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4.1 Functional Description of Module

An MPM may be configured to carry out a number of different functions. The controlling elements of each CI are three MPMs configured as Interlocking MPMs. These Interlocking MPMs are responsible for the safe execution of all Interlocking logic and issue of correct instructions (telegrams) to lineside equipment. They also control the timing of all communications within the system and management of the redundancy system of which they each form a part. The Interlocking MPMs are triplicated for availability and, after failure of one of the modules, will continue to work as a duplicated system.

The Interlocking program is of general application and embodies a set of fixed rules which enables the signalling principles expressed in geographic data to be put into effect for each particular signalled area. Both program and data are stored in read only memories, the data is prepared in accordance with the Scheme Plan and SSI8003 [Ref 2] "SSI Data Preparation" from the Control Tables and allocation of trackside equipment to the TFMs.

The Diagnostic MPM is similar to the three Interlocking MPMs but configured to monitor data flow on the Data Links and communicate with the TT. Geographic data preparation is required for the Diagnostic MPM.

4.2 Module Details

An MPM is contained in a 3U height 19" rack mounted case. The front of the case has the slot for the Memory Module and the System indicator. The rear of the MPM has the power switch, power connector, a 75-way connector, a 50-way connector, a manufacturer's plate and 3 indicators for 'Power', 'Fused Supply' and 'System'. The power supply to the module is 110 Va.c.

- The Power indicator is illuminated when 110Va.c. (BX110) input voltage is applied to the module.
- The Fused Supply Indicator is illuminated when the module is powered up and security fuse is intact.
- The System Indicator is illuminated when the module is online and working.

Westinghouse and ALSTOM modules have different positioning of the indicators on the rear of the modules.

Both Westinghouse and ALSTOM have manufactured SSI MPMs.

The current production versions of SSI are the Category 2B (Extended Memory), AL3A and WS3A versions, and new signalling schemes will be installed to either of these standards.

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Hardware and software for Category 2B (Standard Memory) is also in production. It should not be used for new schemes.

All Interlocking MPMs within a single Central Interlocking (CI) must be of the same type and modification state, and running the same version of main, trackside communications, and internal communications software.

The Diagnostic MPM must contain software of a version compatible with the interlocking and TT software. The TT software must be of a version compatible with the diagnostic and panel processors.

CIIs of different Categories may be joined together on a common pair of internal data links in a control centre.



Westinghouse MkII MPM Front View



Westinghouse MkII MPM Rear View



Data Panel on Rear of Westinghouse MkII MPM

The lettering on the front of a Memory Module used in an Interlocking MPM should contain the following information:

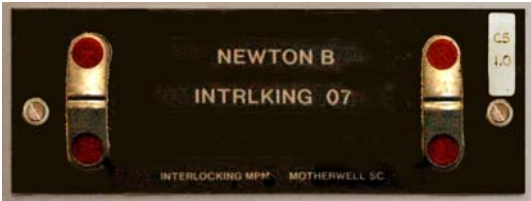
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Interlocking Name	'NEWTON B'
Interlocking Identity Number	'07'
Signalling Centre Name	'MOTHERWELL SC'
Type of Memory Module	'INTERLOCKING MPM' or 'DIAGNOSTIC MPM'

MMs are sealed by using wire seals (ALSTOM Modules) or plastic seals (Westinghouse modules). MMs with missing or damaged seals must not be used.

The design of some MMs and ribbon cable connections from the MPM to the MM may not prevent the cable being connected upside down. Care must be taken to ensure that MMs are connected correctly. This can be checked by ensuring that the ribbon cable to the memory module is not twisted.

The ribbon cable connector is held in place by 2 retaining arms on the MM socket. Pushing the arms outwards (i.e. away from the ribbon cable) disengages the connector. The arms automatically engage when a ribbon cable connector is inserted into the socket.



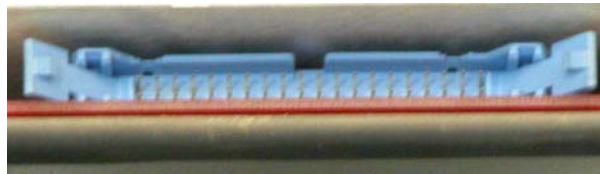
Westinghouse Interlocking MPM Memory Module



Westinghouse Diagnostic MPM Memory Module



Data Panel on Westinghouse MM (MPM type)



Ribbon cable socket on Memory Module, locking arms can be seen at either side of the connector.



Twisted ribbon cable, Memory module should be checked to ensure it is not connected 'upside down'.

4.3 Module Variants

4.3.1 Spec. BR1905 for MkI MPMs

These were used in the Category 1A (Upgrade) scheme at Leamington Spa and the Category 1B schemes at Oxted, Dorchester and Inverness. These sites have all been upgraded to later versions and no Category 1A (Upgrade) or Category 1B SSI CIs remain.

4.3.2 Spec BR1905A for MkII MPMs

MPMs to BR1905A are used on Category 2B (Standard Memory) and 2B (Extended Memory) schemes. When used only as Diagnostic MPMs BR1905A units are also found in category AL3A and WS3A systems.

As well as a revised Interlocking Cubicle, PPM, MPM and TT, Category 2A introduced the use of separate Memory Modules for MPMs and PPMs. These contain the main program, working RAM, and Geographic Data EPROM. MkII MPMs can therefore be swapped between Interlocking and Diagnostic MPM functions as well as between different CIs provided that modification states are compatible.

The 2B (Standard Memory) system introduced the use of the Long Distance Terminal to interface data links to communications systems, the option of an IECC interface for the panel processor, and the incorporation of a menu driven interface on the Technician's Terminal.

The Category 2B (Extended Memory) system introduced the extended memory version of the Memory Module, increasing the capacity of the interlocking and diagnostic geographic data.

Because MkII MPMs still contain trackside and internal Data Link communications programs within the module carcass, they contain trackside communications software for both Interlocking and Diagnostic MPM use. The appropriate software is selected automatically on power up.

4.3.3 Spec. BR1905A Hardware & Software Configuration

Category 2A systems are identified by the use of MPMs of type BR1905A with interlocking software SSI4303-C1 in the interlocking cubicle. There are no longer any Category 2A systems in use.

Category 2B (Standard Memory) systems are identified by the use of MPMs type BR1905A with interlocking software SSI4303-C3 or SSI4303-C5 in the interlocking cubicle.

Category 2B (Extended Memory) systems are identified by the use of MPMs type BR1905A, or ALSTOM MkIIA, with interlocking software SSI4303-D2 or SSI4303-D4 in the interlocking cubicle.

Interlocking MPMs

BR Mod. State	Scheme Type	Installed Program			MM Type	Modification Details
		Trackside Comms	Internal Comms	Main Processor		
2	2B(STD)	SSI4304-C3	SSI4305-B5	SSI4303-C3	BR1911-1	
4	2B(STD)	SSI4304-C3	SSI4305-B5	SSI4303-C3	BR1911-1	
				SSI4303-C5	BR1911A-5 mod 1	
	2B(EXT)	SSI4304-C3	SSI4305-B5	SSI4303-D2	BR1911A1-1 mod 1	
				SSI4303-D4		
5	2B(STD)	SSI4304-C3	SSI4305-B5	SSI4303-C3	BR1911-1	
				SSI4303-C5	BR1911A-5 mod 2	
	2B(EXT)	SSI4304-C3	SSI4305-B5	SSI4303-D2	BR1911A1-1 mod 2	
5	2B(STD)	SSI4304-C4	SSI4305-B5	SSI4303-C3	BR1911-1	#1
				SSI4303-C5	BR1911A-5 mod 2	#1
	2B(EXT)	SSI4304-C4	SSI4305-B5	SSI4303-D2	BR1911A1-1 mod 2	#1
				SSI4303-D4		#1

#1 Because of the lack of a suitable modification panel for the Trackside Communications Program, Spec BR1905A MPMs fitted with SSI4304-C4 software carry an identifying label near the manufacturers label. On ALSTOM Spec BR1905A MPMs this has the legend “SSI-4304-C4 CONV” whereas on Westinghouse Spec BR1905A MPMs the legend is “SSI-4304-C4 Fitted”. Where no such label is present, the Spec BR1905A MPM should be assumed to be fitted with SSI-4304-C3 software.

Problems may be encountered when using MMs of a different manufacturer to that of the MPM or PPM in which they are installed, or with using CMOS EPROMs in MMs. These practices should be avoided.

Category 2B (Standard Memory) systems may suffer from the “Newcastle” problem (for further details see RT/E/C/17902 [Ref 7]). If this is present, an upgrade to Category 2B (Extended Memory) with interlocking software SSI4303-D4 is required. However, there may be timing problems in such a change if an interlocking is near its maximum timing limits.

The interlocking software SSI4303-C5 gives the following benefits:

- a) Removal of an error in the processing of logical data types by the panel processor and Interlocking MPM. A data fix has been applied to Category 2A schemes. See SSI8003-54 [\[Ref 2\]](#) for details.
- b) A problem which may result in interlockings going off line when only one MPM is powered down is overcome (only applies if telegram 62 is used)
- c) Accuracy of timers improved
- d) Correction of minor problems with Technician's Terminal fault codes.

The Interlocking software SSI4303-D4 gives the following benefits:

- a) A data paging problem which previously required a data solution has been resolved (see SSI8003-54 [\[Ref 2\]](#)).
- b) Aspect stepping up of signals where signal on clearing may be held at Y for one major cycle before stepping to a higher aspect (prevents possible irregularity in the event of a track circuit (or track section) failure.
- c) New data type "Input telegram for track circuit (delayed)" introduced.
- d) Improved safety in discrimination between panel requests from panel/IECC and those from another interlocking.
- e) Removal of one cause of signals reverting to red when changing from triplicated to duplicated operation (other causes still under investigation).
- f) Resolution of the "Newcastle" problem (for further details see RT/E/C/17902 [\[Ref 7\]](#)).

SSI4303-D4 should be installed wherever the potential for the "Newcastle" problem has been identified (for further details see RT/E/C/17902 [\[Ref 7\]](#), on all new Category 2B (Extended Memory) schemes.

The Trackside Communications software SSI4304-C4 gives the benefit of improved diagnostics and path failure error detection.

Diagnostic MPMs

BR Mod. State	Scheme Type	Installed Program			MM Type	Modification Details
		Trackside Comms	Internal Comms	Main Processor		
2	2B(STD)	SSI4304-C3 #1	SSI4305-B5	SSI4306-C5	BR1911-1	For use with Category 2B (Standard Memory) systems
				SSI4306-C6	BR1911-1	
4	2B(STD)	SSI4304-C3 #1	SSI4305-B5	SSI4306-C5 or SSI4306-C6	BR1911-1 or BR1911A-5 mod 1	Modified for use with Category 2B (Extended Memory)

BR Mod. State	Scheme Type	Installed Program			MM Type	Modification Details
		Trackside Comms	Internal Comms	Main Processor		
	2B(EXT)	SSI4304-C3 #1	SSI4305-B5	SSI4306-C5 or SSI4306-C6	BR1911-1 or BR1911A-5 mod 1	systems.
				SSI4306-E1	BR1911A-1 mod 1	
				SSI4306-E2	BR1911A-1 mod 1	
	AL3A	SSI4304-C3 #1	SSI4305-B5	SSI4306-C6	BR1911A-5 mod 1	
				SSI4306-E2	BR1911A-1 mod 1	
	WS3A	SSI4304-C3 #1	SSI4305-B5	SSI4306-C6	BR1911A-5 mod 1	
				SSI4306-E2	BR1911A-1 mod 1	
5	2B(STD)	SSI4304-C3 #1	SSI4305-B5	SSI4306-C5 or SSI4306-C6	BR1911-1 or BR1911A-5 mod 2	Modified to improve reliability and to allow wider choice of memory devices
	2B(EXT)	SSI4304-C3 #1	SSI4305-B5	SSI4306-C5 or SSI4306-C6	BR1911-1 or BR1911A-5 mod 2	
				SSI4306-E1	BR1911A-1 mod 2	
				SSI4306-E2	BR1911A-1 mod 2	
	AL3A	SSI4304-C3 #1	SSI4305-B5	SSI4306-C6	BR1911A-5 mod 2	
				SSI4306-E2	BR1911A-1 mod 2	
	WS3A	SSI4304-C3 #1	SSI4305-B5	SSI4306-C6	BR1911A-5 mod 2	
				SSI4306-E2	BR1911A-1 mod 2	

#1 SSI4304-C4 may be fitted instead of SSI4304-C3, but has no noticeable effect on the operation of a Diagnostic MPM. Because of the lack of a suitable modification panel for the Trackside Communications Program, Spec BR1905A MPMs fitted with SSI4304-C4 software carry an identifying label near the manufacturers label. On ALSTOM Spec BR1905A MPMs the legend is "SSI-4304-C4 CONV" whereas on Westinghouse Spec BR1905A MPMs the legend is "SSI-4304-C4 Fitted". Where no such label is present, the Spec BR1905A MPM should be assumed to be fitted with SSI-4304-C3 software.

BR Mod. State 3 for BR1905A MPMs was not used.

The Diagnostic MPM program SSI4306-C6 removes an error which incorrectly reported internal data link faults.

The diagnostic MPM program SSI4306-E1 incorporates paged memory for additional data capacity, but is in restricted use and will not be installed further. It has been replaced by SSI4306-E2, which corrects a known problem with the monitoring of signals and points, and includes diagnostic features for the Axle Counter Module (in development).

4.3.4 ALSTOM MkIIA MPMs

ALSTOM MkIIA MPMs can be used on Category 2B (Standard Memory) and 2B (Extended Memory) schemes. When used only as Diagnostic MPMs ALSTOM MkIIA units are also found in category AL3A and WS3A systems.

ALSTOM MkIIA MPMs use separate plug in Memory Modules that contain the main program, working RAM, and Geographic Data EPROM. ALSTOM MkIIA MPMs can therefore be swapped between Interlocking and Diagnostic MPM functions as well as between different CIs provided that modification states are compatible.

Because ALSTOM MkIIA MPMs still contain trackside and internal Data Link communications programs within the module carcass, they contain trackside communications software for both Interlocking and Diagnostic MPM use. The appropriate software is selected automatically on power up.

Interlocking MPMs

BR Mod. State	Scheme Type	Installed Program			MM Type	Modification Details
		Trackside Comms	Internal Comms	Main Processor		
1	2B(STD)	SSI4304-C3	SSI4305-B5	SSI4303-C5	BR1911A-5 mod 2	ALSTOM part SS1002A, functionally equivalent to BR1905A mod state 5
	2B(EXT)	SSI4304-C3	SSI4305-B5	SSI4303-D2 or SSI4303-D4	BR1911A1-1 mod 2	
1	2B(STD)	SSI4304-C4	SSI4305-B5	SSI4303-C5	BR1911A-5 mod 2	ALSTOM part SS1002B, improved TCP diagnostics and path failure error detection.
	2B(EXT)	SSI4304-C4	SSI4305-B5	SSI4303-D2 or SSI4303-D4	BR1911A1-1 mod 2	

A modification was carried out to the power supply of the ALSTOM MPM to move its power outage criticality 'window' from around 10ms to around 60ms. This was to ensure that the MPM could be adequately protected from power outage by the timer specified in SSI8500 Chapter F –

Signaller's Console. Mk2B MPMs having the upgraded power supply are SS1002A Mod State 3 or higher and SS1002B Mod State 2 or higher.

Diagnostic MPMs

BR Mod. State	Scheme Type	Installed Program			MM Type	Modification Details
		Trackside Comms	Internal Comms	Main Processor		
1	2B(STD)	SSI4304-C3 #1	SSI4305-B5	SSI4306-C5	BR1911A-5 mod 2	Initial Issue, functionally equivalent to BR1905A mod state 5
				SSI4306-C6	BR1911A-5 mod 2	
	2B(EXT)	SSI4304-C3 #1	SSI4305-B5	SSI4306-C5	BR1911A-5 mod 2	
				SSI4306-C6	BR1911A-5 mod 2	
				SSI4306-E1	BR1911A-1 mod 2	
				SSI4306-E2	BR1911A-1 mod 2	
	AL3A	SSI4304-C3 #1	SSI4305-B5	SSI4306-C6	BR1911A-5 mod 2	
				SSI4306-E2	BR1911A-1 mod 2	
	WS3A	SSI4304-C3 #1	SSI4305-B5	SSI4306-C6	BR1911A-5 mod 2	
				SSI4306-E2	BR1911A-1 mod 2	

#1 SSI4304-C4 may be fitted instead of SSI4304-C3, but has no noticeable effect on the operation of a Diagnostic MPM. MPMs fitted with SSI4304-C3 software have ALSTOM part number SS1002A, and those fitted with SSI4304-C4 software have ALSTOM part number SS1002B.

The diagnostic MPM program SSI4306-E1 incorporates paged memory for additional data capacity, but is in restricted use and will not be installed further. It has been replaced by SSI4306-E2, which corrects a known problem with the monitoring of signals and points, and includes diagnostic features for the Axle Counter Module (in development).

4.3.5 ALSTOM type AL1905B 2 MHz MPMs

The Category AL3A system, developed by ALSTOM, introduced a 2MHz version of the ALSTOM MkIIA MPM, reducing the data limitations imposed by data processing speed, and thereby removing the need for complex data structures, and consequently improving reliability, in complex interlocking boundaries.

Category AL3A systems are identified by the use of MkALIII MPMs, type AL1905B, with interlocking software AL4303-G2 in the interlocking MPM positions in the interlocking cubicle.

ALSTOM AL1905B MPMs use separate plug in Memory Modules that contain the main program, working RAM, and Geographic Data EPROM.

Because the Interlocking MPM positions are not pin-compatible with the Diagnostic MPM position within a CI modified to work with AL1905B MPMs, they cannot be used in the Diagnostic MPM position within a CI.

ALSTOM AL1905B MPMs contain trackside and internal Data Link communications programs within the module carcass. Therefore, they contain trackside communications software for both Interlocking and Diagnostic MPM use; the appropriate software is selected automatically on power up.

Interlocking MPMs

BR Mod. State	Scheme Type	Installed Program			MM Type	Modification Details
		Trackside Comms	Internal Comms	Main Processor		
1	AL3A	SSI4304-C3	SSI4305-B5	AL4303-G2	AL1911B mod 1	ALSTOM part SS1003, functionally equivalent to ALSTOM MkIIA mod state 1 except with 2MHz main processor.
1	AL3A	SSI4304-C4	SSI4305-B5	AL4303-G2	AL1911B mod 1	ALSTOM part SS1003B, improved TCP diagnostics and path failure error detection.

The interlocking software AL4303-G2 gives all benefits provided by interlocking software SSI4303-D4, including resolution of the "Newcastle" problem.

The MkALIII MM, type AL1911B, is only available in Extended Memory form. It is not interchangeable with BR1911A types.

The MkALIII MPMs and MMs are not backwards compatible with MkII MPMs/MMs. They are not interchangeable individually or in triplicate with MkWSIII MPMs and MMs.

The pin coding of the 75-way free connectors in the interlocking cubicle is changed to prevent installation of incompatible MPMs.

A modification was carried out to the power supply of the ALSTOM MPM to move its power outage criticality 'window' from around 10ms to around 60ms. This was to ensure that the MPM could be adequately protected from power outage by the timer specified in SSI8500 Chapter F – Signaller's Console. 2 MHz MPMs having the upgraded power supply are SS1003 Mod State 3 or higher and SS1003B Mod State 2 or higher.

4.3.6 Westinghouse type MkWSIII 2 MHz MPMs

The Category WS3A system, developed by Westinghouse Rail Systems, introduced a 2MHz version of the Westinghouse MkII MPM. The MkWSIII MPM and associated MM have double the processing capacity of their MkII equivalents with the main processor clock operating at 2 MHz instead of 1 MHz. This has the effect of improving reliability as complex data structures, previously imposed by data limitations per cycle, can be reduced.

Category WS3A systems are identified by the use of MkWSIII MPMs with interlocking software WS4303-K1 or WS4303-K2.

Westinghouse MkWSIII MPMs use separate plug in Memory Modules that contain the main program, working RAM, and Geographic Data EPROM.

Although the Interlocking MPM positions are pin-compatible with the Diagnostic MPM position within a CI containing MkWSIII MPMs, they cannot be used in the Diagnostic MPM position within a CI due to a different MM type.

Westinghouse MkWSIII MPMs contain trackside and internal Data Link communications programs within the module carcass. Therefore, they contain trackside communications software for both Interlocking and Diagnostic MPM use; the appropriate software is selected automatically on power up.

Interlocking MPMs

BR Mod. State	Scheme Type	Installed Program			MM Type	Modification Details
		Trackside Comms	Internal Comms	Main Processor		
1	WS3A	SSI4304-C3	SSI4305-B5	WS4303-K1 or WS4303-K2	WS1911B mod 1	Initial Issue, functionally equivalent to BR1905A mod state 5 & ALSTOM MkIIA mod state 1 interlocking MPMs except with 2MHz main processor.
1	WS3A	SSI4304-C4	SSI4305-B5	WS4303-K1 or WS4303-K2	WS1911B mod 1	Improved diagnostics and path failure error.

The interlocking software WS4303-K1 gives all the benefits provided by interlocking software SSI4303-D4, including resolution of the “Newcastle” problem.

The MkWSIII MM is only available in Extended Memory Form.

The MkWSIII MPMs and MMs are not backwards compatible with MkII MPMs/MMs and are not interchangeable individually or in triplicate with MkALIII MPMs/MMs.

The MkWSIII external electrical and mechanical interfaces are fully plug-compatible with the MkII MPM. However, the MkWSIII MM plug connector is not compatible with the MkII MM.

MkWSIII MPMs/MMs in triplicate must be contained in a standard MkII cubicle. No changes to the 75 way free connector pin coding are required.

MPM software version WS4303-K2 overcomes a problem with difficulties in bringing a third MPM on line following replacement. All sites fitted with WS4303-K1 should be upgraded to WS4303-K2.

#1 Because of the lack of a suitable modification panel for the Trackside Communications Program, MkWSIII MPMs fitted with SSI4304-C4 software carry an identifying label near the manufacturers label, with the legend “SSI-4304-C4 Fitted”. Where no such label is present, the MkWSIII MPM should be assumed to be fitted with SSI-4304-C3 software.

4.4 Memory Module Variants

4.4.1 Type BR1911

The modules are configured by internal components for the type of host module as follows:

BR1911-1 For use with MPMs

BR1911-3 For use with PPMs

Others For Design Workstation use only

BR Mod. State	Features	Limits on Usage	
		Interlocking MPMs	Diagnostic MPMs
1	Original Mkl Design	BR1905A modstate1 MPMs in Cat. 2A systems with SSI4303-C1 software	BR1905A modstate1 MPMs in Cat. 2A systems with SSI4306-C3 software
2	Hardware modification for improved reliability	or BR1905A modstate2 MPMs in Cat. 2B(STD) systems with SSI4303-C3 software	or BR1905A modstate2 MPMs in Cat. 2B(STD) systems with SSI4306-C5 or SSI4306-C6 software

4.4.2 Type BR1911A

The modules are configured by internal components for the type of host module as follows:

BR1911A-1 For use with MPMs, Extended Memory

BR1911A-5 For use with MPMs, Standard Memory (equivalent of BR1911-1)

BR1911A-3 For use with PPMs (equivalent of BR1911-3)

Others For Design Workstation use only

BR Mod. State	Features	Limits on Usage			
		Interlocking MPMs		Diagnostic MPMs	
		Cat. 2B(STD) systems (BR1911A-5)	Cat. 2B(EXT) systems (BR1911A-1)	Cat. 2B(STD) or Cat 2B(EXT) systems (BR1911A-5)	Cat. 2B(EXT) systems only (BR1911A-1)
1	Original MkII Design for use with MkII Modstate 4 MPMs only.	Systems with SSI4303-C5 software.	Systems with SSI4303-D2 or SSI4303-D4 software.	Systems with SSI4306-C5 or SSI4306-C6 software.	Systems with SSI4306-E1 or SSI4306-E2 software.
2	Modified to operate with MkII MPMs to mod state 5 or ALSTOM MkIIA MPMs only, for improved reliability	Cat 2B(STD) systems with SSI4303-C5 software.	Cat 2B(EXT) systems with SSI4303-D2 or SSI4303-D4 software.	Systems with SSI4306-C5 or SSI4306-C6 software.	Systems with SSI4306-E1 or SSI4306-E2 software.

4.4.3 Type AL1911B

The modules are configured by internal components for the type of host module as follows:

AL1911B-1 For use with Interlocking MPMs only, Extended Memory (equivalent of BR1911A-1)

Others For Design Workstation use only

BR Mod. State	Features	Limits on Usage	
		Interlocking MPMs	Diagnostic MPMs
1	Original Design for AL3A system	Cat. AL3A systems with AL4303-G2 software.	N/A

4.4.4 Type WS1911B

The modules are configured by internal components for the type of host module as follows:

WS1911B-1 For use with Interlocking MPMs only, Extended Memory (equivalent of BR1911A-1)

Others For Design Workstation use only

BR Mod. State	Features	Limits on Usage	
		Interlocking MPMs	Diagnostic MPMs
1	Original Design for WS3A system	Cat. WS3A systems with WS4303-K1 or WS4303-K2 software	N/A

4.5 List of Program Changes

4.5.1 SSI4303 Interlocking MPM Main Processor

Mk1 Programs

A	Original program for MkI MPM used on pilot scheme (1A category schemes).
A to B3	Internal Data Link introduced (1A(upgrade)/1B category schemes).
B3 to B4	Error in logicals part of functional program corrected.

Mk II Programs

B3 to C1	Minimum changes for introduction of MkII MPMs (2A category schemes).
C1 to C3	Diverse routing and LDT/PCM options for Trackside Data Links introduced (2B category schemes). Error in logicals part of functional program corrected.
C3 to C5	Problem corrected of I/L MPM shutting down when going from duplicate to triplicate working if telegram 62 (61 if LDT used) present, or through other CIs going off line. <ul style="list-style-type: none"> • 23xxxx TT report for excessive minor cycle time changed to 25xxxx report (xxxx = panel request number) or 26xxxx (xxxx = minor cycle number). • Point control bits held up for Mode 3 start up. • VIA lines correctly initialised to prevent damage when used with MkII Memory Modules. • Accuracy of timers improved (were running slow). • Accuracy of excessive major cycle time TT report 24xxxx improved such that report issued as soon as 1000ms exceeded.
C5 to D2	Variant of program for use with Extended (i.e. paged) memory version of Memory Module. Note: this change will increase program execution times. Thus when retrofitting the later program issue, checks for excessive cycle times may be required (further details will be added to SSI8003-54 [Ref 2]).