



Voyage MPD Starter Kit 2.0 - Getting Started Guide

Voyage Design and Consultants

15-Mar-2014

Version 1.2

1 Introduction

Voyage MPD Starter Kit is a compact Computer-Audio-Source (CAS) system for playing your favourite audio files from a USB flash memory or network drives. It offers high quality audio playback, with low power consumption, silent and at a very low cost.

1.1 Specifications

- Voyage MPD 0.9.2 pre-loaded on 4GB/8GB SD card or 16GB mSATA SSD.
- PCEngines APU embedded board
 - AMD G series T40N or T40E APU, 1 GHz dual core (Bobcat core)
 - 2GB DDR3-1066 DRAM
 - 3 Gigabit Ethernet (Realtek RTL8111E)
 - 2 miniPCI-e slots, LPC bus, GPIO header, I2C bus, COM2 (3.3V RXD/TXD).
 - 2 USB ports
- Aluminum indoor enclosure

This is a DIY kit and assembly required. This kit does not include a PSU. Suggest at least 18W (e.g. 12V 1.5A) AC-to-DC power adapter with a jack with 2.5 mm center positive connector.

For audio output, you need a separate USB audio DAC/converter (not included,) that supports USB Audio Class 1 or Class 2. Voyage MPD Starter Kit does not work with the USB audio DAC/converter that does not natively support USB Audio Class 1 or Class 2 specification.

1.2 Assembly Guide

The APU CPU and south bridge are passively cooled by heat conduction to the aluminum enclosure.

1. Remove DB9 hex nuts. Using a small x-acto knife or similar, peel transparent backing foil from the small heat spreaders. Apply to CPU and south bridge. Then peel the blue cover foil from the heat spreaders (shown: blue cover foil removed on the right one).



2. Place the aluminum heat spreader (blank side down) over CPU and south bridge. Make sure to avoid conflict with nearby through hole components. Peel the cover foil.



3. "Bottoms up" - hold the enclosure base upside down, feed the board DB9 and LAN connectors through the openings. Lightly press board and enclosure base together to stick the heat spreader in place.



4. Turn around and carefully press down around CPU and heat sink to get good contact between enclosure and heat spreader. Then insert screws and hex nuts.



5. Insert SD-card or mSATA card to APU board. (Most of the kits have SD-card or mSATA SSD pre-installed.)
6. (Optional) For Voyage MPD Wireless Kit:
 - a. Snap U.FL connector of the pigtail to the connector (marked with "main") on mini-PCIe card
 - b. Insert the wireless mini-PCIe card to APU board.
 - c. Fix RP-SMA connectors of the pigtail on the back of the enclosure.
 - d. Fasten antenna on the RP-SMA connectors
7. Put the top enclosure and fasten by 4 screws.

1.3 Before you start

It is suggested to connect on-board DB9 connector to the serial console via null modem cable when you first power on the kit. It allows you to review the boot activities and assist troubleshooting if any problem is encountered. The board's default of serial setting is **115200 8N1**. Connect the board using serial console is optional. Here is some recommended terminal software to connect to the APU board.

Windows: Tera Term¹ or HyperTerminal Private Edition 6.3²
Linux: minicom

2 Starting up Voyage MPD Starter Kit

1. If you want to access Voyage MPD system using a serial console, connect serial port to a PC through null modem cable (RXD / TXD crossed over). Set serial terminal to 115200 8N1, flow control = none or xon-xoff. This step is optional if you really want to access Voyage MPD via serial console and for troubleshooting.
2. Connect Ethernet cable to RJ45 socket (LAN1, leftmost) on the board if needed; connect the other end of the cable to your network/wireless router.

¹ <http://tssh2.sourceforge.jp>

² <http://www.brothersoft.com/hyperterminal-private-edition-download-71955.html>

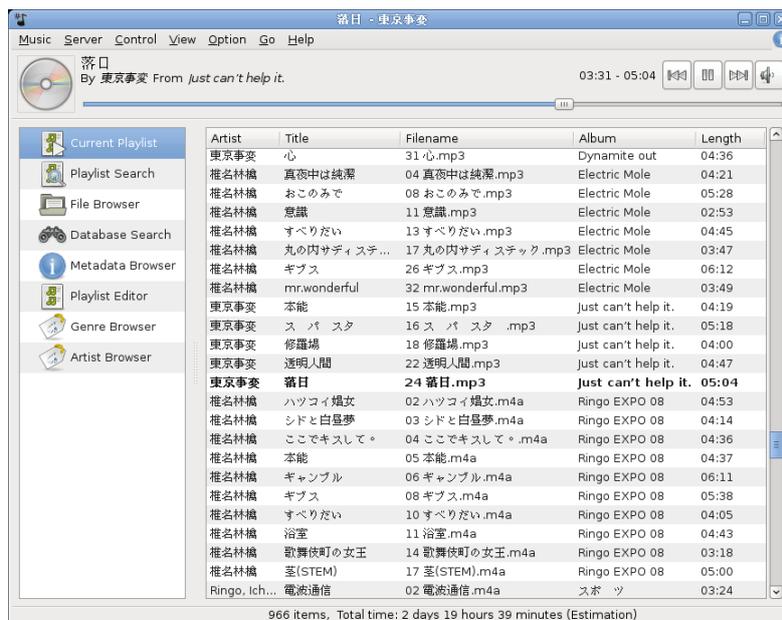
Voyage MPD Starter Kit 2.0 - Getting Started Guide

3. Connect DC power output of the AC adaptor to the DC jack of the board. To avoid arcing, please plug in the DC jack to the board first, then plug the adapter into mains.
4. The board should now power on. All three LEDs will light during BIOS POST, then the system turn off two of the LEDs after POST.
5. During the boot process, Voyage MPD tries to request DHCP lease from your network³. Once the boot completes, a login prompt would appears in the serial console. The default login user is “root” and password is “voyage”. If you don't have a serial console, you can connect to Voyage MPD using ssh protocol. PuTTY (for Windows) and ssh command (for Linux or Mac OS X) are recommended for accessing Voyage MPD remotely.
6. By default, Voyage MPD mounts the disk as read-only. You can issue “remountw” command to mount disk as read-write for installing additional package from Debian. Once you have installed the package, you may want to mount the disk as read-only by “remountro”. To remove all docs and manpages, you can run “remove.docs”.
7. If you have Voyage MPD Wireless Kit, please follow section 4.3 or 4.4 to setup wireless access point or wireless client respectively.

3 Getting Started to Playback Music

- 1 Connect USB DAC or audio converter to the USB port of APU board via a USB cable.
- 2 Connect USB flash memory or external USB HDD to APU. The disk will be automatically mounted (as /media/usb0) and the music files will be automatically seen by MPD.
- 3 Fire up gmpc⁴ or Music Player Minion⁵ application in another computer on the network and connects to Voyage MPD, or you can use ssh connect to the box and run "mpc" commands. (If the kit connects to a wireless router, you can run MPoD⁶ app on your iPhone and connect to it.) Add your music to the playlist and play. MPD connection parameter is:
 - a. IP: <Voyage MPD IP address in eth0> or voyage.local³
 - b. Port: 6600

You can find out the IP address using “ifconfig eth0” command from the serial console or ssh terminal.



³ On Windows PC with iTunes installed, you may remotely access the kit using hostname **voyage.local**

⁴ gmpc, Gnome Music Player Client - <http://gmpclient.org/>

⁵ Music Player Minion, a Firefox addons - <https://addons.mozilla.org/en-us/firefox/addon/music-player-minion/>

⁶ MPoD for iPhone - <http://www.katoemba.net/makesnosenseatall/mpod/> and MPad for iPad - <http://www.katoemba.net/makesnosenseatall/mpad/>

gmpc connects to Voyage MPD

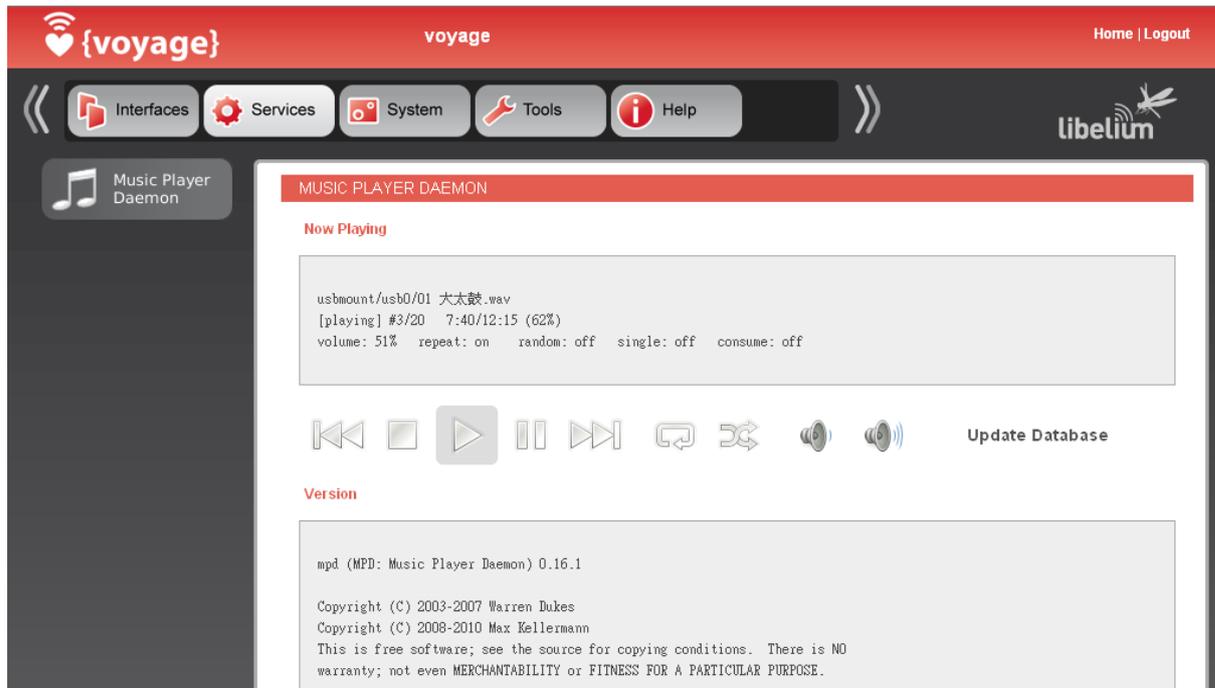


MPod connects to Voyage MPD

- There is also a web GUI in the kit with minimalistic functions to control the playback. It is enabled by default. URL is <http://<Voyage MPD IP address in eth0>>. At login screen, User is “root” and password is “voyage”.



- After login, click “Services” button then “Music Player Daemon” plug-in to control the playback of MPD.



- If you have console or ssh login, you can run the following Linux commands to control the playback. You can query the all music files that could be read by MPD using the following commands:

```
# mpc update
# mpc listall
```

To add all music files to play list, run

```
# mpc listall | mpc add
```

The start play the music by:

```
# mpc play
```

There are some other useful commands in mpc. To see also available commands, run

```
# mpc help
```

Here are some frequently used mpc commands:

MPC COMMANDS	DESCRIPTION
mpc next	Play next song
mpc prev	Play previous song
mpc volume 50	set volume to 50%
mpc stop	stop playing
mpc random	toggle shuffling of songs on or off
mpc repeat	toggle repeating of the playlist
mpc clear	clear the playlist

4 Advanced Setup

Additional setup information could be found in /README in the root disk. This section provides some hands-on setup of Voyage MPD Starter kit.

4.1 Mount to NFS shared drive

Let say the music library is stored on another Linux server (IP: 192.168.1.101) where the music files are accessible via NFS mount (/home/public). So edit /etc/fstab and add NFS mount entry:

```
# remountrw
# vi /etc/fstab
192.168.1.101:/home/public /mnt/public nfs rw,noatime 0 0
```

Then create a /mnt/public directory on Voyage MPD and mount to NFS server:

```
# mkdir /mnt/public
# mount -a
```

Since MPD set /var/lib/mpd/music as default music library path, we now create a symlink that points from default library path to our NFS mount point.

```
# ln -s /mnt/public/ /var/lib/mpd/music/public
```

At last, make sure the NFS shared directories and files are readable by MPD:

```
# chmod -R ugo+r /mnt/public/
```

4.2 Mount to SAMBA shared drive

Like NFS share, if you have music files on Windows or Samba server, you can mount a directory to the samba shared directory. Edit /etc/fstab as below:

```
# remount rw
# vi /etc/fstab
192.168.1.101:/public /mnt/public cifs
username=<username>,password=<password>,file_mode=0644,dir_mode=0755,icharset=utf8 0 0
```

This assumes you have 192.168.1.101 server with a Windows/Samba shared directory named “public”. You need to provide the username and password.

Like NFS mount, create a /mnt/public directory on Voyage MPD and mount to Windows/SAMBA server. Then create a symlink so that MPD is able to search the music files under the SAMBA shared directory.

```
# mkdir /mnt/public
# mount -a
# ln -s /mnt/public/ /var/lib/mpd/music/public
# chmod -R ugo+r /mnt/public/
```

Note: If you are using Synology NAS, please use “username=<name of NAS>/admin” as user name parameter.

4.3 Access to UPnP AV Media Server

If you have music files hosted on UPnP AV Media Server in your network, you can use djmount to access UPnP media from Voyage MPD.

If djmount is not installed, you can use apt-get to install it (requires Internet access from the kit).

```
# apt-get update
# apt-get install djmount
```

Then create a mount directory for UPnP media and run djmount manually:

```
# mkdir /media/upnp
# djmount -o allow_other,nonempty,icharset=utf-8 /media/upnp
[I] Mount options = allow_other,nonempty,icharset=utf-8
[I] Charset : successfully initialised charset='utf-8'
```

Make sure your UPnP media contents are publicly accessible from your network. When djmount is running, you should be able to locate the media files under /media/upnp.

```
#find /media/upnp/
...
/media/upnp/punknix: root/Browse Folders/flac
/media/upnp/punknix: root/Browse Folders/flac/21.no
/media/upnp/punknix: root/Browse Folders/flac/21.no/Shchedrin: Basso Ostinato.flac
/media/upnp/punknix: root/Browse Folders/flac/21.no/Crystalline.flac
/media/upnp/punknix: root/Browse Folders/flac/21.no/Violin Concerto no. 4 in D major KV 218 - Allegro.flac
...
```

Voyage MPD Starter Kit 2.0 - Getting Started Guide

Then update MPD database (e.g. by “**mpc update**” command) so that MPD is able to recognize the music files from the UPnP directory.

Some known issues in djmount are:

1. It does not automatically start after reboot. You will need to start it manually using the above commands.
2. djmount consumes more memory and CPU cycles than NFS or SAMBA client service. Voyage MPD kit may potentially run out of memory if it is run in a prolonged period (> 1 day) without reboot.

4.4 Setting up Wireless Access Point (WPA2) under NAT network

Assume you have wireless card and want to setup wireless access points where wireless clients are in a NAT network. Add the following lines in `/etc/network/interfaces`:

```
auto wlan0
iface wlan0 inet static
    address 10.1.10.1
    netmask 255.255.255.0
    broadcast 10.1.10.255
    hostapd /etc/hostapd/hostapd.wlan0.conf
    up nat.sh wlan0 eth0 "10.1.10.0/24"
```

This assumes your wireless device is wlan0 and the above will setup wlan0 interface with IP address 10.1.10.1 assigned and all traffic is NAT'd to eth0. All wireless clients connected to this access point will be assigned with IP range 10.1.10.0/24.

Then create a file `/etc/hostapd/hostapd.wlan0.conf`:

```
interface=wlan0
driver=nl80211
logger_syslog=-1
logger_syslog_level=2
logger_stdout=-1
logger_stdout_level=2
debug=4
channel=6
hw_mode=g
macaddr_acl=0
auth_algs=3
eapol_key_index_workaround=0
eap_server=0
wpa=3
ssid=voyage-mpd
wpa_passphrase=voyage-mpd
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
eapol_version=1
```

The above configuration will setup both WPA and WPA2. To setup WPA2 only, set “**wpa=2**”. The wireless AP service name (ESSID) will be “**voyage-mpd**” with passphrase “**voyage-mpd**”. Change **ssid**, **wpa_passphrase** and **channel** values if desirable. Then run:

```
# ifup wlan0
```

to activate the wireless access point now. The above setting also automatically enables wireless access point after reboot.

4.4.1 802.11n Access Point Support

For wireless card that supports 802.11n, add the following lines in file `/etc/hostapd/hostapd.wlan0.conf` to enable 802.11n support for access point.

```
wme_enabled=1
ieee80211n=1
ht_capab=[HT40-][HT40+][SHORT-GI-40][TX-STBC][RX-STBC1][DSSS_CCK-40]
```

*** Please note the above configuration only works for wireless card that supports 802.11n. Applying this configuration to 802.11 a/b/g cards will make the access point functions fail completely ***

4.5 Connect to existing Wireless Access Point or Wireless Router (WPA)

If you have nl80211 compatible wireless card (e.g. NMP-8601 / NMP-8602 / RM2) and want to connect to an existing wireless access point or router in your network, update with the following lines in `/etc/network/interfaces`:

```
auto wlan0
iface wlan0 inet dhcp
    wpa-driver wext
    wpa-ssid <your ssid>
    wpa-psk <your WPA shared key>
    wpa-key-mgmt WPA-PSK
    wpa-pairwise TKIP
    wpa-group TKIP
    wpa-proto WPA
    wireless-mode Managed
```

Replace **<your ssid>** to the SSID and **<your WPA shared key>** to WPA shared key of your wireless access point / router.

If you use WPA2 in your wireless network, you need to change **wpa-proto** to “RSN”. You also need to change **wpa-pairwise** and **wpa-group** to “CCMP TKIP” as well. Then run:

```
# ifup wlan0
```

to connect to the wireless access point / router now. The above settings also automatically connect to wireless access point / router after reboot.

5 Troubleshooting

5.1 MPD cannot read my music files on USB disk, NFS or Windows/Samba file shares when running “mpc listall”

If you use USB disk, first check if the USB device is mounted successfully, run:

```
# root@voyage:~# df
Filesystem          1K-blocks      Used Available Use% Mounted on
...
/dev/sda1            1941504    1368856    474024   75% /media/usb0
...
```

You should see the entry like above.

First check you use NFS mount or Windows/Samba shares, you should see the following entry (below show NFS mount):

```
Filesystem          1K-blocks      Used Available Use% Mounted on
...
192.168.1.101:/home/public 103343616  80710144 17383936  83% /mnt/public
...
```

If you see the corresponding entries, problem the music files does not have proper permission set correctly, run:

```
# cd /media/usb0
# chmod -R 777 /media/usb0
```

or,

```
# cd /mnt/public
# chmod -R 777 /mnt/public
```

The above commands will set the permission of all files (and under all sub-directories) to be publicly readable. Then run “mpc update; mpc listall” should see all music file scanned by MPD daemon.

Voyage MPD Starter Kit 2.0 - Getting Started Guide

5.2 After restarting Voyage MPD Starter Kit, all my previous changes to MPD are lost

This is a known issue in Voyage MPD software if you restart the box by unplug and then re-plug the power. The most proper way is to issue a “halt” command via ssh or serial console to shutdown, or use “reboot” command to restart the box gracefully.

However, you can implement periodic saving data to disk so that it could recover from sudden power lost. In webgui (e.g. <Voyage MPD IP> or voyage.local), go to **System** → **Cron** and add the following entries:

```
# m h dom mon dow command
*/5 * * * * ( /etc/init.d/voyage-sync sync )
```

Then, edit (use nano or vi), /etc/default/voyage-util and appends the following lines to the file:

```
VOYAGE_SYNC_RECOVER="YES"
VOYAGE_SYNC_RECOVER_DIRS="/var/lib/mpd"
```

Or simply append the above lines using command line in ssh or serial console:

```
echo "VOYAGE_SYNC_RECOVER=\"YES\"" >> /etc/default/voyage-util
echo "VOYAGE_SYNC_RECOVER_DIRS=\"/var/lib/mpd\"" >> /etc/default/voyage-util
```

5.3 MPD client software cannot show Japanese characters correctly

If you have USB disk device holding music filename in Japanese characters which cannot be displayed correctly under MPD client software such as gmpc, you properly need to enable UTF8 encoding when the USB disk device is mounted.

Run the following command to append a UTF8 mount option to /etc/usbmount/usbmount.conf

```
# echo "FS_MOUNTOPTIONS=\"-fstype=vfat,utf8 -fstype=fat,utf8\"" >> /etc/usbmount/usbmount.conf
```

This will mount your USB disk device using UTF8 codeset. Then reboot MPD kit, do "Update Database" in MPD client software. You should be able to see Japanese characters correctly.

5.4 Voyage MPD Starter Kit does not recognize all my USB drives that has 8 partitions

When USB drives are plugged to Voyage MPD Start Kit, usbmount will be triggered to mount the USB drive to /media/usb0 to /media/usb7 mount points. However, if you have many partitions in your drivers, usbmount may not recognize all drives and only a few drives (e.g. 3 – 4 drives) are mounted. If this is the case, change the following line in /usr/share/usbmount/usbmount, from

```
lockfile-create --retry 3 /var/run/usbmount/.mount || \
to
```

```
lockfile-create --retry 99 /var/run/usbmount/.mount || \
```

This should be around line 221 of /usr/share/usbmount/usbmount. There are racing conditions to create 8 mount points by usbmount at the same time. After 3 retries fail, the mount point creation abort. The above change increases no. of retries to 99. However, this will take approximately 30 sec. to 60 sec. to create all mount points successfully.

5.5 Voyage MPD play with “click” sound or cannot play on my 24-bit/192kHz USB DAC or the playback is sluggish

There are 2 solutions to this problem:

5.5.1 Using network mounted drive instead of USB disk devices

Voyage MPD may not play music files properly or play with continual “click” noise for some 24-bit/192kHz USB DACs. This usually happens when both USB ports are used for USB DAC and USB hard disk / flash memory.

This is because the USB ports are not capable or have enough bandwidth to support both USB devices at the same time. To solve this problem, please use NFS / SAMBA mount for holding music files on a remote machine / NAS instead of USB hard disk / flash memory.

5.5.2 Changing MPD sample rate to auto.

The default MPD configuration assumes 44.1k 16-bit sampling rate. If your music files are in different bit-rate such as 192kHz 24-bit, resampling will be done by mpd software that consume a lot of CPU.

You can run "top" command to show the CPU consumption on mpd process.

To make MPD disable re-sampling and detect the bit-rate automatically, remove the "format" lines in /etc/mpd.conf like below:

```
audio_output {
    type "alsa"
    name "My ALSA Device"
    device "hw:0,0" # optional
#   format "44100:16:2" # optional
#   mixer_device "default" # optional
#   mixer_control "PCM" # optional
#   mixer_index "0" # optional
}
```

Then restart mpd service by running command "/etc/init.d/mpd restart".

5.6 Voyage MPD kit hangs during startup after reboot

The most of the reasons for the kit to hang during startup is the instability and under-power of a power adaptor (PSU). This is usually the case if you have a Voyage MPD Wireless kit or plug-in MiniPCI module that consumes extra power.

First, check the PSU to make sure it could provide a stable source of 15W power, which equivalent to 12V x 1.25A for example. Try switching to a different PSU to see if the hanging problem is resolved.

5.7 The music output is muted after reboot

In the recent version of Voyage MPD (e.g. 0.9-rc1), there is a known issue that the music output is muted after reboot. Run the following commands to check if you music device is set to mute:

```
# amixer

Simple mixer control 'XMOS Clock Selector',0
  Capabilities: pvolume pswitch penum
  Playback channels: Front Left - Front Right
  Limits: Playback 0 - 127
  Mono:
  Front Left: Playback 127 [100%] [0.00dB] [off]
  Front Right: Playback 127 [100%] [0.00dB] [off]
Simple mixer control 'XMOS Clock Selector',1
  Capabilities: pvolume pvolume-joined pswitch pswitch-joined penum
  Playback channels: Mono
  Limits: Playback 0 - 127
  Mono: Playback 127 [100%] [0.00dB] [off]
```

If you see the Playback is set to **[off]**, the music output is muted. You can use 'alsamixer' tools to unmute (by press 'M' key to toggle mute/unmute for each control). Or you can simply run the following commands:

```
# amixer scontrols|sed -e 's/^Simple mixer control/'|while read line;do amixer sset "$line" unmute;done

Simple mixer control 'XMOS Clock Selector',0
  Capabilities: pvolume pswitch penum
  Playback channels: Front Left - Front Right
  Limits: Playback 0 - 127
  Mono:
  Front Left: Playback 127 [100%] [0.00dB] [on]
  Front Right: Playback 127 [100%] [0.00dB] [on]
Simple mixer control 'XMOS Clock Selector',1
  Capabilities: pvolume pvolume-joined pswitch pswitch-joined penum
  Playback channels: Mono
  Limits: Playback 0 - 127
  Mono: Playback 127 [100%] [0.00dB] [on]
```