

Ref:	SSI8003-30
Issue:	4
Date:	05/09/2015
Compliance date:	06/12/2015

Module

Diagnostic

Endorsement and Authorisation

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

This document is the property of Network Rail. It shall not be reproduced in whole or part nor disclosed to a third party without the written permission of Network Rail.

© Copyright 2015 Network Rail.

Uncontrolled copy once printed from its electronic source.

Published and Issued by Network Rail, 2nd Floor, One Eversholt Street, London. NW1 2DN.



Ref:	SSI8003-30
Issue:	4
Date:	05/09/2015
Compliance date:	06/12/2015

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.

Ref:	SSI8003-30
Issue:	4
Date:	05/09/2015
Compliance date:	06/12/2015

Issue record

Issue	Date	Comments
3	Feb 2002	3 rd Issue
4	05/09/2015	Clause 3.2 amended to clarify the qualifier for banner repeating signals. Clause 3.5 amended to provide more detail in the use of letters for inputs to points

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.

Reference documentation

SSIM1303/7	Technician's Terminal Technical Manual
GS/SI8300	SSI Design Workstation Users' Guide

Disclaimer

In issuing this document for its stated purpose, Network Rail makes no warranties, express or implied, that compliance with all or any documents it issues is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

Supply

Copies of documents are available electronically, within Network Rail's organisation. Hard copies of this document may be available to Network Rail people on request to the relevant controlled publication distributor. Other organisations may obtain copies of this from an approved distributor.

Ref:	SSI8003-30
Issue:	4
Date:	05/09/2015
Compliance date:	06/12/2015

Contents

1 Introduction	5
2 Identity Files	5
3 Scheme Design Database	6
3.1 Module Location Information	6
3.2 Signals	7
3.3 Points	8
3.4 Track Circuits	8
3.5 Special Fault Reports	9
3.6 Fault Reporting Delays	10
4 Diagnostic Data Link Map File	11
Figure 1 – Signal Module - Standard Fault Reports	13
Figure 2 – Points Module - Standard Fault Reports	14
Figure 3 – Signal Module - Non-Standard Fault Reports	15
Figure 4 – Diagnostic Trackside Data Link Map Data - Example A	17
Figure 5 – Diagnostic Trackside Data Link Map Data - Example B	21

Ref:	SSI8003-30
Issue:	4
Date:	05/09/2015
Compliance date:	06/12/2015

1 Introduction

The function of the Diagnostic MPM Main Processor (Diagnostic Processor) in an SSI Central Interlocking is to monitor the operation of the signalling system and generate reports to the Technician's Terminal when significant events occur. These reports include the routine logging of changes in the telegram contents on the Trackside and Internal Data Links, responses to requests for information or action from the Technician, and most importantly, fault reports. Some reports are generated solely by the fixed software in the Diagnostic Processor, but others require the program to interpret geographic data which defines the application specific characteristics of the signalling system.

The geographic data for the Diagnostic Processor in each Central Interlocking shall be generated by the signal engineer for the scheme, using the facilities provided in the SSI Design Workstation. The purpose of this document is to describe the content of the data, and how it can be designed to generate the required fault reports on the Technician's Terminal. This document should be read in conjunction with [GS/SI 8300](#), "SSI Design Workstation User's Guide", which deals with the mechanics of entering data into the workstation, running compilers, testing data and programming PROMs. It is also assumed that the reader is familiar with [SSI8003-10](#) and [SSIM1303/7](#) "Technician's Terminal Technical Manual".

The geographic data for the Diagnostic Processor is generated from three sources:

- (i) The identity files written for the Interlocking MPM data, which define the names of the signals, points, routes and track circuits, and associate each name with an identity number.
- (ii) The scheme design database which specifies the name and identity number of each Central Interlocking, the location of each Trackside Functional Module (TFM) and the equipment connected to it, and the Internal Data Link telegrams used to communicate between Central Interlockings within the Control Centre.
- (iii) A source text file written especially for the Diagnostic Processor data, which specifies the order in which locations are connected along the Trackside Data Links, and the location of repeaters and Data Link junctions. This is known as the Diagnostic Data Link Map file.

The remainder of this document describes how the Diagnostic Processor data compiler makes use of the information from each of these sources. The tables at the end give examples of information in the database and text files, with the Technician's Terminal fault reports which will be generated from the resulting data.

2 Identity Files

When Technician's controls are applied to an Interlocking, the communication path between the Technician's Terminal, Panel Processor, Interlocking MPM and Diagnostic MPM requires that the Diagnostic Processor recognises the identity numbers by which the Interlocking MPM refers to each signal, points, track circuit and route, and translates these into the corresponding identity names. These names are listed in the following identity files for the Interlocking MPM data:

Ref:	SSI8003-30
Issue:	4
Date:	05/09/2015
Compliance date:	06/12/2015

SIG signals
PTS points
TCS track circuits
ROU routes

When data has been entered into any of these files on the workstation, the corresponding identity numbers are automatically allocated and stored in the scheme design database, where they can be accessed by the Diagnostic MPM data compiler as well as the compilers for the Interlocking MPM and Panel Processor data. There are a number of other identity files used by these compilers, but these are not relevant to the Diagnostic data.

3 Scheme Design Database

The primary function of the SSI Design Workstation scheme design database is to provide the necessary documentation for the signalling scheme, but it also provides the bulk of the information required for the Diagnostic MPM data compiler (and also the compilers for the Simulator MPM and its associated display systems, which are used for testing). The database is split into a number of files, three of which are used by the Diagnostic MPM data compiler. Information is entered into each of these files by entering data into fields on a "form" presented on a terminal screen.

The Central Interlocking file specifies the name and identity number allocated to each Central Interlocking, and whether it is connected to the Trackside Data Links directly or via Long Distance Terminal equipment. It also defines the attributes of the Panel Multiplex system connected to the Panel Processors, but this information is ignored by the Diagnostic MPM data compiler.

The Internal Data Link Telegram file specifies the origin and destination of telegrams between Central Interlockings on the Internal Data Links. This information is used by the Diagnostic MPM data compiler to specify which telegrams are addressed to the Central Interlocking for which data is being compiled. The database file also contains information on the content of each telegram, but this is not used by the Diagnostic Processor.

The Trackside Module file specifies the location of each TFM and the characteristics of the signalling equipment connected to it. Much of the information is required to detect and diagnose signalling equipment faults. The geographic data produced from this file can be considered in five parts, and these are covered in the following five sections. Section 3.6 covers delays in fault reporting.

3.1 Module Location Information

The database record for each TFM contains two pieces of information which are used by the Diagnostic Processor to recognise common faults on a group of TFMs. These are the name of the location in which the TFM is located, and the name of the fused section of the power supply to which it is connected. Where the number of TFMs in a large location requires the installation of more than one pair of Data Link Modules (DLMs), the location name shall include a suffix to identify to which of the DLMs each TFM is connected. The location names shall match those in the Diagnostic Data Link Map file (see Section 4 below).

Ref:	SSI8003-30
Issue:	4
Date:	05/09/2015
Compliance date:	06/12/2015

3.2 Signals

The Diagnostic Processor requires geographic data for each signal to identify first filament and lamp proving failures for signal aspects and route/junction indicators, and to report aspect changes to be printed on the Technician's Terminal when requested to do so. Failures of aspect proving of searchlight or banner repeating signals shall also be detected. The TFM inputs and outputs associated with signals are recognised by the names contained in the identity, qualifier and description fields. The compiler will recognise the following:

Identities: S.... signal identity (must match an entry in the SIG file)

Qualifier: D green aspect
H yellow aspect
HH double yellow aspect
R red aspect
FH)extra outputs 1,0 associated
FHH)with flashable outputs 6,5
(SUB) position light associated with main aspect
(ON) on aspect for position light shunting signal or banner repeating signal
(OFF) off aspect for position light shunting signal or banner repeating signal
(...) route/junction indicator, where ... represents up to three characters to identify the particular indication

Descriptions: GE.. signal aspect output
GM.. motor output for banner repeating signal
UG.. route/junction indicator output
EC.. signal current proving input
EK.. signal filament proving input
GC.. proving input for aspect of banner repeating signal or searchlight signal
UEC.. route/junction indicator current proving input
UEK.. route/junction indicator filament proving input

Outputs or inputs associated with signals which do not match any of the above (e.g. an AWS inductor output) will be ignored. Signal OFF and Right Away indicators should use description "KE.." and not "GE..", i.e. "GE.." is reserved for the aspects of the signal itself. (Where these indicators are driven by relay, then "KER", not "KR", should be used to avoid producing incorrect equipment listings on the SSI Design Workstation.) Care shall be taken with input names to avoid accidentally using the above descriptions. Thus fringe area input circuits including lamp proving and other signal controls such as track circuits should not be named ECZR; use EZCR, or better still, UCZR or HZR, otherwise lamp failure reports may result every time the input is broken.

Signals with fixed aspects are covered by the above, i.e. lamp and first filament failure reports will be produced, but for a limit of shunt employing a position light shunting signal with two red lamps and two ECR relays, special fault reports are required (see Section 3.5). Where first filament failure reports are required for signals, or group of signals, not controlled by the SSI then the special fault reports as specified in Section 3.5 should be used.