TPG102

Test pattern generator

USER MANUAL

Crystal Vision

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TPG102 Test Pattern Generator
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INTRODUCTION

The TPG102 is a 10 bit Serial Digital Test Pattern Generator. It is very compact with 6 modules fitting in a 1U frame. It will generate either 625 or 525 line standard outputs with automatic detection from external reference sync signal or it will free run with a user selectable line standard. There is storage for up to 32 digital test patterns.

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 are two rotary switches for test pattern selection and an 8 way piano switch. The piano switch selects line standards when there is no reference sync, EDH transmission, Y only or C only and horizontal and vertical delay adjustments. A third rotary switch SW2 selects the remote control node address. Further configuration is possible using movable links.

Remote control is possible using either the Crystal Vision Active Remote Control Panel, RS422, RS232 or GPI.

SPECIFICATION

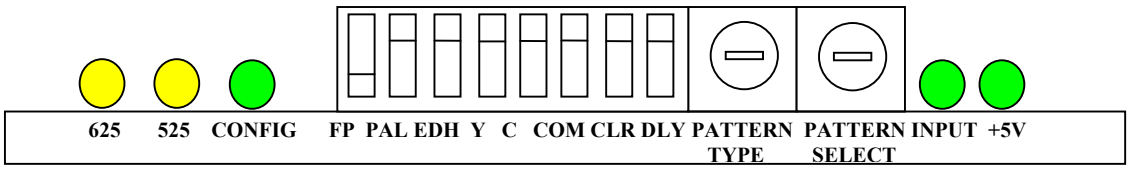
Mechanical

Dimensions	100mm x 266mm module with DIN 41612 connector. User adjustments and indication at end of board to allow access from hinged front panel.
Weight	270g

Electrical

Analogue Input	Sync input 300mV or 2 volt into 75 ohms. Auto or manual 525/625 selection.
Output	2 x 270Mb/s serial digital to EBU Tech 3267-E and SMPTE-259M
Adjustments	0 to 1 line adjustment of horizontal picture position from syncs in 74ns steps. 0 to 624 lines adjustment of vertical picture position in 1 line steps for PAL. 0 to 524 lines adjustment of vertical picture position in 1 line steps for NTSC.
Blanking	To 601 specification vertically.
Test Patterns	Up to 32 digital test patterns.

VIEW OF BOARD FRONT



OPTIONS AVAILABLE FROM FRONT PANEL

DIL SWITCH	UP	DOWN
DIP 1	Remote Control Front Panel Connected. On board switches will not control the module. Remote control is possible.	Remote Control Front Panel Not Connect. On board switches control the module. No remote control is possible.
DIP 2	Output PAL when no input reference	Output NTSC when no input reference
DIP 3	No EDH added	EDH Added
DIP 4	Y and C output	Y only output
DIP 5	Y and C output	C only output
DIP 6	Comms speed 19200 Baud	Comms speed 9600 Baud
DIP 7	No reset of H and V Delay	Reset H and V Delay
DIP 8	No program of Delay	Program Delay

FRONT PANEL LEDS (from left)

Yellow	625	625 input detected
Yellow	525	525 input detected
Green	Config	Board configured and ready for use
Green	Input Present	Valid reference sync input detected
Green	+5V	Supply Voltage present.

LOCAL MODE

Pattern Selection

Pattern banks are selected by rotating the Pattern Type Hex switch. Patterns are selected within a bank by rotating the Pattern Select Hex switch.

Rotating Test Patterns

Each test pattern can be made to rotate about its central horizontal position. This is achieved by setting the pattern type Hex switch to the pattern type number required and adding 8 to the value.

For example, if a rotating Mixed pattern is required, the static version is set as 4 on the Pattern Type Hex switch and 0 on the Pattern Select Hex switch. The rotating version is selected by setting the Pattern Type Hex switch value to 4 + 8 = C.

User Memories

User memories are not available in local mode only remote mode.

Vertical And Horizontal Delay Adjustment

When DIP 8 is set in the down position the horizontal and vertical picture positions can be adjusted.

Rotating the pattern select switch clockwise increases the delay between the output timing and the input reference sync by 74ns on each setting up to a maximum of one line. Rotating the pattern type switch clockwise increases the delay between the output timing and the input reference sync by one line on each setting up to a maximum of one frame.

At any point DIP 7 can be set to the down position to clear both the horizontal and vertical delay amounts to zero.

N.B. After adjustment, when DIP 8 is brought up again, it may be necessary to re-select the required pattern.

REMOTE MODE (REMOTE CONTROL PANEL)

In the REMOTE mode, when the appropriate TPG102 has been selected according to NODE number set by SW2, the operator enters the top level of the menu structure. Here the operator can choose to enter the pattern selection menu, the user memory area, the test pattern mode menu or the delay from reference menu.

Pressing the up arrow key on the control panel puts the operator up one level in the menu structure. If in the pattern select menu level then pressing the up arrow key puts the operator back to the main menu. At any point in the menu structure pressing the HOME key on the control panel puts the operator back to the top level of the menu structure.

Pattern Selection

If the pattern select submenu key is pressed then the pattern bank and the pattern selected within that bank is shown on the control panel display e.g. Bars and 100%

Bars. Pressing the F1 key cycles through the pattern banks each time and wraps round back to the first bank. Pressing the F4 key cycles through the available patterns within the bank wrapping around back to the first pattern in the bank. After a bank or pattern key has been pressed the shaft can be used to go forwards or backwards through the choices.

User Memories

If user memories are chosen then the user memory number is shown on the control panel display. When the Write function is Off, user memories are immediately recalled. Pressing the F1 key cycles through the user memories each time and wraps round back to user memory 1. After pressing the F1 key the shaft can be used to go back and forth through the 10 user memory locations. Keys F2 and F3 do not perform a function but allow the bank and pattern name to be displayed for the indicated user memory location. Pressing F4 turns the Write function from Off to Copy mode. In this mode the operator can go back to the pattern selection menu and choose a pattern to store in the user memory. On re-entering the User memory menu, a memory location can be chosen to store the current pattern. When a location has been chosen, pressing the Write key again writes the current pattern to the user memory location. An OK message is briefly flashed up to indicate that the memory location has stored the pattern and the Write mode then goes to Off to allow recall of user memories.

Mode Changing

If the Mode submenu is entered then the operator can force the current pattern to be luminance only by pressing the F1 key. Similarly it can be forced to chrominance only by pressing the F2 key. If Y only and C only are both on then the pattern shows both its Y and C components. Also, each test pattern can be made to rotate about its central horizontal position. This is achieved by pressing the F3 key. If no external reference is applied on power up of the module then the generator is free running and the line standard can be forced by pressing the F4 key. If a reference is applied when the module powers up then the line standard is shown on the display but cannot be changed.

Delay Adjustment

When the Delay submenu is entered the horizontal and vertical picture positions can be adjusted. To adjust the delay the F3 Prog mode switch must be on. Pressing F1 the horizontal delay key and rotating the shaft clockwise increases the delay between the output timing and the input reference sync by 74ns on each setting up to a maximum of one line. Pressing F2 the vertical delay key and rotating the shaft clockwise increases the delay between the output timing and the input reference sync by one line on each setting up to a maximum of one frame. At any point the F4 Reset key can be pressed to clear both the horizontal and vertical delay amounts to zero. Independent values are stored and used for PAL and NTSC line standards.

TEST PATTERNS

PATTERN TYPE	PATTERN SELECT	PATTERN	DESCRIPTION
0	0	100% Colour Bars	
0	1	EBU Colour Bars	75% Saturation
0	2	95% Colour Bars	
0	3	Split Bars	PAL EBU Colour Bars and Red, NTSC SMPTE Bars are used
1	0	Peak White	Y=235 U/V=128
1	1	Black	Y=16,U/V=128
1	2	Hard Grey	Y=127 U/V=128
1	3	Red	Y=65,U=100,V=212
1	4	Field 1 Only	Field 1 white Field 2 black
1	5	Field 2 Only	Field 1 black Field 2 white
2	0	Luma Only Ramp	Y ramp 16-235 with shaped transition
2	1	Valid Ramp	Y ramp 16-235
2	2	Limit Ramp	Y ramp 1-254
2	3	10 Bit Blue Ramp	Shallow ramp
2	4	Shallow Ramps	5 Shallow ramps of ascending Y=U=V values
2	5	Steps	5 amplitude steps in Y at 15, 59, 103, 147, 191, 235
2	6	Modulated Ramp	PAL 4.43MHz modulation NTSC 3.58MHz modulation
3	0	Luma Only Multi-frequency Burst	Y only at 1,2,3,4,5MHz
3	1	Multi-frequency Burst	Y at 1,2,3,4,5MHz U/V at 0.5,1,1.5,2,2.5MHz
3	2	Luma Only Frequency Sweep	Y only frequency sweep from 0.5-5.5MHz with markers every MHz
3	3	Frequency Sweep	Y frequency sweep from 0.5-5.5MHz with markers every MHz and U/V 0.5-2.2MHz, markers at 1,1.5 and 2MHz

3	4	Bow Tie	Y 500kHz U/V 502kHz for checking Y/C delay. 20ns markers
4	0	Mixed Selection Of Patterns	Cross Hatch,EBU bars,shallow ramp,Y multi-burst,pulse and bar,Y and C multi-burst,steps,EBU bars,Cross Hatch
4	1	SDI Test	Top half has equalisation test. Bottom half has phase locked loop test
4	2	Pulse And Bar	Y is 1 T and half amplitude 20T U is 128 with half amplitude 20T V is 128 through out
4	3	Edge Of Frame Markers	Flat field with markers. Vertical stripes at pixels 0,8,711,719
4	4	Cross Hatch	Anti-aliased cross hatch pattern
5	0	PLUGE	Levels from just below black to white for setting black level and gain
5	1	SPLUGE	Levels from just below black to white for setting black level and gain + coloured boxes
5	2	Co-site	A single coloured pixel to check Y/C alignment
5	3	50Hz Rectangle	White rectangle with 50Hz repetition rate
5	4	Safe Area	Anti-aliased rounded corner box that denotes a safe area
6	0	Crystal Vision Logo	Crystal Vision Logo on blue background with text.

GENLOCK

The digital output may be timed to an external analogue reference. The genlock input will accept any 1V pp video signal that includes syncs, or 2V pp mixed syncs. A loop through output is provided and is used when J1 is jumpered in the OUT position. If J1 is jumpered in the SYNC position then no loop through occurs and the signal is internally terminated with 75R. The Input LED at the front of the board indicates that syncs are present on the reference video.

REMOTE CONTROL PROTOCOL

Communications Standard (other standards available on request)

Baud Rate	9600 or 19200 selectable from DIP switch 6
Parity	None
Data Bits	8
Stop Bits	1
Hand shaking	None

The remote control protocol is to be decided.

Remote control can be achieved using either RS232 or RS422. Jumpers J4, J5, J6 and J7 select the communications standard. With all the jumpers in the 422 position, RS422 is used and with all the jumpers in the 232 position, RS232 is used.

GENERAL PURPOSE INTERFACE

When jumpers J11, J10, J9 and J8 are jumpered on to GPI, remote control via RS422/RS232 is no longer possible. Furthermore, jumper J12 needs to be connected to GPI. In this configuration a remote switch can be used to emulate the Pattern Type rotary switch. A 4-bit rotary switch with pull-up resistors is required.

FR2AV, FR1AV & DTBAV 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

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)

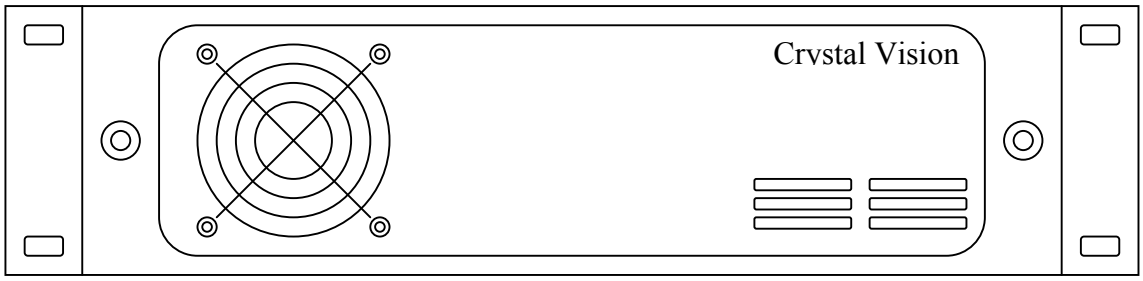
DTB-2 FRAME GPI CONNECTIONS

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

INSTALLATION INFORMATION

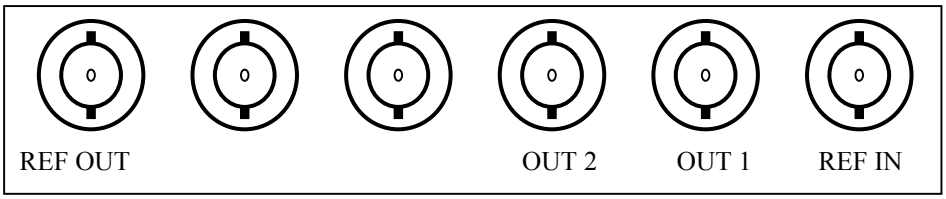
FR2AV 2U FRAME FOR 12 MODULES
FR1AV 1U FRAME FOR 6 MODULES
DTB2AV 1U FRAME FOR 2 MODULES



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.

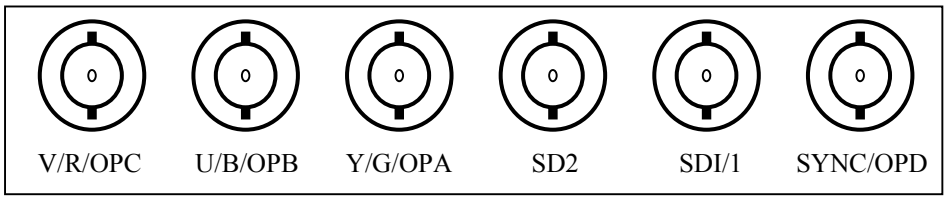
All modules can be plugged in and removed while the frame is powered without damage.

RM01 CONNECTIONS



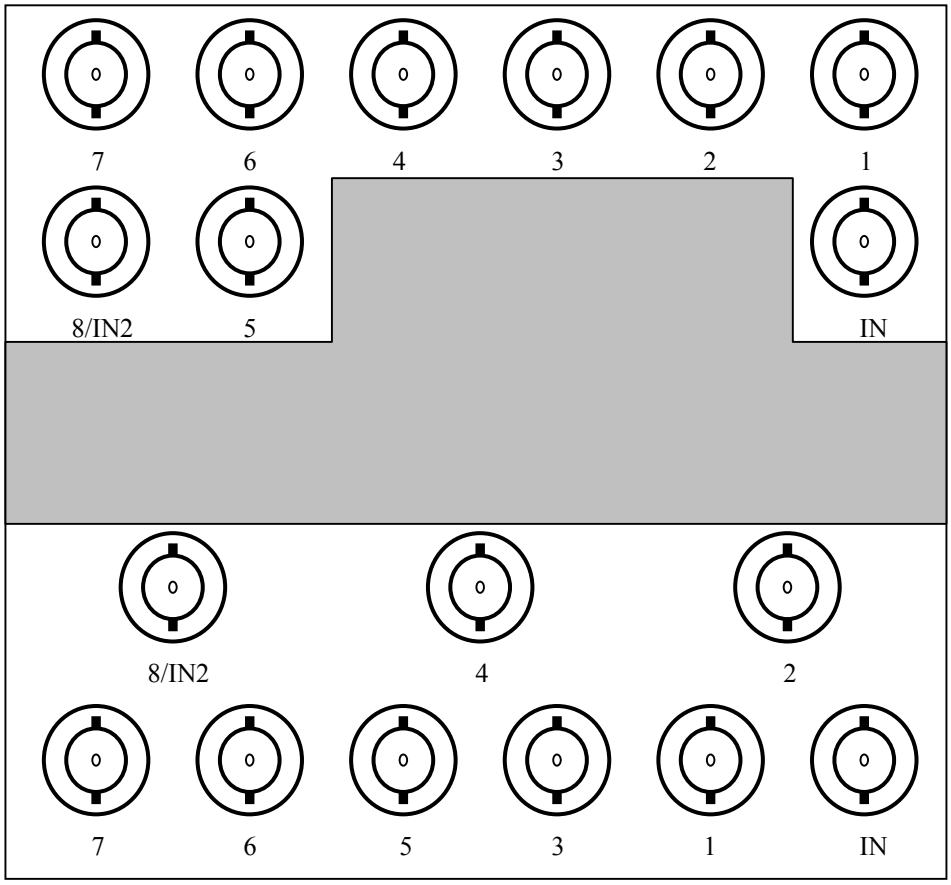
OUT 1	Serial Digital Output 1
OUT 2	Serial Digital Output 2
REF OUT	Sync Output Loop Through (if selected)
REF IN	External reference sync input

With Generic Label



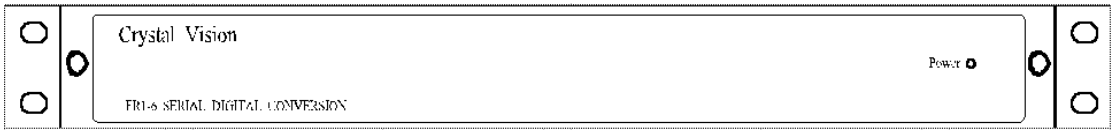
General Label Name (ZLA00073)	Description
SDI/1	Serial Digital Output 1
SD2	Serial Digital Output 2
Y/G/OPA	Not Used
U/B/OPB	Not Used
V/R/OPC	Sync Output Loop Through (if selected)
SYNC/OPD	External reference sync input

RM02 CONNECTIONS



General Label Name (ZLA00110)	Special Label Name (not available)	Description
IN	OUT 1	Serial Digital Output 1
1	OUT 2	Serial Digital Output 2
2	Not Used	
3	Not Used	
4	Not Used	
5	Not Used	
6	REF OUT	Sync Output Loop Through (if selected)
7	Not Used	
8/IN2	REF IN	External Reference Sync Input

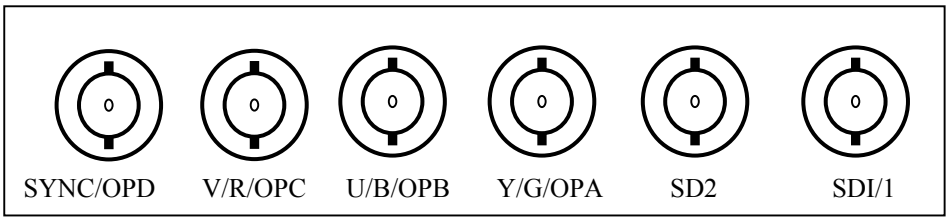
FR1-6 1U FRAME FOR 6 MODULES.
FR2-12 2U FRAME FOR 12 MODULES.
FR2-8 2U FRAME FOR 6 MODULES.
DTB-2 1U FRAME FOR 2 MODULES.



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 1
SD2	Serial Digital Output 2
Y/G/OPA	Not Used
U/B/OPB	Not Used
V/R/OPC	Sync Output Loop Through (if selected)
SYNC/OPD	External Reference Sync Input

FR2-8 CONNECTIONS

SDI/1	Serial Digital Output 1
SD2	Serial Digital Output 2
Y/G/OPA	Not Used
Y/G/OPA(2)	Not Used
U/B/OPB	Not Used
U/B/OPB(2)	Not Used
V/R/OPC	Sync Output Loop Through (if selected)
V/R/OPC(2)	Not Used
SYNC/OPD	External Reference Sync Input
SYNC/OPD(2)	Not Used