

# GV Live How to Configure the ARC (Aspect Ratio Converter)



# **Version History**

Date	Version	Release by	Reason for Changes
14/05/2019	1.0	J Metcalf	Initial release
26/02/2021	1.1	J Metcalf	Rebrand

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# Introduction

Alchemist Live offers a comprehensive ARC (Aspect Ratio Converter). Aspect ratio conversion describes the act of changing the ratio between the horizontal and vertical sizes of an image. This is performed to enhance and optimise the viewing experience on different video displays.

Alchemist Live provides the user with a step by step walkthrough to create the desired aspect ratio in the converted file or full manual control of the four parameters required to define an aspect ratio conversion.

There are many typical conversions which do not require any special ARC configuration. This is generally when the source and output aspect ratio are equivalent. For example, SD (4x3) to SD (4x3), or HD (16x9) to HD (16x9).

In the case of up-conversion (SD to HD), or down-conversion (HD to SD), care should be taken to ensure that the correct aspect ratio parameters are configured in the user profile to ensure the desired aspect ratio is achieved in the output file.

### **ARC Controls**

ARC controls can be found in the Alchemist Live Conversion tab:

Alchemist Live (1	7000:01:01 - Alchemist Live			
Output Output - Audio Conversion Utilities Color LUTs	Unit Status SYS: Running LIC: Valid INP: OK OUT: FAIL	Input Status Video: ST 2110 UHD 50p Audio: ST 2110 8 Channels Last Changed: 16:41:04 UTC 09.02:21	Vulput Status Video: ST 2110 UHD 59p Audio: ST 2110 16 Channels Latency: 287 ms	
			UHD (3840x2160) 💌	
			59.94 Hz 👻	
	O Interlaced O Segmented Frame (psf) O Progressive		O Interlaced O Segmented Frame (psf) O Progressive	
- Conversion Mode a				
	Normal	Mode Select: Motion Co	mp (Ph.C) 💌 🖌 Clean Cut	
Alias Suppressio	<b>n</b> 0	P Verfical:		
Linear Enhancen Horizontal: O	nent 0.0 dB	P Vertical: O		
Aspect Ratio Input Screen Aspe Output Screen Asp Source Image Asp	ct. 16x9 Dect. 16x9 Dect. 16x9	▼ Source Tra ● Fitto Win ● Fitto He ● 0 14x9	nslation dth ight	
Custom Aspe		O Anamor	phic	ARC controls
Size:	100.0 s	% P Aspect:	-0	
Pan:	.0.0 %	P Tilt	0.0 % P	
Blanking		P Right: O	0 P	
Тор: 💁		P Bottom: O		

# 1. Input Screen Aspect

This control allows the user to describe the input screen aspect or input raster aspect ratio. Typically SD content has a native aspect ratio of 4x3 and HD content has a native aspect ratio of 16x9.

It is important to understand that the **Input Screen Aspect** parameters describe the video raster, not the shape of the program content.

Horizontal:	0.0 dB P	Vertical:	°	0.0 dB	P
Aspect Ratio Input Screen Aspect Output Screen Aspect Source Image Aspect Custom Aspect	16x9 4x3 16x9 1.37x1 1.85x1 1.85x1		ource Translation ) Fit to Width ) Fit to Height ) 14x9 ) Anamorphic		
Pan:	2.35x1 2.39x1	Aspect Tilt Right		0.0 %	P

Also included are controls to describe several popular widescreen aspect ratios.

# 1.1 Examples of 16x9 Screen Aspect



A 16:9 image carried in a 16:9 Display.



A 4:3 image pillarboxed in a 16:9 Display



A 14:9 image carried in a 16:9 Display

# 1.2 Examples of 4x3 Screen Aspect



A 4:3 image in a 4:3 Display



A 16:9 image letterboxed in a 4:3 Display



A 16:9 anamorphic image in a 4:3 Display

# 2. Output Screen Aspect

This control allows the user to describe the output screen aspect or output raster aspect. Typically SD content has a native aspect ratio of 4x3 and HD content has a native aspect ratio of 16x9.

It is important to understand that the **Output Screen Aspect** parameters describe the video raster, not the shape of the program content.

Horizontal:		0.0 dB	Ρ	Vertical:	°	0.0 dB	Р
Aspect Ratio Input Screen Aspect: Output Screen Aspect: Source Image Aspect:	16x9 16x9 4x3 16x9		<ul><li>▼</li></ul>	© 0000	ource Translation Fit to Width Fit to Height 14x9 Anamorphic		
Custom Aspect	1.37x1 1.85x1 17x9 2.35x1 2.39x1			Aspect: Tilt:	O		P
Blanking Left:		0	P	Right: Bottom:	°	0 n	P

Also included are controls to describe several popular wide screen aspect ratios.

### 2.1 Examples of 16x9 Screen Aspect



A 16x9 image carried in a 16x9 Display



A 4x3 image pillarboxed in a 16x9 Display



A 14x9 image carried in a 16x9 Display

### 2.2 Examples of 4:3 Screen Aspect



A 4x3 image in a 4x3 Display



A 16x9 image letterboxed in a 4x3 Display



A 16x9 anamorphic image in a 4x3 Display

# 3. Source Image Aspect

This control allows the user to describe the aspect ratio of the source file video content.

Horizontal:	0.0 dB	Р	Vertical:	°	0.0 dB	Р
Aspect Ratio						
Input Screen Aspect: Output Screen Aspect:	16x9 16x9		0	Fit to Width		
Source Image Aspect:	16x9 4x3	~	ŏo	14x9 Anamorphic		
Custom	16x9 1.37x1			•		
Pan:	1.85x1 17x9				0.0 %	
	2.35x1 2.39x1					
Blanking Left:	0	P		°	0	P

As well as the usual television aspect ratios, also included are controls to describe several popular cinema wide-screen aspect ratios.

# 3.1 Example of Pillarboxed 4x3 source image, in a 16x9 Screen



In this case, the Source Image Aspect should be set to: 4x3



3.2 Example of Letterboxed 16x9 image, in a 4x3 Screen input.



In this case, the Source Image Aspect should be set to: 16x9

Horizontal: O		0.0 dB	Р	Vertical:	•	0.0 dB	P
Aspect Ratio Input Screen Aspect: Output Screen Aspect: Source Image Aspect. Custom Aspect	4x3 16x9 16x9			°° 0000	urce Translation Fit to Width Fit to Height 14x9 Anamorphic		
Custom Size: Pan:	。 						
Blanking Left: ©		• 0	Р	Right:	•	0	Р

# 3.3 Example of Pillarboxed 14x9 image, in a 16x9 Screen



In this case, the Source Image Aspect should be set to: 14x9

Aspect Ratio	16x9		•	Source Translation	
	16x9			O Fit to Width	
Source Image Aspect:	14x9			O 14x9	
Custom Aspect				<ul> <li>Anamorphic</li> </ul>	
Custom Size:				:t©	
Pan:	<b>`</b>				
Left: O		0 P	P Right:	o	— 0 <b>P</b>

# 4. Source Translation

In circumstances where a conversion process has input and output aspect ratios that do not match, there are often several solutions available. It will be the case that some form of compromise is necessary. This will be in the form of either cropped source content, or visible black bars in the output picture, or making the output picture anamorphic.

		vennan. 🥪	
Aspect Ratio			
Input Screen Aspect		Source Translation —	
Output Screen Aspect:	16x9	Fit to Width     Fit to Height	
Source Image Aspect	16x9	O 14x9	
Custom Aspect		O Anamorphic	
Custom Size:		Aspect	

This control allows the user to describe how the output image will be displayed with respect to the output screen.

# 4.1 Fit to Width

When set, **Fit to Width** ensures that the output video image is scaled to maximum horizontal width whilst maintaining the source aspect ratio.

#### 4.1.1 Example of down-conversion Fit to Width translation

Consider a down conversion process that converts a 16x9 full frame image to SD.



It is important that the other ARC controls are correctly set:

- Input Screen Aspect set to: 16x9
- Output Screen Aspect set to: 4x3
- Source Image Aspect set to: 16x9

Assuming that the output display aspect ratio is 4x3, setting the **Source Translation** to **Fit to Width** will ensure the output 4x3 display will carry the source picture as 16x9 letterbox.





Note that the output picture maintains the same aspect ratio as the source. The circle in the source remains a circle in the output image.

# 4.2 Fit to Height

When set, **Fit to Height** ensures that the output video image is scaled to maximum vertical height whilst maintaining the source aspect ratio.

#### 4.2.1 Example of down-conversion Fit to Height translation

Consider a down conversion process that converts a 16x9 full frame image to SD.



It is important that the other ARC controls are correctly set:

- Input Screen Aspect set to: 16x9
- Output Screen Aspect set to: 4x3
- Source Image Aspect set to: 16x9

Assuming that the output display aspect ratio is 4x3, setting the **Source Translation** to **Fit to Height** will ensure the output 4x3 Screen will carry the converted picture as a 4x3 center crop:



Input Screen Aspect:	16x9	Source Translation	
Output Screen Aspect:	4x3	<ul> <li>Fit to Width</li> <li>Fit to Height</li> </ul>	
Source Image Aspect:	16x9	• 14x9	
🗌 Custom Aspect		Anamorphic	

Note that the output picture maintains the same aspect ratio as the source. The circle in the source image remains a circle in the output image.

# 4.3 14x9

In circumstances where either SD 4x3 content is up-converted to HD, or when 16x9 HD content is downconverted to SD, a user may choose to display the image as 14x9.

#### 4.3.1 Example of down-conversion 14x9 translation

Consider an HD source with a full frame 16x9 image that is to be down-converted to SD.



HD 16x9 source image

It is important that the other ARC controls are correctly set:

- Input Screen Aspect set to: 16x9
- Output Screen Aspect set to: 4x3
- Source image Aspect set to: 16x9

Setting the control Source Translation to 14x9 will resize the picture as shown below:



Aspect Ratio Input Screen Aspect:	16x9	Source Translation	
Output Screen Aspect:	4x3	O Fit to Width	
Source Image Aspect:	16x9	O 14x9	
🗌 Custom Aspect		<ul> <li>Anamorphic</li> </ul>	

Note that a slight side-crop has been necessary to achieve this conversion and that the source aspect ratio has been preserved. 14x9, in this example, offers a compromise when the user is keen to minimise the black bars top and bottom.

#### 4.3.2 Example of up-conversion 14x9 translation

Consider an SD source with a full frame 4:3 image that is to be up-converted to HD 16x9 display.



It is important that the other ARC controls are correctly set:

- Input Screen Aspect set to: 4x3
- Output Screen Aspect set to: 16x9
- Source image Aspect set to: 4x3

Setting the control **Source Translation** to **14x9** will resize the picture to be a 14x9 image, pillarboxed into the 16x9 screen.



Horizontal: O				•	0.0 dB	
Aspect Katlo	102	~	- 80	urce Translation		
iniput Screen Aspect.	4x3		ő	Fit to Width		
Output Screen Aspect	16X9	×	ŏ	Fit to Height		
Source Image Aspect	4x3		0	14x9		
Custom Aspect			0	Anamorphic		
Size:				<b>o</b>		
	~			•		

Note that a slight top/bottom crop has been necessary to achieve this conversion and that the source aspect ratio has been preserved.

14x9 in this example offers a compromise when the user's preference is to minimise the black bars left and right.

### 4.4 Anamorphic

This control is applicable when either handling anamorphic source content, or when producing output content with an anamorphic aspect ratio.

The anamorphic method of carrying video content is typically only applicable in the SD domain.

When used in conjunction with the other ARC controls, the ARC can be configured to:

- Effectively un-squeeze anamorphic source content as part of an up-conversion process.
- Produce anamorphic content as part of a down-conversion process.

#### 4.4.1 Example of SD Anamorphic to HD

Consider an anamorphic SD source.



Part of the up-conversion process to HD should be to un-squeeze the anamorphic source picture so that the output displays a full 16x9 image.

It is important that the other ARC controls are correctly set:

- Input Screen Aspect set to: 4x3
- Output Screen Aspect set to: 16x9
- Source Image Aspect set to: 4x3

#### Source Translation should to be set to: Anamorphic.

The HD output will now be a full frame 16x9 image with no black bars, no cropping and with the same aspect ratio as the original image before it was projected anamorphically.



Acrost Potic							
Input Screen Accert	422		-	- Si	ource Translation -		
Option of the option of the option	48.0			ō	Fit to Width		
Output Screen Aspect:	1629			ō	Fit to Height		
Source Image Aspect	4x3		•	0	14x9		
🔲 Custom Aspect				0	Anamorphic		
Size:							
	•	0.00		2011	•	0.0.11	

#### 4.4.2 Example of HD to SD Anamorphic

Consider a full frame 16x9 source picture.



This source file is required to be down-converted to SD with an anamorphic projection. It is important that the other ARC controls are correctly set:

- Input Screen Aspect set to: 16x9
- Output Screen Aspect set to: 4x3
- Source Image Aspect set to: 16x9

#### Source Translation set to: Anamorphic.

The SD output will now be a 4x3 display carrying an anamorphic image.



		- 0.0 UD - F	Venuc	di, 🤝	- 0.0 db - (	
Aspect Ratio Input Screen Aspect: Output Screen Aspect: Source Image Aspect: Custom Aspect	16x9 4x3 16x9			Source Translation O Fit to Width O Fit to Height O 14x9 O Anamorphic		
Size:		• 100.0 % P	Aspe	:t	100.0 %	Р

# 5. Custom Controls

The **Custom** controls allow an Operator to set an ARC configuration that is not offered by the standard controls. This maybe because a source file is encountered that has a non-standard aspect ratio i.e. it's not 4x3 or 16x9. Or there may be a requirement to produce a file that has a non-standard aspect ratio.

It is also possible to specify a 'standard' aspect ratio conversion using the standard controls and then tweak the aspect ratio conversion using the custom controls. A typical example might be when the user wants to apply minor overscan due to missing top and bottom lines of the source image.

ſ	Aspect Ratio Input Screen Aspect: Output Screen Aspect: Source Image Aspect:	16x9 16x9 16x9	* *	Source Translation O Fit to Width O Fit to Height O 14x9			
	Custom Aspect Custom Size: Pan:	10 0.0	0.0% P As 1% P Ti	Anamorphic		Custom controls	5
٢	Blanking Left: <b>o</b>	0	P Ri	iaht: O	0 P		

# 5.1 Custom

Default **Custom** setting is *disabled*. When **Custom** is disabled, the custom controls are deactivated and appear greyed-out (as shown above).

Enabling this box will make the custom controls active.

Horizontal: O		0.0 dB P	Vertical:	•	0.0 dB P	
Aspect Ratio Input Screen Aspect: Output Screen Aspect: Source Image Aspect: Custom Aspect	Custom Custom Custom					
Custom Size:	•	100.0 % P 0.0 % P	Aspect: Tilt:		100.0 % P 0.0 % P	
Blanking Left: O		0 P		•	0 P	

# 5.2 Size

This adjusts the size of the whole image. Both vertical and horizontal size change together while maintaining the aspect ratio of the image.

The range of control is from 50% to 200% in 0.1% increments and default is 100%.

Source Image Aspect	Custom	٣	O Fit to Height O 14x9 O Anamorphic		
Custom Size: ——— Pan: ———	9 -0 0	4.8 % P	Aspect	- <b>0</b>	P P
Blanking	0		Diakt <b>A</b>	n	

### 5.3 Pan

This adjusts the horizontal position of the output image. The range of control is  $\pm 75\%$  in 0.1% increments. Default is 0%.

Source Im	age Aspect: m Aspect	Custom		•		14x9 Anamorphic			
- Custom - Size: Pan:		•	94.8 % 2.2 %	P P	Aspect: Tilt:	,	,	100.0 % 0.0 %	P P
/   Blanking —   Left:	°——		0	P	Right:	°——		0	P

### 5.4 Aspect

This adjusts the horizontal size of the image, allowing the shape (aspect ratio) of the output image to be changed. The range of control is from -50% to 200% in 0.1% increments and default is 100%.

Source Image Aspe Custom Aspect	ct: Custom		*	• 14x9 • Anamorphic		
Custom Size: —— Pan: ——	-o	100.0 % P 0.0 % P	Aspec Tilt:	:	80.0 %	P P
Blanking		0 P	Right	o	n	P

### 5.5 Tilt

This adjusts the vertical position of the output image. The range of control is ±75% in 0.1% increments.

Source Ima	ige Aspect: n Aspect	Custom		•		• Anamorphic		
Custom – Size: Pan:	<u> </u>	•	100.0 % 0.0 %	P P	Aspect: Tilt:		100.0 %	P P
, Blanking — Left	o		0	Р	Right:	•——	0	Р

**Note:** as an alternative to using the slider controls, a user can enter specific values for the four controls Size, Asp, Pan and Tilt, by selecting the value parameter and typing a specific value with the keyboard. Alternatively minor step adjustments can be made using the left and right cursors.

