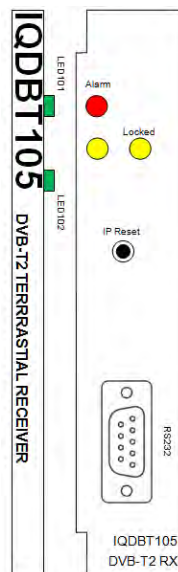# IQDBT105

DVB-T/T2 TERRESTRIAL RECEIVER & MONITOR

Handbook

Version 1, Revision 1

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The information in this document is subject to change without notice.

Document history

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Contents

Introduction

Module Description

The IQDBT105 is a DVB-T/T2 terrestrial receiver, demodulator and monitor. It monitors key RF Quality of Service (QoS) metrics on the RF signal with essential Transport Stream checks. DVB-ASI output is available for additional transport stream diagnostics and decoding.

Status is indicated on the front panel, with advanced control, configuration and measurement functions available via Hawkeye Web Interface, RollCall or command line access via the serial interface.
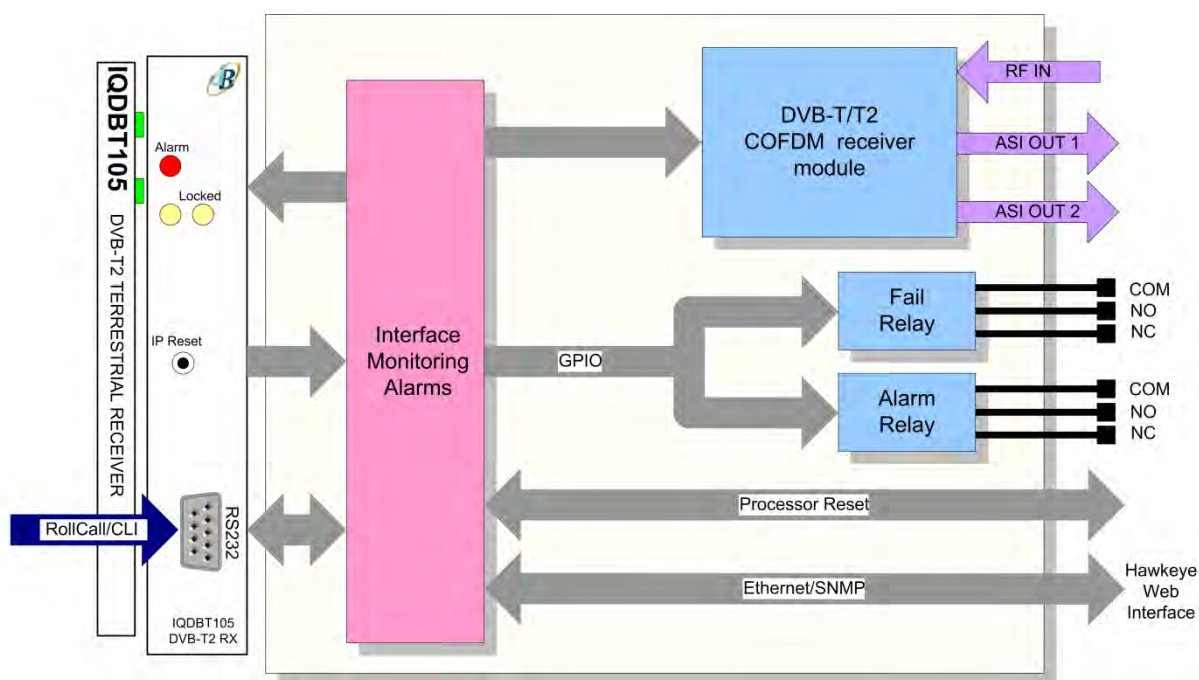
IQDBT105 Overview

Performance checks include Modulation Error Ratio (MER), Low Density Parity Check (LDPC) and RF Input level. DVB-T2 single PLP (mode A) and multi PLP (mode B) modes are supported in accordance with the DVB-T2 standards.

Templates can also be generated, which compare the received DVB-T2 signal against expected modulation parameters. Alarms can be raised if signal performance is out of range and time stamped logs allow continuous management and control of reliability targets.

Feature Summary

The IQDBT Terrestrial DVB-T/T2 Receiver & Monitor provides the following features:

- DVB-T and DVB-T2 terrestrial COFDM to DVB-ASI demodulation with dual DVB ASI outputs
- Covers the frequency bands 178MHz to 858MHz
- Measured parameters for alarms include:
    - RF level
    - Receiver lock status
    - MER
    - LDPC
    - TS bit rate
    - Frequency variation
- RollCall monitoring allows all signal paths to be managed remotely

Applications

- Transmitter Relay site monitoring
- DVB-T and DVB-T2 single and multi-service demodulation
- Digital turn-around (DTA) systems
- Signal acquisition for translating or transcoding platforms
- Off-air signal measurement and monitoring with user-defined alarm thresholds

Order Codes

The following product order codes are covered by this manual:

IQDBT10500-2B   Terrestrial DVB-T/T2 Receiver & Monitor

The module may be used with the following enclosures: B-Style; IQH3B-S-0, IQH3B-S-P as well as the A-Style; IQH1A-S-P. See the Installation chapter on page 9 for more information.

General safety summary

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.

Product inspection. 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 return the unit to dB Broadcast for service or repair.

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

No user serviceable parts. Return to dB Broadcast or an authorized distributor for repair.

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.

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

Cuts and abrasions. When handling the equipment, guard against cuts or abrasions from sharp edges or components.

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.

Operating environment. The unit is for indoor use in a fixed rack. 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 See the Specification chapter. All ratings must be observed.

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

Lithium battery

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

Danger of explosion if battery is incorrectly replaced.

In case of difficulty. Please refer to dB Broadcast.

Installation

Rear Panels and Enclosures

The following shows the IQDBT10500-2B rear panel:
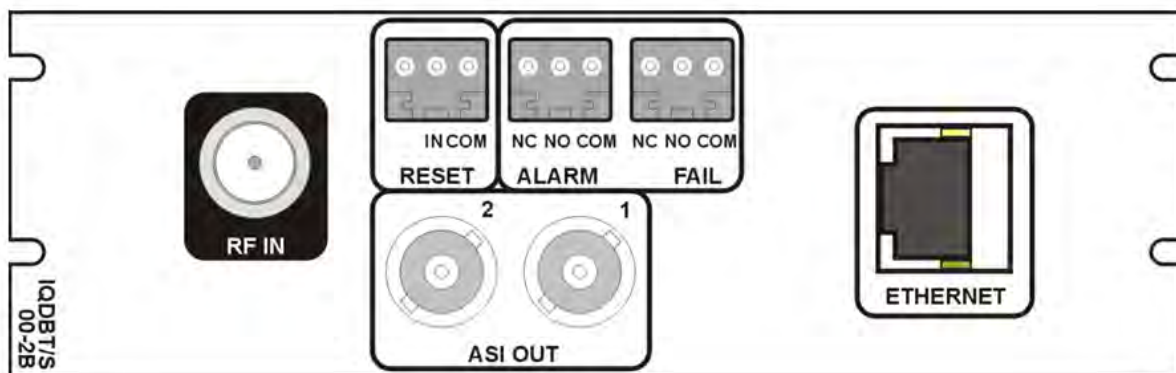
IQDBT105 modules can be housed in frames from dB Broadcast and the Snell Group. Both 1U (IQH1A) and 3U (IQH3B) chassis are available, with single or dual PSUs.

B-style Enclosure

IQH3B-S-0, IQH3B-S-P

Note The IQH3B enclosure provides two internal analogue reference inputs. These inputs are applicable to modules with "B" order codes only.

A-style Enclosure

IQH1A-S-P

Connections

This section describes physical input and output connections.

Relay Outputs

Screw terminal connectors are provided for the relay outputs.

Rear Connector: Alarm/Fail	
	The interface is configured with both Normally Open (NO) or Normally closed (NC) contact arrangements.

Alarm

Alarm indicates a recoverable fault condition. There are 2 possible alarms:

- An event which has been selected on the DVB and TS Configuration pages
- A power supply fault

Fail
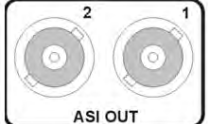
Fail indicates a non-recoverable fault condition.

Reset Input

Screw terminal connectors are provided for the reset input.

Rear Connector: Reset	
	The reset input allows the receiver to be reset from an external source e.g. relay contact or switch.

ASI Outputs

Rear Connector: ASI OUT	
	DVB-ASI compliant transport stream output with nominal 75R impedance.

Ethernet

Rear Connector: Ethernet	
	Direct Ethernet connectivity is provided by a standard RJ45 connector.

RF Inputs

Rear Connector: RF IN	
	Provides RF signal input with a sensitivity of -20dBm to -80dBm with a nominal 75R impedance.

 The F Type RF input connector must not be connected directly to an outdoor aerial or cable distribution system. Use a suitable lightning protection device.

RS232 Serial Interface

An RS232 interface is provided for using a standard 9 pin DIN female socket on the front panel.

Front Panel: RS232	Pin-Out
	1, 4, 9 – N/C 2 – TX, Transmit 3 – RX, Receive 5 – GND, signal ground 6 – DTR, Data Transmit Ready 7 – CTS, Clear To Send 8 – RTS, Ready To Send Shell – Chassis ground

 The Baud rate is factory set to 38400, 8 data bits, 1 stop bit, no parity and XON/FOFF flow control.

RS232 Jumper Settings

Links on the module PCB which control the RS232 front panel socket are normally set for RollCall use as described in the following table.

Links	Normal (RollCall Interface)	CLI (Command Line Interface)
JP 1	RHS	LHS
JP 2	RHS	LHS
JP 3	RHS	LHS
JP 4	RHS	LHS

The RS232 configuration links can be found just behind the front panel RS232 port on the printed circuit board.

Operation

There are several methods of controlling the module:

- Connecting directly to the card with its own Ethernet interface

- Connecting directly to the card with its own serial interface

- Via RollCall

This allows the card to be deployed in many different ways.

Tuning and Checking the Receiver

The receiver must be configured in terms of frequency, bandwidth (7 or 8Mhz) and DVB mode (DVB-T or DVB-T2). Correct program content can then be verified using picture and audio monitors connected to a DVB MPEG 2/4 Decoder fed from the receiver's ASI TS output.

Note If the channel has an offset an adjustment to the frequency is made; for 8MHz channels 166 kHz is added for an upper offset and 166 kHz is subtracted for a lower offset; 125kHz offsets are used for 7MHz bandwidth.

Front Panel (Local Mode)

The following section describes the Front Panel and its operation. The illustration below shows the front panel and its interface.

Front Panel	Indicator	Description
	Alarm	Red = Alarm condition present
	Locked	Yellow = Locked
	LED101	Green = Power good
	LED102	Green flashing = Processor running

Note The unlabelled yellow LED (if present) has no function assigned and does not illuminate.

RollCall Control Panel

RollCall is a control and monitoring system for products complying with the Snell RollCall protocol. It can also monitor third party equipment via SNMP, serial or GPI interfaces.

Information Sub-panels

The Information (and Mode sub-panels) at the top centre and top right appear on menus selected from the scroll box at the top left.
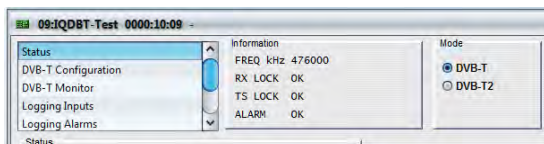
The Information sub-panel show details about the chosen frequency, receiver and transport lock and whether any alarm conditions are present.
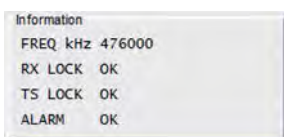
Parameter	Value	Description
FREQ kHz	Value in kHz	The lock frequency selected
RX LOCK	OK or FAIL	The receiver lock status
TS LOCK	OK or FAIL	The Transport Stream lock status
ALARM	OK or FAIL	The overall alarm condition state

Mode Sub-panel

This sub-panel shows the current mode selected.
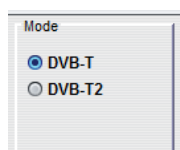
It can also be used to set the DVB mode, with engineer or higher permission.

Status

The status screens provide an overall view of Input and Alarm states; the content changes depending on the current receiver mode.
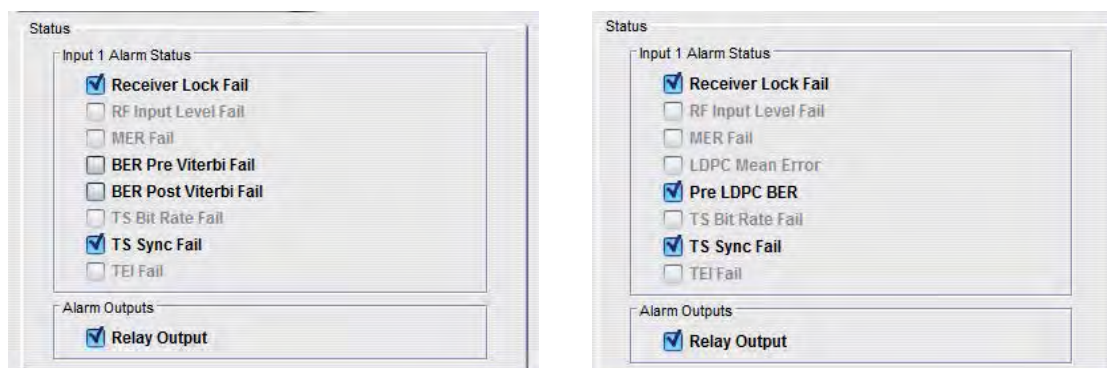
                    DVB-T   DVB-T2

There are two Status panels, one for the Alarm input and another for the Relay Output. A combination of check box and greying/bolding is used to visually emphasize whether a fail condition is present or not.

Understanding Alarm Status

Disabled alarms are shown greyed out and enabled alarms are bolded. Ticked alarms show that the alarm 'trigger' condition is present. An alarm must be enabled with the trigger condition present for it to sound or be asserted.

> **Note**
> Although alarm status indicators may look like clickable 'check boxes', they are not controls. Refer to the Primary Configuration topic on page 15 for alarm trigger conditions and to enable and disable non-mandatory alarms.

Priority	Alarm	Description
Ticked & greyed out	Not asserted	The alarm condition is present, but the alarm is disabled
Unticked & greyed out	Not asserted	Alarm condition is absent and the alarm is disabled
Ticked, highlighted blue and bolded	Asserted	Alarm in enabled, the condition is present, and therefore the alarm is asserted or 'sounding'
Unticked and bolded	Not asserted	Alarm is enabled but the condition is not present, and so the alarm is 'silent' or not asserted

> **Note**
> TEI is particularly relevant to Relay sites and gives early warning that the TS data is corrupted when the input RF conditions become marginal. It is highly recommended that TEI be monitored at a relay site. TEI is normally used in conjunction with MER and LDPC alarms. At a main transmitter site, TEI is not normally asserted.

Alarm Conditions

Alarm	Mode	Description
Receiver Lock Fail	DVB-T, DVB-T2	The receiver is not locked
RF Input Level Fail	DVB-T, DVB-T2	The RF input level is not within user defined limits
MER Fail	DVB-T, DVB-T2	The Modulation Error Ratio (MER) is not within user defined limits
TS Bit Rate	DVB-T, DVB-T2	The Transport Stream (TS) Bit Rate is not within user defined limits
TS Sync Fail	DVB-T, DVB-T2	Indicates loss of incoming transport stream
TEI Fail	DVB-T, DVB-T2	The Transport Error Indicator (TEI), when enabled, will set an alarm whenever a TS packet is corrupted
BER Pre Viterbi Fail	DVB-T	The Pre-Viterbi value is not within user defined limits
BER Post Viterbi Fail	DVB-T	The Post-Viterbi value is not within user defined limits
LDPC Mean Error	DVB-T	The Low Density Parity Check (LDPC) Mean Error value is not within user defined limits
Pre LDPC BER	DVB-T	The Pre-LDPC Mean Error value is not within user defined limits

Any of the alarms detailed above, when enabled and active, will cause the respective Alarm LED on the front panel to turn Red.

Alarm Outputs

These panels indicate the status of the alarm relay outputs.

Alarm	Description
Relay	Indicates whether the respective relay is being driven due to an error condition

Primary Configuration

The DVB Configuration pages are used to configure the products primary configuration parameters. Different pages are shown for DVB-T and DVB-T2 modes. You will require the appropriate permissions in order to be able to set the tuning parameters.

DVB-T   DVB-T2

Note The IQDBT does not support auto-tuning. The correct tuning parameters must be set manually for the product to monitor the RF feed.

DVB-T Tuning

This group of controls set the tuning parameters for the DVB-T receiver. The mode is set using the mode control.

The following parameters are specific for the RF feed that requires monitoring.

Parameter	Description
Frequency	The receiver's frequency
Offset	If the channel has an offset an adjustment to the frequency is made; for 8MHz channels 166 kHz is added for an upper offset and 166 kHz is subtracted for a lower offset; 125kHz offsets are used for 7MHz bandwidth.
Bandwidth	The bandwidth, 7 or 8Mhz

DVB-T Alarm Configuration

This group of controls is used to enable / disable alarms and set their thresholds.
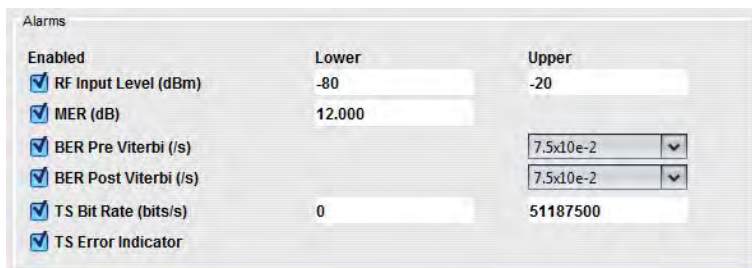
Parameter	Value	Enable/Disable
RF Input Level (dBm)	Enter the required Lower and Upper values in decibels (power)	Select a check mark to enable each alarm as required. Enabled alarms are also highlighted in blue.
MER (db)	Enter the required values in decibels (ratio)	
BER Pre Viterbi	Select the required value from the drop down list	
BER Post Viterbi	Select the required value from the drop down list	
TS Bit Rate Indicator (b/s)	Enter the required Lower and Upper values in bits per second	
TS Error Indicator	Enable or disable only	

DVB-T2 Tuning

This group of controls set the tuning parameters for the DVB-T2 receiver. The mode is set using the mode control.

```
Tuning
          Frequency (kHz) 474167           Offset  [None        ▼]
                     PLP  0              Bandwidth  [8MHz        ▼]
                                       MER Select   [Standard    ▼]
```

The following parameters are specific for the RF feed that requires monitoring.

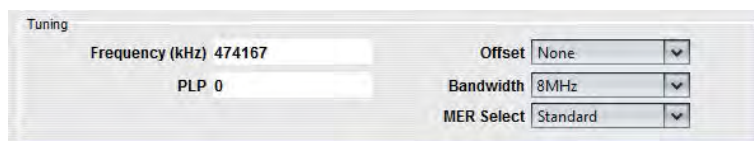| Parameter	Description
Frequency	The receiver's frequency
Offset	If the channel has an offset an adjustment to the frequency is made; for 8MHz channels 166 kHz is added for an upper offset and 166 kHz is subtracted for a lower offset; 125kHz offsets are used for 7MHz bandwidth.
Bandwidth	The bandwidth, 7 or 8Mhz
PLP	The Physical Layer Pipe (PLP)
MER Select	Modulation Error Ratio (MER), Standard or L1-Post

DVB-T2 Alarm Configuration

This group of controls is used to enable / disable alarms and set their thresholds.

```
Alarms
  Enabled                       Lower           Upper
  ☑ RF Input Level (dBm)        -80             -20
  ☑ MER (dB)                    12.000
  ☑ Pre LDPC BER                                [7.5x10e-2   ▼]
  ☑ LDPC Mean Error                             15
  ☑ TS Bit Rate (bits/s)        0               51187500
  ☑ TS Error Indicator
```
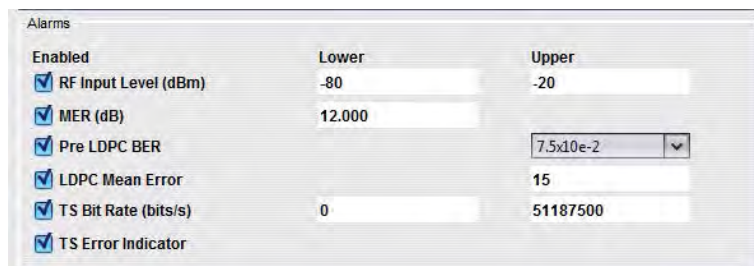
Parameter	Value	Enable/Disable
RF Input Level (dBm)	Enter the required Lower and Upper values in decibels (relative power)	Select a check mark to enable each alarm as required. Enabled alarms are also highlighted in blue.
MER (db)	Enter the required values in decibels (ratio)	
Pre LDPC BER	Select the required value from the drop down list	
LDPC Mean Error	Enter the upper value	
TS Bit Rate Indicator (b/s)	Enter the required Lower and Upper values in bits per second	
TS Error Indicator	Enable or disable only	

Monitor Page

The monitor page reports all of the monitored / measured values. There is a monitor page for each of the two modes. Only the current mode's page is shown.

DVB-T   DVB-T2

DVB-T Modulation Properties

Parameter	Value/Units	Description
FEC	1/2, 2/3, 3/4, 5/6, 7/8	Displays the High Priority Forward Error Correction protection scheme (code rate)
Modulation Index	QPSK, 16QAM, 64QAM	Displays the modulation index; often referred to as the constellation
Guard Interval	1/4, 1/8, 1/16, 1/32	Inter symbol gap
FFT Size	2k, 8k	FFT size (k=1,024)
Mode	DVB-T, DVB-T2	Will show DVB-T if the RF feed is indeed DVB-T

DVB-T Measurements

Parameter	Value/Units	Description
RF Input Level	dBm	Reports actual RF input level
Pre-Viterbi BER		Pre Viterbi decoder error rate
Post-Viterbi BER		Post Viterbi decoder error rate
TS Bit Rate		The measured TS Bit Rate
MER (dB)	dB	Modulation Error Ratio
Freq (kHz)	kHz	The receiver frequency required to achieve lock
Freq Error (kHz)	kHz	The difference between the frequency set to and that required to achieve lock
UCE	Integer	Uncorrected errors - Reed - Solomon errors
UCE Total	Integer	Count of UCE's since last Reset UCE

UCE Reset allows the UCE Total count to be reset.

DVB-T2 Modulation Properties

Parameter	Value/Units	Description
FEC	1/2, 3/5, 2/3, 3/4, 4/5, 5/6	Displays the FEC code rate of the selected PLP
Modulation Index	QPSK, 16QAM, 64QAM, 256QAM	Displays the modulation index for the selected PLP; often referred to as the constellation
Guard Interval	1K, 2K, 4k, 8K, 16K, 32K	Inter symbol gap
FFT Size	2k, 8k	Displays the current FFT of the selected PLP
Mode	DVB-T, DVB-T2	Will show DVB-T if the RF feed is indeed DVB-T
Number of PLPs		The number of PLPs available

DVB-T2 Measurements

Parameter	Value/Units	Description
RF Input Level	dBm	Reports actual RF input level
Pre-LDPC BER		Reports the Pre LDPC BER
LDPC Mean Error		Reports the Mean LDPC BER
TS Bit Rate		The measured TS Bit Rate
MER (dB)	dB	Modulation Error Ratio
Freq (kHz)	kHz	The receiver frequency required to achieve lock
Freq Error (kHz)	kHz	The difference between the frequency set to and that required to achieve lock

Savesets

Savesets allow predetermined RollControl fields to be saved to file which can then be used to either transfer the settings to another card, or used as a backup of the settings for that card.

Saving a Saveset

The following procedure shows the IQASI82 module, but is identical for the IQDBT105.

1. To use the Saveset feature, click on Save 🖫 from the **Connected Units** toolbar.

   The Backup dialog box appears.
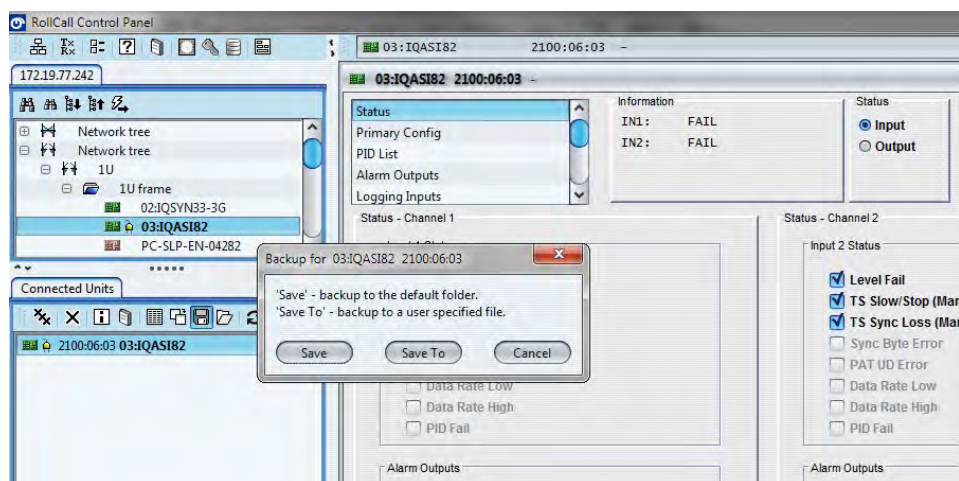
2. Either click the **Save** button to save the unit state to the default backup folder, or click the **Save To** button to save the unit state to a user specified file.

Restoring a Saveset

1. From the **Connected Units** toolbar, click on the Restore folder icon 🗁 (8th icon from the left).

   The Restore dialog box appears.
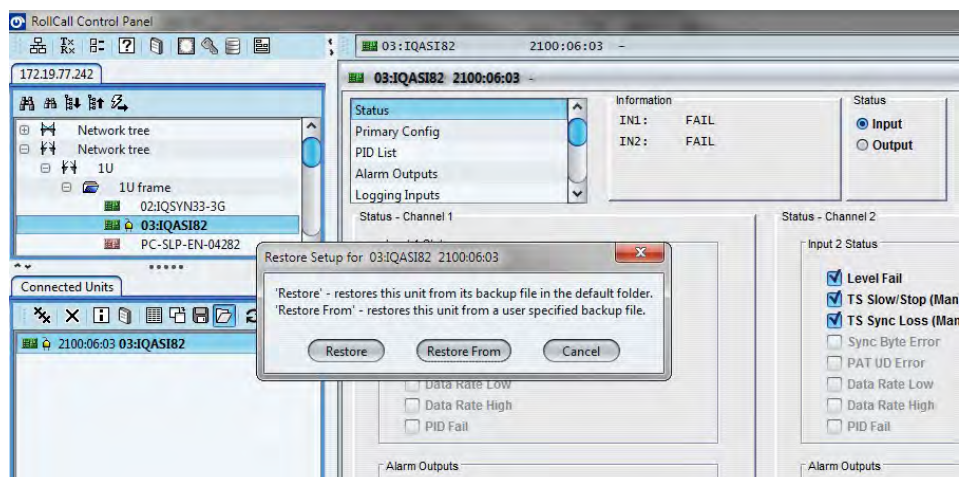
2. Either click the **Restore** button to restore the unit state from the default backup folder or click the **Restore From** button to restore the unit state from a user specified file.

While the Saveset is being restored, a progress bar appears and you can also view its status in the Information Window. The time taken to restore a Saveset depends on the number of differences between the products' current settings, to those of the Saveset being recalled.

Product controls are not locked during the recall time.

Although, products settings can be changed during a recall, changes will not be registered until the recall has finished. It is therefore advisable to wait until the Saveset has been applied, by checking the **Recall** state shown on the **Input Status** panel.

Logging

Information about several parameters can be made available to a logging device that is connected to the RollCall network.

Each logging screen comprises three columns:

- **Log Enable** – Select the check boxes that correspond to the parameters for which log information should be collected

- **Log Field** – Displays the name of the logging field

- **Log Value** – Displays the current log value

Logging Inputs

The **Logging Inputs** menu displays the current log information for each of the two inputs.
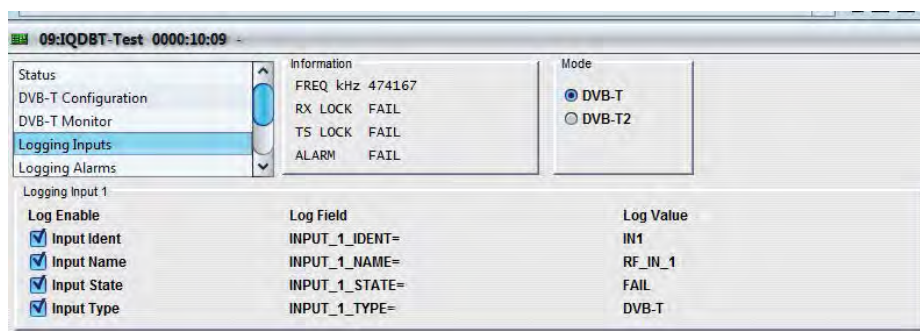
In the Inputs table below, N is the input number.

Logging Inputs	Description
INPUT_N_IDENT=	The identifier of the serial data input, based on the rear ID.
INPUT_N_NAME=	The name of the input, as defined by the user in the **Setup** menu
INPUT_N_STATE=	"OK" – the input signal is good "FAIL" – the input signal is not detected
INPUT_N_TYPE=	This displays the type of input as specified by the unit's configuration: i.e. "DVB-T" – DVB-T mode selected or "DVB-T2" – DVB-T mode selected

Logging Input Alarms

The **Logging Input Alarms** menu is used to select which fields should be enabled for each of the two inputs. This is the same information as presented for the inputs on the **Status** menu.
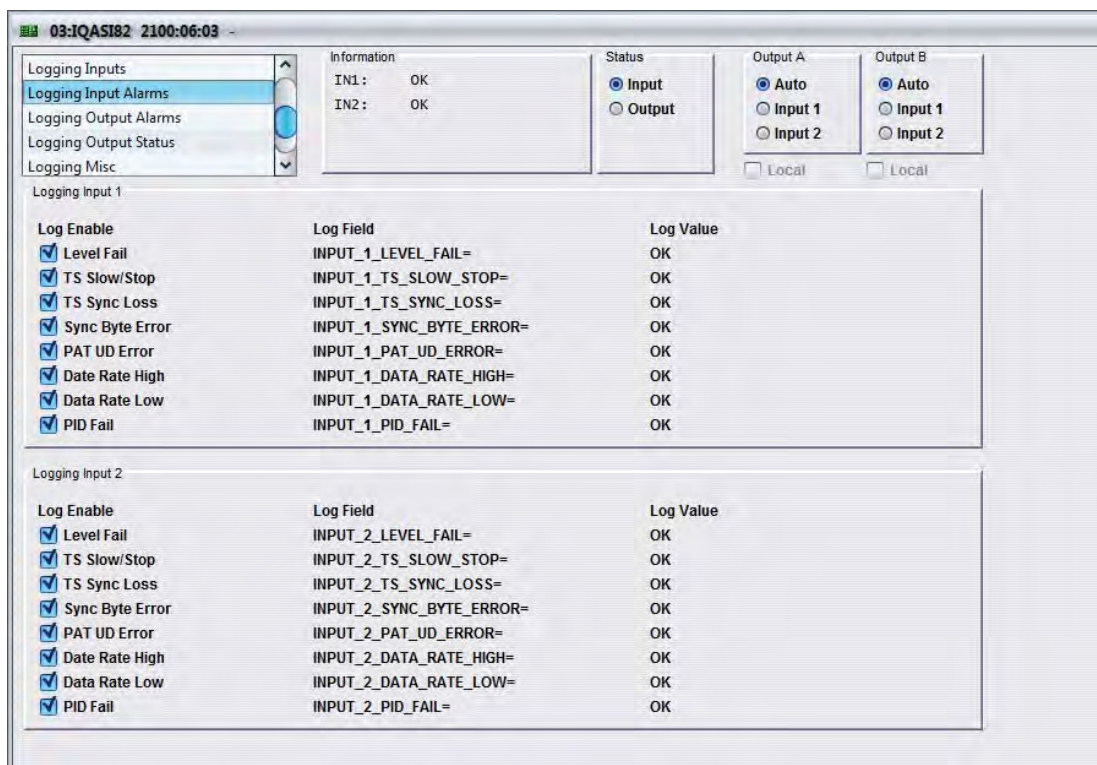
In the Inputs Alarms table below, N is the input number.

Logging Inputs Alarms	Description
INPUT_N_ALARM_RECEIVER_LOCK=	The alarms are as previously described for the Input Status.
INPUT_N_ ALARM_RF=	The alarm will indicate **Fail** if the parameter is outside of the alarm range but will only be acted upon if the alarm is enabled in the primary configuration and/or the alarm outputs.
INPUT_N_ ALARM_MER_FAIL=	
INPUT_N_ ALARM_TSBITRATE=	
INPUT_N_ ALARM_TSSYNC=	
INPUT_N_ ALARM_TEI=	"OK" – The alarm is silent
INPUT_N_ ALARM_RELAY=	"FAIL" – The alarm is active
INPUT_N_ ALARM_POSTVIT=	**Note:** Turning off of an alarm on the configuration page both prevents monitoring of the alarm as well its logging.
INPUT_N_ ALARM_PREVIT=	
INPUT_N_ ALARM_LDPCMEAN=	
INPUT_N_ ALARM_LDPCPRE=	

Logging Output Alarms

The **Logging Output Alarms** menu is used to select which fields should be enabled for each of the two outputs. This is the same information associated with the external outputs, presented for the **Status** menu.
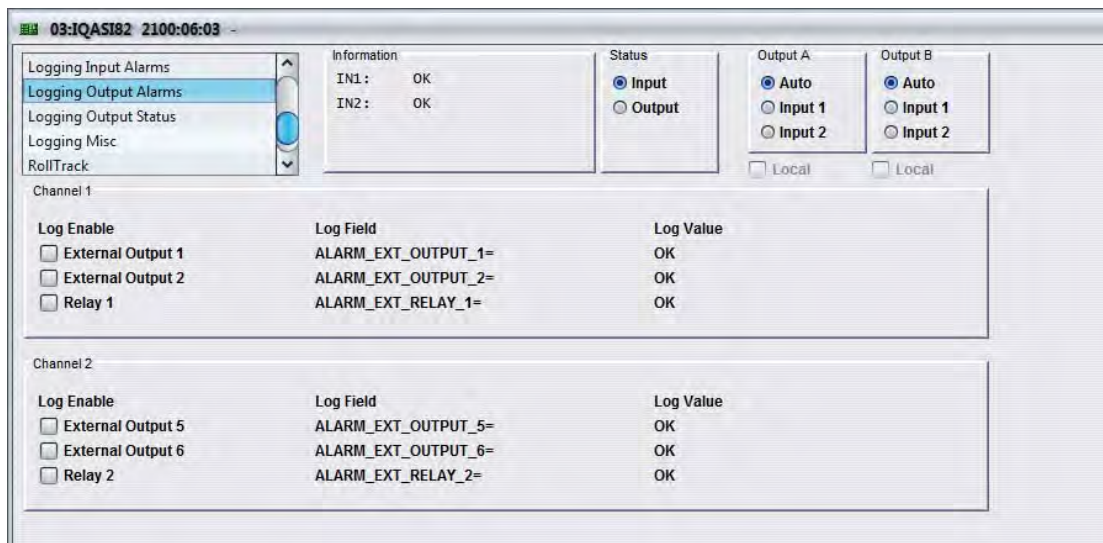
In the Output Alarms table below, N is the input number.

Logging Outputs Alarms	Description
ALARM_EXT_OUTPUT_1=	The alarms are as previously described for the Input Status.
ALARM_EXT_OUTPUT_2=	The alarms are an indication of the GPI output state with respect to the alarm state and which alarms have been selected for the individual GPI outputs.
ALARM_EXT_RELAY_1=	
ALARM_EXT_OUTPUT_5=	
ALARM_EXT_OUTPUT_6=	"OK" – The alarm is silent
ALARM_EXT_RELAY_2=	"FAIL" – The alarm is active

Logging Output States

The **Logging Output Status** menu is used to select which fields should be enabled for the output states. This is the same information presented in the **Output Information** panel.
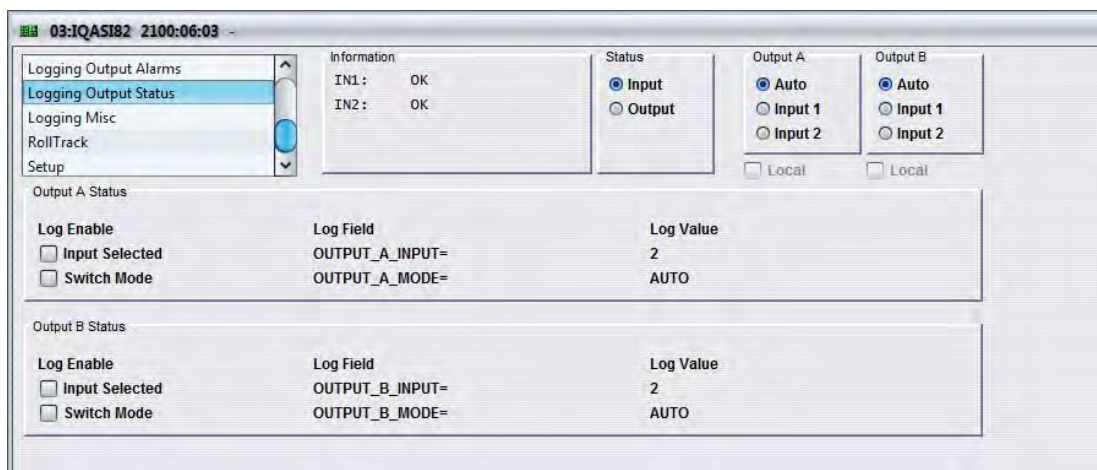
In the Output Status table below, N is the input number.

Logging Output Status	Description
OUTPUT_N_INPUT=	"1" or "2" – The source selected for the output
OUTPUT_N_MODE=	This reports which switching mode is being deployed, namely: "LOCAL" – Front panel switching "REMOTE_SERIAL" – Serial port / RollCall forced "REMOTE_EXT" – GPI switching "AUTO" – ASI82 decision based switching

Logging Miscellaneous

The **Logging Misc** menu is used to select which fields should be enabled for the unit's basic parameters.
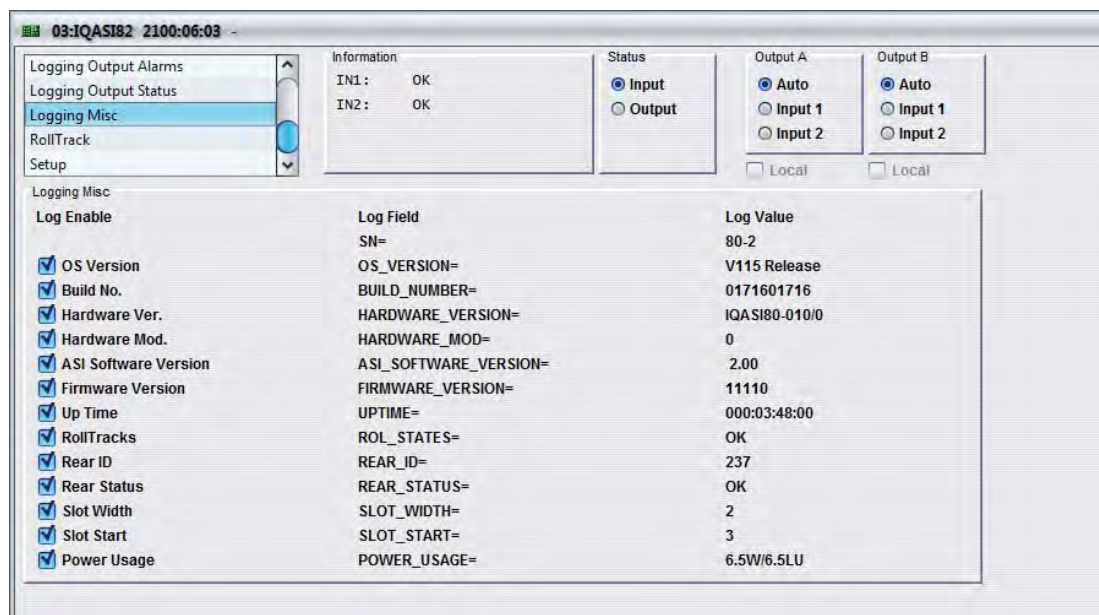
In the Miscellaneous table below, N is the input number.

Logging Miscellaneous	Description
SN=	Displays the module serial number (Note – cannot be deselected)
OS_VERSION=	Displays the operating system name and version. For example, KOS V115
BUILD_NUMBER=	Displays the software build number
HARDWARE_VERSION=	Displays the hardware version number
HARDWARE_MOD=	Displays the hardware modification level
DBT_SOFTWARE_VERSION=	Displays the DBT controller software version
FIRMWARE_VERSION=	Displays the controller firmware version
UPTIME=	Displays the time since the last restart in the format ddd:hh:mm:ss
ROL_STATES=	The status of any RollTracks that have been enabled. Valid values are: OK, Disabled, or FAIL
REAR_ID=	Displays the rear panel type number
REAR_STATUS=	Displays the status of the rear panel
SLOT_WIDTH=	Displays the slot width
SLOT_START=	The first slot number the rear occupies. Use in conjunction with SLOT_WIDTH to determine the slots that the unit occupies.
POWER_USAGE=	Displays the power rating for the module. This is a maximum rating not a live power reading,

RollTrack

The **RollTrack** menu allows information to be sent via the RollCall™ network, to other compatible units connected on the same network.
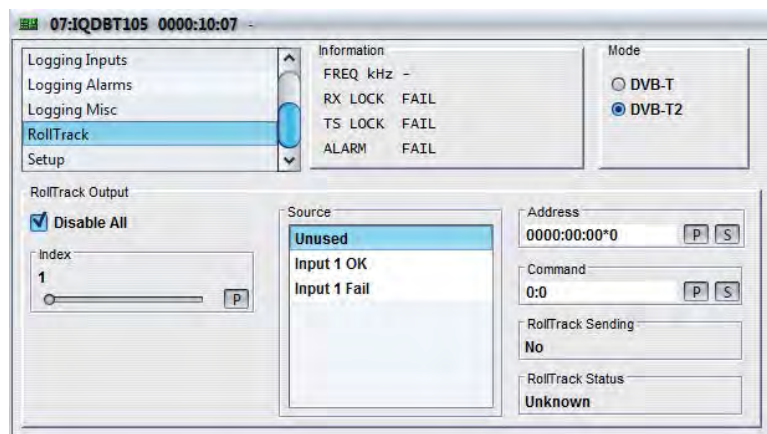
Configuring a RollTrack Action
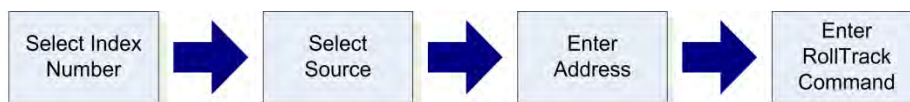
The following sections explain each RollTRack configuration operation in detail.

Disable All

When checked, all RollTrack functions are disabled.

Index

Use the slider to select an index number to identify the RollTrack **action** being configured. Up to 16 actions can be created. Click the Index **P** button to select the default preset value.

Source

Select the RollTrack input from the source menu. **Unused** is displayed if no source is selected.

RollTrack Source	Unused	Input 1 OK	Input 1 Fail
Description:	No RollTracks sent	Input 1 is good	Input 1 is bad

Address

This item enables the address of the selected destination unit to be set.

The address may be changed by typing the new destination in the text area and then selecting the address **S** button to save the selection. Clicking the address **P** button returns to the default preset destination.

The RollTrack address consists of four sets of numbers, for example, 0000:10:01*99:

- The first set (0000) is the network segment code number.

- The second set (10) is the number identifying the (enclosure/mainframe) unit.

- The third set (01) is the slot number in the unit

- The fourth set, 99 in the example, is a user-configured number that identifies the destination unit in a multi-unit system. This ensures that only the correct unit responds to commands. If left at 00, an incorrectly fitted unit may respond unexpectedly.

Rolltracks can be internally looped back using address FFFF:00:00.

Command

This item enables a command to be sent to the selected destination unit.

The command may be changed by typing a code in the text area and then selecting the command **S** button to save the selection. Clicking the command **P** button returns to the default preset command.

The RollTrack command consists of two sets of numbers, for example: 84:156:

- The first number (84) is the actual RollTrack command

- The second number (156) is the value sent with the RollTrack command

RollTrack Sending

A message is displayed here when the unit is actively sending a RollTrack command.

Possible messages are:

Messsage	Description
No	The message is not being sent.
Yes	The message is being sent.

RollTrack Status

A message is displayed here to indicate the status of the currently selected RollTrack index. Possible RollTrack Status messages are:

RollTrack Source	Description
OK	RollTrack message sent and received OK.
Unknown	RollTrack message has been sent but it has not yet completed.
Timeout	RollTrack message sent but acknowledgement not received. This could be because the destination unit is not at the location specified.
Bad	RollTrack message has not been correctly acknowledged at the destination unit. This could be because the destination unit is not of the type specified.
Disabled	RollTrack sending is disabled.

For additional and/or updated information regarding Rolltrack Actions and their configuration, please refer to the Snell IQGateway manual.

Setup

The **Setup** menu display basic information about the module, such as the serial number and software versions. Functions are provided to restart the module or return all settings to their factory or default settings.

Item	Description
Product	The name of the module
Software Version	The currently installed software version number
Serial No	The module serial number
Build	The factory-build number. This number identifies all parameters of the module
KOS	The operating system version number
PCB	The Printed Circuit Board revision number
Rear ID	The rear panel type
DVB-T/T2 Decoder Software	The installed software version associated with the DVB-T/T2 decoder
DVB-T/T2 Decoder Firmware	The installed firmware version associated with the DVB-T/T2 decoder

Factory Defaults

Resets module settings to their factory defaults.

Restart

The Restart button reboots the module, simulating a power-up/power-down cycle.

Input Name

These are the input name displayed in Logging Inputs.

To change the name, type the name in the text field and click **S**. To return the name to its factory default, click **P**.

This menu is only visible in **supervisor** mode; accessible via the RollCall Control Panel.

Built in Web Page

Ethernet Port Connection

The IQDBT105 can be connected to a PC using an Ethernet cable; it may be necessary to use a crossover cable to do this, however most PC nowadays can perform the crossover function internally.

PC Setup

The Ethernet port of the PC needs to be set correctly; for first time connection to MERlin proceed as follows:

- Ensure that the Internet Protocol Version 4 (TC/IPv4) has been installed on the PC
- In the Internet Protocol Version 4 (TC/IPv4) properties, deselect *Obtain an IP address automatically* (i.e. DHCP) and select *Use the following IP address* 192.168.0.161
- Set the Subnet mask to 255.255.255.0

If the default address has been changed and is known, use that instead.

Note The PC IP address must be in the same sub-net range as the IQDBT105 to establish connection.

IP Reset

If the IP address is not known or forgotten, then reset it to its default of 192.168.0.161 by holding the IP reset switch down for greater than 5 seconds. The IP Reset switch is located between the Reset status port and RS232 port on the front panel. The IP address can also be set using the RS232 port and the CLI.

Internet Browser

To view and use the built in web page, proceed as follows:

1) Using the PCs Internet Browser enter the IQDBT105 IP address in your browser's address box.

Tip Remember, the PC IP address must be in the same sub-net range as the IQDBT105 to connect.

2) You will then be asked for the username and password, which are "**MERlin**" and "**MERlin**" respectively.

Tip The username and password can be changed using the RS232 port.

Web User Interface

Example Web Interface screen shot (DVB-T2 Template).

For a detailed Web Interface description, please refer to the dB Broadcast MERlin manual, http://dbbroadcast.co.uk/ProductHandbooks.asp.

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.

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

Terminal settings

Please refer to the RS232 Jumper Settings section on page 11 in the Installation chapter for instructions for setting the serial port for CLI use.

Remember to set the RS232 links on the microcontroller sub-board back to RollCall in environments where RollCall control is required.

This manual only considers the RollCall interface in detail. Please contact dB Broadcast for a full CLI command line directory.

Trouble Shooting

Refuses to lock to incoming RF

- Check that there is an input RF signal that it is within specification (-20dBm to -70dBm)
- Check that the correct frequency has been selected
- Check that the correct channel bandwidth been selected
- Check that this channel is a DVB-T or DVB-T2 broadcast
- Check that a valid PLP has been selected (DVB-T2)

If in doubt, go to the Device Configuration tab, select DVB-T and tune to a known working DVB-T channel.

Picture blocking and break up (decoder connected to receiver ASI output)

Decoder blocking is frequently caused by a poor RF feed. Open the "T2 Status Summary" and check the following:

- Freq Error (kHz) > 30kHz; has the tuner has been tuned to the wrong frequency or is an upper or lower offset (±166kHz) in use? Re-tune the IQDBT to the correct frequency.
- LDPC Iterations > 7, LDPC > 15 and/or MER <20dB; is the RF input signal low in amplitude or subject to interference?

General reception issues

Most reception issues are usually caused by poor RF inputs. Check the following:

- Is the antenna connected?
- Has the antenna feed been split too many ways?
- Is the antenna cable run too long?
- Is the antenna pointed at the transmitter?
- Does the antenna cable have > 5V DC on it?

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.
Adjacent Channel Interference	Interference caused by extraneous power from signal in an adjacent channel. The problem is often caused by the inability to produce perfect filters without roll off. See *Frequency Offset*.
Ambient	The atmospheric conditions surrounding a given item. Normally in terms of factors which influence or modify, such as temperature or humidity.
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. A measure of the errors in a transmitted signal. Bit errors are caused by interference or loss of signal, which can result in disruption to the stream of bits composing the DTV picture.
BNC	A radio frequency connector with an impedance of 75Ω, 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 carries simultaneously. Orthogonality reduces co-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.\n\nCOFDM resists fading, is very tolerant of multipath interference and is well suited to building Single-Frequency Networks (SFNs).\n\nIt is used extensively in European digital television (DVB-T) and digital radio (DAB) systems.
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.
DVB-T2	An extension of DVB-T that allows higher modulation order using advanced error detection and correction (from DVB-S2) to allow higher bit rates.
FEC	Forward Error Correction. A receiver technique for correcting errors in the received data.
Frequency Offset	Intentional shift of a radio carrier frequency to avoid interference with other transmitters.\n\nSee *Adjacent Channel Interference*.

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.
kHz	Kilohertz. One thousand cycles per second (10^3 cps).
LDPC	Low Density Parity Check.
LSB	Least Significant Bit.
MER	Modulation Error Ratio.
MHz	Megahertz. One million cycles per second (10^6 cps).
MPLP	The DVB-T2 Multiple Physical Layer Pipe (MPLP) allows multiple PLP's to be present in the DVB-T2 modulation. The DVB-T2 allows for up to 256 PLP's to be defined.
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	See COFDM.
Packet	A variable-sized unit of information that can be sent across a packet-switched network.
PAL	Phase Alternating Line. 50 Hz video format used in much of the world outside of the USA.
PCR	Program clock reference.
PID	Packet identifier.

PLP	Physical Layer Pipe. See MPLP.
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

Inputs and Outputs

Signal Inputs	
Inputs	1off – RF Terrestrial Feed
Connector / Format	75R F Type
Electrical	+5V Maximum
Tuning Range	178 to 858 MHz
Tuning Step	125KHz 7MHz channel 166.7KHz 8MHz channel
Input Level	-20dbm to 80dbm
Input Return Loss	6db typical
Modulation DVB-T	
Standard	DVB-T in accordance with EN 300 744
Guard Interval	1/4, 1/8, 1/16, 1/32
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
Modulation	QPSK, 16QAM, 64QAM
FFT	2K, 8K
Modulation DVB-T2	
Standard	All single (PLP) modes defined in EN 302 755
Guard Interval	1/4, 19/128, 1/8, 1/32, 1/128, 1/16
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8, 3/5, 4/5
Modulation	QPSK, 16QAM, 64 QAM, 256QAM
FFT	1K, 2K, 4K, 8K, 16K, 32K
Signal Outputs	
Standard	Burst or byte mode selectable (DVB-T only)
Outputs	1 off (offered on x2 connectors)
Electrical	75R, DVB-ASI compliant
Connector / Format	BNC
Control Interface	
Relay Output	Standard Snell Screw Terminal
Electrical	N/O, N/C, COM
Ethernet	RJ45
RS232	9 way D-Type
Start-up Time	12 seconds

Indicators

Front Panel / Card Edge	Status	Indication
Power:	OK	Green
CPU:	OK	Green Flashing
Input Status:	OK Fail	Green Red
Alarm:	Lit = present	Red
Locked:	Lit = unlocked	Yellow
Output Source:	Selected	Yellow

Power Consumption

Module Power Consumption:	4.5 W Max (A frames), 4.5 LU Max (B frames)

Note Please refer to the relevant Snell IQ Enclosure manual for an explanation of LU units.

Physical and Environmental

Dimensions:	2 slots of a Hawkeye IQ 3RU or 1RU frame
Operating Temperature	0 - 40ºC

Note 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'.

RollCall Features

Monitor	Modulation Properties & Measurements
Configuration	Tuning and alarm configuration
User memories	Not supported (use Savesets)
Logging	Inputs
	Alarms
	Misc
RollTrack Controls	On/off, Index, Source, Address, Command, Status, Sending
Setup	Versions, reset defaults, restart