Watchdog
Modular Signal Detection
and Changeover
User Guide

ISSUE 1.3

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Issue	Date	Reason for Change	Approved
0.50	8 April 2013	Corrections & 370-50-00 added	
1.00	14 May 2013	Added references to 370-10-02	
1.10	28 March 2014	Corrected jumper references 370-10-00	
1.2	2 November 2015	Added 370-12-00	
1.3	27 March 2016	New logo	

CONTENTS

1. APPLICATION

1.1 INTRODUCTION

The Trilogy Watchdog cards are used within the Crystal Vision Indigo modular product system to provide monitoring, changeover and comparison of a range of signals commonly used in a broadcast environment.

Here are the cards and rear connectors available at 1st November 2015.

Part Code	Description	Note
370-10-00	Dual Main & Reserve Unbalanced Input Monitor & Changeover Card - Active	
370-10-02	Dual Main & Reserve Balanced Input Changeover Card - Active	
370-11-00	Dual Main & Reserve Input Changeover Card - Passive	
370-12-00	Dual Main & Reserve SD/HD/3G SDI Monitor & Changeover Card – Active	
370-50-00	SDI changeover rear connector assembly	Only use with 370-11-00 Passive Board
370-51-00	D-type rear connector assembly	Crystal Vision part code RM-03
370-52-00	BNC rear connector assembly (no bypass relays)	Crystal Vision part code RM-01
370-52-01	BNC rear connector assembly (with bypass relays)	Crystal Vision part code RM-38 (see Note 1)
370-52-02	SDI changeover rear connector assembly	Crystal Vision part code RM-41

Note 1: This part is no longer available from Trilogy but may be available by contacting Crystal Vision directly.

The 370-10-00 Active Card is designed to auto-detect most types of applied input signals. This is explained in more detail in section 3 of this User Guide.

The 370-10-02 is a reduced feature version of the 370-10-00. It can only be used to detect and changeover AES and LTC signals. It should only be used in conjunction with the D-type rear connector, part number 370-51-00. The board can be managed using the Statesman software.

The 370-11-00 is controlled via GPI inputs on the rear connector. By suitable wiring, it may be set to "follow" the 370-10-00 Active Card.

The 370-12-00 provides two, 2 input x 1 output monitor and changeover channels for SD/HD/3G SDI signals. The card is setup and managed by either the Crystal Vision Statesman GUI or by board edge controls. Changeover may be effected automatically, manually, or from GPI inputs.

Please contact your local supplier or Trilogy for more information.

1.2 APPLICATION

Select the correct combination of card and rear connector according to your application as shown below.

Signal Type	Changeover Type	Card	Rear Connector
Black & Burst Analogue Video Tri level Sync AES unbalanced 10/27Mhz 1 PPS	Active	370-10-00	370-52-00
	Passive	370-11-00	370-52-00
Wordclock	Passive	370-11-00	370-52-00
SD-SDI HD-SDI 3G HD-SDI	Active	370-12-00	370-52-02
	Passive	370-11-00	370-50-00
AES balanced LTC	Active	370-10-02	370-51-00
AES balanced LTC Analogue Audio	Passive	370-11-00	370-51-00

1.3 TECHNICAL SUPPORT

UK & International

Please contact Trilogy at the UK headquarters.

Trilogy Communications Ltd
26 Focus Way
Andover
Hampshire
SP10 5NY
United Kingdom
E-mail: broadcastsupport@trilogycomms.com
Tel: +44 (0)1264 384000

1.4 WARRANTY

Conditions of the warranty may vary according to your terms of purchase. Please consult your sales documentation or if in doubt, contact your original supplier or Trilogy at the offices above, quoting date of purchase and unit serial number.

2. INSTALLATION

2.1 UNPACKING

Carefully unpack the unit from its transit material and check for signs of damage. Check the contents of the box against our despatch note and your original order to ensure that you have received the correct parts.

In the event that the unit has been damaged or does not match your order, immediately contact your supplier or Trilogy at the address given at the front of this guide.

2.2 RACK MOUNTING

For rack mounting of the Crystal Vision Indigo modular frames, please refer to the Crystal Vision manuals provided on the product CD.

2.3 MAINS CONNECTION AND FUSING

For information relating to mains connection and fusing for the Crystal Vision Indigo modular product range, please refer to the appropriate product manuals supplied on CD.

2.4 REAR CONNECTORS
2.4.1 D-TYPE – 370-51-00

15 Way D-Type chassis female	
Pin	Signal
1	AES Ch1 In B-
2	AES Ch1 In A+
3	AES Ch1 In A-
4	Gnd
5	Gnd
6	AES Ch2 In A+
7	AES Ch2 In B+
8	BNC Ch1 In B §
9	AES Ch1 In B+
10	BNC Ch1 Out §
11	BNC Ch1 In A §
12	Gnd
13	Gnd
14	AES Ch2 In A-
15	AES Ch2 In B-

25 Way D-Type chassis female	
Pin	Signal
1	GPI a (Channel 1 out) §§
2	GPI c (Channel 1 in) §§
3	GPI e (currently unused) §§
4	Gnd
5	
6	
7	
8	
9	
10	AES Out Ch2+
11	Gnd
12	AES Out Ch1+
13	Gnd
14	GPI b (Channel 2 out) §§
15	GPI d (Channel 2 in) §§
16	GPI f (currently unused) §§
17	Gnd
18	
19	BNC Ch2 In B §
20	
21	
22	BNC Ch2 Out §
23	AES Out Ch2-
24	AES Out Ch1-
25	Gnd

§ -- these pins should be left floating; only active when BNC rear connector is fitted.
§§ -- GPI lines are also provided on frame connector, adjacent to PSU. See Crystal Vision Indigo frame manual for more information.

2.4.2 370-52-00 – BNC (WITHOUT BYPASS RELAYS)

Ch1 A	Ch1 B	Ch2 B	Ch2 out	Ch2 A	Ch1 out
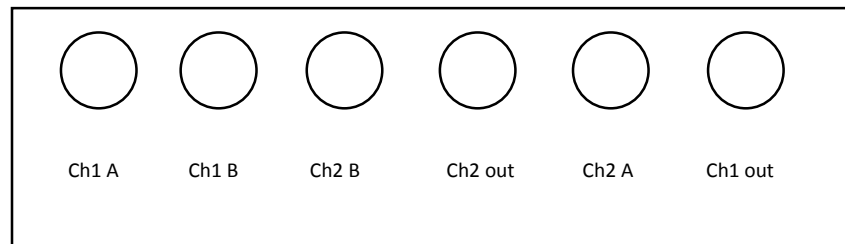
Note: The input sequence for channels 1 & 2 is correct as shown above.

2.4.3 370-52-01 – BNC (WITH BYPASS RELAYS)

Ch1 A	Ch1 out	Ch1 B	Ch2 B	Ch2 out	Ch2 A
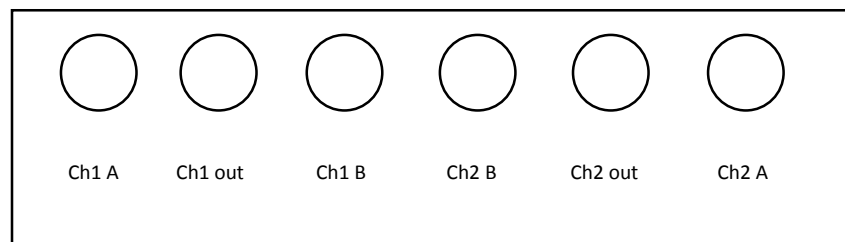
Note:
1. The input sequence for channels 1 & 2 is correct as shown above.
2. This rear connector is no longer available from Trilogy.

2.4.4 370-50-00 -- BNC

Ch1 A	Ch1 out	Ch1 B	Ch2 B	Ch2 out	Ch2 A
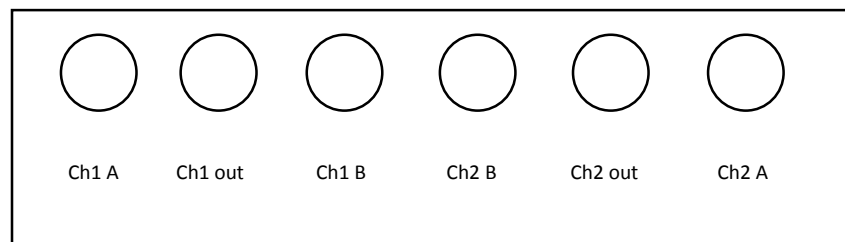
Note:
- The input sequence for channels 1 & 2 is correct as shown above.
- The 370-50-00 may only be used with "*mod state 3*" 370-11-00 modules. See sections 5.1 and 5.5.

2.4.5 370-52-02 -- BNC

Ch1 A	Ch1 out	Ch1 B	Ch2 B	Ch2 out	Ch2 A
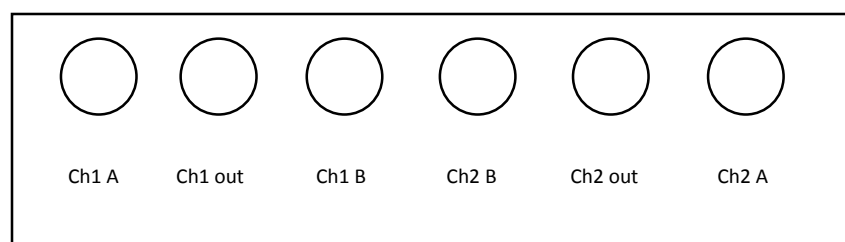
Note: The input sequence for channels 1 & 2 is correct as shown above.

3. 370-10-00 DUAL MAIN & RESERVE UNBALANCED INPUT MONITOR & CHANGEOVER CARD - ACTIVE

3.1 OVERVIEW

The 370-10-00 is used to provide a means of comparing and/or changing over two pairs of inputs. The board is able to interface with a number of different signals and will automatically detect which signal is on the inputs. The signals that the board is able to detect are:

- Black and burst (BB) – both PAL and NTSC
- Tri-Level-Sync (TLS)
- 10 MHz Clock
- 1 PPS GPS Reference
- AES Audio
- Longitudinal Time Code (LTC)

The type of signals the board is able to detect depends on the rear module fitted to the frame.

- BB, TLS, 10 MHz and 1 PPS can be detected when the 370-52-00 BNC rear module is fitted.
- Balanced AES and LTC can be detected when the 370-51-00 rear module with D-Type connectors is fitted. See section 4 for more information regarding detection of balanced signals using the 370-10-02 card.

The board can operate in one of five control modes:

- Automatic, where a signal fault causes changeover to the other signal
- GUI, using the optional Statesman software
- Manual, using controls on the front edge of the board
- Remote, using GPIs from other cards in the system. Remote control is only available when activated via the Statesman GUI
- SNMP

There is no prioritisation of the selection of a control mode.

For example, if Statesman is used to set the mode to "Auto" and then the front edge switches are used to set an output to A, the output will change to A and stay on A even if there is a signal fail on input A. The converse is also true; if the card edge switches are set to "A" and then Statesman is used to set the mode to "Auto", then the board will adopt the automatic mode. Although this will not lead to a conflict, it could cause confusion because the front edge switches will not necessarily indicate the true operating mode of the board. For this reason we advise using either the front edge switches, or Statesman to set the control mode, but not both.

The 370-10-00 has a number of different applications depending on the input type.

- Monitoring: For all input types the signals are continuously monitored. If a fault is detected it is reported via the Statesman software.
- Changeover: On detection of a fault on input A, the fault is reported and depending on how the board is set up, the changeover occurs, either automatically or manually.
- Comparator: For BB, TLS, 10 MHZ and 1 PPS the 370-10 Active Board will compare the 2 inputs and calculate the difference in phase between the 2 inputs. Also when Channel 1 inputs are 10 MHz and channel 2 inputs are 1 PPS, comparisons between the inputs will be made.

3.2 BLOCK DIAGRAM
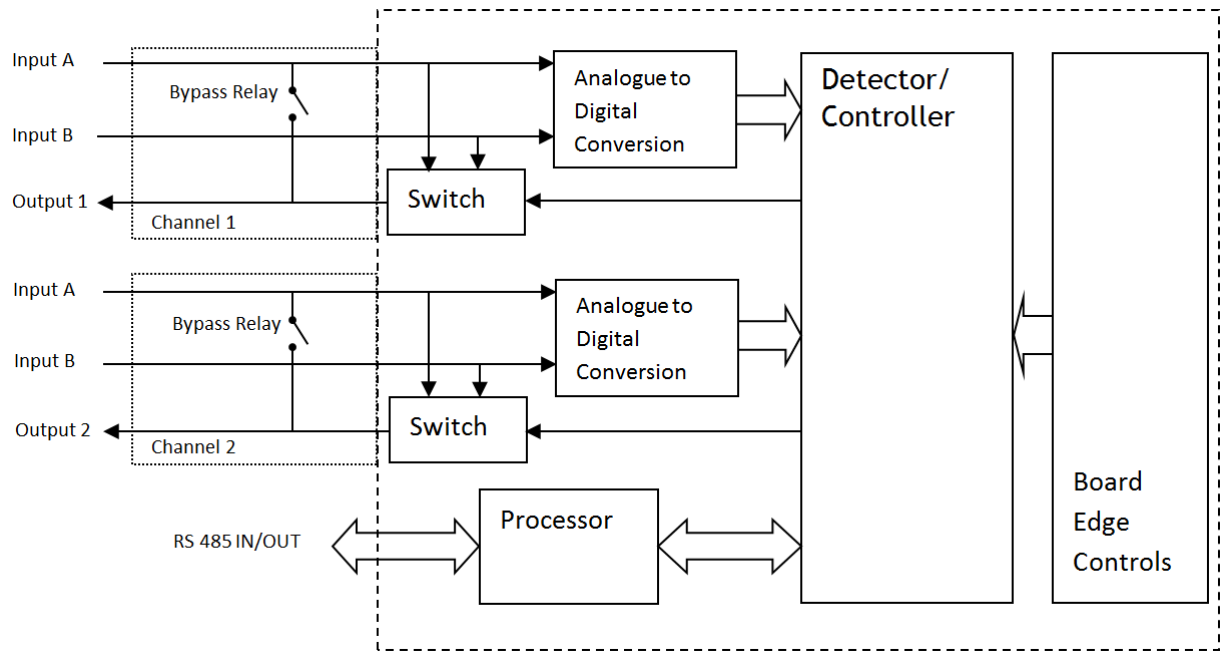
3.3 REAR CONNECTORS

Select the correct card and rear connector according to your application. Connector details are provided in section 2.4.

Signal Type	Changeover Type	Card	Rear Connector
Black & Burst Analogue Video Tri level Sync AES unbalanced 10/27Mhz 1 PPS	Active	370-10-00	370-52-00 BNC

3.4 MONITORING

The fail conditions for each input signal type are described in the following sections. When a fail condition is detected it is reported via the Statesman GUI and indicated by Status LEDs on the edge of the board.

3.4.1 BLACK AND BURST

The 370-10-00 is able to detect both PAL and NTSC black and burst signals.

The following conditions will cause a fail indication:

- Input level error:
  - o If the sync level of the applied input signal is <210 mV in amplitude. It will indicate a failure for double terminated signals.
  - o If the sync level of the applied input signal is >500 mV. It will indicate a failure for un-terminated signals.
- If the line frequency is not within 4% of the line frequency based on an internal oscillator.
- The presence of the burst is detected. When the burst amplitude is less than 10% of the peak to peak specification, a "fail" condition is indicated.

3.4.2 TRI-LEVEL-SYNC

The 370-10-00 can detect the following TLS standards:

1920x1080/60/p	1920x1080/29.97/sF
1920x1080/59.94/p	1920x1080/25/sF
1920x1080/50/p	1920x1080/24/sF
1920x1080/60/i	1920x1080/23.98/sF
1920x1080/59.94/i	1280x720/60/p
1920x1080/50/i	1280x720/59.94/p
1920x1080/30/p	1280x720/50/p
1920x1080/29.97/p	1280x720/30/p
1920x1080/25/p	1280x720/29.97/p
1920x1080/24/p	1280x720/25/p
1920x1080/23.98/p	1280x720/24/p
1920x1080/30/sF	1280x720/23.98/p

The standard detected is reported via the Statesman GUI.

- The following conditions will cause a fail indication:
- Input level error:
  - o If the sync level of the applied input signal is <210 mV in amplitude. It will indicate a failure for double terminated signals.
  - o If the sync level of the applied input signal is >500 mV. It will indicate a failure for un-terminated signals.
- The line frequency is not within 4% of the line frequency based on an internal oscillator.
- The frame frequency is not within 0.5% of the standard detected. For some standards it is possible the wrong standard will be detected if outside of this specification.

3.4.3 10 MHz CLOCK

The following condition will cause a failure indication:
- The amplitude of the applied input signal is <200 mV.

3.4.4 1 PPS

1 PPS is a TTL signal. The following conditions cause a failure indication:
- The amplitude of the signal is < 2.2 V.
- The frequency of the 1 PPS is greater than +/- 10%.

3.4.5 AES

AES audio is a balanced signal. The following conditions cause a failure indication:
- Peak to peak signal level < 2 V.
- Non-valid AES signal.

3.4.6 LTC

LTC is a balanced signal. The following conditions cause a failure indication:
- Level of <0.5 V peak to peak.
- Non-Valid LTC sync word.

3.5 CHANGEOVER

For each changeover set it is possible to route either of the two inputs to the output; this can be done automatically or manually.
The 370-10-00 uses relays and electronic switches to switch between inputs A and B.

- Electronic switches are used to switch the unbalanced signals (BB, TLS, 10 MHz and 1 PPS) when the BNC rear modules is fitted. The changeover will take no longer than 1us.

- Relays are used to switch the balanced signals. The changeover will take no longer than 6ms.

The 370-52-01 BNC rear module has bypass relays which route input A to the output when the board is not present.

Automatic changeover - When the 370-10-00 is set to change over automatically, input B is routed to the output when a failure condition is detected on input A. The changeover will only occur if there are no fail conditions detected on input B. The changeover will be reported via the Statesman GUI. Once the system has changed over, it will not change back to input A, unless:
- a failure condition is detected on input B *and*
- the failure condition on input A has been resolved

Manual changeover - The user is able to manually change over using the Statesman GUI or using the board edge switches. The changeover sets are independent of each other.

3.6 COMPARATOR

For all unbalanced inputs the timing difference between inputs A and B is calculated to an accuracy of ±10 ns. The GUI is able display a timing difference of ±999 999 990 ns.
When channel 1 inputs are 1 PPS and channel 2 inputs are 10 MHz, a comparison is made between 1 PPS on input A of channel 1 and the 10 MHz clock on input A of channel 2. The same comparisons will be made on input B of both channels.

3.6.1 1 PPS AND 10 MHz COMPARISONS

- For each channel, the number of 10 MHz clock cycles in the 1 PPS is counted. The count should be 10,000,000. If the number of clock cycles deviates from this, the difference is reported via the Statesman GUI.
- The 10 MHz inputs are compared over one second and a fail condition is indicated if they deviate by more than 0.1ppm. The difference is reported via the Statesman GUI.
- The 1 PPS signals are compared. A fail condition is indicated if there is a difference of ± 200 ns between the two "one-second" pulses. The difference is reported via the Statesman GUI with an accuracy of ± 20 ns.

3.7 ON BOARD JUMPER SETTINGS

- Jumpers J7, 8, 9 and 11 are for factory use only and should be set to the "in" position.
- Jumper set J2 selects the balanced signal type for Channel 1 when using D-type rear connectors. Set "in" for LTC inputs: "out" for AES inputs.
- Jumper set J3 performs the same function for Channel 2.

3.8 GPI

The GPIs are used to interface with the other active and passive boards in the frame. GPI outputs indicate when a changeover has occurred: GPI inputs accept a command from other boards to cause a changeover. GPI input remote control is only active when turned on via the Statesman GUI. Boards which are responding to remote control via their GPI inputs must also be set to Automatic mode. For a system with multiple cards where simultaneous switching is required, GPIs must be wired in a chain, linking out to in successively, forming a complete circle.

GPI a (Channel 1) and GPI b (Channel 2) are configured as GPI outputs. They indicate the current state of each channel:
- when inactive (open circuit) then input A is routed to the output
- when active (short circuit) then input B is routed to the output

GPI c (Channel 1) and GPI d (Channel 2) are configured as GPI inputs. They are used to remotely control the changeover action of each channel:
- when the input is floating, signal input A is routed to the output
- when the GPI input is grounded, signal input B is routed to the output.

All GPI inputs and outputs, from each slot in the frame are also available on a D type connector adjacent to the power supply. When using the BNC rear connector, all GPI wiring should use this connector. Please see the Crystal Vision Indigo frame manual for more information.

GPI e and f are currently unused.

3.9 BOARD EDGE CONTROLS/STATUS

The edge of the board has switches to control the function of the board and status LEDs. The diagram below shows the layout for the board edge. The LEDs/Switches on the left are for channel 1 and those on the right for channel 2. The LEDs on the bottom indicate the status for input A; those on the top indicate the status for input B.

3.9.1 ORIENTATION
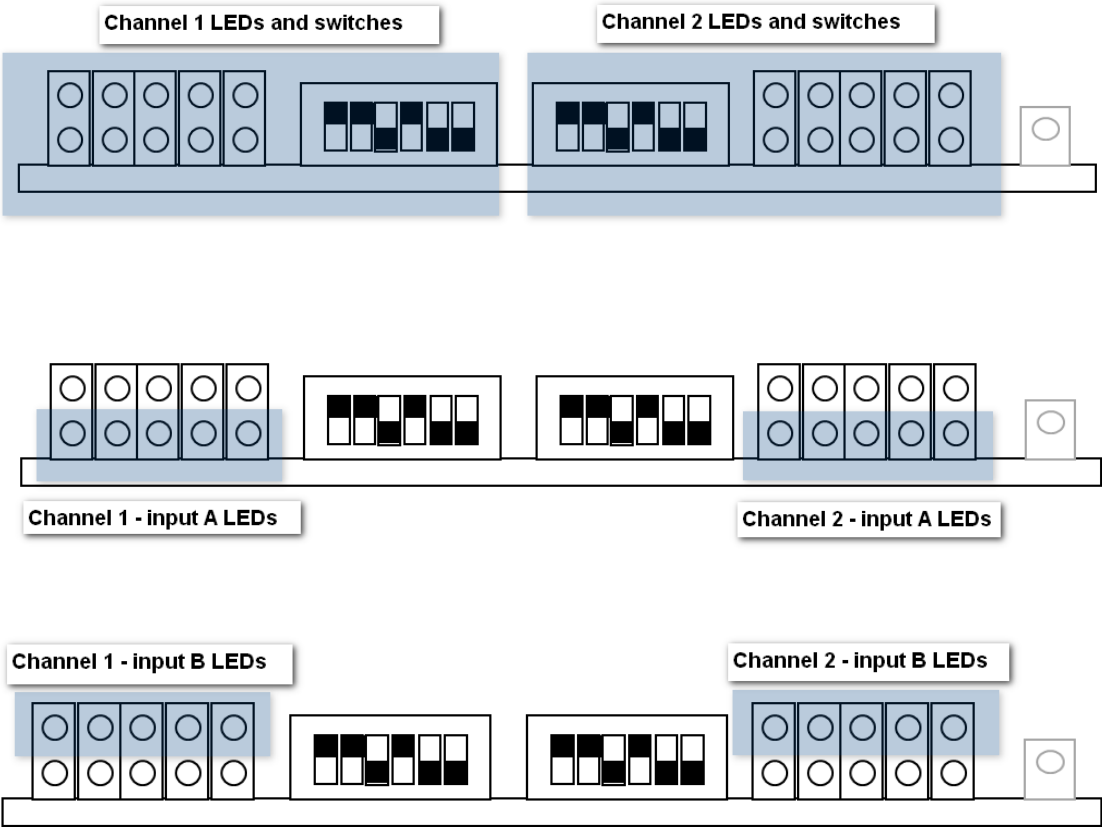
3.9.2 DETAIL

Signal Present/Valid

This LED has three states:

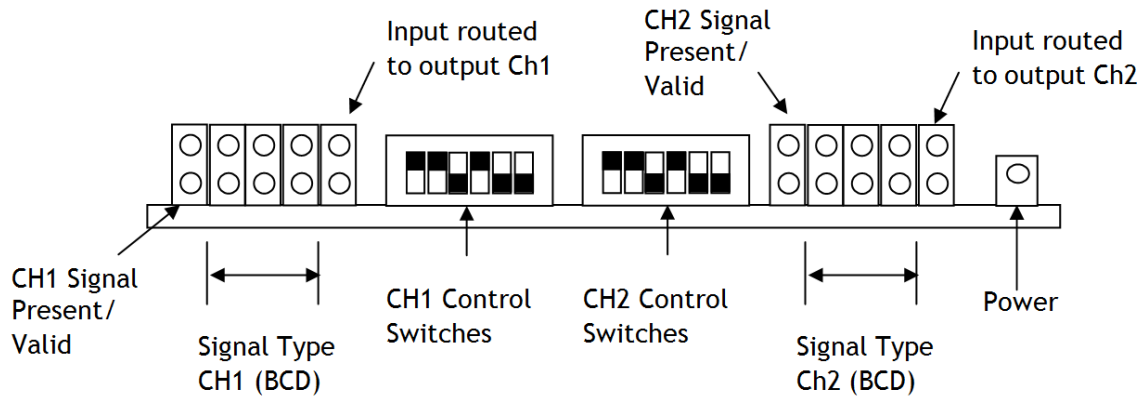| Signal Present LED ↓	Signal Type LEDs	Indicates
Off	Off	No signal detected
	On	Signal errors detected: signal type as shown
Flashing	On	Valid signal but not expected type or subtype (BB and TLS only)
On	On	Valid signal: signal type as shown

Signal type – 3 LEDs are used to code the type of signal as binary coded decimal. The input types are shown in the table below.

BCD	Input Type
"000"	No Signal
"001"	Black and burst
"010"	Tri-Level Sync
"011"	1 PPS
"100"	10 MHz Clock
"101"	LTC
"110"	AES
"111"	Reserved for future use

Control Switches – Each channel has 6 DIP switches. The switches are defined as:

SWITCH	Function
1	Changeover is automatic when down, manual when up.
2	Selects which input is routed to the output when in manual mode. Input A when down, input B when up.
3	When down input type is detected automatically, when up input type is set using switches 4 to 6.
4 to 6	Input type, up- '1', down – '0' BCD signal type code follows the LED table (above).

Power – LED is illuminated when board has power.

4. 370-10-02 DUAL MAIN & RESERVE BALANCED INPUT CHANGEOVER CARD - ACTIVE – AES / LTC ONLY

4.1 OVERVIEW

The 370-10-02 is a reduced feature version of the 370-10-00. It can only be used to detect and changeover balanced AES and LTC signals. It should only be used in conjunction with the D-type rear connector, part number 370-51-00. The card can be managed using the Statesman software and an image is shown in section 7.3.

4.2 REAR CONNECTORS

Signal Type	Changeover Type	Card	Rear Connector
AES balanced LTC	Active	370-10-02	370-51-00 D-type

5. 370-11-00 DUAL MAIN & RESERVE INPUT CHANGEOVER CARD - PASSIVE

5.1 OVERVIEW

The 370-11-00 is used to provide a means of changing over two pairs of inputs. There are no on-board detection or comparator circuits and the primary purpose of the board is to changeover additional circuits under control of an accompanying 370-10-00 Active Board. The 370-11-00 is not recognised and cannot be controlled by the Statesman GUI software.

The board is able to interface with a number of different signal types:

- Black and burst (BB) – both PAL and NTSC
- Tri-Level-Sync (TLS)
- Analogue Video
- 10 MHz Clock
- 1 PPS GPS Reference
- AES Audio
- Longitudinal Time Code (LTC)
- SD / HD / 3G SDI (using the 370-50-00 rear connector assembly)

> Note: only 370-11-00 boards marked as "Mod State 3" are suitable for switching SDI signals, in conjunction with the 370-50-00 rear connector assembly. See section 5.5 on page 21 for information concerning the GPI connections.

The type of signals the board is able to switch depends on the rear module fitted to the frame.

- BB, TLS, 10 MHz, Analogue & Digital video and 1 PPS can be switched when the BNC rear module is fitted.
- Balanced AES and LTC can be switched when the rear module with D-Type connectors is fitted.
- SD / HD / 3G SDI when the 370-50-00 rear connector assembly is fitted

The board can operate in one of two control modes:

- Manual, using controls on the front edge of the board
- Remote, using GPIs from other cards in the system.

The 370-11-00 is used in changeover applications:

- Channel 1 and / or channel 2 will switch from A to B input, depending on either the front edge controls or external GPI inputs.

5.2 BLOCK DIAGRAM
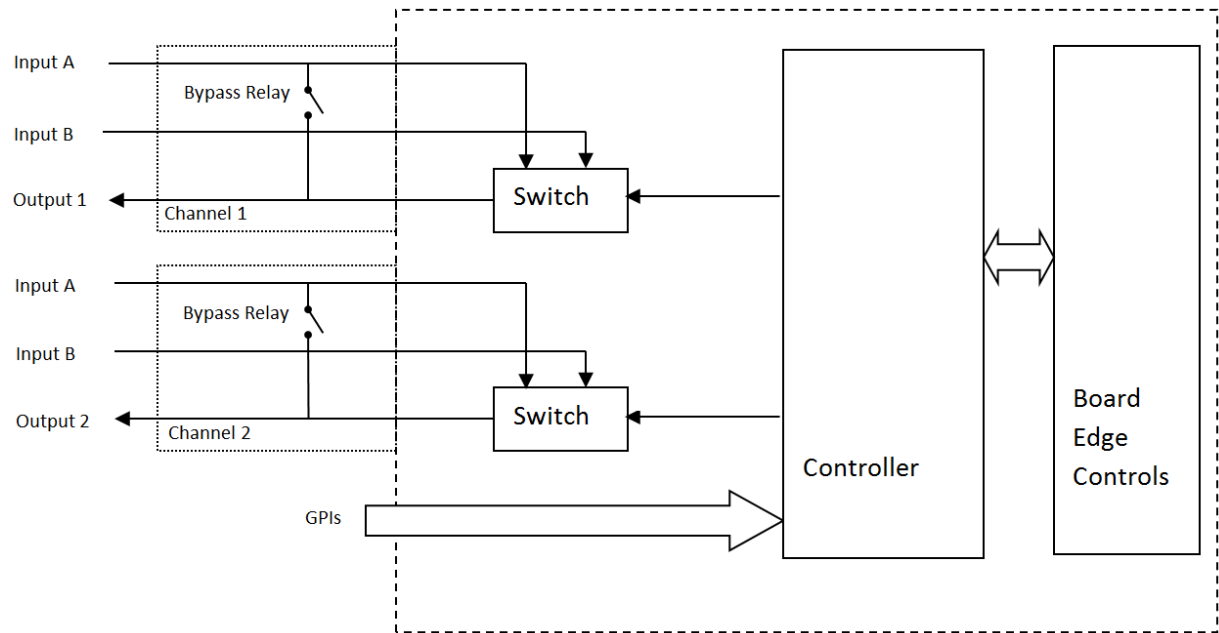
5.3 REAR CONNECTORS

Select the correct card and rear connector according to your application. Connector details are provided in section 2.4.

Signal Type	Rear Connector
Black & Burst Analogue Video Tri level Sync AES unbalanced 10/27Mhz 1 PPS Wordclock	370-52-00
SD-SDI HD-SDI 3G HD-SDI	370-50-00
AES balanced LTC Analogue Audio	370-51-00

5.4 CHANGEOVER

For each changeover set it is possible to route either of the two inputs to the output; this can be done manually or by GPI input control. Channels 1 and 2 can switch independently or in tandem: when set to operate in tandem using the front edge switches, the Channel 1 controls act on both channels.

The 370-11-00 uses relays to switch between inputs A and B. The changeover takes no longer than 6ms.

Controls on the front of the board set whether changeover occurs using the GPI inputs or manually.

Manual changeover - The user is able to manually change over using the board edge switches.

GPI (remote) changeover – GPI 'c' is used to changeover channel 1, GPI 'd' is used to changeover channel 2. When the GPI input is left floating, input A is routed to the output, when it is grounded, input B is routed to the output.

5.5 GPI

The GPIs are used to interface with the other active and passive boards in the frame. GPI inputs accept a command from other boards to cause a changeover. Remote control is only active when selected using the front edge controls (see section 5.6 below).

GPI c (Channel 1) and GPI d (Channel 2) are configured as GPI inputs. They are used to remotely control the changeover action of each channel.
- When the input is floating, signal input A is routed to the output
- When the GPI input is grounded, signal input B is routed to the output.

All GPI inputs from each slot in the frame are also available on a D type connector adjacent to the power supply. When using the BNC rear connector, all GPI wiring should use this connector. Please see the Crystal Vision Indigo frame manual for more information.

GPI e is used with modification state 3 boards only and should be pulled down to ground when the 370-50-00 rear connector assembly is fitted. For all other rear connector assemblies, GPI e should be left floating.

GPI a, b, and f are currently unused.

5.6 BOARD EDGE CONTROLS/STATUS

The edge of the board has switches to control the function of the board and status LEDs. The diagram below shows the layout for the board edge. The LEDs/Switches on the left are for channel 1 and those on the right for channel 2. The LEDs on the bottom indicate the status for input A; those on the top indicate the status for input B.
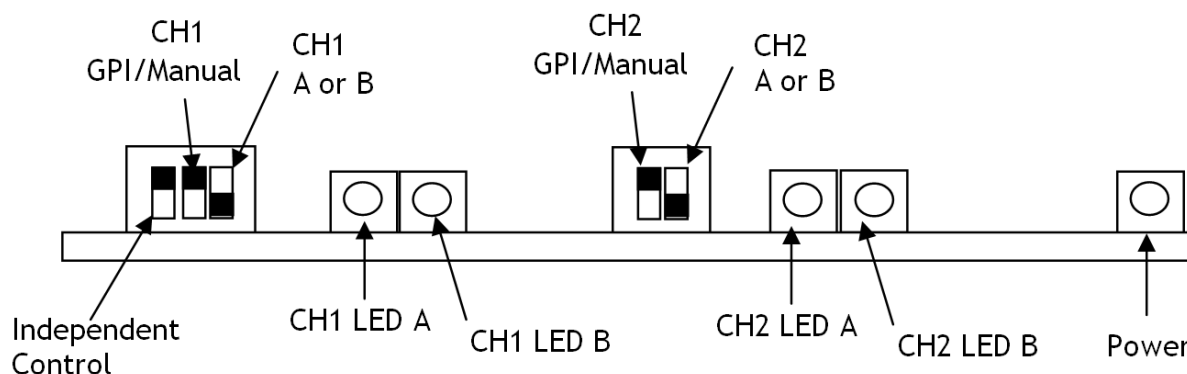
Independent Control – When up, the 2 channels work independently of each other; when down, both channels are controlled in tandem by channel 1 controls.

GPI/Manual –When down, changeover is controlled manually using the switches on the front of the board. When up, changeover is controlled via the GPI inputs.

A or B – When board is in manual change over mode Input A is routed to the output when down. Input B is routed to the output when up.

LED A – Illuminated when input A is routed to the output

LED B – illuminated when input B is routed to the output

Power – LED is illuminated when board has power.

5.7 ON BOARD JUMPER SETTINGS

Jumpers J3 and J4 are for factory use only and should be fitted such that pins 1 & 2 are connected.

6. 370-12-00 DUAL MAIN & RESERVE SD/HD/3G SDI MONITOR & CHANGEOVER CARD – ACTIVE

6.1 OVERVIEW

The 370-12-00 Monitor and changeover card provides a means of monitoring and/or changing over a large number of different SDI video formats. It will automatically detect the video format on the input. The board has 2 sets of changeovers, each set consisting of 2 inputs and 1 output.

The board has two main functions: monitoring and changeover.

- **Monitoring**: The video inputs are continuously monitored. If a fault is detected it is reported via the Statesman software and LED status lights on the edge of the board.

- **Changeover**: On detection of a fault on input A, the fault is reported and depending on how the board is set up, a changeover will occur either automatically or manually.

The board is controlled via the Crystal Vision Statesman GUI, by using the controls on the edge of the board, or by connecting to the GPIs (general purpose interfaces).

6.2 REAR CONNECTOR

External video connections are made via the 370-52-02 rear connector unit.

6.3 BLOCK DIAGRAM
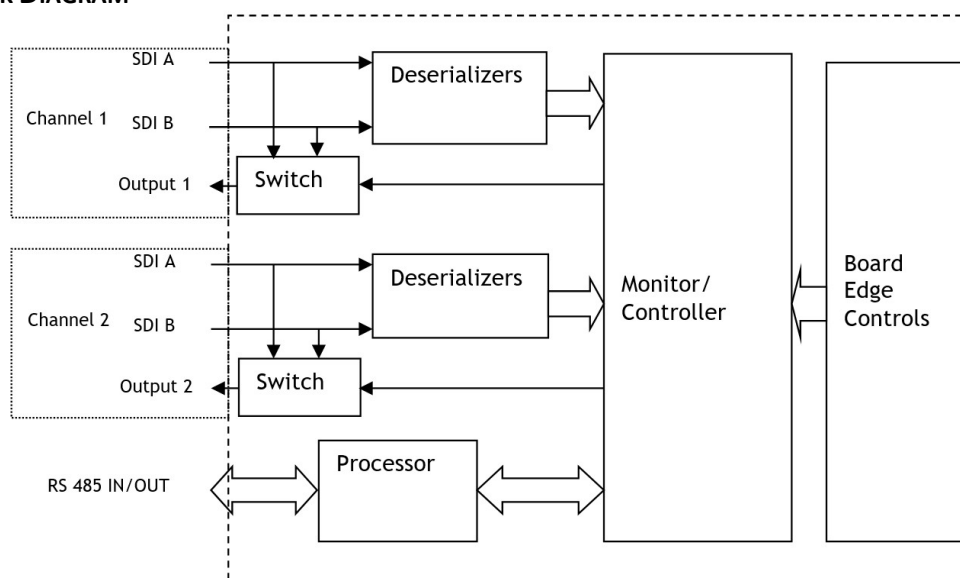
6.4 MONITORING

The input video format on each input is detected automatically and checked for a variety of error conditions.

6.4.1 FORMATS SUPPORTED

All SDI video formats offered by the Trilogy Mentor XL reference generator are supported.

1920x1080/60p	1280x720/60p
1920x1080/59.94p	1280x720/59.94p
1920x1080/50p	1280x720/50p
1920x1080/60i	1280x720/30p
1920x1080/59.94i	1280x720/29.97p
1920x1080/50i	1280x720/25p
1920x1080/30p	1280x720/24p
1920x1080/29.97p	1280x720/23.98p
1920x1080/25p	PAL
1920x1080/24p	NTSC
1920x1080/23.98p	

The SDI format is reported by the statesman GUI: an LED on the edge of the board indicates a valid format is present but does not indicate the actual format detected.

6.4.2 MONITOR CONDITIONS

The following conditions are reported via the statesman GUI:

- SDI Locked.
- Automatic SDI format detection.
- EDH detection and monitor of full field and active picture (SD only).
- CRC monitor (HD only).
- Embedded Audio detection.
- Video frozen.

6.4.3 ERROR CONDITIONS

The following conditions cause an error to be reported:

- SDI not present.
- Non-SMPTE standard detected when locked to SDI.
- EDH errors (PAL and NTSC only).
- CRC errors.
- Embedded audio errors. Checks 192 block sequence.
- Video Frozen.

6.5 CHANGEOVER

For each changeover set, it is possible to route either of the 2 inputs to the corresponding output; this can be done automatically, manually, or via GPI inputs. Video inputs are routed through a crosspoint switch, which is capable of switching 3Gbps signals.

**Note:** There is no passive bypass switch.

Automatic changeover - When the board is set to changeover automatically, input B is routed to the output when a fault condition is detected on input A. The changeover will only occur if there are no fault conditions detected on input B. The changeover is reported via the Statesman GUI. Once the system has changed over, it will not revert to input A, unless input B reports a new fault condition _**and**_ the previous fault condition on input A has been resolved.

Manual changeover - A manual changeover may be carried out using the Statesman GUI or the board edge switches.

GPI changeover – When the board is in a system with multiple monitor/changeover boards the state of the GPI input can effect a changeover. This will occur when one of the other boards has detected a fault condition on an input.

Channel pairs locked together – The changeover sets can be locked together so a failure which causes one set to changeover will also cause the other set to changeover. When the sets are locked together, the controls for channel pair 1 controls both sets.

6.6 CARD EDGE CONTROLS
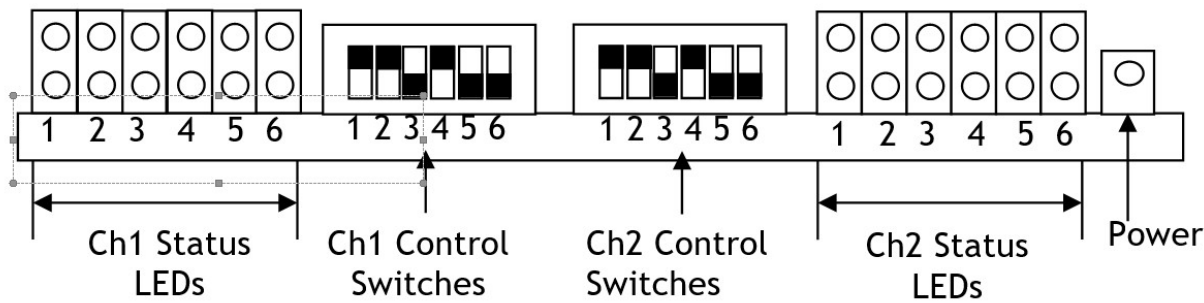
As viewed above, LEDs and switches on the left are related to Channel 1: those on the right relate to Channel 2. The lower LEDs indicate the status of input A – the upper LEDs indicate the status of Input B.

The table below defines the purpose of LED 1 – 6.

LED	Indicates when illuminated
1	SDI Locked.
2	Valid SMPTE Format (see **Error! Reference source not found.** for valid formats).
3	Input not present.
4	EDH(SD)/CRC(HD) errors.
5	Embedded audio errors.
6	Input routed to output.

The switches are used to set up how the board will changeover, and to set which errors will cause an automatic changeover. The function of the switches are described in the table below.

Switch	Function (when switch is in down position)
1	Automatic changeover.
2	Output select.
3	GPI Changeover.
4	Changeover when input not present.
5	Changeover when framing or EDH/CRC errors detected.
6	Changeover when embedded audio errors detected.

7. SOFTWARE CONTROL/STATUS USING STATESMAN

7.1 INSTALLING STATESMAN & CONFIGURING FRAMES FOR ETHERNET CONTROL

A straight through (non-crossover) CAT5 cable should be connected from the PC to a network switch and from the network switch into the Ethernet connector on the rear of the frame.

Connections direct from the PC to a frame using a cross over cable are currently not supported.

7.1.1 FRONT PANEL IP ADDRESSES

When a frame leaves the factory, by default the front panel will be set to DHCP. If you are running a DHCP network the front panel will set a relevant available IP address with the same subnet mask as your network.

If you need to set your own IP address please follow these steps:

1. Power the front panel with piano switch 4 on the front panel PCB in the down position (you will see this on the rear of the front panel when it is open). This will set an IP address of 10.0.0.201 and subnet mask of 255.255.255.0
2. Set your PC to the same IP address range and subnet mask e.g. 10.0.0.200 & 255.255.255.0. Note how the last number in the PC IP address has to be different in order to uniquely identify it.
   - *To change the IP address of a PC go to Start > Settings > Network Connections.*
   - *Right mouse click on the active connection and select "Properties" in the pop-up menu.*
   - *Highlight Internet Protocol (TCP/IP) and click properties.*
   - *Select "use the following IP address" and type in the address and Subnet mask. The default gateway can be left as it is.*
3. Ping the frame from DOS.
   - *To run a DOS prompt in Windows XP go to Start > Run and then type "cmd" (without the speech marks).*
   - *To ping the frame type ping followed by the IP address of the frame, leaving a space between ping and the IP address e.g. C:\>ping 10.0.0.201*
4. With communication between the PC and frame established open a web browser and type in the IP address of the frame (http://10.0.0.201). This will display a page for the Ethernet CPU you are talking to.
5. Click on the select network tab and type in the new IP address and subnet mask you would like to set the frame to. Make sure DHCP is not ticked before confirming selection.
6. Put piano switch 4 back to the up position and re-boot the front panel for the new settings to load.
7. Change your PC back so it is in the same IP address and subnet mask range as set on the frame.

7.1.2 INSTALLING STATESMAN LITE

1. Run the cvsetup.exe file for the version of Statesman you are installing.
2. Click "Next" until you reach the Select Components screen. Un-check Statesman License Server and MySQL user setup. These are only required for multi PC installations.
3. Continue clicking "Next" then finally click Install.

7.1.3 RUNNING STATESMAN LITE FOR THE FIRST TIME

1. Launch Statesman.
2. As this is a new installation there is no database backup to reinstall. "Use defaults" therefore needs to be selected on the "Reinstall database from backup?" pop-up.
3. Now you need to enter and confirm the password you would like to use to log in to Statesman.
4. Now login by leaving the user as Supervisor and entering the password you selected. Here you can choose to store password at login to avoid having to enter it each time you run Statesman.
5. In the Statesman setup pop up click Next on Introduction, Network on Network type and wait while Statesman probes the Network for accessible frames. Then click single PC on servers. At this stage do not add the rack that is visible in the Add a Rack tab. We will do this later within Statesman.
6. An update file is provided on the CD. To install the update:
    i. Click "Data->Update Control Panel Data" and then select the "Use local file" option
    ii. Navigate to the product data file provided in the "software" folder of the CD.
    iii. Click OK
    iv. Wait
    v. Restart Statesman

7.1.4 ADDING THE FRAME TO STATESMAN

1. With communication established between the PC and frame, launch Statesman.
2. Click on 'Statesman Settings' then 'Options'
3. Click on the tab called 'Racks' followed by 'Racks defined' and then 'Add Rack'. The IP addresses of the frames you want to add to Statesman should be visible.
4. Highlight the IP address of a frame for your area and click 'OK'.
5. Click 'OK' again on the options box and then the frame will appear on the left hand panel of Statesman.

7.2 370-10-00

The 370-10-00 Active Board can be controlled via the optional Statesman GUI software. The image below shows a screenshot from the software.
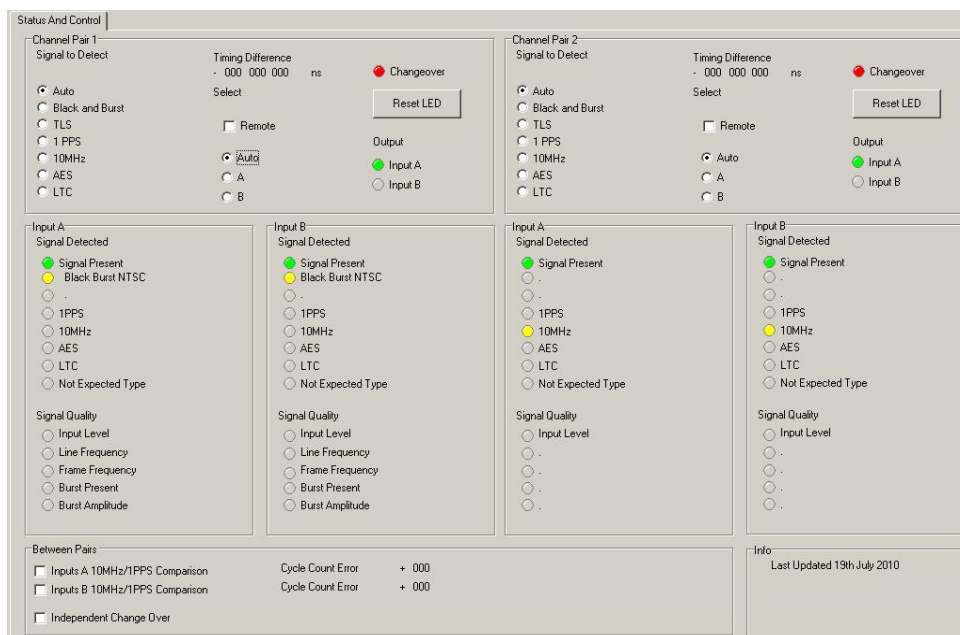
Channel Pair x – This box contains the controls and status of the inputs of each channel pair.

- **Signal to detect -** The type of signal to detect can be selected by selecting the appropriate signal type, alternatively it can be set to auto. In this mode the input type for both inputs is detected automatically. If the inputs are of different types or subtypes input A is assumed to be the correct type.

- **Timing Difference –** When inputs A and B are the same type and subtype the timing difference between the 2 inputs is calculated to an accuracy of +/- 10ns.

- **Select –** This sets how the changeover is controlled:

  o **Remote –** When the box is ticked, the changeover is controlled via the GPI inputs. **Note**: GPI outputs are active at all times.
  o **Auto –** When selected, if an error is detected on the input routed to the output, a changeover will take place if there are no errors on the other input.
  o **A and B –** Manually select which input is routed to the output.

  Note: when controlling multiple boards, the "Remote" checkbox must be ticked and the "Auto" radio button selected on all boards.

- **Changeover LED –** Red when changeover has occurred. Press "Reset LED" to reset.

- **Output LEDs –** Indicates which input is routed to the output.

Input x – This box indicates which signal type has been detected on the inputs and the signal quality.

- **Signal Detected** – These LEDs indicate if a signal is present and the signal type detected. If BB or TLS are detected the subtype of the signal will be displayed e.g. for BB - PAL or NTSC.

- **Signal Quality** – The LEDs indicate if an error has been detected on the input signal. The Errors checked for are displayed depending on the signal type detected e.g. For BB, input level, line frequency, frame frequency, burst present and burst amplitude are checked. For AES the input level is checked. If there is an error the LED turns red.

Between Pairs –

- **Inputs x 10 MHz/1 PPS Comparison** – When this box is ticked and there are valid 1 PPS and 10 MHz signals on the inputs the number of 10 MHz clock pulses in the 1 second period are counted. The cycle count error reports number of 10 MHz clock pulses above or below 10 million in the 1 second pulse period. Error range is +/- 127: if the error is greater than this 127 will still be reported.

- **Independent Change Over** – When the box is checked, the changeover of the channel pairs are independent of each other. When it is unchecked, an error on either of the inputs routed to the output will cause a changeover for both channel pairs if the other inputs are valid with no errors. The board can only be switched into (or out of) this mode using the GUI and the current setting is not indicated on any card LEDs.

By default the card starts up in automatic mode. In this mode the input type is automatically detected and the changeover occurs automatically.
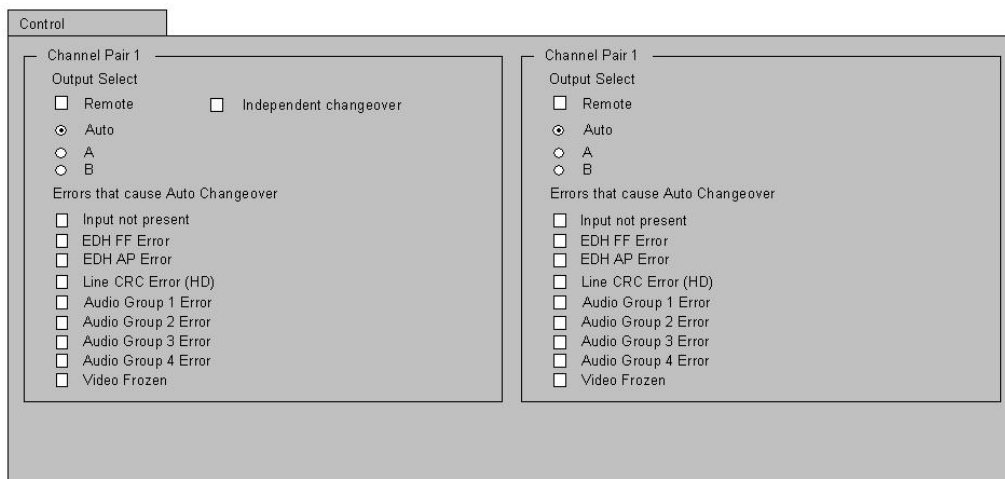
7.3 370-10-02

The image below shows the reduced features provided by the 370-10-02, as seen from Statesman.

7.4 370-12-00

Crystal Visions Statesman GUI can be used to control the board and monitor the status of the inputs. Statesman has 2 tabs -- the first tab shows the controls to set up the board and control the changeover, as shown below.

Channel Pair x – This box contains the controls for the inputs of each channel pair.

- **Output Select –** The output can be selected by the following methods:

    - **Remote –** When box is checked the changeover is controlled via the GPI inputs.

    - **Auto –** When selected, if an error is detected on the input routed to the output, a changeover will take place if there are no errors on the other input.

    - **A and B –** Manually select which input is routed to the output.

- **Independent changeover –** When checked, the channel pairs are independent of each other. E.g. when a failure is detected on input A of channel pair 1, then channel pair 1 will changeover to input B but channel pair 2 will not changeover.

- **Errors that cause auto changeover –** When the following are checked and an error is present on the input routed to the output, a changeover will occur if auto changeover is selected: Input not present, EDH FF Error, EDH AP Error, Line CRC Error, Audio Group 1, Audio Group 2, Audio Group 3, Audio Group 4 and Video Frozen.

The second tab displays the status of the inputs and outputs, see below.
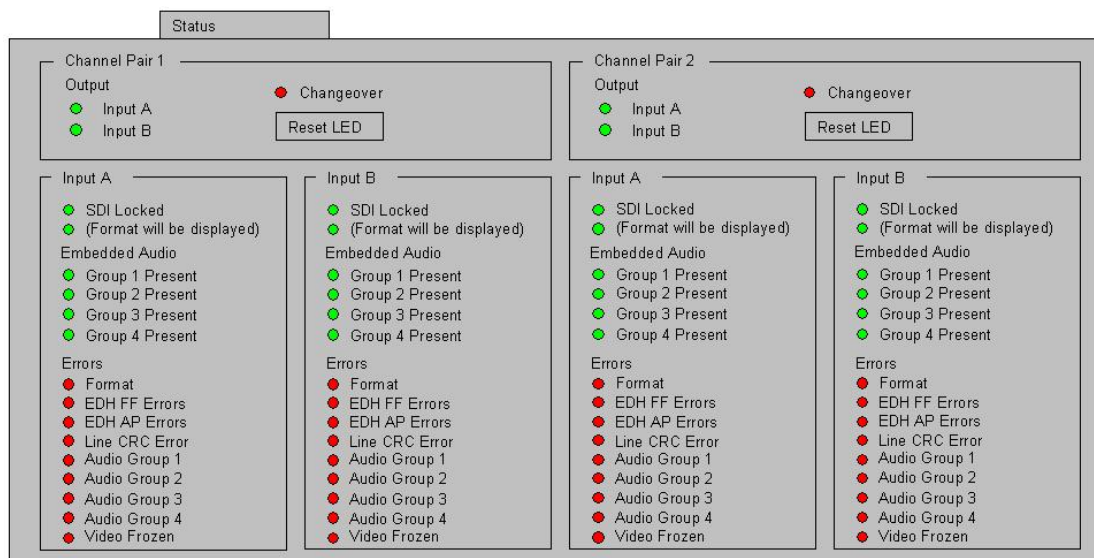
Channel Pair – This box contains the status of the inputs of each channel pair.

- **Output LEDs –** Indicate which input is routed to the output.

- **Changeover LED –** Red when changeover has occurred. Press "Reset LED" to reset.

Input x – This box indicates the status of the input signals

- **SDI Locked –** Green when input signal is a SDI signal.

- **Format –** This will display the format of the input signal if it is a valid SMPTE standard (see section **Error! Reference source not found.**)

- **Embedded Audio –** Indicates which audio groups are present.

- **Errors –** A red LED indicates the errors that are present on the input signals.

8. SPECIFICATION

Note. All measurements are made assuming, where appropriate, that the various offsets controlled from the front panel are set to zero unless otherwise stated. All signal measurements are made with inputs and outputs terminated in 75Ω unless otherwise stated.

8.1 370-10-00 ACTIVE BOARD

Return Loss	< -35dB to 10 MHz < -30dB @ 30 MHz
Isolation between A and B channels	> -60dB to 10 MHz
Insertion Loss	< 1dB

8.2 370-11-00 PASSIVE BOARD

Return Loss	< -35dB to 10 MHz < -30dB @ 30 MHz
Isolation between A and B channels	> -60dB to 10 MHz

8.3 370-12-00 SD/HD/3G SDI BOARD

	270Mbps	1.485Gbps	2.97Gbps
Peak–to-peak signal amplitude	800mV $\pm$ 10%	800mV $\pm$ 10%	800mV $\pm$ 10%
DC Offset	0.0V $\pm$ 0.5V	0.0V $\pm$ 0.5V	0.0V $\pm$ 0.5V
Rise and fall times between 20% to 80% amplitude points	0.4ns – 1.5ns, will not differ by more than 0.5ns.	< 270ps, will not differ by more than 100ps.	< 135ps, will not differ by more than 50ps.
Overshoot	< 10% of amplitude.	< 10% of amplitude.	< 10% of amplitude.
Timing Jitter lower band edge	10Hz	10Hz	10Hz
Alignment jitter lower band edge	1kHz	100kHz	100kHz
Upper band edge	> 1/10 clock rate	> 1/10 clock rate	> 1/10 the clock rate
Timing jitter	0.2UI	1UI	2UI
Alignment jitter	0.2UI	0.2UI	0.3UI