

Share With Pain

IR87 Immingham

SwP003/13

Timeline

- On Wednesday 19th December 2012, the driver of 0D54 train reported IR213 (colour light signal) showing a green aspect leading up to IR87 signal (semaphore signal) with the arm in the ON position.
- On the same day, Network Rail Maintenance attended the scene and restricted IR213 to a yellow aspect for routes towards IR87 signal.
- Following investigations on the cause of this wrong side failure and discussions on the best way to implement the changes to the semaphore signal, the necessary equipment and circuits were installed on Sunday 3rd March 2013 and the aspect restriction removed.

Signals and Signal Box involved

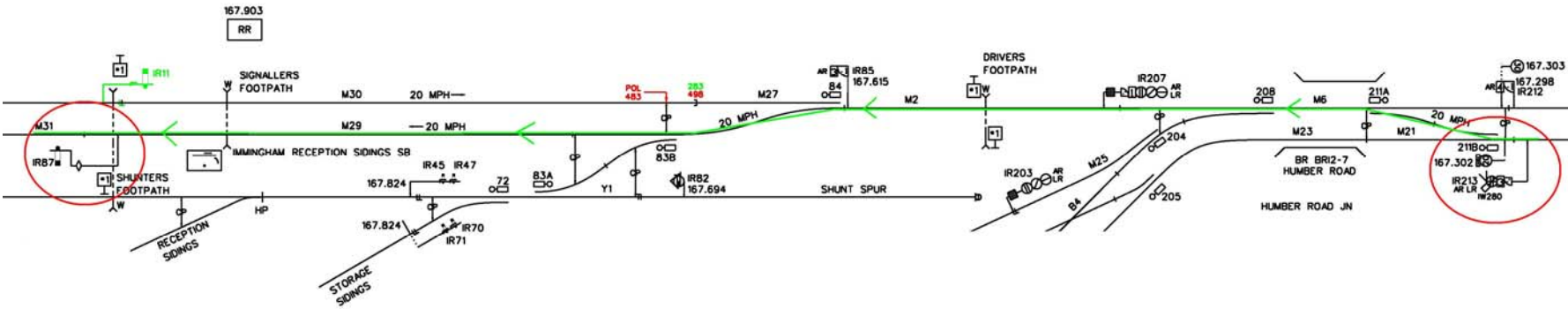


- IR87 semaphore signal is a bracket signal, situated just beyond Immingham Reception Sidings signal box on the double line towards Immingham East Junction.
- IR213 signal is a colour light signal at Humber Road Junction with a route leading towards IR87
- Immingham Reception Sidings Signal Box and the lineside equipment are controlled from a combination of slide lever frame and two (NX) panels. The asset owner is not Network Rail but the infrastructure is operated by Network Rail signallers.

Scheme Plan extract

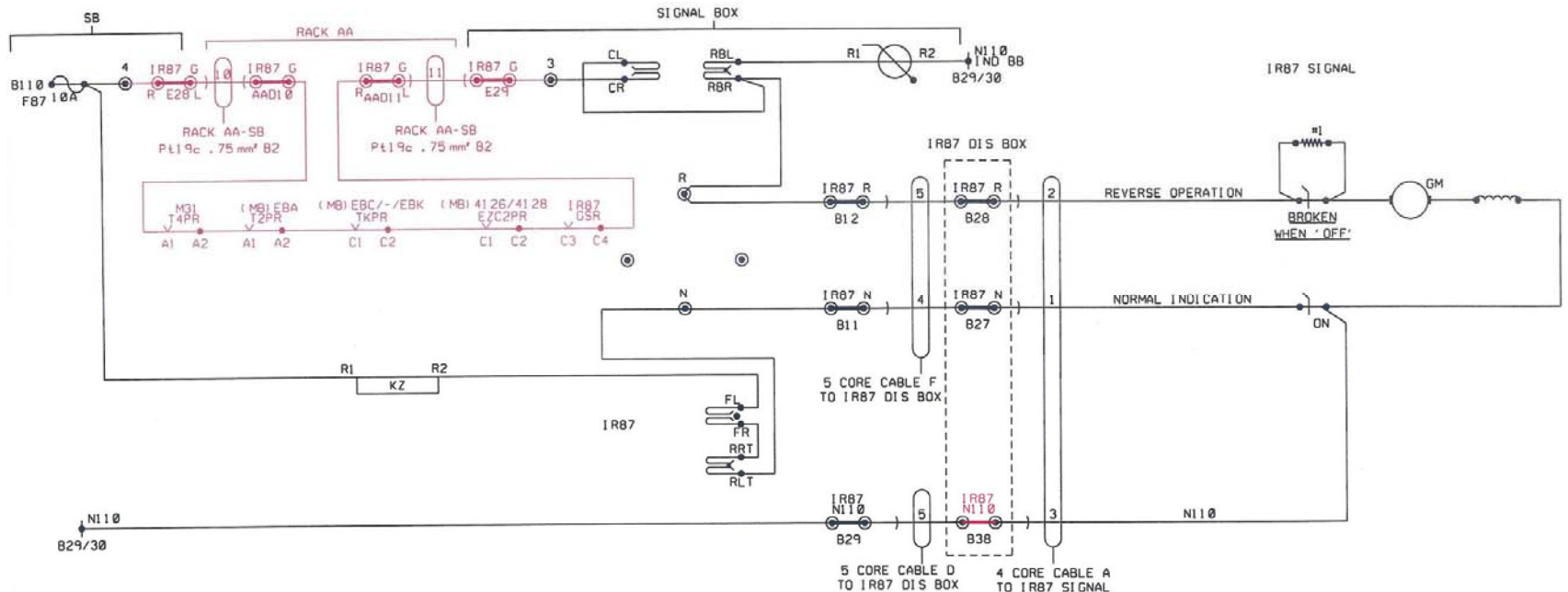
IR87 signal

IR213 signal



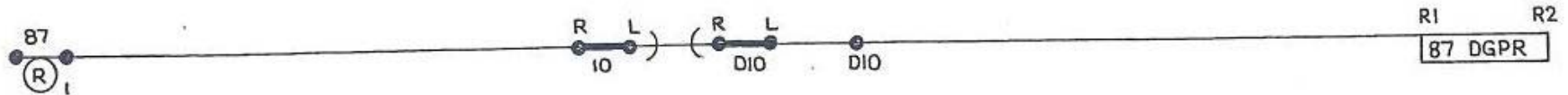
Cause of Wrong Side Failure

- As part of the circuit changes, relay contacts were included in the IR87 signal motor circuits to return the arm to, or keep the arm in, the ON position while track circuits from the signal to the next signal (MB4126) at Immingham East Junction were occupied.



Cause of Wrong Side Failure

- Design & Testing failed to identify that 87DGPR relay was directly driven off the lever (via a circuit controller connected to the lever frame). This relay in turn provided the circuits to IR213 signal to show either Yellow or Green depending on the position of 87 lever.



- This resulted in the possibility to have a train in section, with IR87 lever not (yet) normalised but the track circuits returning IR87 signal to danger, while IR213 would show a green aspect because 87 lever was still reversed (energising 87DGPR relay) when a route for a second train would be set from IR213 to IR87.

Issues for Note

- No arm proving had ever been installed for IR87 signal, despite this being a motor operated semaphore signal. This is not in accordance with Group Standard GK/RT0039, Section 6.3: “Arm repeating shall be provided for all power-operated semaphore signals”.
- It was confirmed by RSSB that, as the interlocking at Immingham Reception Sidings SB was owned by a third party that the design would not necessarily have to comply to the Group Standards.
- Prior to the project works, the Signal Box instructions for Immingham Reception Sidings SB stipulated “When there is a train in the UP main Absolute Block Section between this signal box and Immingham East Junction, you must apply a reminder appliance to the lever for signal IR87 and not remove this until you have received and acknowledged Train Out of Section.” This instruction was removed when the project introduced TC block as it was thought to have been made redundant.

Issues for Note

- The fact that no arm proving was provided on IR87 signal was picked up during early GRIP stages and discussed during the Major Scheme Review Panel (MSRP), but no appropriate entry in the Design Log was made to make designers of following design phases aware of this shortcoming and the risks associated with this.
- The WSF mechanism was not identified by the detailed designers or testers although they both understood the rationale for the requirement for a normalisation alarm.
- MSRP proposed the provision of a normalisation alarm for IR87 signal, which was included on the Scheme Plan as a requirement and provided by the scheme. However, the intent of the requirement may not have been fully understood by the designer.

Issues for Note

- Testing was confined to red/green work and as this signal was indicated in black work it was not tested.

Correction of Wrong Side Failure

- After several options were considered, the final option chosen was to install an arm repeater and associated circuit alterations in line with the Railway Group Standard GK/RT0039.
- An issue affecting the installation of an arm repeater was the poor condition of IR87 structure. An initial structural assessment was undertaken, resulting in the structure being deemed unsafe to access, so an external platform was necessary to install the repeater (and for subsequent maintenance).

Lessons Learnt

- Designers should record design decisions and existing infrastructure deficiencies in the decision log and design risk log in order to pass on sufficient information to designers of later stages. Requirements should be in sufficient detail to allow them to undertake their design activity.
- Continued liaison with the scheme development team allows questioning of earlier design decisions.
- Designers and Testers need to be deemed competent for mechanical infrastructure with recent practical experience not just deemed competent.
- Confirm the ownership of infrastructure where there is doubt and confirm applicable standards with the asset owner.

Lessons Learnt

- Aspect sequence should be tested from one signal beyond the red/green work in future.
- Where scheme scope changes (reduces); the consequences of retaining infrastructure which was previously going to be renewed needs to be fully investigated, agreed and documented; for example condition, compliance status, etc.