



User Instruction Manual

IQOTR31

3G/HD/SD-SDI Single Mode Fiber Optic Transceiver

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Safety Information

Warnings



- All lasers used in this product are Class 1, in accordance with EN60825-1 as well as 21CFR 1040.10 and 1040.11.
- Laser light can be damaging to the eyes. Optical fibers and uniteres should be handled with great care.
- The IQOTR31 is designed for use with Class 1 laser systems only. Ensure that all outputs do not exceed Class 1 as doing so will impair the safety of the system and may result in damage to the equipment.
- Active fibers should not be handled unless their source can positively be identified as not exceeding Class 1 limits.



Notes

Note:

- Optical uniteres have shutters to prevent the ingress of dust. These shutters should only be opened when connecting optical fibers.
- The ends of optical fibers should be cleaned with a liquid fiber cleaner, using a cotton bud, to ensure that there is no dust present before they are plugged in (the uniter is polarized).
- Do not disturb or handle the optical fibers.
- **1550 nm Tx on the IQOTR31 module**

An attenuator is required for short link distances (<15 km) and is fitted by default. For link distances greater than 15 km, the supplied attenuator may be removed to increase power. See "Attenuation" on page 13.

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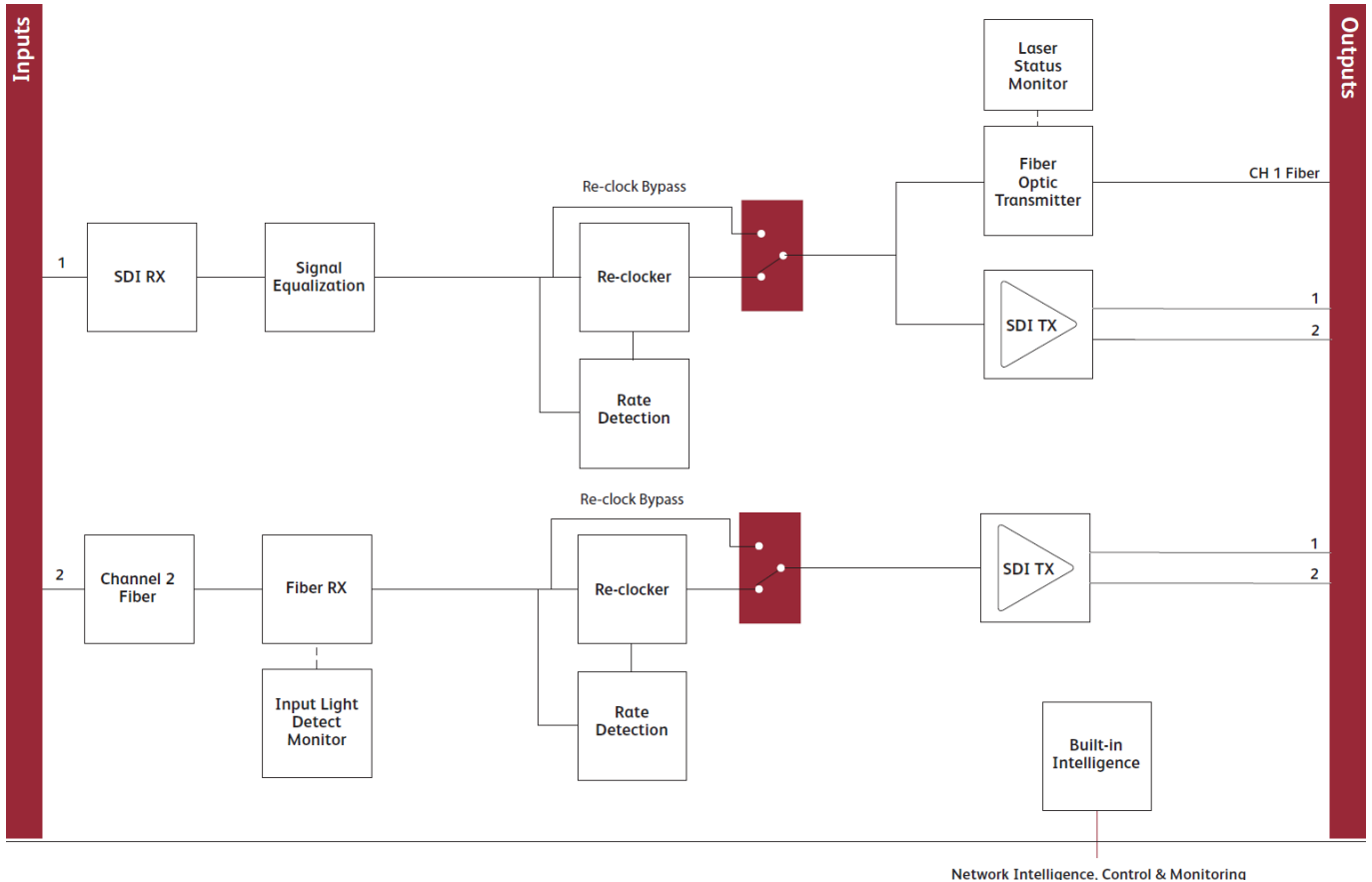
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1. Introduction

1.1 Module Description

The IQOTR31 is a fiber optic transceiver for bi-directional conversion of 3 Gbps, HD, and SD-SDI signals to 1550 nm wavelength optical signals.

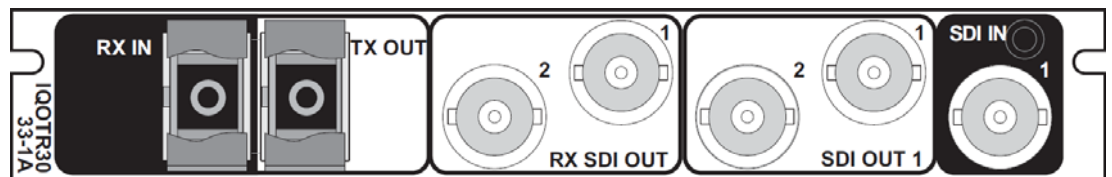


1.2 Order Codes

The following product order codes are covered by this manual.

- IQOTR3133-1A** 1550 nm single mode fiber optic transceiver for HD/SD-SDI. 1 x HD/SD-SDI input, 2 x HD/SD-SDI outputs, 1 x optical output. 1 x optical input, 2 x HD SD-SDI outputs
- IQOTR3133-1A3** Includes 3G-SDI functionality
- IQOTR3133-3G** 3G software upgrade for 3G-SDI operation

1.3 Rear Panel View



1.4 Enclosures

The module can be fitted into the enclosure types shown.

Important: An IQH3B enclosure accepts modules with either “A” or “B” order codes. An IQH3A or IQH1A enclosure accepts modules with “A” order codes only.

1.4.1 B-style Enclosure



Enclosure order codes: IQH3B-S-0, IQH3B-S-P

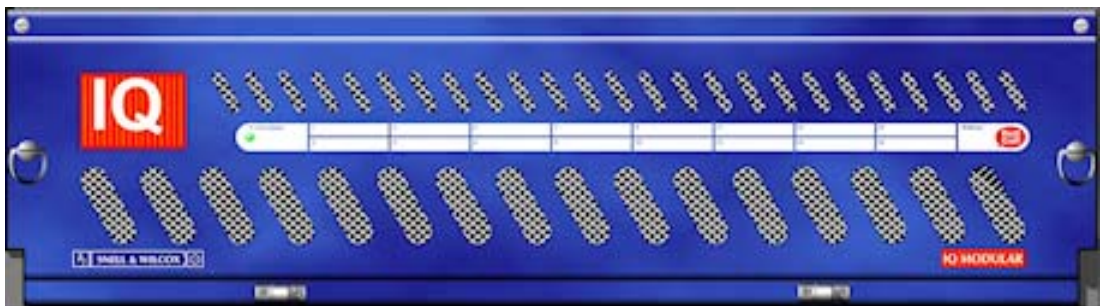
1.4.2 A-style Enclosures



Enclosure order code: IQH1A-S-P



Enclosure order codes: IQH3A-S-0, IQH3A-S-P



Enclosure order codes: IQH3A-E-0, IQH3A-E-P, IQH3A-0-0, IQH3A-0-P



Enclosure order code: IQH1A-S-P

1.5 Feature Summary

The IQOTR31 provides the following features:

- Reclocking for 3 Gbit/s, 1.5 Gbit/s HD-SDI and 270 Mbit/s SDI signals, or asynchronous operation for other frequencies (input range 50 Mbit/s to 3 Gbit/s).
- Single mode fiber optic transmitter for 3G HD/SD-SDI and DVB ASI Signals.
- 1550 nm output wavelength.
- Active loop-through 3G/HD/SD-SDI outputs for each input in accordance with SMPTE424M, SMPTE292M, SMPTE259M and DVB ASI.
- Single mode fiber optic receiver for 3G/HD SD-SDI and DVB ASI Signals.
- Input wavelength range 1260-1620 nm.
- 3G/HD/SD-SDI outputs for CH 2 optical input, in accordance with SMPTE424M, SMPTE292M, SMPTE259M and DVB ASI.

2. Technical Specification

| Inputs and Outputs | |
|--|--|
| Signal Inputs (Tx) | |
| Electrical | 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI (asynchronous operation available at other frequencies) |
| Connector/Format | BNC/75 Ohm panel jack |
| Conforms to | SMPTE 424M (HD level A) SMPTE 292M (HD) SMPTE 259M-C (SD) |
| Inputs | 1 |
| Input Cable Length | Up to 80 m Belden 1694A @ 3 GBit/s Up to 180 m Belden 1694A @ 1.5 GBit/s Up to 350 m Belden 1694A @ 270 Mbit/s |
| Signal Inputs (Rx) | |
| Optical | 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI (asynchronous operation available at other frequencies) |
| Connector/Format | SC/PC singlemode panel uniter |
| Standard | SMPTE 297-2006 |
| Inputs | 1 |
| Signal Outputs (Tx) | |
| Electrical | 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI (asynchronous operation available at other frequencies) |
| Connector/Format | BNC/75 Ohm panel jack |
| Conforms to | SMPTE 424M (HD level A) SMPTE 292M (HD) SMPTE 259M-C (SD) |
| Outputs | 2 reclocked active loop-through for CH1 SDI input, 1 reclocked active loop through for CH2 SDI input |
| Optical | 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI (asynchronous operation available at other frequencies) |
| Connector/Format | SC/PC singlemode panel uniter |
| Standard | SMPTE 297-2006 |
| Outputs | 1 per channel |
| Signal Outputs (Rx) | |
| Electrical | 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI (asynchronous operation available at other frequencies) |
| Connector/Format | BNC/75 Ohm panel jack |
| Conforms to | SMPTE 424M (HD level A) SMPTE 292M (HD) SMPTE 259M-C (SD) |
| Outputs | 2 |
| Control Interface | |
| GPI/O | 2x closing contact via screw terminal (ST) connector |
| Controls | |
| Functions Available via RollCall Only | |
| Mode | Auto/3G/HD/SD |
| Reclocker | On/Off |

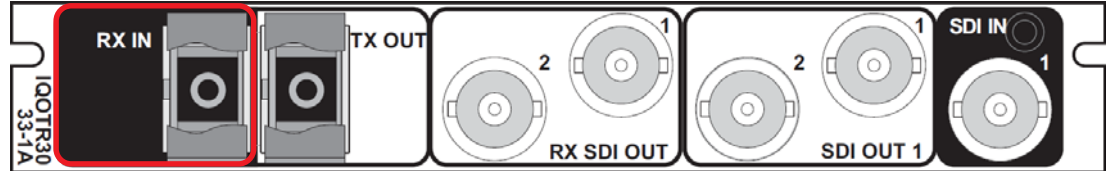
| | |
|--|--|
| Laser Disable | On/Off |
| Rx Input Status | Present, Loss/Unknown, Data Rate |
| Logging | Input 1 (2) Type Input 1 (2) Data Rate Input 1 (2) Present Input 1 (2) Error Input 1 (2) Loss Tx Laser Bias High Warning, Tx Power Low Warning, Tx Power High Warning, Tx Laser Wavelength, Rx Power High Warning, Rx Power Low Warning, Rx Power Measurement |
| RollTrack Controls | On/Off, Index, Source, Address, Command, Status, Sending |
| RollTrack Outputs | Unused Input 1 (2) Present Input 1 (2) Rate Unknown Input 1 (2) Loss Input 1 (2) 3G Input 1 (2) HD Input 1 (2) SD Tx Laser Bias High Warning, Rx Power High Warning, Rx Power Low Warning |
| Indicators | |
| Power | OK (Green) |
| CPU | OK (Green Flashing) |
| Input 1 (2) | OK (Green), Bypass (Orange), Loss (Red) |
| Specifications | |
| Optical Outputs (Tx) 1550 nm Tx | |
| Wavelength | 1550 nm |
| Spectral Width (FWHM) | >1 nm (typical) |
| Output Power | 4 dBm (± 1 dBm) |
| Extinction Ratio | >7.5:1 (typical) |
| Transmission Distance | Up to 50 km max |
| Optical Inputs (Rx) | |
| Input Wavelength Range | 1260 nm (min.), 1620 nm (max.) |
| Optical Power Input Range | >-3 dBm, <-18 dBm |
| Detector Damage Threshold | -3.5 dBm |
| Power Consumption | |
| Module Power Consumption | 4 W max (A Frames) 3.5 W max (B Frames) |

3. Connections

This section describes the physical input and output connections provided by the IQOTR31.

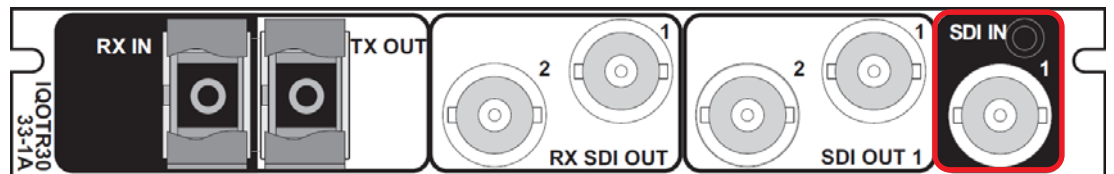
3.1 Optical Input (RX IN)

Optical input (Rx IN) to the module is via a single SC/PC singlemode panel unit.



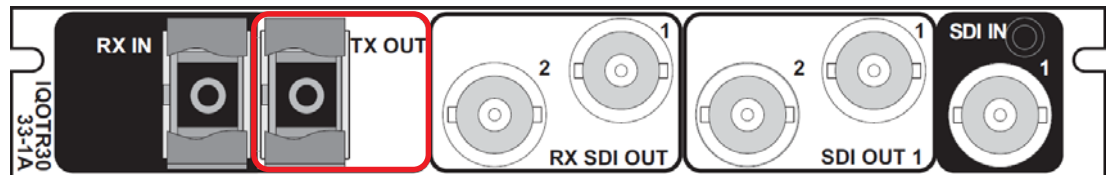
3.2 Electrical Input (SDI IN)

Electrical input (SDI IN) to the module is via a single BNC 75 ohm panel jack connector.



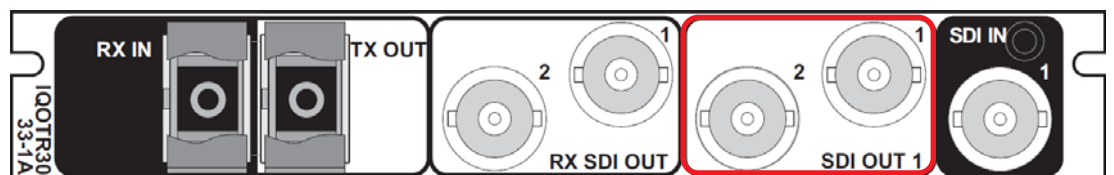
3.3 Optical Output (TX OUT)

There is a single optical output from the unit via an SC/PC singlemode panel unit. The input source for this output is the SDI IN connector.



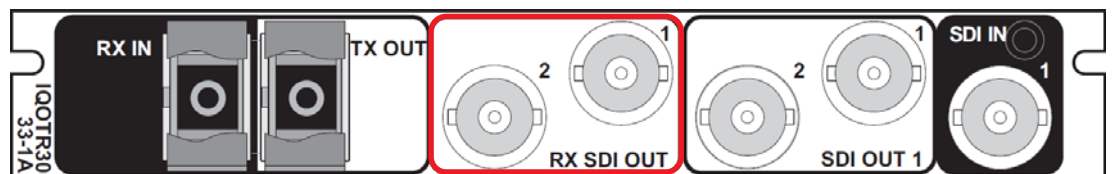
3.4 Electrical Outputs (SDI OUT 1)

There are two serial digital outputs via BNC 75 ohm panel jack connectors. The input source for these outputs is the SDI IN connector.



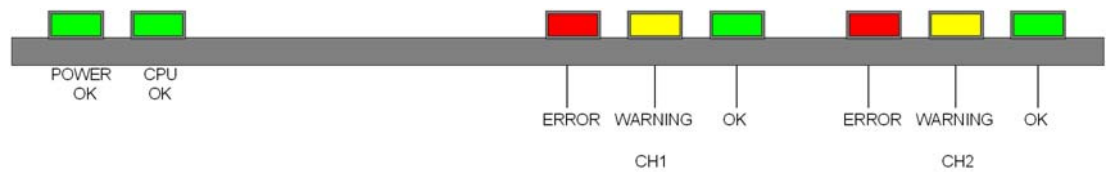
3.5 Electrical Outputs (RX SDI OUT)

There are two serial digital outputs via BNC 75 ohm panel jack connectors. The input source for these outputs is the RX IN connector.



4. Card Edge LEDs

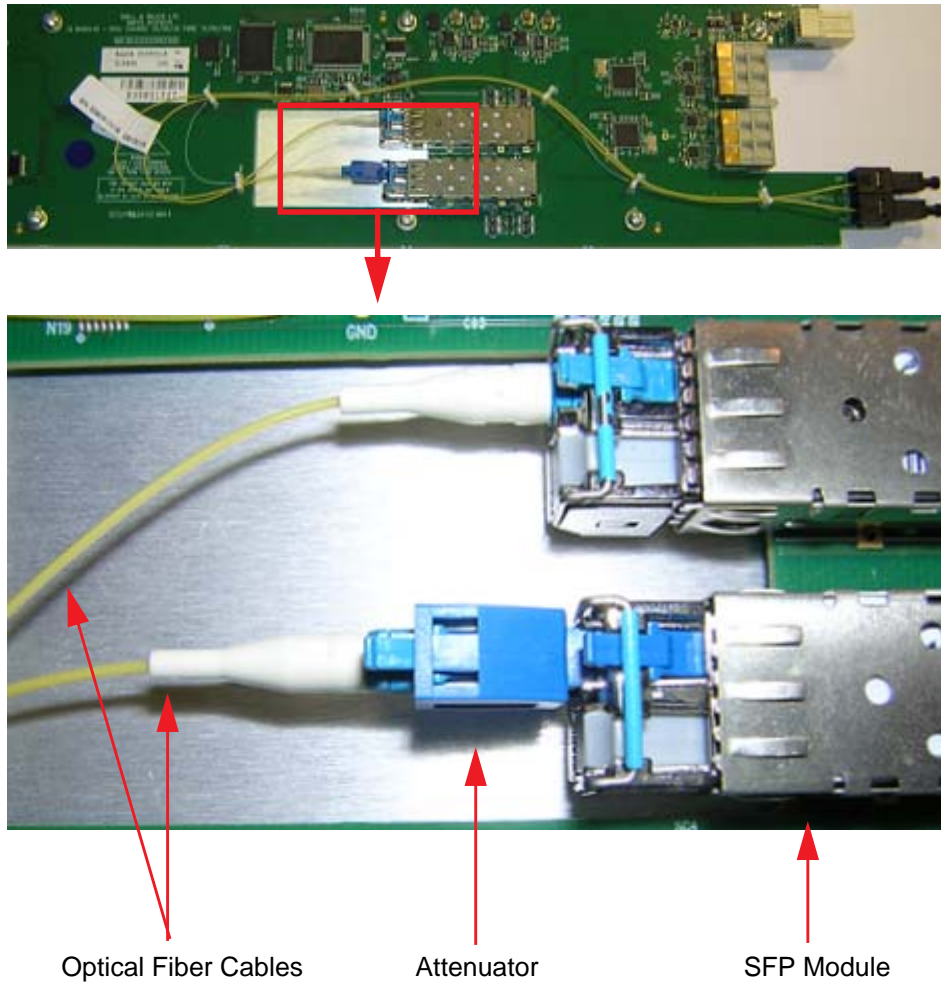
The LEDs on the edge of the module indicate its operating status:



| LED | Color | Description |
|-----------------|--------|--|
| POWER OK | Green | Indicates that a positive power supply is present. |
| CPU OK | Green | This LED will flash to indicate that the CPU is running. |
| ERROR | Red | This LED indicates board fault conditions. When the unit is booting, this LED is illuminated, until the SDI is enabled. |
| WARNING | Yellow | This LED is illuminated if one or more of the SDI inputs is not valid or if the reference signal is missing when the unit is set to Lock to Reference. |
| OK | Green | Indicates that the module is operating correctly. |

5. Attenuation

The IQOTR31 has 1550 nm transmission lasers. The lasers have a higher optical power output than the 1310 nm variety. For link distances less than 15 km, this power is sufficient to saturate receivers. As a precaution, all units with 1550 nm transmission lasers are fitted with a 5 dBm attenuator. For distances greater than 15 km, it may be desirable to use the extra optical power, in which case the attenuator can be removed.



To remove the attenuator:

1. Remove the card from the IQ enclosure.
2. Press down on the blue latch that holds the optical fiber connector in place and withdraw the optical fiber.
3. Press down on the blue latch that holds the attenuator in place and remove withdraw the attenuator from the SFP module.
4. Push the optical fiber connector directly into the SFP module. It will click when it is in place.
5. Refit the card into the IQ enclosure.

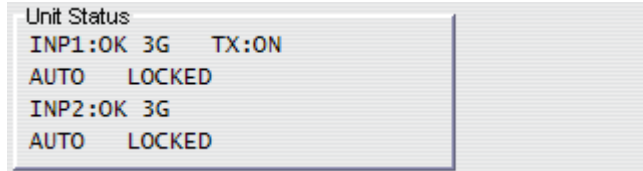
Note: Take care not to touch the exposed glass tip of the optical fiber. If this does happen, clean the exposed tip with an isopropyl alcohol wipe.

6. Controlling the IQOTR31 from the RollCall Control Panel

6.1 Information Window

The information window is displayed in the upper-right corner of each screen and displays basic information about the input status, video, audio and reference status of the module.

6.1.1 Unit Status

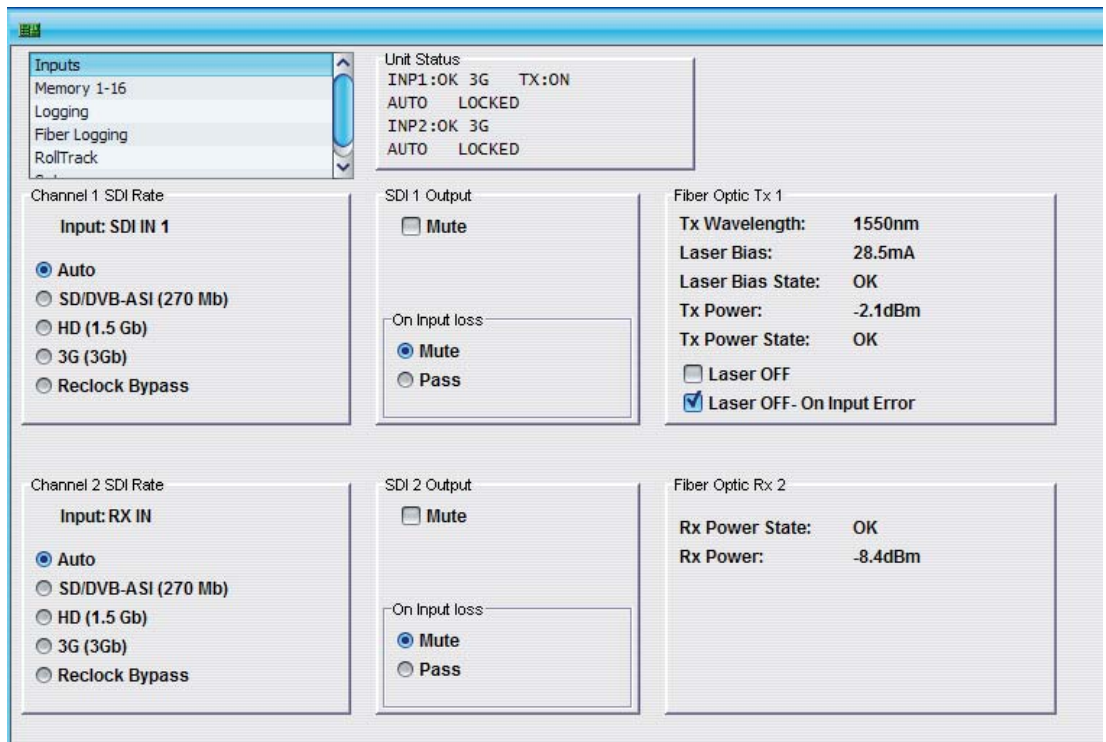


The first two lines of the Unit Status display the input status, detected rate, and input selection method for Input 1.

The third and fourth lines of the Unit Status display the same information for Input 2.

6.2 Inputs

The **Inputs** screen enables the type of input signal to be selected.



6.2.1 Input 1 SDI Rate (SDI IN 1) / Input 2 SDI Rate (RX IN 2)

- **Auto:** When selected, the unit will automatically detect and reclock any valid input signal, and the detected rate will be displayed in the Unit Status.

If anything else is detected, the output will not be reclocked. If the **On Input Loss / Mute** option is selected, the output will be muted; or, if the **On Input Loss / Pass** option is selected, the output will be passed through.

- **SD/DVB-ASI (270 Mb):** When selected, the unit will reclock only SD/DVB-ASI (270 Mb) signals.

When selected, the **On Input Loss** controls are greyed out and are inactive. If any other standard is applied to the unit, the output will be muted.

- **HD (1.5 Gb):** When selected, the unit will reclock only HD (1.5 Gb) signals.
When selected, the **On Input Loss** controls are greyed out and are inactive. If any other standard is applied to the unit, the output will be muted.
- **3G (3 Gb):** When selected, the unit will reclock only 3G (3 Gb) signals.
When selected, the **On Input Loss** controls are greyed out and are inactive. If any other standard is applied to the unit, the output will be muted.
- **Reclock Bypass:** When selected, the unit will not reclock the input signal. If a supported rate is detected, the Unit Status will display the detected rate, otherwise, *** will be displayed.
- If the **On Input Loss / Mute** option is selected, the output will be muted whenever a recognized rate is not detected; or, if the **On Input Loss / Pass** option is selected, any signal standard, frequency, etc... will pass through.

6.2.2 Output 1 / Output 2

- **Mute:** When selected, this option applies a mute on the output.
- **On Input loss / Mute:** When selected, if the Input signal is lost, the output signal will be muted.
- **On Input loss / Pass:** When selected, if the input signal is lost, it will be passed unchanged.

Note: These controls only apply to the SDI outputs on the BNC. The laser output is controlled by the Laser OFF and Laser OFF - On Input Loss controls.

6.2.3 Fiber Optic Tx 1

This section displays the following information about the fiber optic output signal:

- Tx Wavelength
- Laser Bias
- Laser Bias State
- Tx Power
- Tx Power State
- **Laser OFF:** Selecting this option disables the laser.
- **Laser OFF - On Input Loss:** Selecting this option disables the laser if the input signal is lost.

Note: These controls only apply to the fiber optic output signal. The SDI outputs on the BNC are controlled by the Mute and On Input Loss - Mute controls.

When the unit is forced to a particular standard, the laser controls are not grayed out, and the laser will still be active if an incorrect standard is applied unless **Laser OFF - On Input Loss** is selected.

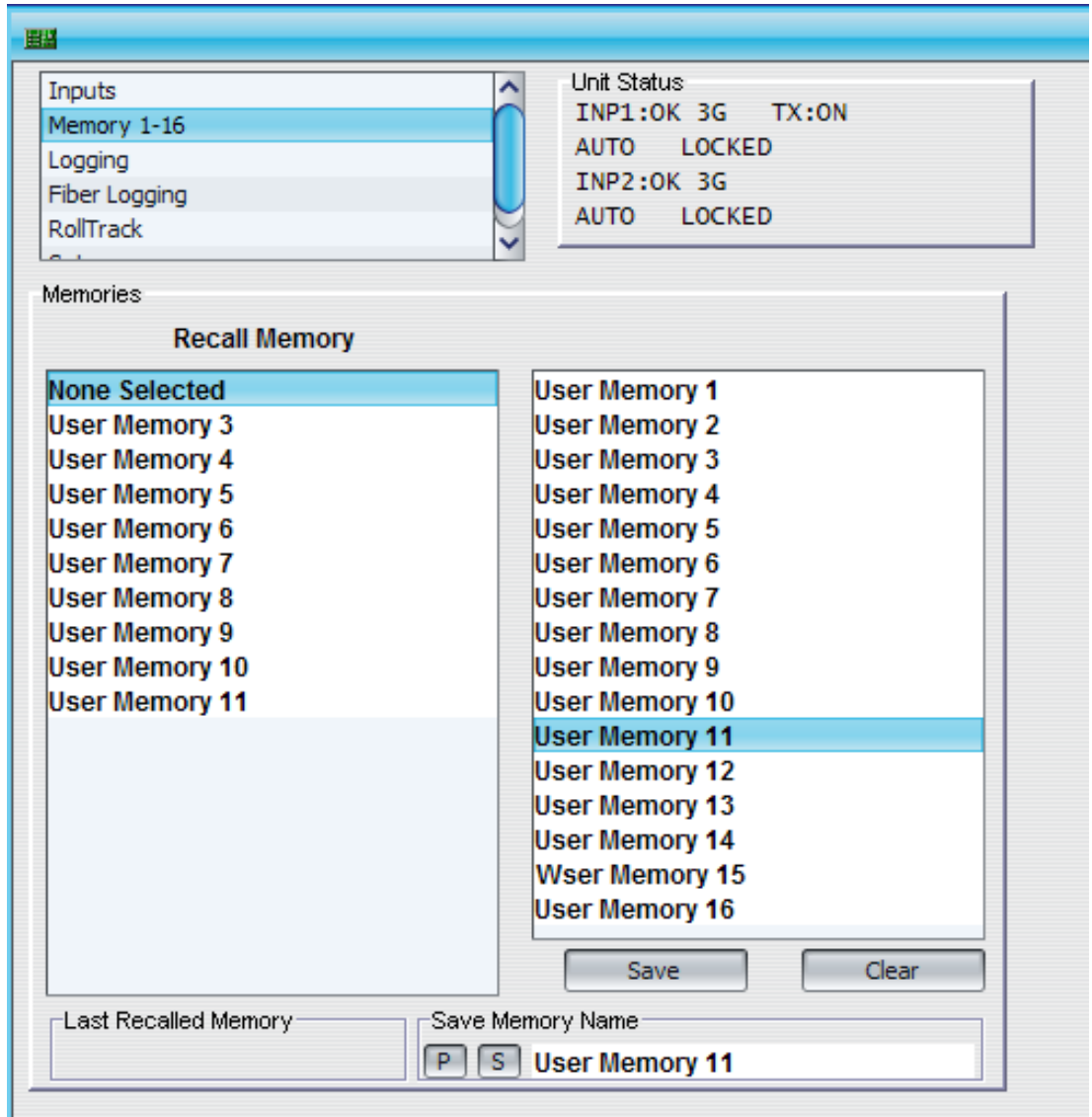
6.2.4 Fiber Optic Tx 2

This section displays the following information about the fiber optic input signal:

- Rx Power
- Rx Power State

6.3 Memories 1-16

The **Memories** screen enables up to 16 setups to be saved and recalled later. The default memory names can be changed to provide more meaningful descriptions.



6.3.1 Saving a Memory Name

To save settings:

- In the **Save Memory** column, select a memory location, and then click **Save**. The current settings are saved and the memory appears in the **Recall Memory** column.

6.3.2 Changing a Memory name

- In the **Save Memory Name** field, type the new memory name, and then click **S**. To return the memory to its default value, click the preset button (**P**).

Use the **Recall Memory** function to recall the settings saved in a memory location. **Last Recalled Memory** displays the most recently recalled memory. An asterisk next to the name displayed in the Last Recalled Memory field indicates that one or more controls has been changed since the memory was recalled.

6.3.3 Recalling a Memory

- In the **Recall Memory** column, select the memory to recall. The recalled settings will be applied and the memory name will appear in the **Last Recalled Memory** section.

6.4 Logging

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

The screenshot displays the RollCall Control Panel interface for 'Memory 1-16'. A sidebar on the left contains a menu with 'Logging' selected. The main area is divided into three sections:

- Unit Status:** A box showing 'INP1:OK 3G TX:ON', 'AUTO LOCKED', and 'INP2:OK 3G AUTO LOCKED'.
- Logging Misc:** A table with columns 'Log Enable', 'Log Field', and 'Log Value'. All 'Log Enable' checkboxes are checked.
- Logging Input 1:** A table with columns 'Log Enable', 'Log Field', and 'Log Value'. All 'Log Enable' checkboxes are checked.
- Logging Input 2:** A table with columns 'Log Enable', 'Log Field', and 'Log Value'. All 'Log Enable' checkboxes are checked.

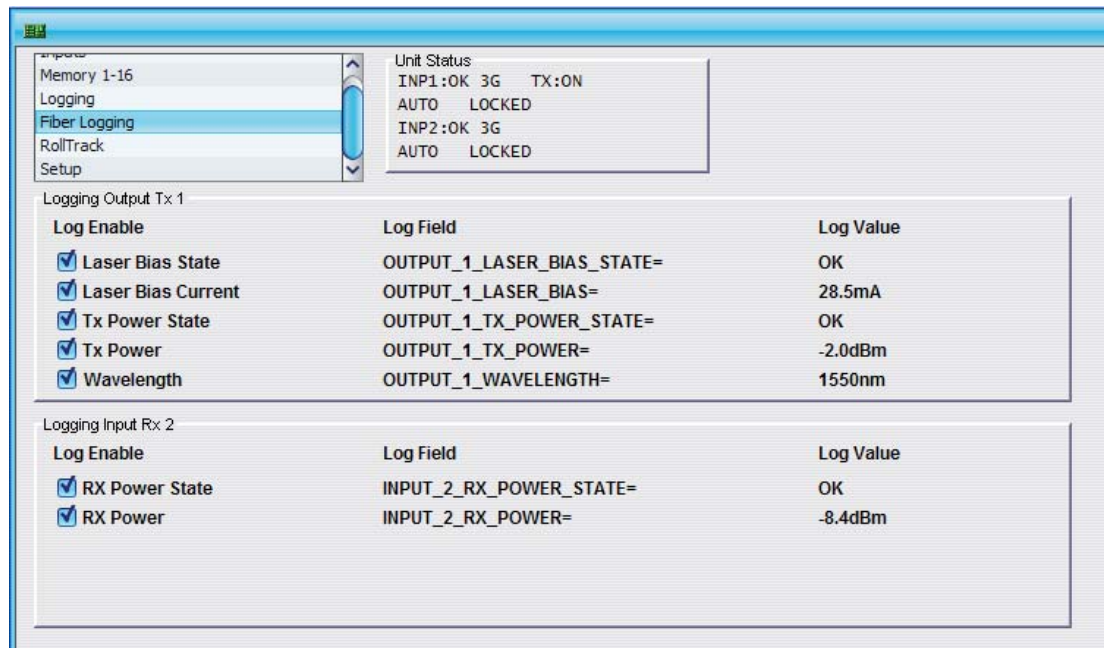
| Log Enable | Log Field | Log Value |
|--|-------------------|--------------|
| <input checked="" type="checkbox"/> | SN= | S38111997 |
| <input checked="" type="checkbox"/> OS Version | OS_VERSION= | V115 Release |
| <input checked="" type="checkbox"/> Build No. | BUILD_NUMBER= | 0000300924 |
| <input checked="" type="checkbox"/> Hardware Ver. | HARDWARE_VERSION= | RD3FDC1X |
| <input checked="" type="checkbox"/> Up Time | UPTIME= | 000:02:46:00 |
| <input checked="" type="checkbox"/> Licensed Options | LICENSED_OPTIONS= | SDHD;3G |

| Log Enable | Log Field | Log Value |
|---|------------------|--------------|
| <input checked="" type="checkbox"/> | INPUT_1_IDENT= | SDI IN 1 |
| <input checked="" type="checkbox"/> Input Name | INPUT_1_NAME= | TX 1 |
| <input checked="" type="checkbox"/> Input Type | INPUT_1_TYPE= | HD/SD/3G SDI |
| <input checked="" type="checkbox"/> Input State | INPUT_1_STATE= | OK |
| <input checked="" type="checkbox"/> Input SDI Bitrate | INPUT_1_SDIRATE= | 3.0Gb/s |

| Log Enable | Log Field | Log Value |
|---|------------------|--------------|
| <input checked="" type="checkbox"/> | INPUT_2_IDENT= | RX IN |
| <input checked="" type="checkbox"/> Input Name | INPUT_2_NAME= | RX 2 |
| <input checked="" type="checkbox"/> Input Type | INPUT_2_TYPE= | HD/SD/3G SDI |
| <input checked="" type="checkbox"/> Input State | INPUT_2_STATE= | OK |
| <input checked="" type="checkbox"/> Input SDI Bitrate | INPUT_2_SDIRATE= | 3.0Gb/s |

6.4.1 Fiber Logging

The **Fiber Logging** screen displays the current log information for the Fiber Optic module.



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.

6.4.2 Log Field Descriptions

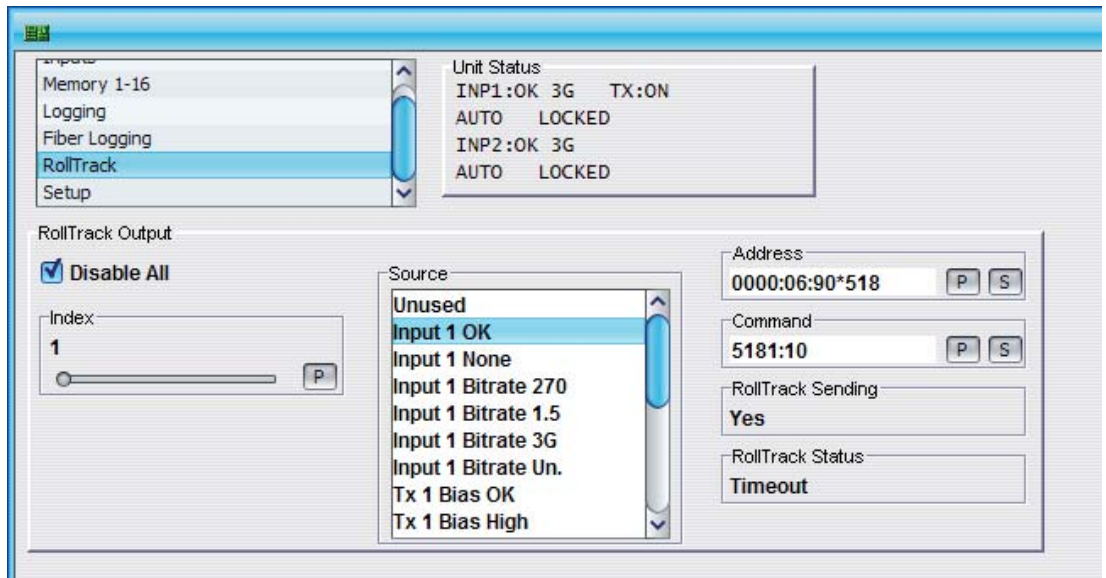
| Log Field | Description |
|----------------------------|--|
| SN= | Displays the module serial number. |
| OS_VERSION= | Displays the operating system name and version. |
| BUILD_NUMBER= | Displays the build number. |
| HARDWARE_VERSION= | Displays the hardware version number. |
| UPTIME= | Displays the time since the last restart in the format ddd:hh:mm:ss. |
| LICENSED_OPTIONS= | Displays any specially licensed options, if applicable. |
| INPUT_N_IDENT= | Display the input ID. |
| INPUT_N_NAME= | Displays the input name. |
| INPUT_N_TYPE= | This displays the type of input as specified by the unit's configuration. Valid values are 3G / HD /SD SDI. |
| INPUT_N_STATE= | Displays the current input state. Valid values are: <ul style="list-style-type: none"> • OK • WARN:Mismatch • FAIL:Lost <p>Note: WARN:Mismatch indicates that the input and output standards are not the same.</p> |
| INPUT_N_SDIRATE= | Displays the input bitrate. |
| OUTPUT_1_LASER_BIAS_STATE= | Displays the current output 1 laser bias state. Valid values are: <ul style="list-style-type: none"> • OK • WARN:Mismatch • FAIL:Lost |
| OUTPUT_1_LASER_BIAS= | Displays the bias level, in mA. |
| OUTPUT_1_TX_POWER_STATE= | Displays the current Tx power state. Valid values are: <ul style="list-style-type: none"> • OK • WARN:Mismatch • FAIL:Lost |
| OUTPUT_1_TX_POWER= | Displays the Tx power in dBm. |
| OUTPUT_WAVELNGTH= | Displays the wavelength in nm. |
| INPUT_N_RX_POWER_STATE= | Displays the power status. Valid values are: <ul style="list-style-type: none"> • OK • WARN • FAIL |
| INPUT_N_RX_POWER= | Displays the Rx power in dBm. |

6.5 RollTrack

The **RollTrack** screen allows information to be sent, via the RollCall™ network, to other compatible units connected on the same network.

Use the settings on the **RollTrack** screen to:

- Enable or disable the RollTrack functions.
- Configure up to 16 RollTrack outputs.
- Specify the conditions that trigger RollTrack data transmission.
- Set RollTrack destinations.
- Specify the RollTrack commands to be sent.



6.5.1 Disable All

When checked, all RollTrack items are disabled.

6.5.2 Index

This slider enables up to 70 RollTrack outputs to be setup. Dragging the slider selects the RollTrack Index number, displayed below the slider. Clicking the **P** button selects the default value.

6.5.3 Source

This slider enables the source of information that triggers the transmission of data to be selected. Dragging the slider selects the RollTrack source, displayed below the slider. Clicking the **P** button selects the preset value. When no source is selected, **Unused** is displayed.

6.5.4 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 **S** button to save the selection. Clicking the **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**) is a user-settable number that is a unique identification number for the destination unit in a multi-unit system. This ensures that only the correct unit will respond to the command. If left at 00 an incorrectly fitted unit may respond inappropriately.

6.5.5 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 **S** button to save the selection. Clicking the **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.

6.5.6 RollTrack Sending

A message is displayed here when the unit is actively sending a RollTrack command. Possible RollTrack Sending messages are:

| | |
|----------------------------|---|
| String | A string value is always being sent. |
| Number | A number value is always being sent. |
| No | The message is not being sent. |
| Yes | The message is being sent. |
| Internal Type Error | Inconsistent behavior. Please contact your local Snell agent. |

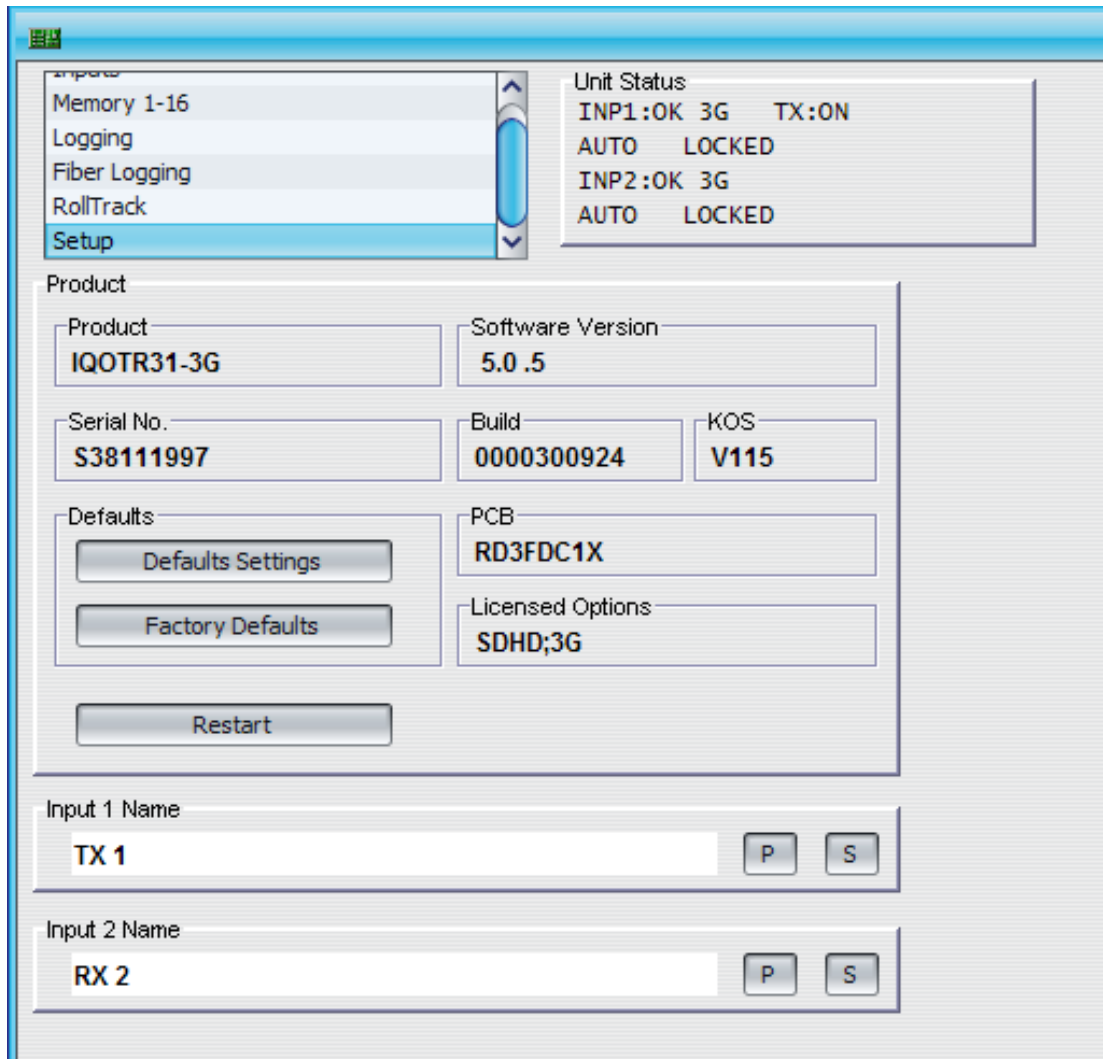
6.5.7 RollTrack Status

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

| | |
|-----------------|---|
| 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. |

6.6 Status

The **Status** screen display basic information about the module, such as the serial number and software versions. Use the functions on the screen to restart the module or return all settings to their factory or default settings.



- **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.
- **Licensed Options:** The currently installed licensed options associated with the module.

6.6.1 Factory Defaults

The **Factory Defaults** button enables the module settings to be reset to their factory defaults.

Note: Resetting the module to its factory defaults also clears all the saved memory settings.

6.6.2 Default Settings

The **Default Settings** button enables module settings to be reset to their factory defaults, leaving user memories intact.

6.6.3 Restart

The **Restart** button enables the module to be rebooted, simulating a power-up/power-down cycle.

6.6.4 Input 1 Name and Input 2 Name

These are the input names displayed in logging. To change the name of Input 1 or Input 2:

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

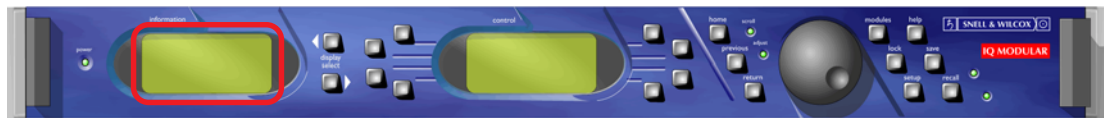
7. Controlling the IQOTR31 from an Active Front Panel

The module can be operated from an active control panel via the RollCall™ network.

All operational parameters and selections described in the previous section are made using a system of menus displayed in the two LCD windows – the information window and the control window.

7.1 Information Window

The information window contains four lines of text indicating the current state of the unit.



7.2 Control Window

The Control window displays all selection menus and sub-menus.



The main or top level menu allows various sub-menus to be selected by pressing the button adjacent to the required text line.

Note that where a menu item is followed by three dots (...) this indicates that a further sub-menu may be selected.

Whenever a menu item is selected the parameters of that selection will be displayed in the Information window of the front panel. Where the selection is purely a mode selection and does not enable a sub-menu, the text will become reversed (white-on-black) indicating that the mode is active. If the mode is not available for selection the text will remain normal.