Cancelling the Postage Stamp, Concluded

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The Dreaded Postage Stamp (HD)

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Wouldn’t You Rather See?

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The Dreaded Postage Stamp (SD)

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Wouldn’t You Rather See?

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Not All Images Use 4x3 or 16x9

- Many films use 2.35:1 or 2.66:1 aspect ratios (and others....)
- This is what “bar data” is for....

2.35:1Image on 16x9 Display

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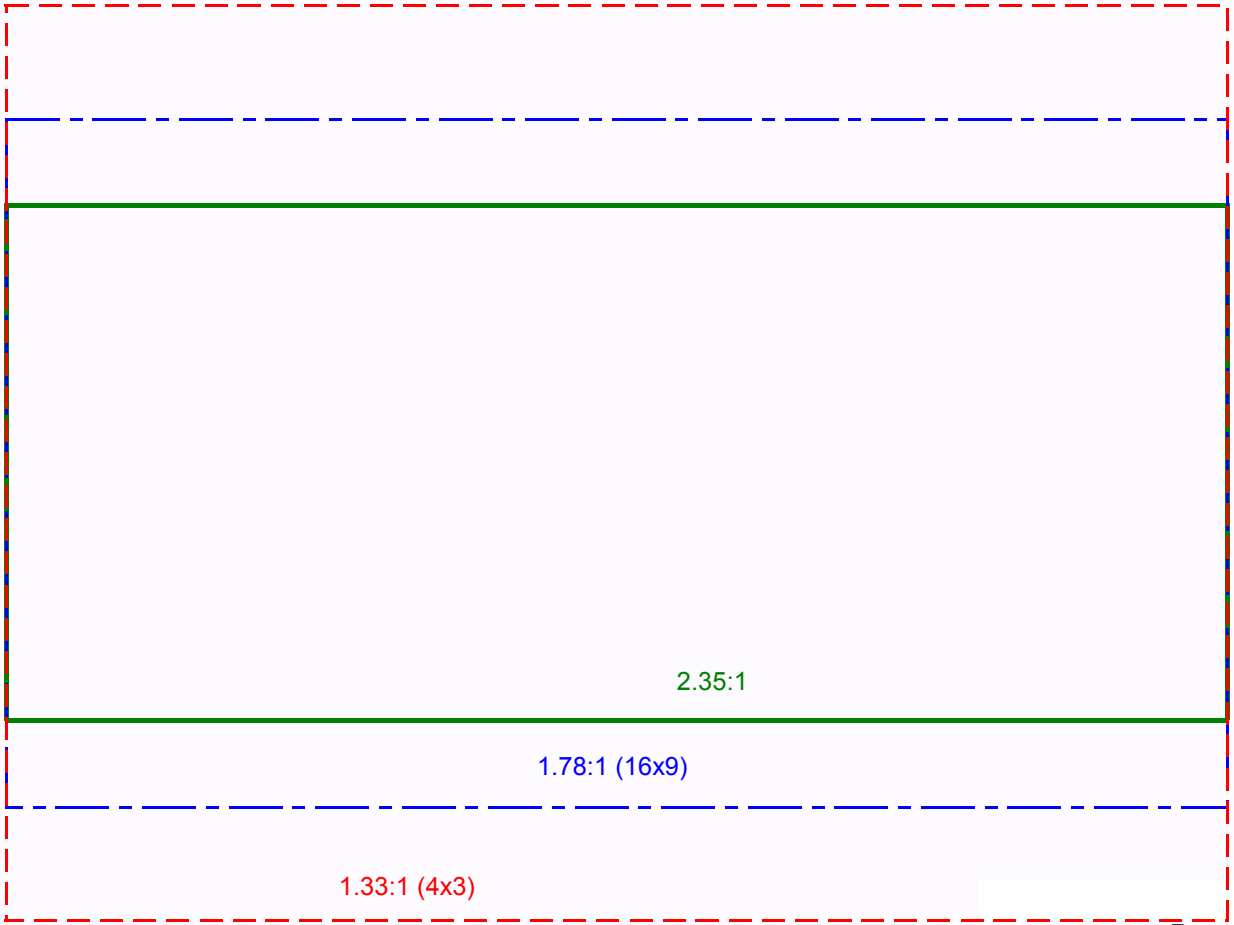
2.35:1Image on 16x9 Display

- Bar data is used to tell the display where (to scan line accuracy!) the picture stops and the letterbox bars begin
- Bar data is signaled in pairs, either top and bottom or the two sides
- Applicable to both HD and SD formats

Production Format Grid



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What are the Issues?

- There is LOTS of 4x3 content
  - It must be placed into both 4x3 and 16x9 “native” programming going forward
  - Correctly handling it is a creative decision
- There is LOTS of content “wider” than 16x9 (1.78:1)
  - Many movies are shot in 2.35:1 (or wider, CinemaScope™ used 2.66:1)
  - Content creators may or may not permit “edge cropping”

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Image Scalers

- A necessary part of fixed pixel displays (LCD, plasma, DLP)
- Adjust the image to match their display matrix (1920x1080 may turn into 1280x720, for example)
- Quality varies widely among implementations
- Most scalers will do a better job with more information about the source image
- Permit the scaler and display to optimize the display for a given program

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This problem won't be "going away"!

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So, what to do?

- Europe began dealing with this issue some time ago
  - DVB TS 101 154 documents AFD (Annex B)
  - The ATSC borrowed this and added bar data
- 2 years ago, a joint CEA, ATSC, and SMPTE effort was begun to address these problems
- CEA dealt with the display end of the chain
- ATSC dealt with the transmission end of the chain
- SMPTE dealt with the content origin end of the chain
- These documents (or revisions to existing documents) are all now done and available to the industry
- New studio facilities are using them

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Standards Specifics

- CEA:
  - CEB-16 “Active Format Description (AFD) & Bar Data Recommended Practice”
  - Test MPEG-2 TS have been prepared by Television Broadcast Technology, Inc.
- ATSC
  - A/53 has specified carriage of AFD/bar data since 2004 (A/53C), based on DVB/ETSI/DTG standardization in Europe
  - A/53 Part 4:2007 added clarifications to the semantics to match CEB-16
- SMPTE
  - SMPTE 2016-1 and 2016-3 have just been published
  - SMPTE will sell you a copy (and mail it to you)
- DVB TS 101 154’s next edition (1.8) will add bar data...

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Equipment Support

- Production equipment to insert AFD/bar data is available now
  - Available from Evertz, Harris, Miranda and others
  - Deployed by several networks
- CE manufacturers are expected to bring product to market this year which makes use of AFD/bar data
- Local stations need to begin implementing this...
- Remember, image quality is important!
  - Don't rely on the display device to guess about formats
  - Don't force your audience to manually adjust it

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What Image Formats Are Supported?

- All 4x3 and 16x9 combinations you can create...
- Bar data facilitates those ultra-wide aspect ratio images
- 14x9 is signaled explicitly
  - Legacy from DVB's documentation
  - ITU-R WP 6J is recommending use of 14x9 as a "compromise" acquisition format
    - 14x9 is NOT a production format!
    - It would be used to frame shots to help ensure cleaner transformation of 16x9 to 4.3 without use of letterbox
    - It can also be used in 4x3 production where the image is to be transformed to 16x9 without the use of pillarbars
  - Production staff may have other opinions...
  - Illustrations coming up

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More on14x9...

- As noted, not a production format!
- Compromise format
  - With all that implies
  - It is widely used in the UK and Scandinavia
- Permits “shoot-to-protect” framing
- Consider for Alternate Image Center (AFD 1110)
- What this does to your framing in the next two slides...

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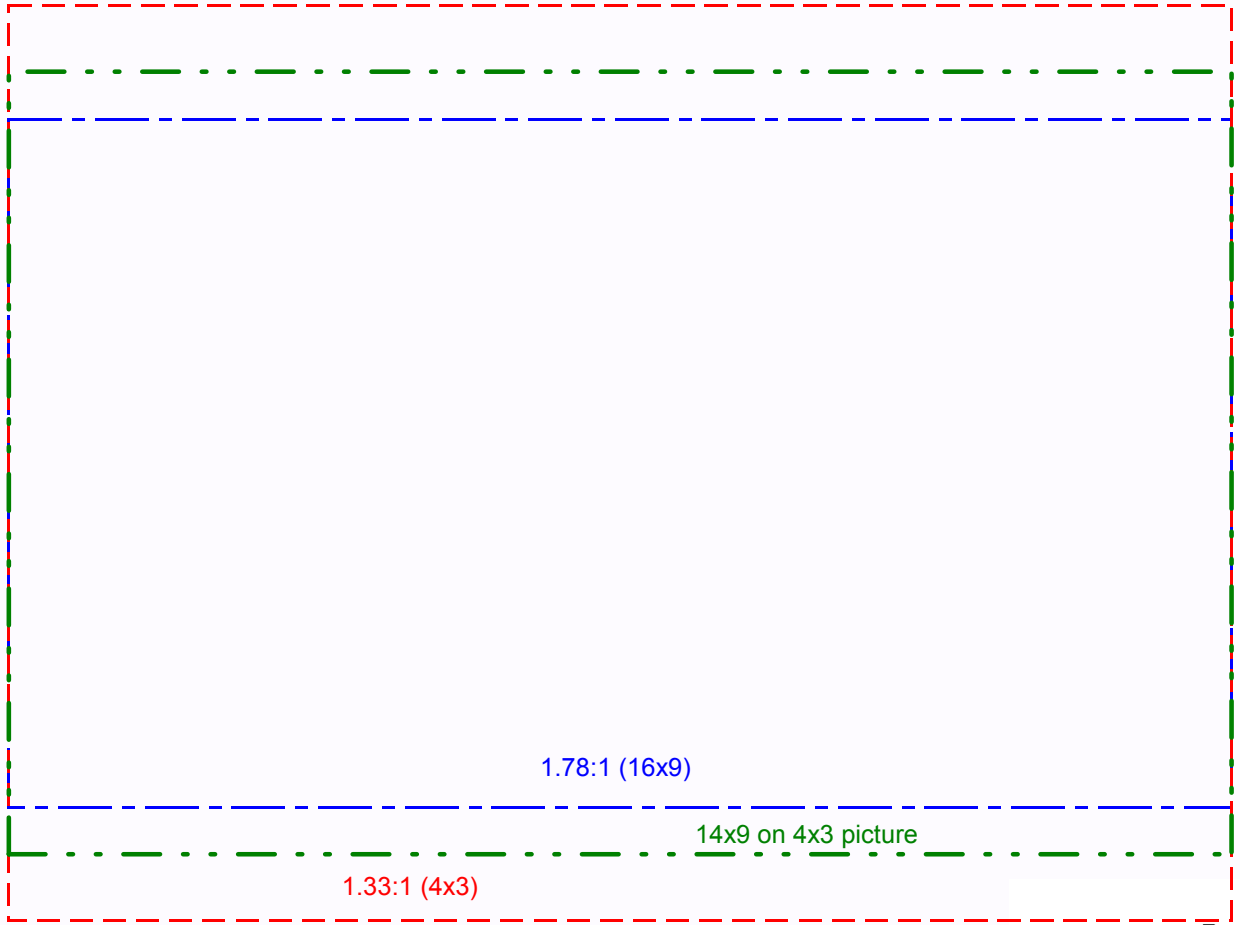
14x9 Laid Over a 4x3 Frame



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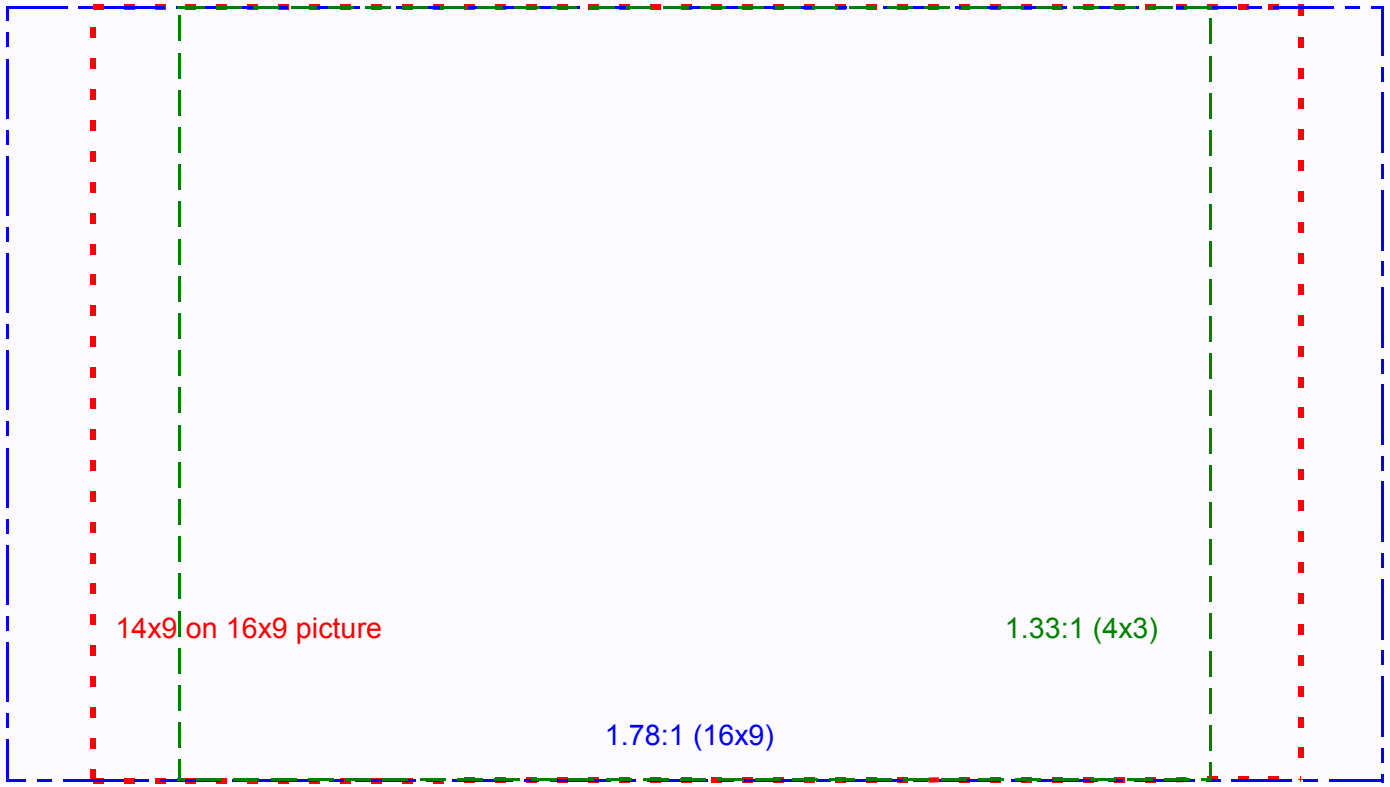
14x9 Laid Over a 16x9 Frame



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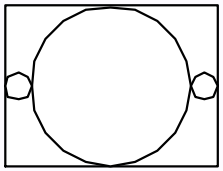
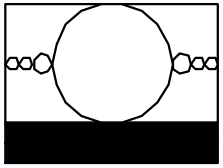
AFD Codes

AFD Codes - 4x3

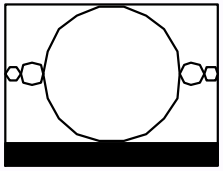
AFD = 0000
Full frame (use bar data!!)



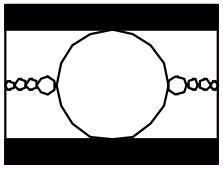
AFD = 0010
Box 16:9 (top)



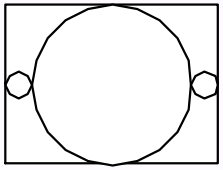
AFD = 0011
Box 14:9 (top)



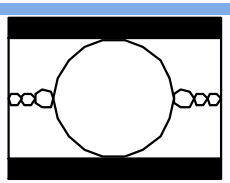
AFD = 0100
Box >16:9 (center)



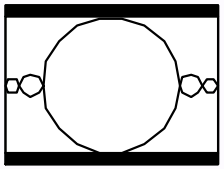
AFD = 1000
Full frame



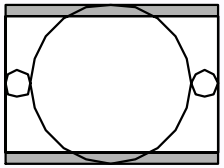
AFD = 1010
16:9 (center)



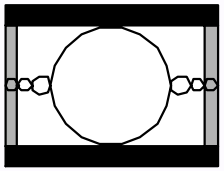
AFD = 1011
14:9 (center)



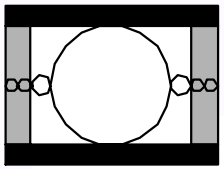
AFD = 1101
4:3 (with alternative 14:9 center)



AFD = 1110
16:9 (with alternative 14:9 center)



AFD = 1111
16:9 (with alternative 4:3 center)



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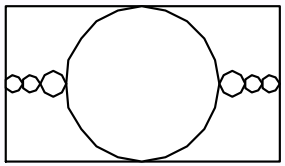
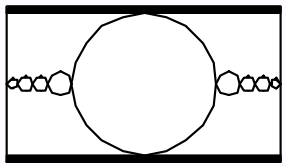
AFD Codes - 16x9

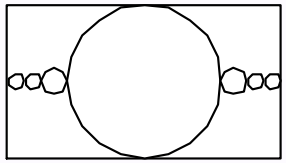
AFD = 0000
Full Frame (use bar data!)



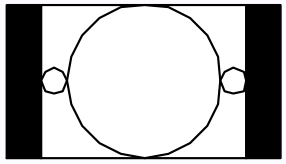
AFD = 0100
Box >16:9 (center)



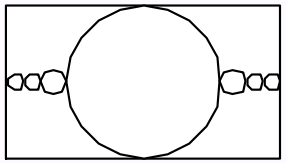
AFD = 1000
Full frame



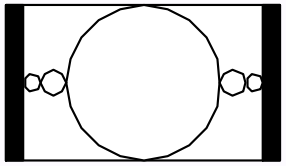
AFD = 1001
4:3 (center)



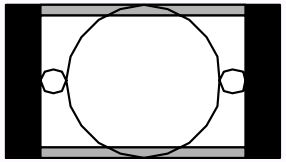
AFD = 1010
16:9 (with complete 16:9 image protected)



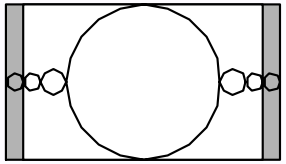
AFD = 1011
14:9 (center)



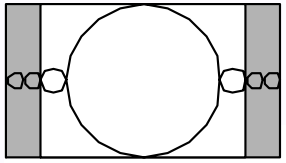
AFD = 1101
4:3 (with alternative 14:9 center)



AFD = 1110
16:9 (with alternative 14:9 center)



AFD = 1111
16:9 (with alternative 4:3 center)



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Bar Data Line Numbers - SD

- For 480i (525-line video or “NTSC”)
  - Top of picture is line 23 for first field or line 286 for second field
- For 576i (635-line video or “PAL”)
  - Top of picture is line 23 for first field or line 336 for second field
- See SMPTE RP202-2000 for further specifics
- Bar size calculations must account for interlace!

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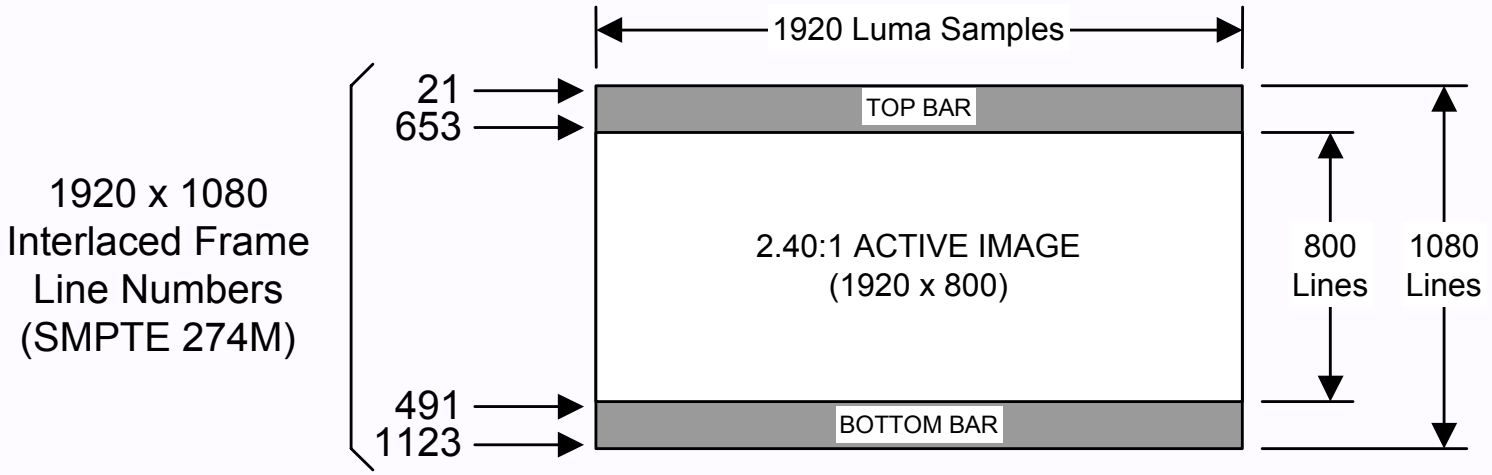
Bar Data Line Numbers - 1080i HD



- Both bars in this example are 140 lines high (source aspect ratio is 2.4:1)
- Top bar ends on line 653 (in the second field)
- Bottom bar begins on line 491 (in the first field)
- See Table B.2 in SMPTE 2016-1

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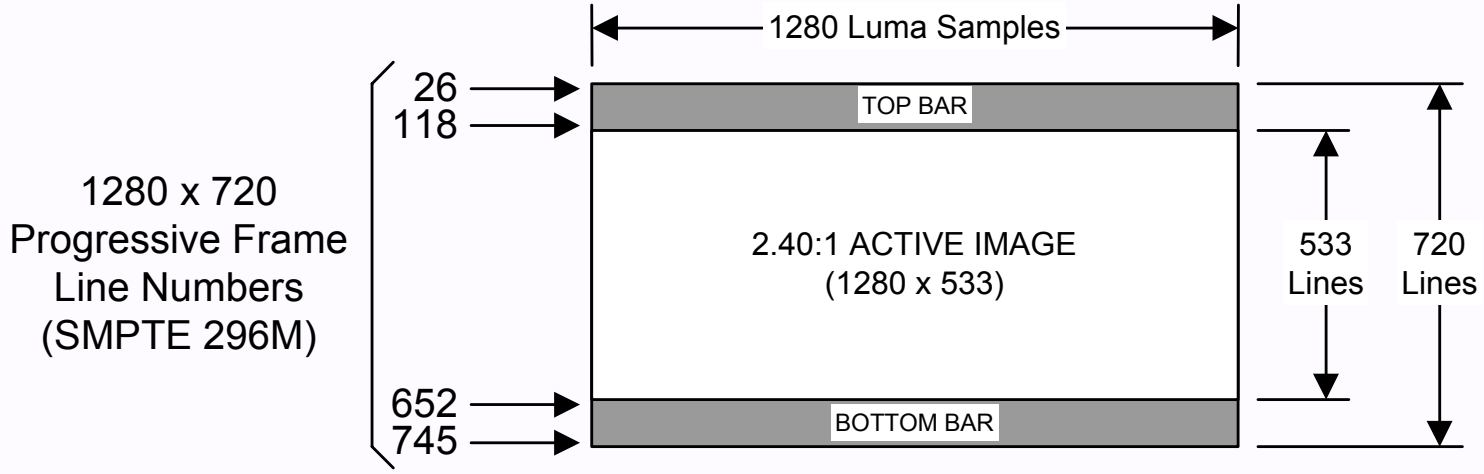
Bar Data Line Numbers - 720P HD



- Conceptually more straight-forward, as there is simply one frame...
- Both bars are 187 lines high (source aspect ratio is also 2.4:1)

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How Did We Get This Image?

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Simple...

- Step 1: 16x9 aspect ratio SD image in letterbox
- Step 2: Upconvert to HD with upconverter automatically adding side bars
- Voila!

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AFD Fixes This...

- Step 1: 16x9 aspect ratio SD image in letterbox
  - AFD code signaled is ‘1010’ (binary)
- Step 2: Upconvert to HD
  - upconverter automatically reacts to code ‘1010’
  - Expands image to fill the 16x9 raster
  - AFD code ‘1010’ remains...
- No side bars!

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How Did We Get This Image?

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Simple...

- Step 1: 4x3 aspect ratio SD image in HD program with side panels
- Step 2: Downconvert to SD with downconverter automatically adding letterbox bars
- Voila!

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AFD Fixes This...

- Step 1: 4x3 aspect ratio SD image in HD program with side panels
  - AFD code signaled is ‘1001’ (binary)
- Step 2: Downconvert to SD
  - Downconverter automatically reacts to code ‘1001’
  - Expands image to fill the 4x3 raster
  - AFD code can be set to ‘1000’
  - No letterbox bars!

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CE Device Test Streams

- Are available through the CEA
- Built for them by Television Broadcast Technology, Inc.
- Contains a complete set of images and AFD codes

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Thanks

- Mike Dolan, TBT
- Graham Jones, NAB
- Bill Miller, ABC

Questions?

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