

digital keying modular
interface audio
converters analogue video

GEN104

Test pattern generator

USER MANUAL



GEN104 Digital Test Pattern Generator

USERS MANUAL

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CONTENTS

INTRODUCTION	3
SPECIFICATION	4
MECHANICAL	4
ELECTRICAL	4
USER ADJUSTMENTS	5
CARD EDGE VIEW	5
10 WAY PIANO SWITCH	5
HPOS FINE	5
SHAFT ENCODER	6
TEST PATTERNS.....	6
DETAILED DESCRIPTION OF MENUS FOR ACTIVE FRONT PANEL CONTROL	8
NAVIGATING THE DISPLAY	9
UPDATING THE DISPLAY	9
MODULE SELECTED	9
HOME MENU	10
INSTALLATION INFORMATION	12
FR2AV 2U FRAME FOR 12 MODULES	12
RM01 CONNECTIONS.....	12
NOTE FOR GEN104 THERE ARE NO CONNECTIONS MADE ON INPUTS LABELLED U/B IN, Y/G IN AND V/R IN	12
RM18 CONNECTIONS.....	12
NOTE FOR GEN104 THERE ARE NO CONNECTIONS MADE ON INPUTS LABELLED U/B IN, Y/G IN AND V/R IN	13
RM02 CONNECTIONS.....	13
GENERAL PURPOSE INTERFACE	14
FR2AV, FR1AV & DTB-AV GPI CONNECTIONS	15
FR2AV GPI CONNECTIONS	15
FR1AV GPI CONNECTIONS	15
DTBAV GPI CONNECTIONS.....	15
<i>Table shows Pin number</i>	15
OLDER FRAMES – FR1-6 , FR2-12 , FR2-8 AND DTB-2	16
FR2-12 FRAME GPI CONNECTIONS.....	17
FR2-8 FRAME GPI CONNECTIONS.....	17
DTB-2 FRAME GPI CONNECTIONS.....	18

INTRODUCTION

The GEN104 is a 10 bit Serial Digital Test Pattern Generator with 4 serial digital outputs. It is very compact with 6 modules fitting in the 1U frame FR1AV, and 12 modules fitting in the 2U frame FR2AV.

It will accept either 625 or 525 line input, with automatic detection from external sync signal.

The unit will plug into the front of the rack frame, and the universal connection system will allow a mixture of Crystal Vision modules, without the use of extra rear panels, in both 1U and 2U frames. The hinged front panel of the case reveals user control of the card, and also LED indication of status. There is a 10 way piano switch that allows selection of some user options, and when used in combination with the a rotary shaft control will allow 9 different test pattern selections and test pattern horizontal picture position with respect to in coming sync timing. Further configuration is possible using movable links.

SPECIFICATION

Mechanical

Dimensions 100mm x 266mm module with DIN 41612 connector.
Indication at end of board with access from hinged front panel.

Weight 260g

Electrical

Power consumption 5.0 Watts

Analogue Input External Sync input can be composite black & burst or 2 volt mixed H & Vsync into 75 ohms.

. Auto or manual 525/625 standards selection.

+/- 2uS adjustment of picture position from syncs.

Output: 4 x 270Mb/s serial digital to EBU Tech 3267-E and SMPTE-259M with EDH (on some frames and rear modules only 2 or 3 SDI outputs are available)
<500ps 1KHz jitter and <800ps broadband jitter from stable 300mV Black and Burst reference or mixed sync reference.

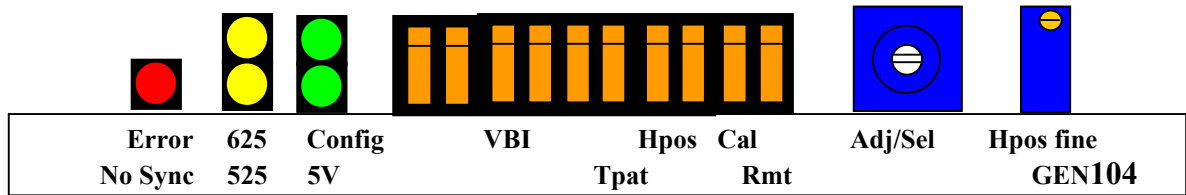
Blanking To 601 specification

Test Patterns The GEN104 has 9 digital test patterns.

Ramps
Edge of frame markers
Frequency sweep
Grey
Multi frequency burst
100% Colour Bars
EBU Colour Bars
SDI test
Black

USER ADJUSTMENTS

CARD EDGE VIEW



10 way piano switch

Pole	Marking	Function
1		Not used
2		Not used
3	VBI	Up for normal blanking Down leaves lines 6 to 22 and 319 to 335 in 625 standard and lines 10 to 20 and 273 to 282 in 525 standard unblanked.
4		Not used
5		Not used
6	Tpat	Down selects internal pattern. Adjusted by Adj/Sel rotary control.
7	Hpos	Down allows adjustment of horizontal picture position up to +/- 2uS from reference sync input. Adjusted by Adj/Sel rotary control.
8		Not used
9	Cal	Normally Up. Switch down then up again to force horizontal picture position to the default factory setting. Only applies in local mode and when Hpos piano pole 7 is down.
10	Rmt	Up local board edge control (local mode). Down remote control by active front panel of GEN104 (remote mode)

Note the selections of 10 way piano switch poles 1 to 9 only apply when pole 10 (Rmt) is in the up position. When pole 10 is down, the sections for poles 1 to 9 are determined by the settings from the active control panel.

Hpos fine

This is a multiturn potentiometer and allows fine adjustment of horizontal picture position relative to incoming syncs. The adjustment range of this potentiometer is approximately +/- 100 nS. The adjustment is possible in either local or remote mode.

Shaft Encoder

The shaft Encoder is a rotary control labelled Adj/Sel and is used in combination with the 10 way piano switch to adjust various parameters when setting up the board. It is only used in local mode. It should be noted that the same parameters can also be adjusted by the shaft encoder on an active remote control panel while in remote mode. In all cases the values set are retained through power down, and restored when the unit is powered up.

Local Mode Only

Parameter being adjusted by shaft encoder Adj/Sel		
Tpat (pole 6)	Hpos (pole 7)	
Down	Up	9 different test patterns on full screen.
Up	Down	Horizontal picture position of incoming video. +/- 2uS adjustment. Note switching Cal (pole 9) down then up again will select the factory default setting .
Down	Down	Horizontal picture position of generated test pattern with respect to in coming sync timing.
Up	Up	None. This would be the normal operational setting.

Test Patterns

There are 9 digital patterns available

Ramps

Edge of frame markers

Frequency sweep

Grey

Multi frequency burst

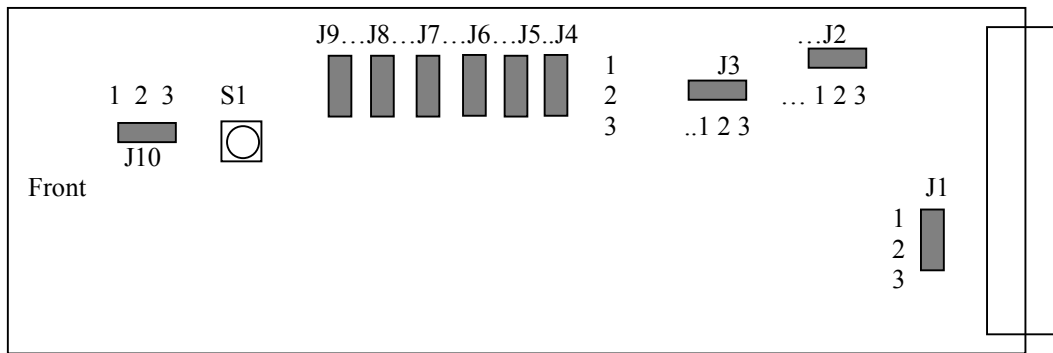
100% Colour Bars

EBU Colour Bars

SDI test

Black

GEN104 card



Jumper settings for J2 and J3

625 / 525 line selection is controlled by a link on J2 and J3 . With the link on J2 in position 2-3 the GEN104 will auto-select between 625 and 525 line mode based on the standard on the sync input. With the link on J2 in position 1-2 the GEN104 will be forced to the standard determined by jumper J3. With the link on J3 in the 1-2 position the standard is 625 lines and with link on J3 in the 2-3 position the standard is 525 lines.

Jumper setting for J1

J1 link setting affects the external sync input. With the link on J1 in the 1-2 position the external sync in is terminated on the board by 75 ohm resistor and there is no signal on the external sync loop out. With the link on J1 in the 2-3 position the external sync input is high impedance and is also connected to the external sync loop out.

Hex switch S1

This switch is normally set to position 0 (factory default). If the GEN104 card is used in older frames such as FR2-12 or FR1-6 and these frames are being used with an active front panel then the Hex switch S1 can be used to set the node number (0 to 15)of the card. Note no two cards in a frame should have the same node number.

Jumper setting for J10

Jumper on J10 is normally set to position 2-3 (factory default). If the GEN104 card is used in older frames such as FR2-12 or FR1-6 and these frames are being used with an active front panel then the jumper can be set to add 16 to the node number which is set by the Hex switch S1.

FRONT PANEL LEDS (from left)

Red	On	No valid syncs on sync input. GEN104 will free run.
	OFF	Valid syncs present on sync input.
Yellow (upper)	On	Input signal is 625 line standard
Yellow (lower)	On	Input signal is 525 line standard
Green (upper)	On	Power on configuration has finished
	Off	Power on configuration is taking place. Usually lasts 2-3 seconds.
Green (lower)	On	The onboard +5V and –6V power rails are OK
	Off	One or both of the onboard +5V and –6V power rails has a problem (low value) or is not present.

DETAILED DESCRIPTION OF MENUS FOR ACTIVE FRONT PANEL CONTROL

This section shows the available menus on the GEN104 under active front panel control.

The 10 way piano switch pole 10 (labelled Rmt) must be in the down position for remote control operation. Many of the parameters which are set in local mode (settings made by 10 way piano switch and by use of local shaft encoder) can be adjusted separately, and in fact made different , while in remote mode using the Active Front Control Panel.

The Crystal Vision Active Front Control Panel is available as an integral part of the FP2-LF front door for the FR2AV 2U frame or as a remote panel REM1U. It communicates using a common bus to all the cards in a frame via an RS422 communication port. Only one control panel can be connected to any frame, although one panel can control two frames.

At power up, the two line 20-character screen will display ‘Crystal Vision’ followed by the firmware version number for the control panel. Once the control panel is initialised, each module in a frame is polled. Modules that have completed their own initialisation will respond with a node address.

The control panel will display the name of the module that first responds to the polling request together with its node address.

Please refer to the Installation chapter and the appropriate Frame manual for further information on node addresses.

Navigating the display

The control panel keys are assigned the following functions when controlling the ADC104:

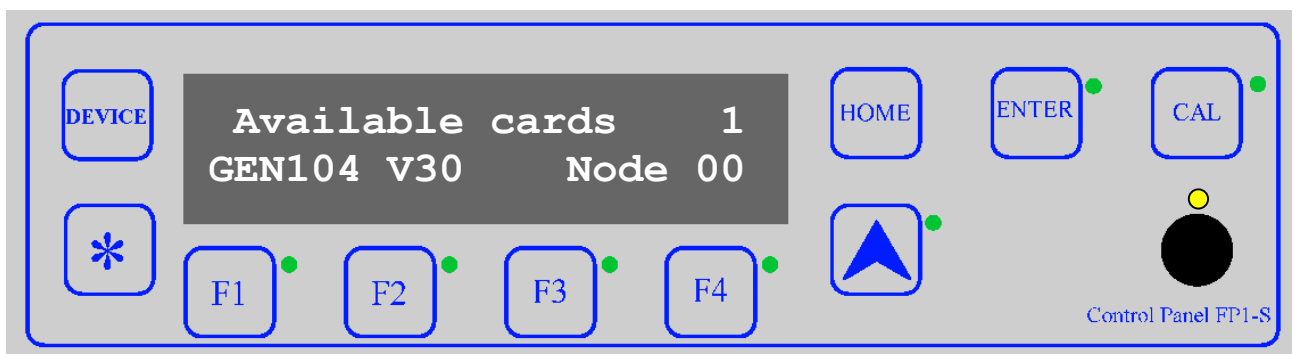
- DEVICE – selects a card or module to control
- Asterisk – no function assigned
- F1 to F2 – soft keys, function assigned within each menu
- HOME – moves the display to the home menu
- ENTER – no function assigned
- CAL – used to calibrate or clear chosen parameter(s)
- Upward arrow – used to move up the menu structure
- Rotary control – shaft encoder used to select options or variable data

In general the lit yellow LEDs will indicate which keys or control are active for a given 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 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, use the upward arrow to leave and then re-enter a menu or in some cases press the F4 key to update the display.

MODULE SELECTED



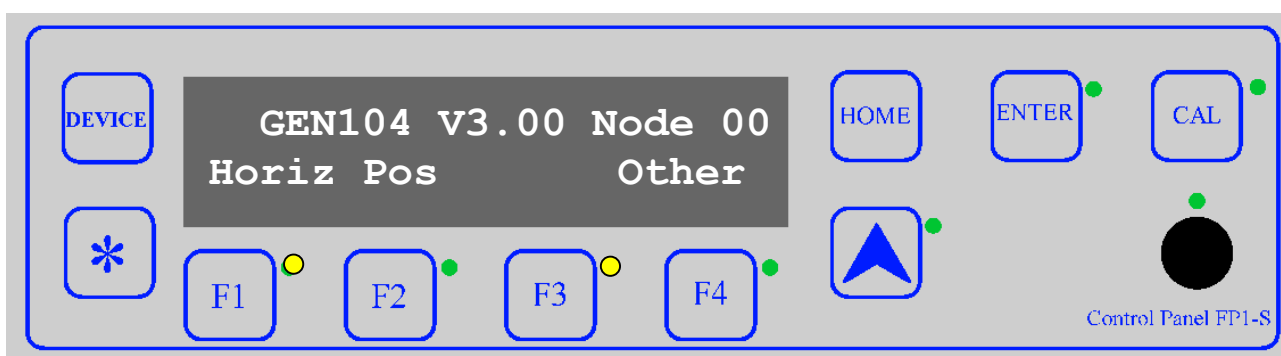
To select a particular module in a frame, press the DEVICE key. The top line of the display will change to show 'Available Cards X', where X is the number of cards that have responded so far to the polling request. Rotating the shaft encoder will cause the

bottom row of the display to cycle through the successfully polled cards by name and node number.

This message shows that an GEN104 has been selected with the version of software on the module as V3.00 and that node 0 is being used to address it. On the FR1AV and FR2AV frames node 0 is the top left hand slot (labelled slot 1). Depending on the software version and the node address used the output may differ from that shown above.

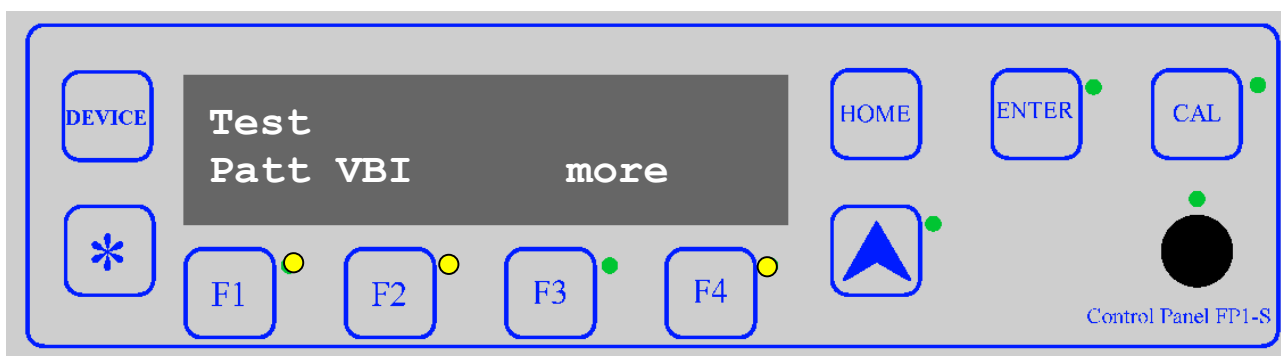
HOME MENU

The home menu is access by pressing the ENTER key. Furthermore, at any point in the menu structure the HOME key can be pressed to show the following output:



Pressing the F1 key leads to further Menu which allows the picture position to be adjusted +/- 30 pixels (+/- 2uS). The factory default setting is 0 pixels.

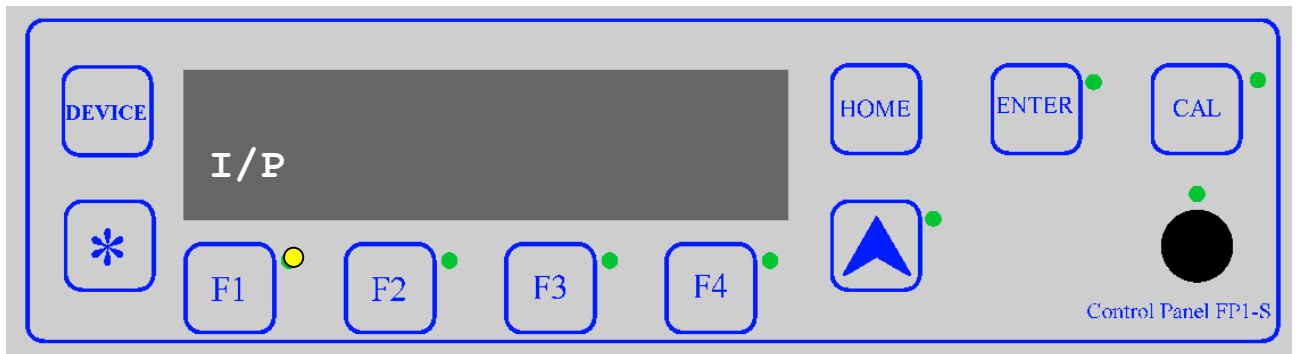
Pressing the F3 key leads to the following Menu



Pressing the F1 key leads to a further Menu which allow the Test Pattern to be switched on/off and allows selection of 9 different patterns (full screen). The display will indicate which test pattern is currently being generated.

Pressing the F2 key leads to a further Menu which allows VBI blanking of the generated test pattern to be switched on/off

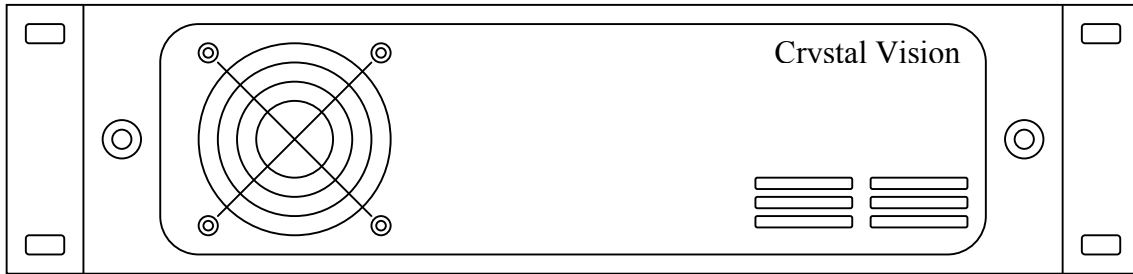
Pressing the F4 key leads to the following Menu



Pressing the F1 key leads to a further Menu which displays the status of the input signal. This includes whether the input sync signal is 625 or 525 standard and whether or not the selected syncs are present.

INSTALLATION INFORMATION

FR2AV 2U Frame for 12 Modules



The 2U FR2AV frame will house up to 12 modules and dual power supplies. A hinged front panel gives access to the PSU and all modules. The universal frame wiring system allows any of the interface range of modules to be fitted in any position with the use of removable rear modules.

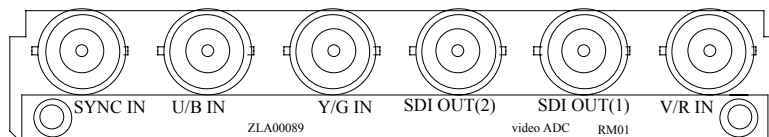
The modules can be plugged in and removed while the frame is powered without damage.

Each GEN104 card has an associated rear connector module RM01. Each RM01 is a single slot high, so that up to 12 such modules, in any mix could be fitted onto an FR2AV frame so it can hold up to 12 GEN104 cards. Other Crystal Vision RM and Interface cards can be mixed in any quantity with GEN104 cards, up to a maximum of 12 cards, providing the other cards do not exceed the power rating of the PSU chosen (normally 150 watts).

The 1U FR1AV frame will house up to 6 modules and one power supply.

The 1U high Desk Top Box DTB-AV will house up to 2 modules and has a built-in power supply.

RM01 CONNECTIONS



Note for GEN104 there are no connections made on inputs labelled U/B IN, Y/G IN and V/R IN.

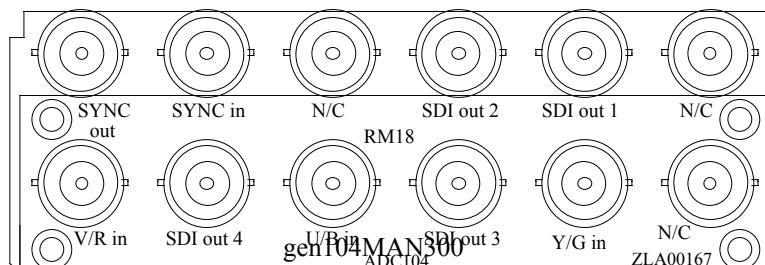
RM18 CONNECTIONS

The RM18 provides extra outputs of the SDI signal and an external sync loop out from a single GEN104 card. The RM18 occupies 2 slots positions and therefore allows up to

6 GEN104s per 2U FR2AV frame

3 GEN104s per 1U FR1AV frame

1 GEN104 per DTB-AV



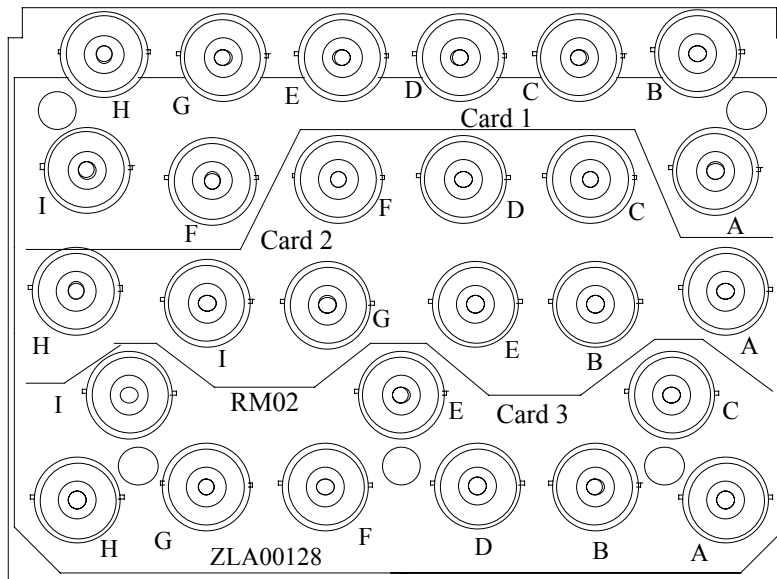
Note for GEN104 there are no connections made on inputs labelled U/B IN, Y/G IN and V/R IN.

RM02 CONNECTIONS

The RM02 rear module occupies 4 slot positions and can only be fitted into a 2U FR2AV frame. Three GEN104s can be fitted into one RM02. One in the top slot position(card 1), another in the second from top slot position(card 2), and the third in the bottom slot position(card 3). Other types of cards can be mixed on the same RM02.

The RM02 allows up to 9 GEN104s per 2U FR2AV frame.

Each GEN104 provides 3 SDI outputs plus a Sync Loop Out.



RM02 with label ZLA00128

Label	Function
A	SDI Output (1)
B	SDI Output (2)
C	N/C
D	SDI Output (3)
E	N/C
F	N/C
G	N/C
H	External Sync loop out (see jumper setting J1)
I	External Sync in

GENERAL PURPOSE INTERFACE

There are 6 GPI 'a' to 'f' on the GEN104 card. They basically perform the same functions as some of the poles on the 10 way piano switch. Note for the GPIs to be effective the corresponding piano poles must be in the **up** position. The function of GPIs are as follows

Links on jumpers J4 to J9 in 1-2 position.

GPI number	Direction	Function
'a'	Input	Active low, selects current Test Pattern, local mode only
'b'	Input	Not used
'c'	Input	Not used
'd'	Input	Not used
'e'	Input	Not used
'f'	Input	Not used

Links on jumper J8 in 2-3 position

GPI number	Direction	Function
'e'	Output	Active low, indicates sync input is not valid. Note if this output is used to drive an LED then a 330 ohm resistor must be added in series with the LED.

The GEN104 has the option of being remotely controlled via a second RS422 communications port by using 4 of the 6 GPI lines. This is done by moving the 4 jumpers J4 to J7 to the 2-3 position. The RS422 connections to the GEN104 card would be made via the Remote 1 connector on FR1-6 or FR1AV frame, Remote 1 or Remote 3 connector on a FR2-12 or FR2AV frame and by the 15way Remote connector of the DTB-2 or DTB-AV frame. The connector pin numbers are dependant on which slot number the GEN104 card is installed in (see FR2AV, FR1AV &DTBAV GPI CONNECTIONS) An active front panel control on the front of the Crystal Vision REM1U remote control panel would typically be used on this second RS422 port. Note an GEN104 card can not be controlled by 2 active front control panels (one on each RS422 communications port) at the same time.

Links on jumpers J4 to J7 in 2-3 position.

GPI number	Jumper	Direction	Function
'a'	J6	Input	RS422 Rx-
'b'	J7	Input	RS422 Rx+
'c'	J5	Output	RS422 Tx+
'd'	J4	Output	RS422 Tx-

FR2AV, FR1AV & DTB-AV GPI CONNECTIONS

Each slot has an associated set of connections on the frame rear-panel remote connectors. The tables below show the GPI connections described above.

FR2AV GPI CONNECTIONS

Remote 1 and Remote 3: 26 way high density D-type **sockets**.

+5V @ 500mA is pin 1. Frame ground is pin 2.

Remote 2 and Remote 4: 26 way high density D-type **plugs**.

+5V @ 500mA is Remote 2 pin 15. Frame ground is pin 6.

Table shows Pin number (Remote number)

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
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)

FR1AV GPI CONNECTIONS

Remote 1: 26 way high density D-type **socket**.

+5V @ 500mA is pin 1. Frame ground is pin 2.

Remote 2: 26 way high density D-type **plug**.

+5V @ 500mA is pin 15. Frame ground is pin 6.

Table shows Pin number (Remote number)

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
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)

DTBAV GPI CONNECTIONS

Remote 15 way D-type **socket**.

Frame ground is pin 15.

Table shows Pin number

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
1	1	2	3	4	5	6
2	9	10	11	12	13	14

OLDER FRAMES – FR1-6 , FR2-12 , FR2-8 AND DTB-2

FR1-6 1U FRAME FOR 6 MODULES.

FR2-12 2U FRAME FOR 12 MODULES.

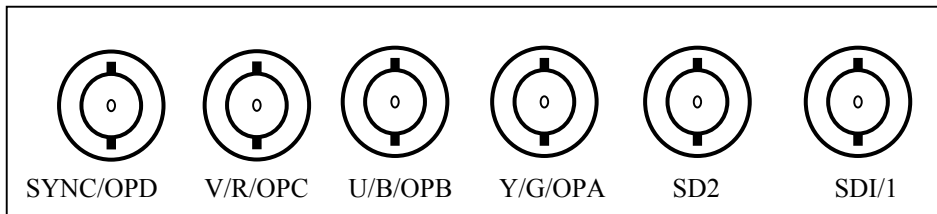
FR2-8 2U FRAME FOR 6 MODULES.

DTB-2 1U FRAME FOR 2 MODULES.



The 1U FR1-6 frame for 6 modules includes rear panel BNC connections and plug-in power supply. A hinged front panel gives access to the PSU and all modules. The universal frame wiring system allows any of the interface range of modules to be fitted in any position. The 2U FR2-12 frame houses up to 12 modules and dual power supplies. The 2U FR2-8 frame houses 8 modules each with extra rear panel BNC connections. The modules can be plugged in and removed while the frame is powered without damage.

FR1-6, FR2-12 & DTB-2 REAR CONNECTIONS



FR1-6, FR2-12 & DTB-2 CONNECTIONS

SDI/1	Serial Digital Output.
SD2	Serial Digital Output
Y/G/OPA	N/C
U/B/OPB	N/C.
V/R/OPC	N/C
SYNC/OPD	External sync input.

FR2-8 CONNECTIONS

SDI/1	Serial Digital Output
SD2	Serial Digital Output
Y/G/OPA	N/C
Y/G/OPA(2)	Serial Digital Output
U/B/OPB	N/C
U/B/OPB(2)	Serial Digital Output
V/R/OPC	N/C
V/R/OPC(2)	N/C
SYNC/OPD	External sync input.
SYNC/OPD(2)	External sync loop out

FR1-6, FR2-12 & FR2-8 GPI CONNECTIONS

Each slot has an associated set of connections on the frame rear-panel remote connectors. The tables below show the GPI connections described above.

FR1-6 FRAME GPI CONNECTIONS

Remote 1: 26 way high density D-type **socket**. Frame ground is pin 2.

Remote 2: 26 way high density D-type **plug**. Frame ground is pin 6.

Table shows Pin number (Remote number)

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
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)

FR2-12 FRAME GPI CONNECTIONS

Remote 1 and **Remote 3:** 26 way high density D-type **sockets**. Frame ground is pin 2.

Remote 2 and **Remote 4:** 26 way high density D-type **plugs**. Frame ground is pin 6.

Table shows Pin number (Remote number)

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
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)	19 (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)

FR2-8 FRAME GPI CONNECTIONS

Remote 1 and **Remote 2:** 26 way high density D-type **sockets**. Frame ground is pin 1.

PSU Relay connection on pin 10.

Table shows Pin number (Remote number)

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

DTB-2 FRAME GPI CONNECTIONS

Remote 15 way D-type **socket**.

Frame ground is pin 15.

Table shows Pin number

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
1	1	2	3	4	5	6
2	9	10	11	12	13	14