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Module

Chapter B: Main Document

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 contains colour-coding according to the following Red–Amber–Green classification.

Red requirements – No variations, could stop the railway

- **Red requirements shall** always be complied with and achieved.
- Red requirements shall be presented in a red box **with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of red requirements lies with the Professional Head/Standard Owner.
- Red requirements are monitored for compliance.
- Corrective actions shall be enforced if deviations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Amber requirements – Controlled variations, approved risk analysis and mitigation

- **Amber requirements shall** be complied with unless variation has been approved in advance.
- Amber requirements shall be presented with an amber sidebar **and with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner, or their nominated Delegated Authority.
- Amber requirements are monitored for compliance.
- Variations **may** be permitted. Variations are approved by the Standard Owner or through existing Delegated Authority arrangements.
- Corrective actions shall be enforced if **non-approved** variations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Green – Guidance

- Guidance is based on good practice. Guidance represents supporting information to help achieve **Red** and **Amber** requirements.
- Guidance shall be presented with a dotted green sidebar **and with the word “should” (usually in notes) or as a direct instruction**.
- Guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used. Alternative solutions do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence or documentation.

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Issue record

Issue	Date	Comments
6	Feb 2002	6 th Issue
7	06/09/2015	AMD 04/01 (7) incorporated

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 06/12/2015.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

Disclaimer

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1 Purpose

To record information for the use of SSI signalling scheme designers, testers and maintainers on SSI program and data requirements, program issues, hardware modification states, their compatibility, equipment labelling, issued Control Centre Identity numbers and other related subjects.

2 Scope

With the exception of Control Centre Identity numbers, this document is limited to recording information on SSI software and hardware that is (or was) in use on Network Rail infrastructure. Information at scheme category level is recorded, but, with minor exceptions, no scheme specific information is recorded. Information is limited to that required by SSI signalling scheme designers, testers and maintainers, and does not include the programs held in Panel Multiplexers, Train Describers, IECC, RETBs or other non-SSI systems that may be connected to SSI equipment.

Other than the ISSR, all items of a procedural nature, although referred to, are generally laid down in other procedural documentation, but any instructions given in this document are mandatory for all work affecting the configuration of SSI installations.

3 Abbreviations

B/S	Boot Strap
CI	Central Interlocking
CISR	Central Interlocking Status Record
DIA	Diagnostics (Application of MPMs)
D/L	Down Load
DLM	Data Link Module
DWS	SSI Design Workstation
EPROM	Erasable Programmable Read Only Memory
EXT	Extended
GEC	ALSTOM (see note below)
GR	Graphical Replay
ICP	Internal Communications Processor of MPM
IDL	Internal Data Link
IECC	Integrated Electronic Control Centre
IF	Interface Processor (used in DWS Simulation Systems)
I/L	Interlocking (Application of MPMs)
INT	Interlocking (Application of MPMs)
I/P	Input
ISSR	Installed SSI Software Record

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LDT	Long Distance Terminal
LLL	Long Line Link
MM	Memory Modules (used in MPMs and PPMs)
MnP	Main Processor of MPM
MnP2	Main Processor of 2MHz MPM
MnP2-E	Main Processor of 2MHz MPM with Extended (paged) Memory
MnP-E	Main Processor of MPM with Extended (paged) Memory
MnP-S	Main Processor of MPM with Standard (unpaged) Memory
MO	Magneto-Optic
mod.	modification
MPM	Multiprocessor Module
PCMCIA	Personal Computer Memory Card International Association
MUX	Multiplexer
N/A	Not Applicable
NVRAM	Non-volatile Random Access Memory
O/P	Output
OSS	On Site Simulator
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PM	Points Module
PPM	Panel Processor Module
prog.	program
PROM	Programmable Read Only Memory
RAM	Random Access Memory
RETB	Radio Electronic Token Block
SIM	Simulator (Application of MPMs)
SM	Signal Module
SSI	Solid State Interlocking
STD	Standard
TCP	Trackside Communications Processor of MPM
TDL	Trackside Data Link
TFM	Trackside Functional Module
TT	Technician's Terminal
TTLR	Technician's Terminal Logger Recorder

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USB Universal Serial Bus
VIA Versatile Interface Adapter
WSL Westinghouse Signals Ltd.

Note: Within this document the terms 'GEC' and 'ALSTOM' are synonymous.

4 Guide To Use Of Document

This document covers:

Categories of schemes and their history (see Section 5)
Equipment marks and specifications (see Section 6.1)
Equipment program and data requirements (see Section 6.2)
SSI program identification (see Section 6.3)
Scheme and Interlocking identification including Control Centre Identity numbers (see Section 6.4)
SSI data identification (see Section 6.5)
Program and data EPROM details (see Section 6.6)
Program and hardware compatibility and changes (see Section 7)
(MPM/PPM/Memory Module compatibility - see Section 7.6.4)
Equipment labelling (see Section 8)
Memory Module configuration and Identification (see Section 9)
Recording of installed programs and data (see Section 10)
Various lists are included in the associated Appendices, although users shall first refer to the relevant section above for explanations on the information displayed:

In Chapter C:

Lists of SSI EPROM programs by scheme category and equipment (see Appendix 1)

In Chapter D:

Program EPROM details such as vital/non-vital category (as defined in [BR1990](#)), memory size, checksums and positions (see Appendix 2)
Data EPROM details such as vital/non-vital category (as defined in [BR1990](#)), memory size and positions (see Appendix 3)
Recommended EPROMs (see Appendix 4)
MPM/PPM/Memory Module compatibility (see Appendix 2)
Benefits to user of program changes that have been made (see Appendix 5)

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In Chapter E:

Benefits to user of equipment hardware changes that have been made both at mark and modification state level (see Appendix 6)

Control Centre Identity numbers allocated so far (see Appendix 8)

Installed SSI Software Record (ISSR) blank forms (see Appendix 10)

To find details of program EPROMs, use Section 5 to identify the scheme category. Then use Sections 6.1 & 6.2 and the equipment schematics in Appendix 1 (in Chapter C) to find equipment marks, Processors and program references and then locate the correct program EPROMs in Appendix 2 (in Chapter D). Alternatively, having found equipment and mark in Sections 6.1 & 6.2 and Appendix 1 (in Chapter C), use Appendix 3 (in Chapter D) to locate data EPROM details.

5 Scheme Category

5.1 Definition

Each scheme has a scheme category according to the various stages of development of hardware and software.

Six scheme categories (1A, 1B, 2A, 2B, AL3A and WS3A) are used to help users both to locate the correct program issues and hardware to be used for a SSI signalling scheme and to establish the compatibility between equipment containing various issues of programs. It is the mark of certain equipment used, viz. of MPMs, PPMs and TTs (MkI & MkII), that defines the "1" and "2" of the scheme category of Central Interlockings and Technician's Terminals, with the "A" or "B" decided by the issues of programs used. Although it is possible to have two different scheme categories within a scheme (see Section 7 on compatibility), such a scheme shall be divided on a category basis into two schemes to avoid the inevitable confusion. Such division will cause difficulties on the DWS if the two schemes are linked by the same IDL, and thus it is recommended that such a situation should be avoided if possible.

A seventh scheme category, "1A(upgrade)", is used to denote 1A schemes where the MPM/PPM/TT program issues and data have been changed to 1B standard, but have special issues of communications programs in MPMs to allow the continued use of MkI SMs and PMs - see Section 7 for more details.

A list of the small number of SSI signalling schemes (at present) in all scheme categories except 2B, AL3A and WS3A is included in Section 5.2, thus allowing identification of category for any signalling scheme (all other SSI signalling schemes are by default in the currently installed category 2B, AL3A or WS3A).

Similarly, four categories (DWS1, DWS2, DWS3AL and DWS3WS) are used for SSI Design Workstation Simulation Systems, the marks of equipment used in these Systems (MkI or MkII MPMs/PPMs/IFs or MkALIII I/L MPMs with MkII DIA & SIM MPMs and MkII PPMs/IFs or MkWSIII I/L MPMs with MkII DIA & SIM MPMs and MkII PPMs/IFs respectively) defining the category. MkIIA MPMs may be substituted for MkII MPMs in all categories of DWS.

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Included in Section 5.3 is a brief history of SSI development through the scheme categories.

5.2 British Schemes

1A	Nil
1A(upgrade)	Nil
1B	DorWey (CI WEYMOUTH)
2A	Willesden (Suburban) (CIs WILLESA & WILLESB) Millerhill (CI MILA)
2B	Other existing schemes and any new schemes utilising MkII MPMs/PPMs/TTs (includes Abercn, Cannon St, Leamington, Liverpool St, Stourbridge, Tweedmouth, Yoker, York)
DWS1	SSI Design Workstation Simulation Systems with MkI MPMs, PPMs & IFs.
DWS2	SSI Design Workstation Simulation Systems with MkII MPMs, PPMs & IFs.
AL3A	Other existing schemes and any new schemes utilising MkALIII I/L MPMs, a MkII or MkIIA DIA MPM and MkII PPMs/TTs.
WS3A	Other existing schemes and any new schemes utilising MkWSIII I/L MPMs, a MkII or MkIIA DIA MPM and MkII PPMs/TTs.
DWS3AL	SSI Design Workstation Simulation Systems with a MkALIII I/L MPM, MkII or MkIIA DIA & SIM MPMs and MkII PPMs/IFs.
DWS3WS	SSI Design Workstation Simulation Systems with a MkWSIII I/L MPM, MkII or MkIIA DIA & SIM MPMs and MkII PPMs/IFs.

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Schemes were in the above categories at the time of issue of this document.

5.3 Scheme History

- 1A** SSI first introduced with pilot scheme at Leamington, using MkI MPMs, PPMs, TTs, PMs & SMs, and MkII/IIA DLMs.
- 1B** MkII SM & PM introduced with extended addressing (i.e. CI Identity number added to messages between SM/PMs and CI to improve message security) with MPM TCP programs changed accordingly. MkIII DLM introduced. Data structure used in PPMs and Interlocking MPMs modified. SSI Design Workstation introduced, with MkI Simulation System (DWS1), using MkI MPMs, PPMs & IFs. Special MPM TCP programs written to allow category 1A schemes to be upgraded to use scheme category 1B software but still use MkI SMs and PMs; these schemes known as category 1A(upgrade).
- 2A** MkII MPMs and PPMs introduced, with MnP program and data EPROMs now in plug-in MM, rather than in "carcass" of MPMs and PPMs. MkII TT introduced with STE bus boards. Communications between MPMs, PPMs, TT and Panel Multiplexers changed from current loop to RS422. Minimum conversion of programs done to introduce just above changes, i.e. this scheme category is only interim. MkII Simulation System (DWS2) subsequently introduced with MkII MPMs, PPMs & IFs, and MMs.
- 2B** Menu driven TT introduced (both DWS1 & DWS2 subsequently upgraded with menu driven TT simulation). SSI range (previously limited to 40km by Baseband transmission) increased by introduction of LDTs allowing use of PCM transmission. PM & SM C-series programs introduced to cope with this "Long Line Link" system, and Control Centre Identity Number introduced (for LDTs) to give required message security. Later during this scheme category the BR1911A MM introduced to give new Extended (i.e. paged) memory option to give greater capacity both for program and data in MPMs in both CIs and DWS(2)s. Enhanced Technician's Terminal software introduced giving:
- improved data logging reliability and 5 second time markers on the log
 - paged memory allowing simultaneous use of trackside display feature and the data logger
 - the ability to interface to Rugby clock thus confirming time synchronisation with other signalling and control systems
 - improved dial up remote access facilities.
- AL3A** MkALIII I/L MPM, and associated MM, introduced with a processor speed of 2MHz. Data processing potential increased. DWS3AL introduced with MkALIII I/L MPM/MM and a single channel downloadable version of the 2MHz Interlocking software. All the other DWS hardware remains at DWS2 standard.
- WS3A** MkWSIII I/L MPM, and associated MM, introduced with a processor speed of 2MHz. Data processing potential increased. DWS3WS introduced with MkWSIII I/L MPM/MM and a single channel downloadable version of the