

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

User Manual

x64 live USB kiosk edition - v2.0

Bit-perfect audio file playback and system tuning
on x64 (Intel/AMD) PCs, from a live USB system, 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 x64 live USB kiosk edition: a condensed version that describes only what you need to know for everyday use. The installation, developer and administrator chapters are deliberately omitted.

After power-on, the machine boots straight into the music selector, automatically, with no login: there is no desktop, no mouse is needed, and you never see a command line, terminal or login prompt during use - a few keys are enough for navigation: arrow keys, Enter, Space, Esc. The entire system runs from the USB stick: it never touches the machine's own internal storage, and after shutdown everything on the computer stays exactly as it was.

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 this kiosk 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 5).

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, DAC-dependent 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 host machine. Tested hardware gave different results - before planning DSD playback with a given device, see the hardware table in Chapter 6.

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 this kiosk edition, bptune automatically applies the basic tunings at boot (CPU governor set to performance, Turbo Boost/Precision Boost disabled) - as an end user, there is nothing for you to do with it. Kernel-level CPU-core isolation and DAC IRQ affinity are deliberately not preset in this edition (see 5.6).

1.5 Important: trial period

This is a time-limited trial edition: the USB stick can be used for 15 days from the first booting. If you need an extension, contact whoever gave you the USB stick.

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: the trial period is tied to the USB stick itself

The trial countdown is not tied to the computer, but to the USB stick itself: you can move the stick into any compatible x64 machine, and the remaining time carries over. The counter is stored on the writable (persistent) area of the stick (see 6.2).

2. System requirements

This manual assumes an x64 (Intel/AMD 64-bit) PC with the accompanying live USB system, based on Debian 13 (trixie). The edition was tested on Intel x64 based machines, see **6.1**. On other architectures (e.g. ARM), the steps described here do not work with this image.

- An x64 (Intel/AMD 64-bit) PC capable of booting from USB - the more RAM available, the larger the playlist that can be loaded into memory; the `zenevalaszto.py` also shows the estimated memory requirement of the selected list at startup, which can serve as a guide.
- A USB stick (or USB SSD), at least 8 GB - the entire system runs from it (see Chapter 3).
- Remote connection requires SSH connection, see 5.1.1
- An ALSA-compatible USB DAC (see Chapter 6 for tested hardware) - or the machine's built-in audio output if no external DAC is connected.
- A network connection (Ethernet) needed for SSH remote and if you want to play music from a network share (NAS); so it is required even for playback from a local drive because of the SSH connection.

3. Preparing the USB stick

This edition can be created from a single downloadable file: you write a bootable, complete system onto a USB stick. The system runs exclusively from the stick - it never touches the machine's own internal storage, and after shutdown everything on the computer stays exactly as it was.

3.1 What you will need

- A USB stick, at least 8 GB (its current contents will be erased!).
- Balena Etcher (recommended, free, works identically on Mac and Windows): <https://etcher.balena.io>
- The `bplay-kiosk-x86_64.img.gz` file (you receive it via a Google Drive link).

The downloaded `.gz` file is about 920 MB; once written, it takes up 8 GB on the USB stick. Of that, about 7.1 GB is a writable, persistent area - this is where your own settings and saved playlists are stored, and the trial countdown is also tied to it (see 1.5); the rest is the read-only part of the system.

3.2 Writing the image with Balena Etcher (recommended)

1. Download and install Balena Etcher from the link above.
2. Plug in the USB stick.
3. Open Etcher → "Flash from file" → select the downloaded `bplay-kiosk-x86_64.img.gz` file (Etcher decompresses the `.gz` automatically while writing - no manual extraction is needed).
4. "Select target" → choose the USB stick. Be very careful here: if several drives are connected, check the size (GB) to make sure you are really selecting the USB stick, not the internal drive.
5. "Flash!" - this erases the entire contents of the stick and writes the image. It takes a few minutes.

3.3 Writing the image with dd (advanced users)

Important safety warning: the `dd` command completely and irreversibly overwrites the specified device. If you specify the wrong device (e.g. your own internal drive instead of the USB stick), you will lose data. Always double-check the device name before pressing Enter.

On Linux:

`lsblk` # before and after plugging in: identify the NEW entry

```
gunzip -c bplay-kiosk-x86_64.img.gz | sudo dd of=/dev/sdX bs=4M status=progress
```

```
sync
```

On Mac:

```
diskutil list # after plugging in, identify the NEW device (e.g. /dev/disk4)
```

```
diskutil unmountDisk /dev/diskN
```

```
gunzip -c bpplay-kiosk-x86_64.img.gz | sudo dd of=/dev/rdiskN bs=4m
```

```
sync && diskutil eject /dev/diskN
```

(dd is not available on Windows - there, Etcher is the only recommended path.)

4. Booting from the USB stick: BIOS/UEFI

You start the machine from the prepared USB stick by selecting the USB drive in the boot menu (or in the BIOS/UEFI boot order) at power-on. Most machines offer this with a shortcut key immediately after power-on.

4.1 Boot menu shortcut keys by manufacturer

- Dell: **F12**
- HP: **Esc**, then **F9**
- Lenovo: **F12** (laptops), **F1** or **Enter** (ThinkCentre/ThinkPad BIOS)
- ASUS: **F8** or **Esc**
- Acer: **F12** (may need to be enabled separately in the BIOS: "F12 Boot Menu")
- MSI: **F11**
- Gigabyte: **F12**
- Apple (Intel Mac): hold the **Option** key at power-on

You can usually enter the BIOS/UEFI setup itself with **Del** or **F2**. If the machine boots past too quickly for you to press the key in time, disable "Fast Startup" in Windows, or try with Restart instead - a restart always begins from a full shutdown (see 4.4).

4.2 Mac (Intel)

1. Shut the machine down completely (not just sleep).
2. As it powers on, immediately press and hold the **Option** key.
3. Select the USB stick from the boot menu ("EFI Boot" or similar).

If the Mac does not offer the USB stick: on Intel Macs, the Startup Security Utility's "Full Security" setting can block booting from external media. Restart into Recovery with **Cmd+R**, then in the Startup Security Utility select "No Security" or "Medium Security" + "Allow booting from external media".

4.3 Windows PC

1. Shut the machine down completely.
2. As it powers on, repeatedly press the boot menu key (varies by manufacturer: most commonly **F12**, **F2**, **Esc** or **Del** - see 4.1).
3. Select the USB stick from the list.

4.4 If the machine does not boot from the USB stick (BIOS/UEFI settings)

- **Secure Boot:** disable it in the BIOS/UEFI (Secure Boot → Disabled). This is the most common reason why a machine ignores an otherwise correctly written, bootable USB stick.
- **Legacy/CSM mode:** if it does not start in UEFI mode, try enabling Legacy/CSM (Compatibility Support Module) mode, or the "boot from removable media" option.
- **Boot order:** on the BIOS/UEFI "Boot" page, move the USB drive to the first position, or use the one-time boot menu (4.1).
- **Another USB port:** try the stick in a different - preferably rear-panel, directly attached to the motherboard - USB port; front-panel ports, hubs and USB splitters can be unreliable at boot.
- **Windows Fast Startup:** because of "fast startup", shutting Windows down is actually hibernation, so the boot menu key seemingly does not work. Disable it (Control Panel → Power Options), or use Restart instead - a restart always begins from a full shutdown.
- **Re-writing:** if writing the stick was interrupted or faulty, the machine will not see it as bootable at all - write the image again (Chapter 3).

5. Using the system

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

5.1 Powering on

Plug in the prepared USB stick, and if you have a separate DAC, connect that to a free USB port as well. If the machine has separate USB 2.0 and USB 3.0 ports, it is recommended to connect the DAC to a USB 2.0 port.

Switch the DAC on first, then the machine. The system starts by itself.

The music selector (called “zenevalaszto”) appears directly on the SSH connected remote screen. After power-on, the first boot can take up to 30-60 seconds - the music selector screen then appears automatically; no password or any other command needs to be typed.

If instead you see a brief message that the system can no longer be used, followed by the machine switching itself off: the trial period has expired (see 1.5). Contact whoever gave you the USB stick.

5.1.1 SSH connection

No technical knowledge is required for this. It is simply a matter of connecting with an application, just as you would with any other app.

Open your SSH app and connect to `kiosk@bpplay-kiosk-en.local` (`kiosk@bpplay-kiosk-hu.local` for the Hungarian image) — this works even without a router or DHCP, straight over a single Ethernet cable between the two machines, and there's no need to note down any IP address in advance.

If `.local` names don't resolve on your network, **Section 5.1.1.1** below describes an alternative way to find the device's IP address. The standard password for establishing the SSH connection is: **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.

Important

The network connection (Wi-Fi or Ethernet) must remain active throughout the entire listening session — the SSH connection keeps the music selection screen alive through the network. If the network connection is interrupted, the SSH connection will also be lost, and you will need to reconnect.

5.1.1.1 Finding the IP Address in the Router's Administration Interface

If you cannot establish an SSH connection to the machine using the recorded IP address, you can also find the device's current IP address through the router's administration interface.

Log in to the router's web-based administration interface and look for a section such as **Connected Devices**, **DHCP Clients**, **DHCP Client List**, **Network Map**, or a similarly named menu. The exact name and location may vary depending on the router model and manufacturer.

In the list, look for the device using its **hostname**, **MAC address**, or, if identifiable, the device manufacturer. The **IP address** shown for that device is its current address on the network.

Once you have found the new IP address, try establishing the SSH connection again using that address.

5.1.2. Where to Find the Terminal Application

macOS / Linux: Built-in Terminal + **ssh** command.

Windows: On Windows 10/11, the built-in OpenSSH client can be used from PowerShell or Windows Terminal, as well as PuTTY.

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

iOS / iPadOS: Terminus or Blink Shell.

(Some of these applications may be paid apps!)

5.2 Selecting storage

If you have just connected a USB drive (flash drive, external HDD/SSD) with music to the machine, 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 1: 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.

5.3 Selecting the audio output

If several audio outputs are connected to the machine (e.g. the machine'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: válasszd azt, amelyiknek a márkaneve 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 2: 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.

5.4 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_T_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 3: 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 4: 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 5: 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 6: 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 7: 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)
bptune 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 8: 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)
bptune 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 9: 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, bptune 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 bptune software mutes the output for a few tenths of a second.

5.5 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
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 machine down completely instead

5.6 What runs in the background

The bptune tuning layer runs automatically at boot: it sets the CPU governor to "performance" mode and disables Turbo Boost/Precision Boost. An important difference compared to the developer's reference machine: kernel-level CPU-core isolation and DAC IRQ affinity are not included in this trial edition - they cannot be safely preset on unknown, unfamiliar hardware (they would require a machine-specific kernel parameter and a reboot). This trial edition therefore does not provide the maximally tuned reference experience - its goal is to let you try the player itself, without risk.

Lockdown: no terminal emulator is installed in the system at all, the other virtual consoles (Ctrl+Alt+F2 etc.) are disabled, and the login shell is the music selector itself - if it ever crashes, it simply restarts, it never falls back to a raw command line.

5.7 If something doesn't work

- **No sound:** check that you selected the right audio output (5.3) and that the DAC is switched on and connected.
- **You can't see your music:** open the storage selector (m, 5.2) and choose the correct drive.

- **"REMOTE HOST IDENTIFICATION HAS CHANGED" warning:** Expected if you're connecting to a different physical stick of the same language, or re-flashed your own stick with a new image; each stick has its own SSH identity. In a terminal on your own device (not the stick!), run `ssh-keygen -R bpplay-kiosk-en.local` (or `-hu.local`) to clear the old one, then reconnect. On mobile SSH apps (Termius, JuiceSSH, etc.), look for a "forget host" option in the app's settings instead.
- **The machine does not start, only shows a message, then switches off:** the trial period has expired (1.5) - contact whoever gave you the USB stick.
- **The machine does not boot from the USB stick:** see Chapter 4 (BIOS/UEFI settings, Secure Boot, boot menu).
- **Blank/black screen after boot:** wait about 30 seconds - the first boot can take longer; if it is still blank after that, re-write the USB stick (Chapter 3), or try a different USB port, or even a different machine.
- **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:** since the kiosk system has no terminal, it is best to check this on another, desktop Linux system, with the DAC connected to it: open the operating system's audio mixer / ALSA controls (e.g. **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 network share (NAS) is not reachable: check the following in order:

1. **Is there an actual network connection** - an Ethernet cable plugged into the machine and the router/switch, or working Wi-Fi.
 2. **Are the machine and the NAS on the same network** - if the NAS is wired to the main network and the machine is on a guest Wi-Fi, they cannot see each other.
 3. Is the address format correct - **server:/path** for NFS, **//server/share** for SMB.
 4. **Is the share enabled on the NAS**, and is it reachable from other devices (e.g. your laptop) as well.
 5. **Give it enough time** - mounting a 1-2 TB network share can take 1-2 minutes.
- **Anything else unusual:** just let the developer know.

6. Hardware

6.1 Computer

Any x64 (Intel/AMD 64-bit) PC capable of booting from USB can be used. The edition's development test machines were Asus workstation with workstation motherboard and XEON CPUs, AsRock workstation motherboard with 16 core i9 CPU, and a 2015 Mac Mini (Intel x64). The bit-perfectness of playback does not depend on the machine's performance; more RAM allows a larger playlist to be loaded into memory.

6.2 Boot medium

This edition boots from a USB stick (or USB SSD), with a minimum capacity of 8 GB. The written system occupies 8 GB: of that, about 7.1 GB is a writable, persistent area - this is where your own settings and saved playlists are stored, and the trial countdown is also tied to it; the rest is the read-only part of the system. The system never touches the machine's own internal storage.

With a larger (32 GB or bigger) stick/SSD, the extra space can be put to use. This is an advanced, optional step - since the kiosk system has no terminal, it must be performed on another, desktop Linux machine, with the USB stick plugged into that machine:

```
sudo growpart /dev/sdX 3 # "3" is the number of the writable partition - check with: lsblk or fdisk -l
```

```
sudo resize2fs /dev/sdX3 # only AFTER this: extend the filesystem
```

6.3 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

The table contains results measured on the developer's reference machines. Since native DSD/DoP capability depends on the DAC's chip and design (see 1.3), not on the host machine, the results are applicable on x64 PCs as well.

7. Appendix: technical background

7.1 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.

7.2 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 system (`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 system, 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 system 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 system 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!