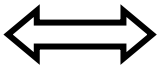
Bluebell OPTICOM LIMITED

OPERATIONS & TECHNICAL MANUAL

For

BC450T
BC450R

Analogue Audio

SDI/HD/3G  **Optical**

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Contents	**BC450T/BC450R**

BC450T

The BC450T (Optical transmitter) module accepts SDI/HD/3G video and analogue audio inputs and after processing, outputs SDI/HD/3G video with embedded audio onto optical fibre.

The BC450T module assembly comprises a BC450T audio processor sub-board coupled to a BC440T transmitter base-board.
The BC440T receives and processes the digital video and also embeds audio from the attached BC450T sub-board.
On the BC450T, eight channels of analogue audio are converted to four stereo channels of I2S digital audio.
Digital audio input to the BC440T is via intercard connectors between the BC440T and the BC450T.

The analogue audio inputs enter via a 26 way high density D type connector.

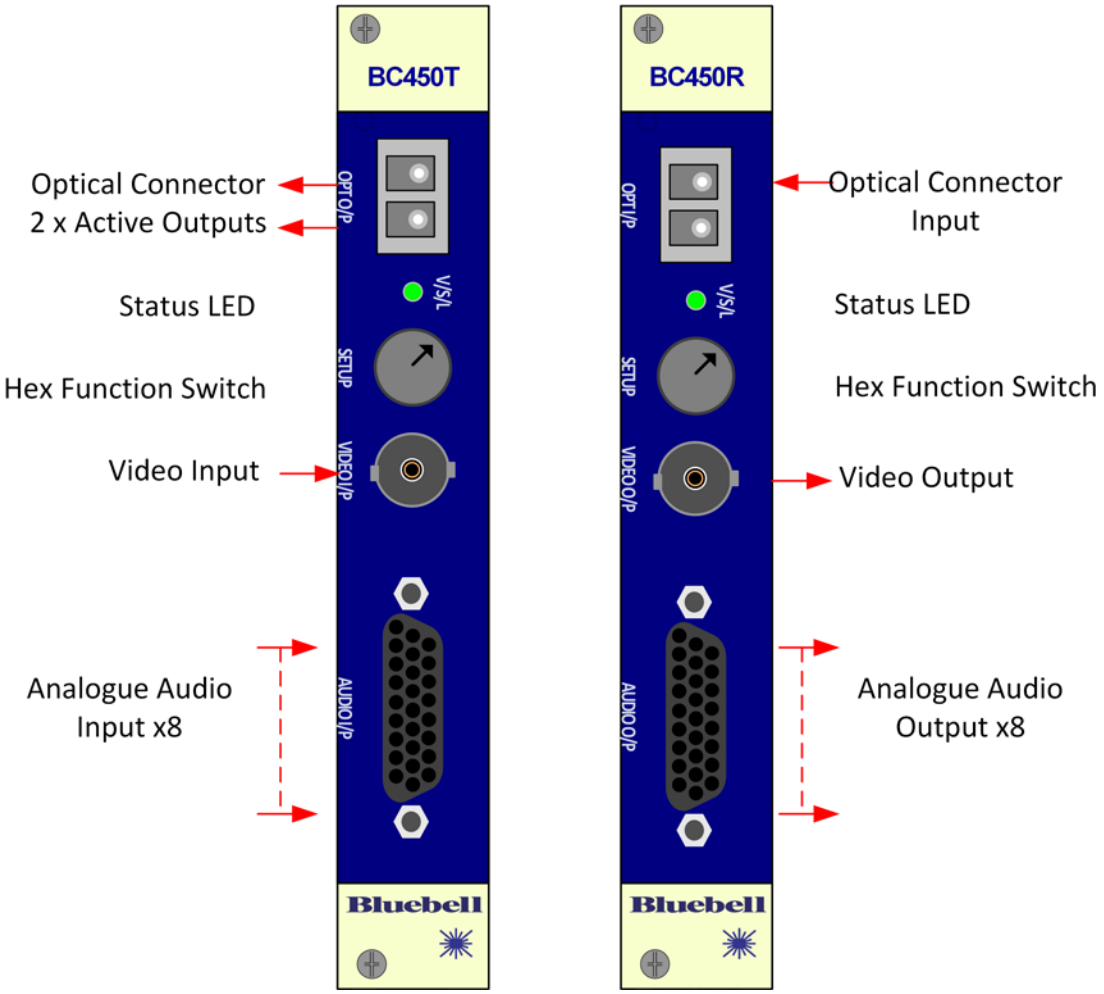
BC450R

The BC450R (Optical receiver) module receives a fibre optic input carrying SDI/HD/3G video with embedded audio and processes the audio to produce analogue audio outputs.

The BC450R module assembly comprises a BC450R audio processor sub-board coupled to a BC440R receiver base-board.
The BC440R base-board receives the optical signal and de-embeds the audio for processing by the attached BC450R sub-board.
On the BC450R, four stereo channels of I2S digital audio from the BC440R are converted to eight channels of analogue audio.
Digital audio connection between the BC440R and the BC450R is via intercard connectors.

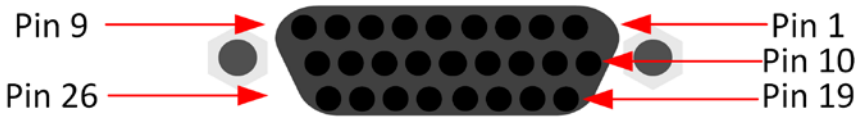
The analogue audio outputs come out on a 26 way high density D type connector.

Product photos	BC450T/BC450R



BC450T Optical transmitter

BC450R Optical receiver



Specification	BC450T/BC450R

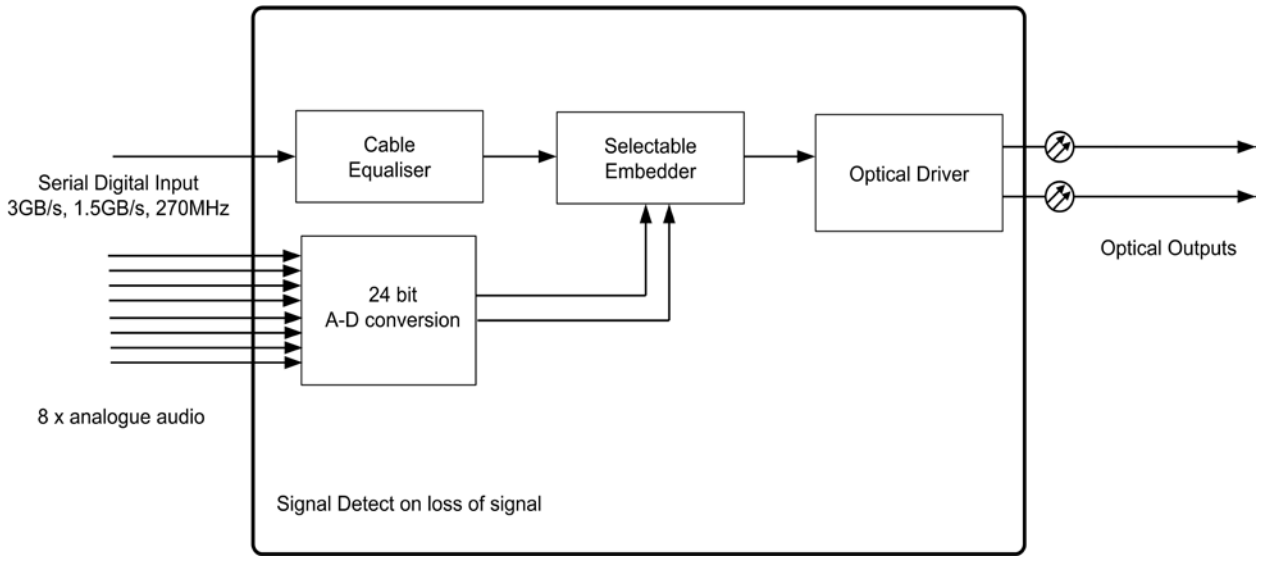
BC450T

Depth	60mm
Width	20mm (4TE)
Height	100mm (3RU)
Weight	100g
Power Supply	6V DC
Power consumption	6W
Current consumption	1000mA
Optical output	LC type connector.
Analogue audio input	4 stereo pairs
Audio connector	26 way female, high density “D” type
Audio levels	Link selectable for:- 0dBu i/p to -18dBFS o/p (Europe) 0dBu i/p to -24dBFS o/p (USA) (=+4dBu i/p to -20dBFS) Variable potentiometer: -0.5 to +3.5dB
Embedding	Onto groups 1 & 2 or 3 & 4 - selectable
Video input	75 Ω BNC
Standards supported	SDI, HD (1080i, 720p @ 50 or 59.94), 3G

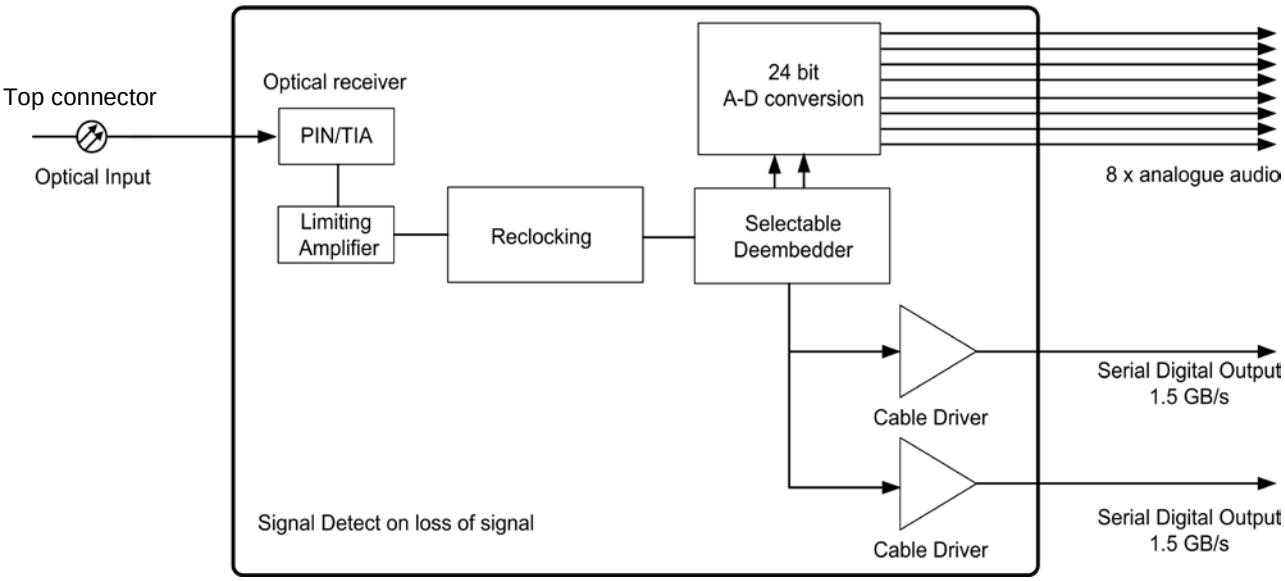
BC450R

Depth	60mm
Width	20mm (4TE)
Height	100mm (3RU)
Weight	100g
Power Supply	6V DC
Power consumption	6W
Current consumption	950mA
Optical input	LC type connector.
Analogue audio output	4 stereo pairs
Audio connector	26 way female high density “D” type
Audio levels	Link selectable for:- -18dBFS i/p to 0dBu o/p (Europe) -24dBFS i/p to 0dBu o/p (USA) (=-20dBFS i/p to +4dBu) -20dBFS i/p to 0dBu o/p Variable potentiometer: -3.5 to +0.5dB
De-embedding	Groups 1 & 2 or 3 & 4 - selectable
Video output	75 Ω BNC

BC450T



BC450R



BC450T - Analogue Audio Input Connections:

The 26 way high density D type electrical connections are as follows:-

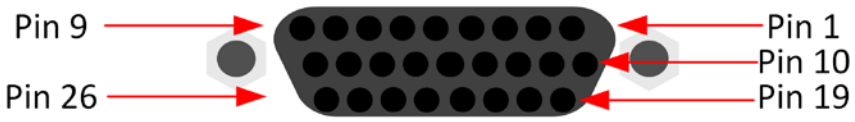
(NOTE; Channel B L & R are reversed compared to other channels)*

1	chan A Left +	10	chan A Left screen	19	chan A Left -
2	chan A Right +	11	chan A Right screen	20	chan A Right -
3*	chan B Right +	12	chan B Right screen	21	chan B Right -
4*	chan B Left +	13	chan B Left screen	22	chan B Left -
5	chan C Left +	14	chan C Left screen	23	chan C Left -
6	chan C Right +	15	chan C Right screen	24	chan C Right -
7	chan D Left +	16	chan D Left screen	25	chan D Left -
8	chan D Right +	17	chan D Right screen	26	chan D Right -
9	Ground	18	Ground		

BC450R - Analogue Audio Output Connections:

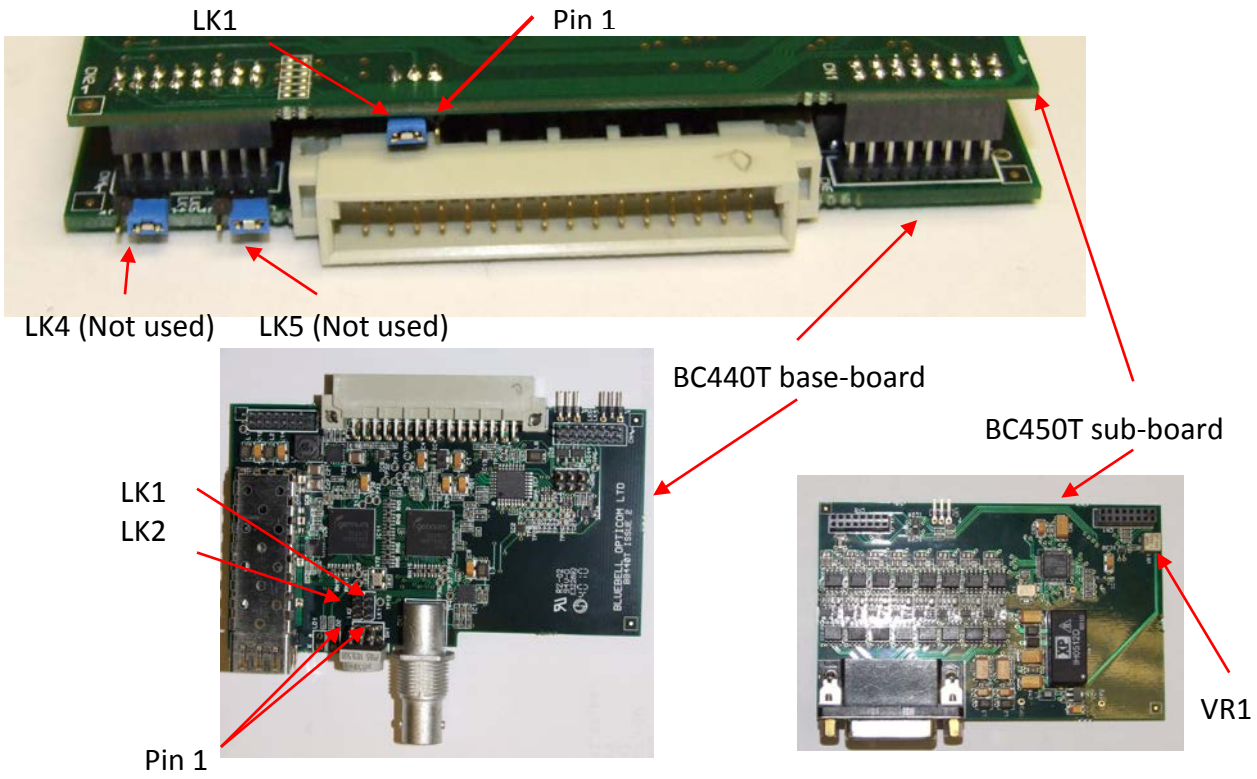
The 26 way high density D type electrical connections are as follows:-

1	chan A Left +	10	chan A Left screen	19	chan A Left -
2	chan A Right +	11	chan A Right screen	20	chan A Right -
3	chan B Left +	12	chan B Left screen	21	chan B Left -
4	chan B Right +	13	chan B Right screen	22	chan B Right -
5	chan C Left +	14	chan C Left screen	23	chan C Left -
6	chan C Right +	15	chan C Right screen	24	chan C Right -
7	chan D Left +	16	chan D Left screen	25	chan D Left -
8	chan D Right +	17	chan D Right screen	26	chan D Right -
9	Ground	18	Ground		



BC450T - Link Settings

	Link	To Link	
On BC450T Analogue Audio Input sub-board			
LK1	Pin 1	Pin 2	0dBu input gives -24dBFS output (Factory default)
	Pin 2	Pin 3	0dBu input gives -18dBFS output
On BC440T base-board			
LK1	Pin 1	Pin 2	Not used
	Pin 2	Pin 3	LD1 indicates SDI input lock (Must be fitted)
LK2	Pin 1	Pin 2	(or no link) Enable embedded audio to fibre output
	Pin 2	Pin 3	Not used (Disable embedded audio to fibre out)
LK4			Not used (Link fitted for possible future use)
LK5			Not used (Link fitted for possible future use)



Variable Resistor Settings: On BC450T sub-board

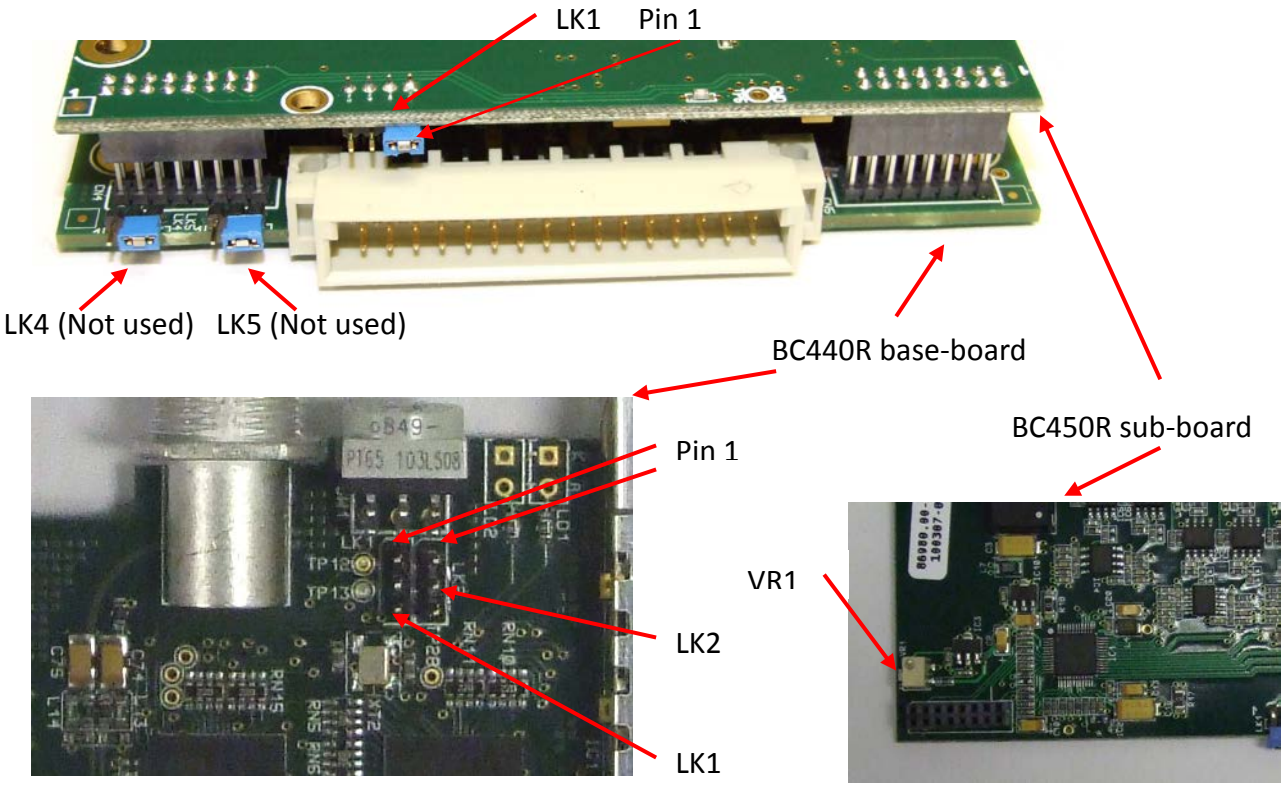
VR1	Gain adjustment for all analogue audio channels: -0.5 to +3.5 dB e.g. (LK1, p2-p3) 0dBu i/p => -18.5 to -14.5dBFS (Factory setting: -18dBFS)

Indicator LEDs

Indicator	Function
LED LD1	"VS/L" SDI/HD/3G input lock
LED LD2 (if fitted)	"AS/L" (Not normally fitted)

BC450R - Link Settings

	Link	To Link	
On BC450R Analogue Audio Output sub-board			
LK1	Pin 1	Pin 2	-18dBFS input gives 0dBu output
	Pin 2	Pin 3	-24dBFS input gives 0dBu output (Factory default)
	Pin 3	Pin 4	-20dBFS input gives 0dBu output
On BC440R base-board			**(Note: LK1, LK2 removed on iss 3 PCBs)**
LK1	Pin 1	Pin 2	Not used
	Pin 2	Pin 3	LD1 indicates i/p optical signal lock (Must be fitted)
LK2	Pin 1	Pin 2	(or no link) Enable embedded audio out
	Pin 2	Pin 3	Not used (Disable embedded audio out)
LK4			Not used (Link fitted for possible future use)
LK5			Not used (Link fitted for possible future use)



Variable Resistor Settings: On BC450R sub-board

VR1	Gain adjustment for all analogue audio channels: -3.5 to +0.5dB e.g. (LK1, p1-p2) -14.5 to -18.5dBFS i/p => 0dBu (Factory setting: -18dBFS)

Indicator LEDs

Indicator	Function
LED LD1	"VS/L" Optical input lock (LK1 pins 2/3 linked)
LED LD2 (if fitted)	"AS/L" (Not normally fitted)

BC450T - Hex Switch Setting summary:

Hex switch	Function
4	Embed Analogue AB, CD on grps 1, 2; Blank audio on grps 3, 4.
5	Embed Analogue AB, CD on grps 3, 4; Blank audio on grps 1, 2.
6	Embed Analogue AB, CD on grps 1, 2; Pass SDI audio on grps 3, 4.
7	Embed Analogue AB, CD on grps 3, 4; Pass SDI audio on grps 1, 2.
A *	Embed Analogue AB, CD on grps 1, 4. Pass SDI audio on grps 2, 3.
other	Not used

See tables below and "Audio Group Selection" page for more details on hex switch.

Audio inputs

Analogue stereo pairs			
A L /R	B L/R	C L/R	D L/R

SDI input embedded audio			
i/p group 1 L1/R1 & L2/R2	i/p group 2 L1/R1 & L2/R2	i/p group 3 L1/R1 & L2/R2	i/p group 4 L1/R1 & L2/R2

Output is fibre carrying SDI with embedded audio

Hex switch	Group 1	Group 2	Group 3	Group 4
0	Not used			
1	Not used			
2	Not used			
3	Not used			
4 (default)	Stereo pairs A & B	Stereo pairs C & D	Blanked	Blanked
5	Blanked	Blanked	Stereo pairs A & B	Stereo pairs C & D
6	Stereo pairs A & B	Stereo pairs C & D	Input group 3 L1/R1 & L2/R2	Input group 4 L1/R1 & L2/R2
7	Input group 1 L1/R1 & L2/R2	Input group 2 L1/R1 & L2/R2	Stereo pairs A & B	Stereo pairs C & D
8	Not used			
9	Not used			
A *	Stereo pairs A & B	Input group 2 L1/R1 & L2/R2	Input group 3 L1/R1 & L2/R2	Stereo pairs C & D
B	Not used			
C	Not used			
D	Not used			
E	Not used			
F	Not used			

* The “hex switch = A” function was added in June 2012 (firmware version 1.04).

BC450R - Hex Switch Setting summary:

Hex switch	Function
0	De-embed groups 1, 2 to analogue. Pass SDI embedded audio.
1	De-embed groups 3, 4 to analogue. Pass SDI embedded audio.
2	De-embed groups 1, 2 to analogue. Blank SDI embedded audio.
3	De-embed groups 3, 4 to analogue. Blank SDI embedded audio.
4 - F	Not used

See tables below and "Audio Group Selection" page for more details on hex switch.

Audio inputs

Input is fibre carrying SDI with embedded audio **As configured by BC450T Hex switch**			
i/p group 1 L1/R1 & L2/R2	i/p group 2 L1/R1 & L2/R2	i/p group 3 L1/R1 & L2/R2	i/p group 4 L1/R1 & L2/R2

Outputs are SDI with embedded audio, and analogue audio

Hex switch	SDI output				Analogue audio output A	B	C	D
0 (default)	i/p grp 1	i/p grp 2	i/p grp 3	i/p grp 4	i/p grp 1 L1 / R1	i/p grp 1 L2 / R2	i/p grp 2 L1 / R1	i/p grp 2 L2 / R2
1	i/p grp 1	i/p grp 2	i/p grp 3	i/p grp 4	i/p grp 3 L1 / R1	i/p grp 3 L2 / R2	i/p grp 4 L1 / R1	i/p grp 4 L2 / R2
2	Blanked	Blanked	Blanked	Blanked	i/p grp 1 L1 / R1	i/p grp 1 L2 / R2	i/p grp 2 L1 / R1	i/p grp 2 L2 / R2
3	Blanked	Blanked	Blanked	Blanked	i/p grp 3 L1 / R1	i/p grp 3 L2 / R2	i/p grp 4 L1 / R1	i/p grp 4 L2 / R2
4	Not used							
5	Not used							
6	Not used							
7	Not used							
8	Not used							
9	Not used							
A	Not used							
B	Not used							
C	Not used							
D	Not used							
E	Not used							
F	Not used							

Audio Group Selection BC450T/BC450R