

Contents

1	Introduction	2
2	Installation	4
2.1	Fitting the 2315 sub-module	4
2.2	Signal I/O and control pinout	5
2.3	Crosspoint control	6
3	Configuration	8
3.1	Configuring an 8x1 switcher	10
3.2	Source expansion	11
3.3	Level expansion	14
3.4	Building a 64 input switcher	16
3.5	Video adjustments	19
4	Trouble shooting	20
5	COSMOS status monitoring	22
6	Specification	24
7	Ordering Information	26

1 Introduction

The 3438 is an eight input, one output analogue video switcher designed to fit in the 1050 3U and 1051 1U ICON modular product rackframes. When fitted to the 1050 rack frame the module occupies 30mm of rack width. The module is intended for use with composite video but may be used with RGB/YUV component signals if multiple modules are employed. It provides a solution for small ancillary or monitoring matrices with the benefit of simple button per crosspoint control.

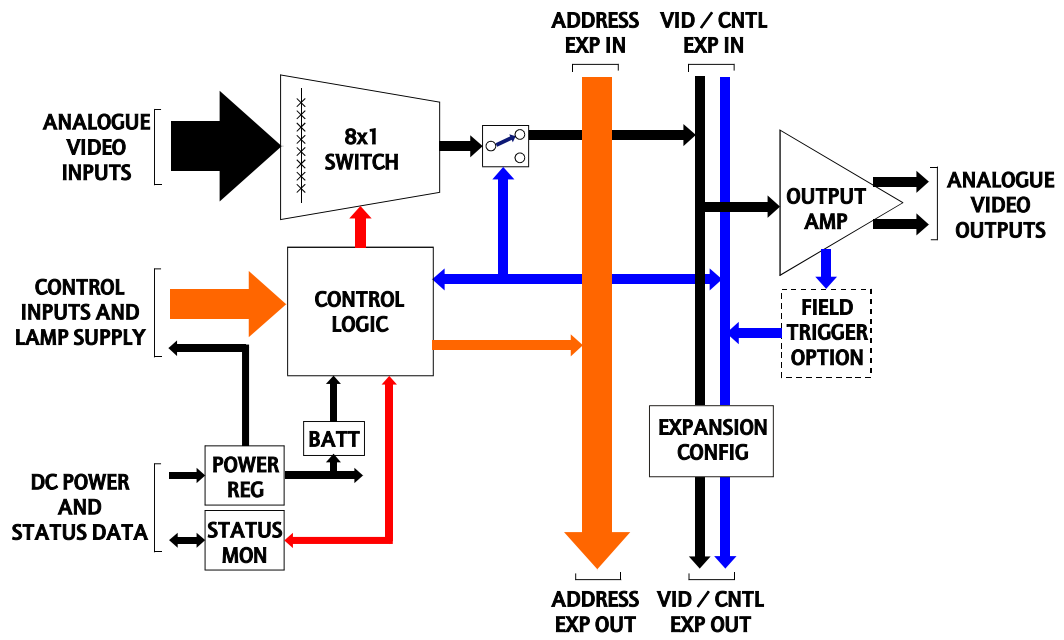
The architecture of the modules allow crosspoint outputs to be bussed together to allow switchers above eight inputs to be built. A 32x1 system requires four modules, and switchers larger than this may be constructed with secondary switcher cards. In addition the analogue video switcher may be configured with other modules in the Pro-Bel range to form married multi-level matrices.

Vertical interval switching is achieved by fitting the optional 2315 field trigger submodule, which produces a vertical interval trigger from the signal present at the output of the card. Only one card in an expanded system requires the field trigger module.

An onboard rechargeable battery provides retention of crosspoint settings after power loss.

Characteristics of the 3438 module are:

- easy expansion up to 64 inputs
- flexible control, with button per crosspoint or binary addressing
- synchronised switching via a plug-in 2315 sub-module
- DC restored inputs
- standalone and master slave configuration
- adjustable HF response and gain
- dual outputs capable of driving 75Ω loads
- crosspoint memory via battery backup
- LED crosspoint tally display
- compatible with Pro-Bel COSMOS status monitoring



The 3438 video switch

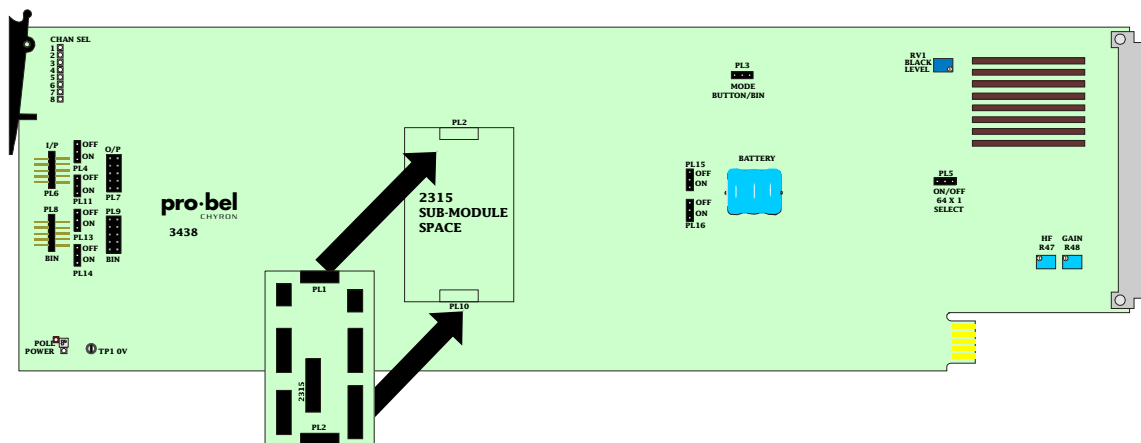
2 Installation

The 8x1 analogue video switcher consists of a 3438 ICON module which takes a single card position in either a 1U 1051 or a 3U 1050 modular rackframe . It uses the 30mm K3438.3 rear connector. A 2315 field trigger sub-module may be optionally fitted. For module and rear connector installation instructions please refer to the appropriate ICON rack frame section of the manual.

2.1 Fitting the 2315 sub-module

Fit the 2315 field trigger sub-module as follows:

- Insert the module carefully using sockets PL2 and PL10 on the main board
- The sub-module is designed to be fitted in either of two orientations. Either mate PL1 on the sub-board with PL2 on the main board, or mate PL1 on the sub-board with PL10 on the main board.



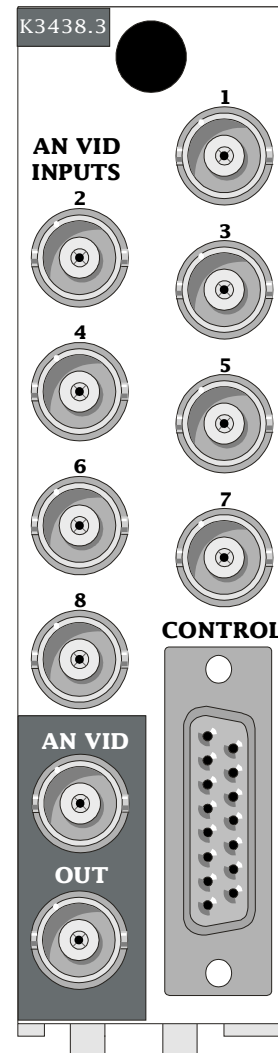
Fitting the 2315 field trigger module

2.2 Signal I/O and control pinout

The K3438.3 rear connector has eleven BNC connections for signal I/O and one 15 way 'D' type socket for control.

BNC input/output connectors	
BNC	Function
1	I/P 1
2	I/P 2
3	I/P 3
4	I/P 4
5	I/P 5
6	I/P 6
7	I/P 7
8	I/P 8
9	O/P 1
10	O/P 2

CONTROL Pin outs			
Pin	Function	Pin	Function
1	SEL 1	9	A2EXT
2	SEL 2	10	A1EXT
3	SEL 3	11	A0EXT
4	SEL 4	12	A3EXT/64x1
5	SEL 5	13	LAMP SUP
6	SEL 6	14	OV
7	SEL 7	15	SCREEN
8	SEL 8		



The K3438.3 rear connector

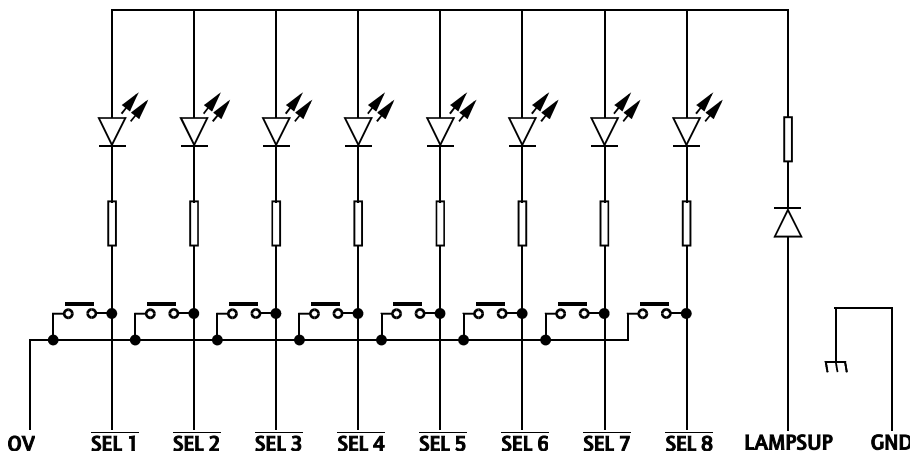
2.3 Crosspoint control

Connecting button panels

Crosspoints may be selected by connecting a button panel (eg. Pro-Bel's 8 button 6200 or 16 button 6202) to the control socket on the K3438.3 rear panel and setting PL3 to 'BUTTON'.

The analogue video switcher card has priority switching built in. If two keys are pressed simultaneously, the higher numbered one will be selected. This feature allows signal 'line up' to be performed quickly. To achieve this, one key must be held down and a higher numbered key pushed and released. Each time the higher numbered key is pushed and released that source will be selected, as long as the button is held down. Once the button is released, the previous source is selected again.

Two 8x1 modules may be independently controlled from a 16 button panel, such as the Pro-Bel 6202. This particular panel has two separate connectors to plug into the control socket on each module, simplifying the installation. If the internal expansion cables are fitted (see Source expansion), priority switching can be performed across several modules. The highest priority module will always be the left most, viewed from the front of the cards.



Example 8 way button panel wiring

Using binary control

To use binary control instead of a button panel, PL3 must be set to 'BIN'. Crosspoints may be then selected by binary addressing using 12V CMOS levels.

Binary addressing				
I/P	A2EXT	A1EXT	A0EXT	A3EXT
1	0	0	0	0
2	0	0	1	0
3	0	1	0	0
4	0	1	1	0
5	1	0	0	0
6	1	0	1	0
7	1	1	0	0
8	1	1	1	0
*	X	X	X	1

* Crosspoint output is tri-stated - used for system expansion.

LOGIC 1 = +12V, LOGIC 0 = 0V

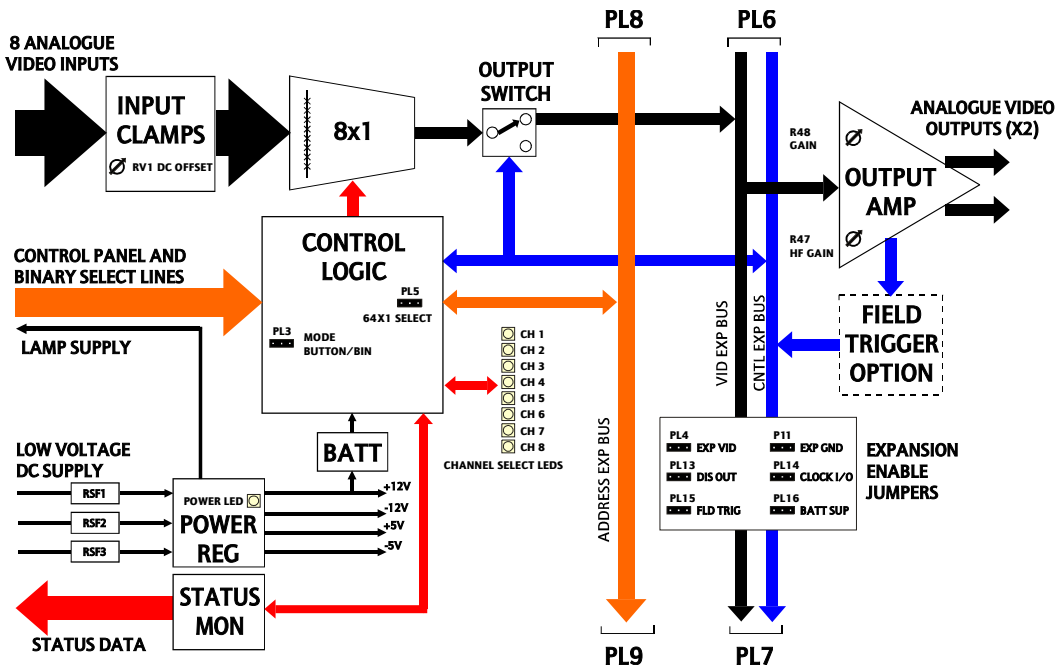
For externally supplied binary signals wiring must be made to the 3438 rear panel. To select an input the correct binary address is needed and A3EXT must be logic 0. For source expansion all other modules whose inputs are not selected A3EXT must be at logic 1.

Binary control signals can be generated by one 8x1 module and fed to another, to create a master slave configuration. To achieve this, the lower expansion cable on the front of the cards must be fitted, and all slave modules set to binary mode. The master module can be set to button mode and conveniently driven from a button panel.

Note: The A3 EXT (input) line becomes the 64x1 (output) select line for systems expanded to 64x1 with PL5 in the ON position.

3 Configuration

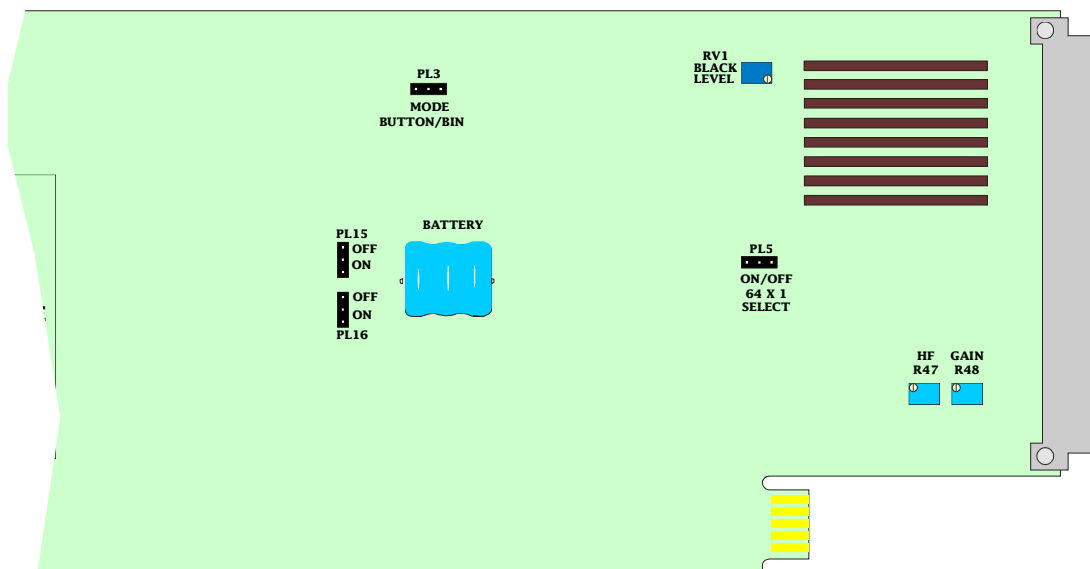
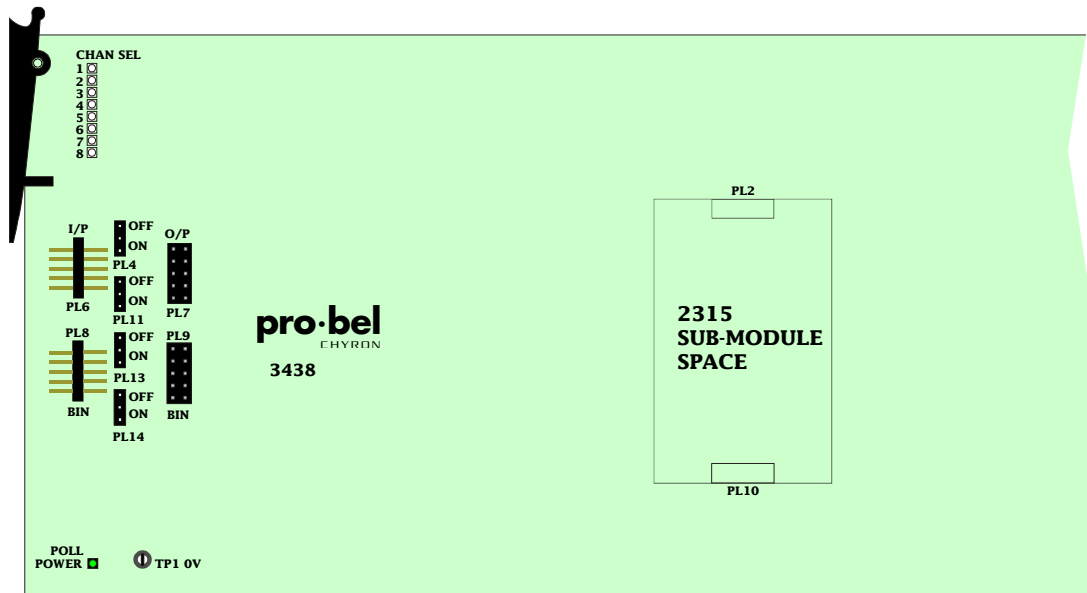
The module is easy to configure and build into expanded systems using expansion cables and jumpers.



3438 8x1 switch schematic view

Configuration jumpers		
Jumper	Condition	Function
PL3	BUTTON BIN	Simple button per crosspoint control Binary control, used in expanded systems and computer control
PL4	OFF or ON	Video expansion bus ground, used when expanding sources
PL11	OFF or ON	Video expansion bus signal, used when expanding sources
PL5	OFF or ON	64x1 select, modifies binary addressing when expanding above 32x1
PL13	OFF or ON	DIS OUT, used to disable downstream cards when expanding sources
PL14	OFF or ON	CLOCK I/O, output clock for downstream cards when expanding sources
PL15	OFF or ON	FIELD TRIGGER, used to distribute to downstream cards for synchronous switching if field trigger sub-module present

The physical location of the configuration jumpers is shown on the board layout drawing:




3438 configuration jumper locations

3.1 Configuring an 8x1 switcher

The simplest configuration is a single 8x1 module without expansion.

Control of the switcher may be from either a simple control panel or in binary form from a more complex control system such as a computer. PL3 is used to establish the method of crosspoint control. All other jumpers positions can be ignored since they only affect expansion.

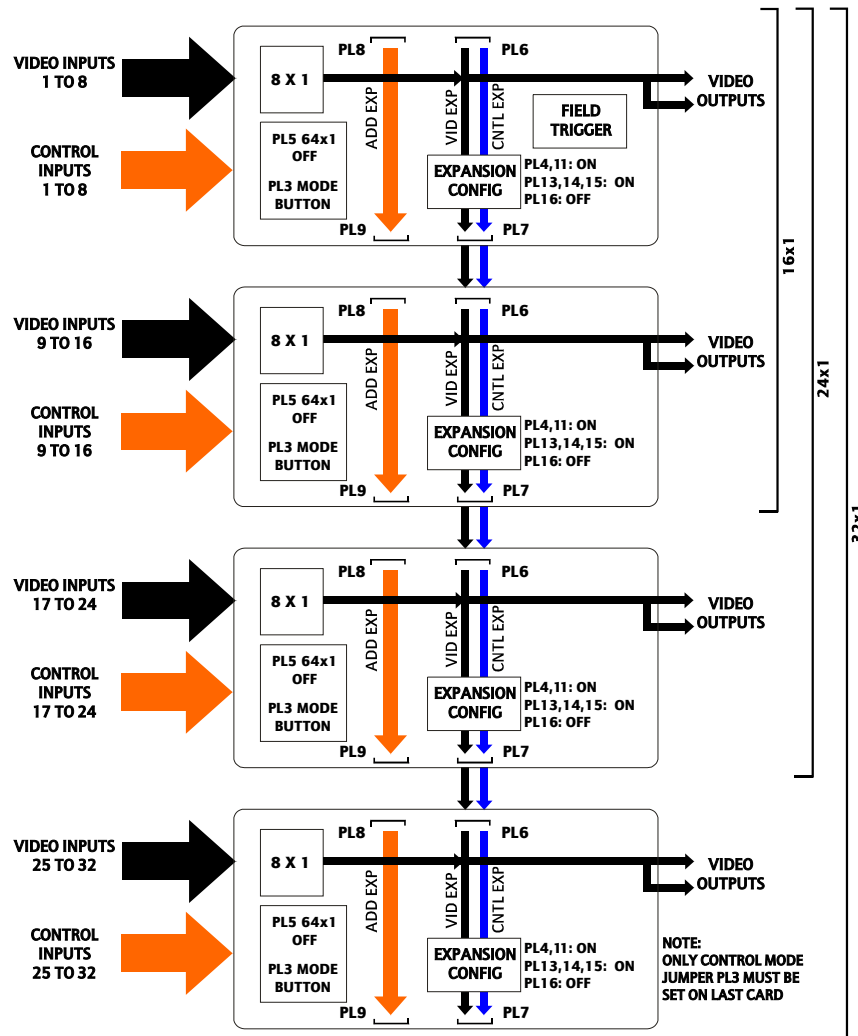
PL3 Crosspoint control mode	
Position	Function
BUTTON	Crosspoint selection using a button panel
BIN	Crosspoint selection using binary control



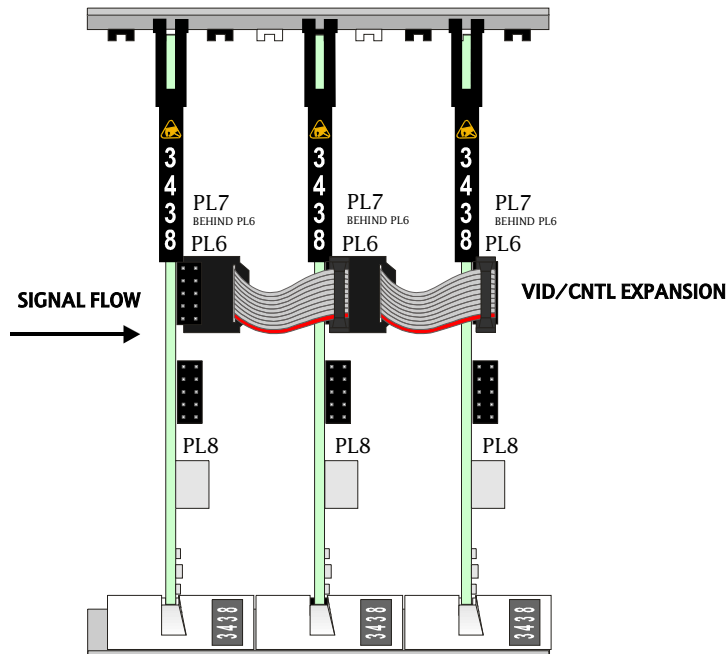
Configuration changes are accomplished by pulling the jumper (the shaded area above) from its current position on the header pins and moving it to the alternate position desired. The jumper must make electrical contact with at least two pins.

3.2 Source expansion

Several analogue audio switcher cards can be linked to make larger switchers up to 64x1. For switchers up to 32x1, only 4 modules are needed. Larger switchers need an extra 3438 as a combiner module. Expansion employs the front of card connectors together with the ribbon cables supplied with the card.



Expanding to 16, 24 and 32 x 1



Expansion cabling for 24x1 system

Source expansion jumper settings with button control and asynchronous switching		
Jumper	Setting	Function
PL3	BUTTON	Control mode
PL4 & PL11	ON	Analogue video signal expansion O/P
PL5	OFF	64x1 select signal
PL13	ON	DIS OUT priority switching signal
PL14	ON	Output clock
PL 15	OFF	Synchronous switching mode
PL16	OFF	Common battery supply line

Synchronous switching

If the first module in the chain is fitted with a 2315 field trigger module, it can synchronise the switching of all the other modules in the chain which have PL15 set to 'ON'. The field pulse is distributed via the VID/CNTL expansion ribbon between PL6 and PL7.

Source expansion jumper settings with button control and synchronous switching

Jumper	Setting	Function
PL3	BUTTON	Control mode
PL4 & PL11	ON	Analogue video signal expansion O/P
PL5	OFF	64x1 select signal
PL13	ON	DIS OUT priority switching signal
PL14	ON	Output clock
PL15	ON	Synchronous switching mode
PL16	OFF	Common battery supply line

The following rules apply to source expansion from 16x1 to 32x1:

- Only video/control expansion bus used
- Expansion jumpers not needed on last card in chain
- Buffered outputs available from all cards
- A field trigger module fitted to the first card in an expansion chain can supply a vertical trigger for synchronous switching on all cards, with PL15 set to ON.
- Synchronous switching between video sources is only possible if all sources are already synchronised to one reference.

Notes:

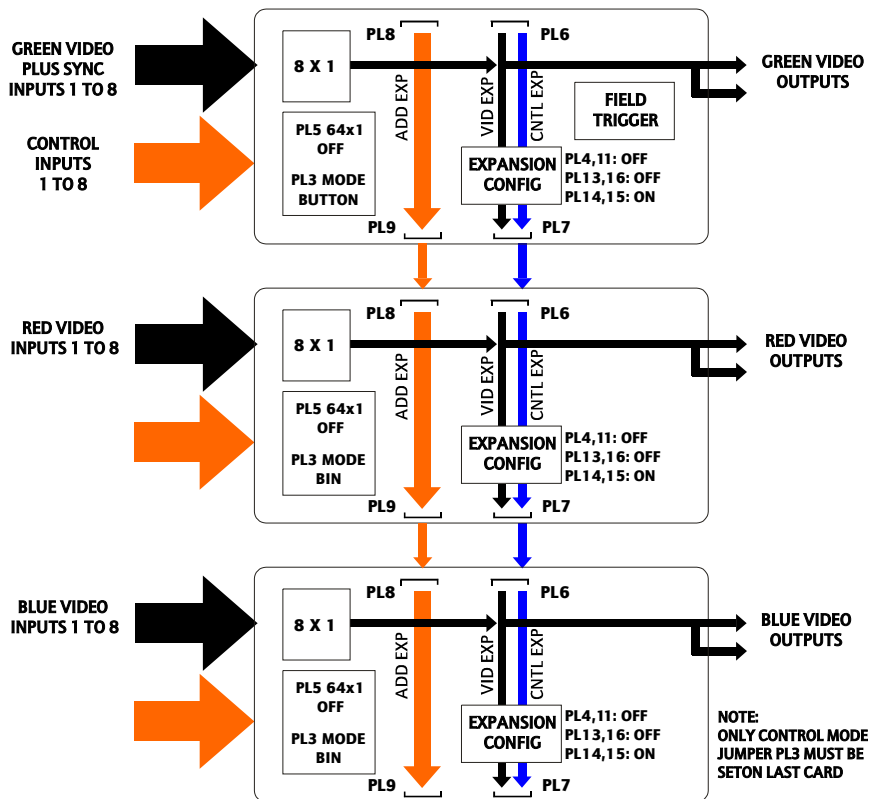
For a 32x1 system the inner two output cards have a slightly different specification @15MHz \pm 0.35dB.

To compensate for the delay of the expansion cables in an expanded system, the lengths of the input cables on the output card can be increased. Adding \approx 3.5 electrical degrees cable length @4.43MHz will reduce the input to output timing window for a 16-32x1 system to less than 1.9 degrees @4.43MHz.

3.3 Level expansion

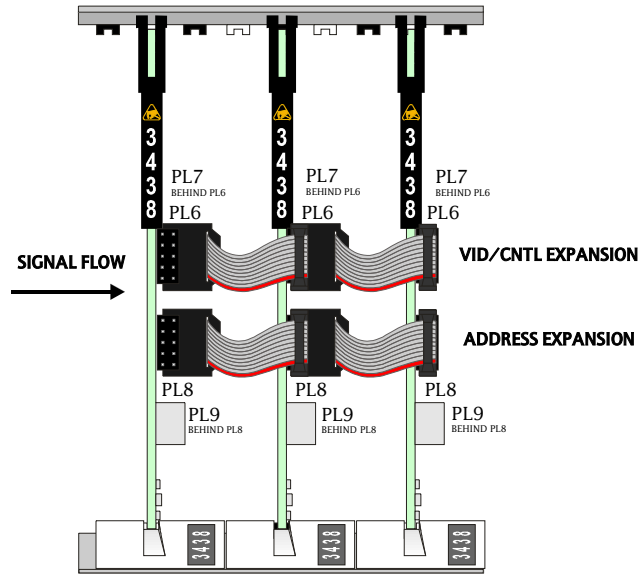
It may be useful in some applications for one card to control the input selection of other cards to create a multi-level switcher. This mode is called master/slave and utilises the binary control interconnections.

The master card can be driven from a button panel and all other cards by binary addressing using the lower expansion connectors PL8-PL9 on the front of the card.



Example of level expansion:
synchronous component video 8x1 switcher

In this example of a synchronous three level component switcher, both address and control/video expansion bus connectors are used since it is desirable to distribute the vertical interval trigger signal from the first card to ensure switching during the correct line of the video field. However, the VID expansion jumpers PL4 and PL11 must be off on all cards.



Expansion cabling for three level switcher

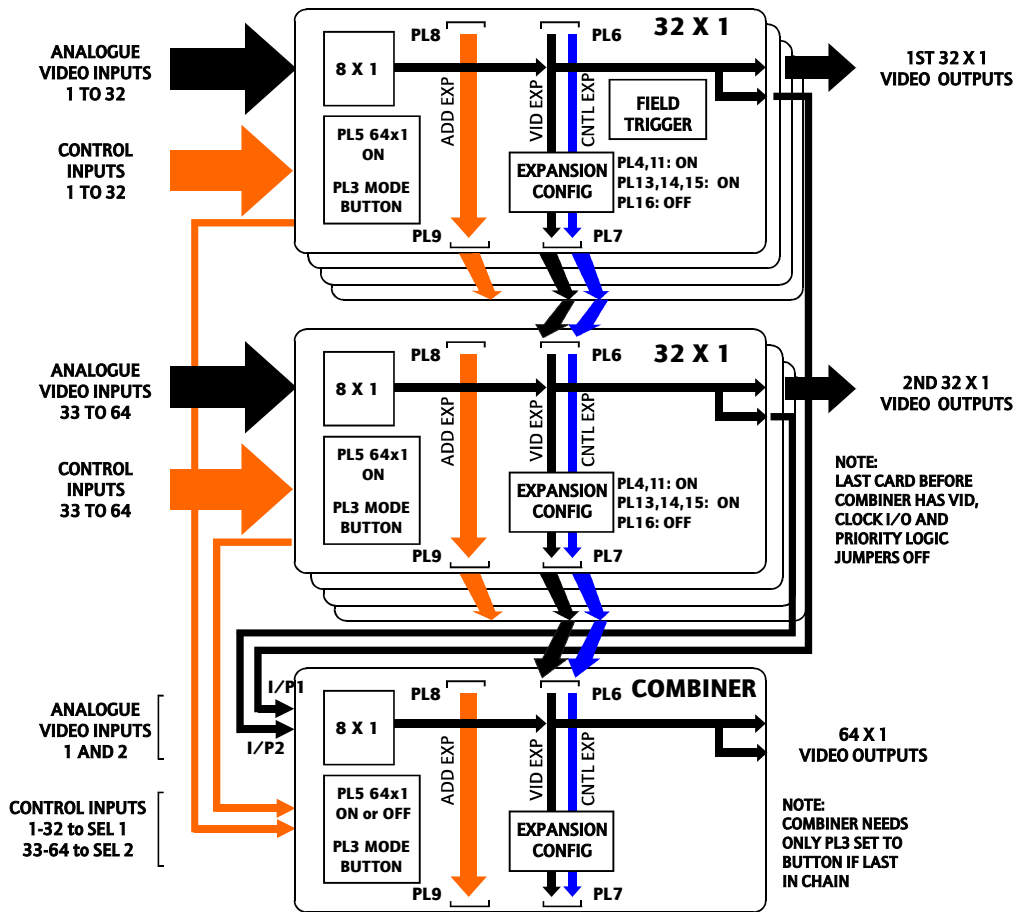
Configuring level expansion with synchronous switching			
Jumper	Master card	Slave cards	Function
PL3	BUTTON	BIN	Control mode
PL4 & PL11	OFF	OFF	Analogue video signal expansion O/P
PL5	OFF or ON	OFF or ON	64x1 select signal
PL13	OFF	OFF	DISOUT, priority switching signal
PL14	ON	ON	CLKI/O, output clock
PL15	ON	ON	Field trigger, crash/sync switching mode
PL16	OFF	OFF	Common battery supply

The following rules apply to synchronous level expansion

- Address and video/control expansion buses used
- Expansion jumpers not needed on last card in chain
- For synchronous switching, a field trigger module fitted to the first card in an expansion chain provides a vertical interval trigger for all cards, with PL15 set to ON
- Synchronous switching between video sources is only possible if all sources are already synchronised to one reference

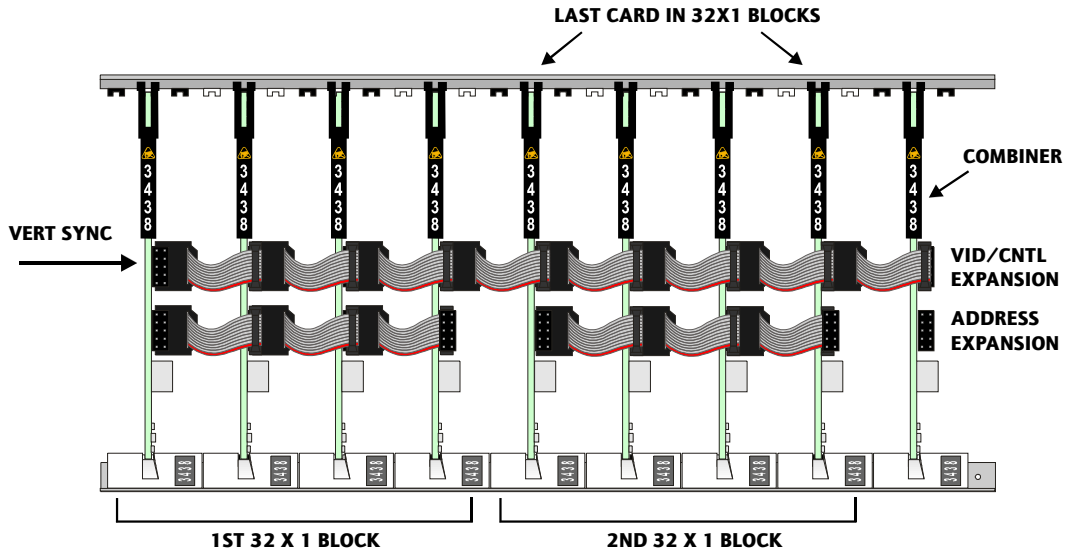
3.4 Building a 64 input switcher

To create a 64x1 an extra analogue video switcher card is needed to act as a combiner module.



Building a synchronous 64x1 switch

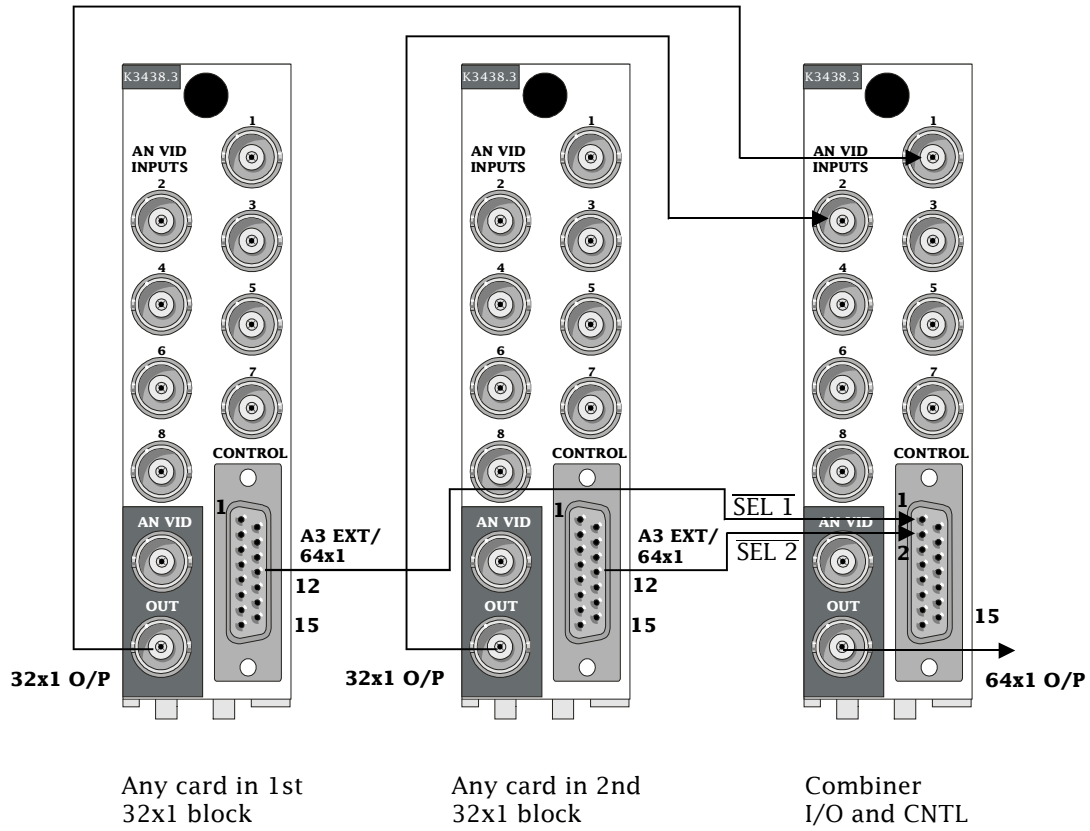
Note: With PL5 set to ON, each card in each 32x1 block has the 64x1 SEL address lines bussed together using the address expansion connectors. The 64x1 SEL line is also brought to pin 12 of the control connector on each rear connector. This address line forms an active low select line for each 32x1 block, which then become the 2 channel select signals for combiner module by making external connections.



Expansion wiring for synchronous 64X1 switcher

Building a 64x1 synchronous switch

Jumper	Cards in 32x1 blocks	Last card before combiner	Combiner	Function
PL3	BUTTON	BUTTON	BUTTON	Control mode
PL4 & PL11	ON	OFF	OFF	Analogue signal expansion O/P
PL5	ON	ON	ON or OFF	64X1 select signal
PL13	ON	OFF	OFF	DISOUT, priority switching signal
PL14	ON	OFF	OFF	CLKI/O, output clock
PL15	ON	ON	ON	$\overline{FTLOGIC}$, synchronous switching mode
PL16	OFF	OFF	OFF	Common battery supply

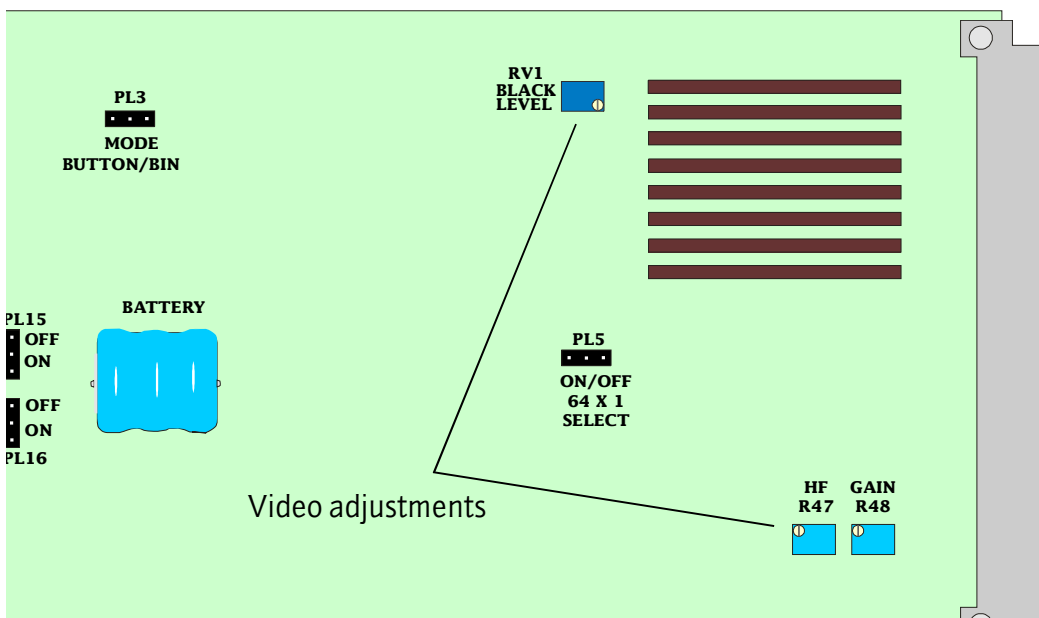


64x1 rear connections

3.5 Video adjustments

The following on-board adjustments are made at the factory and should not require readjustment:

Video adjustments	
Control	Function
RV1	DC offset or input video black level, normally set for blanking level at 0 volts
R48	Output gain, normally set for unity gain
R47	High frequency gain, normally set to achieve flat frequency response



4 **Trouble shooting**

The green card edge POWER LED is not lit

- check the PSU indicator to confirm that there is power to the frame
- check the resettable fuses protecting the card - do this by removing the power to the card for about 30 seconds then restoring the power
- if necessary, refer to the power supply trouble shooting guide in the appropriate ICON rackframe manual section

There is no output signal

- ensure that the green power LED on the front of the card is lit
- check that the inputs are connected to the rear panel and a valid signal is present
- verify that the correct channel is selected - the LED on the button panel should show the same channel number as the CHAN SEL LED on the front of the 3438 module
- check the output connection from the rear panel to the monitoring device and the output cable
- ensure that the cable wiring and jumper link settings are correct for the configuration used

The button panel will not select a different input

- ensure that the jumper PL3 is correctly set to 'BUTTON' on all modules
- check that the expansion cables are correctly installed
- check that another, higher numbered, input is not permanently selected

The output signal is corrupted

- check that jumpers PL4 and PL11 are set correctly for the configuration
- ensure all expansion cables are installed correctly

In a 64x1 configuration, only half of the inputs are being routed

- check that the $\overline{64x1\ SEL}$ line (PL3 ON) from pin 12 of CNTL on the rear panel from each 32x1 block is properly connected to the SEL 1 and SEL 2 pins of the combiner CNTL connector
- check that a video output is connected from each 32x1 block to the first two combiner inputs

5 **COSMOS status monitoring**

If the frame is fitted with a COSMOS controller card the following parameters will be reported back to the COSMOS status monitoring system:

- module present
- input selected
- module power LED status

In addition, the module is programmed with the following information, which can be read by the status monitoring controller:

- module type
- module bar code
- module issue no

For further details of the Pro-Bel status monitoring system please refer to the COSMOS status monitoring manual.

6 Specification

Inputs

Number and type:	8, unbalanced, sync tip restored
Impedance:	75Ω
Amplitude:	1V P-P nominal, headroom +3dB
Return loss:	> 40dB to 4.43MHz, >33dB to 8MHz @1VP-P
Max superimposed DC:	±6V

Outputs

Number and type:	2, unbalanced DC coupled
Amplitude:	1V P-P into 75 Ohms
Gain adjustment:	+1dB to -0.4dB
Return loss:	> 48dB to 4.43MHz, > 40dB to 8MHz
DC on o/p signal: (300mV sync)	< ±30mV
O/P isolation:	> 39dB, 50Hz to 5.5MHz
Impedance:	75Ω nominal

Performance

Gain:	0dB nominal into 75Ω
Gain Stability:	< 0.1dB drift to 8MHz, < ± 0.25dB to 15MHz < ±0.35dB to 15MHz (32x1 or larger)
Group delay:	< 5ns 50Hz to 15MHz
Propagation delay:	13.9ns ±0.2ns
Differential gain:	< 0.1% @ 4.43MHz
Differential phase:	< 0.1 degrees @ 4.43MHz
Noise (ITU-R Rec. 567-2):	Luminance weighted< -80dB RMS Chrominance weighted< -80dB RMS LF and Random< -60dB P-P
Switching transients:	< ±30mV

Black level steps:	< $\pm 20\text{mV}$
Crosstalk:	< -60dB @ 4.43 MHz all channels hostile < -65dB @ 4.43 MHz single channel adjacent
Crosspoint changeover timing:	During line 6/319 of a PAL video signal and line 9/271 of an NTSC video signal with a Pro-Bel 2315 sub-module fitted, asynchronous otherwise.

Control

Battery supply voltage: (BATTSUP)	If supplied by external DC source, +3.5V to +12V
External field trigger: (FTLOGIC)	Allows switch transition to be synchronised to external source
BUTTON mode:	Max current sunk by select line 8mA for 24V external supply, 4mA for +12V on board supply. (LAMP SUP 12V @ 100mA maximum)
BINARY mode:	3 bit binary address, 12V CMOS positive logic convention
Card select (CLKI/O):	Disables other cards in an expanded system
Priority encoding: (DISIN/DISOUT)	Encodes switcher priority for expanded system

Indications

Power:	Green LED
Input selected:	8 x yellow LEDs

General

Power:	+5V DC, $\pm 13.5\text{V}$ DC from ICON rackframe
--------	---

Temperature range

Operating:	0° to +40°C
Storage:	-10°C to +70°C

7 **Ordering Information**

ICO-3438-3000

Analogue Video 8x1 switch with 30mm rear panel