

Information for users

To access individual modules referenced within this standard, blue active links are provided from the relevant index pages where these are listed. Clicking on a specific reference will lead to the corresponding document. Please ensure to open **bookmarks** for easier navigation within the document and to access **index of modules**.

Alternatively, you may use the search facility to search for a specific document by using the complete document reference number – such as NR/L3/SIG/30082/002 – in the search field.

Proceed to document ►

Ref:	NR/L3/SIG/11303
Issue:	6
Date:	03/03/2012
Compliance date:	03/03/2012

Level 3

Signalling Installation

Endorsement and Authorisation

Endorsed by:



Pardip Basran, Working Group Chair

Authorised by:



Ed Rollings, Steering Group Chair

Accepted for issue by:



Mick McManus, National Standards Manager

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 2012 Network Rail.

Uncontrolled copy once printed from its electronic source.

Published and Issued by Network Rail, Kings Place, 90 York Way, London. N1 9AG.

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

User information

This Network Rail standard contains colour-coding according to the following Red–Amber–Green classification.

Red requirements – *No deviations, 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 deviations, approved risk analysis and mitigation*

- **Amber requirements shall** be complied with unless deviation 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.
- Deviations **may** be permitted. Deviations are approved by the Standard Owner or through existing Delegated Authority arrangements.
- Corrective actions shall be enforced if **non-approved** deviations 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:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Issue record

Issue	Date	Comments
1	August 2000	1 st issue
2	September 2010	Reformatted version of previous document incorporating the text of the installation handbook
3	December 2010	Revised 2U05 (AWS), updated for AWS on steel sleepers
4	March 2011	Updated 2C05, 2G05 & 2S05
5	September 2011	TI 074 incorporated into module 2W10
6	March 2012	Modules 1M20 & 2Y05 transferred from NR/SP/SIG/01023 (1)

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 03/03/2012.

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

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 document from IHS. Tel: 01344 328039.

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Contents

1 Purpose	5
2 Scope	5
3 Roles and responsibilities	6
3.1 Project Engineer	6
3.2 Installation Staff	6
3.3 Equipment Suppliers	6
4 Definitions	6
5 Verification and validation	6
6 Dependability	6
7 Alternative Practices	7
8 Safety	7
8.1 Operational safety during the work	7
8.2 Operational safety after the work	8
Appendix A - List of Modules	9
Appendix B - Subject Index	12
Appendix C - Terms and definitions	49

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

1 Purpose

This standard requires that any installation of signalling equipment on Network Rail Managed Infrastructure provides:

- An operationally safe installation of new or altered systems and equipment, with safe interfaces between systems;
- That safe methods of work are adopted, with safe interfaces between all parties involved or affected;
- A correct and consistent interpretation of design detail;
- A neat and tidy appearance;
- Compliance with the client's specified requirements, so that the installation is dependable, fit for purpose and free from defect;
- Adequate testability; and
- Safe and easy maintenance.

2 Scope

This standard applies to:

- General installation techniques;
- The installation of signalling works applicable to the Infrastructure, including temporary works; and
- The installation of specific types of signalling systems and equipment, but not the trainborne parts of track-to-train systems.

This standard also applies to maintenance work and repairs, including like-for-like replacement of equipment. However, reference shall also be made to the appropriate maintenance standards and Signal Maintenance Testing standards.

This standard does not cover:

- The manufacture of individual items of equipment;
- The installation of trainborne equipment; or
- Equipment ordering details and processes.

The presentation of design detail is the subject of [NR/L2/SIG/11201](#).

The testing of signalling works is covered by [NR/L2/SIG/30014](#).

The modules which form part of this specification represent the best historical practice for signalling installation which should be followed unless specified in other standards or approved as a superior practice by the responsible signalling project engineer.

An index of the modules is contained in Appendix A with a topic index in Appendix B.

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

3 Roles and responsibilities

3.1 Project Engineer

The Project Engineer shall approve installation techniques which do not follow the modules forming part of this standard. The reasons for adopting an alternative practice shall be documented and if necessary, apply for necessary non-compliance in accordance with [NR/L2/EBM/STP001](#).

3.2 Installation Staff

All staff installing equipment shall follow the best practices described in the modules forming this standard, subject to observance of health and safety requirements, unless specifically authorised.

3.3 Equipment Suppliers

When new types of equipment are submitted for approval by Network Rail, suppliers shall be required to either demonstrate that the procedures in this standard are applicable or provide new modules specific to the equipment or systems for which they are seeking approval.

4 Definitions

A list of terms and definitions are included in Appendix C.

5 Verification and validation

Installation work shall be subject to appropriate levels of supervision, quality checks and audit, to check that the approved methods of work are applied, and that the required standards of workmanship are achieved.

Equipment to be installed (and existing equipment to be reused) shall be checked to confirm it is of the correct type, free from defects and, where appropriate, correctly configured for its application.

Before normal working is restored (or connection made to operational circuits), the installation shall be checked and tested, in accordance with works testing or maintenance testing procedures, as appropriate. Full configuration control shall maintain compatibility between installation and testing activities.

6 Dependability

Installation activities shall maximise reliability and facilitate maintainability within the constraints of the installation diagrams and the specified equipment, so as to meet the infrastructure manager's requirements.

For example, equipment shall be orientated so that adjustment can be made whilst observing equipment operation. Equipment and test points shall be easily accessible for maintenance and fault finding.

Testability shall also be facilitated, e.g. by provision of disconnection points.

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

7 Alternative Practices

Alternative practices are shown in some places. This is because each is generally equally satisfactory, but the practice to be followed for particular work may depend on local circumstances. For instance, one method may be more suitable for third rail traction areas, or in tunnels, or there may be a need to follow existing arrangements. Staff should be guided by the installation diagrams or other scheme specifications as to which practice to follow.

When working on existing equipment, it is not always possible to apply current installation standards. Exceptionally, under such circumstances, former installation standards may be used, but the supervisor should first seek the agreement of the project engineer.

An applicable installation standard may not exist for newly approved equipment. Under such circumstances, the new techniques should be documented and the agreement of the project engineer sought, before use.

8 Safety

The safety of passengers, public and personnel is dependent on safe installation activities.

It is influenced by:

- the infrastructure;
- working procedures; and
- human factors.

These can affect:

- the operational (or system) safety of the signalling system (both during and after the work); and
- the occupational safety of installation staff (and other personnel, such as testers, maintainers and operators).

Total safety requires each of the following elements to be addressed:

8.1 Operational safety during the work

To maintain operational safety during the work, it is essential that installation activities comply with the rule book, [GE/RT8000](#) series. The protection procedures should be used that is appropriate to the work being undertaken. This will minimise interference to the working of trains in a way that is commensurate with the amount of signalling that can remain operating safely during the work. It may involve signalling disconnections, or possession of the line, as necessary.

Special care should be taken when working in the vicinity of working equipment so that wiring or equipment is not disturbed and terminals or power supplies are not shorted. Any disconnected wires should be insulated as described in Module [1D20](#). For the use of soldering irons, see Module [1H15](#). Test equipment should only be connected to working installations by authorised staff.

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

8.2 Operational safety after the work

To confirm operational safety after completion of the work, it is essential that installation standards are followed that are applicable to the systems or equipment being installed and cover the techniques being used.

In addition, terminating tools, such as crimping devices, should be regularly inspected to check that all new terminations are safe and secure. (Further details are given in Module [1H05](#).) Approval may be required for the use of special tools.

Before normal working is restored, the installation shall be checked and tested, in accordance with works testing or maintenance testing procedures, as appropriate.

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Appendix A - List of Modules

The following modules form part of this standard.

Reference	Title	Version
1B05	Safety: Introduction	2
1B10	Safety: Portable Warning Equipment Withdrawn 04/09/2010 - Obsolete	N/A
1D05	Electrical Wiring: Installation Diagrams and Symbols	2
1D10	Electrical Wiring: Wires and Cables	2
1D15	Electrical Wiring: Wiring Up and Termination	2
1D20	Electrical Wiring: Alterations to an existing installation	2
1D25	Electrical Wiring: Stagework Techniques	2
1H05	Tools and Techniques: Wire Connections and Crimping	2
1H10	Tools and Techniques: Stripping Wires and Cables	2
1H15	Tools and Techniques: Soldering	2
1H20	Tools and Techniques: Wire Wrapping	2
1H25	Tools and Techniques: Torque Wrenches	2
1H30	Tools and Techniques: Meters Withdrawn 04/09/2010 - Obsolete	N/A
1M01	Labelling: Safety Signs	2
1M05	Labelling: Wires and Cables	2
1M10	Labelling: Internal Equipment	2
1M15	Labelling: Telephones Withdrawn 04/09/2010 - See NR/L2/TEL30032 & NR/L2/SIG/30017	N/A
1M20	Labelling Balises for TASS	2
1Q05	Fixings: Nuts, Bolts, Screws, Washers, etc.	2
1Q10	Construction of Concrete Bases Withdrawn 04/09/2010 - See NR/L3/CIV/151 & NR/L3/CIV/140	N/A
1Q15	Padlocks and Security Withdrawn 04/09/2010 - See NR/L2/SIG/50019	N/A
1U10	Pre-commissioning Work: Setting up and Quality Checks	2
1X05	General Advice: Good Housekeeping Practice	2

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

1X10	General Advice: Common Pitfalls	2
2A05	Cabling: Route Construction Withdrawn 04/09/2010 - See NR/GN/TEL/30140	N/A
2A10	Cabling: Jointing and Termination	2
2A15	Cabling: Cross Track and Tail Cables Withdrawn 04/09/2010 - See NR/L2/S19812	N/A
2C05	Relays: Basic Principles	3
2C10	Relays: Plugboard Configuration	2
2E05	Equipment Rooms: Equipment and Wiring Practice	2
2F05	Signal Boxes and Ground Frames: Electrical Equipment	2
2F10	Signal Boxes: Lever Locks and Contacts	2
2G05	Location Construction	4
2G10	Locations: Fitting Out	2
2J01	Power and Earthing: Electrical Safety	2
2J05	Power and Earthing: Power Supplies	2
2J10	Power and Earthing: Earthing Withdrawn 04/09/2010 - Obsolete	N/A
2K05	Batteries: Primary Cells	2
2K10	Batteries: Secondary Cells	2
2M05	Signals: General	2
2M10	Signals: Signals Not in Use	2
2M15	Signals: Signs and Boards	2
2P01	Track Circuits: Definitions	2
2P05	Track Circuits: General	2
2P10	Track Circuits: Rail Terminations	2
2P15	Track Circuits: Bonding	2
2P20	Track Circuits: DC	2
2P25	Track Circuits: DC High Sensitivity	2
2P30	Track Circuits: Jointless Track Circuits	2
2P35	Track Circuits: Aster 'U' and SF15 Types	2
2P40	Track Circuits: TI21 Type	2
2P45	Track Circuits: Reed (Jointed) Type	2
2P60	Track Circuits: Westinghouse Quick Release Type	2

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

	Train Detection	2
2Q05	Train Detection: Treadles: Silex Type	2
2Q10	Treadles: SEL Type Withdrawn 04/09/2010 - Obsolete	N/A
2Q50	Axle Counters: SEL Type Withdrawn 04/09/2010 - See NR/L2/SIG/30081 & NR/L3/SIG/30082/002	N/A
2R20	Servotrim Withdrawn 04/09/2010 - Obsolete	N/A
2S05	Points: General	2
2S10	Points: Electric Point Machines	2
2S15	Points: Clamp Locks Withdrawn 04/09/2010 - NR/GN/SIG/11774	N/A
2S20	Points: Detection	2
2S25	Points: Train Operated Point Systems	1
2U05	Train Warning and Protection Systems: Automatic Warning System (AWS)	3
2U15	Train Warning and Protection Systems: Train Stops	2
2V01	Protection of Equipment against Vandals Withdrawn 04/09/2010 - Obsolete	N/A
2W05	Electronic Equipment: General	2
2W10	Electronic Equipment: SSI and IECC Systems	3
2X05	Level Crossings: Road Traffic Signals	2
2X10	Level Crossings: Lifting Barrier Machines	2
2X15	Level Crossings: CCTV	2
2Y05	Balises: TASS Balise	2

Copyright Network Rail

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Appendix B - Subject Index

The following is an index of subjects covered by the modules which form part of this standard.

A

Description	Module
Additions to existing installations, Equipment rooms	2E05
Alterations made as part of maintenance work, Electrical wiring	1D20
Alterations to an existing installation, Electrical wiring,	1D20
Aluminium power cable, Cabling	2A10
Amp Copalum terminal & splice, Cabling	2A10
Application, Track circuits	2P25
Applying the iron & solder flow, Tools & techniques	1H15
Arrangement at insulated rail joints, Track circuits	2P05
Arrangement diagrams, Points	2S05
Arrangement for the layout of track circuit ground equipment, use of orange pipe, Track circuits	2P05
Arrangement for the layout of track circuit ground equipment, use of sleeper clipped cables, Track circuits	2P05
Asbestos Safety	1B05
Assembly to posts, Signs	2M15
Aster "U" & SF 15 type track circuits, Track circuits	2P35
Aster "U" & SF 15 types, Track circuits,	2P35
Automatic warning system (AWS)	2U05
Automatic warning system, Pre-commissioning work	1U10
AWS	2U05

B

Description	Module
Balises: TASS Balise	2Y05
Banner repeater signals, Signals	2M05
Barrier components required, Level crossings	2X10
Base seal, Locations	2G10
Basic dc electric motor, Points	2S10
Batteries	2K05
Batteries	2K10
Battery room, Equipment rooms	2E05

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Battery rooms Safety	2K10
Bead marking system, Labelling	1M05
Before a job is finished, General advice	1X05
Before leaving the site, General advice	1X05
Being accurate, Electrical wiring	1D15
BICC connectors for solid aluminium cable, Cabling	2A10
Biological hazards Safety	1B05
Block shelf, Signal boxes & GFs	2F05
Bolts and nuts, Fixings	1Q05
Bonding of points and crossings, Track circuits	2P15
Bonding, Track circuits,	2P15

Copyright Network Rail

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

C

Description	Module
Cable cores and wires, Labelling	1M05
Cable entry adaptors for SGE type GA lever lock & Circuit controller, Signal boxes & GFs	2F05
Cable sealing gland kits, Cabling	2A10
Cable sheath stripping, Tools & techniques	1H10
Cable termination at relay/equipment room or location end, Labelling	1M05
Cable termination rack, Signal boxes & GFs	2F05
Cable termination racks, Equipment rooms	2E05
Cable terminations at apparatus end, Labelling	1M05
Cables & wires, Pre-commissioning work	1U10
Cables, labelling method, Labelling	1M05
Cables, Locations	2G10
Cables, Types, Cabling	2A10
Cabling & wiring, General advice	1X10
Cabling, Aluminium power cable	2A10
Cabling, Amp copalum terminal & splice	2A10
Cabling, BICC connectors for solid aluminium cable	2A10
Cabling, Cable sealing gland kits	2A10
Cabling, Cable types	2A10
Cabling, Jointing & termination	2A10
Cabling, Jointing aluminium cored cables	2A10
Cabling, Jointing copper cables using heat shrinkable systems	2A10
Cabling, Jointing kits	2A10
Cabling, Jointing track circuit 50/0.25mm tail cables	2A10
Cabling, Multi-core cable jointing	2A10
Cabling, Solid core aluminium cable jointing & termination	2A10
Cabling, Solid core aluminium power cable	2A10
Cabling, Solid core aluminium power cable, method of jointing	2A10
Cabling, Solid core aluminium power cable, method of termination	2A10
Cabling, Stranded core aluminium power cable	2A10
Cabling, Stranded core aluminium power cable, method of jointing	2A10
Cabling, Stranded core aluminium power cable, method of termination	2A10

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Cabling, Testing external main & tail cables & power cables	2A10
Cadmium Safety	1B05
Camera columns, erection, Level crossings	2X15
Camera columns, general, Level crossings	2X15
Carriage of dangerous goods in road vehicles Safety	1B05
Cartridge propelled stud fixing Safety	1B05
Cathode ray tubes, Safety	2J01
Cavity (hollow surface) and concrete fixings, Fixings	1Q05
Cell size, Batteries	2K10
Cell voltage, Batteries	2K10
Charging the cell, Batteries	2K10
Checking relay spades correctly inserted, Tools & techniques	1H05
Checking, Level crossings	2X05
Circuit diagram title block, Electrical wiring	1D05
Circuit diagrams, apparatus names, Electrical wiring	1D05
Circuit diagrams, colouring, Electrical wiring	1D05
Circuit diagrams, lever and switch contacts, Electrical wiring	1D05
Circuit diagrams, tabulations (analysis), Electrical wiring	1D05
Circuit diagrams, terminal names, Electrical wiring	1D05
Circuit diagrams, termination numbers, Electrical wiring	1D05
Circuit diagrams, wire and cable size and type, Electrical wiring	1D05
Circuit diagrams, wiring symbols, Electrical wiring	1D05
Closed circuit television, Level crossings,	2X15
Clutches and overload devices, Points	2S10
Co-axial cable installation, Level crossings	2X15
Co-axial cable termination, Level crossings	2X15
Co-axial cable types, Level crossings	2X15
Colour codes, Electrical wiring	1D15
Colour light signals, Signals	2M05
Common pitfalls, General advice,	1X10
Communication, General advice	1X10
Computer floors, Equipment rooms	2E05
Concrete foundations for double posts, Signs	2M15
Concrete foundations for posts, Signs	2M15

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Conductor flexibility, Electrical wiring	1D10
Conductor material, Electrical wiring	1D10
Conductor size, Electrical wiring	1D10
Conductor sizes and resistances, Electrical wiring	1D10
Configurations, Relays	2C10
Connecting Westinghouse style B relay spades, Tools & techniques	1H05
Connections, Batteries	2K10
Connectors for relay plugboards, Tools & techniques	1H05
Construction, Batteries	2K05
Construction, Signs	2M15
Contact box construction, Signal boxes & GFs	2F10
Contact materials, Relays	2C05
Conversion of existing light units to quartz halogen type, Level crossings	2X05
Counterbalance weights required for barriers with skirts, Level crossings	2X10
Counterbalance weights required for barriers without skirts, Level crossings	2X10
Crimp connectors (spade style) for terminations to relay plugboards, Tools & techniques	1H05
Crimp connectors for terminations with nuts and screws, Tools & techniques	1H05
Crimp connectors, Faston style, Tools & techniques	1H05
Crimped connectors, Tools & techniques	1H05
Crimped relay spades WBS&Co (standard for new installations), Tools & techniques	1H05
Crimping tools, points to note, Tools & techniques	1H05
CTT RTB-510 tool pressure adjustment, Tools & techniques	1H05
CTT RTB-510 tool pressure adjustment, Tools & techniques	1H05
Current ratings of power cables, Electrical wiring	1D10
Cut off contact, Points	2S10

Copyright Network Rail

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

D

Description	Module
Data link cable, Electronic equipment	2W10
DC electric motor, Points	2S10
DC high density, Track circuits,	2P25
DC, Track circuits,	2P20
Dennard column, adjustable carriage roller, Level crossings	2X15
Dennard column, camera carriage, Level crossings	2X15
Dennard column, pulley/latch assembly, Level crossings	2X15
Detecting the points, Points	2S05
Detection circuits, Points	2S20
Detection, Points,	2S20
Detector box to BR spec 998, internal wiring, Points	2S20
Detector boxes, Points	2S20
Diagrams & symbols, Electrical wiring,	1D05
Difficulties with setting up, Track circuits	2P25
Disc cutter operation Safety	1B05
Disconnection box, Track circuits	2P05
Disconnection box, typical arrangements for multi-track lines (1), Track circuits	2P05
Disconnection box, typical arrangements for multi-track lines (2), Track circuits	2P05
Disconnection boxes typical arrangements for double track lines, Track	2P05
circuits	
Disconnection boxes, installation, Track circuits	2P05
Disconnection boxes, labelling, Track circuits	2P05
Disposal, Batteries	2K05
Door locking mechanism, Level crossings	2X10
Doors, Locations	2G10
Double post arrangement, Signs	2M15
Double post arrangements, Signs	2M15
Drilling the holes, Relays	2C10
Drive mechanism, Points	2S10
Dynamic braking (snubbing), Points	2S10

E

Description	Module
-------------	--------

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Earth faults, Electrical wiring	1D20
Earth rods, Locations	2G10
Earth tests, Electrical wiring	1D20
Economiser contacts, Signal boxes & GFs	2F10
Effect of dc traction cables, AWS	2U05
Effect of dc traction cables, AWS	2U05
Egerton E1890 sheath stripping tool, Tools & techniques	1H10
Electric point machines, Points	2S20
Electric point machines, Points,	2S10
Electrical clearances, Signals	2M05
Electrical detection, Points	2S20
Electrical equipment, Signal boxes & ground frames,	2F05
Electrical interference to S&T equipment, Electronic equipment	2W05
Electrical safety	1B05
Electrical safety, Isolations	2J01
Electrical safety, Permit to work	2J01
Electrical wiring, Alterations made as part of maintenance work	1D20
Electrical wiring, Alterations to an existing installation	1D20
Electrical wiring, Being accurate	1D15
Electrical wiring, Circuit diagram title block	1D05
Electrical wiring, Circuit diagrams, apparatus names	1D05
Electrical wiring, Circuit diagrams, colouring	1D05
Electrical wiring, Circuit diagrams, lever and switch contacts	1D05
Electrical wiring, Circuit diagrams, tabulations (analysis)	1D05
Electrical wiring, Circuit diagrams, terminal names	1D05
Electrical wiring, Circuit diagrams, termination numbers	1D05
Electrical wiring, Circuit diagrams, wire and cable size and type	1D05
Electrical wiring, Circuit diagrams, wiring symbols	1D05
Electrical wiring, Colour codes	1D15
Electrical wiring, Conductor flexibility	1D10
Electrical wiring, Conductor material	1D10
Electrical wiring, Conductor size	1D10
Electrical wiring, Conductor sizes and resistances	1D10
Electrical wiring, Current ratings of power cables	1D10

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Electrical wiring, Diagrams & symbols	1D05
Electrical wiring, Earth faults	1D20
Electrical wiring, Earth tests	1D20
Electrical wiring, Faulty insulation and sharp edges	1D20
Electrical wiring, Fuse and cable analysis	1D05
Electrical wiring, Identification	1D15
Electrical wiring, Identification and labelling of new equipment	1D20
Electrical wiring, Information to others	1D20
Electrical wiring, Insulation	1D10
Electrical wiring, Insulation of wires and connectors	1D20
Electrical wiring, Labelling	1D15
Electrical wiring, Labelling of equipment and wiring to be removed	1D20
Electrical wiring, Links	1D15
Electrical wiring, Numbering arrangement for PO type tag blocks	1D05
Electrical wiring, Other tables and forms	1D05
Electrical wiring, Plans	1D05
Electrical wiring, Plug-in relay wiring	1D15
Electrical wiring, Preparation	1D20
Electrical wiring, Problems with PVC insulated wires	1D15
Electrical wiring, Production of design details presentation	1D05
Electrical wiring, Recording of wiring run etc.	1D15
Electrical wiring, Recovery of wires and equipment, general	1D20
Electrical wiring, Redundant cores within Westpac & similar internal multicore cables	1D20
Electrical wiring, Redundant wire that cannot be removed	1D20
Electrical wiring, Redundant wires that cannot be removed	1D20
Electrical wiring, Relay contact analysis	1D05
Electrical wiring, Relay wiring	1D15
Electrical wiring, Reminders	1D10
Electrical wiring, Removal of redundant equipment	1D20
Electrical wiring, Removal of redundant wiring	1D20
Electrical wiring, Revised cable specification	1D10
Electrical wiring, Routing	1D15
Electrical wiring, Running and termination of wires	1D15

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Electrical wiring, Running of new wires	1D20
Electrical wiring, Running the wires	1D25
Electrical wiring, Sharp corner protection	1D15
Electrical wiring, Sheathing	1D10
Electrical wiring, Special types	1D10
Electrical wiring, Stagework interlink cable	1D25
Electrical wiring, Stagework interlink cabling	1D25
Electrical wiring, Stagework techniques	1D25
Electrical wiring, Telecomm type jacking strip numbering	1D05
Electrical wiring, Termination at existing installations	1D15
Electrical wiring, Termination at new installations	1D15
Electrical wiring, Termination numbering examples	1D05
Electrical wiring, Termination of cables	1D20
Electrical wiring, Termination of new wires	1D20
Electrical wiring, Typical sharp corner protection	1D15
Electrical wiring, Typical use of Spirowrap on small quantities of wires	1D15
Electrical wiring, Unterminated wire on relay	1D20
Electrical wiring, Wire and cable straps	1D15
Electrical wiring, Wire trees, junction strapping	1D15
Electrical wiring, Wires & cables	1D10
Electrical wiring, Wiring colours	1D25
Electrical wiring, Wiring tree faults	1D15
Electrical wiring, Wiring trees	1D15
Electrical wiring, Wiring up	1D15
Electrical wiring, Wiring, why do we need it	1D15
Electrical wiring, Work at commissioning	1D20
Electrical Safety	2J01
Electrical, AWS	2U05
Electricity at work regulations	2J01
Electrolyte, Batteries	2K10
Electronic equipment, Data link cable	2W10
Electronic equipment, Electrical interference to S&T equipment	2W05
Electronic equipment, General,	2W05
Electronic equipment, Handling	2W05

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Electronic equipment, Lightning protection	2W05
Electronic equipment, Location cases & remote equipment rooms	2W10
Electronic equipment, Module connectors	2W10
Electronic equipment, Power supplies	2W05
Electronic equipment, SSI & IECC systems	2W10
Electronic equipment, SSI modules	2W10
Electronic equipment, Wiring	2W05
Environmental noise, Track circuits	2P30
Equipment & wiring practice, Equipment rooms,	2E05
Equipment arrangement, Track circuits	2P40
Equipment arrangement, Track circuits	2P45
Equipment arrangement, Track circuits	2P35
Equipment layout, Locations	2G10
Equipment racks, Equipment rooms	2E05
Equipment rooms, Additions to existing installations	2E05
Equipment rooms, Battery room	2E05
Equipment rooms, Cable termination racks	2E05
Equipment rooms, Computer floors	2E05
Equipment rooms, Equipment & wiring practice	2E05
Equipment rooms, Equipment racks	2E05
Equipment rooms, Final checks	2E05
Equipment rooms, Floor ducts	2E05
Equipment rooms, Labelling	2E05
Equipment rooms, Main overhead trunking routes	2E05
Equipment rooms, Power distribution equipment	2E05
Equipment rooms, Relocatable equipment buildings (REBs)	2E05
Equipment rooms, Telephone and power sockets	2E05
Equipment rooms, Test points	2E05
Equipment rooms, Trunking for cables and wires,	2E05
Equipment rooms, Typical arrangement of cables under a "computer" floor	2E05
Equipment rooms, Typical use of ducting/trunking in REB	2E05
Equipment rooms, Vandal alarms	2E05
Equipment rooms, Vertical and horizontal trunking on racks	2E05
Equipment rooms, Wires and cables	2E05

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Equipment rooms, Work at an existing installation	2E05
Equipment, General advice	1X10
Erection of straight post signals using hinges & lifting pole, Signals,	2M05
Erection of straight post signals using hinges & lifting pole, Signals	2M05
Erection of straight post signals using, Signals	2M05
Erections,Locations,	2G05
Examples of crimp terminals, Tools & techniques	1H05
Examples of crimping tools, Tools & techniques	1H05
Examples of final labelling, Labelling	1M05
Excavations Safety	1B05
Eye protection Safety	1B05

F

Description	Module
Facing and trailing points, Points	2S05
Faulty insulation and sharp edges, Electrical wiring	1D20
Feed circuits,Level crossings	2X05
Fibre rope and slings Safety	1B05
Final charger setting, Batteries	2K10
Final checks,Equipment rooms	2E05
Final checks,Signal boxes & GFs	2F05
Final jobs, Points	2S20
Final work, Locations	2G10
First aid Safety	1B05
Fitting out, Locations,	2G10
Fixing the labels, Labelling	1M10
Fixing to concrete sleepers, AWS	2U05
Fixing to concrete, Fixings	1Q05
Fixing to hollow surfaces, Fixings	1Q05
Fixing to wooden sleepers,AWS	2U05
Fixings, Bolts and nuts	1Q05
Fixings, Cavity (hollow surface) and concrete fixings	1Q05
Fixings, Fixing to concrete	1Q05
Fixings, Fixing to hollow surfaces	1Q05
Fixings, Locking methods, lock nuts	1Q05

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Fixings, Locking methods, lock washers	1Q05
Fixings, Locking methods, locking compounds	1Q05
Fixings, Locking methods, locking nuts	1Q05
Fixings, Locking methods, slotted (or castellated) nut and split pin	1Q05
Fixings, Nuts bolts screws washers etc.	1Q05
Fixings, Screws	1Q05
Fixings, Self locking and slotted nuts	1Q05
Fixings, Split pins used with crank pins	1Q05
Fixings, Threads	1Q05
Fixings, Tools	1Q05
Fixings, Types	1Q05
Fixings, Washers	1Q05
Fixings, Washers	1Q05
Flexible conduit for contact box and controller wiring, Signal boxes & GFs	2F05
Flexible conduit, Signal boxes & GFs	2F05
Floor ducts, Equipment rooms	2E05
Fluxes, Tools & techniques	1H15
Foot protection Safety	1B05
Frequencies, Track circuits	2P35
Frequencies, Track circuits	2P40
Frequencies, Track circuits	2P45
Fuse and cable analysis, Electrical wiring	1D05

G

Description	Module
General advice, Before a job is finished	1X05
General advice, Before leaving the site	1X05
General advice, Cabling & wiring	1X10
General advice, Common pitfalls	1X10
General advice, Equipment	1X10
General advice, Good housekeeping practice	1X05
General advice, Loading materials for transit	1X05
General advice, Log books	1X05
General advice, On communication	1X10
General advice, Planning your work	1X05

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

General advice, Terminations	1X10
General advice, Tools	1X10
General advice, When on site	1X05
General assembly, Train stops	2U15
Good housekeeping practice, General advice,	1X05
Ground mounted posts, general, Signs	2M15
Ground mounted posts, installation, Signs	2M15

H

Description	Module
Hand crank cut-out switch, Points	2S10
Hand operated stripper, Tools & techniques	1H10
Hand protection Safety	1B05
Handling, Electronic equipment	2W05
Hazardous materials Safety	1B05
Hazardous materials, Safety	1B05
Head protection Safety	1B05
Heat sensitive equipment, Tools & techniques	1H15
High visibility clothing Safety	1B05
Hinges and lifting pole, Signals	2M05
Holding the points, Points	2S05
Hole letter codes, Relays	2C10
Hot "vee" stripper, Tools & techniques	1H10
Housing and positioning cells, Batteries	2K10
How to crimp, Tools & techniques	1H05
Hydraulic power packs, Level crossings	2X10
Hydrometer, Batteries	2K10

I

Description	Module
Identification and labelling of new equipment, Electrical wiring	1D20
Identification of clamp lock power unit, Points	2S05
Identification of points on the ground, Points	2S05
Identification, Electrical wiring	1D15
Identification, Locations	2G10
Illuminated diagram, Signal boxes & GFs	2F05

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Inductor installation,general, AWS	2U05
Information to others, Electrical wiring	1D20
Initial charge,Batteries	2K10
Inspection of ladders Safety	1B05
Inspection of punches and chisels Safety	1B05
Installation fault correction procedure, Pre-commissioning work	1U10
Installation on bull head rail, Treadles	2Q05
Installation on flat bottom rail, Treadles	2Q05
Installation, Batteries	2K05
Installation, electrical, Signal boxes & GFs	2F10
Installation, Level crossings	2X05
Installation, Level crossings	2X10
Installation, Points	2S10
Installation, Points	2S20
Installation, Signals	2M05
Installation, Track circuits	2P35
Installation, Track circuits	2P40
Installation, Track circuits	2P45
Installation, Track circuits	2P60
Installation, Train stops	2U15
Insulation adjustment of Amp tools, Tools & techniques	1H05
Insulation displacement connectors, Tools & techniques,	1H21
Insulation of terminations	1D15
Insulation of wires and connectors, Electrical wiring	1D20
Insulation, Electrical wiring	1D10
Internal equipment, Labelling,	1M10
Isolations Electrical Safety	2J01

J

Description	Module
Jointing & termination, Cabling,	2A10
Jointing aluminium cored cables, Cabling	2A10
Jointing copper cables using heat shrinkable systems, Cabling	2A10
Jointing kits, Cabling	2A10
Jointing track circuit 50/0.25mm tail cables, Cabling	2A10

Ref:	NR/L3/SIG/11303
Issue: 6	
Date: 03/03/2	012
Compliance date:	03/03/2012

Jointless track circuits, Track circuits,	2P30
Jumper cables and bonding, Track circuits	2P05
Jumper cables, general, Track circuits	2P15
Jumper cables, identification, Track circuits	2P15
Jumper identification, Track circuits	2P15
Junction indicators, Not in use	2M10
Junction indicators, Signals	2M05

L

Description	Module
"L" plate connector, Track circuits	2P10
Label colour,	1M10
Label material,	1M10
Label position,	1M10
Label positions, Labelling	1M05
Labelling Balises for TASS	1M20
Labelling of cables near signal box or relay room, Labelling	1M05
Labelling of equipment and wiring to be removed, Electrical wiring	1D20
Labelling track circuit termination, Labelling	1M05
Labelling, Bead marking system	1M05
Labelling, Cable cores and wires	1M05
Labelling, Cable termination at relay/equipment room or location end	1M05
Labelling, Cable terminations at apparatus end	1M05
Labelling, Cables, labelling method	1M05
Labelling, Electrical wiring	1D15
Labelling, Equipment rooms	2E05
Labelling, Examples of final labelling	1M05
Labelling, Fixing the labels	1M10
Labelling, Internal equipment	1M10
Labelling, Label positions	1M05
Labelling, Labelling of cables near signal box or relay room	1M05
Labelling, Labelling track circuit termination	1M05
Labelling, Labels at cable joints, examples	1M05
Labelling, Lettering size	1M10
Labelling, Oskarlapp labelling system	1M05