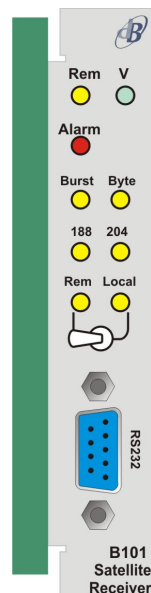


B101

DVB-S QPSK receiver module



Handbook

Provisional Version 0.9



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Document history

Date of first publication 15th May 2007

Current issue and date 0.9 / 29th June 2007

Firmware versions

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Introduction

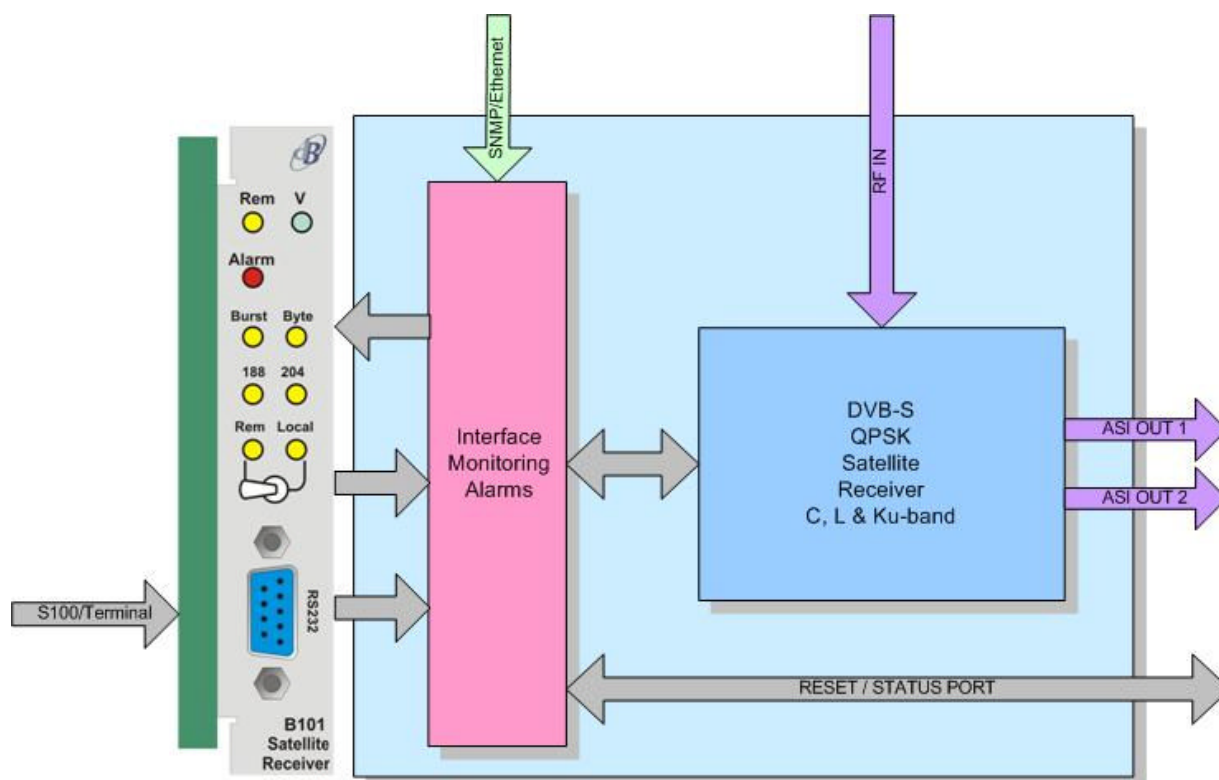
The B101 satellite receiver

The Hawkeye B101 QPSK receiver module is a demodulator for use in professional applications where QPSK services are taken off-air and presented as DVB-ASI content to descramblers, decoders or stream processors, or for onward transmission in other networks.

The B101 satellite receiver demodulates a DVB-S RF signal to a DVB-ASI Transport Stream (TS) and covers the 950MHz to 2150MHz frequency band. A separate MPEG decoder is required to decode the TS to video and audio. Both channel frequency, symbol rate and spectrum inversion can be selected.

The module is housed within the V1606 (3RU) or F010 (1RU) chassis and uses the VB140 rear connector.

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



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 is only supported in the V1606 3RU frame.

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

- QPSK to DVB-ASI demodulation with dual DVB-ASI outputs
- Hot-swappable, compact module
- Tuning including either actual or high/low Ku band LNB offsets
- Demodulated outputs available in either burst or byte modes, 188 or 204 byte packets
- Spectrum inversion for specific C-band applications
- Active alarms for self test, loss of sync, BER and PSU failure.
- Independent alarm thresholds for pre- and post-Viterbi
- Carrier-to-noise, BER measurements, internal LNB power management, alarm status feedback and configuration through S100 GUI software (included)
- Module status indicator available on front panel
- Support for LNB switching voltage (V/H) and DiSEqC signal (22 KHz)
- Low power consumption
- Optional rack based control and monitoring systems for multiple modules over a network
- Reset/Status port on rear connector

Applications

- Digital turn-around (DTA) systems
- Signal acquisition for translating or transcoding platforms
- Off-air monitoring, combined with descrambling or decoding modules
- Off-air signal measurement and monitoring
- DVB-S single and multi-service demodulation

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 handling 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.

Installation

The rear panel assembly must be installed prior to fitting the main decoder module.

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

WARNING: Always remove power whilst fitting the rear module.

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 RF connector goes towards the bottom of the frame.

CAUTION: Damage to the module and/or frame may occur if the rear panel assembly is not the correct type or is incorrectly installed.

Secure the rear panel assembly to the frame 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 module fully home into the DIN connector in the rear panel assembly.

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



RF/ASI I/O

BNC	SIGNAL – B101	Details
RF IN	RF INPUT	Provides RF signal input with a sensitivity of -16 dBmV to $+24$ dBmV with nominal 75Ω impedance.
ASI OUT 1	ASI OUTPUT 1	DVB-ASI compliant transport stream output with nominal 75Ω impedance.
ASI OUT 2	ASI OUTPUT 2	As above

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.

Reset/Status port

The Reset / Status Port connector (labelled RESET / STATUS) is located on the rear-panel. The connector is a 9-pin sub miniature D-type with female contacts.

Reset/Status – 9 way 'D' type	
PIN	SIGNAL
1	Ground
2	Critical alarm common
3	Non-critical alarm NC
4	Non-critical alarm NO
5	Reset control
6	Critical alarm NO
7	Critical alarm NC
8	Non-critical alarm COMMON
9	Reset input
Shell	Chassis ground

The monitoring outputs are two sets of changeover relay contacts, one for critical alarm status and the other for non-critical alarm status.

CAUTION: Connecting or disconnecting cables whilst the module is powered on can result in damage to it's input circuits.

Critical alarm

The critical alarm indicates the total failure of the Satellite Receiver. The only critical alarm condition is loss of power.

In the alarm condition, the relay is unenergised i.e. Critical Alarm Common (pin 2) is connected to Critical Alarm NC (pin 7). In the non-alarm condition, the relay is energised i.e. Critical Alarm Common (pin 2) is connected to Critical Alarm NO (pin 6).

Non-critical alarm

The non-critical alarm indicates a recoverable fault condition. There are 4 possible non-critical alarms:

- Self-test failure
- Loss of Sync
- BER over threshold
- Power supply fault

In the alarm condition, the relay is unenergised i.e. Non-critical Alarm Common (pin 8) is connected to Non-critical Alarm NC (pin 4). In the non-alarm condition, the relay is energised i.e. Non-critical Alarm Common (pin 8) is connected to Non-critical Alarm NO (pin 3).

Reset

Reset Control (pin 5) and Reset Input (pin 9) provide the facility to reset the module from an external source e.g. relay contact or switch.

To reset the module connect Reset Control to Reset Input for a period in excess of 10ms.

Functional check

To ensure the satellite receiver is operating correctly complete the following procedures.

Note: Refer to Refer to the [Command Line Interface](#) chapter for details of the RS232 set up and serial command format for commands used in the following steps.

1. Power up the rack and ensure the green power indicator (+V) on the front panel is illuminated.
2. Connect an RS232 serial cable to the 9 way D-type connector on the front of the unit from a PC running a serial communications package. This will be required to set up the receiver.
3. Move the Remote/Local switch on the front panel to the Local position.
4. Connect a satellite feed to the RF input on the rear panel from the LNB (low noise block) or satellite RF distribution amplifier.
5. Select an appropriate satellite channel from the services available.

The following information will be required on the selected service to configure the receiver.

- Channel Frequency
- Symbol Rate

Example: CNN (ASTRA)

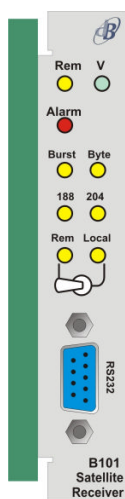
- Channel Frequency: 12.168 GHz
 - Symbol Rate: 27.5 MS/s
1. the serial commands 'FREQ' and 'SYM' are required to configure the receiver with these two parameters and lock to the required channel.
 2. Channel lock is indicated by the packet length LED (either 188 or 204) being illuminated. Sync lock can also be verified using the serial command 'SYNC'. If lock is not achieved check signal RF level, all connections and configuration and ensure the satellite feed is correct via a separate receiver.
 3. The procedures above are a guide to ensuring the receiver is configured to lock to the satellite RF feed and provide an ASI Transport Stream (TS). To view the program content, connect the ASI TS output of the receiver to a DVB MPEG2 Decoder, connected to a picture and audio monitor. Some decoders will expect a particular setting for the ASI format and packet length. Check these parameters with the commands 'ASI' and 'PACKET'. While some transmissions are available un-encrypted, the majority require MPEG decoders with the appropriate Conditional Access to de-encrypt the signal.

Operation

The B101 can be controlled locally using the RS232 port and the supplied S100 software or using low-level commands from a terminal or remotely via Ethernet SNMP or B067 Hawkeye Module Management software.

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
- 188, 204** Amber – ASI Output mode; 188 or 204 byte
- Rem** Amber – Remote mode – SNMP via Ethernet
- Local** Amber – Local (RS232) mode

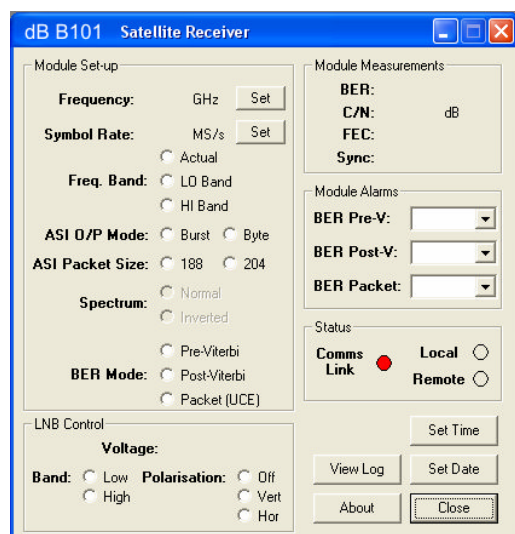
The two position front panel control switches between Remote (left position) and local RS232 control (right position).

Local RS232 control

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.



Control is also possible by sending commands to the unit for monitoring and configuration 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.

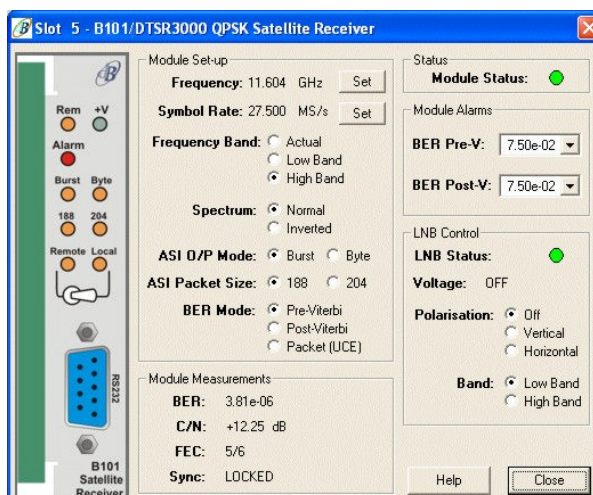
The B067 software can control up to 10 V1606 3RU racks from a single PC. Each rack can be identified by either the IP address or a user-defined name, and accessed at the click of a button.

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 B101 cannot be controlled over DARTnet.



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 B101 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 RS232 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: **Set** and **Get**.

Set command

The Set commands are used to modify B101 settings.

The **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 frequency to 12.265 GHz the command format is:

Command: FREQ=12.265 c/r
Result: OK c/r

Get command

Get commands return information about the module.

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 frequency setting the command format is:

Command: FREQ? c/r
Result: FREQ: 12.265 c/r

Remote command descriptions

The following remote control commands appear in alphabetical order:

ALM PKT

Sets or requests the BER Packet Errors (UCE) alarm level.

Request

Command: ALM PKT?

Returns: Alarm level in e-notation

Set

Command: ALM PKT=

Parameter: 00 to 15 (See Table 1: BER alarm levels)

Returns: OK if command valid COMMAND ERROR if command invalid

Examples

Command: ALM PKT?

Returns: ALM PKT: 2.50e-04

Command: ALM PKT=03

Result: BER Packet Error alarm level set to 7.50e-05

Parameter	Alarm Level	Parameter	Alarm Level
00	0.00e+00	08	1.00e-03
01	2.50e-05	09	2.50e-03
02	5.00e-05	10	5.00e-03
03	7.50e-05	11	7.50e-03
04	1.00e-04	12	1.00e-02
05	2.50e-04	13	2.50e-02
06	5.00e-04	14	5.00e-02
07	7.50e-04	15	7.50e-02

Table 1: BER alarm levels

ALM POS

Sets or requests the BER Post-Viterbi alarm level.

Request

Command: ALM POS?
Returns: Alarm level in e-notation

Set

Command: ALM POS=
Parameter: 00 to 15 (See Table 1: BER alarm levels)
Returns: OK if command valid COMMAND ERROR if command invalid

Examples

Command: ALM POS?
Returns: ALM POS: 2.50e-04

Command: ALM POS=03
Result: BER Packet Error alarm level set to 7.50e-05

ALM PRE

Sets or requests the BER Pre-Viterbi alarm level.

Request

Command: ALM PRE?
Returns: Alarm level in e-notation

Set

Command: ALM PRE=
Parameter: 00 to 15 (See Table 1: BER alarm levels)
Returns: OK if command valid COMMAND ERROR if command invalid

Examples

Command: ALM PRE?
Returns: ALM PRE: 2.50e-04
Command: ALM PRE=03
Result: BER Packet Error alarm level set to 7.50e-05

ASI

Sets or requests the ASI format.

Request

Command: ASI?
Returns: ASI: BYTE
ASI: BURST

Set

Command: ASI=
Parameter: BYTE or BURST
Returns: OK if command valid COMMAND ERROR if command invalid

Examples

Command: ASI?
Returns: ASI: BYTE
Command: ASI=BURST
Result: ASI format set to burst

BMOD

Sets or requests the BER measurement mode.

Request

Command: BMOD?
Returns: BMOD: PRE-VITERBI (QPSK)
BMOD: POST-VITERBI
BMOD: PACKET ERRORS (UCE)

Set

Command: BMOD=
Parameter: PRE-V, POST-V, PACKET
Returns: OK if command valid COMMAND ERROR if command invalid

Examples

Command: BMOD?
Returns: BMOD: PRE-VITERBI
Command: BMOD=POST-V
Result: BER measurement and display mode set to post-Viterbi

CN

Requests the carrier to noise measurement.

Request

Command: CN?

Returns: Carrier to noise ratio in dBs

Example

Command: CN?

Returns: CN: +9.16

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)

Returns: UK – Date in UK format (DD/MM/YY)
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

FEC

Requests the current forward error correction mode.

Request

Command: FEC?
Returns: 1/2, 2/3, 3/4, 5/6, 7/8

Example

Command: FEC?
Returns: FEC: ¾

FREQ

Sets or requests the channel frequency.

Request

Command: FREQ?
Returns: FREQ: 1.665

Set

Command: FREQ=
Parameter: 00.950 to 02.150
Returns: OK if command valid COMMAND ERROR if command invalid

Examples

Command: FREQ?
Returns: FREQ: 1.665
Command: FREQ=00.950
Result: Frequency set to 00.950 GHz

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 and 5 is oldest.
 Returns: LOG n: hh:mm:ss dd/mm/yy desc
 Desc Log entry description (see Table 2: Status log entry messages)

Set

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

Examples

Command: LOG 5?
 Returns: LOG 5: 18:14:06 05/02/02 +5V SUPPLY FAILURE

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
Sync lock lost	Sync lock has been lost
Sync lock regained	Sync lock has been regained
BER over threshold	BER alarm exceeded threshold
BER level ok	BER alarm returned below threshold
+5v supply failure	+5v supply has fallen below threshold
+5v supply ok	+5v supply returned above threshold
+3v3 supply failure	+3.3v supply has fallen below threshold
+3v3 supply ok	+3.3v supply returned above threshold
+2v5 supply failure	+2.5v supply has fallen below threshold
+2v5 supply ok	+2.5v supply returned above threshold
+30v supply failure	+30v supply has fallen below threshold
+30v supply ok	+30v supply returned above threshold

Table 2: Status log entry messages

MODEL

Requests the unit model number.

Request

Command: MODEL?
Returns: MODEL: B101

PACKET

Sets or requests the ASI packet length.

Request

Command: PACKET?
Returns: PACKET: 188
PACKET: 204

Set

Command: PACKET=
Parameter: 188 or 204
Returns: OK if command valid COMMAND ERROR if command invalid

Examples

Command: PACKET?
Returns: PACKET: 204

Command: PACKET=188
Result: ASI packet length set to 188 bytes

SERIAL

Requests the unit serial number.

Request

Command: SERIAL?
Returns: SERIAL: 1234567890

SYM

Sets or requests the symbol rate.

Request

Command: SYM?
Returns: SYM: 27.500

Set

Command: SYM=

Parameter: 01.000 to 45.000
Returns: OK if command valid
COMMAND ERROR if command invalid

Examples

Command: SYM?
Returns: SYM: 27.500

Command: SYM=06.875
Result: Symbol rate set to 6.875 MS/s

SYNC

Requests the sync lock status.

Request

Command: SYNC?
Returns: SYNC: LOCKED
SYNC: NOT LOCKED

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
Frequency	1.665 GHz
Symbol rate	27.500 MS/s
ASI format	BYTE
ASI packet length	204 Bytes
BER Pre-Viterbi alarm level	1.00e-03
BER Post-Viterbi alarm level	2.50e-04
BER Packet errors alarm level	0.00e+00

Table 3: System defaults

Glossary

8-VSB	Eight discrete 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 Ω , 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. An Orthogonal FDM scheme transmits many streams of data on multiple carriers simultaneously. Orthogonality reduces co-

	<p>channel interference and multiple carries minimises losses due to selective interference. The Coded version, C(OFDM) uses integrated forward error-correction coding and statistical analysis based on channel-state information (CSI) to achieve substantial performance benefits compared to uncoded or non-CSI OFDM.</p> <p>COFDM resists fading, is very tolerant of multipath interference and is well suited to building Single-Frequency Networks (SFNs). It is used extensively in European digital television (DVB-T) and digital radio (DAB) systems.</p>
dB (Decibel)	A logarithmic unit used to describe signal ratios. For voltages $dB = 20 \text{ Log}_{10}(V1/V2)$.
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 (10^9 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 (10^3 cps).
LSB	Least Significant Bit.
MER	Modulation Error Ratio.
MHz	Megahertz. One million cycles per second (10^6 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.
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	
Tuning Range	0.950 – 2.150 GHz
Input Level Per Channel	-65dBm to -25dBm @ 27.5MBaud
Input Return Loss:	5dB min.
Input Impedance:	75Ω BNC
FEC:	Viterbi Puncture Rate; 1/2, 2/3, 3/4, 5/6, 7/8
Symbol Rate:	1 MBaud to 45 MBaud
DVB Output:	2 x DVB-ASI, 75Ω BNC
Power	
Input Voltage:	15VDC – provided by rack PSU(s)
Power Consumption:	4 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

B101 module

B101	DVB-S QPSK receiver module
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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)
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Passive rear connectors

VB140	BNC Rear connector for B101 module
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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