GV File

How to Configure the ARC (Aspect Ratio Converter)

Version History

Date	Version	Release by	Reason for Changes
01/02/2014	1.0	J Metcalf	Initial release
06/05/2014	2.0	J Metcalf	Edit for version V1.1.0.6
22/05/2014	2.1	T Huns	Minor corrections
29/04/2015	3.0	J Metcalf	Edit for version V2.0.0.12
07/07/2015	3.1	J Metcalf	Edit for version V2.1.0.8
10/08/2015	3.2	J Metcalf	Edit for version V2.1.1.2
07/09/2015	3.3	J Metcalf	Edit for XF rebrand
25/01/2016	3.4	G Emerson	Completed rebrand
24/04/2018	3.5	J Metcalf	GV rebrand
21/09/2018	4.0	J Metcalf	Edit for version v4.0.0.20
03/08/2020	4.1	J Metcalf	Added FullScreen example
08/03/2021	4.2	J Metcalf	Rebrand

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Table of Contents

1. Introduction **5**

2. Input Screen Aspect **6**

2.1 Examples of 16x9 Screen Aspect 6

2.2 Examples of 4x3 Screen Aspect 6

3. Output Screen Aspect **7**

3.1 Examples of 16x9 Screen Aspect 7

3.2 Examples of 4:3 Screen Aspect 7

4. Source Image Aspect **8**

4.1 Example of Pillarboxed 4x3 source image, in a 16x9 Screen 8

4.2 Example of Letterboxed 16x9 image, in a 4x3 Screen 9

4.3 Example of Pillarboxed 14x9 image, in a 16x9 Screen 9

5. Source Translation **10**

5.1 Fit to Width 11

5.1.1 Example of down-conversion Fit to Width translation 11

5.2 Fit to Height 12

5.2.1 Example of down-conversion Fit to Height translation 12

5.3 14x9 13

5.3.1 Example of down-conversion 14x9 translation 13

5.3.2 Example of up-conversion 14x9 translation 14

5.4 Anamorphic 15

5.4.1 Example of SD Anamorphic to HD 15

5.4.2 Example of HD to SD Anamorphic 16

6. FullScreen Stretch **17**

7. Overscan **18**

8. Custom Controls **19**

8.1 Custom 19

8.2 Size 20

8.3 Pan 20

8.4 Asp 20

8.5 Tilt 20

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9. Output/ Metadata/ Display Aspect Ratio 21

10. Active Format Description (SMPTE 2016) 22

10.1 AFD Enable 22

10.2 Coded Frame Aspect Ratio 23

10.3 AFD Code 23

1. Introduction

GV File 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.

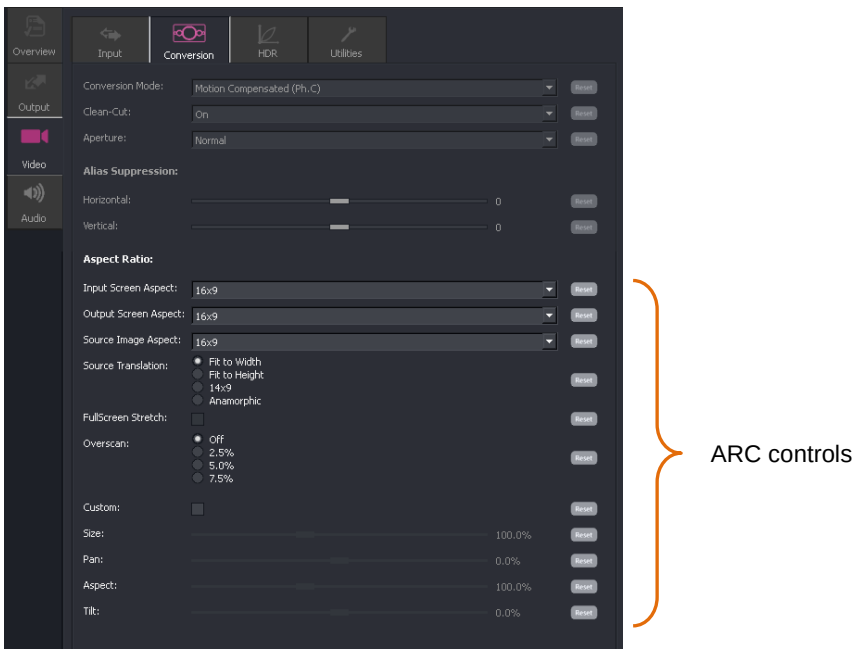
GV File provides the user with a suite of controls to create the desired aspect ratio in the converted file. If needed, a set of manual controls is provided enabling adjustment of the four parameters required to define an aspect ratio conversion.

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), HD (16x9) to HD (16x9), or HD (16:9) to UHD (16:9).

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. This would also apply to conversions between 16:9 and wider formats like 2K and 4K.

ARC Controls

ARC controls are found under the Video/Conversion tab, within the Profile Management window.



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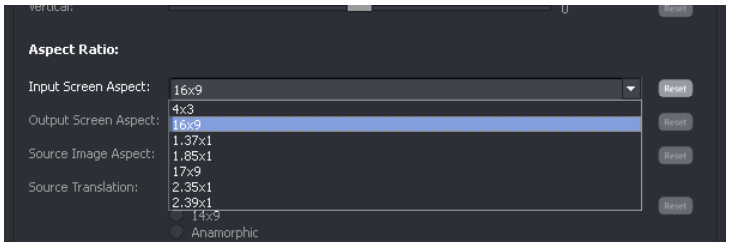
2. Input Screen Aspect

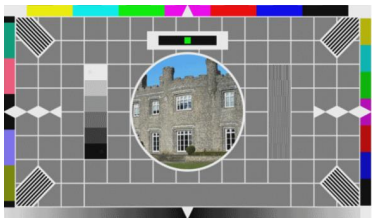
This control allows the user to describe the input screen aspect ratio. Typically SD content has a native aspect ratio of 4x3 and HD content has a native aspect ratio of 16x9.

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

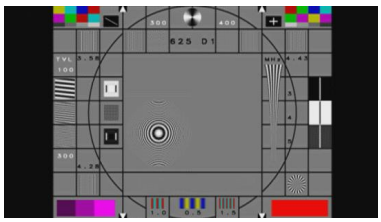


Also included are controls to describe several popular widescreen aspect ratios.

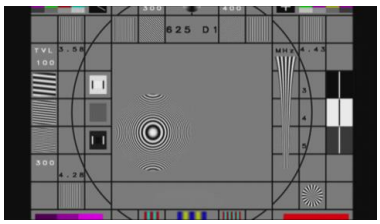
2.1 Examples of 16x9 Screen Aspect



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

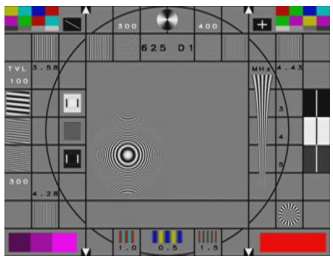


A 4:3 image pillarboxed in a 16:9 Display

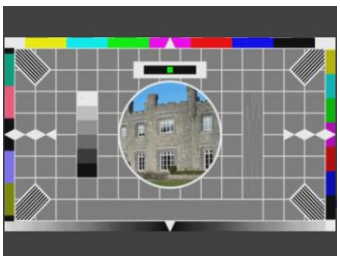


A 14:9 image carried in a 16:9 Display

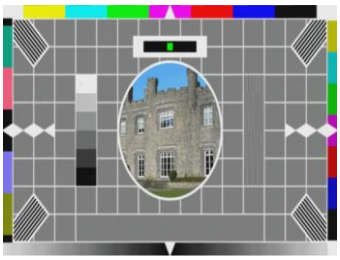
2.2 Examples of 4x3 Screen Aspect



A 4:3 image in a 4:3 Display



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

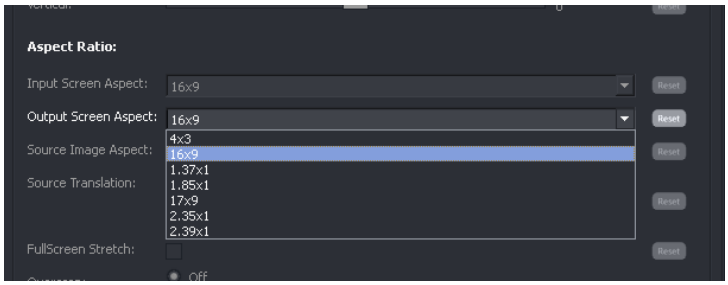


A 16:9 anamorphic image in a 4:3 Display

3. Output Screen Aspect

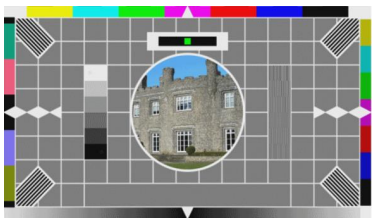
This control allows the user to describe the output screen aspect ratio. Typically SD content has a native aspect ratio of 4x3 and HD content has a native aspect ratio of 16x9.

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

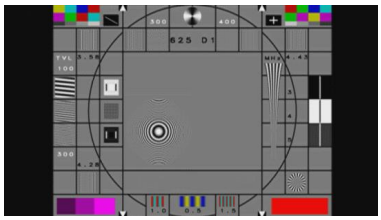


Also included are controls to describe several popular wide screen aspect ratios.

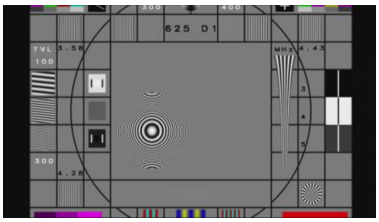
3.1 Examples of 16x9 Screen Aspect



A 16x9 image carried in a 16x9 Display

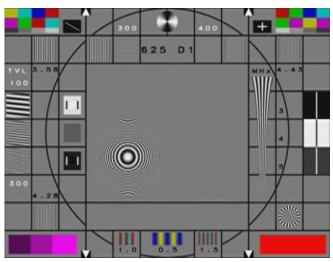


A 4x3 image pillarboxed in a 16x9 Display

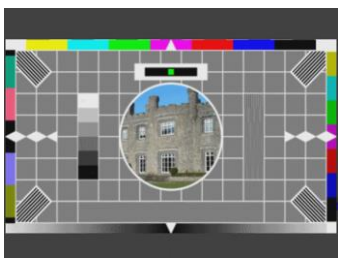


A 14x9 image pillarboxed in a 16x9 Display

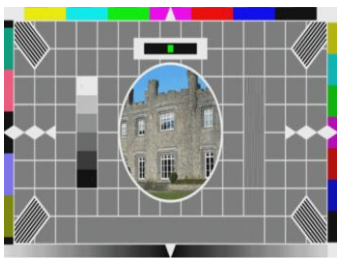
3.2 Examples of 4:3 Screen Aspect



A 4x3 image in a 4x3 Display



A 16x9 image letterboxed in a 4x3 Display



A 16x9 anamorphic image in a 4x3 Display

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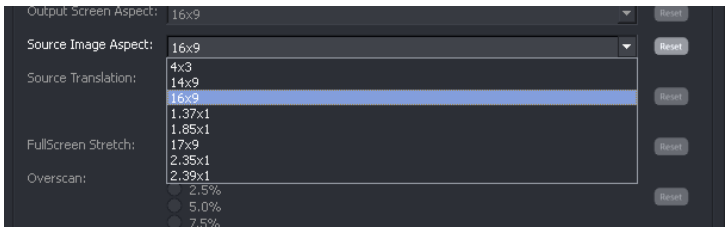
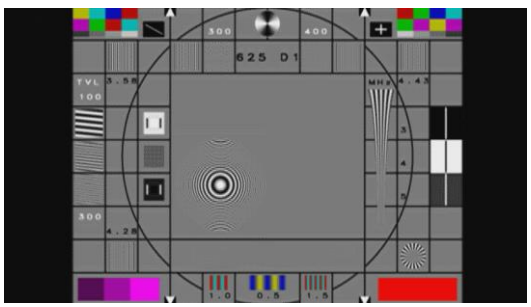
4. Source Image Aspect

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

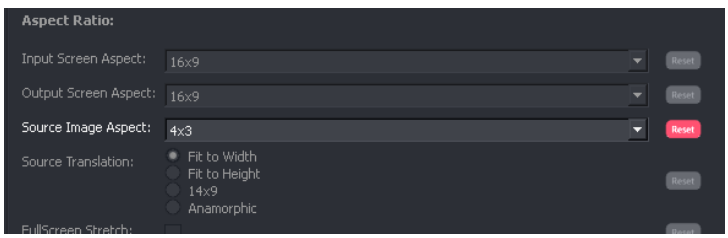


As well as the usual television aspect ratios, also included are controls to describe several popular cinema wide-screen aspect ratios.

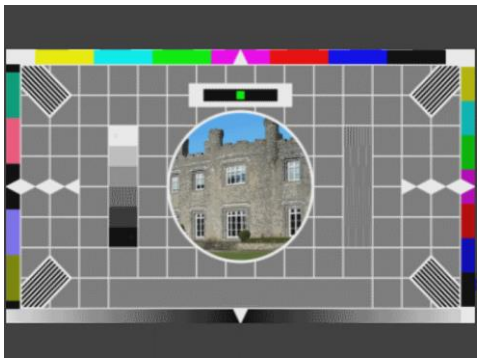
4.1 Example of Pillarboxed 4x3 source image, in a 16x9 Screen



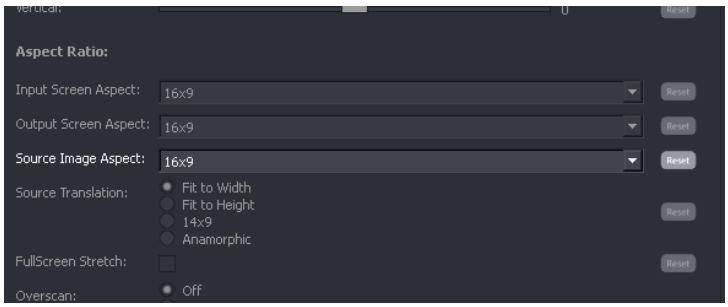
In this case, the **Source Image Aspect** should be set to: 4x3



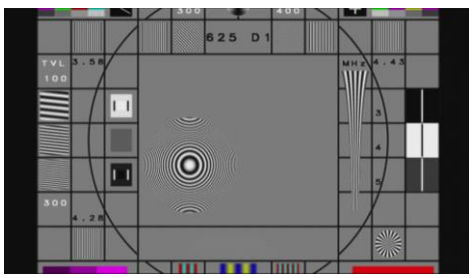
4.2 Example of Letterboxed 16x9 image, in a 4x3 Screen



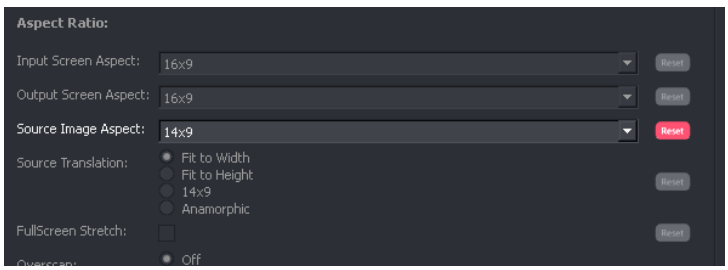
In this case, the **Source Image Aspect** should be set to: 16x9



4.3 Example of Pillarboxed 14x9 image, in a 16x9 Screen



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



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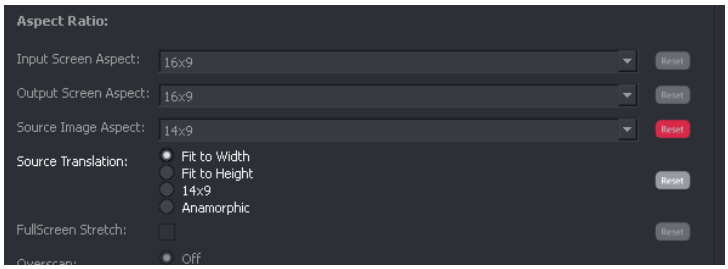
5. Source Translation

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.



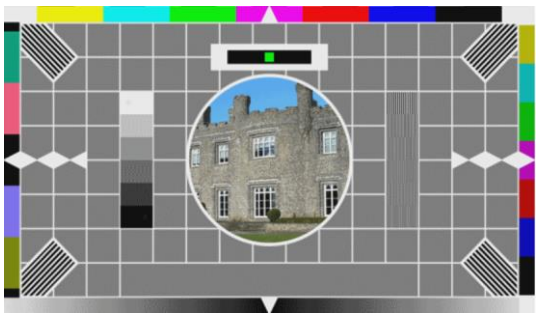
This control allows the user to describe how the output image will be displayed with respect to the output screen.

5.1 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.

5.1.1 Example of down-conversion Fit to Width translation

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

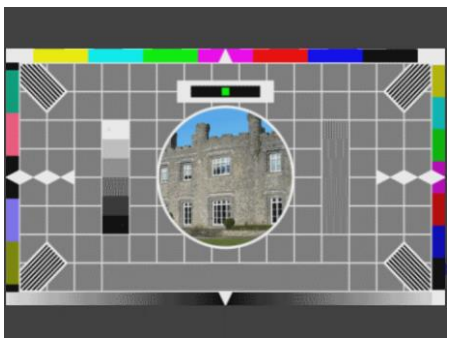


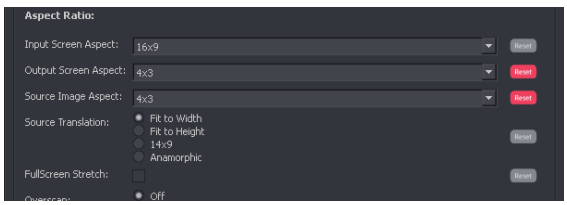
16x9 HD source image

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

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 (it is not an oval).

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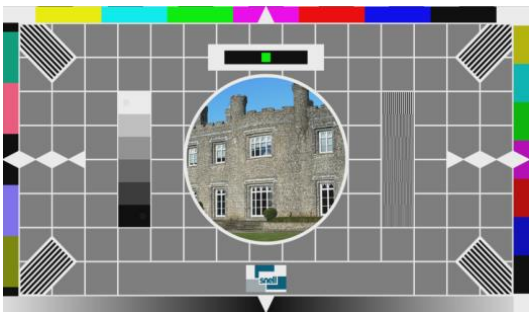
5.2 Fit to Height

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

5.2.1 Example of down-conversion Fit to Height translation

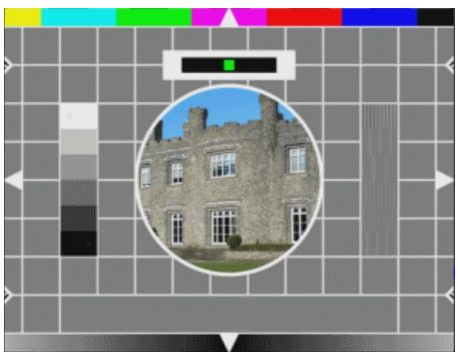
Consider a down conversion process that converts a 16x9 full frame image to SD.

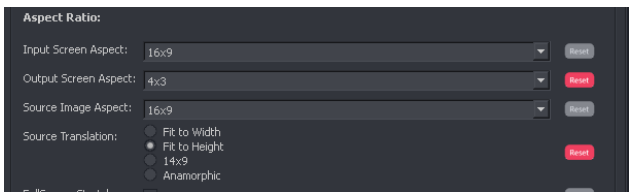


It is important that the other ARC controls are correctly set:

- **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:





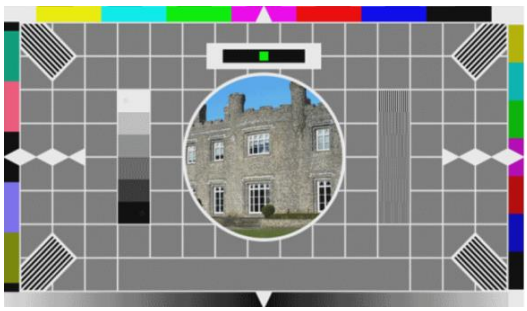
Note that the output picture maintains the same aspect ratio as the source. The circle in the source image remains a circle in the output image.

5.3 14x9

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

5.3.1 Example of down-conversion 14x9 translation

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

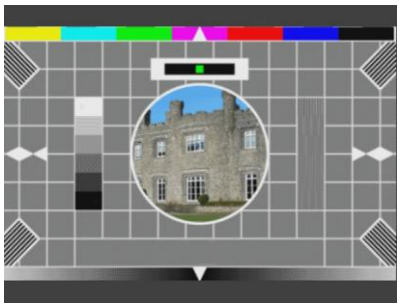


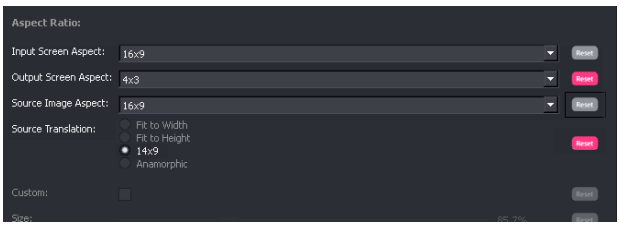
HD 16x9 source image

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:





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, while not excessively side cropping the picture.

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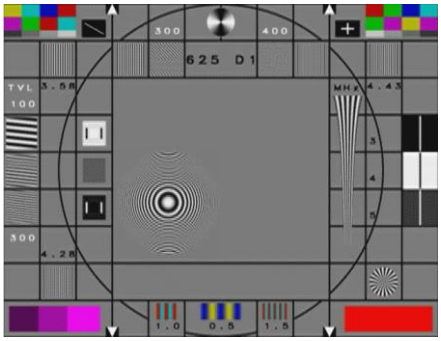
5.3.2 Example of up-conversion 14x9 translation

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

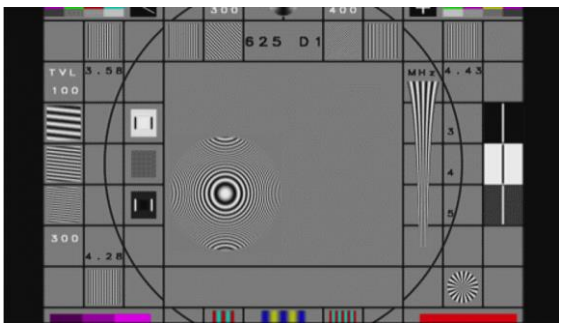


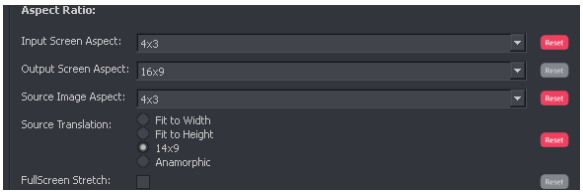
SD 4x3 source image

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

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





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 is keen to minimise the black bars left and right, while not excessively cropping the picture top and bottom.

5.4 Anamorphic

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

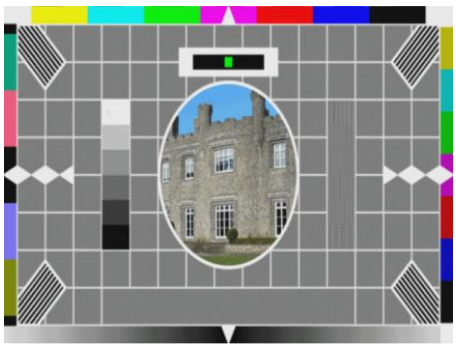
The anamorphic method of carrying video content is typically only applicable in the SD domain.

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.

5.4.1 Example of SD Anamorphic to HD

Consider an anamorphic SD source.



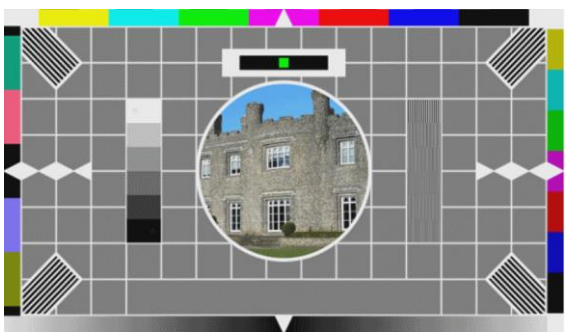
Part of the up-conversion process to HD should be to un-squeeze the anamorphic source picture so that the output displays a full 16x9 image.

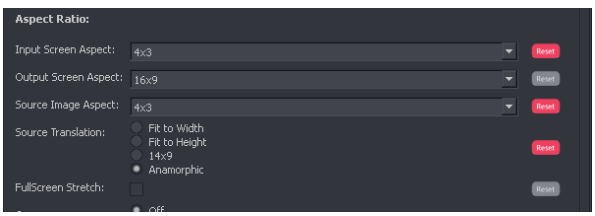
It is important that the other ARC controls are correctly set:

- **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.





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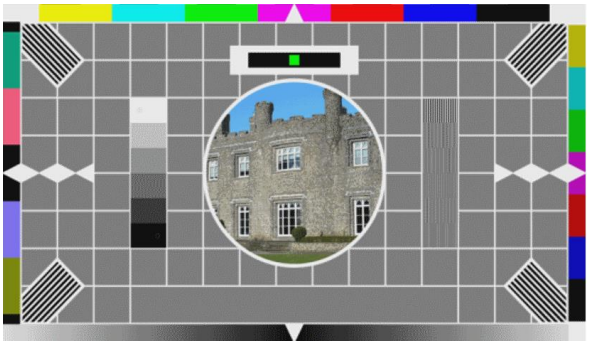
5.4.2 Example of HD to SD Anamorphic

Consider a full frame 16x9 source picture.



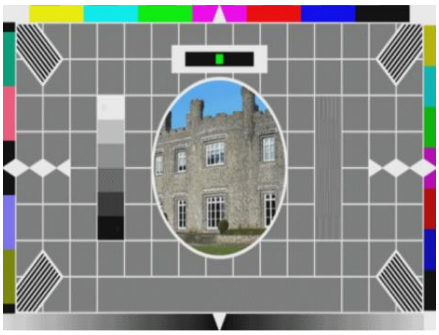
This source file is required to be down-converted to SD with an anamorphic projection.

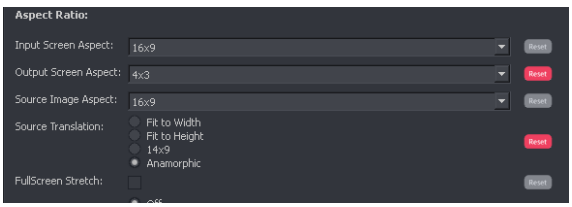
It is important that the other ARC controls are correctly set:

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

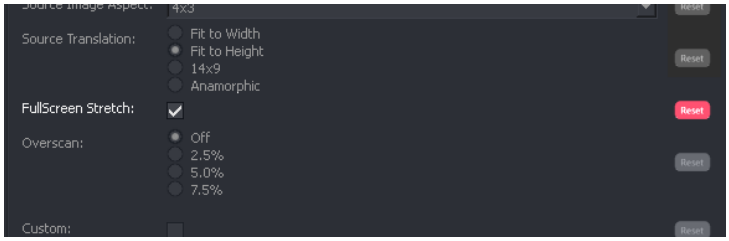
Source Translation set to: **Anamorphic**.

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





6. FullScreen Stretch

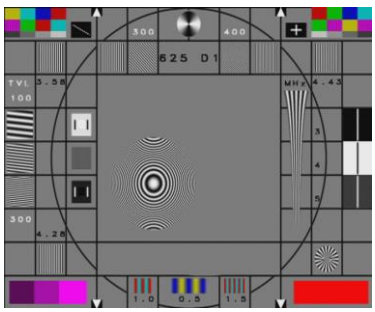


This feature is normally associated with a 4x3 to 16x9 translation.

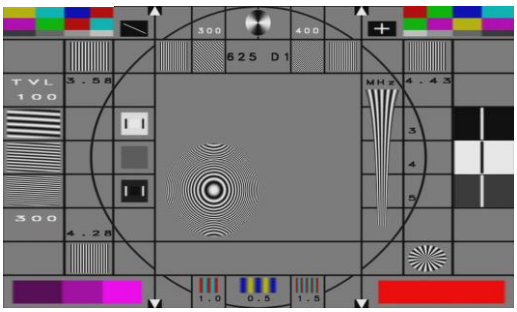
It allows a non-linear aspect ratio conversion to be configured. In such a conversion, the picture content towards the left and right sides is stretched more than the content at the centre.

Example:

Source



Output



Note that the **FullScreen Stretch** tick box is only active with certain ARC configurations exist:

- The source aspect ratio must be narrower than the output aspect ratio.
- Source Translation must not be set to: **Fit to Width.**

This feature can create some strange effects and is often not considered acceptable:

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7. Overscan

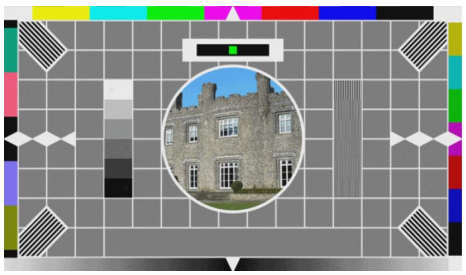
The **Overscan** control allows the picture to be overscanned by:

- 2.5%
- 5%
- 7.5%

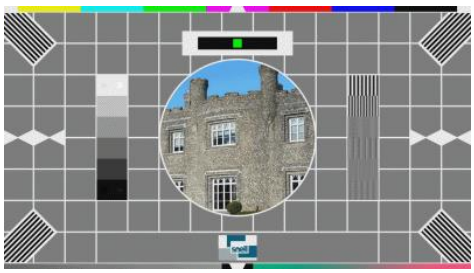
Example:

In this example, the processed image has been overscanned by 7.5%

Source



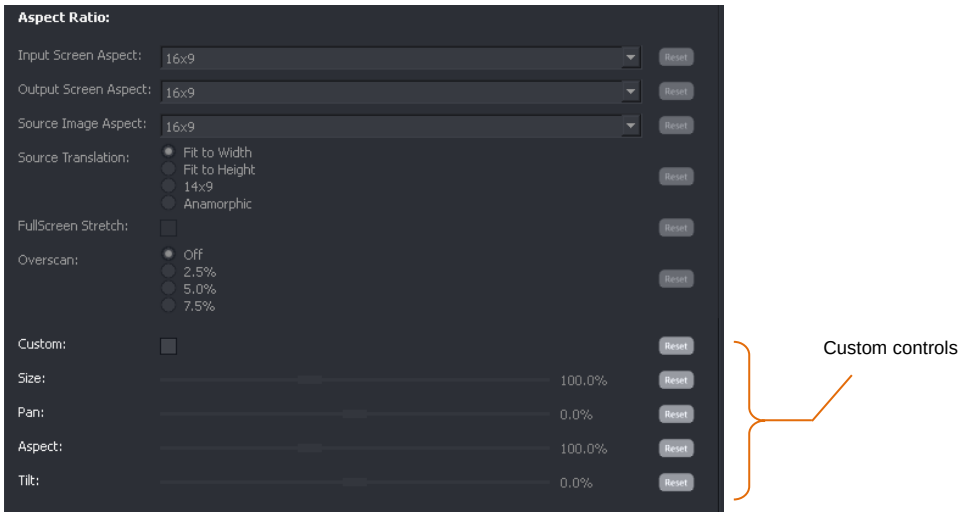
Output



8. 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.

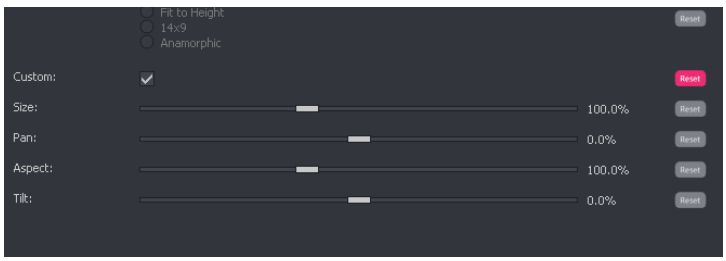


8.1 Custom

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.



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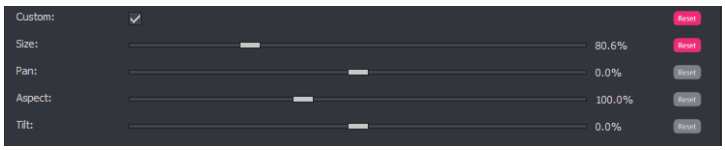
8.2 Size

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

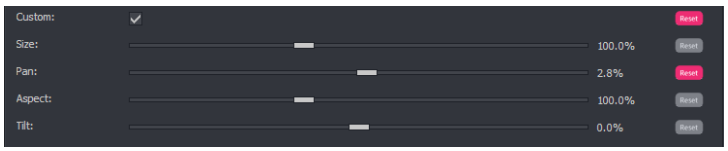
The range of control is from 40% to 200% in 0.1% increments and default setting is 100%.



8.3 Pan

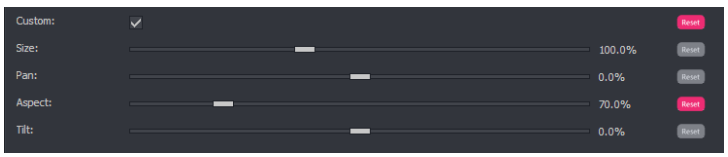
This adjusts the horizontal position of the output image. The range of control is ±75% in 0.1% increments.

Default is 0%.



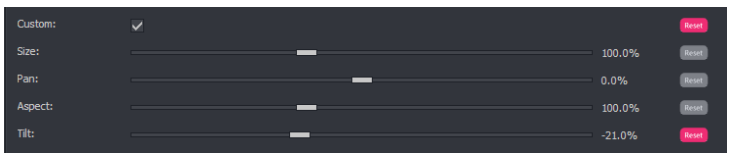
8.4 Asp

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 -40% to 200% in 0.1% increments and default is 100%.

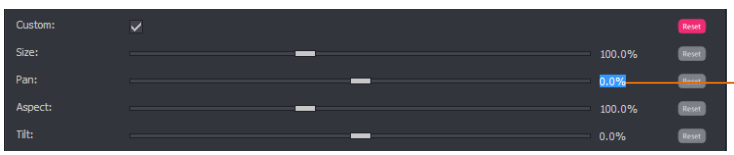


8.5 Tilt

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

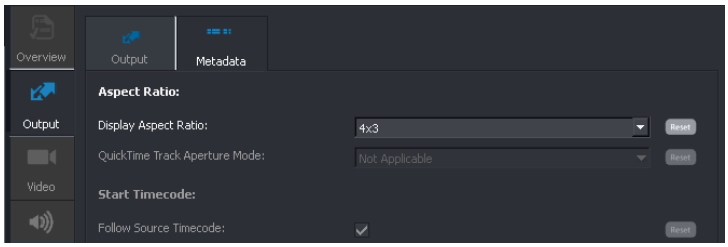


Note: as an alternative to using the slider controls, a user can enter specific values for the four controls Size, Asp, Pan and Tilt, by selecting the value parameter and typing a specific value with the keyboard. Alternatively minor step adjustments can be made using the left and right cursors.



9. Output/ Metadata/ Display Aspect Ratio

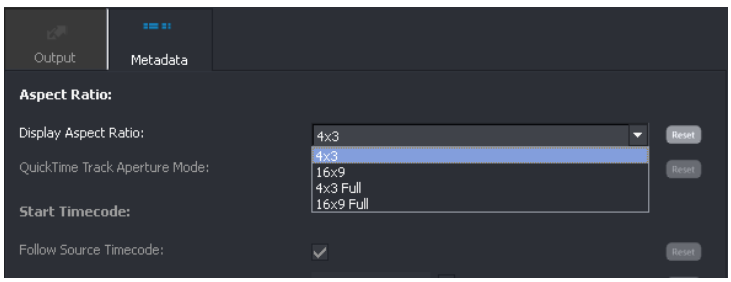
This control is only active when the output format is SD. The default setting is 4x3.



When an HD, 2K, or 4K file format is configured, the **Display Aspect Ratio** control will be inactive (greyed out).

This control allows a User to set the **DAR** (Display Active Ratio) flag.

The control has four possible settings, selectable from a drop down menu:



4x3 This setting is applicable for when the output program is to be displayed on a 4x3 video monitor. This setting uses the default values dictated by the specific file format being employed by the output file.

Note that when the output file type utilizes a MOV file wrapper, that default values are based on analogue blanking (625: 702x576, 525: 702x486). This error is inherent in the MOV file wrapper.

All other file types will scale correctly in the digital domain (625: 720x576, 525: 720x486).

16x9 This setting is used if the SD output program is to be Screened on a 16x9 video monitor. When **16x9** is selected, the spatial scaling will be dictated by the specific file format being employed in the output file.

Note that when the output file type utilizes a MOV file wrapper, that default values are based on analogue blanking values (625: 702x576, 525: 702x486). This will affect scaling to 16x9, where the actual aspect ratio created will be 1.85:1 (true 16x9 = 1.77:1). This error is inherent in the MOV file wrapper. All other file types will scale correctly to 16x9.

4x3 Full This setting is only available when the output file format utilizes a MOV file wrapper. When selected, the output file will be scaled using digital blanking values (625: 720x576, 525: 720x486), so ensuring the output is exactly 4:3.

16x9 Full This setting is only available when the output file format utilizes a MOV file wrapper. This setting is used if the output program is to be Screened on a 16x9 video monitor. Unlike the **16x9** setting, the **16x9 Full** setting will set spatial scaling values to make the output file Screen exactly to 16x9.

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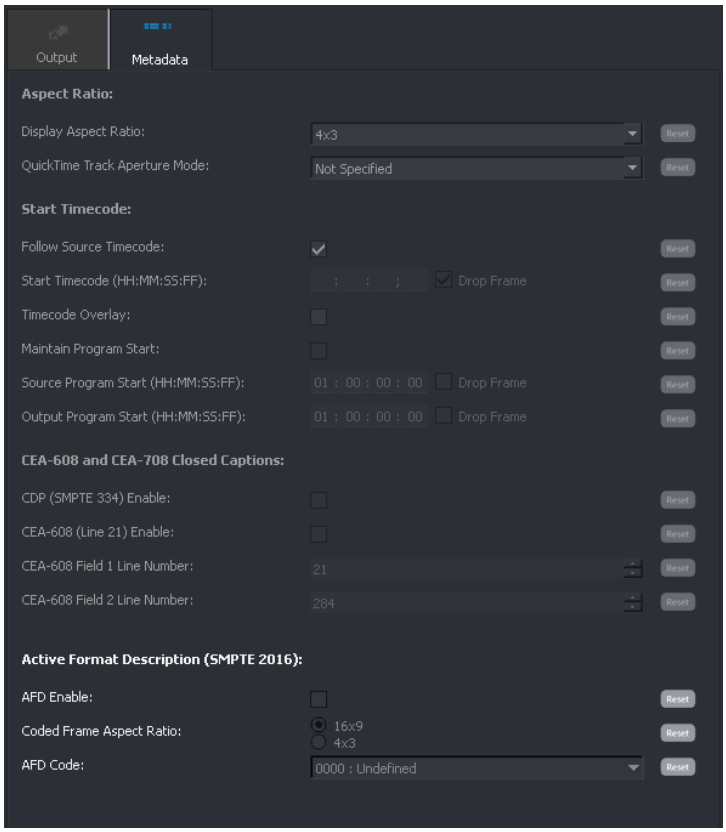
10. Active Format Description (SMPTE 2016)

The release of V2 software introduced the ability to insert an AFD code into the output file. This does depend on whether the chosen output format supports this feature.

This feature is only supported when the output file wrapper is MXF OP1a (except when the Codec type is either XAVC or JPEG2000).

When the feature is not supported, the controls will remain greyed out.

The menu for this feature is in the Output/Metadata tab:



When an output format is configured that supports the insertion of an AFD code, the **AFD Enable** checkbox will become selectable, allowing the User to interact with the menu.

10.1 AFD Enable

This control is default **Off**. When enabled, the other controls become active allowing a User to interact with the menu.

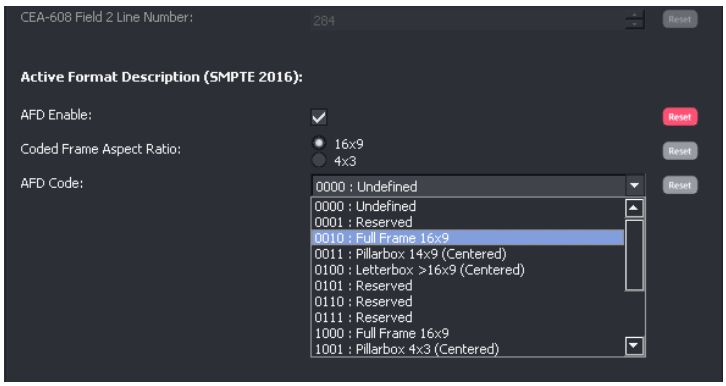
10.2 Coded Frame Aspect Ratio

This control allows the User to set the appropriate AFD aspect ratio of the output coded frame.

In this example the coded frame has been defined as: 16x9.

10.3 AFD Code

An appropriate SMPTE 2016 AFD code can be selected from the drop down list:



In this example, an AFD code of 0100 has been configured.

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