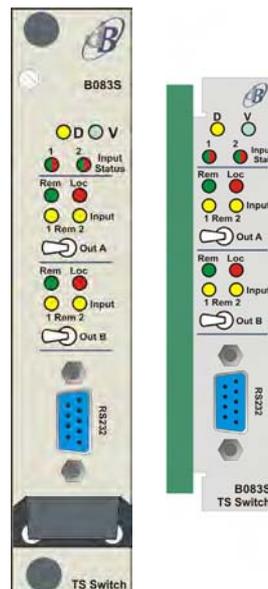# B083

DUAL ASI TRANSPORT STREAM
TABLE MONITOR / SWITCH SERIES

Handbook   Version 1.2

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Document history

Date of first publication   5th Aug 2005

Current issue and date   1.2 / 17th March 06

Firmware versions   1.03 / 1107

Contents

Introduction

The B083 series

B083 modules can be fitted into an Avitel or Vistek chassis from which they derive power. Both 1U and 3U chassis are available. A passive rear connector is required for all signal interconnections.

Below is a list of products in the series:

- B083M - Dual ASI TS Table Monitor

- B083C - Dual ASI TS Table Monitor, with 2x2 changeover switch

- B083S - Dual ASI TS Table Monitor, with 2x2 near-seamless switch

The B083M, B083C and B083S are based upon identical hardware. All B083M features are included in the B083C and all B083C features are included in the B083S.

Common block diagram

The B083 is designed for continuous monitoring of ASI Transport Streams in a broadcast environment. DVB, ATSC and MPEG-2 Transport Streams are supported.
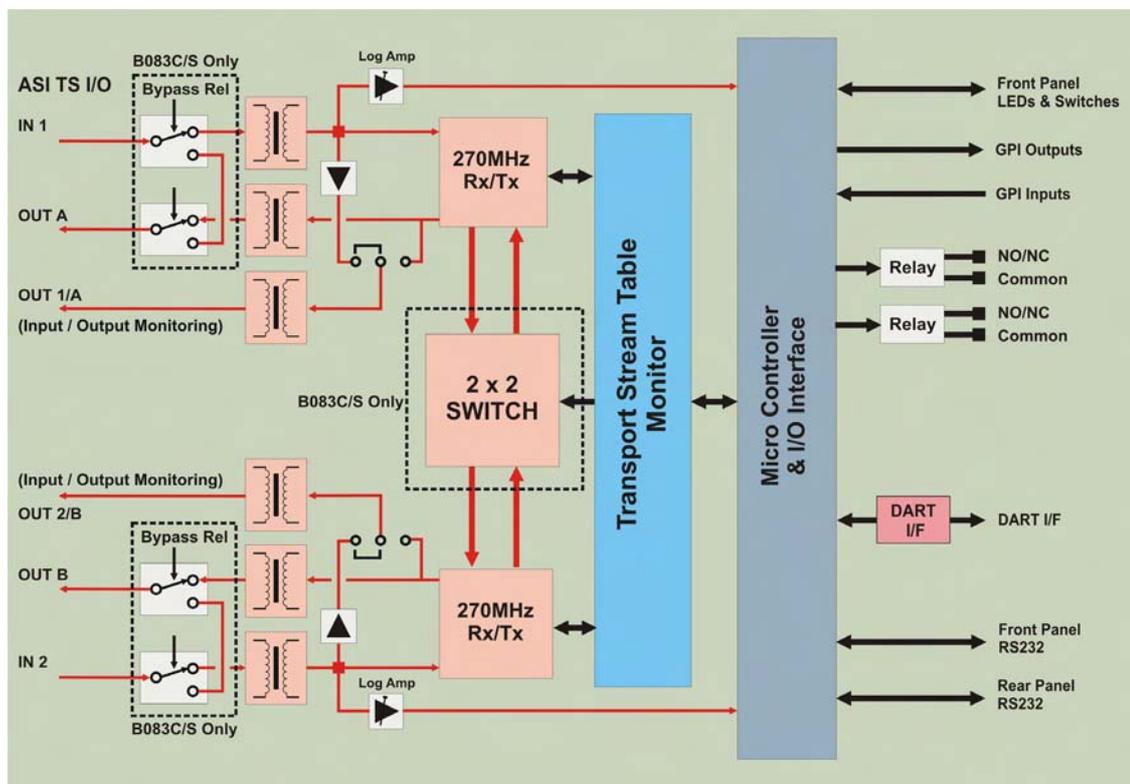
The B083 Dual ASI Transport Stream Table Monitor with 2x2 Switch

The device monitors two ASI streams simultaneously. These can be completely independent or related streams arranged as main and reserve.

The rear connector carries the ASI IO, general purpose IO and a 3-wire serial port. There is an additional serial port on the front panel to facilitate local access.

Main features

The B083 range is configurable, offering flexibility in both monitoring and switching. The modules in the range are fully configurable using dB Broadcast's S080 windows configuration software ensuring that alarms only activate under conditions specified by the user. A Command-Line Interface is also available.

In addition to monitoring critical levels within the Transport Stream, Table Monitoring is provided based on detecting user maintained table sections.

Tables form the basic component of the PSI (Program Specific Information), SI (Service Information) and PSIP (Program and System Information Protocol) and are often used to transmit private data.

Tables may be detected by a combination of PID and table ID, but the B083 takes this a stage further by offering the ability to detect individual table sections. In other words, the user may also specify the table ID extension, section number, version number and current / next status for each test. A total of 32 tests are available, which may be enabled on either or both input channels.

By generalising the above fields, it is straightforward to configure any given test to detect particular tables, sub-tables or table segments. For details, see the Configuring the table tests section on page 29.

For each test an upper distance may be specified. The upper distance is the longest period of time allowed to pass since the last qualifying table section was detected.

A summary of the monitoring features of the B083 is given below:

- Up to 32 table tests

- Supports MPEG PSI, DVB SI, ATSC PSIP and User Defined tables

- User defined maximum and minimum data rates for each transport stream

- Catastrophic failures such as may be caused by no TS, loss of synchronisation or low signal level

- Basic integrity checks such as monitoring the Programme Association Table (PAT)

The user defines which monitored parameters affect the status and external alarms. The status of the input streams is indicated on the front panel and on the serial ports, DART interface and user configurable general-purpose outputs.

The B083M can be upgraded to the B083S and/or B083C, to include an internal 2x2 switch. This enables the module to automatically route the appropriate input stream to the outputs on the basis of the detected results.

Near-seamless & non-seamless switching

The B083C and the B083S feature an integrated 2x2 Transport Stream switch. This switch is capable of multiple switching methods:

- B083C - non-seamless

- B083S - near-seamless and non-seamless

Near-seamless switching is a new method designed to minimize disruption to the output stream, especially in terms of TS synchronisation.

Non-seamless switching mimics the operation of a standard relay style switch, but with a faster response time.

The advantages of the near-seamless method include:

- True-seamless switching between co-timed, identical streams

- TS sync loss prevention when switching general streams

- Can be invoked manually or on detection of user specified errors

- Automatically spots when physical disconnection of a "hot" signal cable is in progress, performing a near-seamless switch to reserve

When switching non-identical streams, service disruption can also be reduced depending on the nature of the input streams and the decoder employed. In general, the more closely related the streams, the smoother is the switching operation.

Modules with a near-seamless switch may also be set to non-seamless mode.

Using the integrated auto-control in either mode will almost always reduce the visible impact of an error-driven switch over a system which uses an external control loop.

The integrated switch offers a space saving advantage over an external switch, as well as a faster response time, regardless of the method used.

Several control options are supported, including an integrated on-chip controller, which can run in biased, unbiased or preview modes.

Configuration, monitoring and control

The various methods of deploying and using the B083 can all be described in terms of three fundamental tasks – configuration, monitoring and control.

Configuration is usually only performed at installation. It involves selecting measurements, defining the external alarms, specifying the table tests and selecting the switching method.

Monitoring involves the display and transfer of the monitoring results to external equipment by some means.

Control refers to the manner in which the TS switch is operated on the basis of the monitoring results. As such, it is relevant only for variants that feature a TS switch. Control will be internal or external, open-loop or closed-loop, local or remote - depending on what the module is connected to and how it is configured.

Appropriate usage of the device relies on an understanding of the various options for carrying out these tasks.

The module has five interfaces, more than one of which may be used within a single installation.

Interfaces

Configuration, monitoring and control are possible as shown in the table below:

Interface	Supported Tasks
Front Panel Serial Port	Configuration, Monitoring, Control
Rear Panel Serial Port	Configuration, Monitoring, Control
General Purpose IO	Limited Monitoring, Control*
Front Panel LEDs and Switches	Limited Monitoring, Control
DART Interface* *	Monitoring, Control*

Notes: * Monitoring is available over any interface, as is control. However, in the case of control, DART is an alternative to the GPIO Interface which must be specified in the configuration if it is to be used. DART is implemented to support a third-party rack based monitoring and control system (Vistek ViewNet).

In normal operation the integrated on-chip controller is used for primary control with the other interfaces providing secondary control options for maintenance etc. If the on-chip controller is disabled, the module can be integrated with an external primary controller, though in this case the ability to automatically prevent propagation of a TS_sync_loss event is lost, as the control loop is now external.

Software tools

Two software solutions exist to enable configuration, monitoring and control over the serial ports. They are:

- S080 Windows software (version 1.3 or later)
- B083 Command-line Interface

The S080 software provides a fully featured graphical alternative to using the command-line. It sits on top of it, interacting with the command-line protocol directly.

The command-line interface is offered for those who prefer this approach and to facilitate scripting. It uses a straightforward protocol with full online help and provides an entry point for integration with existing software systems.

Note: The command line interface does not easily allow changes to the Table List settings. It is recommended to change Table List settings via the S080 configuration interface only.

The full protocol is available on request to enable speedy development of third-party drivers.

Any combination of the above tools can be used simultaneously on the two serial ports, one tool per port.

Vistek ViewNet

Viewnet is a third-party monitoring and control system. It may be used when B083 modules are deployed in a Vistek rack. Details of this system are available at http://www.vistek.tv.

Control over DART must be enabled in the configuration if it is to be used.

Variant details

The B083M is a monitor only version, with no TS switch. Therefore, it has no main ASI outputs.

However, all variants feature a pair of auxiliary ASI outputs to allow a decoder or secondary monitoring device to be attached. Such a device can be used to provide a visual confirmation of the ASI routing at the input or output. Each aux output is jumper-assignable to loop-through an input, or duplicate an output.

On the B083M the jumpers must be set for input loop-through, as this is the only aux output supported.

The B083M requires no control, so the rear panel control inputs are disabled. The rear panel monitoring outputs remains enabled. In addition, the local control switches and output LEDs on the front panel are disabled.

This is the full extent of functional variation in the range.

In addition to functional variation, two mechanical formats are offered. The mechanical format is chosen to match the chassis type in which it will be used. This is also true for the rear connector. See the Ordering information section for details.

Rear connector wiring is consistent across all variants and mechanical formats. It is also consistent with the complete B082 series.

Installation

Selecting rear connectors

All B083 rear connectors are electrically equivalent. The type used depends on the chassis. Overlays are used to label the connections, enabling the use of standard rear connector types.

Type	Chassis	Available Overlays
DMC 3307K	1U / 3U Avitel	-
VB100	1U(F010) / 3U Vistek	B083S/C, B083M
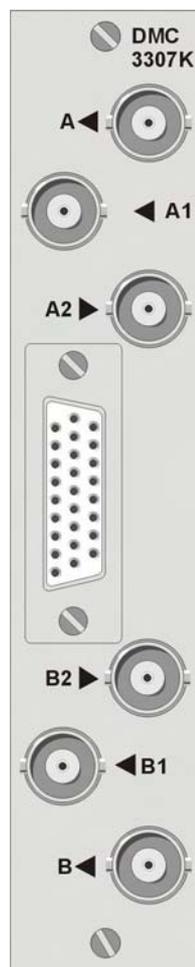
| Avitel style chassis DMC 3307K | 3U Vistek style chassis VB100 | VB100 overlay for B083M | VB100 overlay for B083S/C |

External connections

The ASI Transport Stream IO uses the BNC connectors. The general purpose IO uses the 26 way 'D' type connector.

ASI Transport Stream I/O

BNC	SIGNAL - B083S/C	SIGNAL - B083M
IN 1	TS 1	TS 1
OUT A	TS A	No Connection
OUT 1/A	Aux (TS 1 or TS A)	Aux (TS 1)
OUT 2/B	Aux (TS 2 or TS B)	Aux (TS 2)
OUT B	TS B	No Connection
IN 2	TS 2	TS 2

The input Transport Streams (1, 2) are routed to the main outputs (A, B) under the control of the integrated 2x2 TS switch.

The main outputs are designed to feed a broadcast chain. For this reason they are protected against power failure using a bypass relay, which routes TS1 to TSA and TS2 to TSB if the module power fails. Note that this emergency switching is a conventional non-seamless operation.

All variants also feature a pair of auxiliary ASI outputs to allow a decoder or secondary monitoring device to be attached. Such a device can be used to provide a visual confirmation of the input or output routing. On the B083M only the inputs can be checked. The aux outputs are not protected against power failure, as they are not intended for feeding a broadcast chain.

General purpose I/O

Ext In and Ext Out signals use a LOW voltage for signal TRUE.

PIN	SIGNAL - B083S/C	FUNCTION
1	Tx Data	Rear Serial Port
2	Rx Data	Rear Serial Port
3	Ext In 1	Control - Switch A to 1
4	Ext In 2	Control - Switch A to 2 *
5	Ext Out 1	TS1 Monitoring - Configurable
6	Ext Out 2	TS1 Monitoring - Configurable
7	Ext Out 3	Control - A is in local mode
8	Ext Out 4	Control - A status is TS2
9	Relay 1 NO/NC	TS1 Monitoring - Configurable
10	Relay 1 Common	
11	Not used	
12	Not used	Ext Outs are open-collector Darlingtons with emitters commoned to 0V.
13	0V	
14	0V	Ext Ins are opto-coupled inputs which may be shorted to 0V.
15	Not used	
16	Not used	0V is also the serial port GND.
17	Relay 2 Common	
18	Relay 2 NO/NC - configurable	TS2 Monitoring - Configurable
19	Ext Out 8	Control - B status is TS2
20	Ext Out 7	Control - B is in local mode
21	Ext Out 6	TS2 Monitoring - Configurable
22	Ext Out 5	TS2 Monitoring - Configurable
23	Ext In 4	Control - Switch B to 2 *
24	Ext In 3	Control - Switch B to 1
25	Connected to Pin 2	Rear Serial Port
26	Connected to Pin 1	Rear Serial Port

Note: * If both 'Switch to 1' and 'Switch to 2' control inputs are asserted for an output, the controller will implement 'Switch to 2'.

PIN	SIGNAL - B083M	FUNCTION
1	Tx Data	Rear Serial Port
2	Rx Data	Rear Serial Port
3	Ext In 1	*Not available*
4	Ext In 2	*Not available*
5	Ext Out 1	TS1 Monitoring - Configurable
6	Ext Out 2	TS1 Monitoring - Configurable
7	Ext Out 3	*Not available*
8	Ext Out 4	*Not available*
9	Relay 1 NO/NC	TS1 Monitoring - Configurable
10	Relay 1 Common	
11	Not used	
12	Not used	Ext Outs are open-collector Darlingtons with emitters commoned to 0V.
13	0V	
14	0V	Ext Ins are opto-coupled inputs which may be shorted to 0V.
15	Not used	
16	Not used	0V is also the serial port GND.
17	Relay 2 Common	
18	Relay 2 NO/NC - configurable	TS2 Monitoring - Configurable
19	Ext Out 8	*Not available*
20	Ext Out 7	*Not available*
21	Ext Out 6	TS2 Monitoring - Configurable
22	Ext Out 5	TS2 Monitoring - Configurable
23	Ext In 4	*Not available*
24	Ext In 3	*Not available*
25	Connected to Pin 2	Rear Serial Port
26	Connected to Pin 1	Rear Serial Port

External inputs have pull-up resistors attached. There is a minimum hold time, which is of the order of 10ms. Inputs must be asserted low for at least this time to guarantee acceptance. Spikes that are shorter than this will be ignored.

External outputs are open-collector Darlington outputs. When an external pull-up is connected, this results in a low voltage for signal true.

Each relay is jumper-selectable to select the Normally Open or Normally Closed contact. See next section for details.

External outputs are updated synchronously every second. At any given time they declare the results of the previous analysis second. For monitoring outputs this represents a summary of errors, which occurred during that time. For switch status outputs however, it represents the current status at the update time. It follows that the status outputs may declare a new route up to a second after the event has occurred. Furthermore, since the switch responds quickly to control commands, if successive commands are issued to cause

a switch and then a switch back, this can occur without being reported on the status lines. The front panel LEDs follow exactly the same policy.

In other words, open-loop external control systems are free to drive the switch quickly, whilst closed-loop ones will need to wait for 1s after each command to verify the effect.

Front panel RS232

RS232 – 9 way 'D' type	
PIN	**SIGNAL**
1	N/C
2	Transmit data (To PC)
3	Receive data (From PC)
4	N/C
5	Ground
6	N/C
7	N/C
8	N/C
9	N/C

A one-to-one serial cable is suitable for use on the front panel serial port. USB-to-serial converter cables may also be used.

The rate is set by slider 2 on DIL switch S1 on the microcontroller sub-board. This can be either 9600 or 38400 Baud, with 8 data bits, 1 stop bit, no parity and software handshaking using Xon/Xoff. This setting affects both front and rear serial ports.

Hardware setup
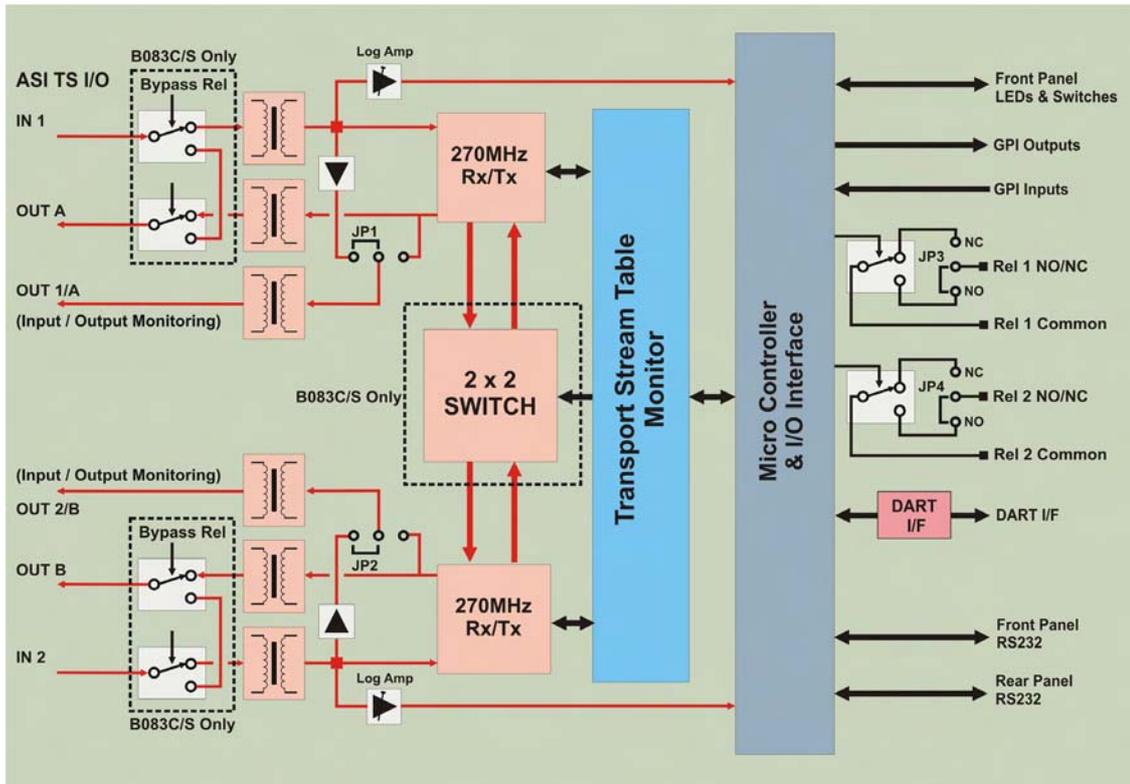
The B083 Dual ASI Transport Stream Table Monitor with 2x2 Switch

Note: The bypass relays and the 2x2 soft switch are only enabled on the B083C/S.
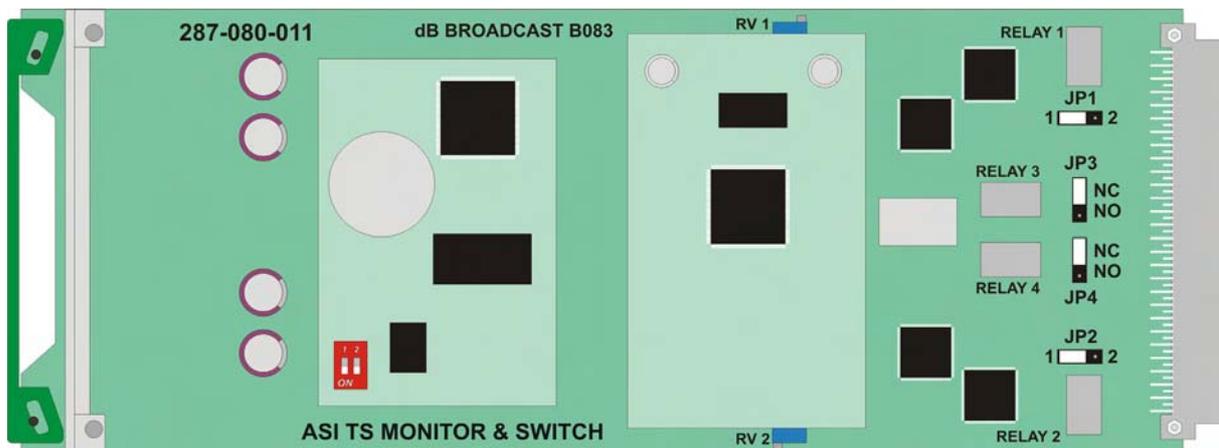
The B083 Module showing jumper links

Link functions

JP1	Position 1: Out 1/A set to TS 1
	Position 2: Out 1/A set to TS A
JP2	Position 1: Out 2/B set to TS 2
	Position 2: Out 2/B set to TS B

Note: Jumper links JP1 and JP2 should be left in position '1' on the B083M.

JP3	NO: Relay 1 NO contact is wired out
	NC: Relay 1 NC contact is wired out
JP4	NO: Relay 2 NO contact is wired out
	NC: Relay 2 NC contact is wired out

The relays are energised in the non-alarm state, so that a power failure has the same effect as an alarm, regardless of whether the NC or NO side is wired out. For the correct sense, read "N" in the table above as "Alarm".

Switch functions

SW1 is located on the VM1 microcontroller piggyback module nearest the front panel.

SW1-1	Programme/Run mode. This should be set to run.
SW1-2	Serial Baud Rate. Select 38k4.

Factory settings

Note: RV1 and RV2 under the rear piggyback module are set at the factory and should not require adjustment.

Operation

Front panel controls and LEDs
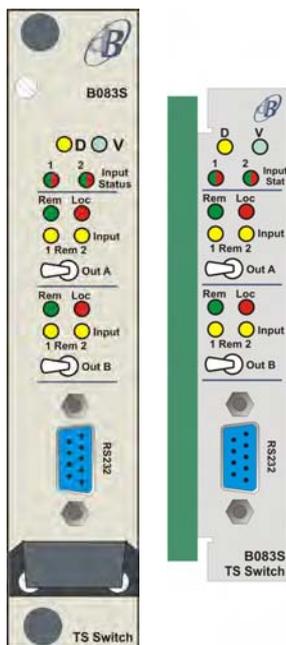
LED Indicators:

D	Yellow – Flashing indicates DART monitoring is active
V	Green – Indicates DC power present & OK
1/2	Green/Red – Red indicates TS Status Fail, Green is TS Status Good
Rem	Green – Remote control active
Loc	Red – Local control active
Input 1/2	Yellow – Shows the currently selected input, either 1 or 2

Avitel   Vistek

Local control is in force on an output when its front panel switch is not in the central position. Remote control is defined as any control mode other than local, including auto. The 8 output indicators and 2 front panel switches are disabled on a B083M.

Each front panel switch can be used to locally force an ASI output to either of the module inputs.

Output	Front panel switch position		
	Left	**Central**	**Right**
A	Output A to Input 1	Remote	Output A to Input 2
B	Output B to Input 1	Remote	Output B to Input 2

The front panel indicators and switches are designed to enable an on-site engineer to quickly re-route signals around a system to assist in fault isolation under emergency conditions.

Full configuration, monitoring and control is possible using either of the serial ports. This allows the rear port to be used as part of the fixed installation whilst the front port can be used for maintenance at the same time.

Control modes

There are several methods of controlling the B083S/C - using the front panel switches, using the general purpose IO, using one or both serial ports and using the on-chip controller. This allows the module to be deployed in many different ways. The control methods are arbitrated using control modes. Each method uses a different control mode. These modes have a fixed order of precedence with 1 being the highest priority:

1. local — - front panel switching

2. remote ext — - GPIO / DART switching

3. remote serial — - front/rear serial port switching

4. auto — - on-chip controller switching

Generally speaking, the device will be connected to operate in one control mode under normal circumstances, leaving the other modes available for occasional use. At any time, the mode is determined by the highest priority active interface. The choice of control system depends the system designer.

Control modes are assigned per output. This means output A can be under local control whilst output B remains in auto, for example.

Example systems

Below are some examples of common control strategies.

Example	Normal Mode	Maintenance Mode
i	Auto	Local
ii	Remote Serial	Local
iii	Remote Ext	Local
iv	Auto	Remote Serial

Local mode

Local mode is for forcing an output manually to one TS input or the other. It is particularly useful for isolating part of a system to perform on-site maintenance. Local mode is achieved per output by activating its front panel switch. It has the highest precedence and overrides all other switching commands. Local mode is indicated by the red front panel LEDs. The control mode LEDs operate in real time without any delay.

Remote ext mode

Remote ext mode is for driving the switch using either the GPIO interface or the DART interface. The GPIO interface is the set of discrete IO lines available on the module rear connector. The DART interface is rack-based and requires third-party software from the rack manufacturer for use.

Only one of these interfaces can be used for control at any one time. Assign the one you wish to use to remote ext in the configuration, using the command-line or the latest version of S080 software.

Remote ext has the second highest level of priority.

For DART control, refer to the manual accompanying your DART control system (e.g. Vistek ViewNet).

When GPIO control is enabled, we enter it when local mode is off and a valid forcing signal is received on the general purpose inputs. These forcing signals must be held for as long as they are required.

Removing them results in a return to auto mode. If both the force-to-1 and force-to-2 control inputs are activated at the same time on a channel, force to TS1 always wins. For serial or auto control to be possible, the remote ext control lines must be inactive (voltage high). This is the default condition when there is no connection to these inputs.

See also notes under General Purpose IO in the INSTALLATION section.

Remote serial mode

Remote serial mode is for driving the switch using a serial port. This could be the front panel serial port or the rear one. This mode is used by both the S080 software and the command-line interface. It has the third highest level of precedence and both serial ports have the same priority. The front panel port is designed for on-site access with a laptop or PDA. The rear port is designed for fixed installations. Both ports may used simultaneously, though if one port is being used by a control system it is wise to use local mode when trying to create temporary overrides.

Remote serial commands are persistent. They must be overridden by another command of equal or higher precedence, or switched off by the return to auto command. This is issued by the auto button in the S080 software or by entering opx:0 on the command-line (x = a or b).

It is possible to drive this port remotely over a LAN using a LAN to serial converter unit (not supplied).

Auto mode

Auto mode is the default used when no other control modes are in force. It can be enabled or disabled. When disabled it does nothing other than act as the off state for the other control modes. When active it gives control to the internal on-chip controller whenever auto mode is invoked. Auto mode is enabled using the switch config box in the S080 software, or the asp command on the command-line interface.

Since the control loop is internal to the analysis chip in auto mode, it is capable of performing a near-seamless switch when one of the inputs loses TS synchronisation, without propagating this error to the ASI outputs. This is not possible using external control.

Changing control mode

To change to a higher precedence control mode, simply issue a command on the higher level interface and any lower precedence commands will be overridden.

To switch to a lower precedence mode, the higher precedence command must first be cancelled. This drops the control down to auto. Provided auto mode is disabled or in agreement with the current routing no change will occur. Auto mode will be always be in

agreement if both streams have the same TS status and the auto-switch preference is set to unbiased. Having returned to auto, any other control command may be issued, changing the mode back up to the required level.

Cancelling local mode is achieved by returning the front panel switch to the central position.

Cancelling remote ext mode is achieved by allowing both switching inputs to float high or by pulling them up externally.

Cancelling remote serial mode is achieved by selecting the auto button from within the S080 software, or by sending the opx:0 command on the command-line interface (x=a for output A, b for output B).

Configurable TS status function

Each channel has an internal status alarm describing its TS input. The state of this alarm is indicated by a front panel LED.

Good status (TS_status = '1') is indicated green, fail status (TS_status = '0') is indicated red.

The definition of TS_status is configurable for each TS input from a pool of available subalarms:

Equation 1	*!TS_status =*	*[ASI_level_fail] or*	
		(TS slow / stopped) or	*(2)*
Fail status is the		*(TS_sync_loss) or*	*(3)*
logical OR of the		*[Sync_byte_error] or*	
enabled sub-		*[PAT_error_2a] or*	
alarms.		*[Low data rate] or*	
		[High data rate] or	
		[Table_X_fail] or	
		[Table_Y_fail].	

The optional terms [ ] in the equation above are sub-alarms which can be configured by the user to be included in **equation 1** or replaced by '0'. The mandatory terms (2) and (3) cannot be removed from the equation.

The TS_status signals for inputs 1 and 2 are TS_status_1 and TS_status_2 respectively. Each may be configured differently. The TS_status function defines the failure condition of each input for the TS switch. On the B083M it can be viewed as a simple summary alarm.

TS status sub-alarms

Equation 1 features a number of terms, each of which is an assignable sub-alarm. The meaning of each is given below.

ASI_level_fail – Ref [2] states that the minimum receiver sensitivity for an ASI receiver should be 200mVpp. This represents 12dB attenuation from the standard output level of 800mVpp. This implies that ASI signals below this level are not guaranteed to be received properly by equipment relying on this specification. The level alarm by default is activated by a signal below –12dB, with 0.5dB hysteresis. The threshold can be trimmed to anywhere between –1dB and –12dB.

TS slow / stopped – Guards against a TS stopping without corrupting a sync byte, and attempts to spot this before any downstream equipment does. This alarm will sound if a correct sync byte is not received every 0.4s. This puts a lower limit on the TS rate which the module will pass; however it is well below even the most specialist of slow rates seen in practice.

TS_sync_loss – This is the standard [5] loss of Transport Stream synchronisation alarm. Two consecutive corrupted sync bytes cause a loss. Five consecutive correct bytes must be achieved before the alarm is cancelled and other measurements made. Note that this alarm will only trigger if corrupted sync bytes are found. Strictly, if the TS stream is merely stopped this alarm will not sound.

Note: Violations of the "2 ASI K28.5's before each sync byte" rule also contribute to this mandatory term as we take the worst case view that the rule could be assumed by some equipment in such a way that a single violation would always result in a TS_sync_loss. This is a datalink effect, which we take care of here.

Sync_byte_error - This alarm is defined in [5]. Every corrupted sync byte will trigger this.

PAT_error_2a - This is the first part of PAT_error_2 as defined in [5]. It checks that PID 0x0000 occurs at least every X seconds. X is configurable (default = 0.5).

Low data rate – All TS packets apart from null packets are counted as data. The user can specify a rate threshold below which this alarm will sound. The rate is averaged over the analysis second.

High data rate – All TS packets apart from null packets are counted as data. The user can specify a rate threshold above which this alarm will sound. The rate is averaged over the analysis second.

Table_X_fail / Table_Y_fail - Two sub-alarms are offered to handle table detection. They are themselves summary alarms. Each is driven by 16 separate table segment detectors. If no table sections belonging to a specified segment are found in the stream, its detector will indicate a failure. This in turn will drive **Table_X_fail** (or **Table_Y_fail**).

For each table segment detector, the user specifies the PID, table_id, table_id_extension and section_number range. By specifying "any" in the section number range, the segment detector becomes a sub-table detector. Similarly by specifying "any" in the table_id_extension field a sub-table detector becomes a table detector.

As well as the upper distance, flags can be configured to control the detection method. These include the current / next status and the version number. There are 16 detectors per table fail alarm, giving 32 in total.

Offering two table fail sub-alarms allows a system designer to separate out two groups of tables with different semantics. For example, you could used table_X_fail to indicate a problem with network information sub-tables, whilst using table_Y_fail to indicate a problem with the program guide.

The sub-alarm may be defined differently for each channel. That is, each input can have a separate table list, with the proviso than not more than 32 table segment tests are defined per module.

| Equation 2 | $Table\_X\_fail = [(sub)\ table\_fail\_1] \dots or\ [(sub)$ $table\_fail\_16]$ |
| Equation 3 | $Table\_Y\_fail = [(sub)\ table\_fail\_17] \dots or\ [(sub)$ $table\_fail\_32]$ |

Note: Numbers in square brackets refer to references, which can be found on rage 26.

Monitoring PSI/SI/PSIP

Configuring the table tests is most easily achieved using the S080 Windows software. Details of the operation of the tests and how to configure them can be found in the S080 Windows software section under Configuring the table tests on page 29.

Auto switch specification

The two main B083S auto-switch modes are as follows:

Mode	Description
Near-seamless	Near-seamless attempts to prevent TS sync losses occurring in downstream equipment by preserving the packet structure during automatic and manual switching.
Non-seamless	Non-seamless is provided for systems, which need to switch between two radically different Transport Streams.

In addition these modes are also available:

Mode	Description
Main/Reserve	In the event of an input failure, both outputs A and B are routed to the remaining good input
Preview	In the event of an input failure, the inputs are routed, so that if (say) the A output is used for transmission it will continue to receive a good signal, whilst the bad input is routed to output B, which can then be used to preview or monitor the failed input.
	(Output B always takes the opposite input to A.)
Off	No auto-switching is performed on either output.

For each output a switch mode can be set (B083C and B083S):

| Mode	Description
Biased	This mode switches the output away from a failed input if the other input is healthy, and back again when the preferred input comes good again. The output can be configured as biased to 1 or biased to 2.
Unbiased	This mode is used to minimise the number of switches that are made, by not preferring one input over the other. This means after a switch is made, the output stays on the new input indefinitely whilst it remains healthy.

The S080 Windows Software

Introduction

The S080 Windows software is a graphical configuration, monitoring and control interface for the B080 series of Hawkeye modules.

The S080 currently supports both the B082 and B083 modules. The configuration screens and their enabled functions depend on the type of module attached. With a B083 the four tabbed screens are as below: Status, Primary Config, Table List X, Table List Y and Alarm Outputs. If a B082 is connected, the PID List tab appears in place of Table List X and Table List Y.

Individual functions not supported by an attached module will be greyed out. If no module is connected all possible configuration screens appear.
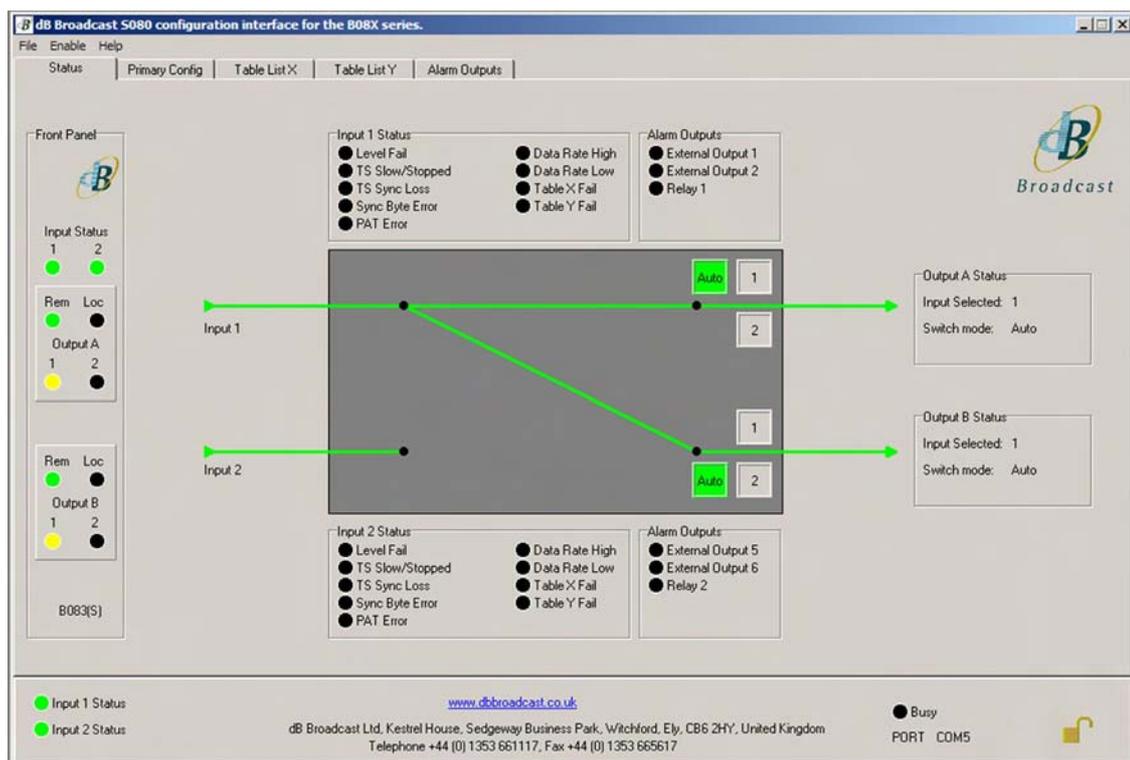
The S080 software connected to a B083S

The status screen may be thought of as an operator interface, whilst the other screens are primarily for the use of installation engineers. The status bar is visible on all screens and shows Input status, Port in use (useful for multiple modules) and port busy status.

Note: The B083 'M' variant has no routing switcher.

Installation

The latest version of the S080 software may be downloaded from the dB Broadcast website http://www.dbbroadcast.co.uk

To install the software extract the files to a temporary folder on your PC and run setup.exe.

Serial configuration

To configure the serial ports select Serial Configuration from the File menu. This will display a dialogue box:
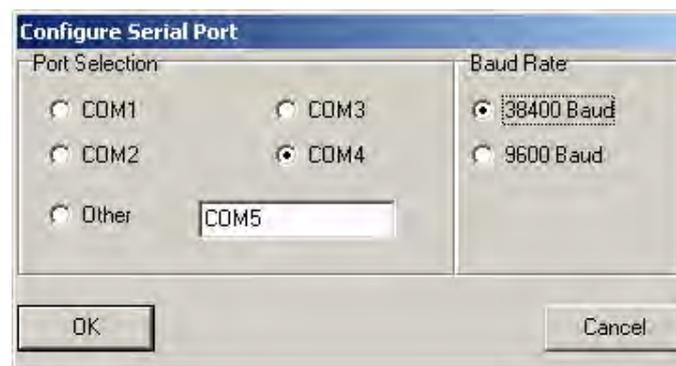
Select com port and Baud rate

Only the port and speed can be configured as all other settings are fixed for the B083.

Tip: The speed selection must match that of the dip switch on the B083 CPU daughter-board. 38,400 Baud is recommended.

System requirements

The following minimum computer system specification is required to run this software.

- Pentium class PC
- Windows 98 SE, Me, NT SP6, 2000 or XP
- At least one Windows supported serial port
- A standard pin-to-pin or 'straight-through' serial cable

Software operation

Using the status bar

The status bar at the bottom of each tabbed menu provides an instant view of the status of the two inputs, serial link including port in use and if the panel is locked.

Status bar

Input status

There are two indicators, one for each input. If the indicator is green, the input is good while if the indicator is red then that input has failed.

Busy LED

The Busy indicator shows the status of the serial link. It is lit when a command has been sent and the PC is waiting for a response. If no other activity takes place it will flash about once per second as it polls the device.

Note: The Busy LED may stay on for several seconds. This is because the software queues the commands to be sent. When a response is received the next request is sent immediately.

Port

This shows the serial port in use.

Locking Mode

The padlock is used to determine whether the application is in read only or read/write mode. It was introduced to prevent accidental modification of parameters in the system.

No configuration can be performed when the padlock is closed.

The state of the locking mode may be changed using the pull-down *Enable Menu* from the top menu bar.

Using the panel mimic

This panel provides a mimic of the LEDs on the front of the module.
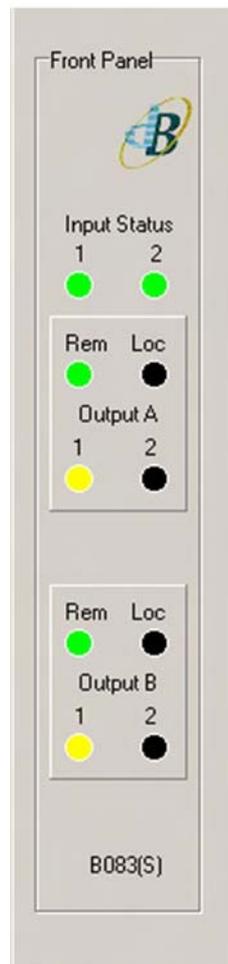
B083S panel mimic

The top two LEDs indicate the status for the two inputs, green for good and red for failure.

The Rem and Loc LEDs indicate the control mode for each output. When a red Loc LED is on, that output is in local mode (a route has been forced using the corresponding front panel switch).

The green Rem LED covers all other modes (remote serial, remote ext and auto). The indication is designed to prevent a maintenance operative inadvertently abandoning a module in local mode. Since local has the highest priority, it effectively disables all other modes of control.

Note: The mimic panel for the non-switched modules does not include the sub-panels for Output A or Output B as they are never illuminated.

Input and alarm status

The status for input 1 is shown above the switch and the status for input 2 is shown below the switch.
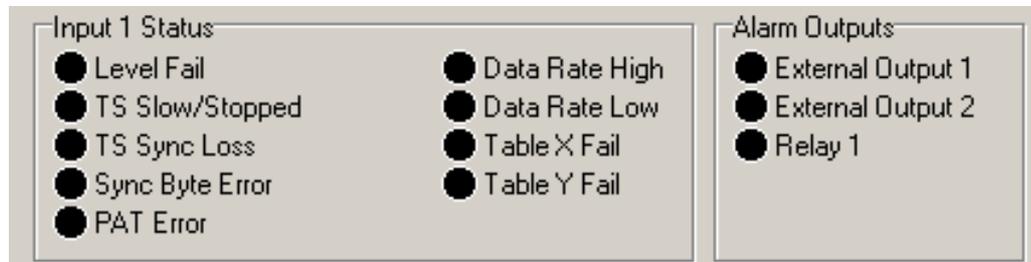
*Input 1 status (and output alarms related to input 1)*

The first two columns indicate the status of the input sub-alarms and the last column indicates the status of the sub-alarm driven summary alarms available on the GPIO connector. Some of the sub-alarms are dependent on configurations found on other screens.

Output alarms are configured using the Alarm Outputs tab and are related to inputs as follows:

Outputs relating to Input 1	Outputs relating to Input 2
External Output 1	External Output 5
External Output 2	External Output 6
Relay 1	Relay 2

Output status

The two output panels on the main Status tab to the right of the input router switch indicate the status of the current output: which input it is switched to, and its control mode. The control mode shows whether it has been switched automatically or has been forced.
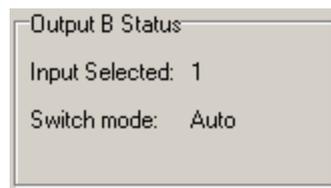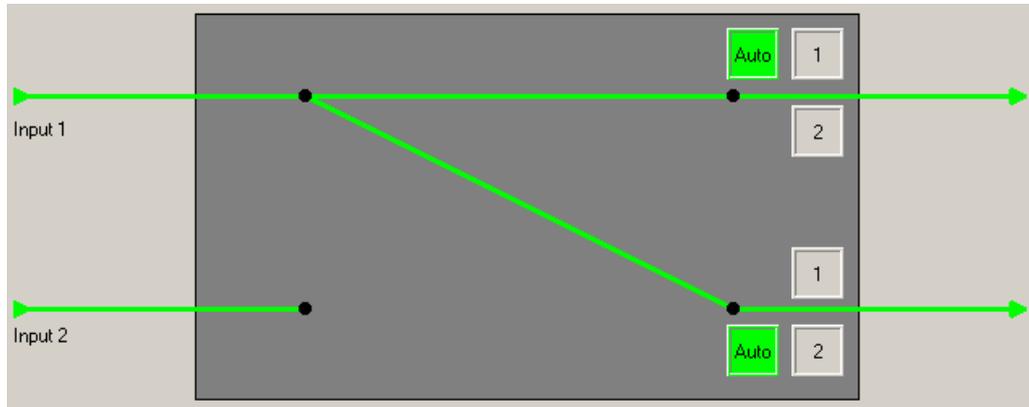

Output status

The methods of forcing are:

- Locally (using the front panel switch)

- Serially (using this software or the command-line interface)

- Externally (using the parallel inputs or the DART interface)

For more information see the Control modes section on page 14.

Using the routing switch

The route of the ASI inputs through the module to the two main ASI outputs is indicated by the routing graphic in the centre of the status tab. Since the B083M does not feature an integrated switch, its graphic shows no through connection to the main outputs. For the B083C and B083S, the current routing configuration is displayed.

Status tab input router switch – red lines means inputs are missing or faulty

A green line indicates the input is good and a red line indicates a faulty input.

This echoes the Input Status LEDs found on the Front Panel Mimic and the Status Panel.

The auto button is illuminated green when that output is in auto control mode. This indicates that the routing of that output is available for serial forcing using this software. Of course if the control mode is already serial, the routing is also available for forcing. If the mode is remote external or local, the routing is not available to be forced serially. Forcing is achieved by clicking on the button showing the number of the required input for that output.

Cancelling a any control mode returns control to auto, rather than the previous setting. A warning will be given if the user attempts to close the S080 software before restoring auto control. Note that auto control may be disabled on the Primary Config tab if required, so that it acts as a dummy state which is guaranteed to do nothing when it has control.

B083M monitoring only status

The monitoring only B083M has no input routing switch or switch controls and the panel mimic has no switch status information.
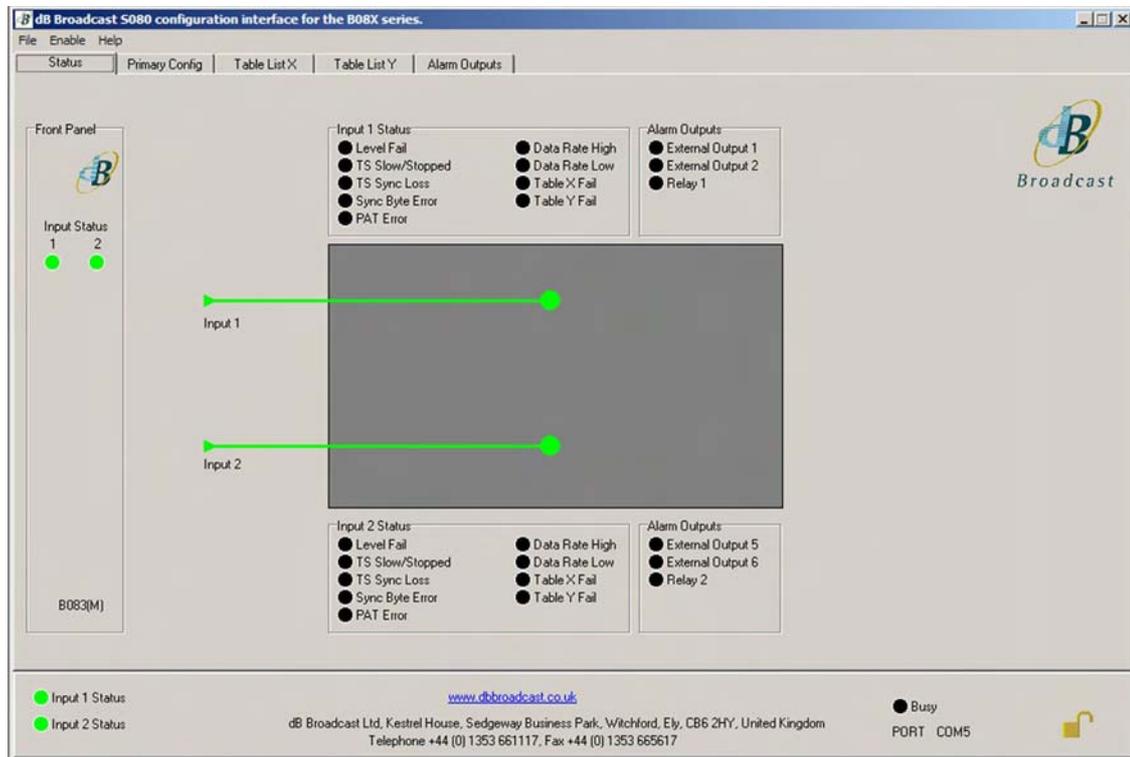
The B083M Hawkeye Control Software – main status screen

Input status and alarm output status is the same as the B083S. The status for input 1 is shown above the switch and the status for input 2 is shown below the switch.
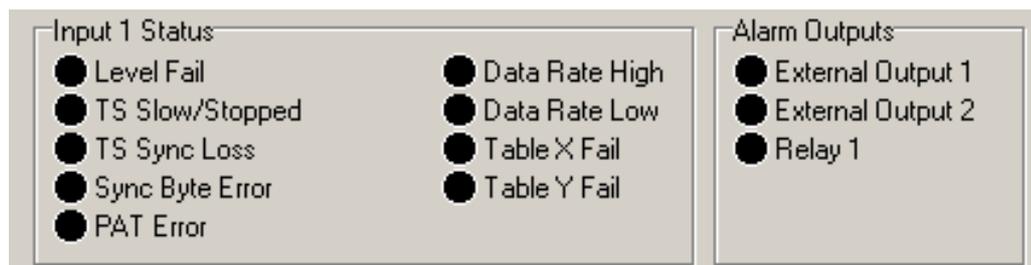
*Input 1 status (and output alarms related to input 1)*

The first two columns indicate the status of the input sub-alarms and the last column indicates the status of the sub-alarm driven summary alarms available on the GPIO connector. Output alarms are configured using the Output Alarm tab and are related to inputs as follows:

Outputs relating to Input 1	Outputs relating to Input 2
External Output 1	External Output 5
External Output 2	External Output 6
Relay 1	Relay 2

Primary configuration

The primary configuration tab provides access to the following:

- Switching configuration panel – (switching modules only)
- Channel alarm configuration
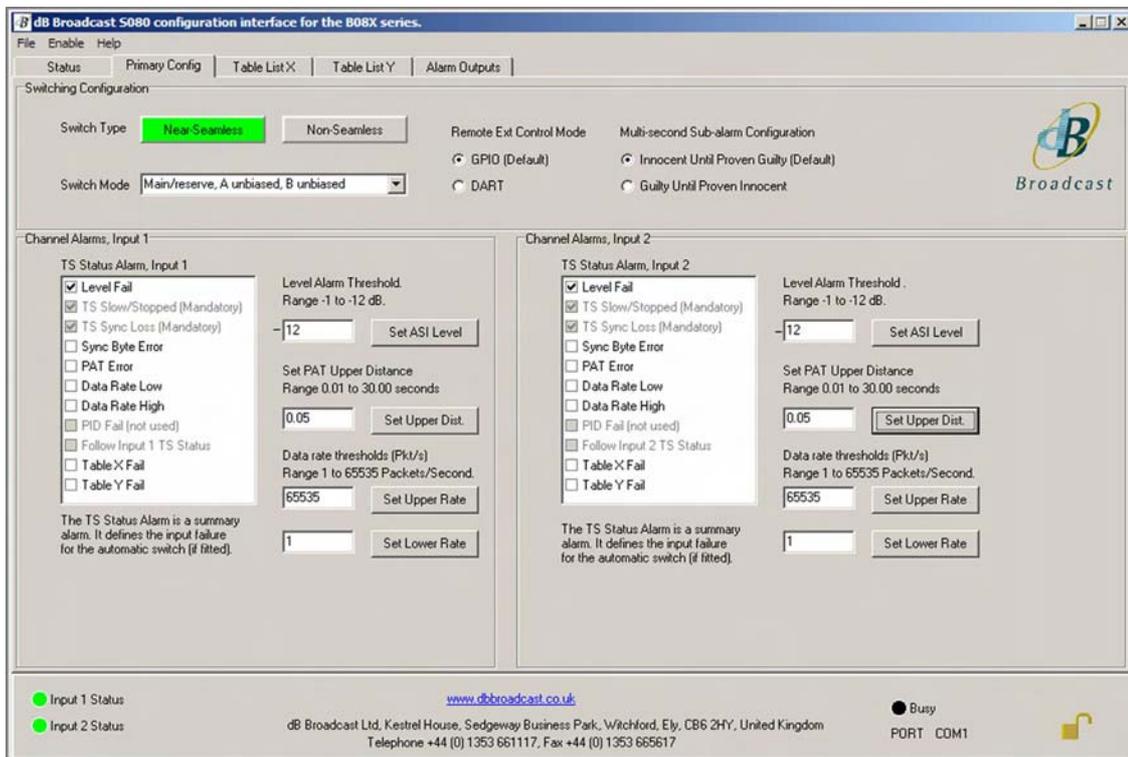
Channel alarms and switching configuration (B083C/S only)

Switching configuration

The switching configuration panel is used to configure the integrated TS switch. It does not appear when connected to a B083M. The TS switch uses the same definition for input failure as is configured for the TS status alarms.

Switching configuration (B083C/S only)

Selecting the switch type (Near seamless/Non seamless)

The switch type buttons indicate the default switching method employed. The B083S allows selection of either near-seamless or non-seamless. The near-seamless switching method guarantees:

- True-seamless switching between co-timed identical streams

- TS sync loss prevention when switching similar or radically different streams

- TS sync loss prevention on cable-pull or other error if reserve input is good

When switching non-identical streams, service disruption can also be reduced depending on the nature of the input streams and the decoder employed. In general, the more closely related the streams, the smoother is the switching operation.

Non-seamless switching guarantees 2 corrupted sync bytes at the switching point, forcing a TS_sync_loss on all downstream equipment with the standard TS_sync_loss definition. This is useful when switching radically different streams on systems where a TS_sync_loss provides the quickest route to a clean reset of the downstream equipment.

Selecting the switch bias

The switch may configured to be biased or unbiased. In addition, Output B may be made dependent on Output A. When Main/reserve is selected, there is no A-B dependency. However when Preview is selected, B always takes the opposite routing to A. This allows B to be used as a monitoring output which always previews the unused input. Use the switch bias drop down list to select from the following options:

- Main/reserve, A unbiased, B unbiased

- Main/reserve, A biased to 1, B unbiased

- Main/reserve, A unbiased, B biased to 2

- Main/reserve, A biased to 1, B biased to 2

- Preview, unbiased

- Preview, biased

- Auto-switch disabled

Remote external control

Control of the switch is automatically arbitrated. See section on Control modes on page 14 for details. However, the remote external control mode must be configured for use with either the General Purpose IO interface on the rear of the module, OR the rack based DART interface. Control over DART is supported for customers using Vistek ViewNet as a rack based control system. GPIO is the default setting.

Channel alarm configuration

There are two channel alarm configuration panels, one for input 1 and one for input 2. They allow the input alarm criteria to be configured.

Configuring channel alarms for input 1

ASI level

The *ASI level* can be set using the edit box. The minus sign is assumed so an integer value between 1 and 12 only will be accepted. The 0dB value for ASI is 800mV pp. Standard [2] specifies the minimum level for receivers as -12dB. Whilst B08X cards offer significantly better performance than this, the level alarm may be used as a warning that some unexpected attenuation has occurred.

Upper and Lower Data Rate Threshold

The upper and lower data rate thresholds are set using these entry boxes. These thresholds are those used in the *High Data Rate* and *Low Data Rate* alarms respectively. The range is 1 to 65535 packets per second.

PAT Upper Distance

This is used to set the maximum time allowed between packets carrying *Program Association Table* data before the alarm is triggered. The range is 0.01 to 30.00 seconds.

Configuring the table tests

The Table X and Table Y screens are used for configuration of table section monitoring.

Tables may be detected by a combination of PID and table ID, but the B083 takes this a stage further by offering the ability to detect individual table sections. In other words, the user may also specify the table ID extension, section number, version number and current / next status for each test. A total of 32 tests are available, which may be enabled on either or both input channels.

For each test an upper distance may be specified. The upper distance is the longest period of time allowed to pass since the last qualifying table section was detected. If this time is exceeded before another valid section arrives, a failure is declared. To reset the failure, two qualifying sections separated by less than the upper distance must be detected.

To detect an individual section, all fields should be specified, and the section number range low and high fields should be set to the same value. By generalising certain fields, a test may be set up to detect other important constructs:

A table segment is defined as a group of sections with contiguous section number. Segments are used in the DVB Event Information Table to carry information for different time slots in the Electronic Program Guide. Since these may be edited and added individually, it is useful to provide a test for them. Simply specify all fields and enter a lower and higher bound in the section number range field. All sections in the segment are now valid for the test.

The sub-table concept is slightly less well defined. It is usually taken to mean a group of table sections of any section number, whose other fields are known. To detect a sub-table, simply select "Any" for the section number range.

To detect tables with short form syntax see the note below on cur / nxt.

Table List Y tab showing tests 17-32 which drive the Table Y Fail sub-alarm.

Changing a parameter on the screen sends the command to update the device as soon as the button is clicked, checked or the edit box loses focus (normally by clicking another box). An update command will also be sent by pressing the return key from within an edit box.

PID

This is the Packet Identifier. The PID is in the range of 0 to 8191.

Table ID

The Table ID used to determine which table associated with the *PID* to detect. The range of valid values is 0 to 255.

Current / Next

The checkboxes marked Cur and Nxt are for selecting the current / next status of the table sections to be detected. PSI/SI/PSIP standards permit the carriage of two complete versions of each table section at any given time. One is active and labelled "current", the other is soon to be active and is labelled "next". This helps decoders realise a smooth transition when applying a version change. Each B083 test can be configured to consider only current sections, only next sections, or both types of section as valid for detection.

To detect tables with short form syntax such as the DVB Time and Date Table or the DVB Time Offset Table both checkboxes *must* be cleared. This greys out the extended syntax fields.

Table ID Extension

The table ID extension is used to determine which sub-table to detect. The valid range of values is 0 to 65535. The Any box that is joined on to the left hand side of the table ID extension is used to set the test to ignore this field.

The meaning of the table ID extension varies from table to table, but it is always found at the same place in the syntax. A sample list of tables is given below, along with the meaning of their table ID extension fields:

    PMT   program_number

    BAT   bouquet_id

    NIT   network_id

    SDT   transport_stream_id

    EIT   service_id

For example, using this field it is possible to verify the presence within a NIT-other table of sections referring to a particular network, and within an EIT-schedule table, the schedule of a particular service.

Section Number

A Section number range is set using the *Section Number L* and *Section Number H* boxes respectively. Alternatively to ignore these boxes select the *Any* box joined to the left hand side of the *Section Number L* box. The upper and lower limits both have a range 0 to 255.

Version

The version number of the table section under investigation. If the *Any* box joined to the left of the version box is illuminated the version number is ignored for the purpose of the test. Version has a range of 0 to 31.

Description

The description field is used to identify a specific test. It is not based on the test number but the parameters used to configure the test itself. For this reason the same description may appear on several lines if the tests are fundamentally the same. Changing the description on one of these tests will automatically change the descriptions on all the others. The following parameters are used:

- *PID*

- *TID*

- *TID Extension* (Ignored if the TID Extension *Any* is illuminated)

- *Section Number L* (Ignored if the Section *Any* button is illuminated)

- *Section Number H* (Ignored if the Section *Any* button is illuminated)

- *Version* (Ignored if the Version *Any* button is illuminated)

- *Current*

- *Next*

The descriptions are stored in the *ini* file for the application (normally found in the Windows directory). In circumstances where several engineers are visiting sites it may be desirable to distribute this file amongst them – this way they can see at a glance which service is represented by which test.

Upper Distance

This sets the upper distance to be used for this test in seconds with range 0.00 to 81.91 seconds. A qualifying section must be detected separated by less than the upper distance from the previous qualifying section or the test will fail.

On 1

Used to select the configured test for input channel 1. The input 1 LED shows the status of the test as applied to input 1. Grey indicates off, yellow indicates not-proven, green indicates good and red indicates fail. A red indication will drive the Table X Fail sub-alarm if the test is defined on the Table X Fail tab (or Table Y Fail if on the Table Y Fail tab). A yellow indication will have the same effect if Guilty Until Proven Innocent is selected on the Primary Config tab. Otherwise the not-proven state is read by the summary alarm as good. This is the default behaviour.

On 2

Used to select the configured test for input channel 2. Indication of the test result on input 2 follows the same rules as for input 1.

Alarm output configuration

This screen is used to configure the alarm outputs available via the GPIO connection. Two open-collector outputs and a relay are available per channel. These outputs can be used to provide a summary of the input monitoring to external equipment. The indicator next to each label gives the current state of the alarm.
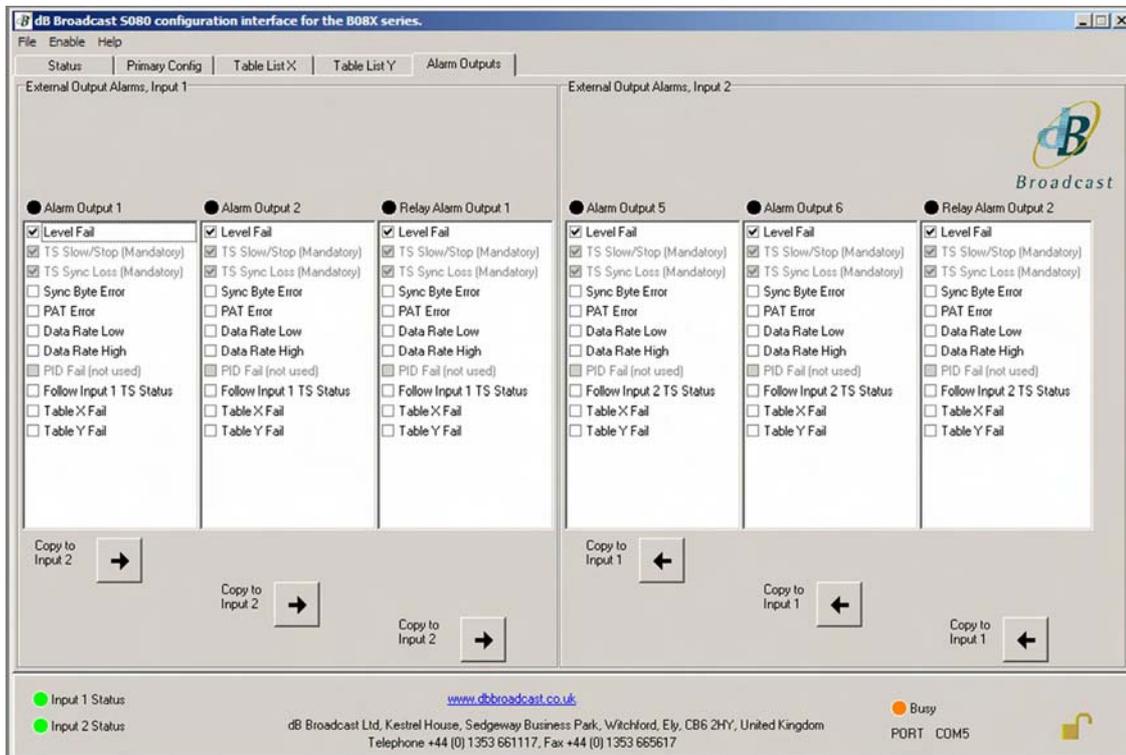
Configuring output alarms

To copy from an output or relay alarm to it's counterpart on the opposite channel use the arrow buttons. (i.e. relay 1 to relay 2, alarm output 1 to alarm output 5, alarm output 2 to alarm output 6 and vice versa).

The Command-Line Interface

The Command-Line Interface (CLI) may be used for configuration, monitoring and control. It is provided to facilitate scripting and as an entry point for integration into existing software systems. It provides full access to all B083 features using a standard terminal emulation program such as HyperTerminal*.

The command line protocol is available via the front or rear serial connection.

Note: The command line interface does not easily allow changes to the Table List settings. It is recommended to change Table List settings via the S080 configuration interface only. However, the full protocol is available on request for customers wishing to develop drivers for third-party systems using this interface.

Terminal settings

The rate is set by slider 2 on DIL switch S1 on the microcontroller sub-board. This can be either 9600 or 38400 Baud, with 8 data bits, 1 stop bit, no parity and software handshaking using Xon/Xoff. This setting affects both front and rear serial ports.

Command directory

Note: CLI commands are not case sensitive.

Dedicated query commands	
alarm	List all the sub-alarms that are assigned to TS status 1 & 2, relays 1 & 2 and external outputs 1 - 8.
config	Query configuration (level alarm thresholds, data rate thresholds and PAT upper distance).
help	List all commands.
inout	Show the state of external inputs, relays and external outputs.
status	Show current TS status and sub-alarms.
version	Query software, firmware and product versions.

Note: *If using HyperTerminal, we recommend using the PE version available from http://www.hilgraeve.com/htpe/order.html, due to a backscroll buffer bug which appears in the free version shipped with versions of MS Windows. This bug was corrected in Windows2000 SP4 but appeared again in the version shipped with Windows XP.

Configuring TS status alarms

atn:x	Add a sub-alarm to input 'n' TS status where 'x' is the alarm code number and 'n' is either 1 for input 1 TS status or 2 for input 2 TS status.
Examples:	at1:6 – add low data rate sub-alarm to input 1 TS status.
	at2:5 – add PAT error sub-alarm to input 2 TS status.
rtn:x	Remove a sub-alarm from input 'n' TS status where 'x' is the alarm code number and 'n' is either 1 for input 1 or 2 for input 2.
Examples:	rt1:6 – remove low data rate sub-alarm from input 1 TS status.
	rt2:5 – remove PAT error sub-alarm from input 2 TS status.

Alarm code numbers

1	ASI level fail
2	TS slow/stopped (Mandatory alarm)
3	TS sync loss (Mandatory alarm)
4	Sync byte error
5	PAT error
6	Low data rate
7	High data rate
8	Not used
9	Not used for atn:x and rtn:x commands
X	Table X Fail
Y	Table Y Fail
?	List alarm codes and current assignments

Note: The '?' argument will turn any of the above commands into a query command.

Configuring external outputs

aon:x		Add a sub-alarm to external output 'n', where 'x' is the alarm code number.
		Outputs 1 and 2 monitor ASI input 1 and will be assigned input 1 sub-alarms.
		Outputs 5 and 6 monitor ASI input 2 and will be assigned input 2 sub-alarms.
		No other values of 'n' are configurable.
	Examples:	ao2:1 – Add to Output 2: sub-alarm 1. This is the ASI level sub-alarm (for ASI input 1)
		ao5:4 – Add to Output 5: sub-alarm 4. This is the Sync byte error sub-alarm (for ASI input 2)
ron:x		Remove a sub-alarm from external output 'n', where 'x' is the alarm code number. Again, 'n' may be 1, 2, 5 or 6.
	Examples:	ro2:6 – Remove from Output 2: sub-alarm 6. This removes the low data rate sub-alarm from Output 2.
		ro6:5 – Remove from Output 6: sub-alarm 5. This removes the PAT error sub-alarm from output 6.
arn:x		Add a sub-alarm to relay output 'n', where x is the alarm code number and 'n' is either 1 or 2. Relay 1 uses input 1 sub-alarms. Relay 2 uses input 2 sub-alarms.
	Examples:	ar1:1 – add ASI level fail alarm to relay 1.
		ar2:4 – add sync byte error alarm to relay 2.
rrn:x		Remove a sub-alarm from relay output 'n', where x is the alarm code number and 'n' is either 1 or 2.
	Examples:	rr1:4 – Remove PAT error sub-alarm from relay 1.
		rr2:6 – remove low data rate alarm from relay 2.

Alarm code numbers

1	ASI level fail
2	TS slow/stopped (Mandatory alarm)
3	TS sync loss (Mandatory alarm)
4	Sync byte error
5	PAT error
6	Low data rate
7	High data rate
8	Not used
9	Follow respective TS status definition
X	Table X Fail
Y	Table Y Fail
?	List alarm codes and current assignments

Note: The '?' argument will turn any of the above commands into a query command.

Configuring level alarm thresholds

lan:xxx	Set level alarm threshold in dB for input 'n' where xxx is integer -1 to –12, 'n' is the input number 1 or 2.
Examples:	la1:-3 – Set input 1 level alarm threshold to –3dB.
	la2:-10 – Set input 2 level alarm threshold to –10dB.

Configuring TS data rate alarm thresholds

dhn:xxxxx	Set high data rate threshold for input 'n' TS, in packets per second from 1 to 65535, where 'n' is input 1 or 2.
Examples:	dh1:15000 – Set input 1 high TS data rate to 15,000 packets per second.
	dh2:5000 – Set input 2 high TS data rate to 5,000 packets per second.
dln:xxxxx	Set low data rate threshold for input 'n' TS, in packets per second from 1 to 65535, where 'n' is input 1 or 2.
Examples:	dl1:150 – Set input 1 low TS data rate to 150 packets per second.
	dl2:50 – Set input 2 low TS data rate to 50 packets per second.

Configuring PAT detection

patudn:xx.xx	Set input n PAT upper distance time in seconds from 0.01 to 30.00
	The TR 101290 recommended value is 0.5s
Example:	patud2:00.50 - set PAT upper distance for input 2 to 0.5s

Configuring initial conditions

sad:x	Set multi-second sub-alarm initial conditions, where x is
	1 - IUPG (default) - "not proven" taken as good
	2 - GUPI - "not proven" taken as fail
Example:	sad:1 multi-second alarms start up as good after TS_sync_loss recovery.

Selecting remote ext control type (GPIO / DART)

rct:x	Configure remote external control mode to use interface x, where x is:
	1 - GPIO (default)
	2 - DART
Example:	rct:2 - enable control over DART interface, disable control over GPIO interface.

Configuring the switch type*

swt:x	Set switch type, where x is 1 – near-seamless, 2 – non-seamless and ? – list switch type codes and current setting.
Examples:	swt:1 – Set 2x2 switch to be near-seamless
	swt:2 – Set 2x2 switch to non-seamless
	swt:? – List alarm codes and current assignment

Configuring auto-switch preferences**

asp:x	Auto-switch preference where x is the preference code number
Examples:	asp:1 – Main/reserve, A unbiased, B unbiased
	asp:? – Show current preference

Preference code numbers

1	Main/reserve, A unbiased, B unbiased
2	Main/reserve, A biased to 1, B unbiased
3	Main/reserve, A unbiased, B biased to 2
4	Main/reserve, A biased to 1, B biased to 2
5	Preview, unbiased
6	Preview, biased
7	Auto-switch disabled
?	List preference codes and current preference

Note: The '?' argument will turn the above commands into a query command.

Controlling the switch*

opa:x	Force output A source to input 'x'. Control is only possible if the current mode is Auto or Remote serial. Selecting 1 or 2 will automatically set the current mode to Remote serial and 0 returns the mode to Auto.
opb:x	Force output B source to input 'x'. Control is only possible if the current mode is Auto or Remote serial. Selecting 1 or 2 will automatically set the current mode to Remote serial and 0 returns the mode to Auto.
Examples:	opa:1 – Force output A source to input 1.
	opb:2 – Force output B source to input 2.
	opa:0 – Return output A to Auto mode.

Note: Commands marked (*) are not supported on the B083M. Commands marked (**) are not supported on the B083M or the B083C.

References

International standards:

[1] ISO/IEC 13818-1   Second Edition (2000-12-01)

Information technology – Generic coding of moving pictures and associated audio information: Systems

European standards:

[2] BS EN 50083-9   (2002)

Cable networks for television signals, sound signals and interactive services – Part 9: Interfaces for CATV/SMATV headends and similar professional equipment for DVB/MPEG-2 transport streams

[3] EN 300 468   V1.4.1 (2000-11)

Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems

US standards:

[4] ATSC Doc. A/65A   Rev. A – 31 May 2000

Program and System Information Protocol for Terrestrial Broadcast and Cable (Revision A) and Amendment No.1

Technical reports: EBU/CENELEC/ETSI-JTC

[5] ETSI TR 101 290   V1.2.1 (2001-05)

Digital Video Broadcasting (DVB); Measurement guidelines for DVB systems

Ordering information

B083 module types

Vistek frames require the /V mechanical variant of the chosen module.

B083M	Dual ASI TS Table Monitor for Avitel chassis
B083C	Dual ASI TS Table Monitor with 2x2 changeover switch for Avitel chassis
B083S	Dual ASI TS Table Monitor with 2x2 near-seamless switch for Avitel chassis
B083M/V	Dual ASI TS Table Monitor for Vistek chassis
B083C/V	Dual ASI TS Table Monitor with 2x2 changeover switch for Vistek chassis
B083S/V	Dual ASI TS Table Monitor with 2x2 near-seamless switch for Vistek chassis

3U Avitel configuration

ERF 3390K–P1	3U Chassis, 14 Module slots, 1 PSU slot, (no PSUs included)
ERF 3390K–P2	3U Chassis, 12 Module slots, 2 PSU slots, (no PSUs included)
MPS 3392L	PSU for above chassis
DMC 3307K	BNC Rear connector module

1U Avitel configuration

ERF 1131K	1U Chassis, 3 Module slots, PSU mounted externally, (no PSUs included)
MPS 0330	PSU for above chassis (requires mounting holsters)
ECA 0331	Mounting holsters for PSU MPS 0330
DMC 3307K	BNC Rear connector module

3U Vistek configuration

V1606-dB-2PSU	3U Chassis, 14 Module slots, 2 PSU slots (2 PSUs included)
V1606-dB-48V	3U Chassis, 14 Module slots, 2 48V PSU slots (2 48V PSUs included)
VB100	BNC Rear connector module

1U Vistek configuration (dual PSU)

F010	1U Chassis, 2 Module slots, 2 PSUs (PSUs included)
VB100	BNC Rear connector module

Windows configuration interface

S080	Configuration Interface software for PC running Microsoft Windows 98, Me, NT, 2000 or XP