TV Calibration Fact Sheet

What areas do you cover?
Melbourne, Australia.

What displays can you calibrate?
LG OLEDs from 2019, 2020, 2021, 2022 and 2023.

What's the cost?
$500 for the following:

- ISF Expert (Bright space, daytime)
- ISF Expert (Dark space, night
- HDR Cinema (Reference)
- HDR Filmmaker * (Day Viewing)
- DV Cinema (Reference)
- DV Cinema Home (Day Viewing)

Essentially, you receive a day and night mode for SDR, HDR and Dolby Vision. For the gamers, SDR and HDR Game modes can be calibrated for an extra $100.

How long will it take?
5-6 hours. 7 hours with game modes.

Who does the calibration?
Tim Farrell works as a video colourist and trainer. He's spent decades analysing digital video images and completed an Imaging Science Foundation (ISF) calibration course in 2006. Tim has worked in Australia and India and was responsible for all the film transfers on *The Matrix* sequels.

What equipment do you use?
X-Rite i1 Pro3 spectrophotometer, C6 meter and Calman software.

What equipment do you use?
Firstly, we use the i1 Pro to create a meter profile for your specific display. Profiling improves colourimeter accuracy and results in a better calibration. Calman then connects to your TV and generates colour patches which are measured against reference values. The software creates a 1D LUT for greyscale and gamma (EOTF) tracking, and a 3D LUT for colour accuracy. The two LUTs are then permanently stored within your TV under the corresponding picture mode.

Under what circumstances could my calibrations be lost?
A factory reset, also known as *Reset to Initial Settings*, will remove all the calibrations. Resetting a picture mode will also remove that individual calibration.

My TV is new, do I need to run it in prior to calibration?
Yes. You need at least 100 hours of viewing time before calibration.

Who should calibrate?
Calibration is for people who want optimal accuracy and picture quality from their display. Maybe you work in media and want a true representation of your work. Or, perhaps you're a cinephile who wants to view films the way producers, directors, cinematographers and colorists intended. And if you've spent $3000 or $6000 on a new display, doesn't it makes sense to spend just 10% or 5% of that, to get the best viewing experience possible.

How does colour grading intersect with display calibration?
When teaching grading I always tell students to look for depth within an image. Are the subjects popping out from the background, or are they blending in? If they're blending in, it's usually because a colour cast is present. The same goes for calibration. If your greyscale isn't neutral, you will never appreciate the true depth of an image. It's the successful illusion of three-dimensional space that provides the immersive cinema experience.

* Calman can't calibrate the *HDR Cinema Home* picture mode, so we use *HDR Filmmaker* as our daytime mode.

HDR and Dolby Vision Information

HDR and Dolby Vision

High Dynamic Range (HDR) and Dolby Vision allow brighter and more detailed highlights, darker and more detailed shadows, and increased colour fidelity compared to Standard Dynamic Range (SDR). HDR10 is an industry standard that TVs and content providers are required to support. The HDR10 format employs **static metadata** which sets brightness for the entirety of a program. Dolby Vision is a proprietary version of HDR which allows **dynamic metadata** to optimise the tone curve and it's associated brightness on a scene-by-scene or shot-by-shot basis.

The *HDR Filmmaker* and *Dolby Vision Cinema Home* picture modes are both able to utilise an AI Brightness function to adjust picture levels according to ambient room light. These modes are usually the preferred option for daytime or bright room viewing. *Dolby Vision Cinema Home* also employs an elevated EOTF, which additionally increases screen brightness.

Conversely, the *HDR Cinema* and *Dolby Vision Cinema* modes are calibrated to reference standards and designed for dark room viewing. However, even in a very dark room, many people find some content viewed in the *Dolby Vision Cinema* mode too dark and instead opt for the *Dolby Vision Cinema Home* picture mode.

You can experiment with the two Dolby Vision picture modes to find what suits your personal taste and viewing environment. *Bridgerton* and *The Crown* on Netflix are good examples of Dolby Vision content. We also recommend using the streaming apps within the LG TV for HDR and Dolby Vision programs, instead of the apps within a set-top box or game console.

HDR Tone Mapping

Tone mapping is the process display manufacturers usilise to display HDR10 mastered content (1000 nits is the most common) on consumer displays. If tone mapping wasn't utilised, the display would simply clip off detail from any values that were higher than its peak brightness level.

When Tone Mapping is enabled, the HDR10 tone-mapping curve is **dynamically** generated by analyzing the signal peak and histogram information on a frame by frame basis.

When Tone Mapping is disabled, the TV uses the internal HDR10 tone curve settings. **Static** metadata determines the brightness levels of the mastered content.

When calibrating HDR, the last step is to measure your display's peak luminance. This number is uploaded to the TV with the appropriate Roll-Off points. For example, if your display measured a peak luminance of 650 nits and we set a Roll-Off point of 70% for 1000 nits material, the display would begin rolling-off highlights at 455 nits.

LG set the following roll-off points for their OLED TVs:

- 70% for 1000 nits
- 60% for 4000 nits
- 50% for 10000 nits

For *HDR Filmmaker,* non-reference day mode, Tone Mapping (dynamic) can be on or off. *Carnival Row* on Amazon Prime is a good example of HDR content.

Picture Mode	Viewing Environment	AI Brightness	Tone Mapping
HDR Cinema	Reference/Night	N/A	Off
HDR Filmmaker	Daytime	On	On or Off
Dolby Vision Cinema	Reference/Night [1]	N/A	N/A
Dolby Vision Cinema Home	Daytime	On	N/A [2]

1. Even in a dark room, some find DV Cinema too dark and instead opt for DV Cinema Home.
2. Dolby Vision Cinema Home employs an elevated EOTF to additionally increase brightness.

OLED Recommended Settings Post Calibration

	ISF Bright (SDR)	ISF Dark (SDR)	Game Optimizer (SDR)	HDR Filmmaker (HDR)	HDR Cinema (HDR)	Game Optimizer (HDR)	DV Cinema Home (Dolby Vision)	DV Cinema (Dolby Vision)	Game Optimizer (Dolby Vision)
Viewing Environment	Day	Night	Day/Night	Day	Night	Day/Night	Day	Night [1]	Day/Night
Calibration LUTs	1D + 3D	1D + 3D	1D + 3D	1D + Matrix	1D + Matrix	1D + Matrix	1D + Config [2]	1D + Config [2]	1D + Config [2]
General									
AI Brightness	Off	Off	On or Off [3]	On [3]	N/A	N/A	On	N/A	N/A
Brightness									
OLED Pixel Brightness				100	100	100	100	100	100
Adjust Contrast	85	85	85	100	100	100	100	100	100
Screen Brightness	50	50	50	50	50	50	50	50	50
Auto Dynamic Contrast	Off	Off	Off	Off	Off	Off	Off	Off	Off
Peak Brightness	Off	Off	Off	On	On	On	On	On	On
Gamma	2.2	2.3 [4]	2.2	N/A	N/A	N/A	N/A	N/A	N/A
Black Level	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
Cinema Screen	On	On	On	On	On	On	On	On	On
Motion EyeCare	Off	Off	Off	Off	Off	Off	Off	Off	Off
Tone Mapping	N/A	N/A	N/A	On or Off [5]	Off	HGIG [6]	N/A [7]	N/A	N/A
Colour									
Colour Depth	50	50	50	50	50	50	50	50	50
Tint	0	0	0	0	0	0	0	0	0
Colour Gamut	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
White Balance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clarity									
Sharpness	0 [8]	0 [8]	0 [8]	0 [8]	0 [8]	0 [8]	0 [8]	0 [8]	0 [8]
Super Resolution	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]
Noise Reduction	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]
MPEG Noise Reduction	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]	Off [9]
Smooth Gradation	Off [10]	Off [10]	Off [10]	Off [10]	Off [10]	Off [10]	Off [10]	Off [10]	Off [10]
Cinema Screen	On	On	N/A	On	On	N/A	On	On	N/A
TruMotion	User [11]	User [11]	N/A	User [11]	User [11]	N/A	User [11]	User [11]	N/A
DV Precision Detail	N/A	N/A	N/A	N/A	N/A	N/A	On or Off [12]	N/A	N/A

Footnotes

1. Even in a dark room, some find Dolby Vision Cinema too dark on some content and instead opt for Dolby Vision Cinema Home.
2. Similar to the process used when calibrating HDR.
3. AI Brightness is available in some picture modes and will boost shadow detail according to ambient light conditions. When enabled a magnifying glass icon will be displayed next to the picture mode name. The setting is also applied independently of each input. Eg: HDMI 1, HDMI 2, Apps. etc.
4. While gamma 2.4 is reference mastering standard, this is designed for a pitch black room and generally unsuitable for home viewing.
5. Tone Mapping (Dynamic) can be either On or Off. Experiment to find your preferred setting.
6. HGIG is the preferred setting for HDR Gaming. Your console will also need to be calibrated via the in-built app.

   See this link to calibrate the Xbox: **tinyurl.com/3kdk485r**

   See this link to calibrate the Playstation: **tinyurl.com/2p8fdnp6**
7. Dolby Vision Cinema Home employs an elevated EOTF (gamma curve) to additionally increase brightness.
8. I always opt for zero sharpening, however you may opt for minimal sharpening of 1-10.
9. I set Super Resolution and Noise Reduction to Off, but you might experiment with minimal to medium settings.
10. I set Smooth Gradation to Off, however a low or medium setting may slightly improve banding (contouring) on some HDR and DV content.
11. I set motion interpolation to Off, but your setting will depend on your personal preferences. Experiment with different settings on different content.

    Cinematic movement might be desirable for movies, while Natural or Smooth might work better for sports.
12. Dolby Vision Precision Detail can alter the light levels in order to increase contrast, sharpness and detail. While this is a fairly subtle enhancement, it should be more apparent in low-key and dimly-lit content.

Game Optimizer Settings

If your SDR and HDR Game Modes were calibrated, the following settings were used.

Menu Setting	Selection
Game Genre	Standard
Black Stabilizer	10
White Stabilizer	10
OLED Motion Pro	Off
Reduce Blue Light	Off
Prevent Input Delay (Input Lag)	Boost
Game Dashboard	On
AI Game Sound	On
VRR and G Sync	On
AMD FreeSync Premium	On
FineTune Dark Areas	0

Additional Settings

Energy Saver should be Off.

Just Scan should always be On.

I have *Adjust Logo Brightness* off. However, if you watch a lot of TV with watermark logos, or do a lot of gaming, you might opt for a minimal or medium setting.

Maintaining your Calibrations

Your calibrations are stored within the TV and will be preserved through firmware updates. However, I opt to have automatic updates disabled and only update my TV if I have a specific problem that needs to be rectified.

A factory reset, also known as *Reset to Initial Settings*, will remove all the calibrations. Resetting an individual picture mode will also remove that specific calibration. So, you obviously don't want to do either of these.

Evaluating your TV

One of the great benefits of calibration is an increase in the depth perception. Hopefully you'll be watching something one night and feel as though you're really seeing into the picture. It's the successful illusion of three-dimensional space which provides that immersive cinematic experience that we cherish.