



eyeheight



OL-X

OL-2, OL-2A and OL-2C Legaliser product
v2.00

user manual

Revision History

Version	Date	Description	Author
2.0	08/05/07	Changed software and thus menus section to legalEyes evolution style.	SRF

Table of Contents

1 System Overview	5
1.1 Legaliser Processing.....	5
1.2 Associated Equipment for the OL-X.....	7
1.2.1 Chassis Types	7
1.2.2 Control Surfaces	7
2 Installation	8
2.1 Installation of the OL-X product.....	8
2.2 Installing the OL-X into a flexiBox	8
2.3 Connections to an OL-X.....	8
2.4 Connecting Panels to the OL-X.....	9
3 Operation	10
3.1 Manual control of the OL-X	10
3.2 Automation Control of the OL-X.....	10
3.3 Operational Menus for the OL-2.....	11
4 Technical Appendix.....	28
4.1 Technical Specification for the OL-X.....	28
4.2 Jumpering the I-BUS (CAN-BUS) Termination	28

Table of Figures

Figure 1-1 OL-X legaliser circuit board.....	5
Figure 1-2 Legaliser Block Diagram.	6
Figure 1-3 flexiBox with flexiPanel fitted.....	7
Figure 1-4 FP-10 desktop modular panel.....	7
Figure 4-1 Location Of I-Bus Termination Link.....	28

I System Overview

The OL-X is a full-featured Legaliser system using Eyeheight Ltd's latest High power processing card. The main features of the OL-X series of legalisers are as follows:

- Provides Legalisation of the SDI Input signal with full 10 bit processing throughout.
- Two Independent SDI outputs for "Legalise" and "Indicate" Legalised parts of the picture (OL-2 & OL-2C only).
- Indicate mode can show different colours for R,G and B components which are "Out of Gamut" (OL-2 & OL-2C only).
- Adjustable Clipping Levels.
- Adjustable soft clipping knee levels.
- Highly effective overshoot and undershoot suppression on the luminance signal.
- EDH re-insertion
- Integral Luma and chroma gain and Black level adjustment.
- EBU 2003 standard legalisation settings.
- 8 User Memories.

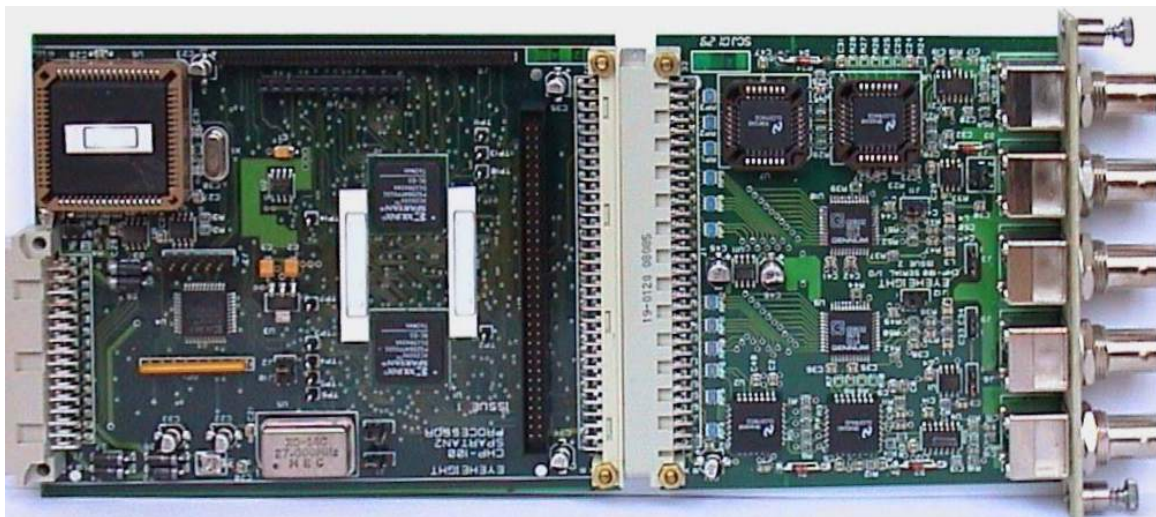


Figure 1-1 OL-X legaliser circuit board.

1.1 Legaliser Processing

A Block diagram of the Legaliser is shown below. The SDI Input firstly goes to the Proc Amp Section. This enables the Luma gain to be adjusted from 0 to 200%, Similarly the Chrominance also is adjustable from 0 to 200%. Full 10 bit by 10 bit Multipliers are used with a rounded 10 bit product. Black level adjustment is also applied at this point.

The next section is the Legaliser, which consists of a colour space conversion from Y,Cr,Cb to R,G,B. This first conversion then enters the RGB Clip unit. This has three purposes:

To Clip, and therefore legalise the incoming signal.

To provide a signal that indicates that a particular part of the signal is legal or illegal ("Not in clip", or "In clip").

To provide information to a "Colour Field Generator" (Not shown) to show parts of the picture that have been modified by the legaliser on the SDI Output.

The Clipping section consists of a 10 bit RAM Look Up Table. This

Enables hard and soft clipping tables to be loaded into the RAM.

The legaliser section has a switch that either selects the fully bypassed input signal, or the "Clipped" or "Legalised" signal. Any signal that is within the specified RGB Legal parameters will pass through the unit transparently. When the unit senses that it is in an "Illegal" part of the signal, it will switch in its processing to output the Clipped (Modified) part of the signal.

The Overshoot and undershoot suppression is employed here. This basically will correct for very fast (Non aliased) edges. These edges will cause the signal, when passed through a 601 Filter to overshoot and undershoot. The "Over-Kill" System predicts these overshoots and undershoots and will "Soften out" ONLY the fast edges that may cause the luminance signal to go outside the legally defined specifications. (As defined by the Low and High Clip Menus). This actually as well as keeping the signal legal also can enhance the look of poorly aliased graphics. Lastly a new EDH is inserted into the output video.

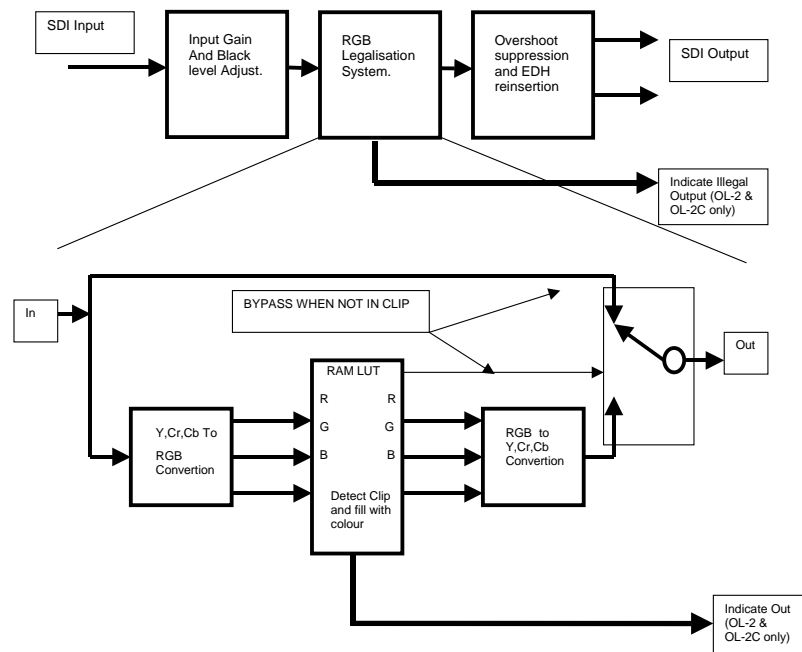


Figure 1-2 Legaliser Block Diagram.

I.2 Associated Equipment for the OL-X

The OL-X is a module and requires both a chassis and a control surface to function.

I.2.1 Chassis Types

- **flexiBox** is a 1RU chassis. The order code is FB-9. This will hold a maximum of 6 OL-X Modules with “Hot Swap” redundant PSU option and “Hot Swap” OL-X modules.
- **maxiBox** is an alternative low cost 1RU chassis. The order code is MX-9. This also will hold a maximum of 6 OL-X modules but it has no redundant PSU option and the OL-X units must be factory fitted.

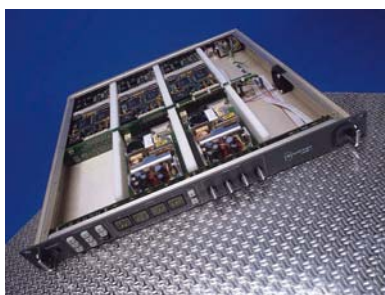


Figure 1-3 flexiBox with flexiPanel fitted

I.2.2 Control Surfaces

- **flexiPanel** is a 1RU control surface that fits on the Front of a 1RU flexiBox. The order code is FP-9. A FlexiPanel can also be used in conjunction with a miniBox, in this case the extra accessory (Order code RR-9) will be required
- **FP-10** is a desk mounting control surface (Order code FP-10). This unit is a modular unit which can be used in conjunction with the units below.



Figure 1-4 FP-10 desktop modular panel

2 Installation

2.1 Installation of the OL-X product

If this unit is already pre-installed in a flexiBox (FB-9), or a maxiBox, with either a local or a remote panel from the factory then refer to the "Hardware Installation Guide" which will be enclosed with the system. If this unit is pre-installed in a miniBox (MB-9), then also refer to the "Hardware Installation Guide" which will be enclosed with the system

If this unit has been ordered separately, we assume here that you already have a flexiBox system with a Flexipanel and that the flexiBox has at least one spare slot for the OL-X card.

2.2 Installing the OL-X into a flexiBox

To install the OL-X into a flexiBox it is desirable (but not necessary) to power down the flexiBox. Follow these instructions.

On the rear of the flexiBox are 6 slots for Products. Remove any spare blanking plate. There are 2 off M2.5 Screws, which require unfastening for each blanking plate.

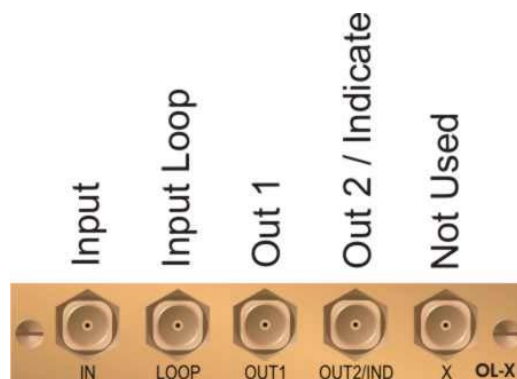
Slide the Product PCB into the spare slot and firmly push it "home".

Use the two thumbscrews to fasten the unit in place.

Now refer to the "GeNETics User Guide". If your system consists of a single flexiBox with a single flexiPanel then refer to the section titled "flexiPanel Auto Set-up". If your system is part of a network with more than one flexiPanel then refer to the section titled "flexiPanel Manual Set-up". This will guide you through acquiring your product as a device on the flexiPanel.

2.3 Connections to an OL-X

Below is the connections to the OL-X. An OL-2A has NO indicate output and so has an extra normal (legalised) output.



2.4 Connecting Panels to the OL-X

The OL-X is usually operated using a FP-9 Flexipanel locally mounted. The OL-X may be controlled via a remote mounted FP-9 or FP-10 control panel. For detailed information on connecting remote panels refer to the section “Connection of Remote Panels to a flexiBox” in the geNETics Hardware Installation Guide.

3 Operation

3.1 Manual control of the OL-X

Manual Control of the OL-X is done using one or more of the following control surfaces:

- The 1RU FP-9 Flexipanel.
- The FP10 Desk mounting Panel

The FP-9 and the FP-10 have identical manual control systems. (The FP-10 is simply a desktop version of the FP-9).

The OL-X is, as are all genetics modules, controlled using a set of MENUS. Each of these menus contains up to 3 parameters that are adjusted using the rotary digipots. The Menus define all of the adjustable operational parameters in the OL-X. Pressing the rotary digipots brings the parameter to its default value. Device selection is done using the device select switches which, when pressed, will offer the name of the device in the LCD Window. Modules can be acquired and then de-acquired using the set-up switch. For a full description of the operation philosophy of the geNETics system refer to the “geNETics User Guide” (section “Operation of the flexiPanel”)

A full list of the Menus and their functions are given in section 3 of this chapter.

3.2 Automation Control of the OL-X

Automation of the geNETics products is achieved via an RS422 port.** This port is marked RS422 on the rear of a flexiBox. For the port to work a flexiPanel MUST be connected locally on the front of the flexiBox.

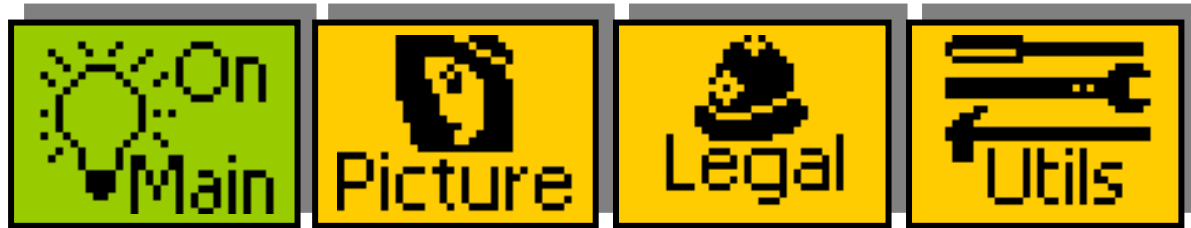
Automation control of the OL-X can be done using the geNETics Automation Protocol.

Genetics protocol is described in detail in the “geNETics User Guide” section titled “Automation Protocol on the geNETics Platform”. The menu list in section 3 of this chapter contains the data information for the protocol.

**On most flexiBoxes later than 1/10/02 the RS422 port has been replaced by a “D-Bus” Port. The D-Bus port is for High Speed data transfer and is not used for serial control. In order to achieve serial control of any products on an I-Bus network Eyeheight Ltd have developed a RS232→I-bus converter “dongle”, (DG-9) which enables greater flexibility of products on the I-Bus network whilst using the same protocols as the RS422 port. Please refer to the “User guide for the DG-9 eyeheight dongle and set-up software.

3.3 Operational Menus for the OL-2

Menu 00-03: Top Level Menus



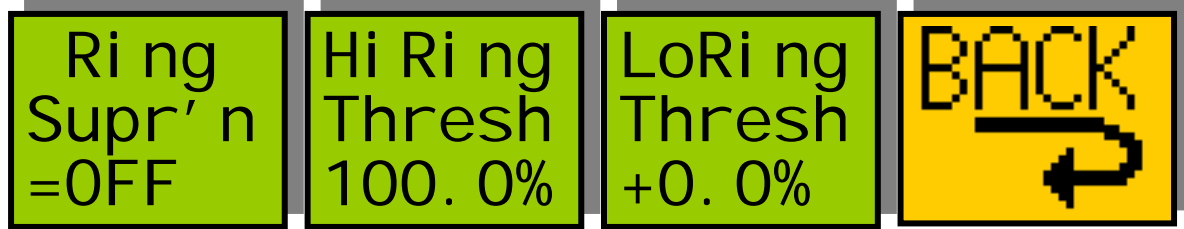
Menu Num.	Heading	Automation	Function
00	System ON or OFF	Off On [0→1]	This will switch in and out the system as a whole, effectively putting it into bypass mode.
01	PICTURE	none	Go To the main Picture menus (24-35)
02	LEGALISE	none	Go To the main Legaliser menus (4-23)
03	UTILITIES	none	Go To the main Utility menus (36-71)

Menu 04-07: Legaliser Menus



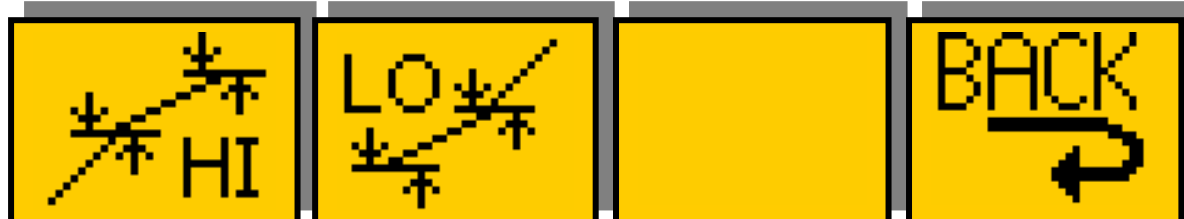
Menu Num.	Heading	Automation	Function
04	Legaliser Status.	On Off [0→1]	This shows the status of the Legaliser block only. (NOT the Proc amp (Input Gain) or the Overshoot suppression. On=ON, Legaliser is active Off=OFF, Legaliser is in Bypass
05	CLIPS	none	Go To the Hi and Lo Clipping menus (12-23)
06	RING	none	Go To the Ring Suppression menus (8-11)
07	BACK	none	Go To the main menus (0-3)

Menu 08-11: Ring control menus



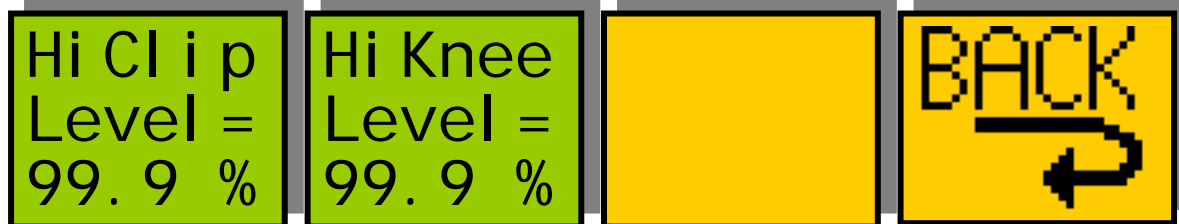
Menu Num.	Heading	Automation	Function
08	Ring Suppression Mode	Off Auto Manual [0→2]	Off= No overshoot or undershoot suppression is employed Auto= The Overshoot and Undershoot suppresser automatically tracks the Settings for the High and Low clip on the Legaliser section. Manual= The user can set the High and low Ring suppression thresholds manually.
09	High Ring Suppression Threshold	51% → 109% [512→1023]	When "Ring Suppression" Mode is in "Manual". This menu allows the user to set the upper limit at which no luma signal can go beyond, whether this is due to its absolute level, or its achievable level as an overshoot or undershoot on a 601 filter.
10	Low Ring Suppression Threshold	-8% → 50% [0→511]	When "Ring Suppression" Mode is in "Manual". This menu allows the user to set the lower limit at which no luma signal can go below, whether this is due to its absolute level, or its achievable level as an overshoot or undershoot on a 601 filter.
11	BACK	none	Go To the Legaliser menus (4-7)

Menu 12-15: Legaliser Clip and Knee Menus



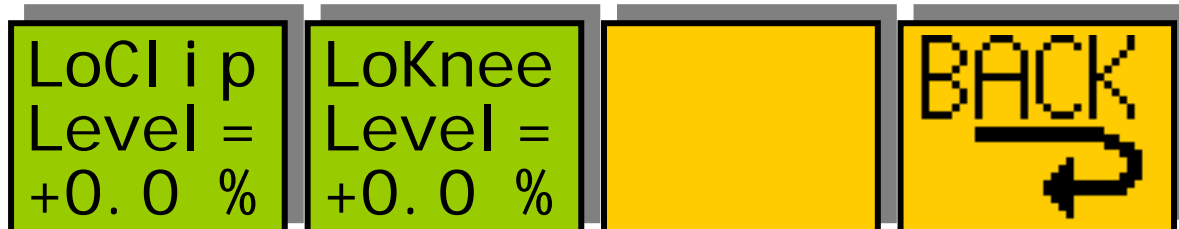
Menu Num.	Heading	Automation	Function
12	Hi	none	Go To the Hi Clip and Hi Knee Clipping menus (16-19)
13	Lo	none	Go To the Lo Clip and Lo Knee Clipping menus (20-23)
14		none	Blank
15	BACK	none	Go To the legal menus (4-7)

Menus 16-19: Legaliser High Clip and Knee settings



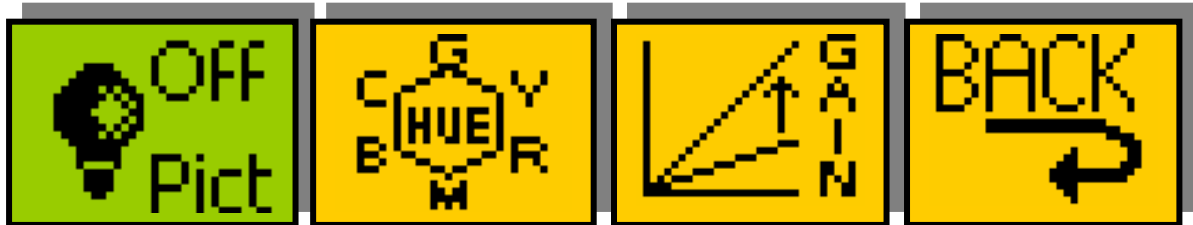
Menu Num.	Heading	Automation	Function
16	High Clip Level	51% → 109.4% [512→1023]	This indicates the High Clip point for the RGB Clipping. This is normally set to 100% for clipping at 0.7V in the analogue domain.
17	High Knee Level	51% → 109.4% [512→1023]	This indicates the High Knee point for the RGB Clipping. This can be set to give a “soft clip” from this knee point to the hard clip point.
18		none	Blank
19	BACK	none	Go To the clip menus (12-15)

Menu 20-23: Legaliser Low Clip and Knee Settings



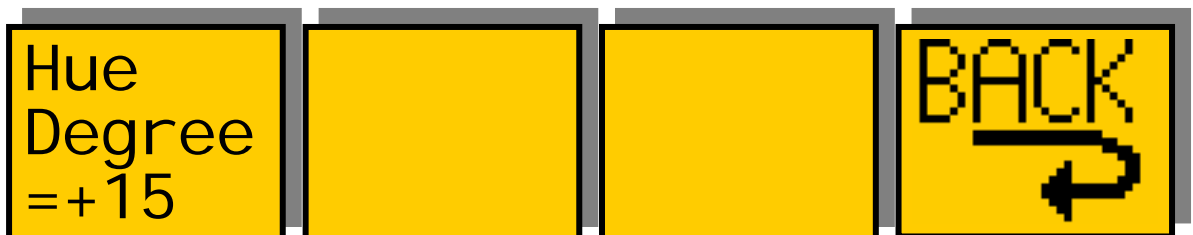
Menu Num.	Heading	Automation	Function
20	Low Clip Level	-7.1%→ 50% [1→511]	This indicates the Low Clip point for the RGB Clipping. This is normally set to 0% for clipping at 0V in the analogue domain.
21	Low Knee Level	-7.1%→ 50% [1→511]	This indicates the Low Knee point for the RGB Clipping. This can be set to give a “soft clip” from this knee point to the Low clip point.
22		none	Blank
23	BACK	none	Go To the clip menus (12-15)

Menu 24-27: Processing Amplifier Menus



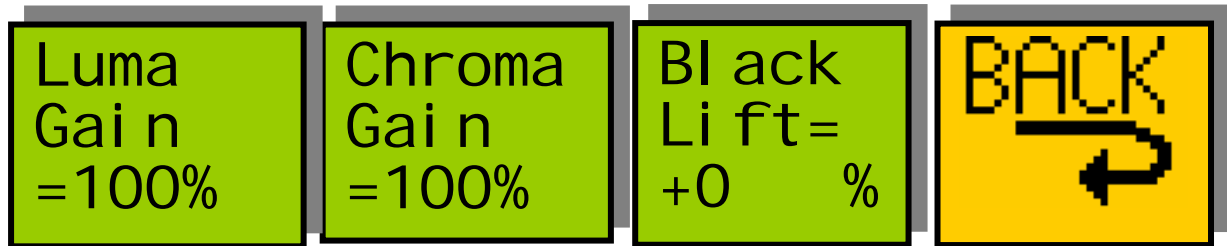
Menu Num.	Heading	Automation	Function
24	Lift, Gain, Hue and Black Control	On Off [0→1]	Active=Proc amp is processing, gain, hue and black controls are active Bypass= Unity Gain and no black offset.
25	HUE	none	Go To the Hue menus (28-31)
26	LIFT/GAIN	none	Go To the Luma, Chroma and Black menus (32-35)
27	BACK	none	Go To the main menus (0-4)

Menu 28-31: Hue Control



Menu Num.	Heading	Automation	Function
28	Hue	-180 to +180 degrees [-511 → +512]	Hue Rotation value, in degrees.
29		none	Blank
30		none	Blank
31	BACK	none	Go To the Picture menus (24-27)

Menus 32-35: Processing amplifier status.



Menu Num.	Heading	Automation	Function
32	Luma Gain	0→200% [0→511]	Luminance Gain Adjustment
33	Chroma Gain	0→200% [0→511]	Chrominance Gain Adjustment
34	Black Level	+/- 20% Range [-255→255]	Black level adjustment
35	BACK	none	Go To the Picture menus (24-27)

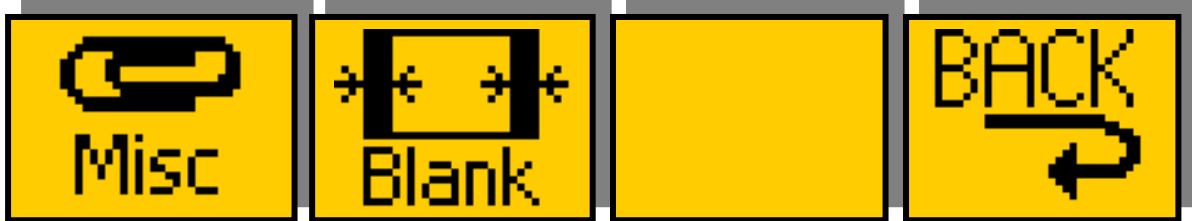
Menus 36-39: Utility Menus



Menu Num.	Heading	Automation	Function
36	MONITOR	none	Go To the Out of Gamut Colour menus (44-47)
37	MEMS	none	Go To the Memory and Software menus (48-71)
38	PRESET	none	Go To the Preset menus (92-95)

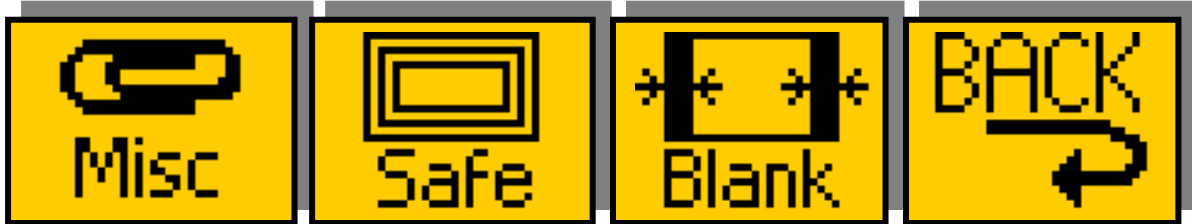
39	BACK	none	Go To the main menus (0-4)
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Menus 40-43 OL-2 & OL-2A only: Utility Menus



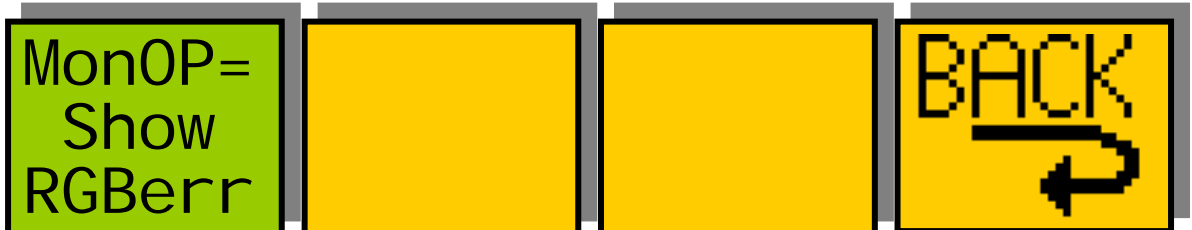
Menu Num.	Heading	Automation	Function
40	MISC	none	Go To the Miscellaneous menus (72-75)
41	BLANK	none	Go To the Blanking menus (76-79)
42		none	Blank
43	BACK	none	Go To the main menus (0-4)

Menus 40-43 OL-2c only: Utility Menus



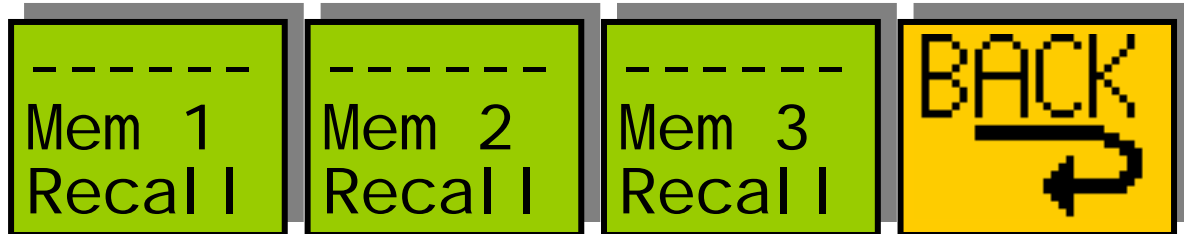
Menu Num.	Heading	Automation	Function
40	MISC	none	Go To the Miscellaneous menus (72-75)
41	SAFE	none	Go To the Safe Area menus (80-83)
42	BLANK	none	Go To the Blanking menus (76-79)
43	BACK	none	Go To the main menus (0-4)

Menus 44-47: Out of Gamut Colour



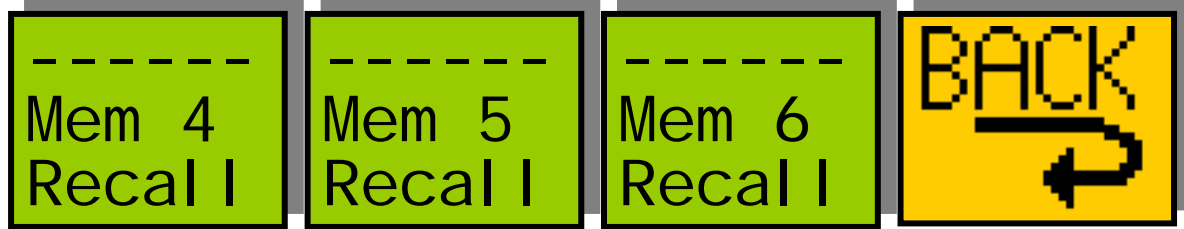
Menu Num.	Heading	Automation	Function
44	Out of Gamut Colour (Has no effect on OL-1)	ShowRGBerr BlueSteady RedSteady GreenSteady WhiteSteady FlashRGBerr BlueFlash RedFlash GreenFlash WhiteFlash LegalOut RawOut [0→11]	This is the colour used to fill in the illegal parts of the picture on the indicate output. RGB Mode will individually indicate the Red, Green and Blue parts of the signal that are modified by the legaliser a corresponding colour. This menu only effects the legalEyesSDiF & SDiS
45		none	Blank
46		none	Blank
47	BACK	none	Go To the Utils menus (36-39)

Menus 48–51: Memory Controls



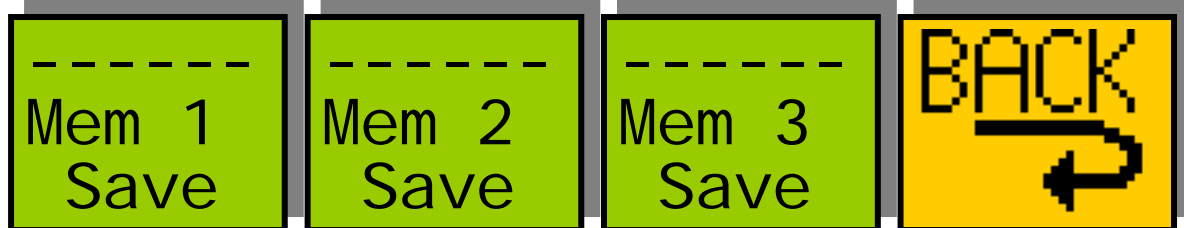
Menu Num.	Heading	Automation	Function
48	MEM1	1=Recall (Variable 1)	Pressing this will recall Memory number 1. User Names can be programmed in to the memories using a keyboard. See “geNETics User guide”, section “Giving product Memories names”
49	MEM2	1=Recall (Variable 1)	Pressing this will recall Memory number 2.
50	MEM3	1=Recall (Variable 1)	Pressing this will recall Memory number 3.
51	BACK	none	Go To the Utils menus (36-39)

Menus 52-53: Memory Controls



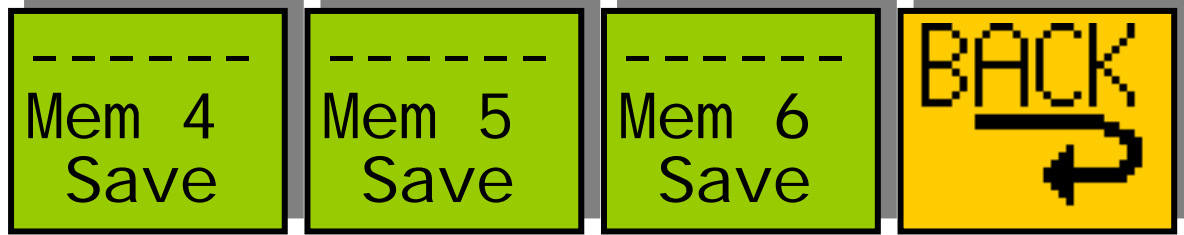
Menu Num.	Heading	Automation	Function
52	MEM4	1=Recall (Variable 1)	Pressing this will recall Memory number 4.
53	MEM5	1=Recall (Variable 1)	Pressing this will recall Memory number 5.
54	MEM6	1=Recall (Variable 1)	Pressing this will recall Memory number 6.
55	BACK	none	Go To the Utils menus (36-39)

Menu 56-59: Memory Controls



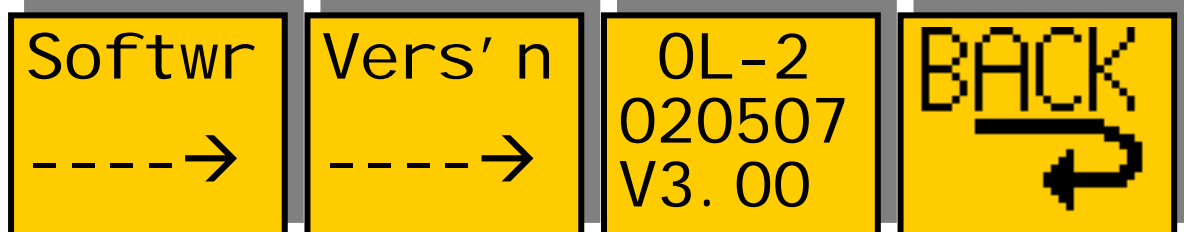
Menu Num.	Heading	Automation	Function
56	Save Mem. #1	1= Save	Pressing this will Save Memory number 1.
57	Save Mem. #2	1= Save	Pressing this will Save Memory number 2.
58	Save Mem. #3	1= Save	Pressing this will Save Memory number 3.
59	BACK	none	Go To the Utils menus (36-39)

Menu 60-63: Memory Controls



Menu Num.	Heading	Automation	Function
60	Save Mem. #5	1= Save	Pressing this will Save Memory number 4.
61	Save Mem. #6	1= Save	Pressing this will Save Memory number 5.
62	Save Mem. #7	1= Save	Pressing this will Save Memory number 6.
63	BACK	none	Go To the Utils menus (36-39)

Menu 64-67: Software Version



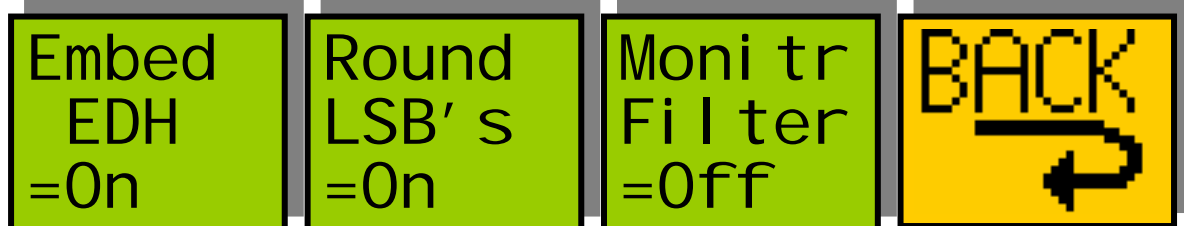
Menu Num.	Heading	Automation	Function
64		none	Blank
65		none	Blank
66	Software Version	N/A	Shows the current software version
67	BACK	none	Go To the Utils menus (36-39)

Menu 68-71: Power-on & Reset Controls



Menu Num.	Heading	Automation	Function
68	Set As Pow On Memory	1=save	Pressing this will save the current set up as the power on default.
69	Recall Pow On Memory	1=Recall	Pressing this will recall the power on default settings.
70	TOTAL RESET	1=Reset	Pressing this will reset the system.
71	BACK	none	Go To the Utils menus (36-39)

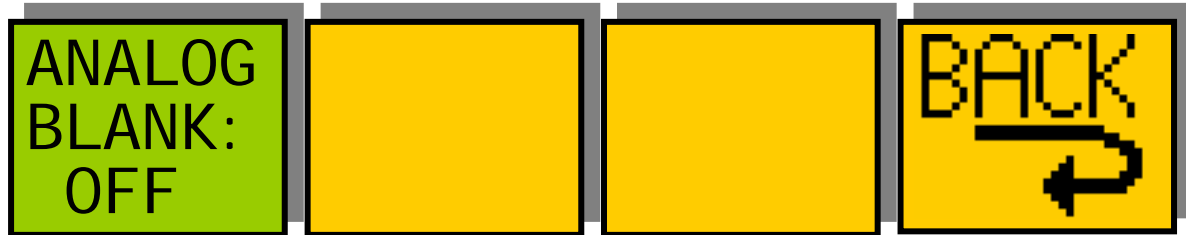
Menus 72-75: Miscellaneous utility menus



Menu Num.	Heading	Automation	Function
72	Embed EDH	Off On [0→1]	This will switch in and out the embedded EDH on the main output.
73	Rounding	Off On [0→1]	This will switch in and out the Eyeheight rounding system for the least significant bit.

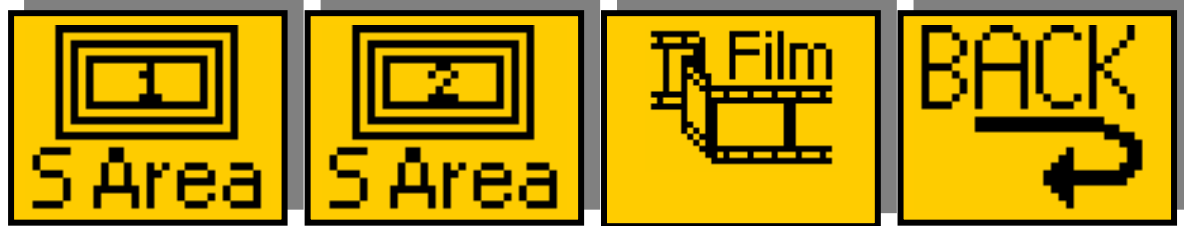
74	Monitor Filter	0=OFF 1=ON	This smoothes the monitor output so that transitions are slower.
75	BACK	none	Go To the Utils menus (36-39)

Menus 76-79: Blanking menus



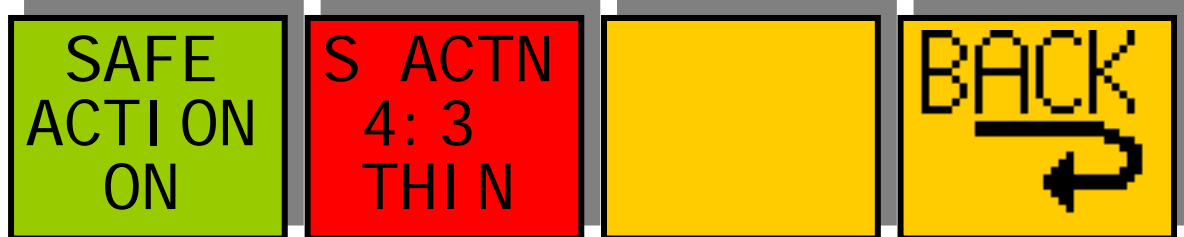
Menu Num.	Heading	Automation	Function
76	Analogue Blanking	Off On [0→1]	This will switch in and out the analogue blanking on the main output.
77		none	Blank
78		none	Blank
79	BACK	none	Go To the Utils menus (36-39)

Menus 80-83 OL-2C only: Safe Area menus



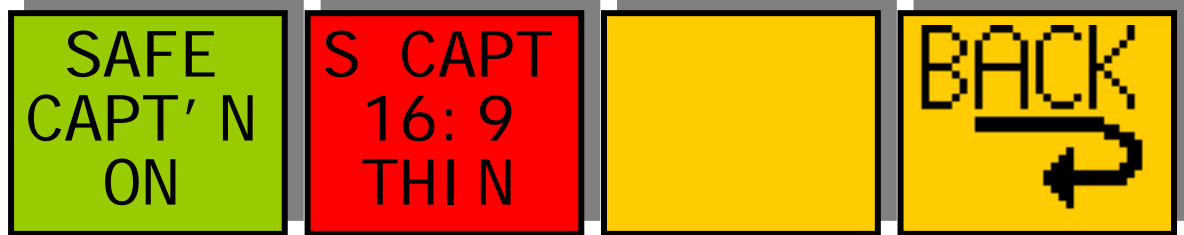
Menu Num.	Heading	Automation	Function
80	SAFE AREA 1	none	Go To the Safe Area 1 menus (84-87)
81	SAFE AREA 2	none	Go To the Safe Area 2 menus (88-91)
82	FILM AREA	none	Go To the Film Area menus (96-99)
83	BACK	none	Go To the Utils menus (36-39)

Menus 84-87 OL-2C only: Safe Area 1 menus



Menu Num.	Heading	Automation	Function
84	Safe Area 1 on-off	On Off [0→1] Variable 3	This Switches on and off the currently selected area. Pressing the "Red" switch next to this one and adjusting the rotary digipots with the lighted green LED's chooses the Selected area.
85	Area selected by menu	<p><u>Digipot A</u> S.Action S.Capt. Dig Edge An Edge [0→3] (Variable 1)</p> <p><u>Digipot B</u> 4:3 16:9 16p4:3 16p149 43p16:9 [0→4] (Variable 2)</p> <p><u>Digipot C</u> Thin Thick Shade Black [0→3] (Variable 3)</p>	<p>When this button is pressed to "Green" the Three-line display in the window indicates the three options, which can be changed by adjusting the three rotary digipots A, B and C.</p> <p>"A" Determines the basic Function</p> <ul style="list-style-type: none"> • Selects "Safe Action" option • Selects "Safe Caption" option • Selects "Digital Edge" option • Selects the "An. Edge" option <p>"B" Determines the Screen Format</p> <ul style="list-style-type: none"> • Standard 4:3 Screen • Standard 16:9 Screen • 16:9 Shoot to protect 4:3 • 16:9 Shoot to protect 14:9 (*) • 4:3 Shoot to protect 16:9 (*) <p>(*) -- Not available in 525</p> <p>"C" Determines the Style of Indicate</p> <ul style="list-style-type: none"> • Thin White lines are used • Thick White lines are used • Shade is used for "danger area" • Black is used for "danger area"
86		none	Blank
87	BACK	none	Go To the Utils menus (36-39)

Menus 88-91 OL-2C only: Safe Area 2 menus



Menu Num.	Heading	Automation	Function
88	Safe Area 2 on-off	On Off [0→1] Variable 3	This Switches on and off the currently selected area. Pressing the "Red" switch next to this one and adjusting the rotary digipots with the lighted green LED's chooses the Selected area.
89	Area selected by menu #84	<p><u>Digipot A</u> S.Action S.Capt. Dig Edge An Edge [0→3] (Variable 1)</p> <p><u>Digipot B</u> 4:3 16:9 16p4:3 16p149 43p16:9 [0→4] (Variable 2)</p> <p><u>Digipot C</u> Thin Thick Shade Black [0→3] (Variable 3)</p>	<p>When this button is pressed to "Green" the Three-line display in the window indicates the three options, which can be changed by adjusting the three rotary digipots A, B and C.</p> <p>"A" Determines the basic Function</p> <ul style="list-style-type: none"> • Selects "Safe Action" option • Selects "Safe Caption" option • Selects "Digital Edge" option • Selects the "An. Edge" option <p>"B" Determines the Screen Format</p> <ul style="list-style-type: none"> • Standard 4:3 Screen • Standard 16:9 Screen • 16:9 Shoot to protect 4:3 • 16:9 Shoot to protect 14:9 (*) • 4:3 Shoot to protect 16:9 (*) <p>(*) -- Not available in 525</p> <p>"C" Determines the Style of Indicate</p> <ul style="list-style-type: none"> • Thin White lines are used • Thick White lines are used • Shade is used for "danger area" • Black is used for "danger area"

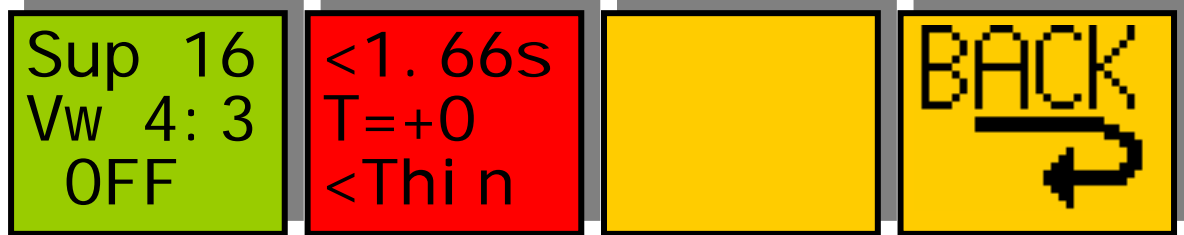
90		none	Blank
91	BACK	none	Go To the Utils menus (36-39)

Menus 92-95: Presets



Menu Num.	Heading	Automation	Function
92	0-100% RGB Preset Setting	1=Recall	Pressing this will Set The system to RGB Clipping: Low Clip=0% High Clip=100%
93	TEK Safe Settings	1=Recall (Variable 1)	Pressing this will Set The system to RGB Clipping and Luma Clipping: Low RGB Clip=+5.4% High RGB Clip=+99.6% Low Luma Clip= 0% High Luma Clip=+101% These settings represent the requirements which will cause no RGB gamut errors on a WFM 700
94	EBU Rec 103 Optimum Setting	1=Recall (Variable 1)	Pressing this will Set The system to RGB Clipping and Luma Clipping: Low RGB Clip=-3% High RGB Clip=+103% Low Luma Clip=0% High Luma Clip=+101% These settings meet the requirements of EBU Rec 103, but pull the settings into a “more” legal setting. This might be regarded as a “safer” setting than meeting EBU 103 exactly.
95	BACK	none	Go To the Utils menus (36-39)

Menus 96-99 OL-2C only: Film menus



Menu Num.	Heading	Automation	Function
96	Film Safe Areas	Digipot A On/Off [0→1] <u>Digipot B</u> 1.55s 1.66s 1.78s 1.85s 2.05s 2.35s 1.33w 1.55w 1.66w 1.85w 2.05w 2.35w [0→11]	Activates the Film Box Generator -Determines the basic Function -14:9 AR viewed on a 4:3 Glass -Super16 viewed on a 4:3 Glass -16:9 AR viewed on a 4:3 Glass -1.85 AR viewed on a 4:3 Glass -2.05 AR viewed on a 4:3 Glass Cinemascope Vw'd on 4:3 Glass 4:3 Viewed on a 16:9 Glass 14:9 Viewed on a 16:9 Glass Super16 Viewed on a 16:9 Glass 1.85 Viewed on a 16:9 Glass 2.05 Viewed on a 16:9 Glass Cinemascope Vw'd on 16:9 Glass
97	Selected Aspect Ratio	1.33 to 2.35	Shows the decimal equivalent of the aspect ratio chosen in menu 96
98	Offset	<u>Digipot A</u> [-134 to 255] Digipot B Thin	The Selected area is chosen by pressing the "Red" switch next to this one and adjusting the rotary digipots with the green LED's which are alight. This determines the position of the frame vertically in line increments. These frames are often offset to include subtitles or teletext. Determines the Style of Indicate Thin White lines are used

		Thick Shade Black [0→3]	Thick White lines are used Shade is used for "danger area" Black is used for "danger area"
99	Back	none	Pressing this button moves the display back up a level of the nested menu structure

4 Technical Appendix

4.1 Technical Specification for the OL-X

Number of Inputs	1
Type of Inputs	270Mbit Serial Digital Video Inputs 75 Ohm
Line Length	At least 200 Meters of PSF1/3 (Typically 275 Meters)
Number of Outputs	3 Output BNC's per Card (Configurable).
Type Of Outputs	270Mbit Serial Digital Video Outputs, 75 Ohm, 800mV
Total Number Of BNC Connections	5, consisting of 1 Fixed Input and 3 Jumper Configurable outputs. (One BNC not used)
SDI Output Jitter	The system will add less than 0.2UI to the input Jitter. (This is only guaranteed on issue 2 or later cards)
Current Consumption	<800mA at +5V
Size	215mm by 100mm

4.2 Jumpering the I-BUS (CAN-BUS) Termination

The I-BUS Network is the "control system" under which all Products and Panels are networked together. Under certain circumstances it is necessary to terminate the network. This can be done on a Panel or a "Product". To terminate this product, locate J6 on the SA-1 Processor Card supplied which is between U1 (The large square "chip") and the Edge connector. (This is on the half of the card labelled "CHP-100 Spartan2 Processor"). Jumper this with a 2mm link.

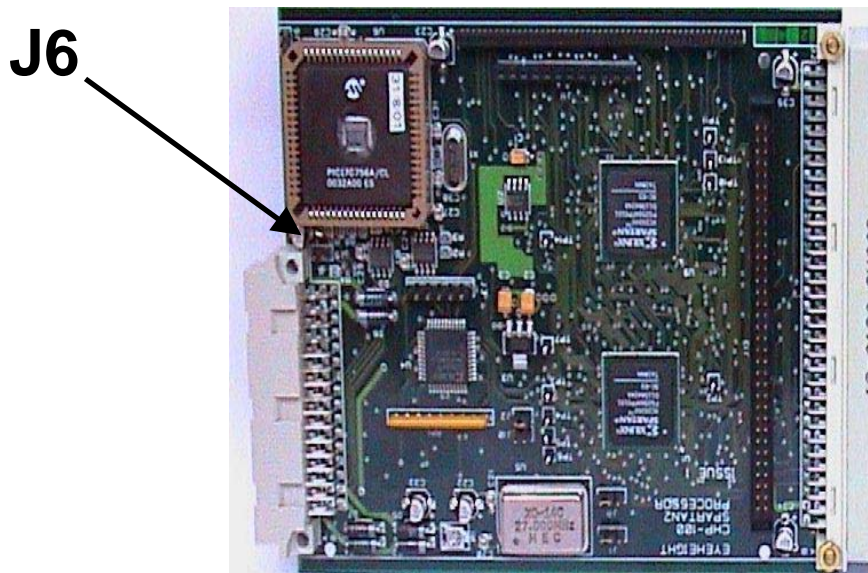


Figure 4-1 Location Of I-Bus Termination Link