Scope 1.5X

Squeezing Even Higher Quality from 35 mm Prints

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Higher Quality from 35 mm Prints

Film can be:
◆ Bright
◆ Colorful
◆ Sharp
◆ Steady

But…
Many theatres fall short of SMPTE Standard
35 mm Print Formats

(in order of image area on the film, per Standard SMPTE 195)

- Scope 2.39:1 (0.825 x 0.690 inches)*
- “Flat” 1.37:1 (0.825 x 0.602 inches)
- “Flat” 1.66:1 (0.825 x 0.497 inches)
- “Flat” 1.85:1 (0.825 x 0.446 inches)*

*Prints of most current 35 mm films use either the 2.39:1 “Scope” or 1.85:1 “Flat” format. Most theatres are equipped to show both formats by changing lens, aperture, and screen masking.
Comparison of Scope and “Flat”
(today’s two predominant 35 mm print formats)

<table>
<thead>
<tr>
<th>Scope (2.39:1)</th>
<th>“Flat” (1.85:1)</th>
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<tr>
<td>0.825 x 0.690 inches</td>
<td>0.825 x 0.446 inches</td>
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<tr>
<td>2X Anamorphic lens</td>
<td>Spherical lens</td>
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<tr>
<td>Used for about 30% of feature films</td>
<td>Used for about 70% of feature films</td>
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<tr>
<td>“Impact” pictures</td>
<td>“Intimate” pictures</td>
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<td>Very wide format requires pan-and-scan or letterbox on video</td>
<td>Close to 16:9 HDTV format, minimal cropping on video</td>
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Comparison of Scope and “Flat”
(today’s two predominant 35 mm print formats)

Scope (2.39:1)
- Uses maximum available image area
- Efficient use of light in the projector (60%)
- Less magnification needed, so better for graininess, sharpness, and steadiness

“Flat” (1.85:1)
- “Wasted” image area (35% is cropped)
- Inefficient use of light in the projector (39%)
- High magnification needed, so worse for graininess, sharpness, and steadiness
Comparison of Scope and “Flat” Projector Apertures and Light Beam

Scope
0.825 x 0.690 inches
60% Efficient

“Flat”
0.825 x 0.446 inches
Only 39% Efficient
“Scope” Uses Anamorphic Lens

- “Squeezed” image on the print is “stretched” to produce wide image on the screen
- 2X Anamorphic Lens used for 2.39:1
- 20th Century Fox CinemaScope
- Panavision
Scope and “Flat” Formats
(2.39:1 and 1.85:1 Aspect Ratios)

**Scope**
- DESIGNED to be efficient
- Maximum image area
- Anamorphic lens
- Lower magnification

**“Flat”**
- EVOLVED from 1.37:1 “Academy” format
- Cropped image area
- Spherical lens
- Greater magnification
“IscoVision”
(1.5X Anamorphic Lens)

- Proposed by Glenn Berggren in 1983
- 1.5X Anamorphic lenses made by IscoOptic, Germany
- Presented to MPAA, SMPTE, and Inter-Society Committee in 1984
- Prints demonstrated “significant improvement” over “flat” 1.85:1
- Improved brightness, steadiness, contrast, and depth of focus
March 26, 1984
To: Jack Valenti, MPAA
From: Allen Cooper

“The reaction of the industry representatives, especially the exhibitors, was, to put it as objectively as I can, overwhelmingly enthusiastic.”
“IscoVision”

- Movie industry reaction to IscoVision was “overwhelming enthusiastic”
- Major problem was “chicken or egg”:
  - Theatres won’t buy lenses until films are distributed in new format
  - Films will not be distributed until theatres are equipped to project films in the new format
- No follow-through by industry
Most new theatres have huge screens in prime auditoriums

Lighting screens larger than 25 feet high is a real challenge with 35 mm prints, especially for the “flat” format

Most screens are too dim, often below the SMPTE standard of 16 footlamberts
Scope 1.5X Advantages

- 1.5 times more light
- Better image quality
- No change in any sound formats
- No projector changes
- No change in release printing methods or cost of prints
- Only change in the theatre is a new lens
Scope 1.5X Production Methods

- Shoot 1.78:1 with 1.5X Anamorphic camera lenses (image area 0.825 x 0.690 inches)

- Shoot 1.78:1 “Super 35” with spherical lenses (image area 0.945 x 0.531 inches)

- Shoot 1.78:1 “Academy” with spherical lenses (image area 0.825 x 0.464 inches)
Scope 1.5X Printing Methods

- For Scope 1.5X camera lenses, same methods as current 2X scope camera lenses (contact printing)
- For spherical camera lenses, use optical printer to generate 1.5X squeezed duplicate negative
- Or, do 1.5X squeeze using digital intermediate to make duplicate negative
- Normal high-speed contact release printing of picture and sound
Scope 1.5X Implementation

- IscoOptic and Schneider are primary lens manufacturers
- Estimate one year lead time on scale up of lens manufacturing of several hundred lenses each
- During transition, provide Scope 1.5X prints and lenses to theatres that need them most (very large screens), and “flat” prints to others
- Ultimately, convert all
Scope 1.5X  The Next Steps

- Produce several Scope 1.5X lenses for optical printers at key film laboratories
- Commission several hundred Scope 1.5X projector lenses from IscoOptic and Schneider
- Produce Scope 1.5X and “flat” duplicate negatives for dual inventory releases, with Scope 1.5X prints going to equipped theatres that have the largest screens
Scope 1.5X Demonstration

- Same original negative, shot with spherical camera lens (0.825 x 0.461 inch image area)
- Make 5244 timed master positive from original negative using wet-gate contact printer
- “Flat” duplicate negative made on dry contact printer
- Scope 1.5X duplicate negative made on optical printer with anamorphic lens
- Release prints contact printed from each duplicate negative and matched for color and density
- Release prints intercut into one roll
- Project on single projector, switching only lens (turret) and aperture
Scope 1.5X Demonstration
(Same projector: only changes are print, lens, and aperture plate)

Scope 1.5X Print
- 1.5X anamorphic
- Image area 0.825 x 0.690 in.
- 16 footlamberts (1.5X brighter image because more efficient)
- Brighter colors
- Less graininess
- Better sharpness
- Better steadiness (less “jump”)

“Flat” Print
- Spherical lens
- Image area 0.825 x 0.461 in.
- 11 footlamberts (typical of many theatres)
- Dull colors
- Grain magnified more
- Less sharp (focus flutter)
- Less steady
Scope 1.5X Demonstration

Intercut “Flat” and Scope 1.5X on same 35 mm projector

Change only lens and aperture plate, all else is unchanged

(Please cap the slide projector, and run the movie demo)
Scope 1.5X - Summary

- Use 1.50X anamorphic projection lens
- Use 0.825 x 0.690 inch scope image area per SMPTE 195
- Screen aspect ratio of 1.78:1 (matches 16:9 HD video)
- Gives 1.5X more light than current “flat” format
- Better color, graininess, sharpness, and steadiness
- Proven and available technology
- No change to projectors
- No change to sound formats
Scope 1.5X - Acknowledgements

- Sigma Design Group:
  - Glenn Berggren

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  - Richard D. Smith
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