

BRITISH RAILWAYS BOARD**SPECIFICATION 1911A****for****SOLID STATE INTERLOCKING PROCESSOR MEMORY MODULE MkII
(Memory Module with Standard/Extended Memory Options)****FOREWORD**

This specification supersedes all previous issues and is issued by:-

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REFERENCES

Reference in this specification is made to:-

British Rail Drawings

ELS-A2-4342 Issue C Mark2 Memory Module Circuit Diagram
ELS-A4-4384 Issue A Mark2 Memory Module Case Details

British Railways specification:

967 Environmental conditions for Railway Signalling apparatus
1900 General Specification for Solid State Interlocking equipment
1905A Specification for Multi-Processor Module (MK II)
1908A Specification for Panel Processor Module (MK II)
1990 Specification for preparation of EPROMS for railway signalling applications

The latest issue of all specifications, drawings and British Standards shall apply unless otherwise stated.

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**Documents**

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1. GENERAL

- 1.1 This specification states the specific engineering requirements for a solid state interlocking Processor Memory Module ("MM").
- 1.2 A MM forms the total requirement of memory for the main processor of either a Multi Processor Module ("MPM") or a Panel Processor Module ("PPM") in an SSI system.
- 1.3 All components except memory devices shall be soldered directly to the p.c.b. Soldering of jumper links for address or device selection is optional.
- 1.4 The module shall meet all the requirements of BR specification 1900 unless otherwise stated.
- 1.5 The module shall be capable of being configured for different applications by means of links which select the type of memory device installed, and the program in a bipolar PROM which determines the address decoding. This allows the module to be used in a Central Interlocking (SSI MPM or SSI PPM) or in a Design Workstation Simulation System (DWS MPM or DWS PPM), with either "Standard Memory" which is interchangeable with equivalent configuration of the Mark 1 Memory Module, or "Extended Memory" which makes use of paging to increase the available program and data address space by 50%. Five options are detailed in Appendix 2:

BR1911A-1	SSI MPM Extended Memory	
BR1911A-2	DWS MPM Extended Memory	
BR1911A-3	SSI PPM Standard Memory	(equivalent to BR1911-3)
BR1911A-4	DWS PPM Standard Memory	(equivalent to BR1911-4)
BR1911A-5	SSI MPM Standard Memory	(equivalent to BR1911-1)

- 1.6 The front plate shall carry a label, as defined in Section 8 of this specification.

2. CONSTRUCTION

- 2.1 The module shall be constructed to meet the requirements of BR specification 1900 when installed as part of its host module.
- 2.2 The module shall meet the requirements of BR specification 967 category 'B' with the exception that drip proofing is not required.
- 2.3 The module shall fit within the outline envelope defined by drawing ELS-A4-4384, to enable it to be inserted into the host processor module through the aperture defined by BR specification 1905A or 1908A as appropriate.
- 2.4. Two handles to facilitate insertion and withdrawal of the module from the host processor module shall be provided.
- 2.5 The module shall be secured to the host processor module by its front plate, using two M4 screws as defined on drawing ELS-A4-4384.
- 2.6 The module, when removed from the host processor module, shall be fully enclosed on all sides. When the connector to the module is removed, the module components shall not be accessible by the standard finger.

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2.7 The module shall be internally labelled in accordance with the following:-

2.7.1 The p.c.b. assembly shall identify all component positions.

2.7.2 The p.c.b. shall carry the manufacturer's identity, p.c.b. type, date and modification state.

2.8 The p.c.b. shall be attached to a plate which shall form the support member for affixing to a host processor module.

2.9 The module shall be fitted with a Manufacturer's label underneath it, containing at least the following information:-

Manufacturer's name
Manufacturer's part number
Module serial number
Date of manufacture
Module application as shown in Section 1.5
(Paged/Unpaged may be used instead of Extended/Standard)
BR Specification BR1911A-1 to BR1991A-5 as appropriate
BR Modification state.

3. ELECTRICAL REQUIREMENTS

3.1 The module shall contain circuitry based on drawing ELS-A2-4342 dependent on configuration. Link settings are dependant on the required option and are shown on this drawing. The module shall be supplied with the links correctly set. The choice of integrated circuits IC2, IC3, IC4, and IC5 is dependent on the required option. The configuring code, stored in the bipolar PROM IC6 is also dependent on the required option. The correct integrated circuits and bipolar PROM with correct configuring code shall be supplied with the module. These requirements are tabulated in Appendix 2 of this specification.

3.2 The component specifications, tolerances ratings and so on, shall be shown on the component schedules except as specifically authorised by the Engineer.

3.3 The input and output connections of the p.c.b. shall be numbered and labelled as shown in Appendix 1.

3.4 The customer is expected to have advised which of three forms, "without EPROMs", "with data" or "without data", should be used for options BR1911A-1, BR1911A-3 and BR1911A-5. For these options the module shall be supplied in one of these three forms and the Contractor shall confirm at the time of tender in which form the module is being supplied:

"without EPROMs", in which case the module shall be supplied without data EPROM IC4 and program EPROM IC5

OR

"without data" in which case the module shall be supplied with an unprogrammed data EPROM IC4 and correctly programmed and labelled program EPROM IC5

OR

"with data" in which case the module shall be supplied with data EPROM IC4 and program EPROM IC5, both correctly programmed, labelled and installed.

- 3.5 If the module is to be supplied with data, the Customer shall specify whether he will prepare the data and supply it as object code or whether the Contractor shall be responsible for preparing the data from source material such as signalling plans and/or control tables.
- 3.6 For forms "with data" and "without data" the customer is expected to have advised of the application of option BR1911A-3 ("IECC" or "PANEL" or "RETB") and of options BR1911A-1 and BR1911A-5 ("INTERLOCKING" or "DIAGNOSTICS" or "SIMULATOR" or "RETB") as this will determine the program to be supplied.

Where the program EPROM is supplied, the Customer shall confirm at the time of tender what issue of program is required. BR will be responsible for the provision of approved or validated code for this program.

- 3.7 All PROM devices (except the data EPROM IC4 in the "without data" form) shall be programmed and labelled in accordance with BR specification 1990, except that the label on the bipolar PROM IC6 shall include just the configuration code reference (SSI1911A-1 to SSI1911A-5 for options BR1911A-1 to BR1911A-5 respectively).
- 3.8 There shall be no external indications provided on the memory module.
- 3.9 No test points need be provided within the module.

4. CONNECTORS

- 4.1 All external connections shall be made via a single 40 way connector, to BT specification D26532 for connector number 244. The connection details are as shown in Appendix 1 of this specification.
- 4.2 The memory module connector shall be a "male" connection. The free lead from the host module shall have a termination to a "female" connector. A centre polarising keying notch, as shown in drawing ELS-A4-4384, shall be provided to ensure that there will be only one way to mate the two parts of the connector together.

5. RELIABILITY

The module shall be designed to have a nominal predicted MTBF of 100,000 hours. The contractor shall send details of the method of calculation used.

6. TYPE APPROVAL TESTS

The type approval tests listed below shall be carried out as detailed in BR Specification 1900.

Visual Inspection 1
Dry heat test
Low temperature test
Vibration Test
Vibration Test (within a host module)
Insulation test
Condensation test
Visual inspection 2
Performance test 1
Damp heat test
Drop test
Drop test (within a host module)
EMC test
Performance test 2

7. ACCEPTANCE

- 7.1 Details of the acceptance tests which shall be carried out on every module during manufacture or after manufacture are contained in BR specifications 1905A and 1908A.
- 7.2 It should be noted that a module shall be tested in a host module for all appropriate electrical tests.

8. MEMORY MODULE LABEL & SEALING

- 8.1 The memory module shall carry a label (in addition to that specified in Section 2.7.3) at the front of the module with the displayed information positioned as shown in Appendix 3. For forms "without data" and "without EPROMs" the provision of this label is optional, i.e. the Customer is expected to have advised whether a label is required, and if so, have supplied the appropriate details listed below.
- 8.2 The label shall be coloured and display a module name as shown below:-

<u>Option</u>	<u>Module Name</u>	<u>Background Colour</u>	<u>Lettering Colour</u>
BR1911A-1	EXT I/L MPM	Black	Silver or White
	EXT DIA MPM	Red	Silver or White
	EXT SIM MPM	Yellow or Gold	Black
BR1911A-2	EXT DWS MPM	Silver or White	Black
BR1911A-3	STD PANEL PPM	Green	Silver or White
	STD IECC PPM	Green	Silver or White
	STD RETB PPM	Black	Yellow or Gold
BR1911A-4	STD DWS PPM	Silver or White	Green
BR1911A-5	STD I/L MPM	Black	Silver or white
	STD DIA MPM	Red	Silver or white
	STD SIM MPM	Yellow or Gold	Black
	STD RETB MPM	Blue	Silver or white

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8.3 The label shall be covered by an optically clear rigid plastic sheet of the same size as the front plate. The sheet shall be chemically and structurally stable. The label and sheet shall be secured to the front plate of the module by the handles, so that the label is not obscured in the forward vertical plane. The label shall not adhere to the front plate.

8.4 For options BR1911A-1, BR1911A-3 and BR1911A-5 additional information , customer supplied where necessary , shall be displayed on the label as follows:-

Interlocking mnemonic
Interlocking identity number
Control centre/signalbox name
Control centre identity number , if one has been allocated

8.5 Where program EPROM IC5 is supplied the module label shall carry a self adhesive EPROM label positioned as shown in Appendix 3. This label shall be an exact duplicate of the label of EPROM IC5.

8.6 Where a programmed data EPROM is supplied the module label shall also carry a second self adhesive EPROM label positioned as shown in Appendix 3. This label shall be an exact duplicate of the label on data EPROM IC4.

8.7 For options BR1911A-2 and BR1911A-4 and for the "with data" form of options BR1911A-1 , BR1911A-3 and BR1911A-5 the Contractor shall seal the memory module unit once it is complete.

APPENDICES

1. Memory Module Connections
2. Bipolar PROM Details.
3. Front Label Details.