

# Complete Audio Chain Configuration - Ghetto Blaster

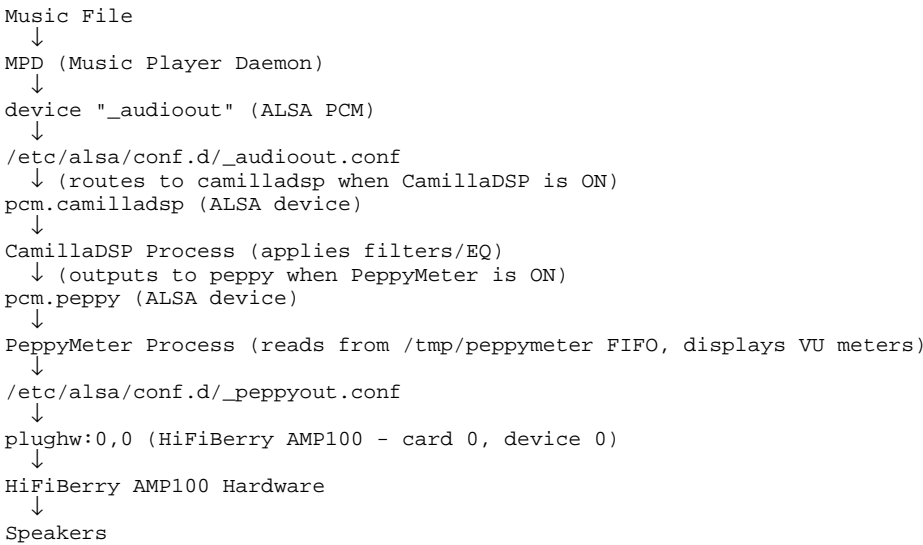
## HiFiBerry AMP100 + PeppyMeter + CamillaDSP

Date: 2025-01-09  
Status: ■ Complete Configuration Document

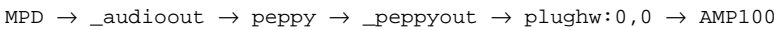
---

### ■ Audio Chain Overview

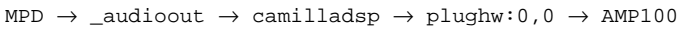
#### Complete Flow (PeppyMeter ON + CamillaDSP ON):



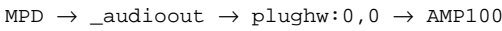
#### Simplified Flow (PeppyMeter ON, CamillaDSP OFF):



#### Simplified Flow (PeppyMeter OFF, CamillaDSP ON):



#### Direct Flow (Both OFF):



---

### ■ Configuration Files

#### 1. Boot Configuration (`/boot/firmware/config.txt`)

```
# Pi 5 specific
[pi5]
dtoverlay=vc4-kms-v3d-pi5,noaudio
hdmi_enable_4kp60=0

# Common settings
[all]
max_framebuffers=2
display_auto_detect=1
disable_fw_kms_setup=1
arm_64bit=1
enable_uart=1

# Display settings
disable_overscan=1
hdmi_group=2
hdmi_mode=87
hdmi_cvt=400 1280 60 6 0 0 0
hdmi_force_mode=1

# Audio settings
dtparam=i2s=on
dtparam=audio=off
dtoverlay=hifiberry-amp100,automute
force_eeprom_read=0
```

### Critical Settings:

- `dtoverlay=hifiberry-amp100,automute` - Enables AMP100 with auto-mute
- `dtparam=audio=off` - Disables onboard audio (prevents conflicts)
- `dtoverlay=vc4-kms-v3d-pi5,noaudio` - Disables HDMI audio

## 2. ALSA Configuration

**`/etc/alsa/conf.d/_audioout.conf`**

**Purpose:** Routes MPD output to correct destination

### Configuration Logic (from `updAudioOutAndBtOutConfs()`):

```
Priority order:
1. If alsaequal != 'Off' → slave.pcm "alsaequal"
2. Else if camilladsp != 'off' → slave.pcm "camilladsp"
3. Else if crossfeed != 'Off' → slave.pcm "crossfeed"
4. Else if eqfal2p != 'Off' → slave.pcm "eqfal2p"
5. Else if invert_polarity != '0' → slave.pcm "invpolarity"
6. Else if peppy_display == '1' → slave.pcm "peppy"
7. Else if audioout == 'Bluetooth' → slave.pcm "btstream"
8. Else → slave.pcm "plughw:CARD,0" (direct to hardware)
```

### Default Template:

```
pcm._audioout {
    type copy
    slave.pcm "plughw:0,0"
}
```

**`/etc/alsa/conf.d/_peppyout.conf`**

**Purpose:** Routes PeppyMeter output to hardware

### Configuration Logic (from `updPeppyConfs()`):

```
If audioout == 'Bluetooth':
    slave.pcm "btstream"
Else:
    slave.pcm "plughw:CARD,0" (or hw:CARD,0 or iec958 device)
```

### Default Template:

```
pcm._peppyout {
    type copy
    slave.pcm "plughw:0,0"
}
```

**`/etc/alsa/conf.d/camilladsp.conf`**

**Purpose:** ALSA wrapper for CamillaDSP

**Configuration:** Managed by CamillaDSP class

- Capture: stdin (pipe from MPD)
- Playback: Set by ``setPlaybackDevice()``
- If PeppyMeter ON: ``device: "peppy"``
- If Bluetooth: ``device: "btstream"``
- Otherwise: ``device: "plughw:CARD,0"``

### 3. MPD Configuration (``/var/lib/mpd/mpd.conf``)

**Audio Output:**

```
audio_output {
    type "alsa"
    name "ALSA Default"
    device "_audioout"
    mixer_type "hardware" # or "software" or "null" (for CamillaDSP)
    mixer_control "PCM" # or "Master" depending on device
    mixer_device "hw:0"
    mixer_index "0"
}
```

**Critical Settings:**

- ``device "_audioout"`` - Always uses ALSA ``_audioout`` device
- ``mixer_type``:
- ``"hardware"`` - Uses AMP100 hardware volume control
- ``"software"`` - Uses MPD software volume
- ``"null"`` - No volume control (used when CamillaDSP is active)

### 4. CamillaDSP Configuration

**Config File Location**

- Active config: ``/usr/share/camilladsp/working_config.yml``
- Configs directory: ``/usr/share/camilladsp/configs/``
- Coefficients: ``/usr/share/camilladsp/coeffs/``

**Playback Device Logic (``setPlaybackDevice()``)**

```
If peppy_display == '1':
    device: "peppy" # Output to PeppyMeter
Else if audioout == 'Bluetooth':
    device: "btstream"
Else:
    device: "plughw:CARD,0" # Direct to hardware
```

**Capture Device**

- Always: ``type: "Stdin"`` (reads from pipe)
- Format: Auto-detected from hardware capabilities

### 5. PeppyMeter Configuration (``/etc/peppymeter/config.txt``)

**Critical Settings:**

```
[current]
meter = blue # Always use blue meter skin
random.meter.interval = 0 # Disable random switching
meter.folder = 1280x400 # Display resolution folder
screen.width = 1280
screen.height = 400

[data.source]
```

```

type = pipe
pipe.name = /tmp/peppymeter      # FIFO pipe from MPD

```

**Meter Skin:** Always blue (set by `set-peppymeter-blue.sh`)

## 6. moOde Database Configuration

### Critical Parameters:

```

-- Audio device
cfg_system.cardnum = 0          -- AMP100 card number
cfg_system.i2sdevice = "HiFiBerry AMP100"
cfg_mpd.device = 0             -- MPD device card number

-- PeppyMeter
cfg_system.peppy_display = 1    -- 1 = ON, 0 = OFF
cfg_system.peppy_display_type = "meter" -- "meter" or "spectrum"

-- CamillaDSP
cfg_system.camilladsp = "bose_wave_filters.yml" -- Config file name or "off"
cfg_system.cdsp_fix_playback = "Yes" -- Enable playback device fix

-- Display
cfg_system.hdmi_scn_orient = "portrait" -- Hardware orientation
cfg_system.local_display = 1           -- 1 = Local display ON

```

---

## ■ Configuration Logic (PHP Code)

### Audio Output Routing (`updAudioOutAndBtOutConfs()`)

#### Priority Order:

1. **\*\*CamillaDSP\*\*** (highest priority if enabled)
2. **\*\*PeppyMeter\*\*** (if CamillaDSP OFF)
3. **\*\*Direct hardware\*\*** (if both OFF)

#### Code Logic:

```

if ($_SESSION['camilladsp'] != 'off') {
    $alsaDevice = 'camilladsp'; // Route to CamillaDSP
} else if ($_SESSION['peppy_display'] == '1') {
    $alsaDevice = 'peppy'; // Route to PeppyMeter
} else {
    $alsaDevice = 'plughw:' . $cardNum . ',0'; // Direct to hardware
}

```

### CamillaDSP Playback Device (`setPlaybackDevice()`)

#### Code Logic:

```

if ($_SESSION['peppy_display'] == '1') {
    $alsaDevice = 'peppy'; // Output to PeppyMeter for display
} else {
    $alsaDevice = 'plughw:' . $cardNum . ',0'; // Direct to hardware
}

```

**Result:** When PeppyMeter is ON, CamillaDSP outputs to peppy, which then routes to `_peppyout` → hardware.

---

## ■ Perfect Configuration Checklist

## ***Boot Configuration***

- [x] `dtoverlay=hifiberry-amp100,automute` in config.txt
- [x] `dtparam=audio=off` in config.txt
- [x] `dtoverlay=vc4-kms-v3d-pi5,noaudio` in config.txt
- [x] `dtparam=i2s=on` in config.txt

## ***moOde Database***

- [x] `cardnum = 0` (AMP100 card number)
- [x] `i2sdevice = "HiFiBerry AMP100"`
- [x] `mpd.device = 0`
- [x] `peppy\_display = 1` (if using PeppyMeter)
- [x] `peppy\_display\_type = "meter"`
- [x] `camilladsp = "bose\_wave\_filters.yml"` (or filter config name)
- [x] `cdsp\_fix\_playback = "Yes"`

## ***ALSA Configuration***

- [x] `\_audioout.conf` routes to correct device:
- CamillaDSP ON → `camilladsp`
- PeppyMeter ON (CamillaDSP OFF) → `peppy`
- Both OFF → `plughw:0,0`
- [x] `\_peppyout.conf` routes to `plughw:0,0`
- [x] `camilladsp.conf` configured correctly

## ***PeppyMeter Configuration***

- [x] `meter = blue` (always blue skin)
- [x] `random.meter.interval = 0` (no random switching)
- [x] `meter.folder = 1280x400` (correct resolution)
- [x] `pipe.name = /tmp/peppymeter` (FIFO pipe)

## ***CamillaDSP Configuration***

- [x] Config file exists in `/usr/share/camilladsp/configs/`
- [x] Playback device set correctly:
- PeppyMeter ON → `device: "peppy"`
- PeppyMeter OFF → `device: "plughw:0,0"`
- [x] Capture device: `type: "Stdin"`

## ***MPD Configuration***

- [x] `device "\_audioout"` (always uses ALSA \_audioout)
- [x] `mixer\_type`:
- CamillaDSP ON → `"null"` (no volume control)
- CamillaDSP OFF → `"hardware"` or `"software"`

---

## **■■ Safety Checks & Validation**

### ***Audio Chain Validation Script***

**Location:** `scripts/audio/validate-audio-chain.sh`

**Checks:**

1. AMP100 detection (`/proc/asound/cards`)
2. moOde database configuration
3. ALSA config files (`_audioout.conf`, `_peppyout.conf`)
4. MPD status and configuration
5. PeppyMeter status
6. CamillaDSP status
7. Volume/mute state

## ***Audio Chain Fix Script***

**Location:** `scripts/audio/fix-audio-chain.sh`

**Fixes:**

1. Detects AMP100 card number
2. Updates moOde database (`cardnum`, `i2sdevice`, `mpd.device`)
3. Fixes `_audioout.conf` to point to correct device
4. Fixes `_peppyout.conf` to point to AMP100
5. Unmutes and sets safe volume
6. Restarts MPD

## ***PeppyMeter Blue Skin Script***

**Location:** `scripts/wizard/set-peppymeter-blue.sh`

**Fixes:**

1. Sets `meter = blue` in `/etc/peppymeter/config.txt`
2. Disables random meter switching
3. Restarts PeppyMeter if running

---

## **■ Audio Chain Scenarios**

### ***Scenario 1: PeppyMeter ON + CamillaDSP ON***

`MPD → _audioout → camilladsp → peppy → _peppyout → plughw:0,0 → AMP100`

**Configuration:**

- `_audioout.conf`: `slave.pcm "camilladsp"`
- CamillaDSP playback: `device: "peppy"`
- `_peppyout.conf`: `slave.pcm "plughw:0,0"`
- MPD mixer\_type: `"null"` (CamillaDSP handles volume)

### ***Scenario 2: PeppyMeter ON + CamillaDSP OFF***

`MPD → _audioout → peppy → _peppyout → plughw:0,0 → AMP100`

**Configuration:**

- `_audioout.conf`: `slave.pcm "peppy"`
- `_peppyout.conf`: `slave.pcm "plughw:0,0"`
- MPD mixer\_type: `"hardware"` or `"software"`

### ***Scenario 3: PeppyMeter OFF + CamillaDSP ON***

MPD → \_audioout → camilladsp → plughw:0,0 → AMP100

**Configuration:**

- `\_audioout.conf`: `slave.pcm "camilladsp"`
- CamillaDSP playback: `device: "plughw:0,0"`
- MPD mixer\_type: `"null"`

**Scenario 4: Both OFF (Direct)**

MPD → \_audioout → plughw:0,0 → AMP100

**Configuration:**

- `\_audioout.conf`: `slave.pcm "plughw:0,0"`
- MPD mixer\_type: `"hardware"` or `"software"`

---

## ■ Configuration Update Functions

### ***`updAudioOutAndBtOutConfs(\$cardNum, \$outputMode)`***

**Purpose:** Updates `\_audioout.conf` routing

**Called from:**

- `updMpdConf()` - When MPD config is updated
- `setAudioOut()` - When audio output changes
- `changeMPDMixer()` - When mixer type changes

### ***`updPeppyConfs(\$cardNum, \$outputMode)`***

**Purpose:** Updates `\_peppyout.conf` routing

**Called from:**

- `updMpdConf()` - When MPD config is updated
- `setAudioOut()` - When audio output changes

### ***`setPlaybackDevice(\$cardNum, \$outputMode)`***

**Purpose:** Sets CamillaDSP playback device in YAML config

**Called from:**

- `updDspAndBtInConfs()` - When DSP configs are updated

---

## ■ Common Issues & Fixes

### ***Issue: No Audio Output***

**Causes:**

1. AMP100 not detected (check `/proc/asound/cards`)
2. Wrong card number in database
3. `\_audioout.conf` points to wrong device
4. MPD not running
5. Volume muted or too low

**Fix:** Run `fix-audio-chain.sh`

## ***Issue: PeppyMeter Shows No Activity***

### **Causes:**

1. PeppyMeter not running (``systemctl status peppymeter``)
2. FIFO pipe not created (``/tmp/peppymeter``)
3. MPD not outputting to ``_audioout``
4. ``_audioout.conf`` not routing to ``peppy``

**Fix:** Check PeppyMeter service and ALSA routing

## ***Issue: CamillaDSP Filters Not Applied***

### **Causes:**

1. CamillaDSP not running (``systemctl status camilladsp``)
2. Config file not selected in moOde
3. Config file missing from ``/usr/share/camilladsp/configs/``
4. Playback device misconfigured

**Fix:** Check CamillaDSP service and config file

## ***Issue: Wrong Meter Skin***

### **Causes:**

1. ``meter = blue`` not set in ``/etc/peppymeter/config.txt``
2. Random meter switching enabled

**Fix:** Run `set-peppymeter-blue.sh`

---

## **■ Verification Commands**

### ***Check Audio Chain***

```
# 1. Check AMP100 detection
cat /proc/asound/cards

# 2. Check ALSA routing
cat /etc/alsa/conf.d/_audioout.conf
cat /etc/alsa/conf.d/_peppyout.conf

# 3. Check MPD config
grep "device\|mixer_type" /var/lib/mpd/mpd.conf

# 4. Check moOde database
sqlite3 /var/local/www/db/moode-sqlite3.db \
    "SELECT param, value FROM cfg_system WHERE param IN ('cardnum', 'i2sdevice', 'peppy_display', 'cam"

# 5. Check PeppyMeter config
grep "meter\|random" /etc/peppymeter/config.txt

# 6. Check CamillaDSP config
cat /usr/share/camilladsp/working_config.yml | grep -A 5 "playback"

# 7. Check services
systemctl status mpd
systemctl status peppymeter
systemctl status camilladsp
```

### ***Test Audio Output***

```
# Direct hardware test
```



```
speaker-test -c 2 -t sine -f 1000 -D plughw:0,0

# Test via _audioout
speaker-test -c 2 -t sine -f 1000 -D _audioout
```

---

## ■ Deployment

### *Files to Deploy*

#### Scripts:

- ``scripts/audio/fix-audio-chain.sh` → `/usr/local/bin/``
- ``scripts/audio/validate-audio-chain.sh` → `/usr/local/bin/``
- ``scripts/wizard/set-peppymeter-blue.sh` → `/usr/local/bin/``

#### Services:

- ``moode-source/lib/systemd/system/fix-audio-chain.service` → `/lib/systemd/system/``
- ``moode-source/lib/systemd/system/set-peppymeter-blue.service` → `/lib/systemd/system/``

#### ALSA Configs:

- ``moode-source/etc/alsa/conf.d/_audioout.conf` → `/etc/alsa/conf.d/``
- ``moode-source/etc/alsa/conf.d/_peppyout.conf` → `/etc/alsa/conf.d/``

### *Deployment Method*

#### Via `INSTALLFIXESAFTER_FLASH.sh`:

- All scripts and services automatically installed
- Configurations applied on boot

#### Manual Deployment:

- Copy scripts to ``usr/local/bin/``
- Copy services to ``lib/systemd/system/``
- Enable services: ``systemctl enable fix-audio-chain.service``
- Run scripts manually or let services run on boot

---

## ■ Summary

#### Complete Audio Chain:

1. **\*\*MPD\*\*** outputs to ``_audioout`` ALSA device
2. **\*\*`\_audioout.conf`\*\*** routes based on enabled features:
  - CamillaDSP ON → ``camilladsp``
  - PeppyMeter ON → ``peppy``
  - Both OFF → ``plughw:0,0``
3. **\*\*CamillaDSP\*\*** (if ON) processes audio, outputs to:
  - PeppyMeter ON → ``peppy``
  - PeppyMeter OFF → ``plughw:0,0``
4. **\*\*PeppyMeter\*\*** (if ON) displays VU meters, outputs to ``_peppyout``
5. **\*\*`\_peppyout.conf`\*\*** routes to ``plughw:0,0``
6. **Hardware** `plughw:0,0` = HiFiBerry AMP100

#### Perfect Configuration:

- Boot: AMP100 overlay enabled, onboard audio disabled
- Database: Correct card number, device settings
- ALSA: Correct routing based on enabled features

- PeppyMeter: Blue skin, no random switching
- CamillaDSP: Correct playback device, filters configured
- MPD: Correct mixer type, device routing

**Safety:**

- Validation scripts check all components
- Fix scripts ensure correct configuration
- Services run on boot to maintain configuration
- Volume safety (unmute, set safe level)

---

**This document contains the complete, precise audio chain configuration for Ghetto Blaster system.**