



kaleidescape

CinemaScape

2.35 home theater as it was meant to be

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The CinemaScope Experience

CinemaScope video processing perfects the 2.35 home theater experience by eliminating the need for anamorphic lens movement or changing projector modes when viewing content with different aspect ratios. CinemaScope makes transitions between different types of content, as well as between content and the onscreen display (OSD), fast and seamless.

Seamless transition is especially important with Kaleidescape Scenes, which enable you to enjoy memorable moments from your favorite movies instantly. In combination with CinemaScope, you can now jump from one scene to another without manually adjusting your projector, or the distraction of a motorized lens sled.

CinemaScope also repositions subtitles if necessary to ensure that they remain visible when the image is enlarged to fill the 2.35 screen.

CinemaScope uses the entire area of the 2.35 screen when displaying your collection. More movie covers are visible than ever before, and the Movie List view shows the title, actors, director, genre, year of release, movie rating, and runtime, all without scrolling.

CinemaScope is widescreen home theater the way it was meant to be.

Aspect Ratios

An aspect ratio is the ratio of the width to the height of a rectangle. For example, standard definition video is four units wide for every three units of height, or 4:3. High-definition video is 16:9.

In film and home theater, it is common to approximate aspect ratios to two decimal places. For example, $16:9 = 16/9$, which is approximated as 1.78. Similarly, a 2560×1080 display is a 2.37 display. This document describes aspect ratios using this decimal notation.

There are several common aspect ratios used in home theater — 2.35, 2.37, 2.39 and 2.40 — that are often referred to collectively as “2.35” for reasons that are discussed below. This document uses this common convention unless specifically discussing the nuances of the exact ratios.

A History of Aspect Ratios at the Movies

Movies were originally shot in the 1.33 aspect ratio that was pioneered by the Lumière brothers in 1895, and then popularized by Thomas Edison.

When soundtracks were added to films in 1927, a lack of standardization made film distribution difficult. As a result, in 1932 the Academy of Motion Picture Arts and Sciences created the Academy Aperture standard, which used a 1.37 frame. Academy Aperture remained the standard until the early 1950s, when competition from television drove movie studios to develop widescreen formats as a way to differentiate the theatrical experience from home television viewing. After many widescreen aspect ratio experiments, Academy Flat and CinemaScope became the modern standards.

Academy Flat (1.85)

Introduced in mid-1953, Academy Flat is essentially a letterboxed format using conventional lenses but framing the action within a 1.85 window within the film frame. Theatrical projectors mask the unused portion of the film and project the 1.85 image to fill a wider screen.

CinemaScope

Introduced by Twentieth Century-Fox in September 1953, CinemaScope used an anamorphic lens, which is a lens that has different optical characteristics in the horizontal and vertical axes. This facilitates filming 2.35 images on standard 35 mm film stock by squeezing the image horizontally.



An anamorphic lens is also used during projection to undo the squeeze and recover the 2.35 image in the theater.



Although CinemaScope equipment had technical limitations that led to the quick adoption of Panavision camera lenses, the CinemaScope name endured, and has become synonymous with very wide screen movies.

In the 1970s, a technical adjustment was made by the Society of Motion Picture and Television Engineers (SMPTE) to the standard film frame size to leave more space between frames for easier film splicing. This change did not impact 1.85 films because of the unused space between frames. For anamorphic films, the frame aspect ratio was adjusted from 2.35 to 2.39, which is the ratio commonly used by anamorphic productions today.

The following table summarizes some common aspect ratios.

Aspect Ratio	Description
1.33	Popularized by Thomas Edison, beginning the silent movie era. This is also the aspect ratio for standard definition television.
1.37	Academy Aperture, introduced in 1932 to standardize framing of films with an audio track. This was the industry standard until 1953. Commonly called 1.33.
1.66	The current European standard for theatrical release. The exact ratio is 5:3.
1.78	The standard aspect ratio for high-definition television. The exact ratio is 16:9.
1.85	Academy Flat, the non-anamorphic standard for theatrical release.
2.35	Known as CinemaScope or "Scope", this was the established anamorphic standard for theatrical release into the 1970s.
2.37	The image ratio projected by a 16:9 home projector using an anamorphic lens. Also the actual ratio of most displays commonly advertised as 21:9, although the exact aspect ratio is 64:27. This is the ratio used by CinemaScope.
2.39	Became the new anamorphic standard for theatrical release in the 1970s. Commonly rounded to 2.40.

Aspect Ratios in Home Theater

With the introduction of single lens digital HDTV home projectors, a 1.78 image could be projected at home. This projector frame is well suited for HDTV, 1.33 images (with black pillarboxing bars on the side) and 1.85 images (with very small letterboxing black bars at the top and bottom). However for 2.35 content, an image that should be panoramic ends up smaller than a 1.85 image.



To solve this problem, 1.33x anamorphic lenses were created for home projectors. These lenses take the projector's 1.78 image and stretch that image horizontally to fill a wider screen. Although this creates panoramic size, an anamorphic lens alone would create a distorted image.

To prepare the projected image for an anamorphic lens, the video frame is stretched vertically to remove the black bars.



When this stretched image is sent through the lens, the correct aspect ratio is restored, and the image is now larger than the projector can create alone.



The CinemaScope difference

Without CinemaScope, switching between 2.35 and lower aspect ratios involves moving the anamorphic lens into or out of position and changing the vertical stretch mode of the projector depending on the aspect ratio of the content. This can be automated using a motorized lens sled and a control system, but the process can still disrupt the viewing experience. Also, the process of stretching the image with a 1.33x lens spreads light out over a larger area, resulting in a visible difference in brightness between content with a 2.35 aspect ratio and content with lower aspect ratios.

CinemaScope performs the video processing within the player, and images of all aspect ratios can be adjusted to display properly when projected with an anamorphic lens. This enables the lens to remain in place and the mode of the projector to remain fixed. In addition to eliminating the disruption caused by lens movement and changes in the projector mode, CinemaScope removes the need for compromises during calibration. The projector can be calibrated with the lens in position so that all aspect ratios share the same level of brightness.

2.35, 2.37, 2.39 and 2.40 — What is actually projected?

With so many similar aspect ratios, and home theater screens commonly available in 2.35, 2.37, and 2.40 aspect ratios, there are a few key points to help decipher what is actually being projected:

- ▶ The actual projected image of an HD video projector with an anamorphic lens is 2.37 when all the pixels on the projector are illuminated.
- ▶ When projecting 2.35 content without CinemaScope, nearly all projectors are actually projecting a 2.37 image, because their vertical stretch feature clips a few pixels from the top and bottom of the 2.35 frame.
- ▶ At typical home theater projection screen sizes, the difference in size between a 2.37 image and 2.35 or 2.40 images is measured in fractions of an inch, which is often less than the amount that the projector is set to spill into the dark border of the screen to hide small imperfections in alignment.
- ▶ With tiny adjustments to the zoom of the projector, a 2.37 image can fit a 2.35 or 2.40 screen with a few pixels spilling invisibly into the top or side borders of the screen.
- ▶ Even native projectors or flat panels that claim 2.35 or 21:9 are really 2.37 ($2560/1080 = 2.37$).

CinemaScope is designed around 2.37, since this aspect ratio works well for all common screen sizes and widescreen formats.

Using CinemaScape in a Home Theater

Available only with M-Class players running KEAOS 4.3 and higher, CinemaScape requires an HDMI® connection configured for 1080i or 1080p. CinemaScape is typically used with an anamorphic lens. Native 2.37 projectors and displays, as well as projectors that zoom to fill a 2.35 screen, are also supported.

Before beginning, consider the configuration of your theater.

Does your projector have an anamorphic lens?

To fill a 2.35 screen, most projectors use an anamorphic lens. Some projectors, however, can natively project 2.35 images without an anamorphic lens. Others use a motorized zoom lens to expand the image to fill the 2.35 screen. Examples of such projectors include:

Type	Projector brand/model
2.35 Native	Digital Projection dVision Scope 1080p projectiondesign avielo optix SuperWide235 SIM2 Nero 235
Zooming	Digital Projection TITAN series Panasonic PT-AE7000 Sony VPL-VW1000ES 4K

If you are using a projector that can fill a 2.35 screen without an anamorphic lens, follow the instructions in [Configuring your player for CinemaScape](#) on page 8 to select **CinemaScape Native 2.35 Display** mode.

If there is an anamorphic lens, proceed to the next section to determine how the lens is triggered.

Determine how the anamorphic lens is triggered

For projectors that use an anamorphic lens, CinemaScape allows all content, including the OSD, to be displayed with the anamorphic lens in place. This means that the lens should be engaged at all times when the Kaleidescape player is the selected source.

For the best possible video quality, allow the Kaleidescape player to perform all video processing necessary to adapt the video for an anamorphic lens. If your projector has a vertical stretch feature, it must not be used. Typically, direct control of the motorized lens system using a control system with a trigger output is required to ensure full control.

Projectors that have built-in lens sled triggers tie the trigger output to the internal vertical stretch feature which is not required by CinemaScape. For this reason, Kaleidescape strongly recommends against using the built-in lens trigger on the projector, and instead suggests using an independent control signal from the control system.

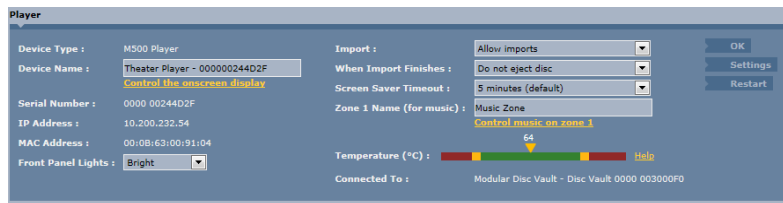
If you are able to control the anamorphic lens directly, follow the instructions in [Configuring your player for CinemaScope](#) on page 8 to select **CinemaScope 2.35 Anamorphic** mode.

If you are able to control the anamorphic lens only by using the projector's built-in trigger, and that trigger also engages the projector's vertical stretch feature, follow the instructions in [Configuring your player for CinemaScope](#) to select **CinemaScope 2.35 Letterbox** mode.

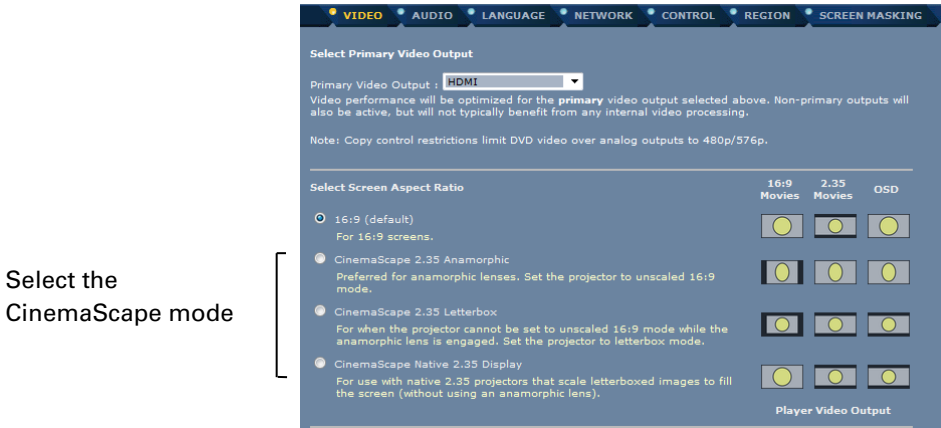
Configuring the player for CinemaScope

To enable CinemaScope use the following procedure:

1. Access the installer pages of the browser interface. Open a web browser and enter either:
 - ▶ <http://my-kaleidescape/installer> (Windows)
 - ▶ <http://my-kaleidescape.local/installer> (Mac)
2. Select the **COMPONENTS** tab.
3. Click on the **Settings** button for the M-Class player attached to the projector.



4. The **VIDEO** tab opens in a new window. Select the desired mode by clicking the associated radio button. The modes are explained below.



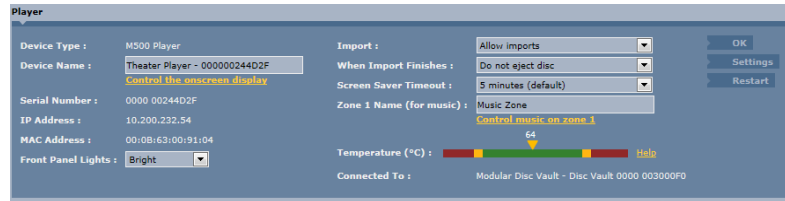
5. Click **OK** to save the settings.

For a detailed explanation of each mode, see [Appendix A: CinemaScope Modes](#) on page 12.

Verify that subtitle repositioning is enabled

To verify subtitle repositioning, use the following procedure:

1. Access the installer pages of the browser interface. Open a web browser and enter either:
 - ▶ <http://my-kaleidescape/installer> (Windows)
 - ▶ <http://my-kaleidescape.local/installer> (Mac)
2. Select the **COMPONENTS** tab.
3. Click on the **Settings** button for the M-Class player attached to the projector.



4. A new window opens. Select the **SCREEN MASKING** tab.
5. Select **Position movie subtitles within the movie image**.

Click on **Position movie subtitles within the movie image**



6. Click **OK** to save the settings.

CinemaScape and control systems

For theaters that use AMX, Control4, or Crestron control systems to control masking, the new CINEMASCAPE_MASK event should be used to control masking while in CinemaScape mode. The controller programmer can assume a horizontally centered full-height frame for aspect ratios less than that of the screen. Assume a vertically centered full-width frame for aspect ratios greater than that of the screen.

In systems where the output of a single player is distributed to more than one room, CinemaScape can be enabled or disabled depending upon which zone is using the player. Control systems can use the SET_CINEMASCAPE_MODE command to change the CinemaScape mode or turn CinemaScape off. Note that if the command is issued while video is playing, there will be no change to the player's output until the video stops.

These commands and events are detailed in the control protocol documentation, available from <http://www.kaleidescape.com/go/control-protocol>.

Updated drivers and documentation for AMX, Control4, and Crestron are available from www.kaleidescape.com/support/control-systems.

The role of the Movie Guide

CinemaScape scales video based on the aspect ratio of the movie in the Kaleidescape Movie Guide. Movies without an aspect ratio set in the Kaleidescape Movie Guide will be displayed as if they are 1.78. To ensure that all movies are displayed properly, use the browser interface to identify movies missing video bookmarks, and loan all such titles to Kaleidescape for processing at no cost to you. For more information, see www.kaleidescape.com/go/loan.

CinemaScape FAQ

Does CinemaScape still require an anamorphic lens?

In a typical installation, yes, you will still use an anamorphic lens with CinemaScape. The exception is when CinemaScape Native 2.35 mode is used. For projectors that are either natively 2.35, or that use zooming to achieve 2.35, no external anamorphic lens is used.

Is a motorized or movable anamorphic lens required?

It depends on the other video sources in the system. If the Kaleidescape System is the only video source in your theater, then you can use a fixed anamorphic lens. However, if you will be using other source devices like game consoles or a cable or satellite receiver, you will typically want to be able to move the lens when selecting and viewing those sources. There is an exception. Some projectors offer a mode, sometimes called Mode 2, which adjusts 1.78 and 1.33 content for projection through an anamorphic lens.

How are intermediate ratios like 1.66, 1.85 and 2.20 displayed?

Aspect Ratio	What is displayed
1.78 and lower	The image is displayed at full height with pillarboxing.
1.85	The image has slight letterboxing and regular pillarboxing.
2.20	The image may have black bars on all four sides, or the content may be cropped and enlarged to fill the 2.37 frame.
2.35	The image fills the width and height of the 2.37 frame with a few pixels lost at the top and bottom of the image.
2.40	The image fills the width and height of the 2.37 frame with slight letterboxing.

What projection screen aspect ratio is optimal for CinemaScape?

A 2.37 screen is recommended as part of an optimal CinemaScape experience, but 2.35 and 2.40 screens will both work well.

How do I add CinemaScope to an existing theater?

To add CinemaScope to an existing theater:

1. If the player is not already an M-Class player, upgrade the player. Kaleidescape offers a generous trade-up program. Dealers can go directly to the Kaleidescape Extranet page for the trade-up program at <https://extranet.kaleidescape.com/promos/m-class>.
2. Configure the M-Class player as described above to enable CinemaScope.
3. Ensure that the player-to-display connection is an HDMI connection and that the display can accept a 1080i or 1080p signal.
4. If possible, establish direct control of the lens sled from the control system so that CinemaScope 2.35 Anamorphic mode can be used for best video quality.
5. Modify the control system programming to engage the lens when the Kaleidescape player is the active source and to leave the lens in place until another source is selected.
6. Update the control system module to the current version from the Kaleidescape website to ensure that screen masking is properly triggered. For more information, see www.kaleidescape.com/support/control-systems.
7. Consider adjusting the calibration of the projector so that the ideal brightness is achieved with the lens in place.

Getting Additional Support

For additional help contact Kaleidescape Support:

- ▶ See online resources at www.kaleidescape.com/support
- ▶ Contact Kaleidescape Support at support@kaleidescape.com or +1 (650) 625-6160

Appendix A: CinemaScape Modes

CinemaScape supports the following modes:

- ▶ CinemaScape 2.35 Anamorphic
- ▶ CinemaScape 2.35 Letterbox
- ▶ CinemaScape Native 2.35 Display

CinemaScape 2.35 Anamorphic mode

This mode is for projectors that use an anamorphic lens, and is the preferred mode for most 2.35 theaters. All content is displayed without user intervention or lens movement, ensuring a seamless viewing experience. Content is sent to the projector as follows:

- ▶ The OSD is drawn using all 1920×1080 pixels of resolution, with images and text rendered in an anamorphic format so that they will appear correctly after horizontal stretching by the anamorphic lens.
- ▶ 1.78 and 1.33 content are adjusted to display correctly after horizontal stretching by the anamorphic lens.
- ▶ 2.35 content is stretched vertically to create an anamorphic image that fills the entire 1920×1080 frame. Once the anamorphic lens stretches the image horizontally, the image will correctly fill the screen.

CinemaScape 2.35 Letterbox mode

This mode is for widescreen theaters that use an anamorphic lens that cannot be engaged without also engaging the projector's vertical stretch feature. Kaleidescape advises establishing direct control over the lens wherever possible so that CinemaScape 2.35 Anamorphic mode can be used for higher video quality.

In this mode, content is sent to the projector as follows:

- ▶ The OSD and 2.35 movies are output letterboxed, with black bars at the top and bottom.
- ▶ 1.78 content is output postage-stamped, with black bars on all sides.

Once the projector and lens have applied their respective stretches, the resulting image will fill the height of the screen without large black bars at the top and bottom. There may be black bars of varying widths at the sides depending upon the aspect ratio.

CinemaScape Native 2.35 Display mode

This mode is for theaters using projectors that can display 2.35 content without moving a separate anamorphic lens into place. These projectors may use a lens zooming mechanism to enlarge 2.35 letterboxed images to fill the screen or use a native 2.35 chip. Since many such projectors automatically detect the presence or absence of black bars and zoom automatically, CinemaScape draws the OSD and 2.35 content letterboxed. Content is sent to the projector as follows:

- ▶ The OSD and 2.35 movies are output letterboxed, with black bars at the top and bottom.
- ▶ 1.78 and 1.33 content are output normally.

Notices

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