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Issue:	5
Date:	03/03/2012
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Module

Design of Schemes, Chapter F: Signaller's Console

Endorsement and Authorisation

For endorsement, authorisation and issue record of this document, please refer to the SSI Applications Manual Contents, NR/L2/SIG/17002

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User information

This Network Rail standard may contain requirements that are colour-coded according to the following Red–Amber–Green classification.

Red – Mandatory requirements

- **Requirements** that **will** be complied with, and achieved under all circumstances.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner.
- These requirements are monitored for compliance.
- Local non-compliances, discovered through engineering verification visits, will be reported and monitored through the quarterly Engineering Verification Report.
- Corrective actions will be enforced where local non-compliances remain open beyond the agreed mitigation plan dates.
- These are presented in a red box **and with the word “shall” or a direct instruction.**

Amber – Conditional requirements

- **Requirements** that **will** be complied with unless deviation has been approved.
- Accountability for the efficacy of these requirements lies with the Professional Head/ Standard Owner, or their nominated Delegated Authority.
- These requirements are monitored for compliance.
- Derogations **may** be permitted; which are to be approved by Standard Owner in advance.
- Derogations and Temporary Non-Compliances **may** be granted through the existing Delegated Authority arrangements.
- These are presented with an amber sidebar **and with the word “shall” or a direct instruction.**

Green – Guidance

- Guidance based on good practice; representing supporting information, based on good practice, to help achieve **RED** and **AMBER** requirements.
- This guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used, which do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence/documentation.
- This is presented with a dotted green sidebar **and with the word “should” (usually in notes).**

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Contents

1 Introduction	4
2 Push Buttons, Switches and Indications	4
3 Panel Multiplexer (PMUX)	4
4 Cross-Boundary Push-Buttons	5
4.1 Cross-Boundary Push-Buttons – Method 1	5
4.2 Cross-Boundary Push-Buttons – Method 2	7
5 Alarms	9
6 Train Describer (TD)	10
7 Signal Group Replacement	11
8 Emergency Signals On Control	11
9 Referenced Standards	12
Figure F1 – Emergency Signals On Control	13
Figure F2 – Panel Button Shared By Interlockings	14
Figure F3 – Signaller's Failure Alarms	15

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1 Introduction

SSI has been designed to operate with an entrance/exit push button Panel outwardly identical to those used with conventional relay Interlockings and meeting the requirements of [NR/L2/SIG/10067](#).

The PPMs in the CI contain geographic data, carry out all indication meshing and button matching and are linked to the PMUXs in the Panel.

SSI can alternatively be linked to an IECC. The IECC employs Signalman's VDU type workstations, includes TD and ARS and carries out the indication and button processing functions normally done by the SSI PPMs. Thus the PPMs have a different non-data driven fixed program and purely act as a communication port between the IECC and the SSI Interlocking MPMs. For the design of, and data preparation for, the IECC system itself, the appropriate IECC documentation shall be referred to.

2 Push Buttons, Switches and Indications

These are in accordance with [GK/GN0525](#) (See [Technical Instruction 157](#)) and are similar to those used for relay Interlockings except that where two position switches are used for special functions, e.g. point heater controls, the switch shall be of the changeover type with both N and R contacts connected to inputs of the PMUX to prevent a single bit error causing a malfunction.

3 Panel Multiplexer (PMUX)

The PMUX does not form an item of SSI equipment. Any system which can satisfy the requirements of BR Specification 1921A, may be used.

One PMUX system shall be provided for each CI, and the following minimum standards for the physical arrangements of PMUXs shall be observed:

1. Where a new Panel is being provided, the Panel shall be designed such that the PMUXs can be physically located within the Panel framework.
2. Where an existing Panel has to be used, the PMUX should be located within the Panel framework subject to satisfactory immunisation from electromagnetic interference. If this is not possible then the PMUX shall be housed in a cubicle. The cubicle shall be located as close to the Panel as possible. The manufacturer's guidance on panel to PMUX cable length, type, installation and maintenance shall be followed when applying a specific type of PMUX. Existing Panel to IDF cables may only be used if of the correct type and in good condition. The use of an IDF shall not unduly increase the length of cable between the Panel and PMUX.
3. Cable from the cable termination point in the Panel to the PMUX shall be a screened cable as specified in Chapter I Section 2.4. The screens of these cables shall be earthed at one end only, and separate cables shall be used for PMUX inputs and outputs. These cables shall only be used for PMUX functions.

Ref:	SSI8500F
Issue:	5
Date:	03/03/2012
Compliance date:	01/09/2012

4. In all instances, due regard shall be taken to minimise possible electrical interference from adjacent equipment and cables. In this respect, the routing of the cabling between the Panel and the PMUX is of prime importance.
5. The requirements of item 4 above shall be thoroughly evaluated and if it is considered that the degree of electrical interference (whether internal or external to the Panel) may be too high for reliable operation, then electrical isolation shall be provided on all of the PMUX inputs from the Panel.

An associated testing requirement is that the final system shall be thoroughly tested and the error rate established prior to commissioning.

The allocation of the PMUX inputs/outputs and of the identities in the SSI Panel button and indication files are interrelated. The button/switch contacts and indications, split into non-flashable and flashable, shall be defined first. The PMUX inputs and outputs shall then be allocated in the order which best suits the geographic wiring of the Panel, with the flashable indications being grouped separately onto dedicated higher numbered output cards. Depending on the PMUX system used the first 8 or 16 inputs and outputs may have to be allocated to system use (status bits). Spares may be scattered or grouped anywhere in the allocations. It may be found that groups of indications have to be split over more than one output where loading limits are exceeded or the group extends across Panel section boundaries. The alarms in Section 4 (a) & (b) together with the "Emergency Signals On Control" button do not form part of PMUX allocation. The button/switch contacts and indications in the SSI identity files are then placed in PMUX allocation order, on a one for one basis, as defined in [SSI8003-20](#) "Panel Processor Data Preparation". It is possible to simplify Panel wiring by treating all indications as flashable but this will be at the expense of increased indication response time, and in extreme cases, reduced system capacity. (Non flashable indications + 2x flashable indications shall not exceed 1536).

The specific exit PPM data required is detailed in [SSI8003-20](#) "Panel Processor Data Preparation".

4 Cross-Boundary Push-Buttons

Where the exit button for a cross-boundary route also acts as the entrance button for a route in the destination interlocking, then the button's F contact cannot just be wired in parallel to both interlockings. If this were done, then when setting the cross-boundary route, pressing the shared button as the route exit would also cause it to be registered as an entrance in the other interlocking, and the button would start flashing.

4.1 Cross-Boundary Push-Buttons – Method 1

With this method, the button's F contact is wired to the interlocking that requires it as an exit. If the button is pressed when that interlocking is waiting for it to be pressed as an exit, then the interlocking will initiate setting of the cross-boundary route. However, if the button is pressed when that interlocking is *not* waiting for it to be pressed as an exit, then the "button pressed" condition is passed to the other interlocking to be registered as an entrance in that interlocking.