



- 4×16 LCD
- 20 LEDs (connected to MBHP DOUT)

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## MIDIbox AY 3 8912 - Hardware

- 1x **Core** (Core8 V3, PIC18F452, MIOS 1.9f)
- 1x LCD Module: **4×16 LCD** (8bit) | See ⇒ [http://www.midibox.org/users/jim\\_henry/building\\_a\\_midibox\\_lcd\\_cable.pdf](http://www.midibox.org/users/jim_henry/building_a_midibox_lcd_cable.pdf)
- 1x **MIDIBox AY 3 8912 board** | See ⇒ [midibox\\_ay\\_3\\_8912\\_board](#)
- 1x **C64 Keyboard** (**C64 Keyboard**, **1xDOUT**(DOUT1: J3), **1xDIN**(DIN1: J3/J4) ) | See ⇒ [midibox\\_ay\\_keyboard](#) | [http://en.wikipedia.org/wiki/Commodore\\_64](http://en.wikipedia.org/wiki/Commodore_64)
- Optional: **CS LEDs** (Connection Diagram for 20 LEDs **MBHP DOUT**(DOUT J4,J5,J6) | See ⇒ [midibox\\_ay\\_cs\\_led](#)
- 1x **OP AMP Mixer** for Tone A B C (CHIP: LM324N (4xOP AMP) +/-12V) | See ⇒ [midibox\\_ay\\_3\\_8912\\_mixer](#)
- **PSU** +5V (MBHP Core +5V ⇒ AY 3 8912 board), +/-12V ⇒ OP AMP Mixer | See ⇒ [http://www.ucapps.de/mbhp/mbhp\\_opl3\\_psu.pdf](http://www.ucapps.de/mbhp/mbhp_opl3_psu.pdf)

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## MIDIbox AY 3 8912 - Software

MIDIbox AY 3 8912 Software Download (for PIC 18F452 (asm), MIOS 1.9f):

- MIDIBox AY 3 8912 Application V1.00 RC1a ⇒ [mbay18f452v1rc1a.zip](#) (22.11.2009)
- Application upload (main.hex) via MIDI ⇒ [MIOS Studio](#)
- Changes @ V1 RC1a : Bankstick (Store up to 127 MBAY Patches on Bankstick)
- Changes @ V0.07 : New Fx Option

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## User Menu - Overview

**User Menu** (4×16 LCD)

- [←] **Menu Overview**
- [F1] **Patch Menu**: load, name and store MIDIBox AY Patches ⇒ [PATCH MENU](#)
- [F2] **Tune Menu**: Detune Tone A, B and C (detune is NOT transpose!) - Details: ⇒ [TUNE Tone ABC \(MENU\)](#)
- [F3] **Mixer** (On/Off Tone A, B and C; On/Off - On/Off Noise @ A,B and C; On/Off Fx Option A,B and C)
- [F4] **Volume Control**: Tone A, B and C [0 to 15 dec.] - Details: ⇒ [VOLUME Tone ABC \(MENU\)](#)

- [F5] **Envelope Control**: Envelope Coarse, Env. Fine, Env. Shape, Env. Assignment to Tone A, B and C - Details: ⇒ [ENVELOPE \(MENU\)](#)
- [F6] **Midi Channel Tone A B C**
- [F7] **Velocity Menu** (Switch Velocity to Volume Tone A, B and C or Noise Period)
- [F8] **Fx Menu** Fx Options - Details: ⇒ [Fx Option](#)

Note: C64 Keyboard - [F2] = [SHIFT + F1], F4 = [SHIFT + F3], etc. (press the [SHIFT] KEY first!).

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### Menu Navigation

- Press [F1] to [F8]
- Step to the next Menu with [CTRL]
- Step to the previous Menu with [SHIFT] + [CTRL]

### Item Navigation:

- DOWN ⇒ [CRSR DOWN] (or [RETURN]) - Item pos. +1
- UP ⇒ [CRSR UP (+ SHIFT)] (or [ARROW UP]) - Item pos. -1

### Change Value:

- INCREMENT Value +1 ⇒ [CRSR →] or [+] or [>]
- DECREMENT Value -1 ⇒ [CRSR ←(+SHIFT)] or [-] or [<]

### Toggle Tone A, B and C (on/off):

- To toggle Tone A B C on/off just use key [A], [B] and [C] (Mixer Menu via [F3])
- To add "Noise" - same here.
- To toggle ENVELOPE Tone A B C on/off use key [A], [B] and [C] (Envelope Menu via [F5])

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## MIDIBox AY 3 8912 - Available MIDI Controllers (CC)

### Available MIDI Controllers for the MIDIBox AY 8912:

See MIDIBox AY 3 8912 CC LIST ⇒ [MIDIBox\\_AY\\_3\\_8912\\_CC\\_LIST](#)

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## Project Status

### DONE:

- C64 KEYBOARD INTERCONNECTION
- SERIAL INTERCONNECTION [ CORE :: J7 → 74HC595 → 8BIT OUT [AY ADDRESS/DATA] ]
- HARDWARE INTERCONNECTION of the AY-3-8912 Sound Chip

- 6 MAIN MENUS ON LCD
- Hardware: OP AMP Mixer for Tone A B C
- MIDI EVENT HANDLING (Note On / Note Off)
- (DE)TUNE MENU is working
- KEYBOARD HANDLING: continuous increment/decrement (via [+] / [-] and the LEFT/RIGHT CRSR Key)
- Added a MASTER VOLUME POT [See ⇒ [midibox\\_ay\\_3\\_8912\\_mixer](#)]
- MIDI CH TONE A B C adjustable
- AY 3 8912 Board (PCB), pdf added (thanks NILS!)
- VELOCITY MENU - switch Velocity to to volume Tone A, B, C and Noise Period [Press F7]
- Menu Navigation with CTRL key
- Keyb.: [CTRL] + [SHIFT] = Step one Menu back
- CONTROL CHANGE: CC 1-22 | See ⇒ [midibox\\_ay\\_3\\_8912\\_cc\\_list](#)]
- Created a MIDIBox AY 3 8912 - VOLUME MENU page | [See ⇒ [midibox\\_ay\\_3\\_8912\\_volume](#)]
- Enabled PITCH BEND @ Tone A, B and C
- SAVE INT. PATCH TO PIC EEPROM (AY Sound Patch Menu)
- Fx Option
- CS LED'S
- Bankstick Patches (MIDIBox AY V1.00)

## WHAT'S NEXT? - Future Plans: MB AY (YM) V2

- [http://www.midibox.org/dokuwiki/doku.php?id=midibox\\_ay\\_ym\\_v2](http://www.midibox.org/dokuwiki/doku.php?id=midibox_ay_ym_v2)

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## Pictures

- The **AY 3 8912** Sound Chip ⇒ [AY-3-8912 \(jpg\)](#)
- MIDIBox AY 3 8912 (Prototype) [mbay20080622c.jpg](#)
- MIDIBox AY 3 8912 (Prototype) [mbay20080622b.jpg](#)
- MIDIBox AY 3 8912 (Prototype) [mbay20080622a.jpg](#)
- Pictures By NILS  
<http://www.midibox.org/forum/index.php/topic,11653.msg102921.html#msg102921>

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## Links

- \* The MIDIBox AY 3 8912 Project @ The MIDIBox Forum ⇒ [Midibox AY 3 8912](#)
- \* The AY 3 8912 Chip ⇒ [en.wikipedia.org](http://en.wikipedia.org) [AY-3-8912](#)
- \* AY-3-8910 AY-3-8912 AY-3-8913 Datasheet ⇒ [AY\\_3\\_8913\\_datasheet.pdf](#)

- \* The Programmable Sound Generator (PSG) ⇒ [PSG \(inteliwiki\)](#)
- \* Mockingboard ⇒ <http://johnson.tmfc.net/apple/mockingboard.html>

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