

Proteus-R

Rack-mount rate/standards/aspect ratio converter

Operation manual

(v1.00bxx)

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Please note the following regarding this manual.

*Note1: throughout the text, buttons and controls are indicated by **bold red text**, and display information in “quotation marks”.*

Note 2: If you have any comments or questions, contact information is available on our website <http://www.brickhousevideo.com>.

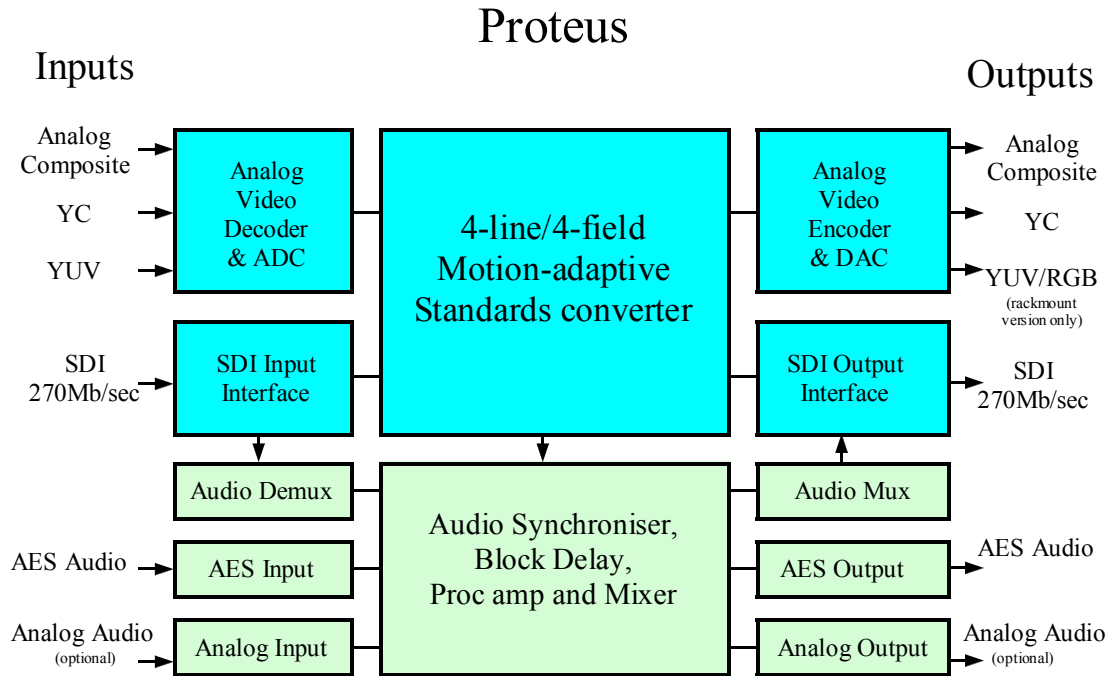


Fig.1 Proteus Standards Converter Block Diagram

Introduction

The Proteus is a 4-line 4 field motion adaptive standards converter that accepts video in any current TV standards with automatic audio synchronisation to prevent the build-up of lip-sync errors. An extremely flexible and versatile system architecture means that Proteus can also be used as a synchroniser and/or a format converter.

Most standards conversion processes require several fields of video delay meaning that the audio must be delayed to compensate for this. Proteus accommodates this compensation by providing audio delay of up to 10 seconds, which means upstream lip-sync issues can also be solved. Such large audio delay requirements are becoming commonplace as more and more programming is processed through digital codecs.

For video, both Analogue (composite, YC, YUV) and digital (SDI) sources are accepted, whilst for audio, sources may be selected from the embedded audio in the input SDI stream or alternatively AES audio or analogue audio. (Please note that for analogue audio I/O, the appropriate option must be fitted—please contact your dealer for details).

Proteus is able to synchronise all outputs to a genlock reference.

Front Panel Overview



Input Select Buttons

Proteus has 8 video inputs: 2 SDI, 2 Composite Video, 1 YUV and 1 YC (S-VHS) input. These can be selected via the front panel 4 input select buttons on the left. The button of the selected input is lit to indicate it has been selected. A faulty or non-existent input is indicated by the button LED flashing. The 4 LEDs on the left of the input select buttons, indicate whether SDI1, SD2 or CV1, CV2 is selected. Note that the YC input is not available on early units.

Input Line Standard LEDs

The 2 Input Line Standard LEDs to the right of the input select buttons indicate the line standard of the selected video input.

Output Line Standard LEDs

The 2 green LEDs to the right of the 2 Input Line Standard LEDs indicate the selected line standard of the output signal. If the line standards of the input and output signals are opposite then Proteus is in standards conversion mode. If they are the same then Proteus enters synchroniser mode.

Genlock LED

The yellow LED is the genlock indicator. This is lit if a reference is present and flashes if there is a reference present but it does not conform to the output line standard. If there is no reference present, the genlock LED remains unlit.

Menu Select Buttons

To the right of the output standard button are the 5 menu select buttons, **shift**, **gain**, **chroma**, **black** and **presets**. Together with the **menu/exit** and **enter** buttons, these buttons navigate the extensive menu structure of Proteus. When the **menu/exit** button is lit, the **rotary encoder** and **enter** key allow a top-down approach to the menu structure. When the **menu** button is unlit, the **gain**, **chroma**, **black** and **presets** buttons allow shortcuts to the relevant parts of the menu structure. Further shortcuts are provided by **shift+gain** = audio level, **shift+chroma** = audio delay, **shift+black** = audio shuffle, and **shift+menu/exit** = genlock.

The complete menu structure is provided in Appendix A.

Front Panel Lockout

Front panel lockout preventing unwanted user disturbance can be achieved by pressing **shift+enter** together. Pressing **shift+enter** again, reactivates the front panel.

The next few pages describe the shortcut operations in more detail.

Video Gain Adjustment

Proteus contains 2 video proc amps, one for analogue sources only, and one for digital levels after the appropriate video source has been selected. Both of these proc amps can be accessed via the **gain**, **chroma** and **black** buttons described here.

Ensuring the menu button is unlit, press the **gain** button. The characters “Picture Gain” will be displayed and the menu button will light. The **rotary encoder** will now allow cycling through the various gain options available.

These are as follows: -

- “Picture Gain”
- “Y Gain”
- “CV Dec Gain”

Once the desired gain adjustment is selected, press **enter**. The display will now indicate the current setting which can be adjusted via the **rotary encoder**. Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

Chroma Gain Adjustment

Ensuring the **menu** button is unlit, press the **chroma** button. The characters “Chroma Gain” will be displayed and the menu button will light. The **rotary encoder** will now allow cycling through the various chroma gain options available.

These are as follows: -

- “Chroma Gain”
- “Cb Gain”
- “Cr Gain”
- “CV Chroma Gain”
- “NTSC Hue”

Once the desired adjustment is selected, press the **enter** button. The display will now indicate the current setting which can be adjusted via the **rotary encoder**. Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

Black Level Adjustment

Ensuring the menu button is unlit, press the **black** button. The characters “Picture Gain” will be displayed and the menu button will light. The **rotary encoder** will now allow cycling through the various gain options available.

“Y Black Level”
“Cb Black Level”
“Cr Black Level”
“CV Dec Black”
“NTSC IP Ped”
“NTSC OP Ped”

Once the desired black level adjustment is selected, press **enter**. The display will now indicate the current setting which can be adjusted via the **rotary encoder**. Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

Audio Level Controls

Note: Audio is an option and may not be fitted.

The Proteus contains an audio proc amp, which comes after the audio source selection point. This allows for +/-12dB of audio gain to be applied on the output audio signals. These gain changes may also be monitored via the headphone socket on the front panel.

Ensuring the **menu** button is unlit, press the **shift+gain** = audio level buttons. The characters “Audio Gain” will be displayed and the **menu** button will light. The **rotary encoder** will now allow cycling through the various audio gain options available.

These are as follows: -

“Audio Gain”	(overall audio gain)
“1 L&R”	(channel 1 left and right simultaneously)
“2 L&R”	(channel 1 left and right simultaneously)
“1 Left”	(channel 1 left)
“1 Right”	(channel 1 right)
“2 Left”	(channel 2 left)
“2 Right”	(channel 2 right)

Once the desired adjustment is selected, press the **enter** button. The display will now indicate the current setting which can be adjusted either via the **rotary encoder**. Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

Audio Delay Control

Note: Audio is an option and may not be fitted.

Proteus contains an audio delay, which comes after the audio source selection point. All selected audio channels are delayed equally. Depending on the standards conversion mode, various options are available.

Tracking Delay

When the input line standard and output line standard are the same, Proteus enters synchronisation mode. Normal synchronisation action will give occasional video frame drops or repeats as the input video frame rate slides through the output video frame rate (which is normally locked to reference). In this case it is appropriate to enable tracking delay since the video delay will vary from 0ms to 33ms/40ms for 525/625 line systems. This will give discernible lip-sync errors if the audio does not track these delays. It is important to note that additional block delay can be superimposed on this tracking delay to accommodate further upstream audio/video misalignments.

Fixed Delay

When the input line standard and output line standard are different, Proteus enters standards conversion mode. The standards conversion process gives a fixed processing delay of 33ms/40ms for 525/625 line systems (this delay refers to the input line standard). In this case it is appropriate to enable fixed delay mode and to dial up the appropriate delay according to the input line standard. Additional block delay can also be added to further accommodate upstream audio/video misalignments.

Jumping or Ramping to Target Delay

When a new delay is selected, there will inevitably be a small disturbance to the audio signal if the system 'jumps' to this new target delay. To alleviate this, Proteus incorporates a 'ramp' option that permits the target delay to be reached over a number of seconds. The compromise is that during the ramping time, lip-sync will be misaligned. Note that ramping is not available for the extended audio option.

Minimum Delay

Please note that the minimum audio delay through the unit is 5ms.

Ensuring the **menu** button is extinguished, press the **shift+chroma** buttons. The characters "Block Delay Adj" will be displayed and the **menu** button will now light. The **rotary encoder** will now allow cycling through the various audio delay options available. These are as follows: -

"Block delay Adj"	(overall audio block delay adjust 0-320mS)
"Track Delay Mode"	(option to track to video delay in synchroniser mode)
"Block delay Response"	(option to jump or ramp to the selected audio delay)

Once the desired adjustment is selected, press the **enter** button. For the first selection (“Block delay Adj”), the display will now indicate the current setting which can be adjusted via the **rotary encoder**. Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

For the last 2 selections (“Track Delay Mode” and “Block delay Response”), there is a choice. This can be selected with the **rotary encoder**. The state surrounded by chevrons is considered to be the active state.

Genlock Controls

Ensuring the **menu** button is extinguished, press the **shift+black**. The characters “H Fine Phase” will be displayed and the **menu** button will now light.

The **rotary encoder** will now allow cycling through the various genlock options available.

These are as follows: -

“H Fine Phase”	(in ns)
“H Coarse Phase”	(in samples)
“V Phase”	(in lines)
“Free Run Frequency”	
“Action On Losing Input”	
“Action On Losing Genlock”	

Once the desired adjustment is selected, press the **enter** button.

For the first 4 selections (“H Fine Phase”, “H Coarse Phase”, “V Phase” and “Free Run Frequency”), the display will indicate the current setting, which can be adjusted via the **rotary encoder**.

Once the desired adjustment is selected, press the **enter** button. The display will now indicate the current setting which can be adjusted either via the **rotary encoder**. Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

Genlock Controls (continued)

For the last 2 selections (“Action On Losing Input” and “Action On Losing Genlock”), there is a choice. This can be toggled by using the **rotary encoder** and **enter** buttons. The state surrounded by chevrons is considered to be the active state.

Adjusting the free run frequency

Proteus contains an internal VCXO that controls all of its output timing. This VCXO can either be locked to the genlock signal or it can free-run. As a precaution, the free-run frequency can be adjusted to a value close to that of the existing genlock signal. This is so that if the genlock fails for whatever reason, the disturbance to the output is minimised whilst the problem is fixed.

To adjust the free run frequency, perform the following list of operations: -

- 1) Ensure that the “Action on losing Genlock” setting is selected as “free run”.
- 2) Connect one of the composite output signals to one channel of either a waveform monitor or oscilloscope.
- 3) Connect the genlock signal to the other channel of the waveform monitor or oscilloscope.
- 4) Ensure the output line standard is the same as that of the genlock signal.
- 5) Select “Free Run Frequency” from the Genlock Controls Menu (see previous page).
- 6) The display will now indicate the Free Run Frequency as a percentage. 50% is the default setting with adjustment from 25% to 75%.

The Free Run Frequency can be adjusted via the **rotary encoder**. This should be adjusted such that the run-through frequency of the two signals on the waveform monitor or oscilloscope is brought to zero.

Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

Note: The setting will be retained even when Proteus is switched off.

Storing and Recalling Presets

Ensuring the **menu** button is unlit, press the **shift+menu** = presets buttons. The characters “Presets Menu” will be displayed and the **menu** button will now light. The **rotary encoder** will now allow cycling through the various gain options available.

These are as follows: -

“Factory Default”

“Recall 1”

“Recall 2”

“Store 1”

“Store 2”

Once the desired preset selection is selected, press the **enter** button. The display will now ask for confirmation. Either press **enter** again to carry out the desired preset option or press the **menu/exit** button to escape to the top level of the presets menu.

Note that if the “Factory Default” option is used and then the “store 1” and “store 2” presets activated, the unit’s parameters will be returned to the original state installed at the factory.

Selecting Audio Sources

Note: Audio is an option and may not be fitted.

The output audio is simultaneously available on the AES and analogue outputs as well as being embedded in the video SDI stream. The input audio can be selected from either embedded audio from the selected SDI input, the AES input or the analogue audio inputs. Alternatively a mixture of sources is also possible.

It should be noted that audio sources that are asynchronous both to the SDI video source and to each other can be accommodated. The one exception to this is that the 2 embedded audio channels within the selected audio group must be synchronous to each other. In practice this is usually the case anyway.

The quickest way to select the audio sources is via the button on the extreme left-hand side of the panel. This allows the user to switch between Embedded, AES and Analogue inputs. The input sources can also be split between channels 1&2 and 3&4. Holding down the **Shift** button while pressing the audio source selector will cycle channels 3 and 4 only through the input source options.

(cont. next page)

Audio Menu access

Ensuring the **menu** button is extinguished, press the **menu** button. The characters “Proteus ARC Menu” will be displayed. The **rotary encoder** will now allow cycling through the various top level options available. These are as follows: -

- “ARC Menu”
- “Aud Source Menu”
- “Video Gain Menu”
- “Chroma Menu”
- “Black Level Menu”
- “Audio Level Menu”
- “Audio Delay Menu”
- “Genlock Menu”
- “Presets Menu”
- “Extended Menus”
- “Status”

Select “Audio Source Menu” and press the **enter** button. The **rotary encoder** buttons will now allow cycling through the second level options available.

These are as follows: -

- “Embedded”
- “AES”
- “Analogue”
- “X-Point”

The state with the chevrons around it is considered to be the active state. If it is desired to mix the audio sources, then select “X-point” using the **rotary encoder** and press **enter**.

Level 3 and Level 4 options will now allow for mixed source selection of the audio outputs. (See the menu table in Appendix A). In selecting the audio channels, it is best to start with selecting the digital source as either embedded, AES or a mixture of both. This is because the digital selection must be done in stereo pairs to ensure correct audio synchronisation with video. Once the digital selection has been made, then the output audio channels can be made from any combination of digital and audio signals.

Selecting Test Patterns

A selection of test patterns can be switched onto the output of both the analogue video signals and independently also the digital video signals (SDI). This is useful for testing downstream equipment or monitors. It can also be useful for testing downstream cable links.

To select the test patterns navigate to the “Test Pattern Select” menu, under the “Extended Menus”, section.

As well as a video test pattern the embedded SDI output test patterns also contain an embedded audio test pattern with channel ident. This is an extended tone followed by a short tone in channel 1, 2 short tones in channel 2, 3 short tones in channel 3 and 4 short tones in channel 4.

It should be noted that audio test patterns on the AES outputs is not currently supported.

Aspect Ratio Conversion Controls

Note: Aspect Ratio Conversion (ARC) is an option and may not be fitted.

There are two ways to control ARC - preset mode and variable mode. The ARC can also be turned off.

Preset mode

There are 8 preset conversions:

- “4:3 => 4:3 Pillar Box”
- “4:3 => 14:9 Pillar Box”
- “4:3 => 16:9 Middle Cut”
- “4:3 => 16:9 Anamorphic”
- “16:9 => 4:3 Centre Cut”
- “16:9 => 4:3 Anamorphic”
- “16:9 => 14:9 Letter Box”
- “16:9 => 16:9 Letter Box”

The first four are valid for 525-line input and 625-line output. They convert a 4:3 full-screen image on 4:3 input screen onto a 16:9 output screen. The last four are valid for 625-line input and 525-line output. They convert a 16:9 full-screen image on a 16:9 input screen onto a 4:3 output screen.

To select the preset conversions navigate to the “Preset” menu, under the “Aspect Ratio Conversion” menu. When “Preset” menu is selected, Proteus works in preset mode until “Variable” menu or “Off” is selected.

Variable mode

Variable mode allows direct control of the output picture position and size both vertically and horizontally, therefore any conversion may be set up.

Variable vertical and horizontal size and position are represented in percentage units. For size, 0% means no resizing. 50% expands the picture to 150% of its normal size. A positive percentage is a size increase and a negative percentage is a size decrease. For position, 0% positions the image centred on the output. 50% moves the image half way off-screen. A positive percentage moves the image down and to the right and a negative percentage moves the image up and to the left.

When “Zoom” is turned on, both vertical size and horizontal size can be changed together if one of them is adjusted. When “Zoom” is turned off, vertical size and horizontal size can be adjusted separately.

To select “Zoom”, “Horizontal Size”, “Vertical Size”, “Horizontal Position” or “Vertical Position”, navigate to the “Variable” menu, under the “Aspect Ratio Conversion” menu. When “Variable” menu is selected, Proteus works in variable mode until “Preset” menu or “Off” is selected.

Once “Horizontal Size”, “Vertical Size”, “Horizontal Position” or “Vertical Position” is selected by pressing the enter button, follow the steps below.

The display will now indicate the current setting which can be adjusted via the **rotary encoder**.

Once the desired adjustment is selected, press the **enter** button. The display will now indicate the current setting which can be adjusted either via the **rotary encoder**. Once the desired setting has been reached, pressing the **enter** button will retain the value. If you wish to cancel the adjustment and return to the previous setting, then the **menu/exit** button should be pressed.

Border

Border colour can be selected from eight colours. Both vertical and horizontal border edges can also be trimmed on a line-by-line and/or pixel-by-pixel basis. When the ARC is turned off, the border adjustments are also turned off.

To adjust the border, navigate to the “Border” menu, under the “Aspect Ratio Conversion” menu. “Horizontal Trim” and “Vertical Trim” can be controlled in the same way as “Horizontal Size”.

Disabling the ARC

Picture resizing can be turned off by selecting “Off” under the “Aspect Ratio Conversion” menu. When it is turned off, the output picture position and size are set to 0% and the border is turned off.

Appendix A

Proteus Menu Structure

Note: Some menus may not function or may not be present dependent on options installed.

Top level	Level 2	Level 3	Level 4	Level 5
ARC Menu	Preset	4:3 => 4:3 PB		
		4:3 => 14:9 PB		
		4:3 => 16:9 MC		
		4:3 => 16:9 Ana		
		16:9 => 4:3 CC		
		16:9 => 4:3 Ana		
		16:9 => 14:9 LB		
		16:9 => 16:9 LB		
	Variable	Zoom	On Off	
		Horizontal Size	8888	
		Vertical Size	8888	
		Horizontal Position	8888	
		Vertical Position	8888	
	Border	Colour	Black Dark Grey Grey Light Grey White Green Red Blue	
		Horizontal Trim	8888	
		Vertical Trim	8888	
	Off			

Top level	Level 2	Level 3	Level 4	Level 5
Aud Source Menu	Embedded			
	AES			
	Analog			
	X-Point	Left Ch - Audio Pair1	Digital Audio Channel 1	
			Digital Audio Channel 2	
			Digital Audio Channel 3	
			Digital Audio Channel 4	
			Analogue Audio Channel 1	
			Analogue Audio Channel 2	
			Audio Analogue Channel 3	
			Analogue Audio Channel 4	
		Right Ch - Audio Pair1	Digital Audio Channel 1	
			Digital Audio Channel 2	
			Digital Audio Channel 3	
			Digital Audio Channel 4	
			Analogue Audio Channel 1	
			Analogue Audio Channel 2	
			Analogue Audio Channel 3	
			Analogue Audio Channel 4	
		Left Ch - Audio Pair2	Digital Audio Channel 1	
			Digital Audio Channel 2	
			Digital Audio Channel 3	
			Digital Audio Channel 4	
			Analogue Audio Channel 1	
			Analogue Audio Channel 2	
			Analogue Audio Channel 3	
			Analogue Audio Channel 4	
		Right Ch - Audio Pair2	Digital Audio Channel 1	
			Digital Audio Channel 2	
			Digital Audio Channel 3	
			Digital Audio Channel 4	
			Analogue Audio Channel 1	
			Analogue Audio Channel 2	
			Analogue Audio Channel 3	
			Analogue Audio Channel 4	
		Digital Audio Channel 1/2	Embedded Audio Pair 1	
			Embedded Audio Pair 2	
			AES1	
			AES2	
		Digital Audio Channel 3/4	Embedded Audio Pair 1	
			Embedded Audio Pair 2	
			AES1	
			AES2	

Top level	Level 2	Level 3	Level 4	Level 5
Video Gain Menu				
	Picture Gain	+0.00dB		
	Y Gain	+0.00dB		
	CV Dec Gain	1		
Chroma Menu	Chroma Gain	+0.00dB		
	Cb Gain	+0.00dB		
	Cr Gain	+0.00dB		
	CV Chroma Gain	1		
	NTSC Hue	0deg		
Black Level Menu	Y Black Level	+0.00mV		
	Cb Black Level	+0.00mV		
	Cr Black Level	+0.00mV		
	CV Dec Black	+0.00mV		
	NTSC IP Ped	Ped On Ped Off		
	NTSC OP Ped	Ped On Ped Off		
Audio Level Menu	Audio Gain	+0.00dB		
	Pair 1 L&R	+0.00dB		
	Pair 2 L&R	+0.00dB		
	Pair 1 Left	+0.00dB		
	Pair 1 Right	+0.00dB		
	Pair 2 Left	+0.00dB		
	Pair 2 Right	+0.00dB		

Top level	Level 2	Level 3	Level 4	Level 5
Audio Delay Menu	Block Delay Adj	0ms		
	Track Delay Mode	Track		
		Fixed		
	Blk Delay Response	Ramp		
		Jump		
	Extended Delay Adj	0ms		
Genlock Menu	H Fine Phase	100ns		
	H Coarse Phase	0 Samples		
	V Phase	0 Lines		
	Free Run Freq	50%		
	Action on No Ip	Cut to Black		
		Freeze		
	Action on No Glk	Lock to Ip		
		Free Run		
Presets Menu	Factory Default	Enter to Confirm		
	Recall 1	Enter to Confirm		
	Recall 2	Enter to Confirm		
	Store 1	Enter to Confirm		
	Store 2	Enter to Confirm		

Top level	Level 2	Level 3	Level 4	Level 5	Level 6
Extended Menus	Audio Controls	Audio Ip Control	Embedded Aud Grp	Group1	
				Group2	
				Group3	
				Group4	
		Audio Op Control	Embedded Aud On/Off	On	
				Off	
			Embedded Aud Pack	Smppte 272M	
				Every Line	
			Monitor Select	Ch 1/2	
				Ch 3/4	
			Phase Reverse	Aud 1 Right Rvs	Enable
					Disable
				Audio 2 Right Rvs	Enable
					Disable
	Ana Vid Ip Setup	Force Standard	NTSC		
			PAL-I		
			PAL-M		
			PAL-cN		
			NTSC 4.43		
			SECAM		
			AUTO		

Top level	Level 2	Level 3	Level 4	Level 5
	Ana Vid Op Setup	Chroma On/Off	Chroma On	
			Chroma Off	
		Burst On/Off	Burst On	
			Burst Off	
		Active Pic Width	Narrow Blank	
			Wide Blank	
		Assign Standard	NTSC-M	
			PAL-I	
			PAL-M	
			PAL-cN	
	Std Conversion	Motion Apt Setup	On	
			Off	
		Motion Thr Setup	Mode	Auto
				Manual
			Motion Threshold	(no action)
	Video TPG	Test Pattern Sel	100% Col Bar	
			75% Col Bar	
			Multiburst	
			SDI Matrix	
			100%Bar+Mbst	
		SDI Op TPG OnOff	Off	
			On	
		Ana Op TPG On/Off	Off	
			On	

Top level	Level 2	Level 3	Level 4	Level 5
	Engineering menu	PCB Issue	1	
		Firmware Ver	2.1	
		Software Ver	2.2	
		Checksum 1	FFFFFFFF	
		Checksum 2	FFFFFFFF	
		Serial number	1xxx	
		Speed Grade	6	
		Options Code	FFFFFFFF	
	Option Settings	Mnemonic Setting	:Shr	
			Long	
		Scroll Speed	Very Slow	
			Slow	
			Medium	
			Fast	
		Disp Brightness	(no action)	

Top level	Level 2	Level 3	Level 4	Level 5
Status	SDI Ip Status	Locked		
		625 Lines		
	Analog Ip Status	Unlocked		
		NTSC		
	Genlock	Missing		
		NTSC		
		Unlocked		
	Embedded Audio	Present		
		Checksum OK		
		Em Audio Ch1	Linear	
			Present	
		Em Audio Ch2	Linear	
			Present	
	AES1 Status	Present		
		No Errors		
		Linear		
	AES2 Status	Present		
		No Errors		
		Linear		
	Audio Delay	5ms		

Appendix B

AES Break-out cable pin ordering

Note: AES audio is an option and may not be fitted.

The AES I/O can be accessed via the 15-way D-type at the rear of Proteus

The Pin out is as follows: -

Pin 1	AES_IN1+
Pin 9	AES_OUT1+
Pin 2	GND
Pin 10	GND
Pin 3	AES_IN1-
Pin 11	AES_OUT1-
Pin 4	GND
Pin 12	GND
Pin 5	AES_IN2+
Pin 13	AES_OUT2+
Pin 6	GND
Pin 14	GND
Pin 7	AES_IN2-
Pin 15	AES_OUT2-
Pin 8	GND

Appendix C

Analogue Audio I/O Break-out cable pin ordering

Note: Analogue audio is an option and may not be fitted.

The Analogue audio Inputs and outputs can be accessed via the 2x15-way D-types at the rear of Proteus

The Pin-outs are as follows: -

Inputs

Pin 1	Analogue1R_IN+
Pin 2	GND
Pin 3	Analogue1R_IN-
Pin 4	GND
Pin 5	Analogue1L_IN+
Pin 6	GND
Pin 7	Analogue1L_IN-
Pin 8	GND
Pin 9	Analogue2R_IN+
Pin 10	GND
Pin 11	Analogue2R_IN-
Pin 12	GND
Pin 13	Analogue2L_IN+
Pin 14	GND
Pin 15	Analogue2L_IN-

Outputs

Pin 1	Analogue1R_OUT+
Pin 2	GND
Pin 3	Analogue1R_OUT-
Pin 4	GND
Pin 5	Analogue1L_OUT+
Pin 6	GND
Pin 7	Analogue1L_OUT-
Pin 8	GND
Pin 9	Analogue2R_OUT+
Pin 10	GND
Pin 11	Analogue2R_OUT-
Pin 12	GND
Pin 13	Analogue2L_OUT+
Pin 14	GND
Pin 15	Analogue2L_OUT-