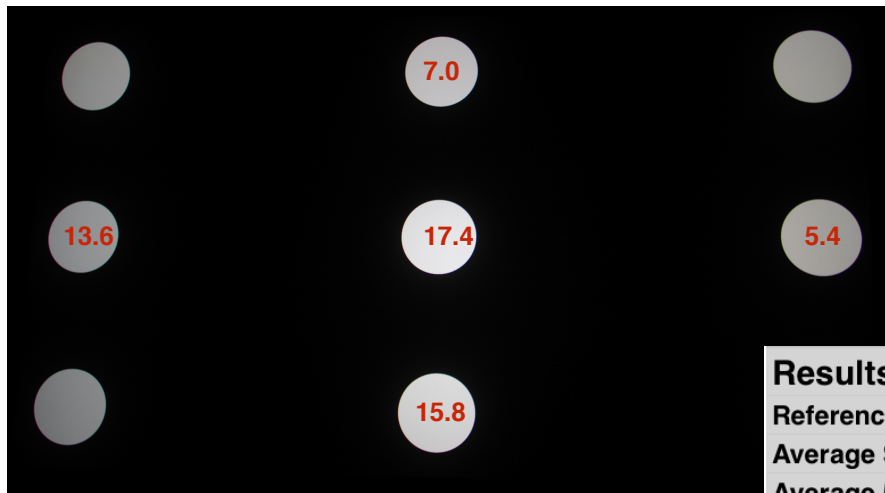


Unofficial Results

- Theater black is better than expected - many achieving under 2 mNits
 - Projector black was 30-40 mNits
 - (Plan for an iPhone test - what is theater black when there is an iPhone on?)
- The center brightness is not a great indicator of picture brightness
 - Gain screens add significant variability
 - The “5 point average” seems to give better information
- People seem to “like” the image when the AVERAGE brightness is above 10fL
 - the center may be very bright (18fL) and the edges are low (9fL).
 - We need more “subjective” testing of images

A Really Good Screen



Center: 17.4 fL
Average sides: 10.4 fL

Results

Reference Center Brightness (fL)	17.5
Average Side Brightness (fL)	10.5
Average 5 point brightness (fL)	11.9
Projector Black (mNits)	39.4
Theater black (Center, mNits)	1.3
Sequential Contrast	1518
DCIC average Contrast	902
Picture Rating	9.0
3D Reference White brightness (fL)	3.5

One (Good) Screen

Results							
Reference Center Brightness (fL)	17.5						
Average Side Brightness (fL)	10.5						
Average 5 point brightness (fL)	11.9						
Projector Black (mNits)	39.4						
Theater black (Center, mNits)	1.3						
Sequential Contrast	1518						
DCIC average Contrast	902						
Picture Rating	9.0						
3D Reference White brightness (fL)	3.5						
Short Form Results (do not enter here)							
Date of Test		20191119		Framing Chart Center:	59.8	DCIC Left Aim Left target	65.700
Time of Test Start (for photos)		11/19/2019 7:40:00 AM		9 Dice Center	59.8	DCIC Left Aim Right target	0.069
Flat or Scope native screen		Flat		Full White Center		DCIC Left Aim Black	0.0419
Curve Screen?		No		Projector black	0.0394	DCIC Right Aim Left target	0.046
Screen Gain		2.4		Theater Black	0.001258	DCIC Right Aim Right target	39.4
Width of Screen		40.4		Trailer Level Black	0.00838	DCIC Right Aim Black	
Height of Screen		23.4		9 Dice Up Center	24.0	3D Left Eye Center - L/R 9 dice	12.1
Projector Throw		82		9 Dice Down Center	54.0	3D Left Eye Center - L 9 Dice / R black	13.7
Projector bulb size / hours / % power		4K - 1698hours - 80%		9 Dice Right Middle	18.7	3D Left Eye Center - L Black / R 9 dice	0.0255
Sit back distance:		46		9 Dice Left Middle	46.7	3D Right Eye Center - L/R 9 dice	
				9 Dice Left Middle (Black)	0.0301	3D Right Eye Center - L 9 Dice / R black	
				Picture Rating	9	3D Right Eye Center - L Black / R 9 dice	
						3D all black	0.0163

One (Good) Screen

Results									
Reference Center Brightness (fL)	17.5								
Average Side Brightness (fL)	10.5								
Average 5 point brightness (fL)	11.9								
Projector Black (mNits)	39.4								
Theater black (Center, mNits)	1.3								
Sequential Contrast	1518								
DCIC average Contrast	902								
Picture Rating	9.0								
3D Reference White brightness (fL)	3.5								
				Short Form Results (do not enter here)		NITS		NITS	
				Framing Chart Center:		59.8	DCIC Left Aim Left target		65.700
Date of Test	20191119			9 Dice Center		59.8	DCIC Left Aim Right target		0.069
Time of Test Start (for photos)	11/19/2019 7:40:00 AM			Full White Center			DCIC Left Aim Black		0.0419
Flat or Scope native screen	Flat			Projector black		0.0394	DCIC Right Aim Left target		0.046
Curve Screen?	No			Theater Black		0.001258	DCIC Right Aim Right target		39.4
Screen Gain	2.4			Trailer Level Black		0.00838	DCIC Right Aim Black		
Width of Screen	40.4			9 Dice Up Center		24.0	3D Left Eye Center - L/R 9 dice		12.1
Height of Screen	23.4			9 Dice Down Center		54.0	3D Left Eye Center - L 9 Dice / R black		13.7
				9 Dice Right Middle		18.7	3D Left Eye Center - L Black / R 9 dice		0.0255
Projector Throw	82			9 Dice Left Middle		46.7	3D Right Eye Center - L/R 9 dice		
Projector bulb size / hours / % power	4K - 1698hours - 80%			9 Dice Left Middle (Black)		0.0301	3D Right Eye Center - L 9 Dice / R black		
Sit back distance:	46			Picture Rating		9	3D Right Eye Center - L Black / R 9 dice		
							3D all black		0.0163
5									

Too Many Details

	11/18 7:50 AM	11/18 8:50 AM	11/18 10:00 AM	11/18 11:00 AM	11/19 7:40 AM	11/19 8:50 AM	11/19 10:00 AM	11/19 11:00 AM	11/20 3:40 PM	11/20 3:40 PM
Results										
Reference Center Brightness (fL)	8.4	5.6	11.4	9.6	17.5	11.6	18.0	20.9	12.8	30.6
Average Side Brightness (fL)	3.4	2.3	5.6	7.3	10.5	7.6	9.2	9.0	11.4	0.0
Average 5 point brightness (fL)	4.3	2.9	6.7	7.8	11.9	8.4	11.0	11.5	11.7	6.1
Projector Black (mNits)	23.0	19.0	42.0	26.0	39.4	36.3	59.8	113.0	10.0	16.1
Theater black (Center, mNits)	1.0	2.0	2.0	2.0	1.3	1.2	1.8	0.7	0.3	0.3
Sequential Contrast	1191	969	917	1286	1518	1081	1038	646	4304	6522
DCIC average Contrast	640	373	369	593	902	758	717	573	1243	1261
Picture Rating					9.0	8.5	9.0	7.5	10.0	
3D Reference White brightness (fL)	0.0	0.0	0.0	0.0	3.5	0.0	0.0	5.4	0.0	0.0

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Table 1

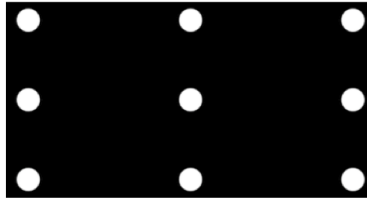
		11/19 7:40 AM	11/19 8:50 AM	11/19 10:00 AM	11/19 11:00 AM	11/20 3:40 PM	11/20 3:40 PM
Average 5 point brightness (fL)	>11	11.9	8.4	11.0	11.5	11.7	6.1
Theater black (Center, mNits)	<2	1.3	1.2	1.8	0.7	0.3	0.3
DCIC average Contrast	>700	902	758	717	573	1243	1261
Picture Rating (subjective)		9.0	8.5	9.0	7.5	10.0	
Projector Black (mNits)	<40	39.4	36.3	59.8	113.0	10.0	16.1
Sequential Contrast		1518	1081	1038	646	4304	6522
Screen Width (feet)		40.4	40.4	40.4	26.5	33	33
Screen Height		23.4	23.4	23.3	15	14	14
Projector Throw		82	94.8	94	52	0	0
Sit-back Distance		46	46	46	30	30	z
3D Reference White brightness (fL)		3.5	0.0	0.0	5.4	0.0	0.0
Reference Center Brightness (fL)		17.5	11.6	18.0	20.9	12.8	30.6

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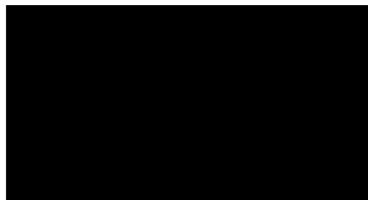
Most Useful Test Patterns



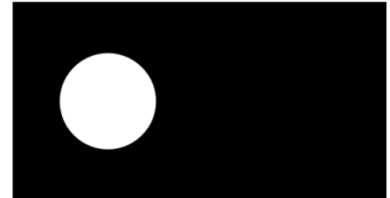
DCP of black and white



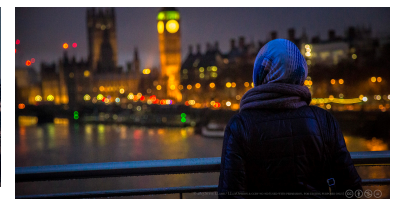
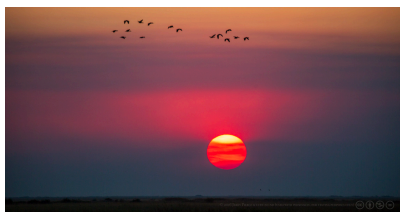
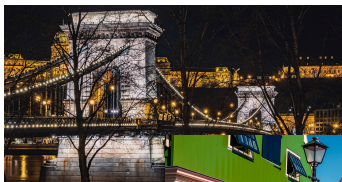
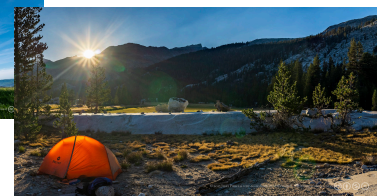
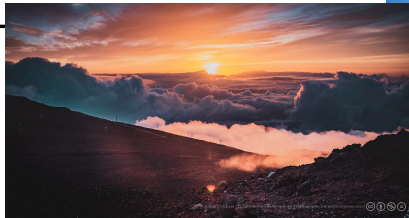
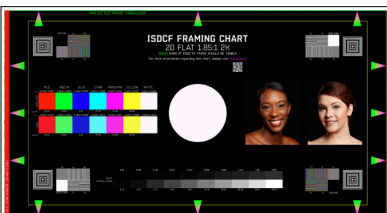
DCP of 9-dice pattern
(SMPTE spec)



No projector - House lights at feature
playback level and trailer/walk in level



DCP of DCIC - a NATO
invention - Digital Cinema
Intraframe Contrast



How do we do measurements?

- Use a detector - on tripod -connect to laptop
 - We are using a CR120, but others can work
- Measure room, record specs of room
- Load set of DCPs with test content (in order)
- Create playlists
- Fill in measurement on spreadsheet

Date/Time of Test Start (for photos)	11/19/2019	11:00:00
Flat or Scope native screen	Scope	
Curve Screen?	No	
Screen Gain	2.4	
Width of Screen	26.5	
Height of Screen	15.1	
Projector Throw	52	
Projector bulb size / hours / % power	2K 80 hours 75%	
Measurement Distance (~2x Height of Screen)	30.2	
Theater name and location	Theater and location info	
Screen Number	6	
Projector Brand / Model	Brand	Model

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DCP Name	Image	Description	Comments
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Africa Sunset: Birds near bottom. Sun bright.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Nepal Hillar: Texture in peaks, crisp mountains and snow	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Hawaii Sunset: Bright sun, texture in foreground.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Sierra Mountains: Bright moon, see trees in hills, clear snow on far hill.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Sierra Sunset: Detail in trees in bright sun, detail in shadows far right.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Bright Tree: Light spot at bottom of tree looks bright. Detail in grass.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		RGB Buildings: Right hand building is dark blue (not black). Color of green is avocado green. Sky is blue.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Night Bridge: Trees can be seen to top of frame against black background.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		Street Singer: Looks like bright day. Can see detail of hair on singer.	
NATeal-1001_TST-1_C_MOS_4K_2020108_OTB_SMFTE_OV		London Jacket: Back of jacket shows detail and seams.	

DCP Name	Left Eye	Right Eye	Name	Action	Measurement
NATeal-20101_SCHWTr_TST-1-3D_C_31_2K_2020108_SMFTE_OV			Target 3D	Left Lens over Detector / AIM Center	
NATeal-20200_SCHWTrEye_TST-1-3D_C_31_2K_2020108_SMFTE_OV			9-dice L/R Eyes		18.6
NATeal-20300_SCHWTrEye_TST-1-3D_C_31_2K_2020108_SMFTE_OV			9-dice L Eye		16.8
NATeal-20400_SCHWTrEye_TST-1-3D_C_31_2K_2020108_SMFTE_OV			9-dice R Eye		0.297
NATeal-20500_SCHWTrEye_TST-1-3D_C_31_2K_2020108_SMFTE_OV			9-dice L/R Eyes	Right Lens over Detector	
NATeal-20600_SCHWTrEye_TST-1-3D_C_31_2K_2020108_SMFTE_OV			9-dice L Eye		0.304
NATeal-20700_SCHWTrEye_TST-1-3D_C_31_2K_2020108_SMFTE_OV			9-dice R Eye		17.4

Short Term Goals

- Meet on Thursday January 23 at AMC Burbank to look at 5+ screens using this procedure
- Share DCPs and spreadsheet for do-it-yourself
 - Biggest issue will be measuring the blacks ... we will be testing other detectors for measuring DCIC - it may be more reliable with affordable detectors
- Ask for feedback on measurements and picture ratings
- Start prepping for higher brightness displays...