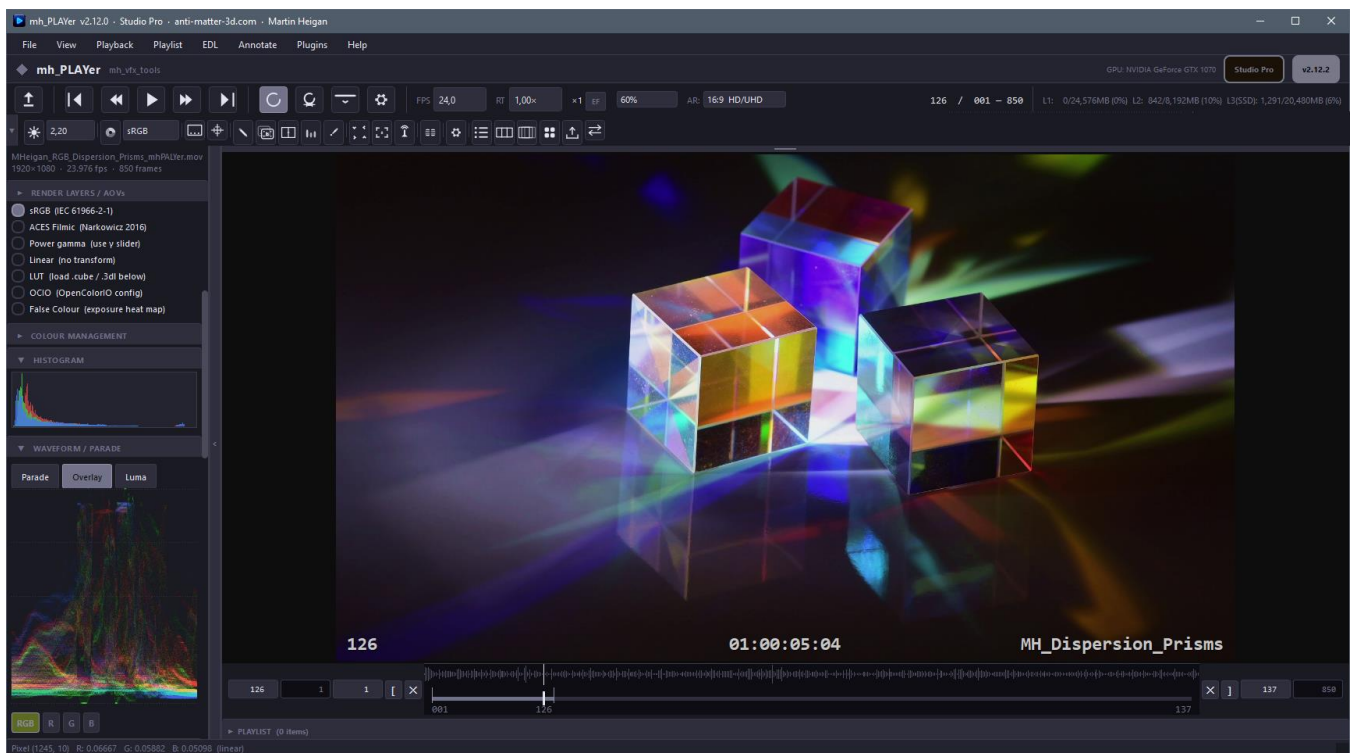


mh_PLAYer

User Manual (v2.12)

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mh_vfx_tools



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1. Introduction

mh_PLAYer is a high-performance image sequence and video player built for CGI and VFX production pipelines. It is designed to handle the formats, colour spaces, and review workflows that artists and technical directors work with every day — from multi-layer OpenEXR sequences to H.264 video dailies.

Key capabilities include:

- Multi-layer OpenEXR playback with per-layer/AOV selection
- Video file support (MP4, MOV, MKV, AVI, WebM, and more)
- Full colour management: sRGB, ACES filmic, custom LUT, and OCIO pipeline integration
- Three-level frame cache (RAM L1/L2 + SSD L3) for sustained playback of large sequences
- Annotation tools with per-frame voice notes and sidecar JSON export
- A/B wipe compare — freeze a frame or load an independent sequence as the B source
- Slate and burn-in baking for export, with licensee watermark
- Remote review via a built-in local HTTP server — any device on the network can view the current frame
- Workspace save/load (.mhplay) preserving the complete review session state

Quick Start

- Launch mh_PLAYer — double-click mh_PLAYer_Win_x64_v2_12_#.exe. No installation or Python required.
- Drop an EXR frame, image file, or video directly onto the window — or use File → Open Sequence.
- Press Space to play. Use J / K / L for shuttle control.

System Requirements

Component	Requirement
OS	Windows 10 or 11 (64-bit)
CPU	Any modern 64-bit processor; multi-core recommended
RAM	16 GB minimum; 32 GB+ recommended for large EXR sequences
GPU	Any GPU supported by Qt6/OpenGL (discrete GPU recommended)
Storage	SSD recommended for L3 disk cache and fast sequence access
Display	1920 × 1080 minimum; 4K supported
FFmpeg	Bundled (see Installation); required for video decode and audio

OCIO	Bundled — OpenColorIO is included in the distribution. No separate installation required.
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2. Licensing & Registration

mh_PLAYer uses a signed license file (license.dat) to unlock all production features. The core player is fully functional without a license for viewing and basic review. Licensed features are clearly indicated in the relevant sections of this manual.

License Types

Feature	Individual	Studio	Studio Pro	Trial
MAC-address bound	✓	—	—	Optional
Single machine	✓	—	—	✓
Organisation-wide use	—	✓	✓	—
Expiry	None	None	None	10 days
Core viewer · QC · CLI	✓	✓	✓	✓
Production features ¹	✓	✓	✓	✓
Studio Pro features ²	—	—	✓	✓

¹ Annotations, A/B Compare, Playlist, Audio, Export (frames & video), Slate & Burn-in.

² EDL / Multi-Clip Timeline, Synced Remote Review, and Plugin Scripting. These advanced collaboration and automation features require a Studio Pro license (or an active Trial). They are noted as Studio Pro throughout this manual.

Installing Your License

- In mh_PLAYer, choose Help → Install License... and browse to the signed license.dat file you were sent. mh_PLAYer validates the file and installs it for you.
- Quit and relaunch mh_PLAYer when prompted; the license is then active.
- The version label in the title bar shows your licensee name when a valid license is active.

Obtaining a License

Licenses are purchased from anti-matter-3d.com. After purchase, the license.dat file is emailed to the address used at checkout. Individual licenses are bound to the MAC address of the primary network interface of the licensed machine.

 **Trial licenses** Trial licenses expire after 10 days from the date of issue. All features are available during the trial period.

2.1 Free Features & Licensed Features

mh_PLAYer is a fully functional player without a license. The core viewer, all display and colour management modes, the full QC toolkit (scopes, pixel inspector, histogram), Multi-View Compare (§13.2), and the pipeline CLI are available to everyone with no time limit and no reduced quality.

A license unlocks the production workflow features:

Feature	Description
Annotations	Draw directly on any frame — pen, line, arrow, rectangle, and text tools. Per-frame voice notes. Strokes saved to a sidecar .annotations.json file.
A/B Compare	Wipe and diff compare modes. Freeze a frame as B reference or load an independent B sequence. Full-frame A-B × amplify difference display.
Playlist	Queue multiple sequences and video clips for sequential review with per-clip In/Out trim and SSD pre-caching between clips.
Audio	Import an external audio track (WAV/MP3/FLAC/AIFF) for sync review against an image sequence. Note: video file audio plays without a license.
Export Frames	Export the current frame or a range to PNG, TIFF, or EXR with optional annotation bake, burn-in, and HUD overlay.
Export Video	Encode a sequence or frame range to H.264, H.265, or ProRes via the bundled FFmpeg.
Slate & Burn-in	Prepend a configurable title card and bake frame number, SMPTE timecode, custom text, and licensee watermark onto exported frames and videos.
EDL / Multi-Clip Timeline (Studio Pro)	Assemble multiple sequences and clips into a single cut with per-clip trims, drag-to-reorder, an editable non-modal timeline, loop playback, and CMX 3600 EDL import/export. See §25.
Synced Remote Review (Studio Pro)	Frame-accurate playback synchronisation across machines on a LAN, with auto-discovery of sessions and host-authoritative timing. See §19.5.
Plugin Scripting (Studio Pro)	Load Python plugins that add menu items, react to playback and export events, and query player state through a stable API. See §26 and Appendix B.

💡 **Tip:** A 10-day full-feature trial is available on request from anti-matter-3d.com — no payment required to evaluate the complete toolset, including all Studio Pro features, in your own pipeline before purchasing.

3. Installation

mh_PLAYer can be installed two ways. Both deliver exactly the same application, are user-level, and require no administrator rights or UAC prompt — choose whichever suits your environment:

- Portable ZIP — extract and run. No installation step, nothing written to Program Files or the registry, and no admin rights. Ideal for running from any folder or a shared drive, on a locked-down workstation, or for keeping several versions side by side.
- Windows installer — a standard, signed setup program that installs mh_PLAYer for the current user, creates Start Menu and optional Desktop shortcuts, can add mh_PLAYer to your PATH, and registers an entry in Apps & features for a clean one-click uninstall. Convenient when IT or a pipeline TD prefers a managed install.

Portable ZIP (extract and run)

- Extract the zip archive (mh_PLAYer_v2_12_#.zip) to a folder of your choice.
- Double-click mh_PLAYer_Win_x64_v2_12_#.exe to launch. No installation or admin rights required.
- On first launch, preferences are written to %APPDATA%\mh_tools\.
- Have a license? Launch mh_PLAYer, then choose Help → Install License... and select your signed license.dat — see Section 2, Licensing & Registration.

Windows installer (optional)

Prefer a managed install? Run mh_PLAYer_Win_x64_v2_12_#_Setup.exe and follow the prompts. The installer is signed, installs into %LOCALAPPDATA%\Programs\mh_tools\mh_PLAYer for the current user only, and never requires administrator rights.

Installer option	Description
Desktop shortcut	Creates a Desktop shortcut. Ticked by default — untick to skip.
Add to PATH	Adds mh_PLAYer to your user PATH so the command line works from any terminal. Ticked by default; identical to Help → CLI PATH Setup....
Start Menu & uninstaller	A Start Menu entry and an Apps & features uninstaller are always created.

To remove mh_PLAYer, use Apps & features or the Start Menu uninstaller; this also removes the PATH entry the installer added. Your preferences and installed license are retained, so they carry over to any future install or ZIP.

 **Tip:** Not sure which to choose? For a quick run, the portable ZIP is fastest. For shortcuts, PATH set-up, and a managed uninstall handled for you, use the installer.

FFmpeg

FFmpeg is bundled in the `ffmpeg\bin\` subfolder of the distribution. `mh_PLAYER` locates it automatically. If FFmpeg is not found in the bundle, `mh_PLAYER` falls back to any FFmpeg on the system PATH. FFmpeg is required for video file playback, audio extraction, and video export.

OpenColorIO

OpenColorIO (OCIO) is fully bundled in the distribution — no separate installation is required. The OCIO display mode is available immediately on launch. To use a custom studio config, point the `$OCIO` environment variable to your `.ocio` file or browse for it in the Colour Management sidebar section.

3.1 Shortcuts (Desktop & Start Menu)

If you installed from the portable ZIP, use `Help → Manage Shortcuts...` to create Desktop and Start Menu shortcuts that point to the correct exe location — no matter where you chose to extract the distribution. The Windows installer creates these shortcuts for you.

Action	Result
Create Shortcuts	Adds a Desktop shortcut and/or a Start Menu entry under <code>mh_PLAYER</code> .
Update Shortcuts	Removes the old shortcuts and recreates them from the current exe location. Use after moving the folder.
Remove Shortcuts	Deletes the Desktop and Start Menu shortcuts.

 **Tip:** If you move or rename the `mh_PLAYER` folder after installation, use `Help → Manage Shortcuts...` → `Update Shortcuts` to refresh the shortcut paths. The exe can be placed anywhere and the shortcuts will always point to the correct location.

Updating

To update the portable ZIP, extract the new ZIP to a fresh folder and launch the new exe. If you used the Windows installer, run the new installer instead — it upgrades in place. Either way, your preferences and installed license carry over automatically.

`Help → Check for Latest Version...` compares your installed version against the latest `mh_PLAYER` release on GitHub and, if a newer version is available, offers a direct link to the download page. This is a manual check only — `mh_PLAYER` never contacts the network on its own or at startup.

3.2 CLI PATH Setup

To use mh_PLAYer from a terminal (cmd, PowerShell, or Windows Terminal) without typing the full path to the exe, add the application directory to your user PATH environment variable.

Use Help → CLI PATH Setup... to manage this safely from inside the application:

Action	Description
Add to PATH	Appends the mh_PLAYer directory to the current user's PATH (HKCU\\Environment). No administrator rights required. The change is immediately broadcast to the system so new terminals will see it without a log-off or reboot.
Remove from PATH	Removes the entry. Use this if you move the folder or no longer want mh_PLAYer on the PATH.

 **Tip:** Only the current user's PATH is modified (HKCU\\Environment — not the system-wide HKLM PATH). No UAC elevation prompt will appear.

 **Already-open terminals (cmd / PowerShell / Windows Terminal) will not see the change until they are restarted. New terminals opened after the change will find mh_PLAYer on the PATH immediately.**

After adding to PATH, the following commands become available from any terminal:

```
mh_PLAYer beauty.####.exr          # Open viewer
mh_PLAYer --check beauty.####.exr   # QC validate a sequence
mh_PLAYer --convert beauty.####.exr out.mp4 # Headless convert
```

4. Supported Formats

Image Sequences

Format	Extensions	Notes
OpenEXR	.exr	Multi-layer, multi-AOV, all bit depths. Linear float16/float32.
PNG	.png	RGB and RGBA. 8-bit and 16-bit.
TIFF	.tif, .tiff	8-bit and 16-bit.
JPEG	.jpg, .jpeg	8-bit. Not recommended for VFX review.
DPX	.dpx	10-bit and 16-bit log/linear.
Radiance HDR	.hdr	Radiance RGBE scene-linear format. Decoded via OpenCV with Reinhard tone-map for display. Channel views (R/G/B) supported.

Video Files

Format	Extensions	Notes
MP4 / H.264	.mp4, .m4v	Most common dailies format. Full audio support.
QuickTime	.mov	H.264, H.265, ProRes (read). Audio supported.
MKV	.mkv	Most codecs supported via FFmpeg.
AVI	.avi	Legacy format. Most codecs via FFmpeg.
WebM	.webm	VP8/VP9 via FFmpeg.
WMV	.wmv	Windows Media Video via FFmpeg.

Audio (Imported Tracks)

Format	Notes
WAV	PCM, 16-bit and 24-bit. Recommended for audio sync work.
MP3	Lossy compression. Useful for reference audio.

FLAC	Lossless. Supported via soundfile library.
AIFF	Apple format. Supported via soundfile library.

Sequence Auto-Detection

When you open any numbered image file, mh_PLAYER automatically discovers the complete sequence in the same folder. Opening beauty_1001.exr will load beauty_1001.exr through beauty_1250.exr (or whatever range is present) as a single sequence.

 **Tip:** If frames are missing from a sequence, a warning appears in the status bar identifying the exact missing frame ranges — useful for catching render farm failures before a review session.

5. Interface Overview

The mh_PLAYer window is divided into four main areas:

Area	Description
Canvas	The central image display area. Background is near-black (#0D0D0D) for neutral colour evaluation. Supports zoom, pan, and A/B wipe.
Transport Bar	Below the canvas. Two rows: (1) Play/Pause, JKL shuttle, loop controls, FPS, frame stride (×N), zoom percentage, frame counter, cache usage; (2) collapsible quick-access icon toolbar with grouped icon buttons for display, colour, HUD, guides, annotation, A/B compare, scopes, pixel inspector, info bar, fullscreen, quick save, remote server, user manual, and preferences.
Timeline	Below the transport bar. Scrub bar showing the full sequence range, in/out markers, and frame position.
Sidebar	Right panel. Collapsible sections for AOV selection, display controls, colour management, annotation tools, histogram, waveform scope, pixel inspector, and more.

Screenshot placeholder: Add annotated window overview screenshot here.

Opening Files

Files can be opened in several ways:

- Drag and drop — Drop any image file, EXR, or video directly onto the mh_PLAYer window from Explorer.
- File → Open Sequence (Ctrl+O) — Opens a file dialog. Select any frame in a sequence to open the full sequence.
- File → Open Recent — Shows the last 10 opened sequences and videos for one-click reopen.
- Workspace load (Ctrl+Shift+O) — Restores a complete review session from a .mhplay file.

Sidebar Panels

All sidebar sections are collapsible. Click the section header to expand or collapse. The entire sidebar panel can be hidden for a clean full-canvas view using the toggle strip — a narrow 14 px bar between the sidebar and the canvas. Click it to collapse or expand the sidebar. The arrow indicator shows ‹ when the panel is open and › when collapsed. The keyboard shortcut Ctrl+Tab does the same (bare Tab is left free for normal field-to-field navigation, e.g. entering grading values). The sidebar state persists across sessions.

- AOV / Layer — channel tree for EXR sequences
- Display Transform — colour mode selection and EV/gamma controls

- Colour Management — LUT loading and OCIO configuration
- Compare — Wipe/Diff mode and position/amplification controls
- Histogram — RGB channel histogram
- Waveform / Parade — RGB parade and luma scope
- Pixel Inspector — linear float readout and colour picker
- HUD — on-screen overlay configuration
- Annotation — drawing tools, voice notes, save/load
- Shot Notes — free-form text notes saved with the workspace

 **Tip:** Collapse the sidebar (Ctrl+Tab or click the < strip) before recording a screen capture or entering a client review session for a clean, distraction-free canvas.

5.1 Sidebar Panel — Collapse / Expand

The sidebar can be collapsed entirely using the 14 px toggle strip between it and the canvas, or via View → Toggle Sidebar Panel (Ctrl+Tab). When collapsed, the full window width is available for the canvas. The sidebar width is remembered and restored exactly on expand.

5.2 Quick-Access Icon Toolbar (Row 2)

The second row of the transport bar is a fully icon-based quick-access toolbar with QPainter-drawn icons. Icons use a consistent line-art style matched to the application theme. Layout left to right, divided into logical groups by vertical separators:

Icon	Name	Action
Sun + γ spinbox	EV / Gamma	Live exposure (EV) spinbox. Click the sun icon to scroll the sidebar to the DISPLAY section.
Palette + colour combo	Colour Mode	Dropdown to select the active display transform. Click the palette icon to open the DISPLAY section.
HUD ▾	HUD Menu	Popup menu — toggle frame number, timecode, and shot name overlays independently. Also scrolls sidebar to the HUD section.
Crosshair ▾	Guides Menu	Popup menu — select Thirds, Safe Area, Golden Ratio, or Clear guides.
Pencil	Annotation	Toggle annotation mode. Scrolls sidebar to the ANNOTATION section. Icon lit when annotation is active.

Two film frames (B)	Load B Source	Open a file dialog to load the B source for A/B compare. Placed immediately before the Compare icon for the two-step left-to-right A/B workflow.
Split screen	A/B Compare	Scroll sidebar to the COMPARE section for wipe position and diff amplification controls.
2x2 grid of squares	Multi-View Compare	Open the Multi-View Compare window for side-by-side comparison of stills and grabbed frames. Sits in the workflow group with Playlist, EDL, and Onion-skin. See §13.2.
Waveform bars	Scopes	Scroll sidebar to the WAVEFORM / PARADE SCOPE section.
Eyedropper	Pixel Inspector	Scroll sidebar to the PIXEL INSPECTOR section.
Info bar	Info Bar	Toggle the slim info strip above the timeline. Icon lit when strip is visible.
Four-corner arrows	Fullscreen	Open the fullscreen player (Ctrl+F).
Stacked list	Playlist	Scroll the sidebar to the PLAYLIST section for queueing and reordering shots. (license)
Film strip + cut	EDL / Timeline	Open the EDL / Multi-Clip Timeline editor. (Studio Pro)
Overlapping frames	Onion Skin	Toggle onion-skin overlay of the neighbouring frames. Icon lit when active.
Arrow out of tray	Export	Open the Export Frame/Range dialog (Ctrl+E). (license)
Two arrows ▼	Sync	Popup menu — host or join a Synced Remote Review session. Icon lit while a session is active. (Studio Pro)
Frame + down arrow	Quick Save	Save the current displayed frame to PNG/TIFF/JPEG (Ctrl+Shift+C).
Antenna	Remote Review	Start or stop the HTTP remote review server. Icon lit in accent colour when server is running.
Open book	User Manual	Open the PDF user manual from the application directory.
Gear	Preferences	Open the Preferences dialog.

Sidebar-anchor icons (EV, Annotation, Compare, Scopes, Pixel Inspector, HUD) automatically expand the sidebar if collapsed before scrolling — a single click is always enough. Load B Source and Compare are deliberately adjacent so the two-step A/B workflow reads left to right.

5.3 Collapsing the Icon Toolbar

The row-2 icon toolbar has its own collapse strip on the left edge — a 14 px vertical bar styled identically to the sidebar toggle strip. Click it to hide or reveal the entire icon row. The ▼ arrow indicates expanded; ▲ indicates collapsed. The state persists across sessions in the user preferences file.

6. Display & Colour Management

6.1 Display Transform Modes

mh_PLAYer applies a display transform to convert scene-linear or log image data to a monitor-ready signal. Select the transform in the Display Transform section of the sidebar, or use the colour mode dropdown in the transport bar quick-access row.

Mode	Description
sRGB	IEC 61966-2-1 piecewise gamma. The standard choice for scene-linear EXR data displayed on an sRGB monitor. Applied after any EV adjustment.
ACES Filmic	Narkowicz 2016 ACES approximation. Provides filmic highlight roll-off and natural contrast for scene-linear data. Recommended for renders with HDR content.
Power Gamma	Simple power-law gamma (user-adjustable γ spinbox). Useful for log footage or specific calibration workflows.
Linear	No transform — raw pixel values clipped to 0–1. Useful for inspecting normalised data such as normals, motion vectors, or depth maps.
LUT	Apply a user-loaded .cube or .3dl LUT as the display transform. Load the LUT in the Colour Management section.
OCIO	Full OpenColorIO pipeline (bundled). Load a config file and select source colour space, display, and view.
False Colour	Maps scene-linear luminance to a colour ramp calibrated to 18% middle grey: green = correctly exposed, blue = under, red/magenta = over. Use EV to shift the reference point. Evaluation only - it does not affect cached or exported data.

 **Tip:** For most render review workflows — scene-linear EXR from a production renderer — sRGB or ACES Filmic are the two most useful modes. ACES Filmic gives a more film-like look with smooth highlight compression; sRGB is more technically accurate for checking exact values.

6.2 Exposure & Gamma

The EV (exposure value) control adjusts scene-linear exposure before the display transform is applied. This is a true linear exposure adjustment — EV +1 doubles the scene brightness. It does not alter the underlying data; it is a view-only adjustment. The EV spinbox (range –8.0 to +8.0) is available in the sidebar and in the quick-access row of the transport bar.

The gamma control (in Power Gamma mode) sets the display gamma exponent via a spinbox (range 0.5–5.0, default 2.2). It has no effect in sRGB, ACES, LUT, or OCIO modes. Shift+R resets both EV and gamma to their default values. Both controls are also accessible in the quick-access row of the transport bar for fast adjustments without opening the sidebar.

6.3 Channel Views & Proxy

Press R, G, B, or A to isolate a single channel. Press C to return to full colour (RGB). These shortcuts work at any time, including during playback. Channel view is supported for all source types including video files.

The proxy control (P key) reduces the decode resolution for faster playback of large sequences:

- Full (1:1) — Native resolution. Recommended for final review.
- ½ proxy — Half resolution in each dimension (¼ of pixels). Suitable for real-time playback of large EXR sequences.
- ¼ proxy — Quarter resolution. Maximum playback speed for very large formats.

 **Tip:** Proxy only affects display decode — the full-resolution data is cached separately. Switch between proxy levels at any time without clearing the cache.

 **EXR and proxy load time** OpenEXR has no native subsampled read — the full file is always decompressed from disk regardless of the proxy setting. Proxy reduces cache RAM usage and display cost, but does NOT speed up EXR loading. For faster initial load of large EXR sequences, reduce the frame range or increase the load stride in the Open Sequence dialog instead.

6.4 LUTs — Display LUT & Source LUT

mh_PLAYer has two independent LUT slots. They sit at different points in the pipeline and expect different data, so loading a LUT into the wrong one is the most common cause of an unexpected result.

Slot	Where it sits
Display LUT	COLOUR MANAGEMENT section of the sidebar. Active when the display transform is set to LUT, and replaces that transform entirely. Takes scene-linear data in and returns display-linear data; mh_PLAYer applies the sRGB encode afterwards, so a display LUT must not bake the sRGB gamma in itself.
Source LUT	SOURCE LUT section of the sidebar (collapsed by default). Applied in scene-linear, before the display transform, so sRGB / ACES Filmic / OCIO all remain selectable underneath it. Use it to carry a creative look or an input-space conversion through a whole review session.

Both slots use the same controls: Browse LUT... to pick a file, Clear to remove it, and a path field that also accepts a LUT dropped straight onto it. The status line beneath reports what actually loaded — for example 3D 33³ · domain [0.00–1.00] — which is the quickest way to confirm a file parsed the way you expected.

Supported formats:

- .cube — 1D curve, 3D cube, or a 1D shaper and a 3D cube together in one file, in which case the shaper runs first.
- .3dl — Lustre / Flame 12-bit integer format. Files with a .look extension are read as .3dl.

The input domain is read from DOMAIN_MIN / DOMAIN_MAX, or from the equivalent LUT_1D_INPUT_RANGE / LUT_3D_INPUT_RANGE header, and defaults to 0–1 when a file declares neither. Values outside the domain are clamped before the lookup, so a LUT intended for scene-linear data should declare a domain that covers the highlights you care about — a 0–1 domain discards everything above 1.0.

A shaper matters for scene-linear work. A 3D cube on a plain linear domain spaces its nodes evenly in linear light, which puts almost all of them in the highlights and leaves the shadows to be interpolated across a single wide interval. A 1D shaper remaps the input logarithmically first, so the cube nodes land where the eye actually looks. For a scene-linear-to-display LUT the difference is large: the same cube can be out by well over a dozen 8-bit code values in the shadows without a shaper, and within a fraction of one with it.

 **Creative LUTs are display-referred** Most downloadable film-look .cube files are authored for footage that is already encoded — Rec.709 or log — and declare a 0–1 domain. Those behave as intended on PNG, JPEG, TIFF and video sources, which mh_PLAYer processes in the encoded domain. Loading one as a display LUT for a scene-linear EXR feeds it linear data it was never designed for, and the result will look wrong. Match the LUT to the source, not just to the slot.

 **Tip:** The free Colour Sanity Kits on the mh_PLAYer page at anti-matter-3d.com include known-good LUTs for both slots. The OCIO / LUT Sanity Kit contains a strict identity LUT: load it and the image must be unchanged, which confirms the LUT path end to end. The LatLong / CGI Environment LUT Kit contains a worked example for each slot.

6.5 OCIO — OpenColorIO

The OCIO display mode provides a fully accurate colour pipeline matching your studio's colour management system. OpenColorIO is bundled with mh_PLAYer — no separate installation is required.

To use OCIO:

- Set the \$OCIO environment variable to your config file path before launching mh_PLAYer. The config will be auto-loaded and OCIO mode activated automatically.

- Alternatively, click Browse Config... in the Colour Management sidebar section (expand the COLOUR MANAGEMENT section to find it). The Input CS, Display, and View dropdowns are populated automatically from the config. If the config references external LUT files, those files must be in the same folder as the .ocio file (search_path: . is the standard).
- Select your source colour space (scene-linear, ACEScg, etc.), display device, and view (ACES 1.0 SDR-video, sRGB, etc.).
- Click Apply to compile the display processor. The sidebar status label shows the active transform.

 **Tip:** If your studio's \$OCIO environment variable is already set, mh_PLAYER will load the config automatically on launch. Otherwise, browse for the .ocio file in the Colour Management sidebar section.

6.6 ASC CDL Grade

mh_PLAYER can apply an ASC CDL primary grade ahead of the display transform. The CDL controls in the Colour Management section of the sidebar expose the three standard ASC CDL operators — Slope (gain), Offset (lift), and Power (gamma) — adjustable per R, G, and B channel. Because these follow the published ASC CDL model, a grade entered here matches the result other CDL-aware applications produce from the same numbers.

The grade is held per source and saved with the workspace, so each clip can carry its own correction. mh_PLAYER precomputes the CDL into the display path for real-time playback, and an identity grade — Slope 1.0, Offset 0.0, Power 1.0 on every channel — is detected and skipped, so an ungraded clip plays at full speed with no added cost.

 **Tip:** The CDL is a primary grade applied before the sRGB / ACES / LUT / OCIO display transform, so it behaves consistently across display modes. Reset every channel to its identity value to remove the grade.

6.7 Aspect Ratio Correction

The Aspect Ratio control corrects for anamorphic or non-square pixel sources where the render pixel dimensions differ from the intended display dimensions. Select a preset from the AR combo in the transport bar (labelled AR:), or expand the DISPLAY section of the sidebar for the full preset list.

Preset	Ratio
Pixel (default)	Square pixels — no correction applied
1:1	1.000 — Perfect square pixels
4:3 PAL/NTSC SD	1.333
16:9 HD/UHD	1.778

1.37:1 Academy	1.370
1.43:1 IMAX 70mm	1.430
1.85:1 Flat	1.850
2:1 Univisium	2.000
2.39:1 Scope	2.390
2K Flat 1.85	1.850
2K Scope 2.39	2.390
4K Flat 1.85	1.850
4K Scope 2.39	2.390

The AR setting is saved per workspace and per session. The transport bar combo and the sidebar DISPLAY section are bidirectionally synced — changing either updates the other immediately.

 **Tip:** For CLI headless convert, use `--ar 2.39` (or any ratio) to bake the correct display geometry into the output frames. Works with all output formats and with `--anaglyph`.

7. Playback Controls

The transport bar provides all playback controls. Most have keyboard equivalents following industry conventions.

Control	Key	Description
Play / Pause	Space	Toggle playback at the sequence frame rate.
Step Forward	→	Advance one frame and stop.
Step Back	←	Go back one frame and stop.
First Frame	Home	Jump to the In point (or first frame if no In set).
Last Frame	End	Jump to the Out point (or last frame if no Out set).
Reverse	J	Play backwards. Press again to double speed.
Stop	K	Stop playback and hold current frame.
Forward	L	Play forwards. Press again to double speed.
Toggle Direction	` (backtick)	Flip playback direction without stopping.
Toggle TC Display	Click counter	Click the frame counter to toggle SMPTE timecode display.
Go to Frame	Ctrl+G	Open a dialog to jump directly to a specific frame number.
Frame Stride	Click ×N label	Cycle stride: ×1→×2→×3→×4→×5→×1. Plays every Nth frame at real-time speed.
Zoom	Zoom combo / scroll wheel	Fit, 25%, 50%, 75%, 100%, 150%, 200%. Combo updates automatically when scrolling or fitting.

 **Tip:** JKL shuttle behaviour matches most NLEs and review tools. Hold J or L to accelerate playback. Press K to stop at any time.

Frame Rate

The FPS control in the transport bar sets the target playback frame rate. For image sequences, mh_PLAYER uses whatever rate you set (default 24 fps). For video files, the FPS is read from the file automatically. Playback uses a monotonic clock for accurate pacing with no QTimer jitter.

7.1 Frame Stride — Open Sequence Dialog & Transport Bar

Frame stride controls how many frames mh_PLAYER skips during loading and playback — useful for a rapid first-pass review of a long render without waiting for every frame to cache.

Setting Stride at Open Time (Recommended)

The primary place to set stride is the Open Sequence dialog. When opening a sequence, the LOAD STRIDE field lets you type any value from 1 upward. Entering 3 loads only every 3rd frame — the sequence is genuinely shorter and faster to cache. The frame count label updates as you type to show exactly how many frames will be loaded.

Example (300-frame sequence)	Result
Stride 1 (default)	300 frames loaded — normal full sequence
Stride 2	150 frames loaded — half the cache cost
Stride 5	60 frames loaded — rapid overview
Stride 25	12 frames loaded — check poses or key frames only

Adjusting Stride After Load

The xN label next to the FPS control in the transport bar adjusts playback stride on the fly — click to cycle through x1, x2, x3, x4, x5 and back. Unlike load-time stride, this does not change which frames are cached; it only controls how many indices are skipped per timer tick.

 **Tip:** Load stride via the Open Sequence dialog is the most efficient approach: fewer frames decode, less RAM is used, and playback starts sooner. The transport bar xN is useful for sequences opened by drag-drop or when you want to change stride without reopening.

 **Tip:** Stride is also available in the CLI: -n N for viewer mode, --stride N for headless convert mode.

7.2 Go to Frame (Ctrl+G)

View → Go to Frame... opens a number entry dialog pre-filled with the current frame number, with min/max set to the sequence range. If the requested frame number is not present in the sequence (due to a gap), mh_PLAYER jumps to the nearest available frame and shows a status bar note. The jump respects active In/Out bounds.

Timecode Display

Click the frame counter label at the right of the transport bar to toggle between frame number display and SMPTE timecode. The timecode start can be configured in Preferences → Timecode (default 01:00:00:00 — standard for delivery). The timecode counts from the In point, matching broadcast and delivery conventions.

8. In/Out Points & Selection

In and Out points define a working range within the sequence. They are used for looping a specific section and for restricting export to a frame range.

Frame Range Bar

The timeline area uses a DJV-style Frame Range Bar. Flanking spinboxes on either side of the scrub bar show the current In and Out frame numbers and can be edited directly. Bracket buttons and individual clear buttons sit alongside each spinbox for fast In/Out management without keyboard shortcuts.

Control	Description
START spinbox (left)	Displays the In point frame number. Edit directly to set the In point to any frame. The spinbox value follows the actual sequence frame numbers — for example, 1001 on a sequence that starts at frame 1001.
[button (left of timeline)	Mark In — sets the In point to the current playhead frame. Equivalent to the I keyboard shortcut.
✕ Clear In (left)	Clears the In point only, returning it to the first frame. Does not affect the Out point.
END spinbox (right)	Displays the Out point frame number. Edit directly to set the Out point to any frame.
] button (right of timeline)	Mark Out — sets the Out point to the current playhead frame. Equivalent to the O keyboard shortcut.
✕ Clear Out (right)	Clears the Out point only, returning it to the last frame. Does not affect the In point.
Play Selection button	Loops playback between the In and Out points only, ignoring the rest of the sequence.

Keyboard & Timeline Methods

Action	Method
Set In point	I key (ApplicationShortcut — fires even when a spinbox has focus), or [button in the Frame Range Bar, or Shift+Drag on the timeline

Set Out point	O key (ApplicationShortcut — fires even when a spinbox has focus), or] button in the Frame Range Bar, or Ctrl+Drag on the timeline
Clear In only	× Clear In button (left), or edit the START spinbox to the sequence start frame
Clear Out only	× Clear Out button (right), or edit the END spinbox to the sequence end frame
Clear both	Playback → Clear In/Out
Jump to In	Home key
Jump to Out	End key

When Play Selection Only is active, playback loops between the In and Out points only, ignoring the rest of the sequence. The timecode counts from the In point — this matches the standard delivery timecode convention where In point = 01:00:00:00.

 **Tip:** The I and O keyboard shortcuts use ApplicationShortcut context — they fire correctly even when the START or END spinbox has keyboard focus. There is no need to click away from the spinbox before pressing I or O.

 **Tip:** In/Out points are saved in the workspace (.mhplay file) and in each Playlist entry, so you can define different working ranges for each clip in a playlist.

9. AOV & Multi-Layer EXR

OpenEXR multi-layer files store multiple render passes (AOVs) in a single file. mh_PLAYer reads the channel structure from the first frame of the sequence and presents all layers and AOVs in the AOV panel on the left side of the sidebar.

AOV Panel

The tree view shows layers at the top level and AOVs (channel groups) below each layer. Click any AOV to display it. For single-layer EXR files (beauty only), the panel remains collapsed automatically. For multi-layer EXRs, the tree expands on load. Typical AOV names include beauty, diffuse, specular, reflection, refraction, albedo, depth (Z), normals, motion vectors, cryptomatte, and others depending on your renderer.

mh_PLAYer reads all AOVs of the target layers in a single EXR decompression pass during preloading. Switching between AOVs or channel views does not clear the L1/L2 cache — each entry is keyed by layer, AOV, and channel, so a previously viewed pass is available instantly without re-reading the file. Sibling-AOV preloading (controllable in Preferences → Performance) extends this to AOVs you have not yet viewed: the preloader decodes them in the background as the sequence loads.

Use the Up and Down arrow keys to cycle through AOVs in sequence order — useful for quickly stepping through all passes during a lighting or compositing review.

Key	Action
Up Arrow	Previous AOV in the list
Down Arrow	Next AOV in the list
R / G / B	Isolate red, green, or blue channel of the current AOV
A	Isolate alpha channel
C	Return to full colour (RGB)
V	Invert display — useful for checking alpha mattes

Channel Naming Conventions

mh_PLAYer parses EXR channel names following the layer.aov.channel convention (e.g. diffuse.direct.R, diffuse.direct.G, diffuse.direct.B). Single-level naming (R, G, B, A) and two-level naming (beauty.R, beauty.G, beauty.B) are also supported.

💡 **Tip:** Float32 EXR values are stored in the L1 cache keyed by layer, AOV, and channel. The colour transform (EV, gamma, display mode) is applied at display time only — changing display settings never re-decodes the file. Switching AOVs, channels, or returning to a previously viewed pass is always instant from cache.

10. Image Sequence Management

Opening Sequences

Open any frame in a numbered sequence and mh_PLAYER automatically discovers the full sequence. The sequence is identified by the filename prefix and the number padding width. For example, opening beauty_v003.1047.exr will load all beauty_v003.####.exr files in the folder.

10.1 Open Sequence Dialog

When opening a sequence with more than one frame, the Open Sequence dialog appears with the following sections:

Dialog Section	Description
FRAME RANGE	Start and End frame spinboxes. Defaults to the full discovered range. The count label updates as you adjust the range.
LOAD STRIDE	Enter any integer N to load only every Nth frame. The count label shows exactly how many frames will be loaded. Default is 1 (every frame).
PROXY RESOLUTION	Full / ½ / ¼ resolution. Reduces decode time and cache memory for large (4K+) sequences.
PLAYBACK	Load as still checkbox — load only the single clicked frame, ignoring the rest of the sequence. Also: Start playback immediately after load.

Two buttons confirm the selection: Load All ignores the frame range spinboxes and loads the full discovered sequence (applying any stride and proxy settings). Load Range applies all sections to produce the final frame list.

 **Tip:** For long overnight renders, combine FRAME RANGE and LOAD STRIDE: set the range to the frames you care about and stride to 3 or 4 for an immediate overview. You can always close and reopen with stride 1 for a full review once you have confirmed the shot looks correct.

10.2 Loading Still Images

File → Load Still Image(s)... (Ctrl+Shift+I) opens a standard file dialog that allows selecting one or more individual image files. Unlike File → Open Sequence, this path does not discover or load any surrounding files — only the files explicitly selected are loaded.

Selected files are sorted by filename and loaded as a virtual sequence with frame numbers 1 to N. All navigation controls work as normal — step through stills with ← / → arrow keys, scrub the timeline, or use J/K/L. All display tools work identically to a discovered sequence.

Use case	How to open
Browse a single reference image	File → Load Still Image(s) → select one file
Compare two renders side by side	File → Load Still Image(s) → select both files, then use [to set B reference
Review a folder of mixed-name images	File → Load Still Image(s) → select all files in the folder (Ctrl+A in dialog)
View one frame from a sequence without loading the rest	File → Open Sequence → check "Load as still" in the dialog

 **Tip:** To load all images in a folder as stills, open the Load Still Image(s) dialog, navigate to the folder, and press Ctrl+A to select all. They will be sorted by filename and loaded as a sequence.

Gap Detection

When a sequence opens, mh_PLAYER checks for missing frame numbers and warns in the status bar if any are found. For example: ⚠ 3 missing frames: 1023–1025. This detects render farm failures before a review session begins. The warning persists for 8 seconds.

Recent Files

File → Open Recent lists the last 10 opened sequences and videos. Click any entry to reopen immediately. The list persists across sessions and can be cleared from the same menu.

Workspace Save / Load

File → Save Workspace (Ctrl+S) saves the complete review session state to a .mhplay file, including:

- Sequence path and current frame position
- In/Out points and loop selection state
- All display settings (EV, gamma, display mode, channel, proxy)
- LUT and OCIO configuration
- HUD settings and shot name
- Annotations (full stroke data, inline)

- Voice annotation file paths
- Playlist entries with per-clip trim
- B-source sequence and offset
- Imported audio path
- Shot notes

File → Load Workspace (Ctrl+Shift+O) restores the complete session. The sequence files must still be accessible at their original paths.

 **Tip:** Save a workspace at the start of each review session. The default filename is <sequence_folder_name>.mhplay, saved next to the sequence.

11. Playlist

License required: Playlist requires a valid mh_PLAYer license.

The playlist queues multiple sequences or video clips for sequential review, each with its own trimmed working range. Open it from the Playlist menu or the playlist button in the row-2 quick-access toolbar.

11.1 Building a Playlist

- Playlist → Add Files... — add one or more sequences or video files to the end of the list.
- Playlist → Add Current — add the currently loaded clip with its active In/Out trim.
- Reorder — drag an entry within the playlist panel, or right-click an entry and choose Move Up / Move Down.
- Remove — right-click → Remove drops a single entry; Clear Playlist empties the list. The loaded clip is unaffected.

11.2 Per-Clip Trim

Each entry keeps its own In/Out trim, so a playlist can hold tight selections from many long sources. Load an entry, set the In and Out points (I and O), and the trim is stored against that entry. A trimmed entry shows its working range as an [in–out] badge in the playlist panel; Clear Trim returns the entry to its full length.

11.3 Playback

Double-click any entry to jump to it. When a clip reaches its Out point during playback, mh_PLAYer advances to the next entry and continues without stopping. Enable the loop option to wrap from the last entry back to the first.

 **Tip:** mh_PLAYer pre-caches the next clip to the SSD cache in the background while the current clip plays, eliminating the pause at clip boundaries — most noticeable with video files and large EXR sequences.

11.4 M3U / M3U8 Playlists

A playlist can be saved to and loaded from a standard .m3u or .m3u8 file via the Playlist menu. Export writes each entry as a path, with its mh_PLAYer In/Out trim recorded in an adjacent comment line; on re-import those trims are restored. The comment is ignored by ordinary media players such as VLC, so an exported .m3u8 still plays its clips end-to-end in any player while round-tripping losslessly back into mh_PLAYer.

💡 **Tip:** .m3u8 is the UTF-8 variant of .m3u and is the safer choice when clip paths contain non-ASCII characters.

11.5 Send to Timeline

Studio Pro: Send to Timeline builds an EDL and requires a Studio Pro license or active trial.

Playlist → Send to Timeline... converts the current playlist into a multi-clip EDL, preserving each entry's order and In/Out trim, and opens it in the EDL Editor. From there the cut can be reordered, trimmed on a timeline, played back, exported as CMX 3600, or rendered headlessly. See §25 — EDL / Multi-Clip Timeline for the full workflow.

12. Annotation Tools

License required: Annotation tools require a valid mh_PLAYer license.

Annotation mode allows drawing directly on the image for review and feedback. Press N to enter annotation mode. Annotations work on all source types including EXR sequences, video files, and all display colour modes.

Drawing Tools

Tool	Description
Pen	Freehand stroke. Pressure-sensitive width with mouse velocity.
Line	Straight line between two points.
Arrow	Line with arrowhead at the endpoint.
Rectangle	Axis-aligned rectangle outline.
Text	Click to place a text label. Type to enter, click away to commit.

Controls

Action	Method
Enter / exit annotation mode	N key
Undo last stroke	Ctrl+Z
Clear this frame	Delete
Clear all frames	Shift+Delete
Save annotations	Ctrl+Shift+N
Load annotations	Annotation panel → Load button

Annotations are stored per-frame in normalised image coordinates, so they scale correctly when switching between proxy levels or viewing at different zoom levels. The sidcar file uses the naming convention <sequence_name>.annotations.json and is saved alongside the sequence.

 **Tip:** Annotations are saved automatically in the workspace (.mhplay file). Loading a workspace restores all strokes without needing the sidecar JSON.

12.1 Voice Annotations

Each frame can have an audio voice note recorded directly in the player. This is useful for verbal feedback during a solo review session that can be shared alongside the annotation JSON.

Action	Method
Record voice note	Click ● Record in the Annotation sidebar panel. Click again to stop.
Play voice note	Click ► Play note (enabled when a note exists for the current frame).
Delete voice note	Click ✕ (with confirmation).

Voice notes are saved as 44100 Hz mono 16-bit WAV files in a <sequence_name>.voicenotes/ folder alongside the sequence. The file paths are stored in the annotation sidecar and restored from the workspace.

 **Microphone required** Voice annotations require a microphone. The sounddevice library is used for capture. Select your preferred input device in the sidebar AUDIO section ("Input:" dropdown) or in Preferences → Audio Input Device. The selection persists across sessions. Click ↻ to refresh the device list if a new device was connected.

13. A/B Compare

License required: A/B Compare requires a valid mh_PLAYer license.

The A/B compare tool displays two images for comparison using either a draggable wipe divider or a full-frame difference image. It supports comparing a frozen frame from the same sequence, or a live second sequence loaded as an independent B track.

Two quick-access icons in the row-2 toolbar provide direct entry into A/B workflow: the Load B Source icon (two film frames with a B label) opens a file dialog to select the B clip, and the Compare icon (split-screen with arrows) scrolls the sidebar to the COMPARE section for wipe position and diff amplification controls. These two icons are placed together deliberately — load B first, then use Compare.

Same-Frame Compare (Wipe)

Press [(left bracket) to freeze the current frame as the B reference and enter wipe mode. Drag the wipe line left or right to reveal A (current playback) or B (frozen reference). Press [again to exit compare mode. The wipe position can also be set using the Position slider in the COMPARE sidebar section.

Independent B-Source

View → Load B Source opens a separate sequence or video as a live B track. The B frame follows the A playhead in real time — as you scrub A, the corresponding B frame is displayed automatically.

13.1 Diff Mode — |A-B| Difference

Switch from wipe to difference display using View → Compare: Diff Mode, or the Wipe / Diff radio buttons in the COMPARE sidebar section. In diff mode, the canvas shows $|A - B| \times \text{amplify}$ — the absolute difference between every pixel in A and B, scaled to make subtle differences visible.

A perfect match displays as solid black. Any difference — a shifted shadow, a changed reflection, a compositing change — appears as a bright region against the black background.

Amplify setting	Effect
1× (minimum)	Only gross differences visible — useful for checking large changes
8× (default)	A 1-stop exposure shift fills the frame — good for subtle lighting changes
16× and above	Very subtle differences visible — floating point precision artifacts may appear

 **Tip:** Use diff mode with a high amplify value (16–32×) to catch single-pixel compositing errors or subpixel motion blur differences between renders. Switch back to wipe for spatial alignment checks.

Compare Controls

Control	Description
[key	Set current frame as frozen B / toggle compare off
View → Compare: Diff Mode	Switch between Wipe (A B) and Diff (A-B) display
COMPARE sidebar → Wipe/Diff	Same as above — radio buttons in the sidebar
COMPARE sidebar → Position	Wipe divider position slider (0–100%). Only shown in Wipe mode. Syncs with canvas drag.
COMPARE sidebar → Amplify	Diff amplification slider (1–32×, default 8×). Only shown in Diff mode.
View → Load B Source	Load a separate sequence or video as live B
View → Clear B Source	Remove the B source and exit compare mode
View → B Offset +1	Shift B sequence forward by one frame relative to A
View → B Offset –1	Shift B sequence backward by one frame
View → Reset B Offset	Return B offset to zero (frames aligned)
Drag wipe line	Reveal A or B — only active in Wipe mode

 **Tip:** The B Offset control is essential when comparing two sequences with different start frames. If render A starts at frame 1001 and render B starts at frame 1101, set the offset to +100 to align them across the wipe.

13.2 Multi-View Compare

A/B Compare (above) overlays exactly two sources on the canvas. Multi-View Compare is a separate, dailies-style window that shows up to nine images at once, side by side, each independently zoomable — for comparing several render versions, lighting variants, or takes in a single glance.

Open it from View → Multi-View Compare... or the 2×2 grid icon in the row-2 quick-access toolbar. Unlike A/B Compare, Multi-View Compare requires no license — it is available in every installation.

The window holds two kinds of image. Add Images... loads stills from disk, and Grab Current Frame captures the player canvas exactly as it is displayed — exposure, gamma, display transform, and channel isolation are all baked into the grab. Grabbing is the key to cross-version comparison: set up a look in the player, grab it, load or step to another version, grab again, and compare the two grabs side by side.

Control	Description
Add Images...	Load still images from disk — EXR, PNG, TIFF, JPG, DPX, Cineon, HDR, BMP, and WebP. EXR files are shown with a neutral EV 0 / sRGB transform.
Grab Current Frame	Capture the player’s current frame exactly as displayed, with EV, gamma, display mode, and channel isolation baked in.
Sync Zoom & Pan	Mirror zoom and pan across every pane, so all images move together under inspection. Toggle on or off at any time.
Fit All	Fit every pane to its cell.
1:1 All	Reset every pane to 100% (one image pixel to one screen pixel).
Remove Selected	Remove the selected entries from the filmstrip.
Clear	Remove every loaded image and grab.

Everything loaded appears as a thumbnail in the filmstrip along the bottom of the window. Selecting thumbnails fills the grid — select between one and nine, and the layout is chosen automatically:

Images selected	Grid layout
1	1 × 1 — single pane
2	1 × 2 — side by side
3	1 × 3 — a single row
4	2 × 2
5 – 6	2 × 3
7 – 9	3 × 3 — the maximum

Each pane zooms and pans independently: the mouse wheel zooms about the cursor, dragging pans, and a live zoom readout is shown in the pane. Switch on Sync Zoom & Pan to lock every pane together — zoom into a corner of one image and every other pane follows to the same place, which is the comparison most consumer viewers cannot do.

The window has its own keyboard shortcuts, active while it holds focus:

Key	Action
← / →	Step the selection through the filmstrip
F	Fit all panes
1	1:1 (100%) on all panes
Esc	Close the window

 **Tip:** The Multi-View Compare window persists for the session — closing it keeps every loaded image and grabbed frame in place, so you can reopen it later in the review and carry on where you left off. Use Clear to start fresh.

14. HUD Overlay

The HUD (Heads-Up Display) overlays information directly on the canvas image. It is useful for review sessions, screen captures, or presentation. Configure it in the HUD section of the sidebar or via the HUD ▾ dropdown in the transport bar quick-access row.

HUD Element	Description
Frame number	Current frame number, bottom-left corner of canvas.
Timecode	SMPTE timecode (HH:MM:SS:FF), bottom-centre of canvas. Uses the same TC start as the transport bar.
Shot name	Bottom-right corner. Three display options selectable in the HUD sidebar section: (1) Filename — derived automatically from the sequence name by stripping the frame-number suffix; (2) Folder — the parent directory name; (3) Custom — free-text field for any shot name, version label, or note.

Timecode follows the project frame rate set in Preferences. At the NTSC rates of 29.97 and 59.94 fps it is shown in drop-frame notation, with a semicolon before the frames field (HH:MM:SS;FF) and the standard skip of two frame numbers at the start of each minute except every tenth, keeping the displayed time matched to wall-clock duration. Integer rates such as 24, 25, 30, 50, and 60 fps use non-drop notation with a colon (HH:MM:SS:FF).

The font size slider controls the HUD text size (range 10–48pt). The HUD is rendered on top of the displayed image using QPainter, with a 1-pixel drop shadow for legibility on any background.

 **Tip:** The HUD overlay is also baked into exported frames when Export Frames is used with the HUD option enabled — matching exactly what is seen on screen. The HUD ▾ button in the transport bar quick-access row provides a fast dropdown to toggle each HUD element without opening the sidebar.

15. Scopes

mh_PLAYer includes two real-time scope displays in the sidebar: the histogram and the waveform/parade scope. Both update on every frame step or scrub (up to 15 fps during playback, where performance takes priority).

Histogram

The RGB histogram shows the distribution of pixel values for the current frame after all display transforms are applied. R, G, and B channels are overlaid in their respective colours. The histogram reflects what is sent to the monitor — not the scene-linear data.

Waveform / Parade Scope

The waveform scope shows pixel level vs. horizontal image position — the same view found in professional grading software. It is essential for evaluating exposure consistency, clipping, and colour balance across the frame.

Mode	Description
Parade	R, G, and B channels displayed in a vertical stack. The standard view for checking colour balance and cast. A balanced image has R, G, B at similar heights across the frame.
Overlay	All three channels overlaid at reduced opacity. Compact view for quickly checking overall level.
Luma	Y' luma only (ITU-R BT.601: $0.299R + 0.587G + 0.114B$). Clean exposure evaluation without colour information.

The scope uses column sampling (up to 256 columns) rendered into a single vectorised RGBA buffer blitted once per frame, giving correct brightness at any widget height. Bright dots indicate many pixels at that level; dark areas are sparse. Overlay and Luma modes use tuned gain constants for good visibility. Grid lines at 0%, 25%, 50%, 75%, and 100% signal level are shown for reference. Solo buttons (RGB/R/G/B) let you focus on a single channel full-height.

16. Pixel Inspector

The Pixel Inspector shows the linear float RGB values of any pixel in the image. It is essential for QC work — verifying that a sky patch reads as expected linear values, confirming alpha coverage, or checking that normals are correctly normalised.

Using the Inspector

Hover the mouse over the canvas to see live pixel values in the Pixel Inspector sidebar section. The readout shows:

- X and Y pixel coordinates
- Linear float R, G, B values (full precision, 6 decimal places)
- Display colour swatch — reflects the active display transform (sRGB, ACES Filmic, OCIO, LUT, Power Gamma, plus EV and gamma) so the swatch matches exactly what is visible on screen.
- Hex #RRGGBB colour value — derived from the display-transformed value for direct use in colour pickers, HTML, or shader constants.

Locking a Value

Click anywhere on the canvas to pick and lock the readout. The values are frozen until you click again or press the Unlock button. Locked values are highlighted in the inspector panel.

Copying to Clipboard

The  Copy button (enabled once a pixel is hovered or picked) copies two lines to the clipboard:

```
X:1024 Y:540 R:0.845231 G:0.762100 B:0.501443  
#D8C280
```

Paste directly into a Nuke expression, a shader constant, or a ticket/report.

Image Info (Ctrl+I)

View → Image Info... (Ctrl+I) opens the Image Info panel for the current frame. The panel is non-modal — it stays open while you continue working — and updates live as you step or scrub frames.

For EXR files, the full OpenEXR header is displayed: resolution, all channel names, compression, line order, chromaticities, and any custom metadata written by the renderer.

For raster files (TIFF, PNG, JPEG, DPX, BMP, HDR), the panel shows: resolution, colour mode, file format, file size, DPI, bit depth, ICC profile presence, EXIF presence, and — for TIFF files — a full tag table.

 **Tip:** Keep Image Info open while stepping through stills or a sequence to see resolution, mode, and metadata update frame by frame. Useful for verifying that a TIFF scan has consistent DPI and bit depth across all frames.

17. Audio

License required: Audio import and playback require a valid mh_PLAYER license.

17.1 Video Audio

When a video file is opened, mh_PLAYER extracts the embedded audio track on a background thread so playback starts quickly. Extraction uses the bundled PyAV library — a direct binding to the FFmpeg libraries that decodes in-process — and falls back to invoking the bundled FFmpeg executable if PyAV is unavailable. The audio then plays back in sync with the video, with no user action required.

17.2 Importing Audio

For image sequences (which have no embedded audio), use File → Load Audio (Ctrl+Shift+A) to import an external audio file. Supported formats: WAV, MP3, FLAC, AIFF.

The imported audio is associated with the current workspace and saved in the .mhplay file (path only — the audio file is not embedded). Ensure the audio file is accessible at its original path when loading the workspace.

17.3 Audio Sync

Imported audio starts at the In point of the sequence. Adjust the In point if the audio and image are offset. Fine-tune sync with the Offset spinbox in the sidebar AUDIO section (in frames; positive = audio delayed, negative = audio early).

 **Tip:** For review sessions with spotting audio, WAV files at 48 kHz / 24-bit give the best quality and are universally compatible with DAWs and video tools.

17.4 Output Device

Select the audio output device in the sidebar AUDIO section or in Preferences → Audio Output Device. The selection persists across sessions.

18. Export

License required: Export frames, export video, and slate/burn-in require a valid mh_PLAYER license.

18.1 Frame Export (Ctrl+E)

File → Export Frame / Range opens the export dialog. Export the current frame or a frame range with optional annotation baking, burn-in, and slate. Supports image sequences and video source files.

Option	Description
Output folder	Destination directory for exported frames.
Format	PNG (8-bit, EV+gamma applied), TIFF (16-bit, EV+gamma applied), or EXR (float16 linear — no display transform).
Frame range	Current frame, In–Out range, Full sequence, or custom start/end. Editing Start or End spinboxes automatically selects the Custom range option.
Proxy level	Export at full or current proxy resolution.
Bake annotations	Composite annotation strokes onto the exported frames.
Burn-in	Frame number (BL), timecode (BC), custom text (BR).

18.2 Video Export (Ctrl+Shift+E)

File → Export Video encodes the sequence or a frame range to a video file. FFmpeg is used for encoding. mh_PLAYER looks for the bundled FFmpeg in the ffmpeg\bin\ folder next to the executable first, then falls back to any FFmpeg found in the system PATH.

Codec	Notes
H.264	MP4 container. Best compatibility. Adjustable CRF quality (0 = lossless, 23 = default, 51 = lowest).
H.265	MP4 container. Better compression than H.264 at equivalent quality. Wider HDR support.
ProRes	MOV container. Industry-standard intermediate codec. Choose from Proxy, LT, 422, 422 HQ, and 4444 profiles.

18.3 Slate & Burn-in

Both frame export and video export support prepending a slate and/or baking a burn-in overlay onto the output.

Slate: A title card prepended before the first frame of the export. Fields: Project, Shot, Scene, Take, Artist, Company, Frame range, Date, Note. A logo image (PNG with alpha) can be placed in the top-left corner. Duration is configurable. The Prepend Slate checkbox defaults to enabled. Project, Artist, and Company fields are remembered across export sessions.

Burn-in: Text overlaid on every exported frame. Three positions: bottom-left (frame number), bottom-centre (SMPTE timecode), bottom-right (custom text). The burned-in timecode follows the project frame rate, using drop-frame notation (HH:MM:SS;FF) at 29.97 and 59.94 fps. The licensee name is automatically baked as a semi-transparent watermark in the top-right corner of every exported frame.

 **Slate requires license** The Slate feature requires a valid mh_PLAYer license. Burn-in (without slate) also requires a license.

18.4 Quick Save (Ctrl+Shift+C)

Quick Save opens a file dialog to export the current displayed frame. Choose a filename and format (PNG, TIFF, or JPEG). The suggested filename is pre-filled with the sequence name and frame number. The saved path is confirmed in the status bar. The frame is read from the display cache if available, or decoded directly from source if not — Quick Save always works regardless of cache state, including for video files.

 **Tip:** Quick Save applies all active display settings — colour transform, EV, gamma, channel isolation, and proxy — exactly as seen on screen.

Multi-clip delivery To assemble several clips into one deliverable rather than exporting from a single source, use the EDL / Multi-Clip Timeline (Studio Pro) — it renders a cut to video or an image sequence, from the GUI or headlessly via the CLI. See §25 and Appendix A.12.

19. Remote Review

mh_PLAYer provides two distinct remote review features. The free, browser-based server streams the current frame one-way to any web browser on the network — ideal for a director or client watching from a tablet or a second screen. Synced Remote Review (Studio Pro) instead links multiple mh_PLAYer stations so that playback stays frame-accurate across every screen. This section covers both; they are independent and can run at the same time.

19.1 Remote Review — Free, Browser-Based

The built-in HTTP server lets any device on the same network — a tablet, laptop, or second monitor — view the current frame in a web browser, with no software installation required on the remote device.

19.2 Starting the Browser Server

Help → Remote Review starts the server on port 8765. The antenna icon in the row-2 quick-access toolbar provides one-click access to the same toggle. The icon lights up in the accent colour while the server is running. A dialog shows the exact URL to open on the remote device — the application auto-detects the correct LAN IP address:

http://192.168.x.x:8765

Navigate to that URL in any modern browser on any device connected to the same network. Help → Remote Review again stops the server and the antenna icon returns to its unlit state.

19.3 What the Viewer Shows

The remote viewer is a full-screen browser page showing the current display-transformed frame at up to 960 px wide. Frames are streamed using an HTTP chain-load pattern — the browser requests the next frame the moment the previous one arrives, giving continuous updates with no polling overhead. A background encoder thread keeps JPEG encoding off the Qt main thread. The dark status bar shows frame number, sequence name, and live frame rate.

Frames update continuously during playback and scrubbing. The page reconnects automatically if the connection drops. The server also works for video file playback, not only image sequences.

Item	Detail
Server port	8765 (fixed)
Stream quality	JPEG 75%, max 960 px wide (≈ 4× faster encoding than full resolution)

Typical frame rate	~15–20 fps on a wired LAN; lower on Wi-Fi
LAN IP detection	Auto-detected — picks the correct Ethernet/Wi-Fi interface, ignoring VirtualBox/WSL/VPN adapters
Browser support	Any modern browser — Chrome, Firefox, Safari, Edge
Remote installation	None required

 **Tip:** The browser server works on any device with a browser and Wi-Fi access to the workstation — iPad, phone, or a second PC. It is intended for director review and client presentation, not colour-critical evaluation.

19.4 Browser Server Limitations

The browser viewer has the following limitations by design:

- Annotations drawn on the canvas are not included in the stream — the viewer shows the clean plate only.
- A paused frame stays visible on the remote browser until playback resumes or the frame changes.
- The stream shows display-transformed, downscaled JPEG — not suitable for colour-critical evaluation.
- One server instance runs per application session. Multiple browsers can connect simultaneously.

NOTE The browser-based remote review server is a free feature — no license required.

19.5 Synced Remote Review — Studio Pro

Synced Remote Review keeps playback frame-accurate across multiple mh_PLAYer stations on the same network. Where the browser server above streams a one-way picture to a web browser, Synced Remote Review links full mh_PLAYer instances so that play, pause, scrub, and single-frame steps stay locked together on every screen. It is a Studio Pro feature and requires a Studio Pro license or an active trial, and mh_PLAYer must be running on each participating station.

19.6 Hosting and Joining a Session

One station hosts the session and the others join it. The host starts a session from the Sync controls, after which it broadcasts a discovery beacon on the local network. On every other station, the Join dialog automatically lists the sessions it has found — there are no IP addresses to type in. Select a session to connect.

Discovery uses a UDP beacon on port 8768, while the review data itself flows over a TCP/JSON connection on port 8767. Both must be reachable between stations — if a studio firewall restricts traffic on the LAN, open these two ports so that hosting and automatic discovery work.

19.7 Control and Sync Model

Transport is bi-directional but host-authoritative. Any participant can drive playback — play, pause, scrub, or step a frame — and the action is mirrored on every connected station. The host remains the timing authority, so the group never drifts out of sync even as control passes between stations. Each station applies its own display transform locally, so exposure, gamma, and colour settings remain per-station and are not forced across the group.

19.8 Security and Resilience

Sessions are protected by an authentication token: a station must present the correct token to join, so an unrelated machine on the same LAN cannot connect to a private review. If a station’s connection drops briefly, it reconnects automatically and re-synchronises to the host’s current frame with no manual intervention.

Item	Detail
Review data	TCP / JSON on port 8767
Session discovery	UDP beacon on port 8768 — hosted sessions auto-listed in the Join dialog
Control model	Bi-directional, host-authoritative clock
Authentication	Per-session token required to join
Resilience	Automatic reconnect and re-sync after a dropped connection
Requirement	mh_PLAYer running on each station; Studio Pro license or trial

NOTE Synced Remote Review is a Studio Pro feature. The free browser server (19.1–19.4) remains available to all users and is independent of it — the two can run at the same time.

20. Cache System

mh_PLAYer uses a three-level frame cache to maximise playback performance. The architecture is transparent — frames are promoted automatically between levels.

Frame preloading runs in a parallel thread pool (auto-sized to CPU count – 2, maximum 8 threads). Preload order uses a centre-out priority scheme — frames near the current playhead are decoded first so playback can start sooner. EXR and raster frames decode in parallel; video frames are serialised through a shared decoder to prevent seek conflicts. A and B sources share the L1 raw cache, minimising memory use during A/B compare sessions.

Level	Type	Default Size	Description
L1	RAM (float16)	8 GB	Raw EXR data before display transform. Instant channel/display mode switching without re-decoding from disk.
L2	RAM (uint8)	16 GB	Display-ready uint8 frames after colour transform. Instant playback for frames already viewed.
L3	SSD (.npy)	20 GB	Persistent frame cache on disk. Survives app restarts. Used automatically for video pre-caching and large sequences.

Configuring the Cache

Cache sizes are configured in Preferences → Cache. L1 and L2 changes take effect on next launch; L3 changes (size and directory) apply immediately. The default SSD cache location is %TEMP%\mh_player_cache\. Change it to a dedicated SSD path for best performance.

Purging the Cache

File → Purge Cache provides three options:

- Purge RAM Cache (L1+L2) — Instant, no confirmation. Frees RAM immediately. Frames will be re-decoded on next access.
- Purge SSD Cache (L3) — Removes all cached .npy files from the SSD cache directory. Confirmation dialog shows the current cache size before proceeding.
- Purge All Caches — Clears all three levels. Confirmation shows the per-level breakdown and total size.

💡 **Tip:** Purge the SSD cache after changing display settings (EV, gamma, display mode) that affect already-cached frames. Otherwise, old cached uint8 frames with the previous settings may be used instead of re-decoding.

21. Fullscreen Mode

Press Ctrl+F to enter fullscreen presentation mode. The image fills the entire screen with no UI chrome. A semi-transparent HUD bar at the bottom shows the filename, frame number, and position. The HUD hides automatically after 2.5 seconds of mouse inactivity and reappears on mouse movement.

Key	Action in Fullscreen
Space	Play / Pause
← / →	Step frame
Home / End	First / Last frame (within In/Out range)
Esc	Exit fullscreen
Ctrl+F	Exit fullscreen
F11	Exit fullscreen
Double-click	Exit fullscreen

Fullscreen mode reads exclusively from the L2 display cache — only frames already cached are shown. For smooth fullscreen playback, allow the sequence to pre-cache (scrub or play through once) before entering fullscreen.

22. Preferences

Open Preferences from the gear button in the transport bar or from the View menu. The Preferences dialog is scrollable to accommodate all settings.

Setting	Description
Show range dialog on every open	When enabled, the Open Sequence dialog appears for every sequence. When disabled, sequences load immediately with defaults.
Auto-cache full range on load	Begin pre-caching the full sequence to L2 immediately after load.
Autoplay	Start playback automatically after a sequence is loaded.
Default FPS	Frame rate used for new sequences (overridden automatically by video files).
Colour mode on load	Default display transform applied when a new sequence is loaded. Options: sRGB, ACES Filmic, Linear, Power Gamma. EXR headers are also inspected — ACES containers are detected automatically regardless of this setting. OCIO and LUT must always be configured manually.
Show SMPTE timecode	Toggle timecode display in the frame counter. Can also be toggled by clicking the frame counter label.
Timecode start	The SMPTE timecode value at the In point. Default: 01:00:00:00.
L1 RAM (raw float16)	Size of the L1 RAM cache in GB. Takes effect on next launch. Default: 8 GB.
L2 RAM (display uint8)	Size of the L2 RAM display cache in GB. Takes effect on next launch. Default: 16 GB.
Enable SSD disk cache (L3)	Toggle the persistent SSD frame cache.
L3 SSD limit	Maximum disk space for the SSD frame cache. Applied immediately. Default: 20 GB.
Cache dir	File system path for the SSD cache. Default: %TEMP%\mh_player_cache\.
Audio output device	Playback device for audio. Applies to both image sequences and video files. Also adjustable in the sidebar AUDIO section.
Audio input device	Microphone / input device used for voice note recording. Also configurable in the sidebar AUDIO section. Persists across sessions.

Performance

The PERFORMANCE section controls the parallel preloader thread pool and sibling-AOV prefetching. Changes take effect on next launch.

Setting	Description
Decode threads	Number of threads in the parallel preloader pool (0 = auto: CPU count – 2, max 8). Increase for machines with many cores and fast NVMe storage. Decrease if the system feels unresponsive during preloading.
Preload sibling AOVs	When enabled (default), all AOVs of the target layers are decoded in one EXR pass as a sequence preloads. Switching AOVs is then instant from cache. Disable on machines with limited RAM.
Preload all layers	When enabled, every layer in a multi-layer EXR is decoded and cached on load. Off by default — enable only on machines with ample RAM when stepping through many layers.

 **Tip:** Leave Decode threads at 0 (auto) unless you have a specific reason to limit concurrency. The auto size is tuned to leave two cores free for the Qt UI and audio threads.

Preferences are saved automatically to %APPDATA%\mh_tools\mh_player_prefs.json when the application closes.

23. Keyboard Shortcut Reference

Playback

Key	Action	Notes
Space	Play / Pause	Toggle playback
J	Reverse	JKL shuttle; hold to accelerate
K	Stop	Stop at current frame
L	Forward	JKL shuttle; hold to accelerate
← / →	Step frame	Step one frame per press
Home	First frame / In	Jumps to In point if set
End	Last frame / Out	Jumps to Out point if set
` (backtick)	Toggle direction	Flip direction without stopping
Ctrl+G	Go to frame...	Dialog: enter frame number to jump to
Ctrl+Tab	Toggle sidebar	Collapse / expand the left panel
Click xN label	Playback stride	Cycle ×1→×2→×3→×4→×5→×1

In/Out & Selection

Key / Control	Action	Notes
I	Mark In	ApplicationShortcut — fires even with spinbox focused
O	Mark Out	ApplicationShortcut — fires even with spinbox focused
[button	Mark In	Frame Range Bar button, left of timeline
] button	Mark Out	Frame Range Bar button, right of timeline
START spinbox	Set / show In frame	Edit directly to set In point to any frame number
END spinbox	Set / show Out frame	Edit directly to set Out point to any frame number
× Clear In	Clear In only	Left × button — does not affect Out point
× Clear Out	Clear Out only	Right × button — does not affect In point

Shift+Drag	Set In on timeline	Drag the timeline while holding Shift
Ctrl+Drag	Set Out on timeline	Drag the timeline while holding Ctrl

Display

Key	Action	Notes
R / G / B / A	Channel isolation	Show single channel
C	Full colour	Return to RGB
V	Invert display	Useful for alpha matte checks
P	Proxy cycle	Full → ½ → ¼ → Full
F	Fit to window	
1	1:1 pixel	Native resolution (100%)
+ / -	Zoom in / out	Also: scroll wheel over canvas
Zoom combo	Zoom preset	Fit / 25% / 50% / 75% / 100% / 150% / 200%
Shift+R	Reset EV & gamma	Returns to default values
↑ / ↓	Cycle AOV	Previous / next AOV

Annotation (license required)

Key / Action	Action	Notes
N	Toggle annotation mode	
Ctrl+Z	Undo last stroke	
Delete	Clear this frame	
Shift+Delete	Clear all frames	
Ctrl+Shift+N	Save annotations	Writes .annotations.json sidecar

Compare (license required)

Key / Action	Action	Notes
[	A/B compare toggle	Freeze B frame / exit compare
View → Compare: Diff Mode	Switch Wipe / Diff	Toggle A-B difference display
COMPARE sidebar → Amplify	Diff amplification	1–32× slider; default 8×
View → Load B Source	Independent B track	Separate sequence or video

File

Key	Action	Notes
Ctrl+O	Open sequence	
Ctrl+Shift+I	Load Still Image(s)	Multi-select dialog, no sequence discovery
Ctrl+S	Save workspace	Saves to .mhplay file
Ctrl+Shift+O	Load workspace	
Ctrl+E	Export frames	License required
Ctrl+Shift+E	Export video	License required
Ctrl+Shift+C	Quick save frame	Save frame dialog (PNG/TIFF/JPEG); license required
Ctrl+Shift+A	Load audio	License required
Ctrl+C	Copy frame path	Copies full path to clipboard
Ctrl+G	Go to frame...	Jump to any frame by number

24. Stereo / Anaglyph

Stereo anaglyph compositing is a free feature — no license required. mh_PLAYer can composite stereo image pairs into a single anaglyph frame for review with colour-filtered glasses. The feature works with two separate left and right eye sequences, or with a single multi-camera EXR file that contains both eye layers. Controls are in the STEREO / ANAGLYPH sidebar section (between COMPARE and AUDIO).

24.1 Two-Sequence Mode

Two-sequence mode is the most common workflow. Load the left eye sequence normally via File → Open Sequence. Then use the Load R Eye... button in the STEREO / ANAGLYPH sidebar section to load the right eye sequence or video. This re-uses the B-source mechanism, so the right eye appears as the B track and the B Offset spinbox in the COMPARE section can be used to synchronise clips with different start frames.

- Open left eye sequence via File → Open Sequence or drag-and-drop.
- Open the STEREO / ANAGLYPH sidebar section and click Load R Eye...
- Select the right eye sequence. Any supported format is accepted: EXR, PNG, TIFF, MP4, MOV, and others.
- Check Enable Anaglyph. The canvas immediately shows the composite.
- Choose a colour mode and adjust eye swap or gamma correct as needed.

 **Tip:** Load R Eye uses the same B-source pipeline as A/B Compare. You can still drag the wipe divider or switch to Diff mode in the COMPARE section while anaglyph is disabled.

24.2 Stereo EXR Mode

Multi-camera EXR files contain both eye layers in a single file, with channel names like left.R / left.G / left.B and right.R / right.G / right.B. mh_PLAYer detects these layer pairs automatically when you use the Load Stereo EXR... button.

- Click Load Stereo EXR... in the STEREO / ANAGLYPH sidebar section.
- Select a single EXR file from the stereo sequence. mh_PLAYer discovers the full sequence automatically.
- The application inspects the channel list, identifies the left and right eye prefixes, and loads both into the canvas. Anaglyph mode is enabled automatically.

Supported naming conventions (auto-detected):

Convention	Example channels
left / right	left.R left.G left.B right.R right.G right.B
L / R	L.R L.G L.B R.R R.G R.B
Camera_L / Camera_R	Camera_L.R Camera_L.G Camera_L.B Camera_R.R ...
eye_left / eye_right	eye_left.R eye_left.G eye_left.B eye_right.R ...

leftCamera / rightCamera	leftCamera.R leftCamera.G rightCamera.R ...
Left / Right	Left.R Left.G Left.B Right.R Right.G Right.B

NOTE If mh_PLAYER cannot detect a layer pair automatically, a warning dialog lists the layer names found. Rename the channels in your renderer or compositing application to use one of the conventions above.

24.3 Anaglyph Modes

Four colour modes are available from the Mode combo in the sidebar:

Mode	Description
Red-Cyan (Half-Color)	Left eye contributes the Red channel; right eye contributes Green and Blue. Best quality for colour renders. Default.
Red-Cyan (Greyscale)	Both eyes are converted to luminance before channel assignment. Eliminates colour rivalry at the cost of removing colour information from the composite.
Amber-Blue (Half-Color)	Left eye contributes Red and Green (warm/amber); right eye contributes Blue. Alternative for environments where red-cyan glasses are unavailable.
Green-Magenta (Half-Color)	Left eye contributes Green; right eye contributes Red and Blue (magenta). Useful as an alignment aid or where red-cyan causes fatigue.

Two additional options appear as checkboxes:

Swap eyes: Reverses the left/right eye assignment. Use when the depth appears inverted (objects that should come forward appear to recede).

Gamma correct: Linearises the display values before channel mixing, then re-applies gamma after. This reduces colour fringing (crosstalk) visible on bright highlights in linear-light EXR renders. Leave unchecked for footage that has already been display-transformed.

25. EDL / Multi-Clip Timeline

Studio Pro The EDL / Multi-Clip Timeline is a Studio Pro feature. The EDL menu is always visible, but creating, editing, and playing a timeline requires a Studio Pro license (or an active Trial).

The Multi-Clip Timeline lets you assemble several sequences and video clips into a single ordered cut and review it back-to-back, exactly as it will be conformed downstream. Each entry on the timeline is a clip: a source plus an In and Out point and a label. `mh_PLAYER` plays the clips in order, applying each clip trim, so a review session can step through an entire sequence of shots without re-opening files. The timeline is stored in a small native `.mhedl` file and can be exchanged with Premiere, Avid, Resolve, Final Cut, and other tools through CMX 3600 EDL import and export.

25.1 Concepts

- **Clip** — one source (image sequence or video) with a Source In and Source Out point and a label. In and Out are frame positions within that source.
- **Timeline** — the ordered list of clips. Clips play sequentially; the timeline duration is the sum of the trimmed clip lengths.
- **Playhead** — the cyan marker on the track view showing the current position during playback.
- `.mhedl` — the native timeline file. It stores the clip list, per-clip trims, labels, and the timeline frame rate.

NOTE Timeline timecode is drop-frame-correct at 29.97 and 59.94 fps and non-drop at all other rates, matching the SMPTE convention used by broadcast NLEs. See §14 for the HUD timecode display.

25.2 Building a Timeline

There are two ways to create a timeline:

From scratch: `EDL → New EDL` starts an empty timeline. Open a source, set In and Out with the I and O keys, then add it as a clip. Repeat for each shot.

From a Playlist: If you have already queued shots in the Playlist (§11), choose `Playlist → Send Playlist to Timeline (EDL)...` The current playlist order and every per-shot trim are carried straight onto the timeline, and the EDL Editor opens ready to refine.

 **Tip:** `Send Playlist to Timeline` is the fastest way to start. Build and reorder the review in the Playlist, set rough In/Out trims per shot, then send the whole thing to the timeline in one step.

25.3 The EDL Editor

`EDL → EDL Editor...` opens the timeline editor. The editor is non-modal: it stays open while you play and scrub, so you can adjust the cut and watch the result without closing and re-opening it. A live cyan playhead tracks playback across the track view in real time.

The editor shows the clip list and a horizontal track view. You can edit the cut directly:

- Drag-to-reorder — drag a clip block left or right in the track view to change its position in the cut. An amber drop-line shows where it will land.
- Trim handles — hover the left or right edge of a clip block; the cursor changes to a resize arrow. Drag to adjust that clip In or Out point. The trim is clamped so In never passes Out.
- Right-click a clip for quick actions, including removing it from the timeline.

NOTE Edits in the editor update the timeline immediately and mark it modified (an asterisk on the title). Save with EDL → Save EDL when you are happy with the cut.

25.4 Timeline Playback

Turn the timeline on with EDL → Activate EDL Playback. With playback active, pressing Play runs through the clips in order, auto-advancing from one clip to the next at each trimmed Out point. Three behaviours make review smooth:

Loop EDL Playback: EDL → Loop EDL Playback wraps from the last clip back to the first for continuous review.

Next-clip preload: shortly before each cut, mh_PLAYER warms the next source into the operating-system cache on a background thread, so the cut is seamless rather than stalling on disk I/O.

Grade persistence: EV, gamma, and CDL grade carry across cuts as you set them, so a look applied for review is not reset at every clip boundary.

 **Tip** If a clip source is offline (renamed or moved), playback skips it and the status bar reports the missing source. Re-link by editing the clip or re-importing the EDL.

25.5 CMX 3600 Interchange

The timeline round-trips with standard non-linear editors through the CMX 3600 EDL format:

- EDL → Export CMX3600 .edl... writes a CMX 3600 list of the current timeline, including record-side timecode and per-event source names.
- EDL → Import CMX3600 .edl... reads a CMX 3600 list and rebuilds the timeline from it.

Frame rates of 29.97 and 59.94 fps are written and read as drop-frame, with the correct FCM: DROP FRAME header and semicolon timecode separator; all other rates use non-drop colon-separated timecode. This matches how Premiere, Avid, and Resolve interpret NTSC EDLs, so timeline positions stay frame-accurate across the round-trip.

NOTE A custom comment line preserves each clip trim so a timeline re-imported into mh_PLAYER is identical to the one exported. Other tools ignore that comment and read the standard event records as normal.

25.6 Headless Rendering

A timeline can be rendered to a flat movie or image sequence from the command line, with no GUI, for farm and batch use:

```
mh_player --convert cut.mhed1 review.mp4
```

mh_PLAYer concatenates the clips in order, applies each trim, and runs the result through the standard convert pipeline — so display transform, EV, gamma, burn-in, and codec flags all apply to the rendered cut. See Appendix A for the full command line reference.

26. Plugins

Studio Pro Plugin Scripting is a Studio Pro feature. Plugins load only with a Studio Pro license (or an active Trial).

mh_PLAYer can load small Python plugins that extend the player — adding menu commands, reacting to playback and export events, and querying player state through a stable API. Plugins are ideal for pipeline glue: writing a review note to a tracker, copying the current frame path to the clipboard, posting to a chat channel when an export finishes, and similar studio-specific tasks.

26.1 The plugins Folder

On launch mh_PLAYer scans a single folder named plugins next to the application: in a release build this is the folder containing the exe; the folder is created automatically on first run. Every .py file in that folder (except names beginning with an underscore or a dot) is imported once at startup. mh_PLAYer ships six ready-to-use Studio Pro plugins in this folder, plus example_plugin.py as a reference for writing your own. Each plugin has its own README in the same folder.

Bundled plugin	What it does
Studio Watermark	Stamp a logo or title PNG onto a folder of rendered frames — opacity, scale, 9-point position or tiled, with a live preview. Originals are never modified.
Field Recorder	Capture a live HDMI / USB device to disk as H.264 (MP4 / MOV) or ProRes 422, with optional audio and a preview mirror. Uses the bundled FFmpeg.
Contact Sheet	Labelled thumbnail grid from a folder of frames, or scan a video for cuts to get one thumbnail per shot. Outputs PNG plus an optional multi-page PDF.
Colour Palette	Dominant colours from an image, a folder, or every shot in a video, as labelled swatches with hex, RGB and coverage. Exports TXT / JSON / CSS.
Colour Theme	Movie-barcode image of a whole shot, sequence or feature — one stripe per sampled frame, in AVERAGE (flat colour) or SQUEEZE (keeps vertical structure) style. Outputs PNG.
Test Patterns	SMPTE RP 219, SMPTE split-field, EBU 100% / 75% bars, grey ramp and staircase, at any resolution. PNG / TIFF / JPEG including 16-bit TIFF.

```
mh_PLAYer\  
  mh_PLAYer_Win_x64_v2_12_#.exe  
  plugins\  
    studio_watermark.py    <- bundled Studio Pro plugins  
    field_recorder.py  
    contact_sheet.py  
    colour_palette.py  
    colour_theme.py
```

```
test_patterns.py
example_plugin.py      <- reference plugin
README_Example_Plugin.txt  <- plus one README per plugin
my_tracker_note.py     <- drop your own plugins here
```

26.2 Writing a Plugin

A plugin is a plain Python module. It imports the injected `mh_player_api` module and registers whatever it needs at import time. The API surface is documented in full in Appendix B.

```
import mh_player_api as mh

def _save_note():
    path = mh.get_current_path()
    frame = mh.get_current_frame_number()
    mh.log(f"note: {path} @ frame {frame}")
    mh.notify("Review note logged")

# Add a command to the Plugins menu
mh.register_menu_item("Log Review Note", _save_note)

# React to events
def _on_open(path):
    mh.log(f"opened {path}")

mh.on_open_file(_on_open)
```

 **Caution** `on_frame_change` fires up to 60 times per second during playback. Keep its callback cheap, or throttle heavy work, or playback will stutter.

26.3 Enabling & Diagnosing Plugins

- Plugins load automatically on startup when a Studio Pro license is active. The Plugins menu lists every command a plugin registered.
- Each successfully loaded plugin prints a line to the log; a plugin that raises during import is reported with its error and skipped, so one broken plugin never prevents the others from loading.
- Plugins are imported once at startup, so edits to a plugin file take effect after Plugins → Reload Plugins, or a restart.
- Plugins → Open Plugins Folder... opens the folder itself, and Plugins → About Plugin API... reports the folder path, the API version, and which plugins are loaded.
- The bundled plugins are refreshed when you re-extract the ZIP or run the installer, so copy one under a new name before editing it. Newer or corrected copies are published at anti-matter-3d.com/mhplayer/ between releases.

 **Tip:** Start from the bundled `example_plugin.py` — copy it, rename it, and edit. See Appendix B for the complete API reference, including state queries, playback control, and the event hooks.

27. License

mh_PLAYER is proprietary software. All rights reserved. © 2026 Martin P. Heigan / mh_vfx_tools.

Permitted Use

- mh_PLAYER may be used for commercial and personal production work on licensed machines.
- The application may be installed on multiple machines for the same licensee (Individual license: MAC-bound to one machine; Studio license: organisation-wide).
- The compiled .exe build may be distributed internally within a licensed organisation.

Restrictions

- Redistribution or resale of mh_PLAYER is not permitted.
- Reverse engineering, decompiling, or modifying the application is not permitted.
- The license file (license.dat) may not be shared or transferred to another machine.

Third-Party Components

mh_PLAYER is built on open-source components. The following libraries are used and are governed by their respective licenses:

- PySide6 — LGPL v3 (Qt for Python). Qt Company.
- NumPy — BSD 3-Clause.
- Pillow — PIL License (HPND).
- OpenCV (cv2) — Apache 2.0.
- OpenEXR / Imath — BSD 3-Clause. Academy Software Foundation.
- sounddevice / soundfile — MIT / BSD.
- PyOpenColorIO — BSD 3-Clause. Academy Software Foundation.
- FFmpeg — LGPL v2.1+ / GPL v2+ (bundled build). Full license at <https://ffmpeg.org/legal.html>

The full text of applicable open-source licenses is available on request at anti-matter-3d.com.

Appendix A — Command Line Interface

A.1 Overview

mh_PLAYer ships in a single exe with three operating modes, selected by the first argument:

Mode	Description
(no flag)	Viewer mode — launch the GUI player, optionally pre-loading a file.
--convert	Headless convert — render an image sequence to video without opening a GUI.
--check	Headless QC — validate a sequence and exit with a status code. No GUI.

All modes share the same sequence notation for specifying file ranges.

A.2 Sequence Notation

Sequences are specified in four equivalent ways:

Notation	Meaning
beauty.####.exr	All frames matching the pattern in the same folder
beauty.1001-1250.exr	Explicit frame range 1001 to 1250
beauty.1001.exr	Auto-discover the full sequence from this frame
/path/to/folder/	All image files in the folder (sorted by name)

A.3 Viewer Mode Reference

Launch the GUI and optionally pre-load a file or configure display settings:

```
mh_PLAYER [sequence] [options]
```

Options:

--ev FLOAT	Exposure value on launch (e.g. --ev 1.5)
--gamma FLOAT	Display gamma on launch (e.g. --gamma 2.2)
--display MODE	Display transform: srgb aces linear gamma lut ocio
--fps FLOAT	Playback frame rate
-n INT	Load stride (every Nth frame)
--proxy INT	Proxy level 0=full 1=half 2=quarter
--fullscreen	Launch in fullscreen mode
--autoplay	Start playback immediately after load
--ocio PATH	OCIO config file path
--lut PATH	Display LUT file (.cube or .3dl)
--source-lut PATH	Source / look LUT, applied in scene-linear before the display transform

A.4 Convert Mode Reference

Headless encode — no GUI opens. Returns exit code 0 on success, non-zero on failure.

```
mh_PLAYER --convert sequence output.[mp4|mov] [options]
```

Options:

```
--fps FLOAT      Output frame rate (default: 24)
--codec STR      h264|h265|prores (default: h264)
--crf INT        CRF quality for h264/h265 (default: 18)
--ev FLOAT       Exposure adjustment
--display MODE   Display transform applied to output
--stride INT     Frame stride (skip every N-1 frames)
--range A B      Export only frames A to B (inclusive)
```

Anaglyph stereo (combine with above options):

```
--anaglyph      Enable anaglyph compositing
--right-eye FILE Right eye sequence (two-sequence mode)
--stereo-exr     Input is a single multi-camera EXR
--anaglyph-mode M rc_half|rc_grey|ab_half|gm_half (default: rc_half)
--eye-swap       Swap left/right eye assignment
--anaglyph-gamma Linearise before mix, re-gamma after
```

Aspect ratio correction (works with all output formats):

```
--ar FLOAT      Display aspect ratio (e.g. 2.39, 1.85, 1.778).
                 Resizes output to the correct display geometry.
                 0.0 = pixel ratio, no correction (default).
```

A.5 Check Mode Reference

Headless QC — validates the sequence and exits. Useful for pipeline integration.

```
mh_PLAYER --check sequence [options]
```

Options:

```
--strict        Fail on any missing frame (default: warn)
--no-header      Skip EXR header validation
```

A.6 Named FPS Values

Name	Value
film	24
ntsc	29.97
pal	25
ntsc_hd	59.94
pal_hd	50

A.7 Pipeline Examples

Quick daily review export:

```
mh_PLAYER --convert beauty.####.exr daily_v003.mp4 --fps 24 --ev 0.5 --display acs
```

Pre-flight check before delivery:

```
mh_PLAYER --check beauty.####.exr --strict
```

Launch viewer on a specific frame with ACES display:

```
mh_PLAYER beauty.1023.exr --display acs --autoplay
```

Anamorphic Scope source — bake 2.39:1 display geometry into the review MP4:

```
mh_PLAYER --convert --ar 2.39 --display acs beauty.####.exr review_scope.mp4
```

Anaglyph convert with AR correction for anamorphic stereo:

```
mh_PLAYER --convert --anaglyph --ar 2.39 left.####.exr --right-eye right.####.exr  
anaglyph_scope.mp4
```

A.8 Nuke Flipbook Integration

The `mh_player_nuke.py` script registers `mh_PLAYER` as a custom flipbook application in Nuke. Place it in your `.nuke` folder or `NUKE_PATH` location and add to `init.py`:

```
import mh_player_nuke
```

When you run a flipbook in Nuke (Ctrl+F or Render → Flipbook), `mh_PLAYER` launches automatically with the rendered frames pre-loaded. The `$OCIO` environment variable is passed through from Nuke's session, enabling the OCIO mode automatically when a config is active.

A.9 Exit Codes

Code	Meaning
0	Success — sequence valid, conversion complete, or viewer closed normally.
1	General error — invalid arguments, file not found, or encode failure.
2	Sequence error — missing frames detected (--check --strict mode).
3	License error — feature requires a valid license.

A.10 Adding mh_PLAYER to PATH

To use `mh_PLAYER` from any terminal without typing the full path to the exe, the application directory must be on the system PATH. Use Help → CLI PATH Setup... to manage this safely from inside the application.

Control	Description
Add to PATH	Appends the mh_PLAYEr directory to the current user PATH (HKCU\\Environment). No administrator rights or UAC prompt required.
Remove from PATH	Removes the entry. Use when moving the installation folder or uninstalling.
Status indicator	The dialog reads the registry on open and shows green ✓ if already present, amber X if not.

After adding to PATH, open a new terminal and verify the entry is visible:

```
# PowerShell
$env:PATH -split ";" | Select-String "mh_PLAYEr"

# cmd
echo %PATH%
```

 **Tip:** Only user-level PATH (HKCU\\Environment) is modified — never the system-wide HKLM PATH. Any already-open terminals must be restarted to see the change; new terminals opened after adding will find mh_PLAYEr immediately.

 **If you move the mh_PLAYEr folder to a new location, use Remove from PATH followed by Add to PATH to update the entry. A stale PATH entry pointing to a moved folder is harmless but will cause “mh_PLAYEr is not recognised” errors until corrected.**

A.11 Anaglyph Convert Examples

The --anaglyph flag adds stereo compositing to the headless convert pipeline. The same four colour modes and display transforms available in the GUI are available from the CLI.

Two-sequence mode — left and right eye as separate sequences:

```
mh_PLAYEr --convert --anaglyph \
  left.####.exr \
  --right-eye right.####.exr \
  anaglyph_review.mp4
```

With ACES display transform and gamma correction:

```
mh_PLAYEr --convert --anaglyph --display acs --anaglyph-gamma \
  left.####.exr --right-eye right.####.exr anaglyph.mp4
```

Greyscale Red-Cyan — minimum ghosting, no colour:

```
mh_PLAYEr --convert --anaglyph --anaglyph-mode rc_grey \
  left.####.exr --right-eye right.####.exr review.mp4
```

Single stereo EXR sequence with auto-detected layer pairs:

```
mh_PLAYER --convert --anaglyph --stereo-exr \  
camera_stereo.####.exr anaglyph.mp4
```

Export as an anaglyph image sequence (PNG) instead of video:

```
mh_PLAYER --convert --anaglyph \  
left.####.exr --right-eye right.####.exr \  
anaglyph.####.png
```

 **Tip:** Use `--eye-swap` if the depth appears inverted. Use `--anaglyph-gamma` for linear EXR sources to reduce colour fringing on bright highlights. Both flags work identically in GUI and CLI mode.

A.12 EDL, Playlist & Headless Timeline Render

Beyond image sequences and video files, the CLI accepts timeline (.mhedl) and playlist (.m3u8 / .m3u) files in both viewer and convert modes (Studio Pro for .mhedl).

Open a saved timeline in the viewer and start playing it:

```
mh_player cut.mhedl --play
```

Open a playlist (M3U / M3U8) in the viewer — per-shot trims written by mh_PLAYER are honoured:

```
mh_player review.m3u8 --play
```

Render a timeline headlessly to a movie — clips are concatenated in order with their trims, then run through the standard convert pipeline:

```
mh_player --convert cut.mhedl review.mp4  
  
# with a display transform, burn-in, and a chosen codec  
mh_player --convert cut.mhedl review.mov \  
--display aces --burnin --codec prores
```

A timeline can also be rendered to an image sequence by giving a sequence output path:

```
mh_player --convert cut.mhedl out/cut.####.png
```

NOTE Image-sequence source clips are read directly; video source clips are frame-extracted first, so mixed-source timelines render correctly. A missing or unreadable clip is warned and skipped, and the process returns a partial-success exit code (1) so batch scripts can detect it.

 **Tip:** Burn-in timecode in `--convert` is drop-frame-correct at 29.97 and 59.94 fps, matching the timeline and HUD timecode.

Appendix B — Plugin API

Plugins (§26) import a module named `mh_player_api`, injected by `mh_PLAYER` before any plugin loads. This appendix documents the full surface. The API is versioned; `mh.api_version` is a (major, minor) tuple — the major number increases only on a breaking change, the minor on additive changes. `mh.player_version` is the running `mh_PLAYER` version string.

B.1 State Queries

All queries are read-only and safe to call at any time. They return plain Python types so a plugin needs nothing beyond the standard library.

Function	Returns	Description
<code>get_current_frame()</code>	<code>int</code>	Current frame index within the active sequence or clip (0-based).
<code>get_current_frame_number()</code>	<code>int</code>	Actual frame number of the current frame (the sequence frame number, e.g. 1001).
<code>get_sequence()</code>	<code>list[str]</code>	Ordered list of file paths in the active sequence.
<code>get_current_path()</code>	<code>str</code> <code>None</code>	Path of the current frame file, or <code>None</code> .
<code>get_video_path()</code>	<code>str</code> <code>None</code>	Path of the loaded video file, or <code>None</code> for an image sequence.
<code>get_fps()</code>	<code>float</code>	Current playback frame rate.
<code>get_in_out()</code>	<code>(int, int)</code>	Current In and Out frame numbers.
<code>get_ev()</code>	<code>float</code>	Current exposure (EV) value.
<code>get_gamma()</code>	<code>float</code>	Current gamma value.
<code>get_display_mode()</code>	<code>str</code>	Active display transform key (e.g. "srgb", "aces", "ocio").
<code>get_proxy()</code>	<code>int</code>	Active proxy / downscale level (1 = full resolution).
<code>get_playlist()</code>	<code>list[dict]</code>	Playlist entries: each dict has path, label, in, out.
<code>get_edl()</code>	<code>dict</code> <code>None</code>	Active timeline as a dict (name, fps, clips[]), or <code>None</code> .
<code>is_edl_active()</code>	<code>bool</code>	True when timeline playback is active.

B.2 Playback Control

Function	Description
<code>goto_frame(n)</code>	Jump to frame number <code>n</code> .
<code>play()</code>	Start playback.
<code>pause()</code>	Pause playback.
<code>stop()</code>	Stop playback and return to the In point.
<code>open_file(path)</code>	Open a file or sequence by path, as if dropped onto the window.

B.3 UI & Logging

Function	Description
<code>register_menu_item(label, callback)</code>	Add an entry to the Plugins menu. The callback takes no arguments.
<code>log(msg, level="info")</code>	Write a message to the player log (prefixed for plugins).
<code>notify(msg, timeout_ms=3000)</code>	Show a transient message in the status bar.

B.4 Event Hooks

Register a callback to be notified when something happens. A hook may be registered more than once; all callbacks fire.

Hook	Callback signature & when it fires
<code>on_frame_change(cb)</code>	<code>cb(frame_idx: int, frame_path: str)</code> — on every displayed frame. Fires up to 60×/second; keep it cheap.
<code>on_open_file(cb)</code>	<code>cb(path: str)</code> — when a new file or sequence is opened.
<code>on_export_complete(cb)</code>	<code>cb(out_path: str)</code> — when an export job finishes.

B.5 Versioning

- `mh.api_version` — (major, minor) tuple. This release is (1, 1).
- `mh.player_version` — the running `mh_PLAYER` version string.
- Guard against API drift by checking `mh.api_version[0]` at import time if your plugin relies on a specific major version.

 **Tip:** Everything a plugin can do is in this appendix. If you need a capability that is not here, it is not yet exposed — request it, rather than reaching into player internals, which are not a stable interface.