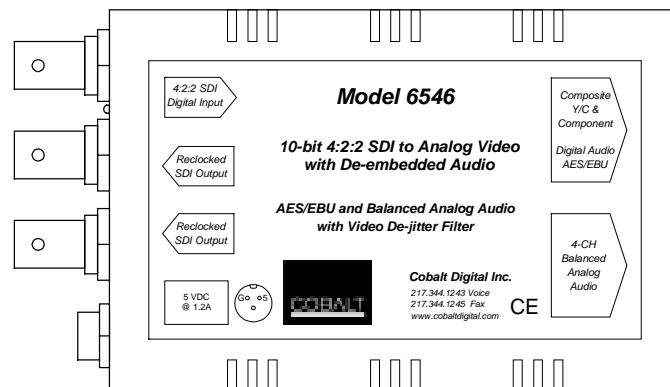# COBALT

Model 6546

SDI 4:2:2 10-bit to Analog Composite,
Y/C or Component YPbPr & RGB
Encoder with De-embedded
Digital and Analog Audio outputs

Owner's Manual

Cobalt Digital Inc. 2005

The 6546 is a high quality 10-bit digital to analog encoder and audio de-embedder for converting 525/625 4:2:2 SDI signals to analog Composite, Y/C and Component signals (YPbPr or RGB) with de-embedded AES/EBU digital audio and four channels of balanced analog audio. The 6546 auto-detects the line-input standard and outputs the corresponding NTSC or PAL standard. The user can configure the default PAL outputs to be PAL-B/D/G/H/I, PAL N or PAL 60 and NSTC M or N. Pedestal selection can be enabled or disabled for NTSC operation.

The 6546 can be user configured by externally accessible switches to three different analog output configurations: all Composite, Composite with Y/C, and Component. The 6546 supports four different Component output modes: BetaCam™, MII™, SMPTE/N10 and RGB. The encoding process is 10-bit with sample up-conversion from 4:2:2 to 4:4:4, to 8:8:8 (2x-output mode) or 16:16:16 (4x output mode). Full user digital processing (proc.) controls are available to the end user for adjusting black level, Y Gain, Saturation and Hue. Advanced controls include VBI Blanking, line by line VBI Pedestal control, extended filtering, DNR and Gamma configuration. All adjustments can be saved to non-volatile memory or Factory defaults can be restored. A De-jitter VCXO is included to reduce input jitter from high frequencies down to 2Hz.

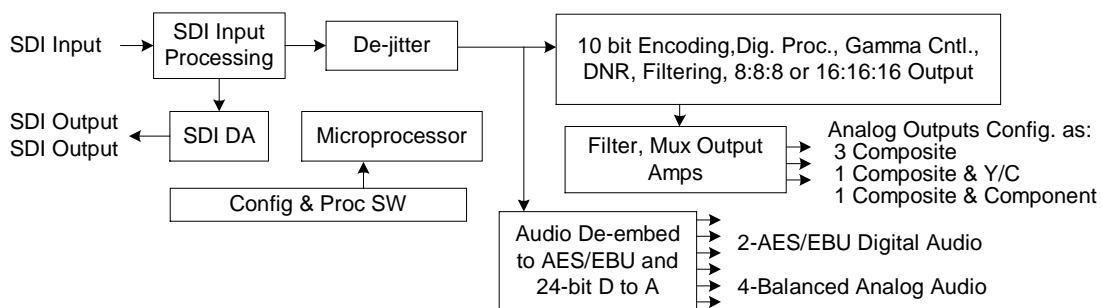The 6546 includes two reclocked digital output copies.

Figure 1 - 6546 Block Diagram

ANALOG VIDEO OUTPUT SWITCH SETTINGS

S1 VIDEO INPUT AND COLOR SEPARATION MODE (See Chart Below)

Analog Output Switch S1 Configuration			
S1-1	S1-2	S1-3	Function
1	1	1	All Composite
1	0	1	Y/C and Composite
0	1	1	YPbPr BetaCam (tm)
0	1	0	YPbPr MII (tm)
0	0	1	YPbPr SMPTE
0	0	0	RGB

1 = SW ON, 0 = SW OFF

ANALOG OUTPUT SWITCH SETTINGS CONTINUED

S1- 4   COLOR
OFF - B&W output   ON - Color enabled

S1- 5   COLOR BARS ON/OFF
OFF - Display Video   ON - Display COLOR BARS

S1- 6   SETUP (NTSC modes only – PAL Pedestal is always Off)
OFF - No Pedestal   ON - 7.5 IRE pedestal added

S1- 7   OUTPUT SAMPLE MODE (interior switch)
OFF - 2x (8:8:8)   ON - 4x (16:16:16)

S1- 8   DE-JITTER FILTER (interior switch)
OFF - De-jitter Filter Off   ON - De-jitter Filter On

LED INDICATOR
The front panel LED indicates video lock when On and loss of video when blinking. A dark
LED indicates loss of power. Internal switches S3&2 need to be set to 0-0 for normal LED
operation.

VIDEO PROC. ADJUSTMENTS
Full control of Y-Gain, Y-Black level, Color Saturation and Hue can be User controlled via S2,
S3, S4 & S5 after removing bottom cover. Note that YPbPr and RGB have no hue control.
To change Video Proc. settings, set S3-S2 as shown below then press Up or Down to adjust.
To save settings set S3-S2 to 9-9 then press Up.
To restore factory defaults Set S3-S2 to 8-8 then press Up.

Switch S3-S2 Functions (remove bottom cover)
S3-S2:
1-1 Y-Gain
1-2 Y-Black level
1-3 Color Saturation
1-4 Hue +/-22.5º in 0.18º increments
1-5 SCH Phase
1-6 Sharpness –4dB to +4dB in 12 steps
2-7 VBI lines 10-20 Encoded LED On = Encoded, Off = VBI Blanked
5-0 VBI Pedestal odd lines 10-18 (NTSC only)
5-1 VBI Pedestal odd lines 19-25
5-2 VBI Pedestal even lines 10-18
5-3 VBI Pedestal even lines 19-25
5-4 Global VBI pedestal LED on = VBI Pedestal added Off = pedestal removed
  Note 5-4 over-writes settings of 5-1 & 5-4

ANALOG OUTPUT CALIBRATION
Turn on bars and composite mode, restore Digital Proc. Factory Defaults S3-S2 set to 8-8 and
press up or down switch once. Connect output to calibrated waveform monitor. Place 6546 into
All composite mode and adjust R144 for 100 IRE at J7, then adjust the three remaining pots
R132 for J5, R153 for J3, R242 for J1 so that you have 100IRE of video at each output. Place
6546 into BetaCam mode and adjust R234 for 100 IRE at J1, adjust R142, R121 for 75% vectors
on J3, J5.

GENERAL DESCRIPTION

The Cobalt Digital 6546 will accept standard definition, serial digital signals with embedded audio and provide high quality analog video and de-embedded AES/EBU digital audio with four channels of balanced analog audio.

Video Connector assignments:

Video output, High Density 15-pin connector

Pin	Signal - Mode			
	RGB	S-Video	Component	Composite
1	R	C	Pr	Composite
2	G	Y	Y	Composite
3	B		Pb	Composite
4	NC	NC	NC	NC
5	Ground	Ground	Ground	Ground
6	Ground	Ground	Ground	Ground
7	Ground	Ground	Ground	Ground
8	Ground	Ground	Ground	Ground
9	NC	NC	NC	NC
10	Ground	Ground	Ground	Ground
11	NC	NC	NC	NC
12	NC	NC	NC	NC
13	Cmpst or AES (3/4)	Cmpst or AES (3/4)	Cmpst or AES (3/4)	Cmpst or AES (3/4)
14	AES/EBU (1/2)	AES/EBU (1/2)	AES/EBU (1/2)	AES/EBU (1/2)
15	NC	NC	NC	NC

AES/EBU Digital Audio output.

       CH-1/2 on V or Black cable (V-marked on plastic BNC molding)
       CH-3/4 of H or Gray cable (H-marked on plastic BNC molding)

Audio Output, 9 pin D-sub connector (1729 daughter card)

Pin	Signal
1	CH1A+
6	CH1A-
2	CH1B+
7	CH1B-
4	CH2A+
8	CH2A-
5	CH2B+
9	CH2B-
3	Ground

AUDIO DE-EMBEDDER – GENERAL CONCEPTS

The model 6546 audio de-embedder unit, provides the following audio related outputs:

a. Four balanced (differential) analog output signals that may be either two Stereo pairs or four monaural.
b. One dedicated AES/EBU 75-ohm drive digital data stream.
c. One switch selectable output, which may be either composite video or AES/EBU output signal.

The 6546 can be configured to decode AES/EBU audio groups 1 through 4. The following table defines the group number, associated channel numbers, and the outputs at which the analog signals will be present. Ground for all of these signals is present on pin 3 of the 9 pin D-sub connector.

Group Selection	Channel	Analog Output	D sub 9 pin connector assignment
1	1	CH1A+	1
		CH1A-	6
	2	CH1B+	2
		CH1B-	7
	3	CH2A+	4
		CH2A-	8
	4	CH2B+	5
		CH2B-	9
2	5	CH1A+	1
		CH1A-	6
	6	CH1B+	2
		CH1B-	7
	7	CH2A+	4
		CH2A-	8
	8	CH2B+	5
		CH2B-	9
3	9	CH1A+	1
		CH1A-	6
	10	CH1B+	2
		CH1B-	7
	11	CH2A+	4
		CH2A-	8
	12	CH2B+	5
		CH2B-	9
4	13	CH1A+	1
		CH1A-	6
	14	CH1B+	2
		CH1B-	7
	15	CH2A+	4
		CH2A-	8
	16	CH2B+	5
		CH2B-	9

GROUP SELECTION, ANALOG AUDIO VOLUME, MIXING AND PHASE REVERSAL CONTROLS

Analog output levels are varied via the user external dip-switch settings, as shown in the chart below.

Audio switch S6 logic level								Function
S6-1	S6-2	S6-3	S6-4	S6-5	S6-6	S6-7	S6-8	Feature Control
1	1							Group 1 Audio select (Chan 1,2,3,4) AES & Analog
1	0							Group 2 Audio select (Chan 5,6,7,8) AES & Analog
0	1							Group 3 Audio select (Chan 9,10,11,12) AES & Analog
0	0							Group 4 Audio select (Chan 13,14,15,16) AES & Analog
		1	1	1				Analog output level +8 dB
		1	1	0				Analog output level +4 dB
		1	0	1				Analog output level +0 dB
		1	0	0				Analog output level −4 dB
		0	1	1				Analog output level −6 dB
		0	1	0				Analog output level −8 dB
		0	0	1				Analog output level −14 dB
					1			Analog Sum channels 1 & 2
						1		Analog Sum channels 3 & 4
							1	Analog Reverse phase channel 2 and Channel 4

1 = Switch ON
0 – Switch OFF

SPECIFICATIONS

Analog Outputs	Analog Composite, Y/C or Component YPbPr (BetaCam™, MII™ & SMPTE/N10) or RGB
Analog Configuration	3 (4-if one AES I/O selected as analog video) analog outputs User configurable as: All Composite, Dual Composite w/Y/C, Composite with Component or Dual Y/C
Output Return Loss	> 35 dB at 5 MHz
Output D to A Quantization	10-bit – Input to Output
Sampling rate	4:2:2 up-sampled to 8:8:8 (2x) or 16:16:16 (4x)
Frequency Response	4x Y: 0-5.5 MHz +/- 0.15 dB
	4x PbPr: 0-2.2 MHz +/-0.2 dB
K-Factor 2T	< 0.6 %
SCH Phase	< 0.8º
Differential Gain	< 0.5 %
Differential Phase	< 0.5º
S/N	> 75 dB
Chroma/Luma Delay	Composite < 2 ns; Y/C < 2 ns; YPbPr < 1 ns
Conversion Time	< 2 us
Jitter Filter LBW	2 Hz
Digital Input	270Mbit 4:2:2 SDI SMPTE259M-C/ITU-R.BT656
Digital Outputs	2 – Reclocked copies of Input
Digital Output Return loss	>17 dB @ 270Mbit
Digital Audio Output	2 – CH (2-75ohm BNCs) of AES/EBU De-embedded Audio (1 full group)
Analog Audio Output	4 – CH of balanced Analog Audio
Levels	Up to 24 dB into 10K ohm loads
THD	>0.1% at 24 dB into 10K ohm balanced
S/N:	less than 78 dB balanced
Frequency Response	20-20KHz +/- 0.25 dB
D/A Quantization	24 bits
D/A Sample Rate	48KHz up-sampled to 192KHz
Operating Temp.	40-110º F (4-43º C)
Humidity	(non-condensing)
Power Input	5 VDC @ 1.2 A
Size	6" x 3" x 1" (153 x 76 x 25mm)

This product is not authorized for use in life support systems. Product liability limited only to the replacement of this unit. Cobalt Digital Inc. does not assume any liability for loss of use due to failure of this component.

Specifications subject to change without notice.