



Playback Pi™

Installation & Operator Guide

Release v3.0

Movie System Show Controller for Raspberry Pi

FOR THE TECHNICIAN

This document covers: what the app does, hardware requirements, OS re-flash, installation, media setup, operator use, and troubleshooting.

The Pi was previously used for another project — a full re-flash is required.

1 WHAT IS Playback Pi?

Playback Pi™ is a cinema show controller that runs on a Raspberry Pi. A small touchscreen attached to the Pi gives the projectionist a simple, purpose-built interface to manage the entire evening — from pre-show music through to post-show credits — without touching a keyboard or mouse.

What it controls

- Pre-show loop — a silent sponsor reel on screen while a background music playlist loops for the audience as they arrive.
- Intro & Countdown — announcements that start instantly at 100% volume; the background music automatically “ducks” (drops low) underneath them.
- Feature Film — with file validation before every screening. Background music stops for the film.
- Sponsor Thank You — plays automatically after the feature film.
- Post-Show Loop — starts automatically; sponsor reel + background music until the operator ends the night.
- Fades are tuned per stage: announcements start with no gap, while leaving or pausing the music stages fades out over a graceful 10 seconds.

Operator interface tabs

Tab	What it does
PREP	Step-by-step checklist before every show: check for updated files, validate the film, detect geometry, align the test pattern, adjust corner-pin warp, confirm PA audio. All six steps must be green before the show can start.
SHOW	Live playback control: Play/Pause, Next, Back, volume. Shows now-playing title, elapsed time, and current stage.
SETUP	Configuration and tools — seven sections, each opened as a full-screen panel: MEDIA (DVD rip, file transfer, upload), VALIDATION, VOLUME DEFAULTS, MUSIC DUCKING, GEOMETRY, SWAP DISPLAYS, and TRACK PREVIEW.
DIAG	Diagnostics: engine status, disk space, display config, recent errors, RTC clock.

Show stages and default volumes

Stage	Volume / Behaviour
Test Pattern	100% — used for geometry alignment only; not part of the show flow
Pre-Show	50% — silent sponsor reel + looping background music until the operator starts the show

Stage	Volume / Behaviour
Showtime — Intro & Countdown	100% — plays once; starts instantly while the background music ducks underneath
Showtime — Feature Film	100% — plays once; background music stops; advances automatically when credits end
Sponsor Thank You	100% — plays once automatically after the feature film
Post-Show	50% — sponsor reel + background music, loops until stopped; pausing fades out over 10 seconds

Default volumes and the music duck level can be changed on the SETUP screen without editing any files.

2 HARDWARE REQUIREMENTS

Item	Specification
Raspberry Pi	Pi 4 or Pi 5 — 4 GB RAM minimum
Operator display	7" DSI touchscreen (800×480) connected via ribbon cable to DSI-1
Projector output	HDMI-A-1 — first HDMI port on the Pi
Audio	USB audio interface, HDMI audio, or 3.5 mm jack to PA mixer
Storage	64 GB SD card or larger recommended — media files are large
Network	Wi-Fi or Ethernet (for initial SSH setup and browser access)

Display wiring

The touchscreen is the operator's control surface. The projector only ever shows black or video — never the desktop. The installer configures both outputs automatically.

⚠ IMPORTANT — The Pi was previously flashed with 'Payoutbee' software. Do NOT skip Step 1 (re-flash). Starting from a dirty OS will cause unpredictable failures.

3 INSTALLATION

Step 1 — Re-flash the SD card

Do this on a laptop or desktop, not on the Pi.

- Download Raspberry Pi Imager from: <https://www.raspberrypi.com/software/>
- Insert the SD card into your laptop.
- Open Imager → “Choose OS” → Raspberry Pi OS (64-bit) — select the full Desktop version.
- Click the pencil/gear icon before writing and set: Hostname: playback-pi · Enable SSH (password authentication) · Username: pi with a password you write down · your venue Wi-Fi SSID and password.
- Click “Write”. Insert the card into the Pi and power it on.
- Wait about 90 seconds for first boot. Find the Pi's IP address from your router admin page, or run: `ping playback-pi.local`

⚠ IMPORTANT — Do NOT skip the re-flash. The Pi was previously used for a different application. Starting from a dirty OS will cause unpredictable failures.

Step 2 — Copy the app to the Pi

From your laptop on the same Wi-Fi network as the Pi:

```
scp playback-pi.zip pi@<PI_IP_ADDRESS>:~/
```

Then SSH into the Pi and unzip:

```
ssh pi@<PI_IP_ADDRESS>
cd ~
unzip playback-pi.zip
```

This creates ~/playback-pi/ on the Pi. Alternative: copy playback-pi.zip to a USB stick and unzip on the Pi directly.

Step 3 — Run the automated installer

```
cd ~/playback-pi
bash install.sh
```

The installer will:

- Install VLC, ffmpeg, Python 3, Chromium, and support tools
- Create a Python virtual environment and install all app dependencies
- Verify the media folder structure and add README.txt guides in each folder
- Register two systemd services that start automatically on every boot: playback-pi (the show controller) and playback-pi-kiosk (Chromium full-screen kiosk on the touchscreen)
- Start the controller immediately and print the access URL

When complete, you should see:

```
✓ Playback Pi™ is running.
  Open the operator interface at:
```

```
http://<PI_IP>:8080
```

If you see a failure, check the logs:

```
sudo journalctl -u playback-pi -n 50
```

Starting with v2.17, once the app is installed you can apply all future updates from the operator interface — no terminal, no file copying. Press FIRMWARE in the footer, then CHECK FOR UPDATE. See Section 6 (Keeping the Software Current) for the full procedure.

4 LOADING YOUR MEDIA FILES

This is the most important setup step. The app reads media using exact filenames from specific folders. Use the names below exactly — including the three-digit prefix. A README.txt file inside each folder repeats these instructions.

Required folder structure and filenames

```
~/playback-pi/media/
|
├─ 00-test-pattern/           ← AUTO-GENERATED – do not add files here
|
├─ 10-pre-show/
|   └─ 010-pre-show-roll.mp4   ← silent sponsor reel (pre-show)
|
├─ 20-showtime/
|   ├── 010-sponsor-introduction.mp4 ← sponsor intro announcement
|   ├── 015-countdown.mp4        ← countdown to the feature
|   └─ 020-feature-film.mp4      ← feature film (DRM-free)
|
├─ 25-sponsor-thanks/
|   └─ 010-sponsor-thank-you.mp4 ← sponsor thank-you (after film)
|
├─ 30-post-show/
|   └─ 010-post-show-loop.mp4    ← silent sponsor reel (post-show)
|
└─ music-library/              ← background music (.wav / .mp3)
    └─ (your ambient tracks)
```

Background music (music-library folder)

The sponsor reels are silent by design — during Pre-Show and Post-Show the audience hears the tracks in music-library/, looping continuously as an ambient bed. The music automatically ducks under announcements and stops for the feature film. The playlist is defined in config/show.json under “backgroundMusic” — the filenames listed there must match the files in the folder. If a listed file is missing, it is skipped (check DIAG / logs if you expect music and hear none).

The zip ships with empty media folders — each contains a README.txt explaining exactly what goes inside. Copy the real event media in, keeping filenames exact. For a full dry-run before the real media arrives, scripts/generate-sample-media.sh creates small placeholder files for any that are missing.

⚠ IMPORTANT — The feature film must be a DRM-free video file (MP4, MKV, etc.). DRM-protected files will fail validation and cannot be screened.

After copying your media files

Restart the service so the app picks up the new files:

```
sudo systemctl restart playback-pi
```

Recommended media format

Property	Recommendation
Container	MP4 (preferred) or MKV
Video codec	H.264 at or below projector resolution (e.g. 1920×1080)
Audio codec	AAC or MP3
Music files	.wav or .mp3 in media/music-library/
DRM	Must be DRM-free — protected files fail validation and cannot play

After replacing the feature film: run DETECT BARS on the SETUP tab so the projector geometry updates for the new film's aspect ratio, then press SAVE & APPLY.

5 OPENING THE OPERATOR INTERFACE

From any device on the network

Open a browser and navigate to:

```
http://<PI_IP_ADDRESS>:8080
```

From the Pi's own touchscreen

After a reboot, Chromium opens automatically in full-screen kiosk mode and loads the operator interface. No action is needed. If you need to open it manually:

```
http://localhost:8080
```

Service management

Command	What it does
<code>sudo systemctl status playback-pi</code>	Check if the app is running
<code>sudo systemctl restart playback-pi</code>	Restart (do this after adding/replacing media)
<code>sudo systemctl stop playback-pi</code>	Stop the app
<code>sudo journalctl -u playback-pi -f</code>	Watch live logs in real time
<code>sudo journalctl -u playback-pi -n 50</code>	See the last 50 log lines

6 KEEPING THE SOFTWARE CURRENT

Starting with v2.17, you can update the show controller's firmware directly from the operator interface — no terminal, no file copying, no laptop. Do this in the studio while the Pi has internet access, before heading to the venue.

How to update (v2.18 and later)

- Make sure the Pi is connected to your studio Wi-Fi.
- Open the operator interface in any browser on the same network (or on the Pi's own touchscreen).
- Press FIRMWARE in the footer. A panel opens showing the installed version and the version available on the production server.
- Press CHECK FOR UPDATE.
- If a newer version is available, press UPDATE NOW.
- A progress bar tracks the download. When it completes, the show controller restarts automatically.
- The console reconnects and confirms the new version. Done.

Total time: approximately 3-5 minutes, unattended after pressing UPDATE NOW.

A red UPDATE badge appears on the FIRMWARE button automatically whenever a newer version is available. You do not need to check manually — the console checks for you each time it loads.

What is updated automatically

Updated	Not touched
App code and all features	Show configuration (config/)
Operator interface (HTML/CSS/JS)	Geometry calibration
Python dependencies	Media files
Scripts, playlists, and docs	Validation history

Safety interlocks

- The update is refused if a live show is in progress (anything other than Test Pattern). Return to Test Pattern first.
- The firmware zip is fully downloaded and verified before a single existing file is changed.
- The current app is backed up before the swap. If the service fails to start after the update, the previous version is restored automatically.

IMPORTANT — v2.17 requires a manual install

Because the self-update feature is new in v2.17, this version must be installed manually using the standard procedure (Steps 2-3 above). Every release after v2.17 can be applied with the

two-button UPDATE flow.

⚠ IMPORTANT — Do the v2.17 manual install while you are in the studio with a network connection and a laptop available. Once it is done, you will never need to do it again.

Manual update fallback (if the one-button update fails)

If the automatic update fails (network outage, server unavailable), the Pi's existing software is untouched — the rollback is automatic. You can always fall back to the manual process:

```
scp playback-pi-vX.XX.zip pi@<PI_IP>:~/  
ssh pi@<PI_IP>  
cd ~ && rm -rf playback-pi  
unzip playback-pi-vX.XX.zip  
cd playback-pi && bash install.sh
```

A plain Download zip link is also available inside the FIRMWARE panel for exactly this purpose.

7 SYSTEM CONFIGURATION

Hardware settings live in `~/playback-pi/config/system.json`. Edit with any text editor, then restart the service.

```
{
  "engine": "auto",
  "touchDisplay": "DSI-1",
  "projectorDisplay": "HDMI-A-1",
  "touchResolution": "800x480",
  "projectorResolution": "1920x1080",
  "audioOutput": "configured-audio-device",
  "defaultVolume": 75,
  "showtimeHoldSeconds": 1.5,
  "fadeInSeconds": 7,
  "fadeOutSeconds": 7,
  "autoStartPostShow": true,
  "requireFeatureValidation": true,
  "musicDuckingPercent": 25
}
```

Key	Description
engine	Leave as “auto” — uses VLC on the Pi, simulator elsewhere
touchDisplay	xrandr name of the touchscreen (run: xrandr to list displays)
projectorDisplay	xrandr name of the HDMI projector output
touchResolution	Touch display resolution — 800x480 for the official 7" DSI screen
projectorResolution	Native projector resolution (match your projector's specs)
audioOutput	Leave as “configured-audio-device” — the Pi's headphone jack is auto-detected and used by default; set an ALSA device string only to override
defaultVolume	System-wide fallback volume (0-100). Per-stage defaults override this.
showtimeHoldSeconds	How long PLAY/PAUSE must be held during Showtime (safety lock)
fadeInSeconds / fadeOutSeconds	System-wide fade defaults. Stages override these in config/show.json — the music stages fade out over 10 s and announcements start instantly; those overrides are already set.
autoStartPostShow	true = post-show loop starts automatically after Sponsor Thank You
requireFeatureValidation	Keep true — blocks Showtime until the film passes FULL CHECK

Key	Description
musicDuckingPercent	How loud the background music stays under announcements — also adjustable on the SETUP tab (MUSIC DUCKING)

Volumes, ducking and fades

Per-stage volumes and the MUSIC DUCKING level are adjusted on the SETUP screen — no file editing needed. Fade lengths are tuned per stage in config/show.json and are already set for the show:

Setting	Behaviour
Pre-Show / Post-Show	50% ambient level; leaving or pausing these stages fades out over 10 seconds
Intro / Countdown / Feature / Thank You	100% full cinema volume
Announcement start	Instant — no fade gap; background music ducks underneath
MUSIC DUCKING (SETUP tab)	How far the background music drops under announcements

8 PRE-SHOW PREP WALKTHROUGH

The PREP tab walks the operator through six steps before every screening. All six must show a green checkmark before the SHOW tab allows the show to start.

Step	Action required
1. Check for updated files	Asks the media server whether any show files (announcements, music, sponsor reels) were replaced since the last download. Press CHECK — a clean result confirms the step automatically. If new files are available, press DOWNLOAD to fetch them. The feature film is never changed this way.
2. Validate feature film	Reads the film file end-to-end and confirms it plays without errors. Catches corrupted files, bad rips, and DRM-locked content. Press FULL CHECK — takes a few minutes. Must pass every event.
3. Projector geometry	Detects black bars in the film and sets the crop so the projected image fills the screen correctly. Press DETECT BARS to scan the film, then SAVE & APPLY.
4. Test pattern aligned	Sends a white grid border to the projector so you can physically confirm the image is correctly aligned to the screen. Press REBUILD (if needed), then SEND to display it. Press DOWNLOAD to save a copy for reference. Align, then press CONFIRM.
5. Corner pin	Corrects keystone (image tilt or skew). Press ADJUST to open the corner-pin editor and drag the four corners to match the screen edges, then press DONE.
6. Audio audible at PA	Press TEST AUDIO — a tone, spoken test message, and beep play through the system. Confirm sound reaches the PA speakers, then press CONFIRM.

Once all six steps are green

The banner turns green and reads READY TO SHOW. Switch to the SHOW tab to start the evening. Prep confirmations are stored for up to 6 hours. If you re-open the app the same day, you do not need to redo them. Press RESET CHECKLIST to clear them and start fresh.

9 RUNNING THE SHOW

Typical show flow

Event	What happens
Pre-show starts	Switch to SHOW tab. Silent sponsor reel plays with the background music looping at 50%. When ready: tap NEXT — the stage badge shows WAITING. Then hold PLAY for 1.5 s to confirm.
Intro & Countdown	Starts INSTANTLY at 100% — the background music ducks underneath the announcement. Countdown follows automatically.
Feature Film	Follows the countdown automatically. Background music stops. Plays at 100% volume.
Sponsor Thank You	Starts automatically when the feature film ends. Plays at 100% with the music returning softly underneath.
Post-Show	Starts automatically. Sponsor reel + background music loop at 50% until the operator ends the night.
End of night	Tap PAUSE during Post-Show — everything fades out over a graceful 10 seconds. Then shut down (see docs/SAFE-SHUTDOWN.md).

SHOW tab controls

Control	Behaviour
NEXT (tap)	Steps the up-next cue FORWARD through the lineup. Tap repeatedly to cue further ahead — the stage badge shows WAITING and the cued title is highlighted. Audio keeps playing; nothing changes yet.
BACK (tap)	Steps the cue BACKWARD through the lineup. Stepping back onto what is currently playing cancels the cue (WAITING clears).
PLAY (hold 1.5 s)	Fires the cued transition. Announcements start instantly with the music ducking under them; the feature follows its countdown automatically.
PLAY / PAUSE (tap)	During Pre-Show or Post-Show: starts a gentle 10-second fade-down, then pauses — tap again during the fade to cancel and bring the music back up. During Showtime: hold 1.5 s required (safety lock).
Volume slider	Adjusts live volume immediately. On the music stages it controls the music bed.

Safety: tapping NEXT or BACK alone never changes what is playing — WAITING is just a queue. The

transition only happens when you hold PLAY for 1.5 seconds. This prevents accidental transitions from a bump or mis-touch.

10 TROUBLESHOOTING

Page won't load in browser

Check the service is running: `sudo systemctl status playback-pi`

If stopped, start it: `sudo systemctl start playback-pi`

“Simulator engine” shown in DIAG (on the real Pi)

VLC Python bindings are missing. Run inside the app venv:

`~/playback-pi/.venv/bin/pip install python-vlc`

`sudo systemctl restart playback-pi`

Wrong display / projector not showing video

Run `xrandr` on the Pi to list display names. Update `touchDisplay` and `projectorDisplay` in `config/system.json` to match, then restart:

`sudo systemctl restart playback-pi-displays playback-pi playback-pi-kiosk`

The layout is applied automatically on every boot by the `playback-pi-displays` service — no manual `xrandr` setup is needed.

No audio at PA

Audio exits the Pi's 3.5mm headphone jack by default and its hardware level follows the app's master volume. Check the PA cable is in the headphone jack and the volume slider is above 0. To force another device run `scripts/configure-audio.sh`.

No background music during Pre-Show / Post-Show

The files in `media/music-library/` are missing or their names don't match the `backgroundMusic` lists in `config/show.json`. Missing files are skipped — check the logs for “background-music file(s) missing”.

“FEATURE FILM MISSING” error

The filename in `media/20-showtime/` does not match `020-feature-film.mp4`. Rename the file to match exactly, then restart the service.

Showtime is locked (lock icon visible on SHOW tab)

Validation has not passed for the current feature file. Go to PREP tab → Step 1 → press FULL CHECK.

VLC crashes mid-show / projector goes black

The controller auto-retries. If black persists more than 10 seconds:

1. Press PLAY/PAUSE, then BACK (restart track).
2. Last resort: `sudo systemctl restart playback-pi`

Prep confirms show as stale / wrong timestamp

The Pi clock reset (no RTC hardware). Press RESET CHECKLIST and redo prep. Install a hardware RTC for persistent clock across reboots.

Test pattern looks wrong / geometry off

SETUP tab → DETECT BARS to re-scan the film, then SAVE & APPLY. Use ADJUST in the corner-pin step to correct keystone manually.

Feature film changed but Showtime still locked

The new file has a different checksum — validation must re-run. Run FULL CHECK on PREP Step 1. After it passes, Showtime unlocks automatically.

11 FIELD CHECKLISTS

The PREP walkthrough (PREP tab) is the primary pre-show verification tool. It covers the majority of checks automatically. Run it first and confirm all five steps are green before the show. Items marked PREP Step N are verified by the software. Items marked ☐ require a separate manual check.

Projector isolation

Verified by	Check
PREP Step 3	Test pattern border aligned to projected image edges — operator sends pattern and presses CONFIRM
PREP Step 3	Title-safe (inner) rectangle fully on the screen surface
PREP Step 4	No keystone distortion — corrected and confirmed via corner-pin step
PREP Step 3	Projector is displaying video output, not the desktop
☐ Manual	Operator UI visible only on the touchscreen, not the projector
☐ Manual	No cursor visible on projector screen — OS cursor-hide is active

Audio

Verified by	Check
PREP Step 5	Audio signal is reaching the PA — TEST AUDIO plays a tone sequence; operator confirms at speakers
☐ Manual	Volume slider set to planned show level on the SHOW tab before starting
☐ Manual	Music bed plays during Pre-Show and ducks under announcements (announcements start instantly — no fade gap — by design)
☐ Manual	10-second fade-out audible when leaving or pausing Pre-Show/Post-Show
☐ Manual	No hum or buzz in the audio chain — listen during TEST AUDIO

Show readiness

Verified by	Check
☐ Manual	All five media folders populated (incl. countdown) and music library loaded before starting PREP
PREP Step 1	Feature film validated — file is complete, decodable, DRM-free, and safe to screen

Verified by	Check
PREP Step 2	Geometry approved and test pattern regenerated
AUTO	Showtime unlocked — happens automatically when PREP Steps 1 and 2 pass
☐ Manual	DIAG tab quick check: engine connected, disk space OK, no recent errors
PREP banner	All five PREP steps confirmed green — banner reads READY TO SHOW

12 TRADEMARK & LEGAL NOTICE

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