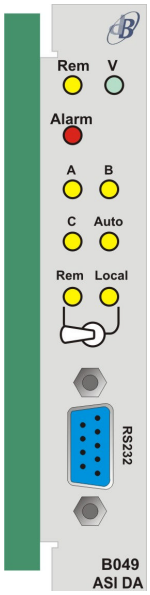
Broadcast

B049

ASI DA with auto sensing switch

3in x 6out



Handbook

PROVISIONAL Version 0.9B

Certification and compliance

CE certification

The B049 and B049L meet all the CE Class B requirements with the exception of Emission Requirements. To meet CE requirements, cables must be connected on all ASI outputs (ASI out 1, ASI out 2, ASI out 3, ASI out 4, ASI out 5 and ASI out 6). When cables are connected to these outputs then the device is compliant with FAIR-RITE 0443164151.

FCC compliance

FCC compliance notice

Trade name	dB Broadcast Ltd
Product name	ASI switched distribution amplifier
Product model numbers	B049 & B049L

These devices comply with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, this equipment may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician.

Modifications not expressly approved by the manufacturer could void the user authority to operate the equipment under FCC Rules.

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Firmware versions

Contents

Introduction

The B049 series

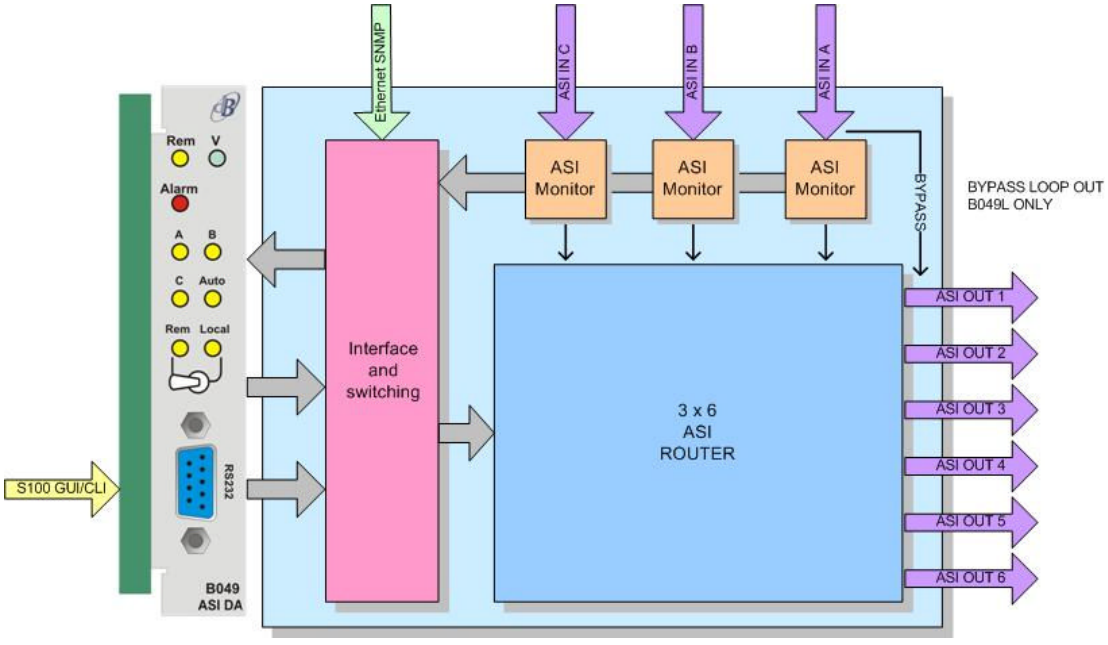
The Hawkeye B049 distribution amplifier is a DVB-ASI auto-sensing and auto-switching module with three inputs and six outputs. Any input can be switched through to all the outputs, or as a 3x6 router, to any one output.

All three inputs have independent monitors capable of detecting data rate, null packet rate and specific PID presence.

Automatic switching decisions can be made if any of the parameters exceed user-definable limits. The switching sequence can be prioritized forward or backward.

The module is housed within the V1606 (3RU) or F010 (1RU) chassis.

Status is indicated on the front panel, with additional advanced control, configuration and measurement functions available via S100 configuration software included with the module.



Two versions of the B049 are available:

- B049; Auto sensing ASI DA, 3 inputs and 6 outputs – uses the VB210 rear connector
- B049L; As B049 but with loop through of ASI IN A to ASI OUT 1 in the event of failure – uses the VB220 rear connector

Both versions feature an integrated digital switch, allowing any input to be routed to any output.

Control options

Whilst the supplied S100 software provides full configuration and monitoring for individual modules via the RS232 front serial connector, remote control of multiple modules over a LAN is also available.

Control and monitoring of multiple modules over a network can be achieved via SNMP or by using the optional B067 Hawkeye Module Management software. In each case the frame requires both the B065 RS232/Ethernet controller and the V6081 rack controller. The V6081 can only be used with V1606 3RU frames.

Note: A built-in Command Line Interface protocol is also implemented to allow control and monitoring from an RS232 terminal or terminal emulator for individual modules.

Features

- ASI loop-through in the event of module failure or removal (B049L only)
- Transport stream sync, data rate, null packet rate and PID presence analysis on all three inputs
- Priority control of input sources for switching
- Automatic sampling of secondary sources prior to switching
- User-definable debounce delay in redundancy architectures
- Alarm feedback of all sources, whether primary or secondary
- Alarm status feedback through GUI software
- Service selected indicator, switching status on front panel
- Low power consumption
- 3x6 ASI distribution
- User configuration switching condition on each input
- S100 configuration and monitoring software included as standard
- Optional rack based control and monitoring systems for multiple modules over a network

Applications

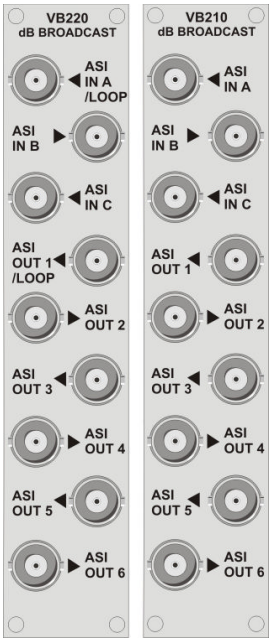
- DVB-ASI signal distribution
- Self-contained redundancy switching of DVB-ASI streams
- Redundancy architectures
- Small-scale DVB-ASI router
- Low-cost monitoring of DVB-ASI streams
- A-B-C and A-B Switching

Installation

The correct rear panel assembly must be installed prior to fitting the main ASI DA switch module.

To do this, remove the blanking plate from the required slot in the rear of the rack.

Insert the rear panel assembly taking care to align the control and power pins at the top and bottom of the rear panel correctly. The ASI OUT connectors go towards the bottom of the rack.



CAUTION: Damage to the module and/or chassis may occur if the rear panel assembly is not correctly installed.

Secure the rear panel assembly to the chassis using the 4 screws that held the blanking plate (M2.5 x 10mm).

Pull down the front panel and insert the module into the appropriate slot taking care to ensure it is within the top and bottom guides. Push the decoder fully home into the DIN connector in the rear panel assembly.

CAUTION: Always ensure the B049 ASI Switched Distribution Amplifier is only inserted into a slot with a rear panel of the correct type.

To remove the module from the rack pull the unit from the front of the rack using the handle.

DVB ASI I/O

BNC	SIGNAL - B049	SIGNAL - B049L
ASI IN A	ASI INPUT A	ASI INPUT A
ASI IN B	ASI INPUT B	ASI INPUT B
ASI IN C	ASI INPUT C	ASI INPUT C
ASI OUT 1	ASI OUTPUT 1	ASI OUTPUT 1/PWR fail IN1 loop out
ASI OUT 2	ASI OUTPUT 2	ASI OUTPUT 2
ASI OUT 3	ASI OUTPUT 3	ASI OUTPUT 3
ASI OUT 4	ASI OUTPUT 4	ASI OUTPUT 4
ASI OUT 5	ASI OUTPUT 5	ASI OUTPUT 5
ASI OUT 6	ASI OUTPUT 6	ASI OUTPUT 6

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
Shell	Chassis ground

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.

Functional check

To ensure the B049 ASI switched distribution amplifier is operating correctly complete the following procedures:

1. Connect 3 valid ASI transport streams to the 3 ASI inputs, A, B, C on the rear panel assembly.
2. Connect the ASI 1 output to the ASI input of a compatible MPEG2 decoder.
3. Feed the video output of the decoder to a compatible picture monitor.
4. Using either Local control (via RS-232) or Remote control (e.g. via SNMP) with the appropriate control application program, set control to manual.
5. Switch alarms on the A, B, & C inputs to Sync Lock Fail only.
6. Ensure that manual switching of any of the 3 inputs (plus zero) to output 1 is possible.
7. The alarm LED on the front panel should be off.
8. Connect each output in turn to the MPEG decoder & repeat for outputs 2, 3, 4, 5, & 6.
9. Ensure that switching of any of the 3 inputs (plus zero) to any of the 6 outputs is possible.
10. Set control to Auto.

Input failure

If an input fails, the output will switch to the next “highest” input. For example, with 3 valid inputs, if “A” fails then the output should switch to “B”.

However, if “A” then comes good the output will remain on “B” thus preventing an unnecessary disturbance on the transmission output.

If “A” & “B” fail then the output should switch to “C”

As described above, remove each input in turn (to cause a fail condition) and ensure the unit automatically switches to the correct alternative input.

Refer to the Output Switching table on page 9.

Note:

1. When an input has failed, the Alarm LED will light even when the unit has successfully switched to the correct alternative input.
2. The Alarm LED will indicate the loss Sync on the failed channel.
3. The unit may be set for Alarms on other parameters other than Sync Lock fail. See Alarms and Alarm Masks on page 12 in the Operation chapter.

General safety summary

Precautions to avoid personal injury, fire or product damage.

Every care has been taken in the design, manufacture, assembly and testing of this product to obviate health and safety risks to personnel and to prevent fire or other hazards. However, please review the following safety precautions for continued protection.

General use. This product must only be used as specified in this manual. Failure to follow any ratings or directions for use may impair the protection provided.

On receipt of the product. Verify there is no damage and that all accessories are present .

Suspected damage or failure. Do not operate the product. Have it inspected by qualified service personnel or contact dB Broadcast or an authorised distributor.

Operating environment. The unit is for indoor use only. See the Specification chapter for further environmental, physical, certification and safety information.

Do not operate in wet or damp conditions.

Do not operate in an explosive atmosphere.

Power cable. Use only a power cable specified for this product and certified safe for the country of use.

Grounding. *This product must be grounded*. Before making any signal connections, ensure that the product is grounded. The product is grounded through the power cable. To avoid electric shock under fault conditions, the protective grounding conductor within the power cable must be connected to an earth terminal of the building in which the product is located.

Mains supply voltage and fuse ratings. See the Specification chapter. All ratings must be observed.

Ventilation. To prevent overheating do not obstruct ventilation holes.

Cuts and abrasions. When handling the equipment, guard against cuts or abrasions from metal parts of the case or components.

CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

Toxic content. Unwanted or obsolete components must be disposed of safely as some may release toxic vapours if incinerated.

In case of difficulty. Please refer to dB Broadcast.

Lithium battery

A lithium battery is located in this product, which provides back up for the real-time clock. In normal operation this battery has a life in excess of 5 years. If the real-time clock's operation becomes erratic when cycling the power, then the battery may need replacing. Battery replacement should only be performed by a 'skilled and competent technician', or by returning to db Broadcast for repair.

CAUTION: Danger of explosion if battery is incorrectly replaced.

Product damage precautions

Take anti-static precautions

Since this unit contains exposed PCB and electronic components, ensure proper anti-static precautions are observed when handing this equipment.

Provide proper ventilation

To prevent product overheating, provide proper ventilation.

Do not operate with suspected failures

If you suspect there is damage to this product, have it inspected by qualified service personnel.

There are no user serviceable parts

Return to dB Broadcast or an authorized distributor for repair/service.

Installation

On receipt of the unit, open the box and verify that the unit and all accessory items included.

Save the shipping carton and packing materials in case it becomes necessary to ship the unit to dB Broadcast for service or repair.

Operation

The B049 has two control modes, internal and external.

External

The unit will not switch unless instructed to do so by an external device locally via the front panel RS232 port or remotely over a LAN.

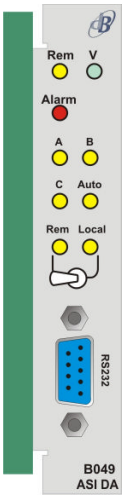
Internal (automatic)

The unit makes switching decisions according to the rules and modes built into an internal controller. The module can be put in automatic mode via external control. For example remotely via SNMP or via the B067 management software, or locally via the supplied S100 configuration software from a PC connected to the front panel RS232 port.

The front panel LEDs indicate the current input selected on the outputs with the AUTO LED illuminated to indicate automatic mode is active.

Front panel controls and LEDs

The front panel offers local monitoring & control features by means of its LEDs and switches.



LED Indicators:

Rem	Amber – Remote mode active
V	Green – Indicates DC power present & OK
Alarm	Red – Indicates fault condition detected
A, B, C	Amber – Input status; meaning varies with control mode
Rem	Amber – Remote mode – SNMP via Ethernet
Local	Amber – Local (RS232) mode

The two position front panel control switches between Remote (left position) and Local RS232 control (right position).

Automatic control

Auto mode gives control to the internal on-chip controller. It allows the module to operate autonomously, without any outside influence.

In auto mode, the switching of the outputs is dependant upon the status of the inputs, as shown below, with input A the main feed, followed by input B and finally input C.

Output switching

Active I/P	Input A	Input B	Input C	Result
A	Good	Good	Good	No Change
B	Good	Good	Good	No Change
C	Good	Good	Good	No Change
A	Fail	Good	Good	Change to Input B
B	Fail	Good	Good	No Change
C	Fail	Good	Good	No Change
A	Good	Fail	Good	No Change
B	Good	Fail	Good	Change to Input A
C	Good	Fail	Good	No Change
A	Good	Good	Fail	No Change
B	Good	Good	Fail	No Change
C	Good	Good	Fail	Change to Input A
A	Good	Fail	Fail	No Change
B	Good	Fail	Fail	Change to Input A
C	Good	Fail	Fail	Change to Input A
A	Fail	Good	Fail	Change to Input B
B	Fail	Good	Fail	No Change
C	Fail	Good	Fail	Change to Input B
A	Fail	Fail	Good	Change to Input C
B	Fail	Fail	Good	Change to Input C
C	Fail	Fail	Good	No Change
A	Fail	Fail	Fail	No Change
B	Fail	Fail	Fail	No Change
C	Fail	Fail	Fail	No Change

In automatic control, outputs may be individually changed using local or remote control but when an input failure is detected then all outputs will change to the new setting.

Auto mode is the default used when no other control modes are in force. When disabled it does nothing other than act as the off state for the other control modes.

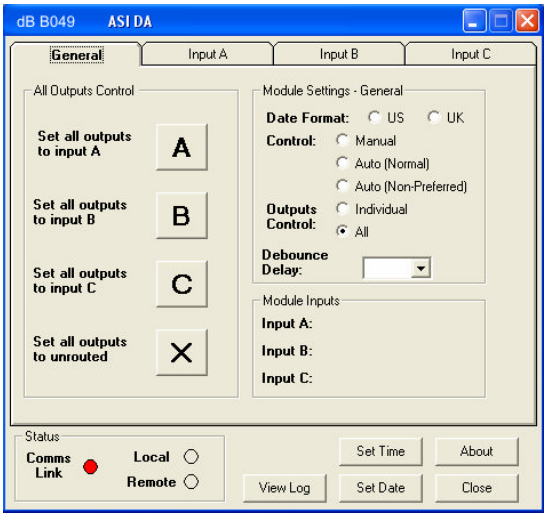
Local RS232 control

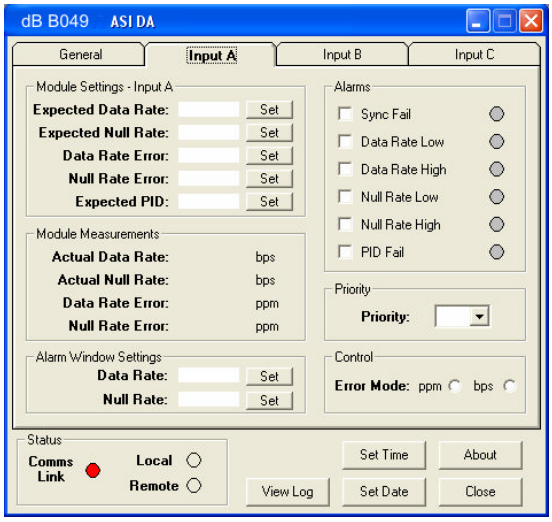
Using the S100 configuration software

S100 configuration software, which works with the B100-B130 series, is supplied with the B101 module.

It works via the RS232 port on the front of the module and does not require any other interface modules to be present in the rack.

The S100 software automatically selects which type of module it is connected to and displays the appropriate menu. It is possible to override the automatic selection and choose the correct menu manually.





Using a terminal or terminal application

Typed commands from a terminal can be sent in local control mode allowing the unit to be monitored and configured using a standard RS232 terminal or similar application such as Windows® HyperTerminal.

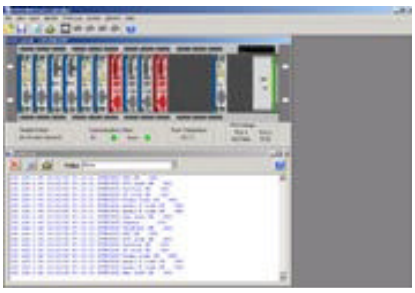
Remote serial commands are persistent. They must be overridden by another command of equal or higher precedence, or switched off by the return to auto command. It is possible to drive this port remotely over a LAN using a LAN to serial converter unit (not supplied).

Command protocol and a list of local control commands are detailed in the Command Line Interface chapter.

Remote control

When the front panel switch is in the ‘Remote’ position, control of multiple frames can be achieved over a network.

There are two ways this can be achieved; using SNMP or by using the optional B067 Hawkeye Module Management software.



The B067 software can control up to 10 V1606 3RU racks from a single PC. Each rack can be identified by either the IP address or a user-defined name, and accessed at the click of a button.

The active rack graphic, which mimics the actual appearance of the rack, shows module status (red indicates an alarm condition), communication link status, rack operating temperature and power supply voltage levels.

Alarms from all connected racks are aggregated and can be viewed in real time or stored to a nominated file for later analysis.

For either SNMP or B067 remote control, frames require both the B065 RS232/Ethernet controller and the V6081 rack controller.

Note: The B049 cannot be controlled over DARTnet.

Data rate & null rate

The B049 monitors each input and detects the validity of the incoming ASI transport stream. The validity of each input is checked and if present, the packet size, data rate and null rate are calculated. The maximum possible ASI bit stream rate is 99,999,999 bps.

Bit streams over this rate should not be used as they may cause the B049 to work erroneously.

The packet size of each input is calculated and is used in bit rate calculations. There are two possible values for packet size, 188-byte and 204-byte. Data/Null rate errors are calculated from the expected data/null rate value entered by the operator and the actual data/null rate calculated from the input stream.

Errors are recorded in parts per million.

Example:

Expected data rate:	19000000 bps
Actual data rate:	18096128 bps
Data rate error:	(Actual – Expected)/(Expected/1000000)
	(19000000 – 18096128)/(19000000/1000000) = 47572 ppm

Data / Null rate alarms are triggered when the actual data / null rate exceeds or falls below a threshold set by the operator.

The threshold range is 00 – 25 ppm.

PID matching

The Switched ASI Distribution Amplifier has the facility to monitor each input to check for a specific Program Identifier. The operator enters the PID for each input and if no match is found on the incoming transport stream then an alarm is raised.

The valid PID range is 00000 to 16383.

Alarms & alarm masks

Sync lock fail:	Indicates no sync detected on transport stream. Loss of input sync lock occurs when 2 consecutive packets are lost. Sync lock is regained when 5 consecutive packets are detected.
Data rate lower:	Indicates actual data rate below expected data rate – threshold.
Data rate higher:	Indicates actual data rate above expected data rate + threshold.
Null rate lower:	Indicates actual null rate below expected null rate – threshold.
Null rate higher:	Indicates actual null rate above expected null rate + threshold.
PID fail:	Indicates PID not detected in transport stream.

The alarms for each input can be masked (disabled) by clearing the appropriate bit in the input alarm mask.

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 B049 features using a standard terminal emulation program such as HyperTerminal.

Note: If using HyperTerminal, we recommend using the PE version available from http://www.hilgraeve.com/htpe/order.html , due to a back scroll buffer bug which appears in the free version shipped with versions of MS Windows. This bug was corrected in Windows 2000 SP4 but appeared again in the version shipped with Windows XP.

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

Serial port connection

The front panel serial connector (labelled RS232) allows local control and monitoring using a PC. See the Installation chapter for connector information and pin-out.

Before initiating remote control set the PC serial port as follows:

Speed:	19200 baud
Decoder protocol:	1 start bit, 8 data bits, no parity, 1 stop bit
Interface:	RS232
Handshaking:	RTS/CTS

Command syntax

The remote control commands use the standard ASCII character set and are split into two types: **Send** and **Get**.

Set command

The Set commands are used to modify B049 settings.

Set command format:

Set Command:	<Command> = <Setting> c/r
Where:	<Command> is the command string
	= is ASCII character 61
	<Setting> is the value to be set
	c/r is ASCII character 13

One of three responses are returned by the module to a Set command:

OK:	Command implemented successfully
COMMAND ERROR:	Command was not recognized
REMOTE CONTROL:	Command was ignored because the unit is set to remote control mode

e.g. To set control to automatic the command format is:

Command:	CONTROL=AUTO
Result:	Automatic control selected

Get command

Get commands return information about the Switched Distribution Amplifier.

The Get command format:

Get Command:	<Command> ? c/r
Where:	<Command> is the command string
	? = ASCII character 61
	c/r is ASCII character 13

The reply format to the Get command is as follows:

Reply:

<Command> :	<Value> c/r
Where:	<Command> is the command string
	: is ASCII character 58
	<Value> is the setting
	c/r is ASCII character 13

e.g. To get control setting the command format is:

Command:	CONTROL?
Result:	CONTROL: MANUAL

Remote command descriptions

The following remote control commands appear in alphabetical order:

ACTDATA

Command:	ACTDATA ip?
Parameter:	ip A – Request input A actual data rate
	B – Request input B actual data rate
	C – Request input C actual data rate
Returns:	ACTDATA ip: dr
	dr is 00000000 – 99999999 (actual data rate in bps)

Example

ACTNULL B?

ACTNULL B:	18096128
	(Input B actual null rate measured at 18096128bps)

ACTNULL

Command:	ACTNULL ip?
Parameter:	ip A – Request input A actual data rate
	B – Request input B actual data rate
	C – Request input C actual data rate
Returns:	ACTNULL ip: nr
	nr is 00000000 – 99999999 (actual null rate in bps)

Example

ACTNULL A?

ACTNULL A:	01043776
	Input A actual null rate measured at 1043776bps

ALARM

Requests the input's alarm state.

Request

Command	ALARM ip?
Parameter:	ip A – Request input A alarm status
	B – Request input B alarm status
	C – Request input C alarm status
Returns:	ALARM ip: abcdefgh
	a Sync lock fail alarm (0 or 1)
	b Data rate low alarm (0 or 1)
	c Data rate high alarm (0 or 1)
	d Null rate low alarm (0 or 1)

e Null rate high alarm (0 or 1)
f PID match fail alarm (0 or 1)
g Spare alarm (0)
h Spare alarm (0)

Note: 0 alarm inactive; 1 alarm active

Example

Command: ALARM C?
Input C sync lock fail alarm active
Returns: ALARM C: 10000000
(Input C sync lock fail alarm active)

ALMASK

Sets or requests input's alarm mask.

Request

Command: ALMASK ip?
Parameter: ip A – Request input A alarm mask
B – Request input B alarm mask
C – Request input C alarm mask
Returns: abcdefgh
a Sync lock fail alarm mask (0 or 1)
b Data rate low alarm mask (0 or 1)
c Data rate high alarm mask (0 or 1)
d Null rate low alarm mask (0 or 1)
e Null rate high alarm mask (0 or 1)
f PID match fail alarm mask (0 or 1)
g Spare mask (0)
h Spare mask (0)

Note: 0 masks alarm (disables); 1 unmasks alarm (enables)

Set

Command: ALMASK ip=abcdefgh
Parameter: ip A – Set input A alarm mask
B – Set input B alarm mask
C – Set input C alarm mask
abcdefgh a Sync lock fail alarm mask (0 or 1)
b Data rate low alarm mask (0 or 1)
c Data rate high alarm mask (0 or 1)
d Null rate low alarm mask (0 or 1)
e Null rate high alarm mask (0 or 1)
f PID match fail alarm mask (0 or 1)

g spare mask (0 or 1)
h Spare mask (0 or 1)

Note: 0 masks (disables) alarm; 1 unmasks (enables) alarm

Returns: OK if command valid
COMMAND ERROR if command invalid

Examples

Command: ALMASK C?
Returns: ALMASK: 10000000
Input C sync lock fail alarm unmasked (enabled)
All other alarms masked (disabled)
Command: ALMASK A=11111111
Result: All alarms for input A unmasked (enabled)

CONTROL

Sets or requests unit control state, which can either be automatic or manual. Automatic control allows each module to change its own outputs depending upon input status. In Manual control outputs can only be changed by external control. Refer to the Operating Chapter for a description of the control states.

Request

Command: CONTROL?
Returns: CONTROL: c
c: AUTO – Automatic control active
MANUAL – Manual control active

Set

Command: CONTROL=c
Parameter: c
AUTO – Selects automatic control
MANUAL – Selects manual control
Returns: OK if command valid
COMMAND ERROR if command invalid

Examples

Command: CONTROL?
Returns: CONTROL: MANUAL - Manual control active
Command: CONTROL=AUTO
Result: Automatic control selected

DATAPPM

Requests input's actual data rate error in parts per million (ppm).

Request

Command: DATAPPM ip?

Parameter:	ip	A – Request input A data rate error
		B – Request input B data rate error
		C – Request input C data rate error
Returns:	DATAPPM ip: ppm	
	ppm ±0000000 – 1000000 Data rate error in ppm	

Examples

Command:	DATAPPM A?
Returns:	DATAPPM A: -0047572
	Input A actual data rate 47572ppm below expected data rate
Command:	DATAPPM B?
Result:	DATAPPM B: 00005340
	Input B actual data rate 5340ppm above expected data rate

DATE

Sets or requests the unit date. The date format depends upon the date mode selected (Refer to DMOD command).

Request

Command:	DATE?
Returns:	DATE: dd/mm/yy (or mm/dd/yy)

Set

Command:	DATE=dd/mm/yy (or mm/dd/yy)
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	DATE?
Returns:	DATE: 06/02/02
Command:	DATE=09/11/01
Result:	Unit date set to 9th November 2001

DMOD

Sets or requests the unit date format (used by status log).

Request

Command:	DMOD?
Returns:	DMOD: dm
	dm US –Date in US format (MM/DD/YY)
	UK – Date in UK format (DD/MM/YY)

Set

Command:	DMOD=dm
Parameter:	dm
	US – Date in US format (MM/DD/YY)
	UK – Date in UK format (DD/MM/YY)
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	DMOD?
Returns:	DMOD: US
	Date currently set to US format i.e. MM/DD/YY
Command:	DMOD=UK
Result:	Date set to UK format i.e. DD/MM/YY

DPPMLIM

Sets or requests data rate alarm limit in parts per million (ppm). This is used by module for calculating data rate alarm levels. Refer to the 'Operating Basics' section of this manual for a full description

Request

Command:	DPPMLIM ip?
Parameter:	ip A – Set input A data rate limit
	B – Set input B data rate limit
	C – Set input C data rate limit
	ppm 00 – 25 Data rate limit in ppm
Returns:	DPPMLIM ip: ppm
	ppm 00 – 25 Data rate limit in ppm

Set

Command:	DPPMLIM ip=ppm
Parameter:	ip A – Set input A data rate limit
	B – Set input B data rate limit
	C – Set input C data rate limit

	ppm 00 – 25 Data rate limit in ppm
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	DPPMLIM B?
Returns:	DPPMLIM B: 15
	Input B data rate limit set to 15ppm
Command:	DPPMLIM C=5
Result:	Input C data rate limit set to 5ppm

EXPDATA

Sets or requests input's expected data rate in bits per second (bps).

Request

Command:	EXPDATA ip
Parameter:	ip A – Request input A expected data rate
	B – Request input B expected data rate
	C – Request input C expected data rate
Returns:	EXPDATA ip: dr
	dr 00000000 – 99999999 expected data rate in bps

Set

Command:	EXPDATA ip=dr
Parameter:	ip A – Set input A expected data rate
	B – Set input B expected data rate
	C – Set input C expected data rate
	dr 00000000 – 99999999 expected data rate in bps
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	EXPDATA A?
Returns:	EXPDATA A: 24000000
	Input A expected data rate set to 24Mbps
Command:	EXPDATA B=48500000
Result:	Input B expected data rate set to 48.5Mbps

EXPNULL

Sets or requests input's expected null rate in bits per second (bps).

Request

Command:	EXPNULL ip?
Parameter:	ip A – Request input A expected null rate
	B – Request input B expected null rate
	C – Request input C expected null rate
Returns:	EXPNULL ip: nr
	nr 00000000 – 99999999 Expected null rate in bps

Set

Command:	EXPNULL ip=nr
Parameter:	ip A – Set input A expected null rate
	B – Set input B expected null rate
	C – Set input C expected null rate
	Nr 00000000 – 99999999 Expected null rate in bps
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	EXPNULL C?
Returns:	EXPNULL C: 01500000
	Input C expected null rate set to 1.5Mbps
Command:	EXPNULL A=00100000
Result:	Input A expected null rate set to 100Kbps

GETIP

Requests status of inputs.

Request

Command:	GETIP ip?	
Parameter:	ip	A – Request input A status
		B – Request input B status
		C – Request input C status
Returns:	GETIP ip: sts	
	Sts	LOCKED (188-BYTE)
		LOCKED (204-BYTE)
		UNLOCKED

Examples

Command:	GETIP A?
Returns:	GETIP A: LOCKED (204-BYTE)
	Input A transport stream present with 204-byte packet length

LOG

Request command gets a single status log entry. Set command clears entire status log.

Request

Command:	LOG n?
Parameter:	n
	0 – 5 where 0 is latest log entry, 5 is oldest.
Returns:	LOG n: hh:mm:ss dd/mm/yy desc
	Desc Log entry description (see Table 1: Status log entry messages)

Set

Command:	LOG=
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	LOG 0?
Returns:	LOG 0: 07:25:08 03/04/03 INPUT A SYNC OK
	Log entry showing input A regained sync at 7:25
Command:	LOG=
Result:	Entire status log cleared (all log entries deleted)

Status log entry message	Description
Log entry clear	No log entry
System reboot	Unit power cycled
Self-test failure	Unit failed power-on test
PSU failure	Unit internal power failure detected
PSU ok	Unit internal power OK
Input A sync failure	Input A no sync detected
Input A sync OK	Input A sync lock restored
Input A data low	Input A data rate below expected data rate
Input A data high	Input A data rate above expected data rate
Input A data OK	Input A data rate within acceptance window
Input A null low	Input A null rate below expected null rate
Input A null high	Input A null rate above expected null rate
Input A null OK	Input A null rate within acceptance window
Input A PID failure	Input A expected PID not found in TS
Input A PID OK	Input A expected PID found in TS
Input B sync failure	Input B no sync detected
Input B sync OK	Input B sync lock restored
Input B data low	Input B data rate below expected data rate
Input B data high	Input B data rate above expected data rate
Input B data OK	Input B data rate within acceptance window
Input B null low	Input B null rate below expected null rate
Input B null high	Input B null rate above expected null rate
Input B null OK	Input B null rate within acceptance window
Input B PID failure	Input B expected PID not found in TS
Input B PID OK	Input B expected PID found in TS
Input C sync failure	Input C no sync detected
Input C sync OK	Input C sync lock restored
Input C data low	Input C data rate below expected data rate
Input C data high	Input C data rate above expected data rate
Input C data OK	Input C data rate within acceptance window
Input C null low	Input C null rate below expected null rate
Input C null high	Input C null rate above expected null rate
Input C null OK	Input C null rate within acceptance window
Input C PID failure	Input C expected PID not found in TS
Input C PID OK	Input C expected PID found in TS

Table 1: Status log entry messages

MODEL

Requests the unit model number.

Request

Command:	MODEL?
Returns:	MODEL: B049

NPPMLIM

Sets or requests null rate alarm limit in parts per million (ppm). This is used by module for calculating null rate alarm levels. Refer to the Operating Chapter for a full description.

Request

Command:	NPPMLIM ip?
Parameter:	ip A – Request input A null rate limit
	B – Request input B null rate limit
	C – Request input C null rate limit
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Set

Command:	NPPMLIM ip=ppm
Parameter:	Ip A
	Set input A null rate limit
	B – Set input B null rate limit
	C – Set input C null rate limit
	ppm 00 – 25 Null rate limit in ppm
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	NPPMLIM A
Returns:	NPPMLIM A: 01
	Input A null rate limit set to 1ppm
Command:	NPPMLIM B=25
Result:	Input B null rate limit set to 25ppm

NULLPPM

Requests input's actual null rate error in parts per million (ppm).

Request

Command:	NULLPPM ip?
Parameter:	Ip A
	Request input A null rate error
	B – Request input B null rate error
	C – Request input C null rate error
Returns:	NULLPPM ip: ppm
	Ppm ±0000000 – 1000000 Null rate error in ppm

Examples

Command:	NULLPPM A?
Returns:	NULLPPM A: -0003045
	Input A actual null rate 3045ppm below expected
Command:	NULLPPM B?
Result:	NULLPPM B: 00005340
	Input B actual null rate 5340ppm above expected null rate

PID

Sets or requests input's expected Program Identifier (PID) code. This is used by module to check the incoming transport for the expected PID and set the PID alarm accordingly. Refer to the Operating Chapter for more details.

Request

Command:	PID ip?
Parameter:	ip Request input A expected PID
	B – Request input B expected PID
	C – Request input C expected PID
Returns:	PID ip: pid
	pid 00000 – 16383

Set

Command:	PID ip=pid
Parameter:	Ip A
	Set input A expected PID
	B – Set input B expected PID
	C – Set input C expected PID
	pid 00000 – 16383
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	PID C?
Returns:	PID C: 00001
	Input C expected PID set to 00001
Command:	PID B=01234
Result:	Input B expected PID set to 01234

SERIAL

Requests the unit serial number

Request

Command:	SERIAL?
Returns:	SERIAL: 3010-0002

SETOP <1 – 6>

Sets or requests the current routing status of outputs. Command has optional parameter allowing individual output to be set.

Request

Command:	SETOP op?
Parameter:	op 1 to 6
Returns:	SETOP op: ip
	ip A – Output fed from input A
	B – Output fed from input B
	C – Output fed from input C
	0 – Output off

Set

Command:	SETOP=ip Set all outputs to input
	SETOP op=ip Set single output to input
Parameter:	Op 1 – 6
	Ip A - Output fed from input A
	B – Output fed from input B
	C – Output fed from input C
	0 – Output off
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	SETOP 3?
Returns:	SETOP 3: B
	Output 3 is fed from input B
Command:	SETOP=A

Result:	All outputs fed from input A
Command:	SETOP 2=0
Result:	Output 2 off

TIME

Sets or requests the unit time (24h clock format).

Request

Command:	TIME?
Returns:	TIME: hh:mm:ss

Set

Command:	TIME=hh:mm:ss
Returns:	OK if command valid
	COMMAND ERROR if command invalid

Examples

Command:	TIME?
Returns:	TIME: 13:03:49
Command:	TIME=17:10:15
Result:	Unit time set to 17:10:15

VERMPU

Requests the unit's main processor firmware number and version.

Request

Command:	VERMPU?
Returns:	VERMPU: FW0775 V01

VERPGA

Requests the unit's FPGA firmware number and version.

Request

Command:	VERPGA?
Returns:	VERPGA: FW0776 V01

System defaults

This section lists the system default values for user definable settings.

Item	Default setting
Date mode	UK
Control	Manual
Input A expected data rate	10000000 bps
Input A data rate error limit	25 ppm
Input A expected null rate	10000000 bps
Input A null rate error limit	25 ppm
Input A expected pid	00001
Input A alarm mask	11111111 (All alarms enabled)
Input B expected data rate	10000000 bps
Input B data rate error limit	25 ppm
Input B expected null rate	10000000 bps
Input B null rate error limit	25 ppm
Input B expected pid	00001
Input B alarm mask	11111111 (All alarms enabled)
Input C expected data rate	10000000 bps
Input C data rate error limit	25 ppm
Input C expected null rate	10000000 bps
Input C null rate error limit	25 ppm
Input C expected pid	00001
Input C alarm mask	11111111 (All alarms enabled)

Addendum

There are several new features added to the firmware that affect the Auto and Auto Non-Preferred modes of operation. The Manual mode of operation is unaffected by these changes.

Input debounce delay

A configurable debounce delay has been added to each input in the module. This facility allows the operator to define the period of failure, from 0 to 10s in 250ms increments, before the Auto mode switches from the failed input.

The debounce timer is activated when an input failure is detected. As long as the input remains in the fail state, the debounce timer continues until the debounce period is reached. If the input changes state during the debounce period then the debounce timer stops and resets.

Input priority

The priority of each of the inputs can now be adjusted. There are three levels of priority (1 to 3) with level 1 being the highest priority and level 3 being the lowest. The priority level can be used in the Auto mode of operation to determine which of the 2 remaining inputs are selected upon detection of failure on the active input.

Example:

- Input A is active input
- Input A priority is set to level 1
- Input B priority is set to level 3
- Input C priority is set to level 2
- If input A fails then input C will become the active input as it's priority level is higher than input B's.

If all inputs are set to the same priority level then input A is highest priority followed by input B then input C.

Optional changes

Disable A-B-C operation in favour of A-B only

Change prioritisation of switching to revert back to input A if it comes good, otherwise it would remain on B

Glossary

8-VSB	Eight discreet amplitude level, “vestigial side-band” broadcast transmission technology. VSB is an analogue modulation technique used to reduce the amount of spectrum needed to transmit information through cable TV, or over-the-air broadcasts used in the NTSC (analogue) standard. 8-VSB is the U.S. ATSC digital television transmission standard.
Ambient	The atmospheric conditions surrounding a given item. Normally in terms of factors which influence or modify, such as temperature, humidity, etc.
Amplitude	The magnitude of variation in a changing quantity from its zero value.
ASI	Asynchronous Serial Interface.
Attenuation	A reduction in power. It occurs naturally during wave travel, through lines, waveguides, space or a medium such as water. It may be produced intentionally by placing an attenuator in circuit. The amount of attenuation is generally expressed in decibels per unit of length.
ATSC	Advanced Television Systems Committee. Formed to establish technical standards for US advanced television systems. Also, the name given to the digital broadcast transmission standard.
Bandwidth	The range of frequencies over which signal amplitude remains constant (within some limit) as it is passed through a system.
BER	Bit Error Rate. Bit errors are caused by interference, or loss of signal, so the stream of bits composing the DTV picture is disrupted. A measure of the errors in a transmitted signal.
BNC	A radio frequency connector with an impedance of 75 ohms, designed to operate in the 0 to 4 GHz frequency range.
C/N	Carrier to Noise ratio. A measurement of the ratio of RF signal power to noise power.
COFDM	Coded Orthogonal Frequency Division Multiplexing. COFDM can transmit many streams of data simultaneously, each one occupying only a small portion of the total available bandwidth.

	The DTV standard used in Europe.
dB (Decibel)	A logarithmic unit used to describe signal ratios. For voltages dB = 20 Log10(V1/V2).
DID	Data identifier.
DTV	Digital television. This comprises all the components of digital television, including HDTV, SDTV, datacasting and multicasting.
DVB	Digital Video Broadcasting
DVB-C	Digital Video Broadcasting baseline system for digital cable television.
DVB-S	Digital Video Broadcasting baseline system for digital satellite television.
DVB-T	Digital Video Broadcasting baseline system for digital terrestrial television.
FEC	Forward Error Correction. A receiver technique for correcting errors in the received data.
GHz	Gigahertz. One billion cycles per second (109 cps).
Headend	Electronic control centre of a cable system. The site for collecting signals from many sources, processing them and preparing them for distribution through the cable system's network of cables.
KHz	Kilohertz. One thousand cycles per second (103 cps).
LSB	Least Significant Bit.
MER	Modulation Error Rate.
MHz	Megahertz. One million cycles per second (106 cps).
Modulation	A process that moves information around in the frequency domain in order to facilitate transmission or frequency-domain multiplexing.
MPEG	Moving Picture Experts Group. Industry standard for compressing and decompressing digital audio video signals
MSB	Most Significant Bit.

MSps	Mega-symbols per second.
Multiplexer	An electronic device that allows multiple channels to be combined into a single signal.
OFDM	Orthogonal Frequency Division Multiplexing. Used in European digital television systems.
Packet	A variable-sized unit of information that can be sent across a packet-switched network.
PAL	Phase Alteration Line. 50 Hz video format used in much of the world outside of the USA.
PCR	Program clock reference.
PID	Packet identifier.
PSI / SI	Program specific information.
QAM	Quadrature Amplitude Modulation. A digital modulation technique that allows very efficient transmission of data over media with limited available bandwidth.
QPSK	Quadrature Phase Shift Keying. A digital technique that is widely employed in direct broadcast satellite or terrestrial transmission systems
RF (Radio Frequency)	In broadcasting applications, the signal after the modulation process.
RS	Reed-Solomon.
SNR	Signal to Noise Ratio.
Symbol Rate	Replacement term for Baud; a unit of signalling speed, the number of times a signal on a communications circuit changes.
Termination	An impedance at the end of transmission line that matches the impedance of the source and of the line itself. Proper termination prevents amplitude errors and reflections. ASI transmissions use 75Ω transmission lines, so a 75Ω terminator must be at the end of any signal path.
Tuner	Any device or apparatus used for selecting and controlling the operating frequency of a circuit or equipment, such as the channel selector in a television receiver.

UTP	Unshielded Twisted Pair.
Viterbi	Algorithm for Forward Error Correction.

Specification

Performance	
Input Return:	Loss 15dB
Input Impedance:	75Ω BNC
Bit Rate:	100 MB/s maximum
DVB Input:	3 x DVB-ASI, 75Ω BNC
DVB Output:	6 x DVB-ASI, 75Ω BNC
Power	
Input Voltage:	15VDC
Power Consumption:	8 W Maximum
Environmental	
Temperature (Operating):	0 °C to +50 °C
Storing Temperature:	-20 °C to +70 °C
Altitude (maximum operating):	2000 meters (6500 feet)
Relative Humidity (maximum operating):	80% for temperatures up to 31 °C, decreasing linearly to 40% at 50 °C
Physical	
Dimensions Height:	100 mm (4 inches)
Width:	25 mm (1 inch)
Depth:	265 mm (10.5 inches) (not including rear panel)
Net Weight:	0.35 kg (0.75 pounds)

Safety standards	
U.S. Nationally Recognised Testing Laboratory Listing:	UL3111-1, standard for electrical measuring and test equipment
Canadian Certification:	CAN/CSA 22.2 No. 1010.1 Safety requirements for electrical equipment for measurement, control and laboratory use.
European Union Compliance:	Low Voltage Directive 73/23/EEC, amended by 93/68/EEC IEC 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use.

Safety certification	
Equipment Type:	Test and Measuring
Safety Class:	Class I (as defined in IEC 61010-1, Annex H) – grounded product
Over voltage Category:	Over voltage Category II (as defined in IEC 61010-1, Annex J)
Pollution Degree:	Pollution Degree 2 (as defined in IEC 61010-1) Note: Rated for indoor use only

EC Declaration of Conformity – EMC: Meets intent of Directive 89/336/EEC and 92/3EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:	
EC Declaration of Conformity – Low Voltage: Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 73/23/EEC, amended by 93/68/EEC IEC 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use	
EN50081-1 Emissions:[1]	
BS EN55022:	Class B radiated and conducted emissions
BS EN55013:	Emissions standard for Broadcast Equipment
EN50082-1 Immunity: [1]	
BS EN61000-4-2:	ESD Requirements
BS EN61000-4-3:	Radiated susceptibility
BS EN61000-4-4:	Electrical Fast Transient Burst requirement
BS EN61000-4-5:	Surges requirement
BS EN61000-4-6:	Conducted susceptibility
BS EN61000-4-11:	Voltage Dips and Interruptions
BS EN55103-2:	Immunity for Product Family Standard, Audio, Video Audio Visual and Entertainment lighting control apparatus for professional use

FCC Compliance: Emissions comply with FCC Code of Federal Regulations 47, Part 15,Subpart B, Class A Limits[1]
FCC Information: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. **WARNING:** The user must install the system as per manufacturers instructions, to comply with the requirements of FCC.

[1] Compliance demonstrated using high-quality, shielded cables.

Ordering information

B049 module types

B049	ASI DA with auto sensing switch 3in x 6out
B049L	ASI DA with auto sensing switch 3in x 6out w/loop though

3U Probel 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)

1U Probel Vistek configuration (dual PSU)

F010	1U Chassis, 2 module slots, 2 PSUs (PSUs included)

Passive rear connectors

VB210	BNC rear connector module for B049 module
VB220	BNC rear connector module for B049L module

Hawkeye Module Management

Optional components for single point of control over Ethernet SNMP or RS232 recommended for use with Hawkeye modules in V1606 (3RU) frames.

B065	RS232/SNMP rack controller module; requires V6081
V6081	Rack controller (DART)
B067	PC-GUI control software, one per B065