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MANCHESTER NORTH RECONTROL – SSI boundary issues

Infrastructure Projects

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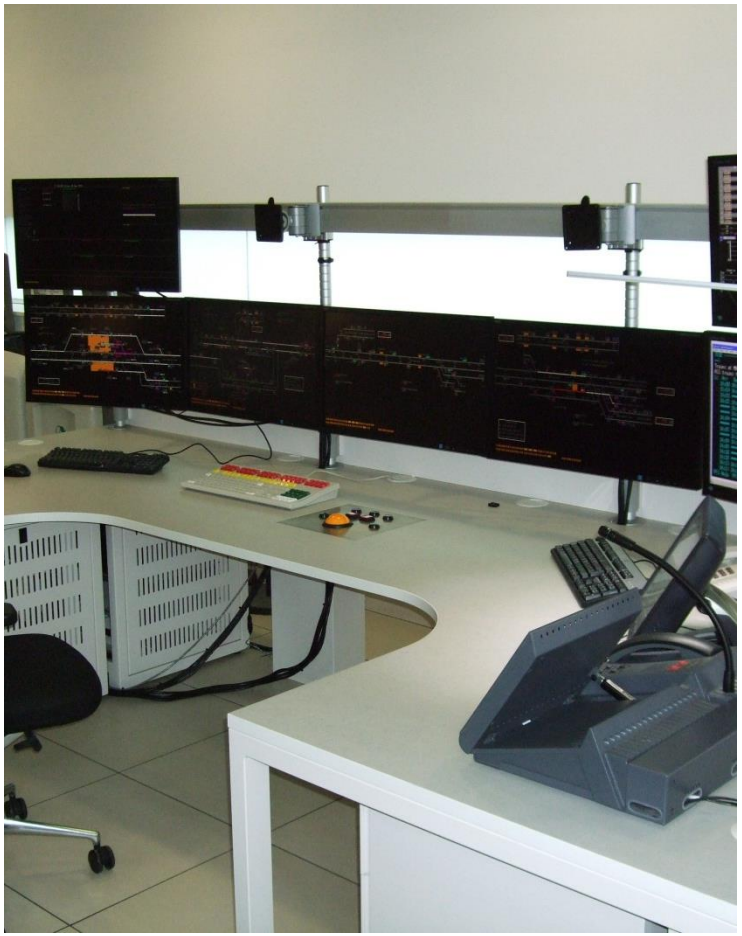
Background

As part of the recontrol of Manchester North SCC to Manchester ROC the existing NX panel and associated multiplexers at Manchester North were replaced with a WestCAD

The new system consisted of 2 workstations at Manchester ROC. Each workstation controlled 2 of the original 4 interlockings.

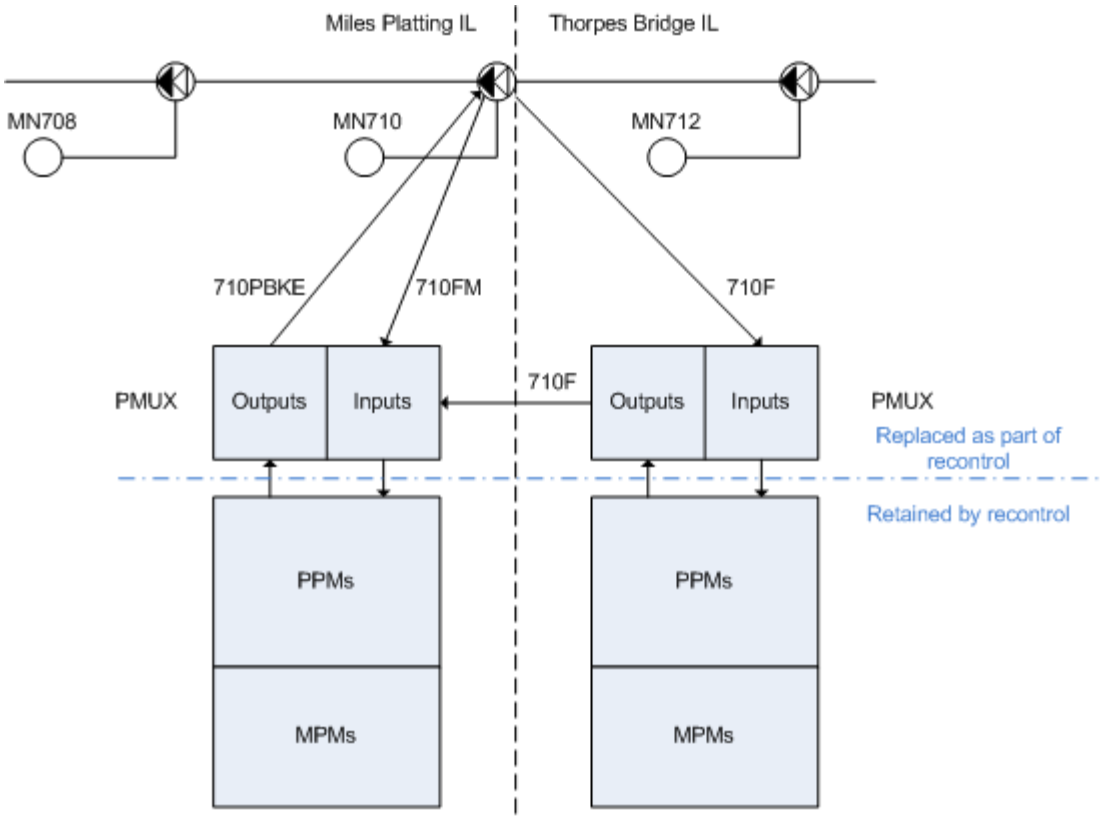
The new system was commissioned at Easter 2015

In June 2015 the signallers identified some anomalies with the setting of the routes over the SSI boundaries within each Workstation.



Site Configuration

The PMUX arrangements for the original panels were as described in SSI8500F section 4.1 – Cross-Boundary Push Buttons – Method 1



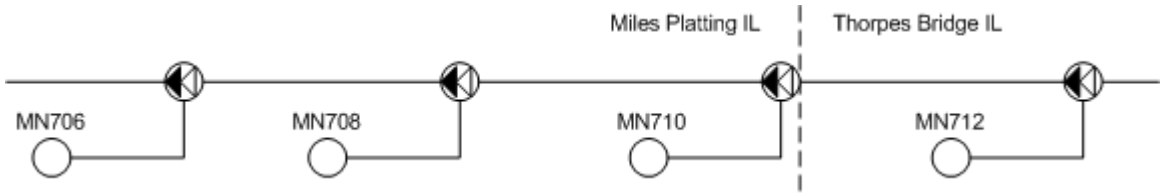
Simplified diagram of cross boundary push buttons

Route Setting Effect

During the data preparation for the WestCAD, the significance of the SSI boundaries within each workstation was overlooked.

Consequently, the same identity was used in the PBK file associated with each interlocking.

This had the effect of passing a ‘button press’ on the VDU to both interlockings and therefore could lead to erroneous route setting as a single press of 710 could be seen as both an exit and entrance in adjacent interlockings.

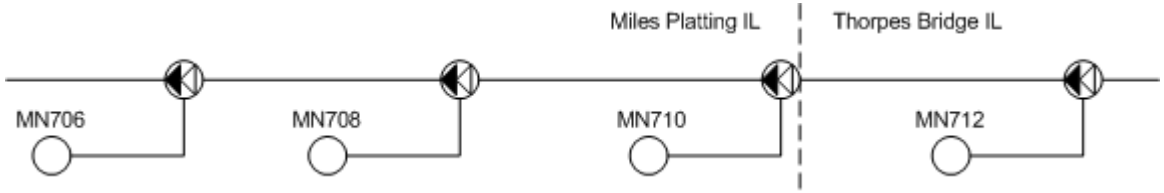


e.g. An attempt to set 712 to 710 and 708 to 706 could set 712 to 710 and 710 to 708 instead.

Reminder Device Effect

As part of the recontrol, reminder facilities were implemented within the WestCAD to replicate the functionality of magnetic reminders from the panel.

SSI data produced for use on VDU based systems (as opposed to data produced for panels) contains the reminders within the interlocking. However, WestCAD includes the reminder functionality, originally intended for use on recontrolled relay interlockings, and the decision was made to minimise the alterations to the existing SSI data and implement the reminders on the new WestCAD.



If a reminder was set on 710 and a reminder override applied to allow a route up to 710 to be set an attempt to also set 708 to 706 within the 10 second window would still allow 710 to 708 to set. i.e. a single reminder override would allow 710 to function as both an exit and an entrance (i.e. both the route up to and the route from the signal could be set with only a single override).

Testing

The issue of erroneous route setting would only be revealed if a valid exit was requested on the VDU within 10 seconds of the request to set a route up to a signal on the boundary of the interlockings.

No specific tests were specified for the cross boundary route setting and routes were tested in alphanumeric order.

This made identification of this issue through normal testing very unlikely.

Action taken

Once the issue was identified on site by the signallers, the workstation data was modified and successfully installed and tested the same night.

Lessons learnt – System interfaces

Problems at the interfaces between systems are well known.

- Noticeboard 001 issued in 2003 was titled ‘Always the “Fringe”’
- PAN0092 is about ‘Identification of Cross Boundary Signalling Interfaces’.

In this case it was a boundary internal to the control area but still between interlockings that was not fully understood. This should have been within the scope of the Interface Specification required to be produced under PAN0092.

> Cross Boundary Signalling Interfaces are defined as any interface whether it be a function or telegram transmitted from one interlocking area to another interlocking area, irrespective of the interlocking technology type including fringes to auto sections.

The GRIP4 Interface Specification would not have been expected to identify all the specific functions but should have identified that interfaces between PMUXs existed due to the dual purpose of the buttons.

No interface specification was produced by the project at either GRIP 4 or 5. The contractor has advised that this was considered but it was felt that one wasn’t required for a ‘simple’ recontrol.

A PAN0092 Interface Specification shall be produced even for simple interfaces.

This should identify all interfaces and allow a greater review/ investigation of existing boundaries/ interfaces. A designer’s briefing note on ‘how it works’ may also help.

Lessons Learnt – Timescales and Change

The original project plan had been to implement the new workstations at the same time as replacement of the existing SSI interlockings with Westlock with the data produced for a VDU system.

In early 2014 the decision was made to continue with the recontrol despite rescheduling the relock to a later stage. This was intended to de-risk and simplify the final resignalling.

This occurred prior to the ‘signalling safety step up initiative’ briefed in late 2014 that provided a reminder to undertake a risk assessment of any changes in scope.

Assessment of any change, including de-scoping decisions that might reveal new interfaces, shall be undertaken by Projects.

Further Information…

For any further details or information please contact:

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