewals and alterations on electro-mechanical equipment. By providing training on this older equipment we feel we will be working to help bridge these skill gaps.

Array of point machines with rigs to simulate switch and stock rail



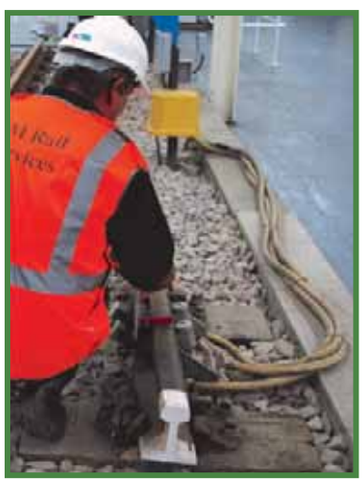
At this point we would like to thank the many people who have helped us with materials that would otherwise have been scrapped, and ask that if the reader has any kit becoming spare / surplus that would assist in our aims of keeping the knowledge of older systems current we'd be very pleased to house it at the school.

That said, we are of course keen to work with OEM's and Product Approvers to ensure that we keep the school's capability as up to date as we can so that we can continue to provide the training and assessment that the introduction of new technology will require.

If the above article has whetted your appetite to pay us a visit and see the school for yourself please contact Darren Whitley on ***dwhitley@gmrail.co.uk*** to arrange a visit.

Finally, a reminder of the equipment installed in the school:

- Four types of points operation; mechanical, clamp locks, HW2000 & M63 machines with M3, 5P and SGE machines on site;
- Two types of back drive - single and double with supplementary detectors;
- Three types of full length switch: B, C and F (all on timber);
- A Shallow Depth 'D' Switch on concrete;
- An NR 60 'F' Switch on concrete fitted with In Bearer Clamp Locks;
- A range of two, three and four aspect signals with subsidiary, route indicators and stencil indications, a fibre optic banner, a four aspect LED signal including route indicator and sub signal;
- Three lengths of plain line rail with flat bottom, bull head and RT60 rail;
- Standard AWS arrangement including a suppressor, as well as a 'Southern' AWS;
- Four types of track circuit: d.c., TI21, HVI and a.c.;
- An 8 lever frame with mechanical signals and detectors;
- AzLM Axle Counters;
- SSI Location Case;
- A full TPWS fitment;
- AHB level crossing with associated circuits.



AzLM axle counters

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ERA Executive Director Marcel Verslype;
ADIF President Antonio Gonzalez Marin;
RENFE President Jose Salgueiro Carmona;

and many more railway chief executives.

Test Trip

On 31 March from 09:00 until 17:00, delegates will have the chance to participate in a test trip by high-speed train on the line Málaga - Cordoba where cab signals will be displayed on monitors inside the coaches.

Some time will be allocated to visit the beautiful city of Cordoba before the return trip with change from LCB to ERTMS.

Parallel Exhibition

You will also have the opportunity to interact with the most prominent professionals in the world of signalling and telecommunications during the parallel exhibition with about 5000 m² of exhibition space available.

Sponsoring opportunities

Should your company/organisation be interested in being a sponsor of this forthcoming event or in exhibiting at the trade exhibition, please contact us as soon as possible as demand has outstripped supply at previous events.

Contact

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A Day in the Life of.....

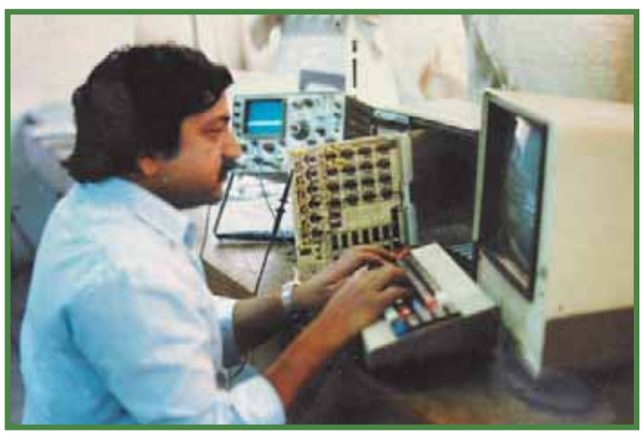
A Design and Development Engineer in previous years

by Mukul Verma, FIRSE

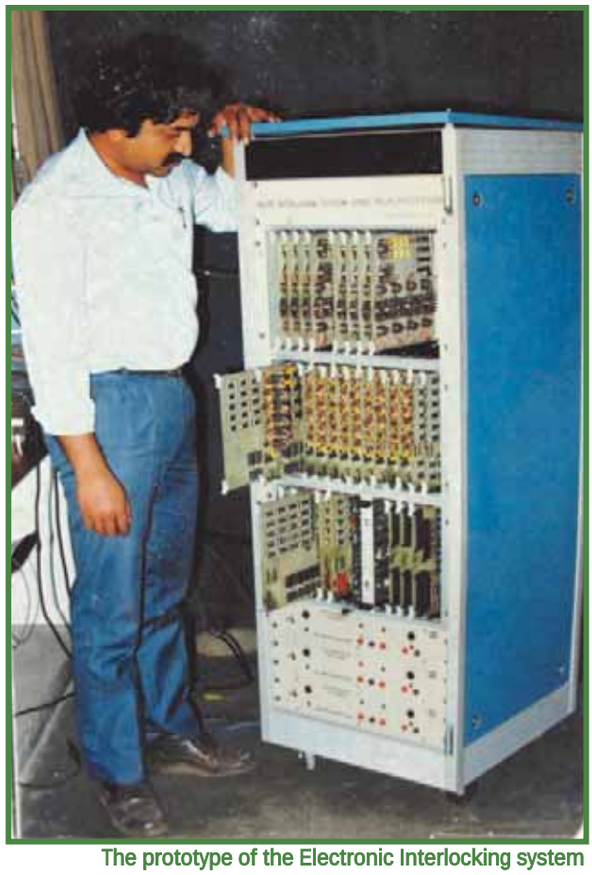
I would like to go back to the early 1980s when I was developing Electronic Interlocking systems for Indian Railways.

The development called for some research, as processor based technology was not yet fully matured for safety applications. Microprocessors had come on the scene only a few years ago and research was still on in the area of fault tolerance for their safety applications. Therefore, a research project was undertaken at a leading technological university of India, Indian Institute of Technology, Delhi, to develop the interlocking system.

Literature survey showed that a number of railways and countries were involved in development of electronic interlocking systems at that time. Technical journals were replete with papers by A.H.Cribbens of the then British Railways, H.J.Lohmann of Siemens, Robert Mathson of Ericsson, D.R.Disk of Union Switch and Signals, I.Okumura of Japan National Railway, and others. Broadly, two schools of thought were emerging for the design approach – (a) hardware redundancy, supported by British Railways, Japan National Railway and Siemens, and (b) software redundancy supported by Ericsson and Union Switch and Signals. Interesting debate was on between the supporters of the two approaches. Some considered hardware redundancy to be superior because use of multiple hardware units would ensure that a failure of one unit would not affect safety; it would be detected and corrected by the good units. On the other hand, supporters of Software redundancy claimed that use of identical hardware takes care of only random faults. Common mode failures among the redundant units would pass and give wrong results. Two independent software programs will detect the systematic failures like design faults in hardware as well as software. However, independence of software programs was a big question.



The test set up for the EI system



The prototype of the Electronic Interlocking system

Interestingly, nobody was talking about hardware diversity. They were either talking about identical hardware and identical software, or single hardware with diverse software. The reason was that the hardware units were tightly synchronized with outputs compared after every instruction cycle; therefore, it was not possible to use diverse hardware. We decided to take advantage of both approaches and developed an architecture which could support both hardware diversity as well as software redundancy. I worked with a Professor in the Institute and developed a suitable architecture. The system eventually went into the field and proved successful.

I would like to present the scenario prevalent at that time. Computer technology was supposedly galloping at a tremendous rate, people were wondering – what next? Had the technology reached its peak? The computer system, which used to take a whole room or a big hall till recently, was now available at your desk top, you had 100s of kBs of main memory at your command, you had a wonderful and user friendly operating system – DOS (Bill Gates was yet to show his magic wand of Windows), you had a strong assembly language of Intel 8086 (As far as I remember, “C” was not yet mature enough for embedded applications in early 1980s). Of course, Internet was not yet available (www was yet to be created in late 1980s) and CENELEC was at least a decade away.

Developing the design, conducting Mean Time Between Failures and safety analyses, doing lab tests, proving safety and reliability of the equipment is one thing and installing a completely new technology equipment in a station, where a failure might not only jeopardise the whole yard, but could also put the lives of hundreds of travelling public at risk, is an entirely different game. No CSTE (Chief Signal and Telecom Engineer) of Indian Railways was ready to try a new technology for the first time on his railway; the issue had to be forced through the Railway Board on one of the railways.

Although the EIS (Electronic Interlocking System) had gone through various safeties testing to validate its design, the nominated railway put the following conditions for installation:

Accelerated testing of the equipment with random field conditions should be done in the lab. For this, we had to develop a simulator to provide panel commands and random yard inputs and test the equipment for about half a million operations. As expected, no discrepancy was found.

VDU based operator's terminal was not acceptable. They did not want any change in the operator's environment. We had to develop a panel processor, which would take inputs from the conventional domino panel and deliver to the EIS and vice versa.

Installation should be done in three phases:

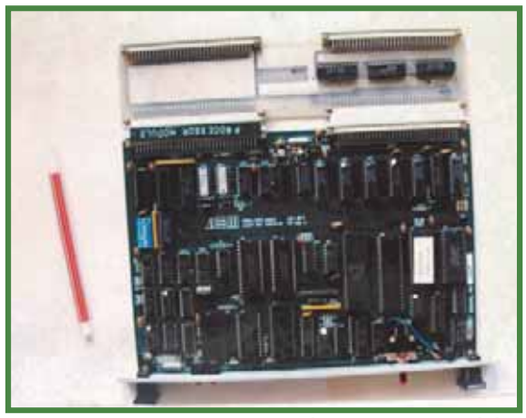
In the first phase, the existing relay based installation (RRI) would not be disturbed. Parallel inputs would be given to EIS and RRI and the outputs of the two systems would be recorded and compared by a data logger. Field equipment would continue to be operated by the RRI.

After satisfactory performance in phase one, outputs of RRI and EIS would be put in series and logging of the data would continue. Field equipment would be controlled by series of contacts of EIS and RRI.

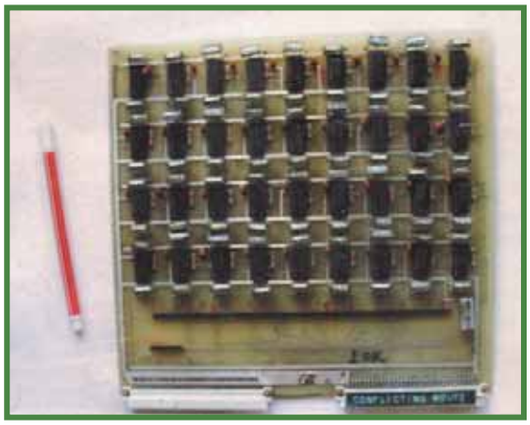
In phase three, outputs would be driven by EIS, but RRI would be kept as a standby. Just by throw of a switch, it should be possible to disable EIS and transfer the control to RRI. I am proud that switching back to RRI was never resorted to; however, the operator was instructed to put back the switch to RRI periodically and ensure that RRI was still operational.

There were some interesting observations during the installation phase. We got some mismatch reported by the data logger due to some limitations in the existing RRI installations. One such case was absence of route setting feature in the RRI. Points were required to be set individually before setting the route, whereas, EIS had an entry/exit feature. We had to incorporate this infirmity in the EIS to keep the alarms off.

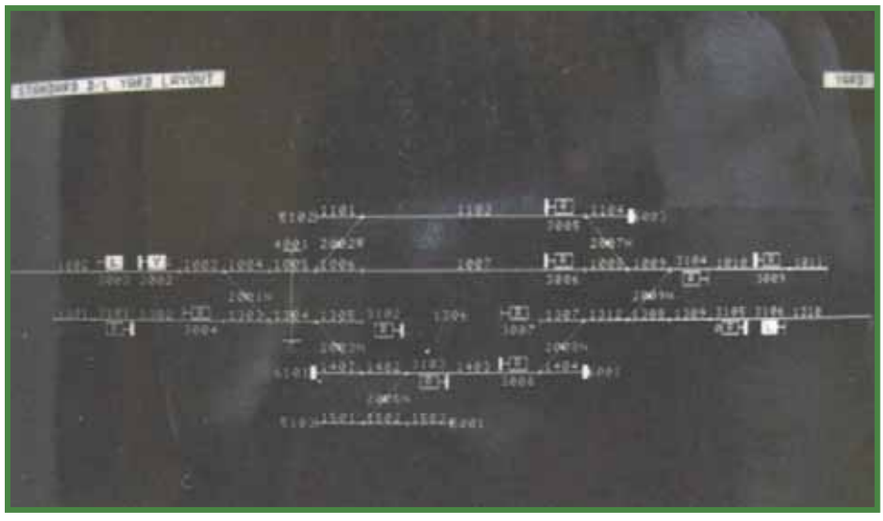
Finally, we passed through all the three phases and could eventually commission the system stand-alone. It was indeed, a great satisfaction to bring a system from scratch and finally install it on a passenger line.



The processor module



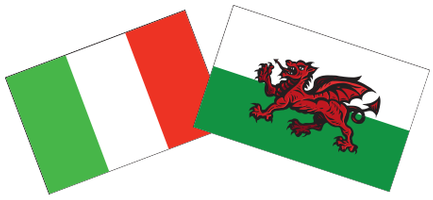
The Route checking module



The yard simulation for testing the Interlocking system

Author receiving his Ph.D. degree for the development from Indian Institute of Technology, Delhi

The Irish Connection



Photos: Ian Rudd

By Ian Rudd

With Acknowledgement to Richard Lemon

Martin Duncan (FRCo S&T Manager) and John Maxey (FRCo S&T Technician) looking very happy with their new collection of toys

Ever since the Festiniog Railway Company (FfR) was given approval to reopen the moribund Welsh Highland Railway (WHR) there have been many thoughts and ideas as to how a 26 mile (43 km) long single line railway was going to be controlled. At one stage a system similar to the Ravenglass and Eskdale radio control was considered, the Cambrian RETB system was also looked at but each time it looked like the system which was on use on the existing Ffestiniog Railway was the most straight forward and, as both railways were to link in Porthmadog, it brought continuity.

The Ffestiniog has used miniature Electric Train Staff (ETS) token instruments since the early 1900s. If the Welsh Highland was to be signalled using token instruments then a minimum of six pairs of instruments would be required along with two intermediate instruments for the Porthmadog – Pont Croesor section. The intermediate instruments would be for the commonly known gas works siding which is in the main car park in Porthmadog and for the junction with the Welsh Highland Railway (Porthmadog) at Pen y Mount.

To find 14 instruments in a reasonable standard of repair is quite a tall order. The S&T Manager of the FfR / WHR, Martin Duncan had been making enquiries in all areas including South America, India and South Africa. All to no avail at a realistic price.

During the same period, a band of volunteers were rebuilding the signal box at Rhiw Goch which is a mile or so above Penrhyn station on the FfR. The original building was put up in the middle 1970s and was not much more than a garden shed. At that time money was VERY tight. The box served well considering the location, however it was suffering with rot and had to be replaced. An appeal was sent out and hands dug deep into pockets and eventually enough money was raised to complete the rebuilding of Rhiw Goch signal box. At a "thank you" party for all those involved a discussion was had regarding token instruments and an offer was put forward by one of the participants that he had contacts with Iarnród Éireann (CIE/IE) and that they may be able to help.

After several phone calls to and from Gregg Ryan who is the Heritage Officer for Iarnród Éireann, Gregg announced that he had found enough instruments for us along with several generators and block bells. This was fantastic news. All that was required was agreeing a price and arranging for collection. Most of these instruments had come from the west of Ireland where they had been replaced with either CTC or the lines had closed. And all the equipment withdrawn and stored.

So, after several months of negotiating Martin Duncan and I set sail on 28 August 2008 from Holyhead, with a hire van to collect the 'Small' pattern token instruments. Gregg kindly met us off the SeaCat in Dun Laoghaire, and we were escorted to the works at Inchecore where we inspected and then loaded the instruments. There are 15 'small' pattern instruments with either an 'A' or a 'B' configuration with one of the instruments being an 'E'. There are also two large Webb and Thompson instruments. All of the 'small' instruments had been overhauled recently and are in excellent condition. The two large instruments will require major work but that will not be a problem. They were all on pallets and Gregg had very kindly persuaded a fork lift driver to come and load them into our van. Once loaded we were treated to a superb lunch in a nearby hostelry and we then made our way back to the SeaCat and Wales.

All the instruments are in full working order; however we have to make the necessary tokens to complete them. IE would not release the original tokens for security purposes.

Now, can anybody help us with 26 miles of cable to link them? If anybody knows of 26 miles of cable, then please get in touch. Preferably five-pair armoured. We can collect, distance is probably no problem. Please contact irudd@toucansurf.com.

On the Move .....

New CEO and Chief Country Representative of Bombardier Transportation Switzerland

Announced in Berlin on February 9, 2009 – As of July 1, 2009 Stéphane Wettstein will assume responsibility of CEO and Chief Country Representative for Bombardier Transportation (Switzerland) AG. Wettstein will also remain Head of the Passengers Division for Switzerland.

Stéphane Wettstein is 49 years old and from Russikon (ZH) and Neuenburg (NE). He has an industrial engineering degree from Basel University and has been with Bombardier and its predecessor companies ABB/Adtranz since 1992.

Alfred Ruckstuhl, who has held the position of CEO and CCR for Switzerland since 2001, will remain chairman of the Management Board of Bombardier Transportation Switzerland. In addition Ruckstuhl will represent Bombardier's strategic interests at the European Union, effective July 1, 2009.

"*We are very pleased that Alfred Ruckstuhl will continue to provide Bombardier with his valuable knowledge and experience,*" says Chris Antonopoulos, Vice President Group Sales, Bombardier Transportation. "*Alfred Ruckstuhl has made important contributions to the successful long-term development of Bombardier Transportation in Switzerland. His leadership as CEO and Chairman were essential to Bombardier's successful and continuous development.*"

Alfred Ruckstuhl is 60 years old and was born in Zurich. His extensive professional background lies in the fields of finance and business administration among other disciplines. He started his career at Bombardier in 1997 when he joined Adtranz Switzerland, acquired by Bombardier in 2001.

Bombardier Transportation employs around 900 staff in Switzerland, located mainly at its Zurich, Villeneuve and Winterthur sites. The Swiss management board is based at the Zurich site, which also hosts sales, engineering and services of trams, trains and loco-motives for the Swiss market, and offers a wide range of products, maintenance and other services for operators. Zurich is also the group's headquarters for the "Locomotives and Equipment" division, which covers development, engineering, sales and project management relating to electric locomotives, as well as propulsion and control systems for locomotives and trains. At the Villeneuve and Zurich sites, over 280 employees develop and manufacture the NINA product platform for commuter and regional trains, INOVA low-floor coaches, as well as the COBRA tramway. With nearly 5000 vehicles in service for more than 40 customers, Bombardier has a strong presence in Switzerland and offers, thanks to its local and international know-how, reliable support for Swiss operators.

Accident-free Works deliver Charity Donation

In November 2008, the Infrastructure Projects Division of Track Safe Telecom Ltd (TST) completed its first major renewals contract for Network Rail. TST, whose headquarters are based in Newport, South Wales were a Principle Contractor to the Network Rail A09 Line Speeds Enhancement Project. The work contracted to TST was based on signalling legacy renewal and improvement works. The project was undertaken on the West Coast Main Line between January and November 2008.

Whilst undertaking these works, the Network Rail Project offered a challenge to its contractors regarding safe working practices. For every accident free period or event, the project would donate £100 to charity, to be matched by each contractor, to a worthy cause of their own choice. During the year, TST undertook five successful signalling commissionings which resulted in a grand total of £1000 being raised.

Ian Allison, Infrastructure Projects Director for TST said "*I would to thank the Network Rail A09 Project Team at Manchester for the opportunity to undertake this project and for their help and assistance in raising the charity donation. I would also like to thank all the TST staff and sub contractors involved for their hard work, commitment and safe working*".

In a charity presentation event held in Manchester on December 2, 2008, the monies were presented to Malcolm Freckelton and Tony Sparks representing the David Clarke Railway Trust (DCRT), towards the provision of a disabled lift at the Great Central Railway (GCR) Loughborough station, by Ian Allison of TST and David Smith of Network Rail.

Ian Allison of TST presents Malcolm Freckelton with the cheque for £1000. Tony Sparks (left) and David Smith of Network Rail (right) look on during the presentation in Manchester

Photo: Network Rail

Tony Sparks said "*both Malcolm and I would like to thank Ian and his colleagues at TST for the generous donation of £1000 made to the DCRT funds for the Loughborough disabled project. We both felt that making the journey to Manchester was worthwhile, and we should also thank you for the hospitality extended to us on our arrival*".

"*We would also like to congratulate TST on achieving this award from Network Rail for safe working practices, and would hope that it will stand you in good stead for future work. Finally, I know that I speak for the GCR as well in saying thank you for the donation which will be put to good use on this important project.*"

Younger Members' AGM and Exam Review

Thursday 15 January 2009 saw the annual Younger Members (YM) half day seminar incorporating the AGM and Exam Review. In truth, this event started the evening before when a number of the YM (and not so YM) informally gathered for a social evening in Covent Garden!

Covent Garden: the meeting before the meeting.

The main event was hosted by **Olga Wisniewska**, the YM Publicity Secretary, who began the day by welcoming over 50 delegates. Following this, **Lynsey Hunter**, the YM Chair, proceeded to review events supported and organised by the YM throughout 2008. The number of events was greater than ever, including the first YM International Technical Visit, a number of exam workshops, the ASPECT Conference introductory day and the regular YM November seminar. Many thanks to all who got involved last year and helped make these happen. It is worth noting that the YM are aiming to host more events this year and are looking for volunteers to help.

After a hugely successful first year as chair, Lynsey Hunter is to remain in the position for the coming year. Both **Jesper Phillips** and **Rob Ireland** are stepping down this year - many thanks to them both for their efforts over the last twelve months. Three new members have been appointed - **Martin Fenner** to the position of secretary and **Ananthudu Madiraju** to the position of YM Forum champion. The resulting YM committee for 2009 is as follows:

- Chairman – **Lynsey Hunter**
- Treasurer – **Andrew Witton**
- Secretary – **Martin Fenner**
- Publicity Secretary – **Olga Wisniewska**
- YM Forum Champion – **Ananthudu Madiraju**
- Management Committee Rep.– **Daniel Woodland**

After the formal AGM, a half day seminar commenced with five very different sessions. **Paul Cheeseman**, the Global Technical Director of Lloyd's Register Rail, began by presenting an impartial view on how to approach Module 1 of the IRSE exams, Safety of Railway Signalling and Communications.

Paul Cheeseman

Safety engineering has never been a subject which draws in the crowds and is notoriously hard to revise for. It consistently achieves a low pass rate compared to the other IRSE exam papers. Paul, however, presented an interesting and entertaining view of safety engineering and its importance to railway engineers. Drawing from his wide-ranging industry experience, he described what safety is all about, and defined a number of the commonly used terms such as hazard, risk, cause, etc. and how these all relate to each other. Paul then moved on to the fundamentals of Risk Management before finishing by giving some recommendations on resources that are available to aid studies when preparing for the exam. I would recommend any students studying for Module 1 to come along to the workshop on 30 March 2008, to hear Paul and others give more guidance on how to tackle this exam.

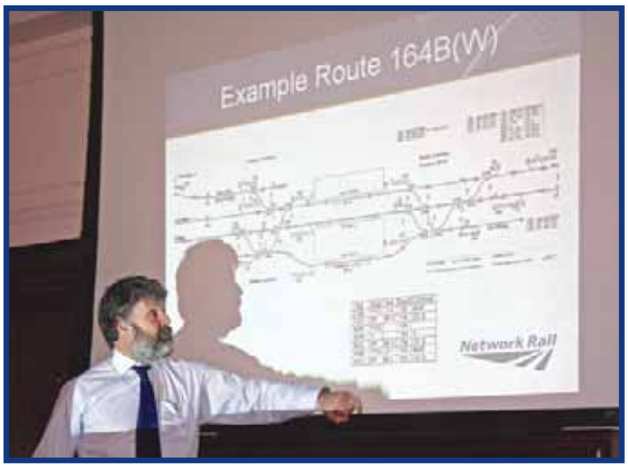
Olga and Lynsey enjoying the presentations

Following this, **Jesper Phillips** presented a review of his technical visit to North America. Jesper was awarded the Thorrowgood Scholarship by the IRSE for exceptional performance when sitting the IRSE examinations in 2007. This award includes a bursary to fund a study tour looking at signalling solutions abroad. Jesper chose North America and managed to find a great deal about signalling practices there in a very short period of time. His presentation gave an excellent overview of these practices and how they compare and contrast with those in the UK.

Jesper Phillips enthusing about his trip to America

Peter Woodbridge followed this up by giving a whirlwind tour of the new online IRSE exam forum. This has been set up to help candidates studying for the IRSE exams. It is intended that this website will act as an online study group, promoting the exchange of information and ideas between many different students. It will also be particularly relevant to those students not fortunate enough to be able to physically get to a study group, and to those students studying for some of the less popular modules such as Module 4. All students are strongly urged to get involved in making this site a success. The site is about giving as well as receiving, and so Peter made a strong plea for students to be active on the site where possible and not to just 'lurk'! You can register to use the site by going to: ***www.irseexam.co.uk***.

Before Peter was able to launch into his presentation, our president, **Alan Fisher**, took the opportunity to present him with an IRSE Merit Award (see page 27 in Issue 142, February 2009). Peter has been a true champion of YM activities in recent years, devoting many hours to help with study groups, workshops and the new online IRSE exam forum. This Merit Award reflects the commitment and energy he has put in – congratulations and big thanks to Peter from all the YM.



Some pointers from John Alexander

The next presentation was a short review of the YM International Technical Visit (ITV) to Berlin, which was held in October 2008, given by **Ken Doggett**. The trip was a huge success with fourteen attendees from six different countries. It was a great educational and social experience, with highlights including a visit to the ICE train maintenance depot, Thales testing facility and the U-Bahn control centre. This year, Ken is looking to organise another YM ITV to Holland, with Amsterdam looking like the most likely hosting city. Look out for more details in future editions of IRSE NEWS.

Ken Doggett looks back at the hugely successful YM trip to Berlin

The last presentation of the day was provided by **Ananthudu Madiraju** from McML Systems in India. Ananthudu had come a very long way to present the second paper in the history of the Younger Members Forum (YMF) on Driverless Metro Systems. The aim of the YMF is to bring together young engineers from across the world to meet and exchange information and lessons learnt in an interactive way using a virtual environment hosted by the IRSE. The main deliverable of the YMF is the provision of a technical paper on an annual basis.

The YMF is a virtual, interactive message board with file transfer protocol capabilities. A 'Viadesk' site has been procured by the IRSE for use by the YMF.

Look out for further information on the YMF, and how to get involved, in forthcoming editions of IRSE NEWS. In the meantime, if you are interested in joining or finding out more about the YMF, please contact Ananthudu at: ***ananthudu.madiraju@mcmlsystems.com.***

To conclude the day's proceedings, Examiners **Daniel Woodland, John Alexander** and **Andrew Stringer** were welcomed to give some feedback on the 2008 IRSE Exams. Daniel Woodland gave an overview of the results for 2008, comparing and contrasting these with previous years. The Examiners then gave their feedback on Modules 7, 3 and 2 respectively. The speakers discussed the good and the bad, and drew the attention of the audience to some of the common pitfalls. They also gave useful tips and pointers for candidates sitting the examinations in the future.

Ananthudu Madiraju presents a paper on Driverless Metro Systems

Further informal feedback from this session can be located on the exam forum at: ***www.irseexam.co.uk***.

Finally. if there is anything you would like to see in the YM programme or if you would like to get involved, please do not hesitate to contact us at: ***younger.members@irse.org***.

Andrew Witton

Jesper Phillips with a display of grade crossing equipment

IRSE Exam Results 2008

Surname	Forename	M1	M2	M3	M4	M5	M6	M7
Backhouse	Michael John	P	P					C
Bedford	Mark William		C	C				
Bhasin	Rahul		C	P		P		
Briggs	Matthew	P	D	P		P		
Caporn	Scott				C			
Carter	Alex	P	C	C		P		
Chapman	Terence David					P		
Cheung	Pan Yeung					P		
Chislett	Gareth John		C					
Cooper	Simon Robert					C		C
Duffy	Michael	P						
Dylewski	Michal Tomasz		P					
Farquhar	Garry William					P		
Fearn	Matthew					P		
Fozard	Jon	P	P					
Freer	David Anthony		P	P		C		
Fury	Ian David	P		P		C		
Gardner	John Spencer	P			P			
Goei	Alex Beng Guan			P				
Grange	Michael Stephen	P						P
Greenwood	David			P				
Gupta	Rajeev							C
Gurumukhi	Manoj							P
Handley	Mark			P				
Haris	Noviar Arman					P		
Howley	James		P	P				
Hung	Ho Man		C			C		
Ingram	Phillip Alexander		P	P				
Kalra	Naresh Kumar	P						C
Karunakar Reddy	K		P			P		
Kirkham	Richard Alexander			P				
Krishnan	Lakshmi Narasimhan					P		
Liu	Fu Kuen Eric					P		
Lockyear	Andrew		P					
Makwezva	Wilbert	P						
Malik	Nasir		P	P				P
McDonald	Sean Peter				P		C	
McRoberts	Lee John	P						
Miller	Craig Stewart	P	P					
Moir	Scott James	C				P		
Mott	Angela Alison			P				
Mukku	Vara Prasad		C	C		P		
Muriu	Charles Kiama					P		
Naylor	Mark Andrew		P	P		P		
Neptune	Senthil Vel	P						
Odusanya	Oluwole			P				
Onrubia	Montserrat		P					
Patankar	Pranay Kumar	P						P
Patel	Hitesh Kumar Ramanlal							P
Pearson	Matthew	P				P		
Phillips	Christopher James	P				C		
Poon	Cathy Yeuk Lan		D	C				
Roberts	Lee	C	P					
Roberts	Paul Salisbury		P	P				
Sealy	Nathan Paul					P		
Sharma	Aditi Karina	P						
Shukla	Devanand	P						
Sibanda	Jephious	P						
Sienkiewicz	Maciej		C					
Smith	Paul James		P					
Stubbs	Andrew Gordon		P	P		C		
Tam	Tak Lung		P					
Taylor	Alan	P		P				
Thomas	Bartholomew			C				
Thomson	Neil		P	P				
Tomar	Arjun Singh							P
Verma	Gajendra Kumar	P	P					
Walker	Simon Charles		P					
Waszkiewicz	Artur		P					
Witton	Andrew	P	D			C		
Witts	Darren	P				P		
Woods	Matthew John					C		
Yadava	Krishna Kishore		P	P		P		

York Section

The Chairman, **Andrew Smith**, welcomed thirteen members and three guests to the Technical Meeting on Tuesday 13 January 2009 at the Bar Convent in York.

Andrew introduced **Chris Knowles** of Lloyds Register Rail and invited him to present his paper "Asset Management"; Chris was in replacement of **Brian McKendrick** who was unable to attend due to his wife taking him on a surprise holiday!

Asset Management is a fundamental component in the delivery of rail services. Aiming to align engineering and commercial activities, structured asset management provides a risk based approach to the delivery of strong system performance – in line with business needs and stakeholder expectations. It is based upon compliance with BSI PAS 55: 2008. The aspirations are to look after the asset base, deliver against obligations – and be in control!

Chris had been involved in some of the early drafting leading towards this standard so was well placed to be able to deliver a commentary.

He made the point that we all were, in some way, asset managers. Rather than being something separate from and additional to existing processes Asset Management aims to bring them together as a cohesive entity. It is based upon how things really are rather than how people might like them to be with an Organisational Strategic Plan sitting above Asset Management, Policy, Strategy and the Objectives. It should lead to management which is resilient, achieves optimal solutions and ensures compliance with requirements, legislation and standards. We were introduced to the concept of "Understanding the Risk Appetite" of an organisation rather than simply being constrained by Risk Aversion"!

Chris presented an overview of the latest developments in asset management standards, and provided examples of asset management approaches applied to rail in the UK and abroad. For example, development of their asset management was a precursor to the recent merger of the very successful MTR and KCRC in Hong Kong; the positive culture in both organisations, not least in cross-functional participation, helped this process considerably.

Chris traced the evolution of the approach to assets in their management which he characterised as reactive in the 1900s, Preventative in the 1930s, Proactive – based upon Condition Monitoring – in the 1980s and Risk Based – applying Knowledge Based Management - in the present decade.

A question and answer session followed with **Richard Parker, Paul Taylor, Melvyn Nash, Quentin Macdonald** and **Andrew Witton** contributing. The Vote of Thanks was given by **Ian Moore.**

Midland & North Western Section

Sixth Annual Luncheon & Technical Visit to Peak Rail, Derbyshire Sunday 14 June 2009

The Midland & North Western Section has arranged the next annual luncheon and technical visit to take place at Peak Rail, the Matlock to Buxton railway project at Rowsley in Derbyshire on Sunday 14 June. Following on from the five previous successful annual luncheons, it is intended to visit the signalling installations along the line and the locomotive engineering facilities, followed by provision of a three-course meal upon the Palatine dining train service on the four mile line between Matlock and Rowsley South station.

Places are limited to 48 and will be given out on a first come, first served basis. Further details will be published in the next issue of IRSE NEWS when prices and the itinerary have been fully confirmed.

For further information about this event and joining instructions, please send an email to *enquires@allisonrailways.org*.

For further information about the railway, please go to *www.peakrail.co.uk*.

Loco 31270 sits with D8 Penyghent for company, as they wait to work the 09:58 service to Matlock Riverside from Darley Dale on 11 May 2008
Photo: R82 Photography

The January Lecture

Ed Rollings from Network Rail was the presenter of the Section's January lecture, held courtesy of Signet Solutions at their training facility in Derby. Around 60 members and guests attended the event, including **Alan Fisher**, to listen to Ed give 'Some Fresh Ideas for Signalling Implementation'. He explained that the ideas he was about to discuss were not necessarily ground breaking, or even new, but were intended to be thought provoking and that the audience should understand sometimes it is more than acceptable to re-invent the wheel.

The present signalling project delivery process is very human centric, with every design being bespoke and encompassing many legacy processes. Furthermore, the railway operating methodology is also very labour intensive with signallers, control offices and higher level management organisations. Finally, maintenance is all about human intervention with the equipment all carried out in rapidly diminishing track access times. All these factors come together to make the product somewhat variable, with a large number of boundaries or interfaces to manage. As more and more components are added to the system railway, the more variable the outcome can become.

To help redress the balance, the industry needs to move to a different way of delivering infrastructure projects, particularly on secondary lines where generally a slower and less intensive train service exists. Far more standardisation is required, moving back to the way mechanical designs were delivered in the nineteenth and twentieth centuries with minimum diversity. A reduction in disproportionate effort expended in activities such as junction risk assessments, signal sighting and scheme development would all contribute to reducing project turnout times and deliver more standardisation at reduced cost.

Implementing some new ideas, such as IDEF0, a process developed by United States defence organisations to better understand how system components interact with each other would bring a fresh outlook. The use of Goal Structured Notation with structured modular arguments may also help to bring more standardisation in safety cases and allow the same arguments to be used over and over again. Hardware and software appropriate to the classification of line would help to reduce over complication, along with the use of far more standardised off-the-shelf equipment. With increased factory build, test and rehearsal, reducing site work and project timescales, costs should also be saved. Geographical interlockings were a good example of how this was achieved in the past, with units manufactured and tested off-site. Signal controls tended to be more standard than today and site work consisted of 1960s style 'plug and play'. With modern electronic systems there are opportunities to improve on this technology, with the old problems of redundancy and floor space demand having been banished by the use of modern computer cards or modules of software to represent the sets.

The lecture concluded with a great number of questions from the audience. Ed had set out at the start of his lecture to inspire people to think in a different way. After three quarters of an hour, the questions demonstrated he had clearly achieved this goal. Individuals discussed varying subjects including the argument of standardisation being diametrically opposite to innovation and whether it is time to drastically change operational rules and procedures bringing greater simplification to signalling requirements. There were of course comments from some that they remembered it 'being like this' in the middle part of the last century. Chairman Nash had to call a very unpopular halt to proceedings eventually in order to allow people a chance to get their last trains home.

Ian R Bridges

Feedback

Botswana RETB

The enhanced RETB system supplied by GEC-GS was put into service in Botswana in 1989, having been developed in the UK – the hardware by GEC-GS in Manchester, and the modified RETB interlocking software by BR Research in Derby, under a subcontract from GEC-GS. Marconi provided the trunk radio system under another subcontract.

The Botswana system included additional features compared to UK RETB, such as train location proving by means of passive track transponders, a warning to the driver as the train approached the end of the section for which it had an electronic token, and a "Trainstop" function if a train set off into a single line section without a token. A "transportable" version of the on-board equipment was also supplied, for use on track maintenance machines. Several later additions were made to the system, including fitting the branch line, and equipping further batches of locomotives.

As a signalling scheme it was very unusual; we never saw a formal track plan, and there was no provision to undertake any rationalisation of unwanted loops, or conversion from "main line plus sidings". There was some earlier lineside colourlight signalling at the larger stations which were left unchanged. The RETB in fact only formed a block system, with existing rules still applying in loops, which meant that signalling could be installed at stations independent of the block system. It seemed at the time that supplying low-cost signalling in developing countries could be a viable business, but the bulk of the contract value was in the dedicated telecoms, and the signalling elements formed quite a small part.

New consultants to Botswana Railways each made another upgrade proposal – usually to improve the signalling at the major stations and to rationalise the loops. Some of these proposals were undertaken (e.g. HR92 hybrid relay interlockings from Telkor and Siemens at a few stations around 1994/5). We heard that the worsening political situation in Zimbabwe led to a decline in traffic on the line in the later 1990s, and some more radical upgrade proposals were shelved. Maintaining the electronic equipment was always difficult in Botswana, with trained railway staff finding alternative employment repairing radios and TVs!

GEC-GS (later ALSTOM) supplied spares to Botswana from time to time, but such requests seemed to stop around 2001 or 2002. ALSTOM was not informed of any decision to abandon the RETB system, but it sounds as though that may have happened at that time.

The operation of such single lines obviously benefits greatly from modern radio communications and off-the-shelf technology such as GPS, which can replace much of the functionality that had to be developed specially for the RETB solution. It is good to see that the adaptation of the QR DTS system now installed has done just that – and it is good that the additional functionality seems very similar to the features pioneered by GEC-GS 20 years ago!

My thanks to John Slinn, Harry Ostrofsky and Gary Lewis for information to piece together this story.

Bob Barnard

When is a short spanner not a 'short spanner'?

I note the RAIB report into the Grayrigg derailment regarding the adequacy/ clarity of the instructions prescribed for checking the tightness and security of stretcher bar bracket joints.

I wish to bring to notice that the term *'a short spanner'* is not a description of the 'physical size' of the tool required for use on stretcher bars.

The Permanent Way department traditionally used a very limited number of spanners to undertake their work. All of the P Way spanners are of the 'hot forged' variety i.e. they are ***black spanners***:

1. A long spanner;
2. A 'running up' spanner;
3. A 'Top Hat' spanner;
4. A 'short spanner'.

A 'short spanner' is P Way department jargon for the special spanner used to tighten the square nuts on non-adjustable stretcher bars and rail brackets. The name identified it from the more familiar spanner used to tighten up fishplate bolts, unsurprisingly called a 'long spanner'.

The failure to identify and mandate this specialised 'stretcher bar spanner' probably occurred when the S&T undertook certain maintenance duties previously undertaken by the Civil Engineer. It is probable that when the S&T department requested details of the tools used for stretcher bar maintenance; the Civil Engineer informed them that only 'a short spanner" was needed. Regrettably, the phrase *'a short spanner'* in the S&T instruction is now obviously ambiguous. The importance of the need to use the required specialised stretcher bar spanner is clearly not widely understood within the present S&T department. This ambiguous term continues to be used in present instructions and apparently was taken literally by the Network Rail Maintenance staff who seem to have accepted a normal spanner (even adjustable types) to be an acceptable 'short spanner' and therefore OK to be used to tighten square stretcher bar bolts.

A stretcher bar or '*short spanner'* is a single ended, forged spanner. It has a specially angled head for ease of access to the square nuts used on stretcher bars and brackets.

Jargon to '*identify',* as apposed to '*accurately describe'* a vital safety tool has been misinterpreted by the uninitiated / unaware. In this case a specialised tool was not clearly mandated 'MUST' Be Used'. Sadly, this may have led directly to a loss of life, and may yet lead to others, unless this essential tool is made available urgently to all staff engaged in the maintenance and checking of non-adjustable stretcher bars. A stretcher bar spanner is not listed in the NRS Catalogue. They are therefore effectively 'not available through neglect of use'.

A 'short spanner' has an acutely cranked head and is **not 'short' and** is 18¼ inches long. Two spanners are required to securely tighten the stretcher bar bolts. Alternatively only one is required if a small plate' having two square holes' is fitted over the heads of both stretcher bar bolts (to prevent the bolts rotating, when the nuts are tightened.

The photograph shows the Stretcher Bar Spanner, a 'short spanner' (to the P Way dept.).

Malcolm (Mac) Tunley (Retired)

Manchester South

I very largely agree with Bruce MacDougall in his letter concerning Manchester South; however I believe that the problem went deeper than the technical characteristics of the signalling system. Since the level of safety on most of the western European railways is broadly comparable, it should in theory have been possible to import 'foreign' systems into the UK without much modification to their signalling principles and maintain the same level of safety, had the technical integrity of the signalling system been the only consideration.

However, the so called signalling principles are very largely a set of application rules designed to meet the requirements of a railway's operating rules, and this is where the difficulty arises.

Any signalling system is designed to operate within, and to enforce, a particular set of operating rules; and if it is to be used in an environment with a different set of operating rules, modification is inevitable and is likely to be proportionate to the difference between the two sets of operating rules. Changing the operating rules is usually not an option in the short term because, largely from human factors considerations, safety is highly dependent on the operating rules being consistent, at least within a route, or network of routes.

Had consideration been given at an early stage to the operating rules for which the imported signalling systems were designed, and how they differed from UK practice, rather than just looking at the signalling system in isolation, the true scale of the problem might have been appreciated and a lot of heartache might have been saved.

This failure to take a system wide view is not confined to the UK, and the lesson has clearly not yet been learned. Real interoperability will not be achieved within Europe while all the effort is concentrated on the technicalities of ERTMS and the need for a set of harmonised operating rules is largely ignored.

Philip Wiltshire

A Unique Experience?

For those Signalling and Telecommunications Technicians, Managers and Engineers who would not normally be able to get involved with physical works by the lineside to gain experience, a unique opportunity has arisen.

Voted number 12 on the list of the 50 greatest railway journeys in the world, the Great Central Railway is the UK's only double track, main line heritage railway. It's the only place in the world where full size heritage trains can be seen passing each other. Each year the railway's volunteer Signalling and Telecommunications Department holds a working week in order to undertake engineering works to develop the railway further.

This year, the working week will take place from Saturday 9 May until Sunday 17 May and will focus on work required to be undertaken at Rothley and Swithland Sidings Signal Boxes. IRSE Members and Licence Holders are invited to attend and assist like-minded professionals and enthusiasts to experience and learn the following in a volunteer capacity:

- Mechanical Signalling Installation practices;
- Electro-Mechanical Signalling Installation practices;
- Telecommunication Installation practices;
- Civil Engineering practices;
- Signalling and Telecommunications Maintenance.

All work activities will be fully supervised with instruction in a safe and controlled environment. This is an ideal opportunity to gain experience to further individual's professional development and knowledge. Witness testimonies can be provided for activities undertaken and completed upon request.

For further information, please contact Graham Bannister on +44 7771 668681 or send an email to ***enquires@allisonrailways.org***. Details regarding the Great Central Railway can be found at ***www.gcrailway.co.uk***.

GREAT CENTRAL RAILWAY
LOUGHBOROUGH, LEICESTERSHIRE

Foreign Equipment & Locomotive Numbers

"British Interlockings for British Railways" sounds somewhat chauvinistic and disrespectful to our foreign colleagues. If however we apply common sense, it is what we end up with. It makes sense to use the same technology throughout the railway, except when a significant improvement can be made. This enables staff to be re-allocated without retraining, reduces the variety of spares required and eliminates those nasty interfacing problems.

Remember the Øresund Bridge. The Danish and Swedish interlockings at each end are the same make and same model, but because they are programmed with different signalling principles, they can only communicate through a relay interface. We have widely installed SSI which works well and has even been liked abroad and we have had compatible derivatives of it produced by two different manufacturers. Forcing German and Italian systems to fit British conditions has not been easy or advantageous. It has not helped our railway and done no good to the reputations of the two manufacturers who had the courage to supply schemes.

Are we then to remain insular? No, let us continue to get hot box detectors from USA, treadles from France, axle counters from Germany and other bits and pieces from the people who do them best. ERTMS may prove an effective way for our continental friends to become more heavily involved without the same problems. Let us just remain consistent and compatible.

The steam locomotive involved in our Polish trip as detailed in IRSE NEWS Issue 142 is actually numbered OL49-59. OL49 is, of course the class and 59 the individual locomotive within that class. The second character really is an 'L', but not as we know it.

J.R.Batts

Membership

ELECTIONS

We extend a warm welcome to the following newly-elected members:

Fellow

Krishnakumar	B	Southern Railway, India
Raghunathan	V	Ansaldo STS Trans India
Ramesh Kumar	V G	Ansaldo -STS India
Rao	G S	McML Systems

Member

Agrawal	M	Softech Global
Boss	K R	Transnet
Du Plessis	B	Transnet
Eichenberger	F	eduRail
Engela	D J	Transnet Capital Projects
Fernandez Montoya	M	Alstom Transport
Kotzé	J H	Transnet
Kruger	L N	Metro Rail
Le Roux	B J	Transnet
Mishra	R K	RITES
Neethling	H J	Transnet
Rashid	A	SCG Consultants
Salikram	J J	Metro Rail
Stapelberg	H S	Transnet
Stevens	B E	Metro Rail

Associate Member

Ali	S R M	McML Systems
Bandyopadhyay	A	Metro Railway
Bates	H	Northern Ireland Railways
Bird	A D	MetroRail South Africa
Bowles	G D	Transnet
Brecher	A	Metrorail
Buthelezi	S V N	Transnet
Chakraborty	D N	Metro Railway
de Vry	F A	Metrorail
Donaldson	G A	Transnet
Dudeja	A K	M/s Larsen & Toubro
Farmer	J H	Transnet
Freestone	M	Atkins RAil
Govinda Rajalu	D K	McML Systems
Khumalo	D	Metrorail
Krishnamoorthy	R	McML Systems
Kunnath Peter	J	McML Systems
Lupton	J W	Network Rail
Mak	W K	Atkins China
McVea	C W	Northern Ireland Railways
Meyer	C M	Metrorail
Minnie	A M J	Transnet
Mngadi	M S	Metrorail
Mollett	J S	MetroRail
Munyai	M E	Transnet
Ndima	N S	Metrorail
O'Hare	S P	Babcock Rail
Panchagnula	S S	McML Systems
Pranlall	N	Metro Rail
Roux	L H	Durban Metrorail
Rudra	N	McML Systems
Seager	L J	Transnet
Shongwe	B E	Metrorail
Small	H	Metrorail
Supatan	L	Rail Networks
Todkill	J G	Transnet
Van Der Westhuizen	H R	Transnet
Van Niekerk	P	Metrorail
Vasudeva Rao	M	McML Systems
Wallace	A M	Mott MacDonald

Associate

Deyzel	A	Transnet
Gassman	P	Pebe Holdings
Hlambisa	T H	Metrorail
McGrory	C	Atkins
Mhlanga	T	Amey
Msomi	Z P	Metrorail
Ngiba	M W	Transnet
Nzuza	L S F	Transnet
Porter	D R	Atkins
Radford	M A	OnTrack New Zealand
Taylor	N J W	MGB Signalling

Student

Akshatha Raj	N	McML Systems
Amarthaluri	N R	McML Systems
Anchi	M	McML Engineering Service
Babu	D	McML Systems
Banu	N	McML Systems
B M	L	McML Systems
Chandrasekaran	M	McML Systems
Chandrasekaran	N	McML Systems
D R	U	McML Systems
Devarahu SV	V G	McML Systems
Elliott	G F	Parsons Brinckerhoff
Gagarin	K	McML Systems
Gondela	R	McML Systems
Harsha	R	MCML Systems
K R	K K	McML Systems
Koppalakonda	K	McML Systems
Koppalakonda	K	McML Systems
Manjuladevi	P	MCML Systems
Mathialagan	L	McML Systems
Meghanathan	N	McML Systems
Moodekula	V N	McML Systems
Morgan	I	Atkins
Namratha	H R	MCML Systems
Natarajan	N	McML Systems
Nithyapriya	J	McML Systems
Panneer Selvam	R P	McML Systems
Pillai	Y	McML Systems
Prasad	R M	MCML Systems
Rajasekhar	J	McML Systems
Ramakrishna	A	McML Systems
Ravi Kiran	B A	McML Systems
Rengasamy	G	McML Systems
Rengasamy	V	McML Systems
Sangeetha	S	MCML Systems
Sankarasubramanian	V	McML Systems
Sethuraman	B	McML Systems
Sreerangan	N	McML Systems
Surulimuthu	N	McML Systems
Suvarna	S	McML Systems
Suyambulingham	S	McML Systems
Tamrakar	N	WS Atkins & Partners Overseas
Thanapriyaa	A R	MCML Systems
Vaddella	S	MCML Systems
Vasanthakumar	T	McML Systems
Vasundhara Ramesh	B K	McML Systems
Vinay Kumar	K J	McML Systems
Waters	C	Westinghouse Rail Systems

TRANSFERS

Member to Fellow

Antoni	M M	SNCF

Associate to Member

Freer	D A	Network Rail

Associate Member to Member

Awan	T-u-h	Westinghouse Signals Australia
Owen	P R	Track Safe Telecom
Verma	G K	Westinghouse Rail Systems
Wong	T C	MTRC

Associate to Associate Member

Dudekula	R R	McML Systems
Jones	D	DeltaRail

Student to Accredited Technician

Penneru	V	McML Systems
Singavarapu	S L K	McML Systems

RESIGNATIONS

Hardcastle	R L
Hobson	E G
Mercado	M

RE-INSTATEMENTS

Taylor	I
Noble	J D

DEATHS

It is with great regret that we have to report the death of the following member:

Hewlett	F M

ENGINEERING COUNCIL UK REGISTRATION

The following member has been recommended for registration with the Engineering Council UK:

IEng (Interim)

Mumford	J

Current Membership Total is 4365

STOP PRESS

IRSE Indian Section Formed

The Indian Section of the Institution was formally inaugurated at the Indian Railway Institute of Signal Engineering and Telecommunications training centre at Hyderabad on Wednesday 18 February 2009. The inauguration ceremony, attended by the President Alan Fisher, Buddhadev Dutta Chowdhury, Council Member and myself.

A full report will be given in the next IRSE NEWS, but suffice it to say there was great enthusiasm shown by all those present at the inauguration, which was attended by senior managers and staff from both Indian railway organisations and supply companies.

The section was inaugurated with a total of 191 members, making it on the day of its inauguration, the second largest non-UK section of the Institution, behind Australasia, but catching up fast! Prior to the inauguration, a technical meeting and welcome event was held at the Eastern Railway Officers Club at Kolkata on Monday evening, 16 February, which we again attended, at which there was an attendance of over 130. Both events attracted considerable press coverage in the local and national media in India which gives an indication of the importance attached to the formation of the section.

Colin Porter

Technical meeting of IRSE Indian Section at Calcutta held on 16 Feb 2009

Stage set for IRSE inauguration ceremony at Hyderabad on 18 Feb 2009

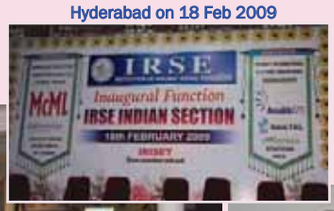


Photo of first AGM of Indian Section, held at IRISET training centre at Hyderabad on 18 Feb 2009

Advance Notice

2009 IRSE Exam Workshops

This year we are intending to run three workshops to help candidates studying for the IRSE professional exams.

Following the success of events over the last two years we intend to run sessions focused on modules one, two, three and five.

Module One – This workshop will be held at Network Rail's training centre in Watford on **Monday 30 March**. The event will explore the key subject area of Engineering Safety Management.

Modules Two & Three – These modules will be tackled together over a single weekend, and candidates will be invited to attend either or both days depending on what modules they intend to sit. Signet Solutions in Derby will host the event over the **weekend of 15 and 16 August**.

Module Five – This workshop will be held at the GM Rail Training centre in Rugby on **Saturday 25 July**. The aim of this event is to familiarise candidates studying for the Module 5 exam with some common trackside signalling equipment.

If you require more information on the exam workshops, please contact us at ***younger.members@irse.org*** or go to the IRSE exam forum at ***www.irseexam.co.uk.***

Book Review

Level Crossings

By Stanley Hall MBE and Peter van der Mark

Published by Ian Allan Publishing Ltd., Mail Order Department, Watling Drive, Hinckley, Leicestershire, LE10 4EY, UK
www.ianallanpublishing.com
ISBN 978 0 7110 3308 5

As a Signalling or Telecommunications Engineer, you either like them or loath them. Personally I like them and have spent many years maintaining and testing the varying types around the East and West Midlands of the United Kingdom. Recent correspondence in the Feedback Section of this magazine confirms that they continue to be a topical subject and I suspect that they always will be. This book summarises the subject matter from the beginning in an easily understandable and well laid out format with some excellent pictures, bringing things right bang up to date to December 2008, when the book was first published.

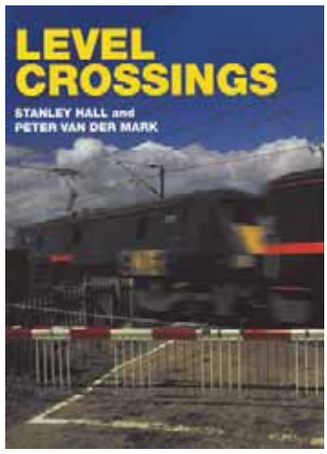
The authors of this book are well known within the Institution and continue to make regular contributions and comment on varying topical subjects, including level crossings. Having both been involved at varying times in the research and investigation of level crossing safety in the UK, they have clearly left no stone unturned during the research for this publication, and they are both to be commended for their efforts and those others who are clearly acknowledged on page 125 of the book, which includes an IRSE Dutch past president!

The book starts off in the first Chapter explaining the development of the level crossing up to 1863 in the UK and the outline beginnings of some sort of generalised regulation to try to manage the interaction with the highway. The differing early Acts of Parliament and details of the differing terminology are clearly defined, including that of the difference between a Private and an Accommodation crossing. Public footpaths, bridleways and the establish-ment of a Railway Inspectorate are also covered here.

The second Chapter continues regarding the signalling, operation and safety of level crossings from 1863 until 1914 and details the improvements and more stringent regulations imposed during this time. This included the mechanical interlocking of signals with level crossing gates and the problems and issues that existed where no signals existed or signals were kept in the clear position for lightly used crossings, which was clearly not a fail safe situation.

Chapter Three covers the rise of motorised transport between 1919 and 1939 and this is where the in-depth details of the events of the early accidents, incidents and fatalities begin, following the gradual expansion of the road network and the traffic upon it. At this stage in addition, it becomes clear regarding early human factors and in particular, that of human error and its consequences!

The post-war years of 1945 to 1967 in Chapter Four identifies the need for modernisation and the break-through in the technologies available to achieve such. With the very first automatic half-barrier (AHB) crossing with flashing red road lights having been brought into use at in the UK at Spath on the now closed Uttoxeter to Ashbourne line on 5 Feb 1961, there had already been wide scale modernisation and automation of level crossings on numerous continental railways for several years beforehand. With the first UK accident occurring at an AHB in 1965 at Cleghorn, between Carstairs and Motherwell, it was not until the accident at Trent Road Crossing near Gainsborough in 1968, that the 'second train coming' sequence had to be reconsidered for redesign, but disaster was about to occur!



The 1968 Hixon level crossing accident features exclusively in Chapter Five with the detailed sequence of events being explained along with the contributory factors leading to the disaster. With the resultant publication of the report into the events at Hixon, a period of stagnation took place between 1968 and 1978 regarding level crossing modernisation. The details of some of the more notable accidents during this period are documented in Chapter Six, including a rise in the expectation of road users 'zigzagging' around the barriers at AHB's.

Chapter Seven covers the major reappraisal of the level crossing policy after 1978 and identifies the new standards and arrangements following a detailed review by the Department of Transport and the British Railways Board, along with the proposed thinking behind it. The occurrence of 'zigzagging' was clearly on the increase and as a consequence, the amount of accidents increased accordingly.

The Lockington level crossing accident of 1986 and its impact on the industry features extensively in Chapter Eight. The event saw the end of the further installation of automatic open crossings, remotely monitored (AOCR's) and questioned the suitability of automatic open crossings per se. The safety at public level crossings since 1991 and subsequent accidents and events are documented in the same chapter, along with the events at Ufton AHB in 2005. At the end of this chapter, I was pleased to read in the final bullet points regarding future proposals about radar obstruction monitoring trials on level crossings in Europe and the UK. This subject is worthy of a technical paper and is of particular interest to me personally.

The danger at private level crossings and at footpath and bridleway crossings and the shift in legal responsibilities is the subject matter of Chapters Nine and Ten. Again subsequent accidents and events are documented in both chapters. It is saddening to think that because members of the public do not follow the basic instructions for the use of these types of crossings, they can potentially loose their lives and the railway potentially gets the blame.

The final chapter looks at the international perspective as a direct comparison, identifying British differences and equivalent terminology with such places as North America, Australia, New Zealand, the Asian continent, Japan and varying European countries. Again documenting accidents and events as a comparison, it is note-worthy that similar issues that are raised, have the same underlying causes as those in the UK.

In summary, I found this book to be extremely interesting and difficult to put down. It reminded me of various places I have previously worked at and the accidents, incidents and events I have had to attend at level crossings. Whilst not wishing to criticize in the slightest, the development and operational importance of the level crossing telephone, particularly at AHB's after the Hixon level crossing accident is not fully covered. Perhaps this information and that of the potential for level crossings to be made into a standard European type, or at least have additional features for obstruction monitoring, for inclusion into ETCS schemes around the world can be included in the next reprint of this book?

Ian Allison

We're ready for change, are you?

In these uncertain economic times Network Rail is expanding. We have five years of secure funding, with a plan to invest £28.5 billion on improvements to the network across the country.

We're now facing the challenge of ensuring that we meet the demands of internal and external stakeholders across the company and industry. Our current portfolio is being extended to include the on-network works of the Crossrail scheme, extending our scope from signalling renewals and specialist enhancements. Within our Enhancements Team in the Infrastructure Investment Group, development teams are being created to ensure that the projects meet the requirements set by our Engineering function.

Building on recent recruitment, we need to further expand our large, established and highly skilled team of Design Engineers to help to achieve our goals across England and Scotland. Network Rail's in-house design teams are now looking to recruit signalling experts, from Design Managers through to Assistants.

As part of the team you must be IRSE Licensed and have strong verbal and written communication skills. In return you'll receive a competitive remuneration package, and be able to look forward to a visible career structure as well as a comprehensive training programme.

We're hiring across **England & Scotland**, if you think you're up to the challenge, we'd like to hear from you:

SENIOR SIGNALLING DESIGN ENGINEERS – IRC404612 / IRC405459
SIGNALLING DESIGN ENGINEER – IRC347261
SIGNALLING, PWAY OR E&P DESIGN ENGINEERS – IRC407651
SIGNALLING DESIGNER – IRC405466
MULTI-DISCIPLINE PRINCIPAL DESIGN ENGINEERS – IRC407644
MULTI-DISCIPLINE SENIOR DESIGN ENGINEERS – IRC407647
SIGNALLING PRINCIPLES DESIGNER – IRC386683
ASSISTANT SIGNALLING DESIGN ENGINEER – IRC389441
SENIOR PROJECT ENGINEER – IRC407768
PROJECT ENGINEER – IRC407670

If you'd like to know more about any of these roles or to apply, go to **www.networkrail.co.uk/careers** and type in the above reference number in the keyword category. Alternatively contact Bhavesh Dave on 020 7557 8201.

Network Rail

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Blair Hickman / 0117 970 7712 / blair.hickman@epcglobal.com

Bristol:
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Sheffield:
0114 292 3711

Web www.epcglobal.com
e-mail rail@epcglobal.com

Senior Signalling Project Engineer
London - £450 - £500 per day

This is a Senior position for a signalling project engineer working on the North London line extension for the enablement of the 2012 work programme including the new freight diversionary route around the 2012 lines.

You will be working with the signalling design partners and will be responsible for taking the lead on all signalling / interface issues and will be supported by a project engineer. The successful candidate must have overland rail signalling project experience and held sign authority, any candidates without this will not be considered for the role.

Fiona Macblain / 0117 970 7718 / fiona.macblain@epcglobal.com

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Ellen Hipkin / 0117 970 7709 / ellen.hipkin@epcglobal.com

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THE SUNDAY TIMES 100 BEST SMALL COMPANIES TO WORK FOR 2008