

B P P L A Y + B P T U N E

User Manual

Raspberry Pi 4 / 5 appliance edition - v2.0

Bit-perfect audio file playback and system tuning
on Raspberry Pi 4 and Pi 5, as a sealed appliance in kiosk mode



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About this edition

This end-user edition is derived from the full v2.0 manual of the bpplay/bptune appliance edition: a condensed version that describes only what you need to know for everyday use of the device. The installation, developer and administrator chapters are deliberately omitted.

The device boots straight into the music selector, with no login; you simply connect to it over SSH (see 3.1.1). You never see a command line, terminal or login prompt during use - a few keys are enough for navigation: arrow keys, `Enter`, `Space`, `Esc`.

1. Introduction

1.1 What is bpplay?

bpplay is a command-line, bit-perfect audio file player application for Linux and macOS. It has no graphical interface, no volume control, no equalizer - deliberately.

Its goal is one single thing: to deliver the contents of the music file unchanged, via the shortest possible path with the fewest conversion steps, to the DAC (digital-to-analog converter).

Whenever possible, the program plays in so-called "integer mode", which means the integers stored in the file (integer samples) reach the sound card without a single bit shift or conversion. When this is not possible (e.g. the source is in float format, or the DAC does not support the exact bit depth of the source), the program always states this clearly - it never stays silent about being forced into a compromise.

In the appliance edition the end user never launches this program directly - instead, the `zenevalaszto.py` Python script invokes it in the background for the selected track(s) (see Chapter 3).

1.2 No tricky or hidden conversions behind the scenes

This is the most important design principle of bpplay. If, for any reason, the program cannot achieve exactly the sample rate, bit depth or format the file requires, it:

- clearly states on screen what happened;
- never silently conceals a format deviation;
- if a DAC does not return exactly the requested sample rate, the program retries rather than quietly accepting a wrong rate.

1.3 Native DSD and DoP

DSD (Direct Stream Digital) is a high-resolution audio format used by SACDs and some downloadable/streamed releases. Many players repackage DSD data into PCM frames (DoP, DSD

over PCM) before sending it to the DAC. bpplay can send DSD data directly, without repackaging, if the DAC supports it - this is called native DSD playback.

Important, Pi-specific limitation

Native DSD and DoP support depends entirely on the chip of the connected DAC/USB interface and on the design of the DAC, not on the Raspberry Pi. Tested hardware gave different results - before planning DSD playback with a given device, see the hardware table in Chapter 4.

1.4 What is bptune?

bptune is a standalone system-tuning tool (licensed separately from bpplay, non-GPL) that optimizes Linux kernel and hardware settings for low-latency, glitch-free audio playback, and also handles background services that would interfere with playback.

In the appliance edition, the factory installer has already configured bptune - as an end user, there is nothing for you to do with it.

1.5 Important: trial period

This device is issued as a trial unit: it can be used for 15 days from the first time you actually power it on, not from whenever the SD card was written. The trial period can be extended once by +15 days (up to 30 days in total) - the developer can do this remotely if you get in touch.

After the trial period expires, the machine shuts down automatically and completely at power-on; the music selector never appears, only a brief message explains the reason for the shutdown.

This restriction cannot be bypassed by setting the system clock back.

Important: this SD card is locked to one specific device

This SD card image is device-locked: on its first real boot, the software records the hardware serial number of the Raspberry Pi it is running in, and from that point on it will only start on that specific device. If you remove the card and put it into a different Pi, the device **will not boot at all**. This is not a bug; it is a deliberate protection mechanism.

2. System requirements

This manual assumes a Raspberry Pi 4 or Pi 5 running Raspberry Pi OS (64-bit, Debian-based). Operation as described is not guaranteed on earlier Pi models.

- Raspberry Pi 4 or 5, any RAM variant - more RAM allows a larger playlist to be loaded into RAM; the `zenevalaszto.py` also shows the estimated memory requirement of the selected list at startup, which can serve as a guide.
- Raspberry Pi OS 64-bit (arm64), based on Debian 13 (trixie).
- Boot medium: microSD card (used by this appliance edition).
- PREEMPT_RT kernel (installed automatically by the factory installer).
- ALSA-compatible USB DAC (see Chapter 4 for tested hardware) - or the Pi's built-in audio output if no external DAC is connected.
- Network connection (Ethernet or Wi-Fi) - required: the music selector is reached over an SSH connection to the device (see 3.1.1); without it, the end user cannot select and play music.

3. Using the device

No technical knowledge is required for use - which is exactly why the appliance (kiosk) mode does not offer administrator privileges.

3.1 Powering on

Connect the Raspberry Pi to its power supply (and if you have a separate DAC, connect it to the Pi's USB port as well). It is recommended to connect the DAC via USB 2.0 rather than USB 3.0. These are usually the two outermost connectors on the back panel.

Switch the DAC on first, then the RPi. The device starts by itself.

No monitor or keyboard is needed for use: the music selector does not appear on a screen attached to the device - it is reached over an SSH connection from your own tablet, phone or computer. If a monitor happens to be connected to the Pi, its screen goes dark shortly after boot and stays off for the rest of the session; this is deliberate, not a fault — it is not stuck or frozen, it is simply switched off.

After powering on, wait about half to one minute, then establish the SSH connection to the device (see 3.1.1) - the music selector screen then appears; no password or any other command needs to be typed.

If instead you see a brief message that the device can no longer be used, followed by the machine switching itself off: the trial period has expired (see 1.5). Contact the person you received the device from.

3.1.1 Connecting via SSH

No technical knowledge is needed for this either - just a simple connection with an app, the same way as with any other app.

You get the device's IP address or network name from the person you received the device from. Kiosk machines are typically reachable at `kiosk@raspberrypi.local` or `kiosk@IP-address`. The usual password, should it be needed: `bitperfectsound`. Both the user name (`kiosk`) and the password use only characters that sit in the same place, without Shift, on the common keyboard layouts (QWERTY, QWERTZ, AZERTY), so the login works even if your computer's layout differs from what you're used to.

```
|koscsof1@Koscso-MacBook-Air-3 ~ % ssh kiosk@raspberrypi.local
```

Figure 1: Connecting via SSH from a macOS terminal

Important

The network connection (Wi-Fi or Ethernet) must stay up for the entire listening session - the SSH connection keeps the music selector screen alive through it. If the network drops, the connection drops too, and you need to reconnect.

macOS / Linux: built-in terminal + `ssh` command.

Windows: on Windows 10/11, the built-in OpenSSH client from PowerShell or Windows Terminal, or PuTTY.

Android: Termux (full terminal emulation), JuiceSSH or ConnectBot.

iOS / iPadOS: Termius or Blink Shell.

3.2 Selecting storage

If you have just connected a USB drive (flash drive, external HDD/SSD) with music to the device, you can reopen the storage selector on the screen at any time with the `m` key:

- The selector lists the available drives that contain (or may contain) music - both those already mounted and those plugged in but not yet mounted.
- Navigate with the Up/Down arrows, select with `Enter`.

```
Zenei gyökér kiválasztása – Fel/Le, Enter=kiválaszt, q/Esc=alapértelmezett

Alapértelmezett: /home/kiosk/Zenék (1.7 GB szabad)
/mnt/aserver-zene-cd (1.0 GB szabad)
/mnt/aserver-zene-hr (0.0 GB szabad)
EFI (200M, vfat, nincs csatolva)
mypassport2 (1.8T, exfat, nincs csatolva)
WD Unlocker (30M, udf, nincs csatolva)
Mentett playlista betöltése...
Egyéni útvonal megadása...
```

Figure 2: The storage selection screen

- If you choose a drive that is not yet mounted, the system mounts it automatically - no password is needed for this.
- An item can be excluded from the list with the x key — it never appears again afterwards (useful when an always-connected but non-music drive clutters the selector).
- Some music-selector versions also offer a "Mount network share (NFS/SMB)..." line in the storage selector. With it you can reach a shared music folder on another machine (e.g. your NAS) by entering its address (e.g. 192.168.1.10:/zene for NFS, //192.168.1.10/zene for SMB). The music selector automatically recognizes the type (NFS or SMB) from the form of the address. The share itself - whether it exists at all and is accessible - must be set up in advance on the NAS or the other machine; that is not the job of bpplay/the music selector, which only mounts an already existing, reachable share.
- Accessing network storage is naturally slower than local storage and strongly depends on the state of the network. Mounting 1 or 2 TB of network storage can take up to 1–2 minutes - this is completely normal behaviour.
- Previously used network shares are remembered (up to 5) and appear as their own selectable rows in the list — press Enter on one to reconnect without retyping the address. Press x on one to forget it.
- If only a single storage location is available, the screen automatically skips this step.

3.3 Selecting the audio output

If several audio outputs are connected to the device (e.g. the Pi's built-in output AND an external USB DAC at the same time), it offers a choice at startup: Up/Down arrows, Enter. If there is only one output, it automatically skips this step too.

The selector's cursor cannot land automatically on a built-in (onboard/HDA-type) sound card if an identifiable external DAC is also present in the list - so you cannot pick the wrong output even by accident.

```
Kimenet (hangkártya) kiválasztása – Fel/Le, Enter=kiválaszt
Ha bizonytalan vagy: válassz azt, amelyiknek a márkanéve van feltüntetve (nem a beépített hangkártyát).
[0] bcm2835 Headphones (hw:0,0) (default)
[1] Gustard USB Audio 2.0 (hw:1,0)
[2] vc4-hdmi-0 (hw:2,0)
[3] vc4-hdmi-1 (hw:3,0)
```

Figure 3: The audio output selector: the cursor is on the external DAC

q or **Esc** selects the default output — this screen can no longer be left without a working exit key.

3.4 Browsing and playback

- If your music is organized into folders (albums), you first see an album list: Enter opens the track list of a given album, Esc takes you back.

```

/ - ↑↓ | Enter=belép | Space=kijelöl | a/n | r=ismétlés | s=mentés l=betöltés | /=keresés | Esc=fel | m=
[ ] [D] 2022_zenék
[ ] [D] DSD256 Archive
[ ] [D] French Cafe
[ ] [D] Gojdar_LP
[ ] [D] John Williams live - Deák ANdrás felvétele
[ ] [D] Kada Ad Lib 9624
[ ] [D] Lauditeur demo
[ ] [D] MRC2020
[ ] [D] MRC_2022
[ ] [D] Pinkfaun
[ ] [D] Roon backup
[ ] [D] Szendro_LP_Pyramix
[ ] [D] Szendrő Gábor DSD
[ ] [D] Szendrő Gábor FLAC original
[ ] 33bowls_breathe_MQA.mqa.flac (1630.0 MB, 48kHz)

```

Figure 4: Album list view

- If there is no folder organization (all files are in one place), the track list appears immediately.

```

/2022_zenék/Master Tape Sound Lab _Metaxas recordings - ↑↓ | Enter=belép | Space=kijelöl | a/n | r=ismét
[ ] ----planets_1_fullversion.wav (425.0 MB, 48kHz)
[ ] ___Takacs_HAYDN_1.wav (156.9 MB, 48kHz)
[ ] ___messiah_45_redeemeth_rehearsal.wav (114.9 MB, 48kHz)
[ ] ___morri_chindamo_3.wav (151.3 MB, 48kHz)
[ ] ___requiem_AWB_3.wav (70.0 MB, 48kHz)
[ ] ___requiem_AWB_4.wav (148.3 MB, 48kHz)
[ ] ___requiem_STARS.wav (50.7 MB, 48kHz)
[ ] ___SELLECK_syzygy.wav (217.0 MB, 48kHz)
[ ] ___AndreaKeller_2.wav (174.8 MB, 48kHz)
[ ] ___ASQ_janacek.wav (197.3 MB, 48kHz)
[ ] ___EricGriswold_4.wav (145.4 MB, 48kHz)
[ ] ___grant_3.wav (116.9 MB, 48kHz)
[ ] ___il_giardino1_Biber.wav (143.4 MB, 48kHz)
[ ] ___love_10.wav (89.5 MB, 48kHz)
[ ] ___PascalSchumacher_4_2clicks.wav (180.8 MB, 48kHz)
[ ] ___russian_1.wav (70.5 MB, 48kHz)
[ ] ___stavrou_1_GRIEG_1.wav (290.0 MB, 48kHz)
[ ] ___vivaldi__folia.wav (229.6 MB, 48kHz)
[ ] ___anzac_2.wav (267.2 MB, 48kHz)
[ ] ___BMW_adam.wav (187.7 MB, 48kHz)
[ ] ___BMW_keller.wav (92.8 MB, 48kHz)
[ ] ___BMW_phil.wav (93.6 MB, 48kHz)
[ ] ___j4.wav (185.6 MB, 48kHz)
[ ] ___prom_7.wav (63.3 MB, 48kHz)
[ ] ___toy_band_8.wav (84.9 MB, 48kHz)
Kijelölve: 0 track | becsült RAM: 0.0 MB
zenevalas@bash* "raspberrypi" 10:28 26-Aug-26

```

Figure 5: Track list view, before any selection - the memory usage counter at the bottom of the window

- Tracks are selected with the Space key.

```

/2022_zenék/Master Tape Sound Lab _Metaxas recordings - ↑↓ | Enter=belép | Space=kijelöl | a/n | r=ismét
[x]  ____planets_1_fullversion.wav (425.0 MB, 48kHz)
[x]  ____Takacs_HAYDN_1.wav (156.9 MB, 48kHz)
[x]  ___messiah_45_redeemeth_rehearsal.wav (114.9 MB, 48kHz)
[x]  ___morri_chindamo_3.wav (151.3 MB, 48kHz)
[x]  ___requiem_AWB_3.wav (70.0 MB, 48kHz)
[ ]  ___requiem_AWB_4.wav (148.3 MB, 48kHz)
[ ]  ___requiem_STARS.wav (50.7 MB, 48kHz)
[ ]  ___SELLECK_syzygy.wav (217.0 MB, 48kHz)
[ ]  __AndreaKeller_2.wav (174.8 MB, 48kHz)
[ ]  __ASQ_janacek.wav (197.3 MB, 48kHz)
[ ]  __EricGriswold_4.wav (145.4 MB, 48kHz)
[ ]  __grant_3.wav (116.9 MB, 48kHz)
[ ]  __il_giardino1_Biber.wav (143.4 MB, 48kHz)
[ ]  __love_10.wav (89.5 MB, 48kHz)
[ ]  __PascalSchumacher_4_2clicks.wav (180.8 MB, 48kHz)
[ ]  __russian_1.wav (70.5 MB, 48kHz)
[ ]  __stavrou_1_GRIEG_1.wav (290.0 MB, 48kHz)
[ ]  __vivaldi__folia.wav (229.6 MB, 48kHz)
[ ]  _anzac_2.wav (267.2 MB, 48kHz)
[ ]  _BMW_adam.wav (187.7 MB, 48kHz)
[ ]  _BMW_keller.wav (92.8 MB, 48kHz)
[ ]  _BMW_phil.wav (93.6 MB, 48kHz)
[ ]  _j4.wav (185.6 MB, 48kHz)
[ ]  _prom_7.wav (63.3 MB, 48kHz)
[ ]  _toy band_8.wav (84.9 MB, 48kHz)
Kijelölve: 5 track | becsült RAM: 918.1 MB (50% a gép 1844 MB RAM-jából)
zenevalas0:~$
"raspberrypi" 10:28 26-Aug-26

```

Figure 6: Selecting with the Space key - the counter shows 50%

- The selection of any track can be removed with the n key.
- The memory usage counter at the bottom of the window tracks how much of the memory your selection fills.

```

/2022_zenék/Master Tape Sound Lab _Metaxas recordings - ↑↓ | Enter=belép | Space=kijelöl | a/n | r=ismét
[x]  ____planets_1_fullversion.wav (425.0 MB, 48kHz)
[x]  ____Takacs_HAYDN_1.wav (156.9 MB, 48kHz)
[x]  ___messiah_45_redeemeth_rehearsal.wav (114.9 MB, 48kHz)
[x]  ___morri_chindamo_3.wav (151.3 MB, 48kHz)
[x]  ___requiem_AWB_3.wav (70.0 MB, 48kHz)
[x]  ___requiem_AWB_4.wav (148.3 MB, 48kHz)
[ ]  ___requiem_STARS.wav (50.7 MB, 48kHz)
[ ]  ___SELLECK_syzygy.wav (217.0 MB, 48kHz)
[ ]  __AndreaKeller_2.wav (174.8 MB, 48kHz)
[ ]  __ASQ_janacek.wav (197.3 MB, 48kHz)
[x]  __EricGriswold_4.wav (145.4 MB, 48kHz)
[ ]  __grant_3.wav (116.9 MB, 48kHz)
[ ]  __il_giardino1_Biber.wav (143.4 MB, 48kHz)
[ ]  __love_10.wav (89.5 MB, 48kHz)
[ ]  __PascalSchumacher_4_2clicks.wav (180.8 MB, 48kHz)
[ ]  __russian_1.wav (70.5 MB, 48kHz)
[ ]  __stavrou_1_GRIEG_1.wav (290.0 MB, 48kHz)
[ ]  __vivaldi__folia.wav (229.6 MB, 48kHz)
[ ]  _anzac_2.wav (267.2 MB, 48kHz)
[ ]  _BMW_adam.wav (187.7 MB, 48kHz)
[ ]  _BMW_keller.wav (92.8 MB, 48kHz)
[ ]  _BMW_phil.wav (93.6 MB, 48kHz)
[ ]  _j4.wav (185.6 MB, 48kHz)
[ ]  _prom_7.wav (63.3 MB, 48kHz)
[ ]  _toy band_8.wav (84.9 MB, 48kHz)
Kijelölve: 7 track | becsült RAM: 1211.9 MB (66% a gép 1844 MB RAM-jából)
zenevalas0:~$
"raspberrypi" 10:28 26-Aug-26

```

Figure 7: The counter tracks the estimated RAM requirement as the selection grows

- At 70% usage the counter turns red, warning of the risk of overfilling. If you still overfill the memory with your selection, playback will not start.

```

/2022_zenék/Master Tape Sound Lab _Metaxas recordings - ↑↓ | Enter=belép | Space=kijelöl | a/n | r=ismét
[ ] __SELLECK_syzygy.wav (217.0 MB, 48kHz)
[ ] __AndreaKeller_2.wav (174.8 MB, 48kHz)
[ ] __ASQ_janacek.wav (197.3 MB, 48kHz)
[x] __EricGriswold_4.wav (145.4 MB, 48kHz)
[ ] __grant_3.wav (116.9 MB, 48kHz)
[ ] __il_giardino1_Biber.wav (143.4 MB, 48kHz)
[ ] __love_10.wav (89.5 MB, 48kHz)
[x] __PascalSchumacher_4_2clicks.wav (180.8 MB, 48kHz)
[ ] __russian_1.wav (70.5 MB, 48kHz)
[ ] __stavrou_1_GRIEG_1.wav (290.0 MB, 48kHz)
[x] __vivaldi__folia.wav (229.6 MB, 48kHz)
[ ] __anzac_2.wav (267.2 MB, 48kHz)
[x] __BMW_adam.wav (187.7 MB, 48kHz)
[ ] __BMW_keller.wav (92.8 MB, 48kHz)
[ ] __BMW_phil.wav (93.6 MB, 48kHz)
[ ] __j4.wav (185.6 MB, 48kHz)
[ ] __prom_7.wav (63.3 MB, 48kHz)
[ ] __toy band__8.wav (84.9 MB, 48kHz)
[ ] __wendy morrisson 468_9.wav (171.2 MB, 48kHz)
[ ] aaron_BMWedge.wav (150.8 MB, 48kHz)
[ ] adam3-inc.wav (196.3 MB, 48kHz)
[ ] adam_footscrayF.wav (96.4 MB, 48kHz)
[ ] adam_ivanhoeF_ORIG.wav (154.4 MB, 48kHz)
[ ] anita2_orig.wav (274.3 MB, 48kHz)
[ ] bach_FINAL2.wav (141.7 MB, 48kHz)
Kijelölve: 10 track | becsült RAM: 1809.9 MB (98% a gép 1844 MB RAM-jából)
zenevalas0:~$
"raspberrypi" 10:28 26-Aug-26

```

Figure 8: Risk of overfilling - the counter has turned red

- When you have finished selecting, pressing **p** starts playback of the playlist, loading the tracks into memory one by one.

```

Van egy legutóbbi lejátszási lista: 9 track (mentve: 2026-08-17 14:16).
Betöltsem induláskor? [i/N]: n
Lejátszás indul, 9 track:
- ____planets_1_fullversion.wav
- ____Takacs_HAYDN_1.wav
- __messiah_45_redeemeth_rehearsal.wav
- __morri_chindamo_3.wav
- __requiem_AWB_3.wav
- __requiem_AWB_4.wav
- __EricGriswold_4.wav
- __PascalSchumacher_4_2clicks.wav
- __vivaldi__folia.wav
Device: Gustard USB Audio 2.0 (hw:1,0)
bpplay 1.1.0
Loading 9 file(s) into RAM...
File: /mnt/aserver-zene-hr/2022_zenék/Master Tape Sound Lab _Metaxas recordings/____planets_1_fullversion
.wav - 48000 Hz, 16-bit, 2 ch, 1160.5 s
Physical format: 32-bit integer.
Virtual format: integer, 32-bit, 8 B/frame - INTEGER MODE ACTIVE, signal path truly conversion-free
zenevalas0:~$
"raspberrypi" 10:28 26-Aug-26

```

Figure 9: Playback begins: format check and integer mode feedback

Playback starts after the loading completes.

```

Van egy legutóbbi lejátszási lista: 9 track (mentve: 2026-08-17 14:16).
Betöltsem induláskor? [i/N]: n
Lejátszás indul, 9 track:
- ____planets_1_fullversion.wav
- ____Takacs_HAYDN_1.wav
- ___messiah_45_redeemeth_rehearsal.wav
- ___morri_chindamo_3.wav
- ___requiem_AWB_3.wav
- ___requiem_AWB_4.wav
- ___EricGriswold_4.wav
- ___PascalSchumacher_4_2clicks.wav
- ___vivaldi__folia.wav
Device: Gustard USB Audio 2.0 (hw:1,0)
bpplay 1.1.0
Loading 9 file(s) into RAM...
File: /mnt/aserver-zene-hr/2022_zenék/Master Tape Sound Lab _Metaxas recordings/____planets_1_fullversion
.wav - 48000 Hz, 16-bit, 2 ch, 1160.5 s
Physical format: 32-bit integer.
Virtual format: integer, 32-bit, 8 B/frame - INTEGER MODE ACTIVE, signal path truly conversion-free
Loading track 2/9...
Loading track 3/9...
Loading track 4/9...
Loading track 5/9...
Loading track 6/9...
Loading track 7/9...
Loading track 8/9...
zenevalas0:~$

```

Figure 10: Tracks being loaded into memory one by one

Loading speed depends on the storage devices and, in the case of a NAS, on the transfer capability of the network. From an SSD, even 96 kHz/24-bit FLAC tracks load instantly, without any waiting.

If the assembled playlist contains files with different sample rates, bpplay groups the tracks with identical sample rates into one playlist for the sake of gapless playback. When the next part of the original playlist, with a different sample rate, starts playing, a short pause of one or two seconds will be audible. This is not an error - the switchover simply takes this long. To avoid clicks, the bpplay software mutes the output for a few tenths of a second.

3.5 All keys needed for operation

Key	Function
Up / Down	Navigation
Enter	Enter a subfolder; on a track row it deliberately does NOTHING (so it cannot accidentally undo a selection made with Space)
Esc	Back to the previous (parent) menu item/folder
Space	Select a track (in track view), or select all tracks of an entire album at once (in album view)
a	Select all (under the currently open folder, recursively)
n	Clear selection
r	Toggle repeat mode; when on, the playlist automatically restarts from the beginning after it finishes
s	Save the current selection as a playlist (asks for a name)
l	Load a previously saved playlist

Key	Function
o	Manually re-select the audio output (DAC) during playback; complements (does not replace) the automatic re-check before each playback
/	Search (filters by title)
m	Switch drive/storage
p	Start playback in the selected order
q	Quit without playing (the screen then restarts automatically, it does not stay "out"); in kiosk mode, at the top level it shuts the device down completely instead

3.6 If something doesn't work

- **No sound:** check that you selected the right audio output (3.3) and that the DAC is switched on and connected.
- **You can't see your music:** open the storage selector (m, 3.2) and choose the correct drive.
- **"REMOTE HOST IDENTIFICATION HAS CHANGED" warning:** Expected if raspberrypi.local previously pointed at a different Pi (e.g. another Pi of your own on the same network), or the SD card was re-written; each device has its own SSH identity. In a terminal on your own device (not the Pi!), run `ssh-keygen -R raspberrypi.local` (or for the IP address you used), then reconnect. On mobile SSH apps (Termius, JuiceSSH, etc.), look for a "forget host" option in the app's settings instead.
- **The device does not start, only shows a message, then switches off:** the trial period has expired (1.5) - contact the developer.
- **If the volume seems unusually quiet:** bpplay is intentionally designed to never touch any volume control; playback is always bit-perfect, meaning the source file reaches the sound card without modification. This means that if the DAC (or sound card) has its own firmware-level volume control, and that was previously set to a low level (for example by a different playback program), that setting will persist under bpplay too; the player neither can nor will override it. This is not a bug, but a necessary consequence of bit-perfect operation: for the same reason, bpplay never distorts, mixes, or silences any source on its own judgment.
- **What to do if this happens:** It is worth checking the following even before installing the Pi image:

Check your operating system's audio mixer / ALSA controls (on Linux, for example `alsamixer` or `amixer`), and set the DAC's own volume control to maximum (0 dB).

If the DAC (or its USB interface) has multiple, independent volume controls, which occurs on some unusual, multi-channel USB interfaces, make sure all of them are set to maximum. If you are unsure, contact whoever gave you the system; for common, known DAC models, this setting can also be applied automatically at startup in advance.

- This phenomenon is not a random quirk of any particular chip vendor, but a design choice. Reference-grade devices intended purely as an audiophile "digital-to-analog bridge" (XMOS, Amanero) typically deliberately omit any software volume control, while general-purpose USB audio bridge chips aimed at playback and recording, or at the consumer sound card/headset market, often do include one by default.
- Known general-purpose chip families worth checking in advance (we have not empirically tested these ourselves; the risk is inferred from the general design pattern, not confirmed case by case):

C-Media CM6631A / CM6632A

Savitech SA9018 / SA9023 / SA9027 / SA9227 / SA9228

Texas Instruments/Burr-Brown PCM2704 / PCM2706 / PCM2707

Tenor TE7022 / TE8802

Any consumer-oriented "USB sound card/headset" style chip in the C-Media CM106/108/119 family

- Rule of thumb: the more a DAC/interface resembles a general-purpose USB sound card (playback plus microphone, headset compatibility), the more likely it is to have a software-adjustable volume control; the more it resembles a purely audiophile, playback-only bridge, the less likely.

If the device cannot be found on the network: Before anything else: the target device intentionally uses only a wired Ethernet connection; Wi-Fi is deliberately disabled on it, for determinism and sound quality reasons. If no Ethernet cable is physically connected between the device and your router or switch, it will never get an IP address, and no device finder tool will locate it. If `kiosk@raspberrypi.local` `kiosk@IP address` is not reachable, check the following in order:

1. **Confirm an Ethernet cable is actually connected** to the Pi and to your router. This is the most common cause.
2. **Give it enough time.** Especially on a freshly written SD card, first boot can take one to two minutes before the system is fully up and on the network; do not judge too quickly.
3. **Check your router's own admin page** for connected devices (DHCP clients), rather than relying only on a separate network scanner. This is more reliable, since it does not depend on mDNS (`.local` name resolution), which can be blocked on certain routers or VLANs.
4. **Confirm you are on the same network.** If your computer is on Wi-Fi on a guest network while the Pi is wired to the main network, you may not see each other even though both are working.
5. **Watch the SD card activity LED** at power-on. If it blinks green for a while, then turns solid red around the 30 second mark, that is a known, documented failure with a known fix; do not keep trying on your own, ask for help instead.

6. **Try re-writing the SD card.** A partial or corrupted write can cause exactly this symptom.
7. **If nothing else helps,** the most reliable diagnostic is to connect a monitor (HDMI) and keyboard (USB) directly to the Pi and read what appears on screen at boot. That will immediately show whether the device is even reaching network initialization.
- **Anything else unusual:** just let the developer know.

4. Hardware

4.1 Board/computer

Validated exclusively on Raspberry Pi 4 (CM4 module in the case of Holo Red) and Pi 5, in any RAM variant. Not tested, not guaranteed on earlier Pi models (Pi 3 and older).

4.2 Boot medium

The appliance edition boots from a microSD card.

4.3 Tested USB DACs and receivers

Device	Chip/interface	PCM	Native DSD	DoP
Gustard USB Audio 2.0	(direct USB DAC)	Yes	Yes	Yes
TT-DAC-2026 TT-DAC-NV	/ Amanero Combo 384 and 768	Yes	Yes	Yes
Audio-GD DDC → Gustard (I2S)	Amanero Combo384	Yes	No - due to the 384 kHz sample-rate ceiling, DSD256 is ruled out at the hardware level both natively and via DoP	No - the chip's DoP detector only recognizes 24-bit frames at firmware level; the 32-bit DoP attempt produced audible noise with both byte orders, and the display showed PCM instead of DSD

5. Appendix: technical background

5.1 The signal path philosophy

bpplay's design goal is for sound to travel from the file's loading into memory to the DAC through the fewest, best-documented steps possible. When an integer source meets an integer DAC format, this means zero arithmetic conversion.

5.2 The role of the sound driver

The phrase "the sound driver performs the last step" in the signal-path messages refers to the audio subsystem of the underlying operating system (ALSA on Linux) - a platform-independent, precise wording.

Articles on medium.com about the development of the software and the workings of computer audio systems:

Part 1: [bpplay - no-compromise computer audio: architecture and software minimalism](#)

Part 2: bpplay - what happens inside the case?

Part 3: Bit-perfect, in-memory audio file playback in 2026

Part 4: Optimization options of Linux and Windows environments for high-end audio playback

Part 5: Bit-perfectness - what it really means and when it truly matters

Disclaimer

The bpplay and bptune software, as well as the music selector serving this device (`zenevalaszto.py`) is provided "as is", without warranty of any kind, express or implied, including but not limited to the warranties of merchantability or fitness for a particular purpose.

The developer accepts no liability for direct or indirect damages arising from the use, malfunction or failure of the software or the device, including possible damage to connected audio equipment (DAC, amplifier, speakers), loss of data, or any damage resulting from use other than the intended purpose.

This manual strives to describe the most accurate, current state possible, but the developer does not guarantee the completeness or error-freeness of its contents, and reserves the right to update it without prior notice. The device and the manual are made exclusively for the end-user music-listening purpose described herein; any other use is at your own risk.

All rights to the software and the device are reserved; copying, reverse engineering or passing them to third parties may only take place with the prior written permission of the developer.

HAPPY LISTENING!