

SSI Data Preparation - Simulator

Chapter B: Introduction and TFM & Interlocking Simulation

Chapter B

I. Introduction

I.1 SSI Simulator

A Simulator MPM is used in a SSI Design Workstation simulation system or to replace one of the three Interlocking MPMs in a SSI Central Interlocking during testing, to simulate incoming telegrams from Trackside Functional Modules and other Central Interlockings. The telegrams to be simulated are specified in the Simulator MPM's geographic data, which is generated by a compiler which forms part of the SSI Design Workstation data preparation facilities. The Simulator MPM is usually used in conjunction with a Technician's Terminal or Interface Processor which provides an interface to a colour graphic display and trackerball which are used to generate instructions to the Simulator MPM to amend the content of the telegrams being simulated to represent events at the trackside or in adjacent Interlocking areas.

Optionally, the Simulator MPM geographic data may also include information to allow train movements to be simulated by sequences of telegram changes which represent track circuits being occupied and cleared. The simulated trains move in response to the state of the bits in the output telegrams from the Interlocking MPMs which control signal aspects and points controls. Facilities are provided for trains to be created and deleted from the simulation at selected locations, allowing simulation of train movements across Interlocking boundaries.

The purpose of this document is to describe the content of the Simulator MPM data. This document should be read in conjunction with the "SSI Design Workstation Users' Guide", which deals with the mechanics of entering data into the workstation databases and source text files, running compilers, testing data and programming PROMs. It is also assumed that the reader is familiar with the documents for Diagnostic and Interlocking data preparation (SSI8003-30 and SSI8003-10 respectively).

The geographic data for the Simulator MPM is generated from two sources:

- (i) The scheme design database which specifies the name and identity number of each Central Interlocking, the equipment connected to each Trackside Functional Module, and the information contained in the Internal Data Link telegrams used to communicate between Central Interlockings within the Control Centre.
- (ii) A source text file (referred to as the SIM file) which specifies the paths which may be taken by trains through the controlled area, with references to signal, point and track circuit names. The length of each track circuit and the speed limits which apply are specified, together with any other features which may affect the

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movement of simulated trains. This file need only be created when train simulation is required.

Sections 2 & 3 of this document describe how the Simulator MPM data compiler derives its information from the scheme design database to simulate telegrams on the Trackside and Internal Data Links, Chapter C Section 1 describes the principles behind train movement simulation, and Chapter C Section 2 describes the train simulation data in the SIM file in detail.

1.2 IECC Simulator

The IECC simulator has two main functions:

- (i) Testing of IECC subsystems, particularly Automatic Route Setting (ARS) and the Relay Interlocking Interface (RII).
- (ii) Training of IECC operators.

It may not be used for testing SSI data.

The IECC simulator computer unit makes use of standard Motorola 68000-based processor boards as used in other IECC subsystems. Each computer unit can simulate up to 12 SSI Interlockings. Train-movement simulation is also provided, and trains may run to a timetable downloaded from the IECC Timetable Processor. Trains may also be split and joined. A PC-based user interface is provided, allowing the control of trains in the simulation, and also the operation and failure of various items of trackside equipment.

The IECC simulator accepts trackside and train-movement simulation data in the same format as that for the SSI simulator, although some parts of the data are ignored. The IECC simulator has additional data areas to control the user interface and timetable facilities. Preparation of this additional data is described in the IECC Data Preparation Manual Section IDPM 1401.

This document describes the preparation of data which will be acceptable to both systems, and the text applies to both types of simulator except where otherwise noted.

2. Trackside Modules Simulation Data

The compiler produces a block of data from each record in the "Trackside Modules" database file. The compiler uses the names of the inputs and outputs and the proving information in the record to generate data which allows the Simulator MPM to determine the initial default state of each reply telegram and where it is necessary for the simulator to respond to a change in a command telegram from the Interlocking MPM with a change in a reply telegram bit for lamp proving or points detection of the controlled output. The rules used by the compiler are intended to reflect the standard signalling nomenclature for inputs and outputs, and providing the information in the Trackside Module database is correct, the Simulator

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MPM data will be produced without any extra effort by the data preparer. The detailed explanation below is provided to aSSlst with understanding the rules which the compiler applies.

2.1 Signal Module

Eleven bytes of object code are produced for each Signal Module. The first byte identifies the data as relating to a Signal Module, and the second byte identifies the Module outputs which are red-retained, using the information from the "output mode" fields in the database record. The next eight bytes relate to the eight Module inputs, and specify the outputs proved by each input (i.e. if outputs 7,6,5 are proved on input 7, bits 7,6,5 in the first of the eight bytes will be set, giving a hexadecimal value of E0). This applies to current path proving on inputs 7,6 and relay proving (including EK) on inputs 5-0, using the information in the "proving" fields in the database record.

The final byte of data for each Signal Module determines the default state of each bit in the reply telegram when the Simulator MPM is initialised. The normal default state is for each bit to be set to "0", but for features such as track circuits it is preferable to set the default state of the bit to "1", so that the simulation is started with all track circuits clear, and the compiler examines the names allocated to each input to determine if this is the case. The conditions under which the default state is set to "1" are as follows:

- (i) Lamp and filament proving of non-controlled aspects. Identified by an input "description" field commencing with "EC" or "EK", but no reference to this input in the "current path" or "relay proving" fields for any of the outputs.
- (ii) Track circuit inputs, "Identity" and "Description" fields both commence with "T".
- (iii) Automatic signal occupation switches. "Identity" field commences with "S", and "Qualifier" field "(OCC)".
- (iv) Ground frame detection normal. "Qualifier" field "N" or "(N)".
- (v) An input for which a special diagnostic fault report has been defined by means of a letter "A", "B" or "C" in the "note" field (see "Diagnostic Data Preparation Guide").
- (vi) Points contactor down-proving. "Description" field "WCR". This type of input should be connected only to a Points Module, but the simulator compiler will allow it on either a Points or Signal Module.

The compiler makes a special check for inputs used for proving of the most restrictive aspect for electro-mechanical searchlight signals or banner repeating signals, "Qualifier" field "R" or "(ON)", "Description" field "GC". A bit is set in the final byte of data to set the default state of this