Discipline
Engineering Standard – NSW

Category
Signalling

Title
Solid State Interlocking (SSI)

Reference Number
SMP 32 – (RIC Standard: SC 00 52 00 32 SI)

Document Control

Status	Date	Prepared	Reviewed	Endorsed	Approved
Issue 1 Revision 2	Mar 05	Standards and Systems	Standards Engineer	GM Infrastructure Strategy & Performance	Safety Committee
		Refer to Reference Number	H Olsen	M Owens	Refer to minutes of meeting 12/08/04

Disclaimer

Australian Rail Track Corporation has used its best endeavors to ensure that the content, layout and text of this document is accurate, complete and suitable for its stated purpose. It makes no warranties, express or implied, that compliance with the contents of this document shall be sufficient to ensure safe systems of work or operation. Australian Rail Track Corporation will not be liable to pay compensation in respect of the content or subsequent use of this document for any other purpose than its stated purpose or for any purpose other than that for which it was prepared except where it can be shown to have acted in bad faith or there has been willful default.

Document Approval

The technical content of this document has been approved by the relevant ARTC engineering authority and has also been endorsed by the ARTC Safety Committee.

Document Supply and Control

The Primary Version of this document is the electronic version that is available and accessible on the Australian Rail Track Corporation Internet and Intranet website.

It is the document user's sole responsibility to ensure that copies are checked for currency against the Primary Version prior to its use.

Copyright

About This Standard

This Standard defines the procedures and tests to be followed when carrying out maintenance on Solid State Interlocking (SSI)

Document History

Primary Source – RIC Standard SC 00 52 00 32 SI Version 2.0

List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	01/09/2004		▪ Reformatting to ARTC Standard
1.2	14/03/2005	Disclaimer	Minor editorial change

Contents

1 General

1.1 Introduction

SSI employs microelectronic technology to maintain the integrity of the railway signalling, and for the transmission of safety data to the lineside. Microprocessors and programmable devices are installed within the interlocking, and within points and signal modules which control ground signalling equipment. The software programs resident within these devices are fixed and protected. The overall system is of modular design: all modules are plug coupled, and first line fault rectification is limited to the exchange of modules.

1.2 Fault diagnostics and reporting

SSI incorporates a system of automatic fault monitoring. Faults to lineside equipment, such as signal lamp failures and loss of point detection are detected by the diagnostic system and an appropriate fault message provided to the technician's terminal and an audible alarm raised. SSI module failures are also detected and similarly reported. In addition a system logger is provided which records all messages sent to and from the interlocking. This log is available for analysis as required.

2 SSI Procedures 2.1 General

The procedures given hereunder are those specific to SSI. They are supplementary to other procedures contained within this manual, which must be obeyed where relevant.

2.2 Types of module

SSI utilises the following modules:

Points module	Specification BR 1901 A
Signal module	Specification BR 1902A
Data link module	Specification BR 1904A
Multi Processor module	Specification BR 1905A
Panel Processor module	Specification BR 1908A
Memory module	Specification BR 1911 A
Long Distance Terminal	Specification BR 1906

2.3 Module Seals

All modules supplied by the manufacturers are sealed. These seals shall not under any circumstances be broken in the field by maintenance staff.

2.4 Module handling

The integrity of SSI modules being placed into service is paramount. All modules must be handled, transported and stored with care, and not in any manner, condition or circumstance that would subject them to damage or deterioration. SSI modules must be stored on racks in enclosed buildings or locations in a clean, dry non corrosive environment.

2.5 Faulting and Maintenance Manuals

Documents are provided which specify the detailed procedures for fault finding and maintenance. These documents shall be referred to as required.

3 Responsibility in the Event of an Irregularity

3.1 Signalling Maintainer

a) The signalling maintainer's first duty is protection of the line in accordance with Procedure SMP 03 and Paragraph 4 herein.

Incident reporting, inspections and examinations shall also be carried out in accordance with Procedure SMP 03.

b) The technicians terminal fault print out should be examined for evidence of equipment failure or malfunction.

Current system activity, particularly telegram data to and from the trackside, should be monitored using the facilities provided for this purpose on the technicians terminal. All unexpected activity shall be recorded in the Technicians Terminal Controls Log Record Book or another book provided for the purpose.

c) Evidence of system operation during the incident is recorded on the PC system logger. The signalling maintainer is solely responsible for ensuring that the logger is not touched or tampered with in any manner, prior to the arrival of the investigating signal engineer.

d) The indications displayed on all relevant SSI modules, both trackside and interlocking shall be recorded, along with their associated serial numbers. It may be necessary for these modules to be removed later for investigation.

3.2 Signal Engineer

3.2.1 Log Analysis

A Signal Engineer is responsible for investigating the incident. The SSI Technicians Terminal incorporates a PC system logger which records all interlocking data messages.

The signal engineer shall copy the relevant file to floppy disk, and then, using the analysis program, analyse the data bits in the messages to check on what controls and indications were sent to and from the lineside during the time of the incident.

An incident report shall be produced from the analysis. In the event of an irregularity being detected in the transmitted data messages then the interlocking shall be stopped via the Technician's terminal and a Signal Engineer shall be immediately contacted. They shall examine the signalling control tables and data listings and give appropriate instructions for any further action to be taken.

3.2.2 Testing

The technicians terminals may be used to test the conditions leading up to an incident by the application of track circuit occupancy via the Technician controls. The logger will be recording all system activity and can be later analysed and compared with the original incident log.

3.2.3 Removal of Equipment

SSI modules suspected of mal-operation shall be initially subjected to functional tests in situ. These tests shall simulate, as accurately as possible, the events leading to the irregularity, and module behaviour shall be observed and recorded. If the incident warrants, the module in question shall be removed and returned to the appropriate third line facility for a detailed examination. Full details shall be recorded of any module so removed. TFM modules under investigation must not be placed in a TFM tester.

3.2.4 Remote Interrogation

A remote terminal is provided to enable remote interrogation of the SSI to gain information on faults and to monitor system activity. This facility may be used before proceeding to site, or to assist in providing immediate advice to the attending signalling maintainer.

4 Protection of the Line

4.1 Precautions

Solid State Interlocking equipment contains electronic components that may be damaged by mis-use. No SSI module shall be disconnected unless its power supply has been removed. The normal precautions regarding safety shall be observed. Precautions regarding equipment handling are detailed in section 6.

4.2 Disconnections

When it is required to disconnect signalling apparatus, the necessary safe working procedures shall be strictly observed as stipulated in SMP 09.

4.2.1 Disconnection of Signals

The following action should be taken in order to place any signal controlled by an SSI signal module to its most restrictive aspect. When it is required to disconnect a signal controlled from an SSI signal module in order to place it at stop and prevent it from clearing, a bar/restriction shall be applied from the Technician's Terminal.

If the Technician's Terminal is not available then:

a)   for a running signal with a trainstop, the signal train stop motor fuse shall be removed and the trainstop reverse indication into the module shall be opened at the external cable link. This places the trainstop and the signal at stop.

This method is also to be used if it is required to disconnect the trainstop itself or if authority is obtained to suppress the trainstop in failure conditions.

b)   if trainstop control of the signal is not provided then the signal "A" track circuit shall be disconnected to force the signal to be retained at stop. It should be remembered that this may cause other signals to be returned to stop and associated points to be track locked.

c)   if methods (a) and (b) are not practical, the signal module can be forced to adopt the "red retaining" mode of operation by removal and replacement of the link in the NX (current path) return from the signal head. On removal of the external cable link the module "output interface" indication will be extinguished. After a period of at least 5 seconds the link should be re-inserted and confirmation obtained that a red aspect is displayed.

Fuses to the signal's aspects other than red shall then be removed.

To return to normal operation it is necessary to power down the module and then power up. All functions provided by the module will obviously be lost whilst the power is off.

Note: It must be appreciated that a main power supply interruption will also re-initialise the module and thus reinstate its output interface removing the "red retaining" feature. In this event if the signal is then cleared, the red lights will extinguish and the signal will be blacked out.

4.2.2 Disconnection of Points

When it is necessary to electrically disconnect a set of points controlled from an SSI points module in order to prevent their operation then the points shall be disabled via the Technicians Terminal as described in Section 4.3, after communicating with the signaller. The local power shall also be disconnected from electric point machines and the air supply cut off EP point machines.

Where ESML arrangements (Emergency Switch Machine Lock, Annett Key and attached crank handle) on electric points machines or EOL or plug connector arrangements on E.P. points machines are provided for the manual operation of power worked points, the disconnection of the points and the protecting signals is accomplished through use of ESML, EOL or plug connector arrangements.

When the ESML, EOL or plug connector arrangements are utilised during failure conditions or for the testing (only) of facing point locks and detectors, it is not necessary to disable the points from the Technician's Terminal.

ESML, EOL or plug connector arrangements are not to be restored while trains are approaching or moving over the points.

Points should be in correspondence with the interlocking when re-connected. The points module will automatically try to re-drive the points, if it is receiving a continuous control to do so from the interlocking.

Note: It must be appreciated that the points module can remember via its NVRAM the last call made by the interlocking, and on reconnection will attempt to drive to its last called position with or without communication with the interlocking.

4.3 Technicians Controls

Facilities are provided within the SSI technicians terminal to allow the suitably accredited signalling maintainer to apply various restrictive controls to the interlocking. The following controls are allowed:

1.   Route Prohibit

2.   Track circuit occupation

3.   Points disable

4.   Aspect disconnect

5.   Temporary Approach control

The application of these controls must be done in co-operation with the signaller. All controls applied must be recorded on Technician Terminal Controls Log.

A book of forms SF J174/B shall be used as the "Technician's Terminal Controls Log".

Facilities are also provided within the technicians terminal for the interlocking to be stopped or re-started for emergencies. The "stop" command will cause all signals to revert to danger, and route setting will no longer be possible.

5 Failures

The SSI System maintenance and fault finding manual contains the detailed procedures for dealing with faults to the SSI system and equipment. The information given in this section outlines the module failure modes and principal actions required.

5.1 Interlocking Cubicle

The SSI System cubicle incorporates duplicated panel processor modules and triplicated interlocking multi-processor modules. One PPM failure and/or one interlocking MPM failure will therefore have no effect on the operation of the signalling.

The diagnostic MPM is not duplicated and failure of this module results in loss of all diagnostics and technicians terminal facilities.

5.1.1 Panel Processors

Failure of both panel processors will result in loss of communication between the signalling panel and the interlocking.

All panel indications will be extinguished. This failure will be indicated by an audible and visual alarm on the signaller's panel.

The interlocking will continue to function normally. Routes that are already set will remain set with signals cleared as appropriate, and trains will be moving in response to the signalling. It will not be possible to set any further routes.

This failure will persist until a serviceable panel processor(s) is installed in place of the faulty equipment.

5.1.2 Interlocking MPM

Failure of 2 or 3 of the interlocking MPMs results in a total shut-down of the interlocking. This will be indicated to the signaller by a critical alarm and all panel indications will be extinguished or frozen depending on which P-Mux is used.

All signals will revert to red. This situation will persist until serviceable modules are installed in place of the faulty equipment.

It will be necessary when installing new interlocking MPMs or Memory Modules to re-start the interlocking from the technicians terminal.

When new interlocking MPMs are brought on line there is a time-out period of 4 minutes before normal working can be resumed. This time out period is indicated to the signaller by a "normal working failed" alarm flashing indication.

The new interlocking will also require to be enabled from the Technicians terminal. If it has not been enabled the "normal working failed" alarm will show a steady indication. Before enabling the interlocking the signalling maintainer must re-enter all technician controls that were applied at the time of the interlocking failure. The details of these will be in the Technicians Terminal Control Log Record Book. The "normal working failed" indication will then be extinguished and the interlocking is enabled.

5.2 Points Modules

Failure of point equipment connected to the module such as loss of detection, or failure to drive are detected by the diagnostic system and alarmed via the technicians terminal. Failures to points module themselves are also diagnosed and fall into 3 categories:

5.2.1 Output Interface Failures

Points modules can control two sets of points, known as X and Y and will disable outputs to either of these in the event of a fault occurring. A critical alarm will be given to the Signaller and the technicians terminal will report "Module A output interface". The points concerned will continue to be detected, but it will not be possible to move them from the signallers panel.

5.2.2 Input Interface Failures

All inputs, both point detection and general purpose are detected by a duplicated processor system within the module. If the processors disagree on the state of an input then an input interface fault is declared and the input concerned is set to its most restrictive state. A critical

alarm will be given to the signaller and the technicians terminal will report "Module A input interface".

5.2.3 Complete Module Failure

In the event of a complete module failure, known as a "shutdown" a critical alarm will be given to the signalman and the technicians terminal will report "no reply from TFM A both links". The points will remain locked in their last set position, the interlocking will have lost detection and this will indicate to the signaller in the usual way. If a module fails to receive data on both data links A & B it will cease all transmissions. This is detected by the interlocking as the same as a module shutdown.

When the interlocking detects a module shutdown condition it immediately puts all input functions associated with that module to their most restrictive state, and retains this state until normal communications with the affected module are resumed.

5.3 Signal Modules

Failure of signalling equipment connected to the module, such as lamp failures, are detected by the diagnostic system and alarmed via the technicians terminal. Failures to signal modules themselves are also diagnosed and fall into 3 categories:

5.3.1 Output Interface Failures

In the event of a fault occurring in the signal module output circuitry the module will disable its outputs and apply a "red retaining" feed to selected outputs, generally the red lamp(s) of its associated signals. A critical alarm will be given to the signaller and the technicians terminal will report "Module A output interface". Current proving, and other inputs, will continue to be detected, but it will not be possible to clear the signal from the signallers panel.

5.3.2 Input interface Failures

All inputs are detected by a duplicated processor system within the module. If the processors disagree on the state of a input then an input interface fault is declared and the input concerned is set to its most restrictive state. A critical alarm will be given to the signaller and the technicians terminal will report "Module A input interface".

5.3.3 Complete Module Failure

In the event of a complete module failure, known as a "shutdown" a critical alarm will be given to the signaller and technicians terminal will report "no reply from TFM A both links". Any signal controlled by the failed module will be displaying a red (or most restrictive) aspect.

If a module fails to receive data on both data links A and B, it will cease all transmissions. This is detected by the interlocking as the same as a module shutdown. When the interlocking detects a module shutdown condition it immediately puts all input functions associated with that module to their most restrictive state and retains this state until normal communications with the affected module are resumed.

5.4 Data Link

5.4.1 Data Link modules interface the interlocking with its points and signal modules. The data link transmission system is duplicated, and a failure to either link A or link B will have no effect on system operation, but will be detected by the diagnostics and a non critical alarm will be given to the signaller.

5.4.2 Failures due to data link cable faults or data link bearer systems are also diagnosed and alarmed, and a printout is available to the technician indicating the position of the fault.

5.4.3 Failure of both data links results in the interlocking losing communications with all or some of its points and signal modules. Such failures are potentially serious and could cause the interlocking to be completely inoperative.

Diverse routes are generally adopted for the two transmission systems and thus complete failure to both links simultaneously are very rare.

5.4.4 Data Link lightning protection is provided by UTB-9 surge units. These are installed at every location containing data link modules. In the unlikely event of a short circuit fault occurring within the UTB-9 unit the data link concerned will fail, this will be detected and alarmed as detailed in 5.4.2.

5.5 Reporting

The failure reporting requirements are detailed in Section SMP 04.

A further Solid State Interlocking Equipment Failure Report must be completed with the appropriate information associated for each failure at an SSI installation. This form shall be signed and attached to the associated Failure Report Form.

5.6 Track Circuits

SSI interlockings do not allow for conventional methods to manually release route holding or approach locking.

Track circuit failures will need to be rectified and affected traffic operated under the rules and regulations.

6 Maintenance Policy

6.1 Test Equipment

6.1.1 Use of Special SSI Test Equipment

Test equipment specifically designed for SSI use is provided, and shall be operated in accordance with the manufacturers instructions.

Unauthorised development or use of other special diagnostic or test equipment is forbidden.

The types of test equipment provided are detailed below.

6.1.1.1 Trackside Functional module tester

This is provided to enable a points or signal module to be functionally tested before being installed, for example as a replacement for a failed module. The TFM tester will also on conclusion of its test, erase the contents of the TFMs NVRAM which includes the interlocking identity, thus enabling modules taken from one interlocking to be re-installed in another.

Note: In the event of a signalling irregularity or an alleged signalling irregularity, the associated TFM modules must not be tested using a TFM tester as this will erase the contents of the memory.

All modules shall be tested on the TFM tester before being installed on a working installation.

6.1.1.2 Data Link Telegram Generator

This portable test unit simulates data link transmission from an interlocking and is designed for testing TFMs installed in locations before an installation is commissioned.

Data Link Telegram Generators are only to be issued for use of Signal Engineers authorised by ARTC General Manager ISP or nominated Signalling representative.

Use of this equipment on working installations is strictly forbidden.

Unauthorised use could cause unsafe behaviour of the interlocking. It is vital that DLTG units are stored securely away from working installations and are only issued for use to suitably accredited Signal Engineers.

6.1.1.3 Data Link Interrogator

This portable test unit which is receive only, is used to monitor data link messages sent to or from the interlocking. It is attached to special test points provided in each location or bungalow where TFMs and DLMs are installed. DLIs are provided to signalling maintainers to assist in first line maintenance. Some DLIs also provide an output to trigger an oscilloscope when used in observing messages on the data link during second line maintenance. This enables only data from specific modules to be analysed from the constant stream of data passing between the interlocking and TFMs.

6.1.2 Conventional test equipment

High impedance multimeters and digital storage oscilloscopes are required to carry out conventional measurements. Mains powered and mains earthed oscilloscopes must not be directly connected to a data link as this will earth one leg and could cause the data link to fail.

6.2 Exchange of Modules

6.2.1 General

All SSI modules are fitted with 50 way or 75 way plug couplers, and it is therefore not possible to disturb SSI wiring when exchanging modules. The connectors are secured by two hand

operated retaining bolts and care must be exercised when removing/replacing these connectors to ensure that the bolts are unscrewed/screwed evenly, or damage to the connector may result.

6.2.2 Multi Processor and Panel Processor Modules

When it is necessary to remove interlocking or diagnostic multi processor modules, or panel processor modules from the interlocking cubicle they shall be removed complete with their associated memory module, and replaced by new units which are also fitted with the appropriate memory module. Removed MPMs and PPMs shall be promptly returned to the manufacturers, accompanied by the appropriate documentation as detailed in Section 5.5.

6.2.3 Data Link Modules

When it is necessary to remove DLMs from a working system, care must be exercised to ensure that disruption to transmissions, with loss of data by associated TFMs, does not occur. However, the data link transmission system is duplicated, and therefore removal of any one DLM will have no effect on the normal operation of the signalling.

Removed DLMs shall be promptly returned to the manufacturers, accompanied by the appropriate documentation as detailed in Section 5.5.

6.2.4 Points and Signal Modules

When it is necessary to remove PMs or SMs from a working installation they must be first be powered down by removing the appropriate module 120V NX disconnection link. All modules being placed into service shall have first been confirmed operational by being satisfactorily tested on the TFM tester referred to in Section 6.1.1.1.

There is a 9 to 10 second initialisation period before a TFM comes on line after the application of its 120VAC supply.

If it becomes necessary to transfer TFMs from one SSI interlocking to another, these TFMs must, before re-installation, be tested on the TFM tester in order to erase their old interlocking identity number as detailed in section 6.1.1.1.

Removed TFMs shall be promptly returned to the manufacturers accompanied by the appropriate documentation as detailed in Section 5.

6.3 Power Supplies

6.3.1 General

All SSI equipment operates from the signalling 120V ac supply. Normal and emergency primary supplies are provided, with automatic change-over controlled by a static switch, mechanical ECO or GGI (inverter).

6.3.2 Testing the Change-over Function

Correct operation of the static switch or GGI shall be tested on every maintenance visit and at least every 12 weeks by failing the normal supply and observing that the load is taken by the

emergency supply with no effect on the SSI or associated signalling equipment. On restoration of the normal supply the static switch will automatically change back to this supply. A record of all such tests shall be maintained. The mechanical block contactor on the normal supply input to the static switch or GGI must be inspected to confirm that the contactor de-energises when the normal supply is failed.

6.3.3 Maintenance by-pass switch

A three position switch is fitted to the unit to allow maintenance whilst the load is being directly supplied from either of the two sources.

6.4 Rostered Maintenance Visits

Solid state interlocking equipment consists of a number of sealed modules requiring no maintenance and therefore routine maintenance in SSI areas will continue to be dominated by conventional signalling equipment.

6.4.1 Peripheral Equipment

The SSI technicians terminal incorporates peripheral equipment such as printers, logger PC, remote dial in modems which require maintenance in accordance with the manufacturers recommendations. The Signal Maintenance Engineer shall program maintenance accordingly.

6.4.2 Technicians Terminal PC Logger

In order to prove that the logging feature is working correctly, the appropriate daily files shall be downloaded to floppy disc and analysed off-line. This test shall be carried out at 12 weekly intervals.

6.4.3 Data Link Line Measurements

The SSI diagnostic system is designed to detect faults to the data link that are beginning to cause message corruption. However it is useful to check line levels as this will enable deterioration in the transmission line, or data link modules to be detected at an earlier stage, and it will provide records on which to base future judgements on the line.

Line measurements shall be taken at 6 monthly intervals and shall be recorded, generally at the control centre, using a digital storage CRO, with a data link interrogator providing the trigger source. Full details of the procedures for line measurements are given in the appropriate manuals.

The event logs shall be checked to confirm that no telegrams are being lost on either datalink.

6.5 Equipment Records

6.5.1 Hardware Records

Each control centre shall maintain a database containing the detailed records of all SSI equipment associated with the area. The type of information to be recorded is listed on "Solid State Interlocking Hardware Record" forms.

6.5.2 Software Records

Records of all installed SSI software, both program and data shall be maintained and copies kept on site, securely attached to the inside of each interlocking cubicle door. The type of information to be recorded is listed on two "Installed SSI Software Record" forms. Examples of these forms are included in standard Specification SCP 08-12 SP. Full details of the procedures associated with software records are given in the appropriate SSI documentation, SSI 8500, and SSI 8150.

6.6 Spares

The level of spares holdings is determined by the type and number of installed modules.

Full lists of the spares provided for the control centre shall be made available and maintained at the appropriate depot.

It is important to ensure that any spare module installed is of the correct version for the system. Full details of module types and compatibilities are included in the installed software records referred to in paragraph 6.5.2.

All spare modules shall be fully tested and certified as operational before being placed into the stock of spares.

6.7 Technicians Terminal

6.7.1 Password

Access to the facilities of the technicians terminal is by password. The Maintenance Supervisor is responsible for the password and for changing it if this becomes necessary.

Only authorised staff shall be aware of the password and when accessing the technicians terminal shall input their name, location and purpose as requested by the system.

6.7.2 Fault Print-out

The technicians terminal fault printer generates records of all faults, all accesses to the technicians terminal, controls applied and other associated information. The hard copy output from the printer shall be retained and held on site in the technicians terminal records file.

Glossary of Terms - Abbreviations

DLI	Data Link Interrogator
DLM	Data Link Module
DLTG	Data Link Telegram generator
LDT	Long Distance Terminal
MM	Memory Module
MPM	Multiprocessor Module

NVRAM		Non-volatile random access memory
PM		Points Module
PPM		Panel Processor Module
SM		Signal Module
SSI		Solid State Interlocking
TFM		Trackside functional Module
TT		Technicians Terminal

Australian Rail Track Corporation Signalling Form   SF J174/A Sh.1 of 2 Rev.1
SSI EQUIPMENT FAILURE REPORT

Report No.: _____

District: _____ **Control Centre :** _____

What Interlocking is equipment connected to: _____

_____

Please complete all relevant sections by ticking appropriate boxes and answering appropriate questions. Append one copy to any failed equipment returned to the manufacturer and forward another copy and append to the Failure Report Form.

1. TIME

Time of Failure: _____ **Date of Failure:** _____

Tech. Terminal Fault Printout: _____

2. DESCRIPTION (INTERNAL EQUIPMENT) (**Tick the appropriate box**)

What piece of equipment failed:

Panel Processor Module ☐   **Multi Processor Module** ☐   **Diagnostic Processor Module** ☐

Other (Specify) _____

3. DESCRIPTION (EXTERNAL EQUIPMENT)

What piece of equipment failed:

- **Signal Module**

    At what system address: _____

    Manufacturer: _____

    What type(s) of Signal does the module drive: _____

    Which indications were alight on arrival at site:

    Power ☐   **System** ☐   **Rx Data** ☐   **Outputs** ☐

- **Points Module**

    At what system address: _____

    Manufacturer: _____

    What type(s) of Points does the module drive: _____

    Air Points ☐   **or what type of point machine:** _____

    Which indications were alight on arrival at site:

    Power ☐   **System** ☐   **Rx Data** ☐   **Points X** ☐   **Points Y** ☐

Rail Infrastructure Rail Signalling Form SF J174/A Sh.2 of 2 Rev.1

SSI EQUIPMENT FAILURE REPORT

- **Data Link Module**

    At which location: _____ **Which Data Link (A or B)** _____

    Manufacturer: _____

- **Long Distance Terminal**

    At which location: _____ **Which Data Link (A or B)** _____

    Manufacturer: _____

    What indications were alight on arrival at sight:

    System ☐ **Data from SSI** ☐ **Data to SSI** ☐ **Data to PCM** ☐

    PCM Tx Clock ☐ **PCM Rx Clock** ☐ **PCM Rx Line** ☐ **Power** ☐

4. HOW WAS THE FAULT RESTORED?

Module recovered on its own: ☐ **Module recovered after being powered down then up:** ☐

Module replaced with the spare, serial numbers below

Failed Module Serial No.: _____ **Replacement Module Serial No:** _____

5. OTHER INFORMATION

DC Electrified Area: **YES** ☐ **NO** ☐

Weather conditions at time of failure (e.g. dry, wet, hot, lightning): _____

Other comments (e.g. power failure or interruption etc.): _____

_____

_____

Signed: _____

Date: / /

Australian Rail Track Corporation   **Signalling Form**   **SF J174/B Rev.1**

TECHNICIAN TERMINAL CONTROLS LOG

Control Centre: _____

Interlocking Name: _____

TIME & DATE	CONTROL APPLIED	BY WHOM	REASON FOR CONTROL	CONTROL REMOVED	BY WHOM	TIME & DATE