FTX202

Dual channel SDI
to fibre optic transmitter

USER MANUAL

Crystal Vision

Contents

1   Introduction

The FTX202 is a dual re-clocking serial digital video optical transmitter

The universal connection system allows a mixture of Crystal Vision modules in the frame. The modules plug in the front and the rear connectors plug in the back. Depending on frame design, a hinged or removable front panel reveals LED indication of input and PSU status when opened.
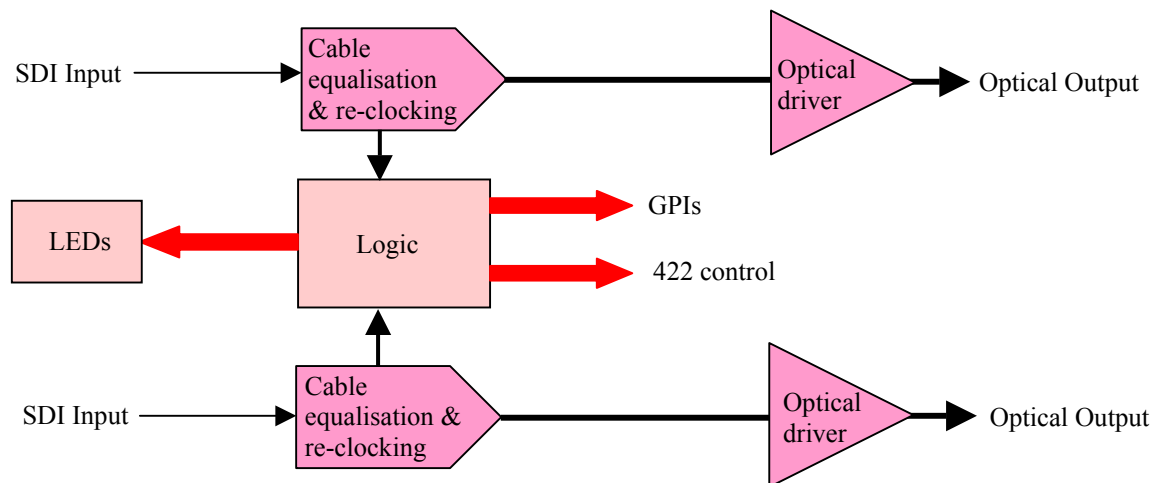
FTX202 dual SDI optical transmitter

The single slot rear connector provides two serial digital outputs per channel with up to 24 modules in 4U of rack space.

The range of Crystal Vision optical boards has been designed to work in conjunction with the Indigo 4 frames, or Issue 2 Indigo 1, 2 or DT frames. The board may be plugged into any of the PCB slots, the only proviso being where it needs to be placed below a standard definition board. The rules governing frame configuration are explained in the installation chapter.

Note: You can find the issue number of a frame inside at the front.

The Indigo frames have been designed to accept any selection of boards from our range of standard definition, high definition, audio, video and optical products. The high packing density allows up to six modules in 1U, up to 12 modules in 2U and up to 24 modules in 4U.

The main features of the FTX202 are as follows:

- 2 channel SDI optical transmitter

- LED SDI input presence indication

- Indication of laser near end of life and shutdown

- Automatic and manual laser shutdown

- Will drive into both Single mode and Multimode fibre systems
- Laser Automatic Power Control (APC), Extinction Ratio Control (ERC) and automatic laser safety features.
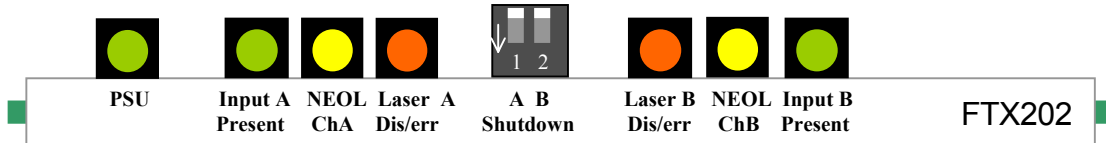
FTX202

The two identical channels of the FTX202 dual channel optical transmitter are completely independent of each other. Each channel consists of a SDI input section, which both re-clocks and equalises the input signal for cable length, a laser diode and laser driver with APC. Both channels are under the control of a CPU, which monitors and reports their status.

At the heart of the FTX202 is a pair of state-of-the-art dual-loop laser driver chips, which give the laser diode emitters a stable performance through out their lifetime. These features of automatic power control and modulation compensation combined with built-in thermal compensation ensure a constant optical extinction ratio over temperature and lifetime. Safety circuitry's within the driver chips monitor the operation of the laser driver and force a shutdown should any critical parameters be exceeded. Warning is also given once the laser is considered to have reached near to the end of its expected lifetime. This warning is triggered after approximately 80% of its expected lifetime are expired.

2 Card edge operation

The front edge of the FRX204 card provides power rail monitoring and signal status.

FTX202 front edge view

LED	Location/colour	Meaning when lit
PSU Ok	Green	All PSU voltages are within range
Input A Present	Green	There is a serial digital video input on Channel A.
NEOL ChA	Amber	Channel A laser has reached its Near End Of Life.
Laser A Disabled	Red	Channel A laser is not emitting light or has been disabled.
Laser B Disabled	Red	Channel B laser is not emitting light or has been disabled.
NEOL ChB	Amber	Channel B laser has reached its Near End Of Life.
Input B Present	Green	There is a serial digital video input on Channel B.

Switch	Up	Down
A shutdown	Laser shutdown is under auto control	The Channel A laser is manually shutdown preventing light emission.
B shutdown	Laser shutdown is under auto control	The Channel B laser is manually shutdown preventing light emission.

Note. Caution this product emits high intensity light. Suitable precautions must be taken when servicing the rear of a frame containing this product due to the possible damaging nature of high intensity light.

3 Hardware installation

The Crystal Vision optical boards have been designed to work in conjunction with the Indigo 4 frames, or Issue 2 Indigo 1, 2 or DT frames. All modules can be plugged in and removed while the frame is powered without damage.

Note: You can find the issue number of a frame inside at the front.

Links and settings

The FRX204 optical receiver does not contain any user adjustable controls. Potentiometers P1 to 8, Jumper links PL2 and PL3 are all factory set and require no further adjustment.

Handling

Due to its fragile nature fibre optic equipment must be handled with care. Sharp blows or snagging the fibre pigtails will fracture the internal glass filament and destroy its light carrying ability. A degraded performance will also result if a build-up of dust and dirt film on the connector ferrules is allowed to occur. It is strongly recommended that the supplied dust caps are in place whenever the transmitter card or rear modules are de-mounted for any reason.
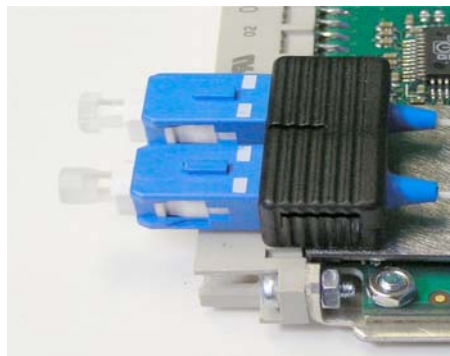
PCB connectors with the dust caps fitted.

The RM31 rear module is also fitted with dust caps on both sides of the optical connector. The pair of dust caps that will be internal to the frame must be removed before the rear module is fitted. The external pair can then be removed when the fibre tails are connected. It is also recommended that dust cap should be re-fitted if the fibre tails are to be removed for a while. Should the FTX202 be removed for any length of time it is recommended that the rear module should also be removed and stored with the dust caps in place.
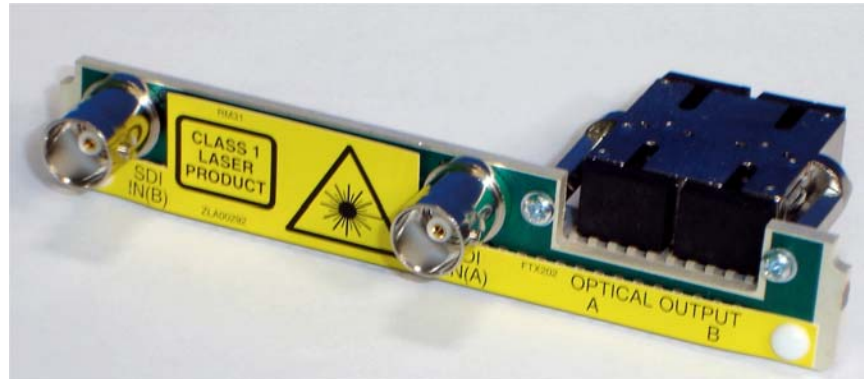
RM31 rear module with dust caps fitted to both sides of the optical connector

3.1 Universal rear connectors

When using the RM31 single height rear connector, the 4U Indigo 4 frame will house up to 24 modules and three power supplies, the 2U Indigo 2 frame will house up to 12 modules and dual power supplies, the 1U Indigo 1 frame will house 6 modules and a single power supply. The 1U desk top box will not currently accept the Crystal Vision optical modules.

The Indigo frames have hinged front panels giving access to the PSU and all modules. The universal frame wiring system allows any of the interface modules to be fitted in [1]any position with the use of removable rear modules.

[1] Due to height restraints, there are restrictions when mixing optical modules with other crystal vision modules.

Loading restrictions

The FTX202 can be loaded into any slot position of compatible frames but due to its extra height it is not possible to place cards from the Crystal Vision standard definition or audio range directly above it in certain positions. HD cards do not share this restriction.

Frame type			
Indigo 4			
	Optical module	Optical module	Optical module
	Optical module	Optical module	Optical module
Indigo 2			
	Optical module	Optical module	Optical module
Indigo 1			
	Optical module	Optical module	Optical module

Optical cards loaded in these slots will not allow standard definition or audio card to be fitted above.

Rear module connections, RM31

RM28 fits in all frames	Description
	RM31 • 24 modules in 4U, 12 modules in 2U & six in 1U • All frame slots can be used

BNC	I/O assignment
Optical Input (B)	Optical serial digital video output (B)
Optical Input (A)	Optical serial digital video output (A)
SDI IN(A)	Channel A SDI Input
SDI IN(B)	Channel B SDI Input

3.2 General purpose interface

The external GPI control lines 'a' to 'f' at the frame remote connectors are provided to allow remote control and/or remote status indication. The FRX204 has four GPI output lines assigned for status reporting.

GPI Connections

	OPEN	CONNECT TO GROUND
'a'	Serial digital input present on Input A	No serial digital input present on Input A
'b'	Serial digital input present on Input B	No serial digital input present on Input A
'c'	Channel A laser functioning within normal tolerances	Channel A laser has reached its near end of life point.
'd'	Channel B laser functioning within normal tolerances	Channel B laser has reached its near end of life point.
'e'	Channel A laser is shut down.	Channel A laser shut down.
'f'	Channel B laser is shut down.	Channel B laser shut down.

GPI lines are pulled up to +5V through 6k8 Ohm, 270 Ohm series resistor so they can drive an LED directly. If the series resistor is shorted out, the GPI output can drive a bulb at +45V 100mA max.

4U frame GPI Connections

GPI lines 'a' to 'f' of each card connect to one of eight rear remote connectors as follows:

Slot no.		'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1		8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2		7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3		8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4		7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5		5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	Upper	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7		5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8		4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9		3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10		10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11		3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12		10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)
		'a' pin	**'b' pin**	**'c' pin**	**'d' pin**	**'e' pin**	**'f' pin**
1		8 (5)	9 (5)	18 (5)	26 (5)	19 (6)	20 (6)
2		7 (5)	16 (5)	17 (5)	25 (5)	10 (6)	11 (6)
3		8 (7)	9 (7)	18 (7)	26 (7)	19 (8)	20 (8)
4		7 (7)	16 (7)	17 (7)	25 (7)	10 (8)	11 (8)
5		5 (5)	6 (5)	15 (5)	24 (5)	1 (6)	2 (6)
6	Lower	4 (5)	14 (5)	13 (5)	23 (5)	3 (6)	4 (6)
7		5 (7)	6 (7)	15 (7)	24 (7)	1 (8)	2 (8)
8		4 (7)	14 (7)	13 (7)	23 (7)	3 (8)	4 (8)
9		3 (5)	12 (5)	22 (5)	21 (5)	12 (6)	13 (6)
10		10 (5)	11 (5)	19 (5)	20 (5)	21 (6)	22 (6)
11		3 (7)	12 (7)	22 (7)	21 (7)	12 (8)	13 (8)
12		10 (7)	11 (7)	19 (7)	20 (7)	21 (8)	22 (8)

Table shows pin number (Remote number)

Note: Remote 1, Remote 3, Remote 5 and Remote 7 are 26-way high density D-Type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case.
Remote 2 and Remote 4 are 26-way high density D-Type male plugs. Frame ground is pin 6 and +5V @500mA is pin 15 in each case.

2U frame GPI Connections

GPI lines 'a' to 'f' of each card connect to one of four rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)

Table shows pin number (Remote number)

Note: Remote 1 and Remote 3 are 26-way high density D-Type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case.
Remote 2 and Remote 4 are 26-way high density D-Type male plugs. Frame ground is pin 6 and +5V @500mA is pin 15 in each case.

1U frame GPI connections

GPI lines 'a' to 'f' of each card connect to one of two rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
4	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
5	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
6	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)

Table shows pin number (Remote number)

Note: Remote 1: 26-way high density D-Type socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26-way high density D-Type plug. Frame ground is pin 6 and +5V @500mA is pin 15.

4 Using the active front panel

4.1 Module selected

This operational guide assumes that the panel has been setup according to the Panel setup procedure described in the Crystal Vision Control Panel manual.

Note: It is **ESSENTIAL** that the Panel setup procedure is followed and any old or unknown passwords cleared prior to using the panel for the first time.

At power up, the two line 20-character screen will display 'Crystal Vision' followed by the firmware version number for the control panel. All eight control panel keys LEDs will illuminate.

The Crystal Vision control panel start up display

'Control Panel' then briefly replaces the version number display.

If the control panel firmware has been updated for Statesman control (version 1.5.0 or higher), Statesman Mode will be entered and the message, 'Press CAL to Exit' will be displayed and the CAL LED will light.

Statesman mode is entered by default

To continue with control panel operation or configuration, press the CAL key once. A second press of the CAL key will return to Statesman control.

The control panel will display the name of the card that first responds to the polling request together with its location number.

The location number consists of the frame number plus the card position in the frame.

Navigating the display

The functions assigned to control panel keys are:

- DEVICE – enters Device menu to select a card or show cards available / enters Panel setup when held down during power up / shows frame status when pressed from Statesman mode

- CAL – enters or leaves Statesman mode / enters panel diagnostics mode when held down during power up / updates the display

- Asterisk – enters board rename menu from the Device menu

- F1 to F4 – soft keys, function assigned within each menu

- HOME – moves the display to the home menu

- ENTER – accept current selection

- Upward arrow – used to move up the menu structure / enter lock panel menu from the Device menu

- Rotary control – shaft encoder used to select options or variable data

Menu numbering scheme

This manual uses a simple menu numbering convention based on the sequence of keys required to reach each menu from the top level home menu. For example, menu 1.1.2 is reached from the home menu by pressing F1, then F2. Menu 1.2.3 is reached by pressing F2 and then F3.

Note: Please refer to the Crystal Vision Control Panel manual for details of the Panel Setup, Lock Panel and Diagnostic menus.

Selecting FTX202

To select a particular card in a frame, press the DEVICE key to go to the Device menu. The top line of the display will show 'Available Cards X', where X is the number of cards that have responded so far to the polling request.


The available cards menu

Rotate the shaft encoder and the bottom row will display the successfully polled cards by name and location or slot number.

In the example above, the card displayed is located in the first frame in slot number 1.

When the desired card is selected press the ENTER key to access that card's HOME menu.

The message shows that a FTX202 has been selected with the version of software on the module as V1.00.
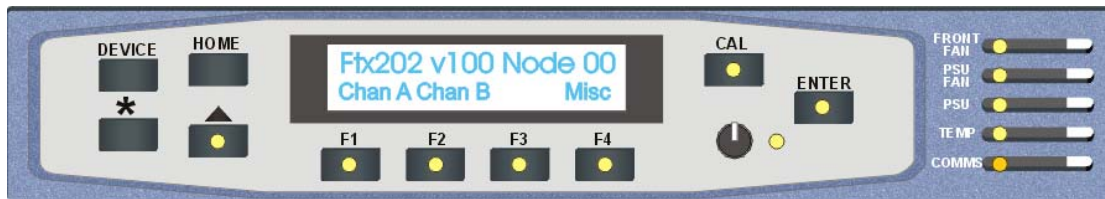

The FTX202 home menu

Updating the display

The values displayed on an active front panel are only updated when an adjustment is made and when changing menu level. If mode changes occur through the use of Statesman, card edge controls or through automatic response to the input video signal, the text displayed on the active front panel will not be updated immediately. If necessary, press CAL to update the display.
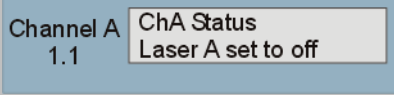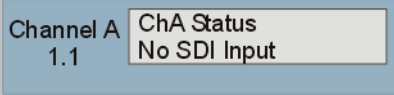
The FTX202 menu structure

The main top-level menu is obtained by pressing the F1 HOME menu. Menu keys are illuminated when active and when further menus are available.

The following chart shows the available FTX202 menus. The actual menus available may vary slightly as software is updated.
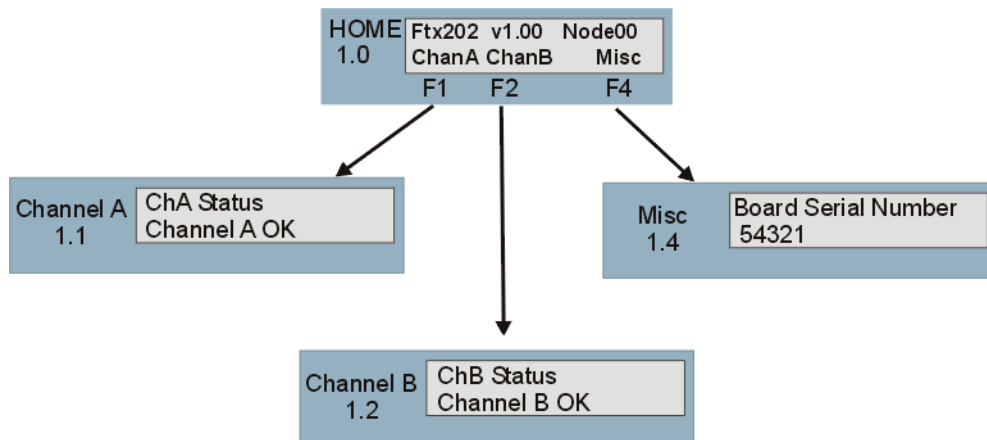
The FTX202 menu tree

Note: Function keys LEDs are illuminated when active.

Configuration menu structure	Description
Channel A 1.1 — ChA Status Channel A OK	Channel A status OK and the laser is emitting light. (Channel B similar)
Channel A 1.1 — ChA Status Laser A set to off	Channel A laser is shutdown either due to a safety situation that has arisen or been disabled from the board edge. (Channel B similar)
Channel A 1.1 — ChA Status No SDI Input	Channel A has no Serial Digital input signal. The laser will also be shutdown. (Channel B similar)

Channel Status

The FTX202 will display the presence of a Serial Digital input signal and whether that particular channel laser is emitting light. The absence of SDI input is also indicated along with a laser shutdown.

Note. There can be several reasons for the laser to shut down, apart from it being manually disabled for maintenance purposes or lack of video input. Automatic shutdown will result if the laser's working parameters becoming out of specification as in reaching its end of working life or for some transitory transgression of its design limits. Once the laser been has shut down, as a safety feature it will latch to this condition. If it is suspected that the shutdown has been the result of a transitory condition this latched shutdown condition may be reversed by moving the channel shutdown switch to down then up again.

Both channel A and Channel B are independent in operation of each other.

5 Statesman

The Crystal Vision Statesman PC control software is designed to control a range of Crystal Vision modules via serial control from a PC.

The main Statesman application communicates with each module in a frame that is fitted with an active front panel. This panel can be with or without a LCD display. Statesman will not normally be able to detect modules used in a frame with only a passive front panel unless it is part of an active/passive combination.

5.1 Installing Statesman

Minimum pre-requisites:

- A PC running Windows 98, NT4 with SP 5 or higher Windows 2000 or Windows XP
- A parallel port dongle supplied with the Statesman software package
- An RS422 serial connection from the host PC to the Indigo frame control input or to Remote 2 connector on an FR1AV or FR2AV Crystal Vision frame with at least one FTX202 module and/or other Statesman compatible module
- An active control panel MUST be fitted to the frame with version 1.63 or above firmware – if it is an Indigo frame the firmware must be V1.04 or above
- An optional RS422 to RS232 converter if the PC has no RS422 ports

Installing Statesman

- Refer to the readme and/or help file on the CD before proceeding
- To view all application windows, set graphics resolution to at least 1024 x 768
- Remove any previous version of the Statesman software using the Add/Remove Programs application in the Windows Control Panel
- Ensure that the Statesman dongle is fitted to the parallel port of the host PC
- Insert the Statesman CD and the installation should start immediately – if it does not, run the setup.exe file on the CD
- Obey any installation program prompts and restart the PC when prompted

Running Statesman for the first time

The Statesman PC Control System may be run from the Crystal Vision programs folder via the Start menu or by double clicking on the Crystal Vision.exe file in the installed program directory.

When the program runs it will require licence information and an administrator name and password. It will also need to know which computer port is being used to connect to a Crystal Vision frame(s).

Note: For further details of Statesman configuration please refer to the Statesman manual.

5.2 Statesman operation

Once Statesman is configured it should automatically detect any Statesman compatible modules in the connected frame or frames and display them in the main application left hand explorer-style window.

Open any frame by clicking on the + sign or by double clicking on a frame. Installed modules should be shown with module icons. Frame and module icons can be named as desired by right clicking or using the edit menu and choosing rename.

To aid user recognition of module and frame status quickly, the following colour and size coding is used:

- A module is shown present by full colour and absent by greyed colour
- A module is shown open by large icon size and closed by small icon
- A module is the source of an active alarm if red and not alarmed if green

Double clicking on a module will enable the display of the main application menus.
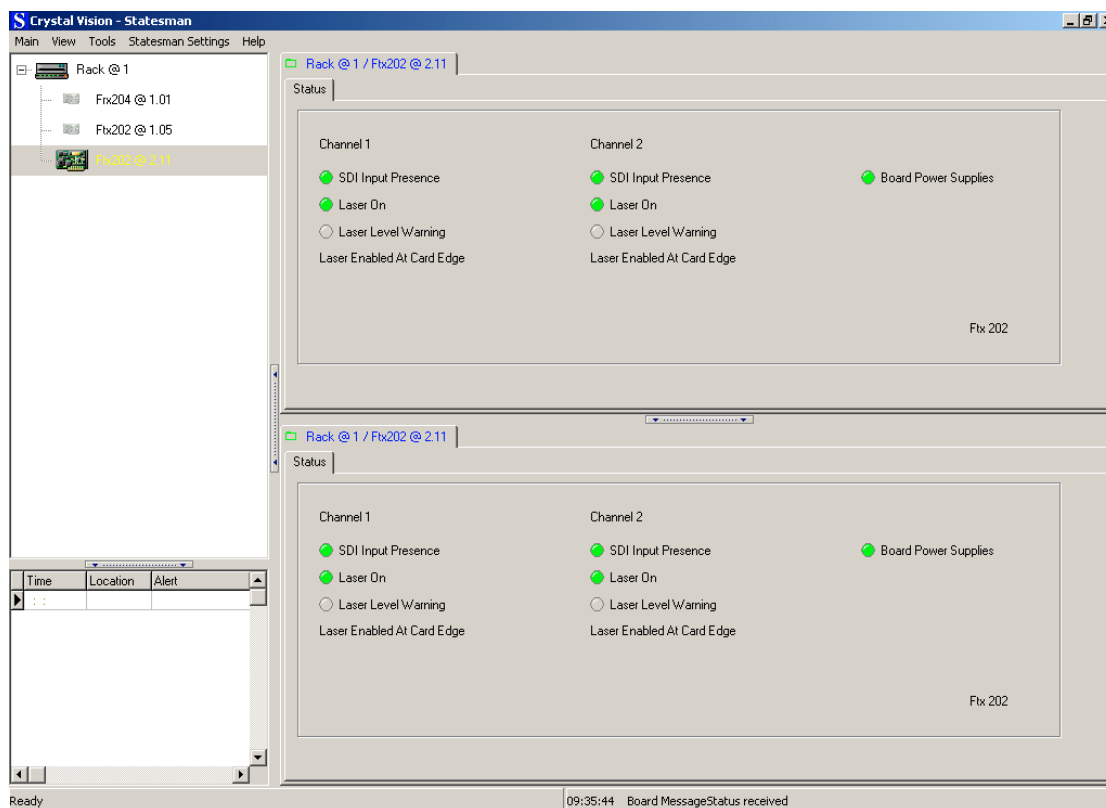
Statesman main application window

The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower plane or drag the button to vary the size of the panes.

Note: For further details of Statesman configuration and operation please refer to the Statesman manual.

Status

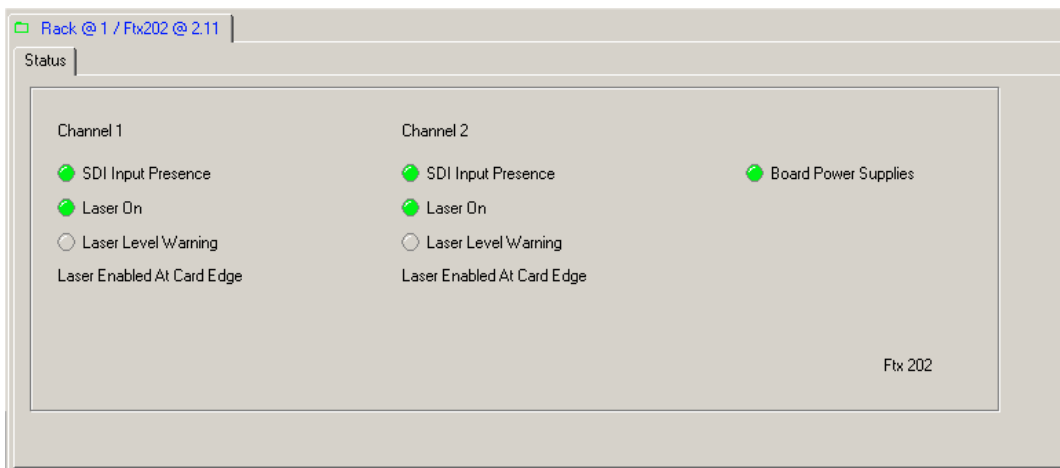The Status tab provides access to the following:

Channel A

- SDI input present
- Laser On
- Laser Level Warning (Near end of life)
- Card edge shutdown status

Channel B

- SDI input present
- Laser On
- Laser Level Warning (Near end of life)
- Card edge shutdown status

Board power supply status

Status monitoring

Channel Status

Status indication is as follows:

Input setting	Description
SDI Input Present	Green when input detected. Red when no input detected.
Laser On	Green indicates that the laser is emitting light. Greyed out indicates that the laser is not emitting light.
Laser Level Warning	Greyed out, no warning. Amber, the laser has reached it's near end of life point (NEOL)
Card edge switch status	Indicates the status of the card edge shutdown switch

6 Problem solving

Basic fault finding guide

The Power OK LEDs are not illuminated

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information.

Check that the card is seated correctly in the frame.

There is no video input present

Check that a valid video input is present and that any cabling is intact.

There is no optical output

Check that the laser disabled/error LED is not illuminated.

Laser disable/error LED illuminated

Check that SDI input is present.

Check that the card edge shutdown switch is not in the down position.

Toggle the shutdown switch to reset the laser driver. If reset is not successful there is likely to have been a catastrophic fault.

NEOL LED illuminated

Near End Of Life. The laser emitter is reaching its life expectancy and will require replacement.

The video output is low quality

Check that the maximum cable length has not been exceeded for both the optical input and video output .

Check that the optical connectors have not become contaminated.

Re-setting the card

If required, the card may be reset by simply removing the frame power and re-applying power after a few seconds or by removing the card from the frame and then re-inserting it.

It is safe to re-insert the card whilst the rack is powered

7 Specification

General

Dimensions	100mm x 266mm module with DIN 41612 connector
Weight	200g
Power consumption	3 W

Inputs

Video	2 channel Serial Digital Component (SDI) 270Mbit to EBU 3267-E & SMPTE
Cable equalisation	>200m Beldon 8281 or equivalent (video)

Outputs

Number and type:	2 Optical Outputs to SMPTE 297M-2000
Optical power	max –8.5dBm, min –9.5dBm, nominal -9.0dBm/0.125mW.
Fibre pigtail	single-mode 8/125uM
Optical wavelength	1292-1325nm
Extinction Ratio	7:1 nominal
Connector type	SC/PC

Status monitoring

LED display	Front of card edge visual monitoring with LED indicators to indicate: PSU rail present, SDI input present, laser near end of life, laser error/disabled.

Ordering information

FRX202	Dual re-clocking serial digital video optical transmitter
Indigo 4	4U frame without active control panel for up to 24 modules
Indigo 2	2U frame without active control panel for up to 12 modules
Indigo 1	1U frame without active control panel for up to 6 modules
Indigo 2A	2U frame with active control panel for up to 12 modules
Indigo 1A	1U frame with active control panel for up to 6 modules
Indigo 4S	Statesman enabled only 4U frame for up to 24 modules
Indigo 2S	Statesman enabled only 2U frame for up to 12 modules
Indigo 1S	Statesman enabled only 1U frame for up to 6 modules
RM28	Single slot rear module with 2 x SC fibre optic connectors and 4 BNCs