



Appendix E, *Maintenance*

Network Rail specification

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1 Introduction

1.1 Background

The concept of Modular Signalling has been adopted and developed within Network Rail in order to bring about significant cost savings in the implementation of signalling renewal schemes.

The introduction of Modular Signalling to the rail network offers an opportunity to re-evaluate the approach to maintenance and maintainability. Users demand that modern systems deliver, at least, the traditionally-provided levels of safety but also very high levels of availability, reliability and maintainability.

1.2 Purpose

The purpose of this specification is to record the philosophy and requirements which will be applicable to the maintenance of Modular Signalling.

1.3 Scope

This specification deals only with maintenance and maintainability. The Modular Signalling system is defined in other appendices to the Handbook. In particular, Appendix D sets out non-functional requirements for areas such as system performance and system safety.

1.4 Definitions

Common definitions are set out in the main section of the Modular Signalling Handbook.

LRU

Line Replaceable Unit

2 Maintenance concept

NOTE 1 The essential concept of Modular Signalling will achieve a high degree of maintainability in that the system should be modular in nature, built to a known, simplified configuration and easily installed and highly accessible. A system designed in accordance with the concept will minimise planned and reactive manual intervention and visits to track-side.

NOTE 2 The system will deliver safe operation of the railway at levels of reliability, availability and maintainability appropriate for secondary routes and as defined in Appendix D. Limiting constraints applicable to Modular Signalling routes are set out in the Modular Signalling Handbook.

The system shall be designed with capability to maximise the use of remote diagnosis to a level suitable for its application on remote and secondary routes and the requirement to provide the maintainer with remote diagnostic tools to support prediction and timely identification of technical degradation. **[MSME 3.1E]**

The system shall provide remote interrogation, diagnostic information and restoration capability so as to enable identification of a defective LRU or host part of the system. **[MSME 3.2E]**

Capability within the system for data logging and condition monitoring will minimise site attendance for fault investigation and diagnosis and facilitate preventive maintenance. Data logging of critical functions shall be provided as necessary to meet NR standards and support the system safety case. **[MSME 3.3E]**

The modular nature of the system shall allow components to be inserted or removed quickly and easily. Configuration or compatibility requirements shall be taken care of by physical or electronic addressing and keying and thus reducing dependence on the application of Signalling Maintenance Testing Handbook procedures. **[MSME 4.1E]**

Components shall be exchanged rather than repaired on site. Interconnections between sub-system assemblies shall be designed to be plug-coupled to achieve rapid replacement and minimal testing. **[MSME 3.4E]**

The system shall provide data to, and interface with, Network Rail's "Intelligent Infrastructure" system. **[MSME 3.5E]**

The Supplier shall apply the techniques of Reliability Centred Maintenance to develop the generic maintenance regime for the system so that the tasks are correctly defined and their frequency of application is appropriate. The application of this process will achieve a maintenance regime that is transparent, robust and easily adapted for each deployment without significant re-work. **[MSME 4.2E]**

The maintenance regime for the system shall be developed using the process set out in NR/L2/SIG/10662. **[MSME 4.3E]**

3 System performance requirements

NOTE The level of performance to be delivered by a Modular Signalling system is set out in Appendix D of the Modular Signalling Handbook, Non-functional Requirements. Maintainability performance is expressed in terms of mean time between service affecting failures and mean time to repair, made up of time to travel to the failure and time to diagnose and rectify after arrival on site.

The supplier of the system shall deliver a combination of system architecture and maintenance regime that meets the required level of performance. **[MSAC 5.2E]**

Where duplicated equipment/sub-systems are provided, each shall be provided with the means to identify a faulty unit and allow action to be taken before loss of the second unit results in loss of functionality. **[MSME 3.6E]**