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6.1 Functional Description of Module

TFMs (Signal Modules and Points Modules) are connected to the Trackside Data Link by Data Link Modules (DLM), or, where a Long Line Link is used, sometimes by direct connection to a Long Distance Terminals (LDT); each DLM or LDT has 6 outputs and usually has connected up to 5 TFMs, with the sixth used as a test point to the Data Link, though in non-preferred cases all 6 have to be connected to TFMs with no test point provision.

Each TFM receives in turn serial data (telegrams) addressed to it via the Data Links from the Central Interlocking (CI) and switches the corresponding power level outputs controlling conventional lineside signalling equipment. Each TFM then immediately replies to the CI giving the state of the trackside signalling, e.g. track section occupancy, and of the health of the TFM itself and of the Data Links.

The SM is designed to provide the power interface to multi-aspect colour light signals but is also sufficiently flexible to cope with other signalling loads.

The SM also has facilities for current proving and inputs from other signalling functions.

6.2 Module Details

A SM is mounted on trackside equipment case racking. The front of the module has a 75-way connector, a manufacturer's plate and 4 indicators for 'Power', 'System', 'Rx Data' and 'Outputs'. 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 System Indicator is illuminated when module is powered up and security fuse is intact.
- Rx Data indicator is illuminated when acceptable data is being received by the module.
- The Outputs indicator is illuminated when the module's output interface is available.

Both Westinghouse Rail Systems (WRSL) and ALSTOM Transport (ALSTOM) have manufactured SMs. References to WRSL shall include modules labelled 'Westinghouse Signals' where appropriate. References to ALSTOM will include modules labelled 'ALSTOM Signalling Ltd', 'GEC Alsthom Signalling Ltd' and 'GEC General Signal Ltd' where appropriate.

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WRSL MkII



ALSTOM MkII



WRSL Mk3



ALSTOM Mk3

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ALSTOM MK4



WRSL MkIIIA (WSL label)



WRSL MkIIIA (WRS label)

6.3 Module Variants

6.3.1 Spec. BR1902 for Mkl SMs

These were used in the Category 1A scheme at Leamington Spa only, which has now been replaced. They are not to be used on any other Network Rail scheme.

6.3.2 Spec BR1902A for MkII SMs

BR Mod. State	Modification Details	Installed Program	Limits on Usage
1	Not used	-	-
2	Original Issue of BR1902A Module	SSI4311-B3	Used at Inverness only. Special procedures required at manufacturer.
3	As 2 with Software Change	SSI4311-B4	Used at Inverness only. Special procedures required at manufacturer.
4	As 3 with Hardware modification to earthing	SSI4311-B4	Used at Inverness only. Special procedures required at manufacturer.
5	As 4 with improved NVRAM (ALSTOM modules)	SSI4311-B4	Not to be used with LLL (LDT) transmission
6	Revised Hardware (WRSL modules)	SSI4311-B4	Not to be used with LLL (LDT) transmission
7, 8	Improved software to increase tolerance to Data Link blip problems	SSI4311-C1	LDT compatible
9, 10	Software change to improve reading of module address and modifier inputs in presence of noise.	SSI4311-C2	LDT compatible
11, 12	Hardware modification to improve noise immunity.	SSI4311-C2	LDT compatible
13, 14	Hardware modification to improve immunity against short term power interruptions.	SSI4311-C2	LDT compatible
15	Software change. Red aspect outputs no longer blink during self-test. Better Data Link performance.	SSI4311-C3 or later	LDT compatible
16	WRSL MkII as for 15 but with program issue D1.	D1	WRSL MkII modified to improve the performance of the TPWS interface.
17	Alstom MkII as for 15 but with program issue C4	C4	Alstom MkII modified to improve the performance of the TPWS interface.

The BR modification state number is that number following the last number crossed out.

WRSL MkII modules also display a manufacturer's modification state, the WRSL manufacturer's modification state is shown by the letters that are crossed out.

Reasons to be considered for replacement/upgrading existing modules are as follows:

Problems with Data Link “blips”, as revealed by a Data Link survey, where modification state 5 or 6 is currently in use.

Problems are encountered with EMC (consideration should be given to replacement by module to spec. BR1902B, AL1902C or WS1902B)

Where modules control more than one independent device (e.g. two signals on opposite tracks, or an AWS magnet on the opposite track). Modules before mod. state 15 cause any displayed aspect to “blink” when the module performs its self test. This may be initiated by a change in the other controlled device. In the case of a train stood at a red signal, this may possibly be misinterpreted as a change of aspect. With mod. state 15, any retained aspect (normally the red) does not blink. This is a significant safety consideration.

6.3.3 Spec. BR1902B for MK3 SMs

BR Mod. State	Installed Software	Applicability
1	SSI4311-C3 (see below)	All sites (see below)
1	SSI4311-C4 (see below)	All sites (see below)

Both WRSL and ALSTOM have manufactured SMs to BR1902B (otherwise known as the MK3 Signal Module).

BR1902B modules all bear a separate manufacturer’s hardware modification state label.

The BR1902B signal module offers significant improvements in EMC performance over the BR1902A (MkII) module, and consideration should be given to replacing the latter in areas where traction interference is a problem.

The BR Modification State is shown as the Railtrack Modification State on ALSTOM Modules labelled as manufactured by ASL, see below:



GASL MK3 Modstate Label



ASL MK3 Modstate Label

BR1902B modules all bear a separate software version label. All modules from both manufacturers were originally issued with SSI4311-C3 software.

A problem driving certain signal head transformers has resulted in updated software SSI4311-C4 being applied to ALSTOM SMs. An upgrade program for modules already in service is in progress.