

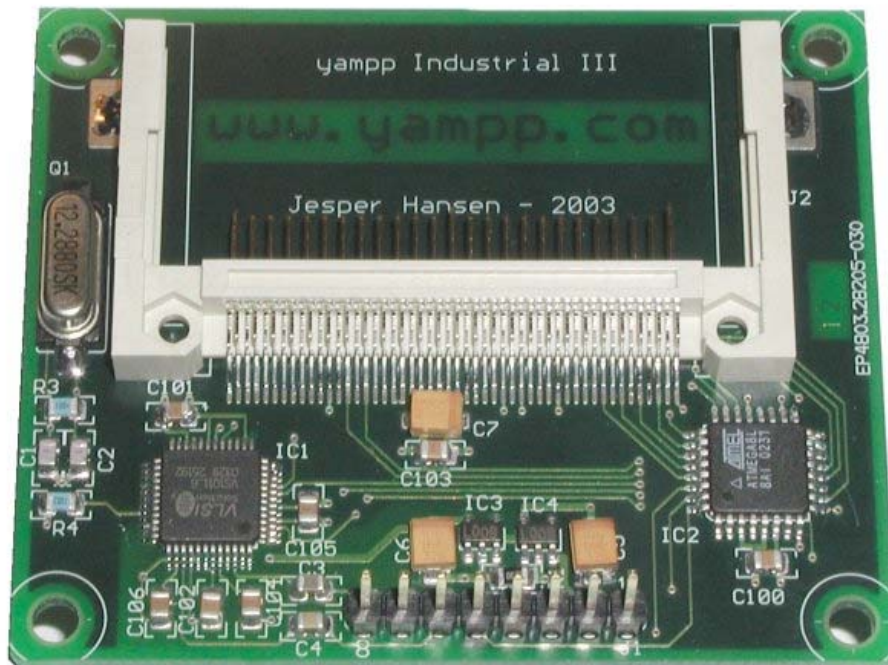
# yampp Industrial III

## Board Specification

### Rev. C

(hardware rev A)  
(boot firmware 1.1)

2006-11-20



## Table of Contents

<i>Document History</i>	<i>1</i>
<i>Company Information</i>	<i>1</i>
<i>Features</i>	<i>1</i>
<i>Overview</i>	<i>1</i>
<i>Technical Data</i>	<i>2</i>
<i>Playing Time</i>	<i>2</i>
<i>Usage</i>	<i>2</i>
<i>Serial Interface</i>	<i>3</i>
Serial Commands	3
yampp Extensions	4
<i>Speed Setting</i>	<i>4</i>
<i>Firmware Update</i>	<i>5</i>
<i>BUSY Pin</i>	<i>5</i>
<i>Restoring Default Settings</i>	<i>5</i>
<i>Connectors</i>	<i>6</i>
<i>Board Layout</i>	<i>6</i>

## Document History

Date	Author	Revision	Comments
2004-01-02	Jesper	A	Initial Revision
2005-03-17	Jesper	B	Clarifications and corrections
2006-11-20	Jesper	C	Speed setting and eeprom erase added

## Company Information

JELU HB is a privately owned company located in Vallentuna, just north of Stockholm, Sweden. We're specializing in MP3 technology, both for leisure and for commercial applications. We have been designing MP3 devices since 1999. Many of the designs are used in commercial applications such as alarm and evacuations systems, presentation and kiosk displays, theme parks, various entertainment systems as well as in busses and trains.

For more information please contact Jesper Hansen at [jesper@jelu.se](mailto:jesper@jelu.se) or call +46 (8) 511 711 21.

Also see the company and player websites: <http://www.jelu.se/> and <http://www.yampp.com/>

## Features

The yampp Industrial III (YI3) is the newest commercial MP3 player based on the yampp series of MP3 players. See [www.yampp.com](http://www.yampp.com) for details.

Compared to the yampp Industrial, it's physically smaller, but at the expense of the digital control inputs and the power supply.

However, it has a completely new firmware, making it compatible with the command set used by Quadravox players, making it easy to replace these.

The YI3 has the following feature :

- + Small size, only 50x60 mm. Card protruding 14 mm on long edge.
- + High quality 4-layer PCB for low EMI.
- + CompactFlash card based. Using standard PC formatted FAT16 cards. Card can be up to 4GB, allowing more than 70 hours of continuous, unrepeatable near CD quality music (at 128 kbps).
- + Easy and fast firmware upgrade through a file on the CF card.
- + Serial asynchronous interface for remote control of the player (Like RS-232, but at 3.3V levels).
- + BUSY status output line.
- + Flexible 5-15V DC supply voltage.
- + Line level output for connection to an external amplifier.
- + Low power consumption. Approx. 40 mA (operating, with Sandisk 128 MB card).
- + Plays all MP3 bitrates up to and including 320kbps.

## Overview

The yampp Industrial III, is like its sister card, the yampp Industrial, mainly intended as a replacement for mechanical playback units such as Cassette Decks or CD-ROMS. The mechanical nature of these devices often makes them slow and/or unreliable and require regular maintenance or replacement.

The yampp Industrial III is a complete Solid-State design, with no moving parts, offering high reliability and reducing maintenance to an absolute minimum.

The player firmware has an extensive command set, which makes it highly flexible. A few features like autostart e.t.c. allows it to be used autonomous in some environments, but it's mainly intended for being controlled by an external controller.

The player can be controlled via the serial port. The communication standard is like normal RS-232, but at 3.3V level with active low signalling.

## Technical Data

Supply voltage	5-15 V DC
Power Supply Current	40 mA (operating)
Audio Output Level	1.8V pp
Output Load	30 Ohm
Total Harmonic Distortion	0.1 %
Dynamic Range	90 dB
S/N Ratio	87 dB
Channel Separation	70 dB

## Playing Time

The playing time depends on the CF card size and the bitrate used. 16 or 32 kbps is generally used for voice or medium quality music, while 128, 192 or 256 kbps is used for music in near CD quality. The times shown in the table below is total playing time for a certain CF card size. This time can of course be divided between a number of separate files.

	16 kbps	32kbps	64kbps	128kbps	256kbps
<b>16MB</b>	2:19	1:09	0:34	0:17	0:08
<b>64MB</b>	9:19	4:39	2:19	1:09	0:34
<b>128MB</b>	18:38	9:19	4:39	2:19	1:09
<b>256MB</b>	37:16	18:38	9:19	4:39	2:19
<b>512MB</b>	74:33	37:16	18:38	9:19	4:39
<b>1GB</b>	149:07	74:33	37:16	18:38	9:19

*Approximate playing times for some common CF cards and bitrates (hours:minutes)*

## Usage

To start the player, simply insert a CF card containing MP3 files into the player.

The player currently only supports files in the root directory (limiting the number of files to 512).

The player only looks at the first 3 characters of the filename, so both long and short filenames can be used.

The files should therefore be named "000xxx.mp3" to "511xxxxx.mp3", where x can any valid filename string (or empty).

## Serial Interface

The player have standard asynchronous serial interface. It's like a RS-232 interface, but operating at 3.3V levels.

The interface speed defaults to 19200 bps, but this can be changed to any speed from 1200 to 38400 bps. The new speed value will be stored in EEPROM so the player will use that value, even after power off, until set again. The data format is 8-bit, no parity.

The serial port will report the status on all commands executed on the player. Status for playing commands will be returned when the playing is complete.

## Serial Commands

The player is compatible with the command set also used by the Quadravox MP3 players. In addition to this, it has a number of "extension" commands, for special configuration and control.

The player supports the following commands :

0x01-0x7F:	Play one of the 127 directly addressed sounds. Will play sounds with filenames "001*.mp3" to "127*.mp3".
0x80-0xB8:	Set common volume (both channels) to one of 56 levels (0x80 is mute). Returns <volume >
0xC0-0xCF:	Set balance left (by attenuating the right channel 0-15 levels) Returns <balance>
0xD0-0xDF:	Set balance right (by attenuating the left channel 0-15 levels) Returns <balance >
0xE0:	Play file number 1-255. The file number is defined by the next transmitted byte. Will play sounds with filenames "001*.mp3" to "255*.mp3".
0xE1:	Play file number 256-511. The file number (minus 256) is defined by the next transmitted byte. Will play sounds with filenames "256*.mp3" to "511*.mp3".
0xE4:	Return the hardware revision.
0xE5:	Return the software revision.
0xE6:	yampp Extension. See next section.
0xE7:	not implemented <i>retrieve file. The second byte contains a coded representation of the file name</i>
0xE8:	not implemented <i>pop phrase</i>
0xE9:	not implemented <i>push phrase</i>
0xEA:	Unmute the Left channel. Returns <mode >
0xEB:	Mute the Left channel. Returns <mode >
0xEC:	Unmute the Right channel. Returns <mode >
0xED:	Mute the Right channel. Returns <mode >
0xEE:	Set extended balance; the second byte is +/- 56. Negative = left. Returns <balance >
0xEF:	Return the number of files detected, modulo 256
0xF0:	Stop playing.
0xF1:	Clear loop mode; play in progress will complete. Returns <mode >
0xF2:	Increment volume. Returns <volume >
0xF3:	Decrement volume. Returns <volume>
0xF4:	Set loop mode. Returns <mode >
0xF5:	Get status.
0xF6:	Get errors. Returns <errors >
0xF7:	S/W reset.
0xF8:	Pause.
0xF9:	Resume.
0xFA:	Jog balance left. 56 steps. Returns <balance >
0xFB:	Jog balance right. 56 steps. Returns <balance >
0xFC:	Get volume. Returns <volume >
0xFD:	Get balance. Returns <balance >
0xFE:	Get revision. Returns 4.
0xFF:	Get type. Returns 0x79 ('y') .

For each command, the status byte is returned (except where otherwise indicated).  
The status byte has the following format:

Bit	Meaning
7	hardware error
6	alternate busy bit
5	no card in socket
4	pause
3	blank (requested file not found)
2	mute
1	loop
0	playing

## yampp Extensions

For further functionality beyond the Quadravox compatibility, the yampp Extension command (0xE6) can be used.

CMD	Databytes	Function
0x01	1	Set the level of the power on beep in 0-55 levels.
0x02	1	Set Logo display flag. (1=display logo (startup text) )
0x03	1	Set Song autostart 0-255. (Setting 0 will cancel any autostart)
0x04	1	Set Song autostart 256-511.
0x05	1	Set Saved Volume restore flag. (1=Restore on reset).
0x06	0	Save current volumes.
0x07	0	Restore saved volumes.
0x08	1	Set debug level. (0-3, 0=off, 3 begin most verbose.)
0x09	1	Speed setting (see below)

All commands will respond with 'y', unless otherwise indicated. If a command is not understood, a '?' will be returned.

## Speed Setting

To change the communication speed, use the yampp Extension command 0xE6 0x09. Follow this with a single databyte, indicating which speed to use. The value to use for various speeds are as follows:

0x00 – 1200 bps  
 0xCF – 2400 bps  
 0x67 – 4800 bps  
 0x33 – 9600 bps  
 0x19 – 19200 bps  
 0x0C – 38400 bps

It's NOT recommended to use speeds above 38400 bps.

## Firmware Update

The player supports download of new firmware through a file on the CF card. The file should be named **YAMPPIND.BIN** and located in the root directory of the card.

The player will automatically replace the current firmware with the one on the CF card. Note that there is no version control, so you can also "downgrade" to a previous version. Also, you can easily upgrade to a custom version, especially designed for your needs.

To update, remove power from the player and insert the CF card with the new firmware. The player will transmit the following bytes on the serial port, indicating the progress:

'B' - bootloader started.

'P' - yamppind.bin file found, programming started.

'D' - programming successful.

Now remove power and the CF card from the player and insert a card containing the MP3 files. When applying power to the player, it should respond with 'B' and 'A', indicating that the application has been started.

## BUSY Pin

The BUSY pin will go high during a playback of a song. Commands can still be sent, it's just an indicator of the playing status.

In addition to this, the BUSY pin will be high during the player initialisation. No commands should be sent after power-up or reset until BUSY goes low. This normally takes about 100-200 mS.

## Restoring Default Settings

If an incorrect speed setting has been issued or, for some other reason it is necessary to return all settings to their default values, connect the BUSY and RXD pins together and power cycle the player. After this, all player settings are returned to the default values.

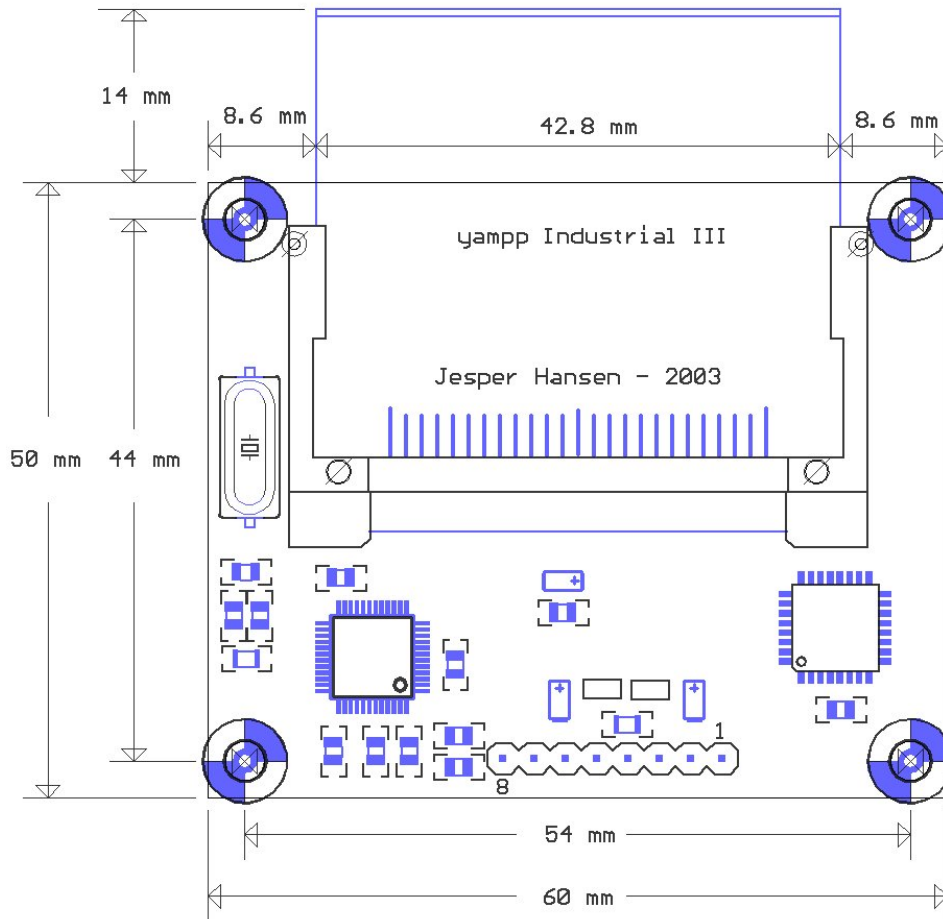
(The BUSY and RXD pins should not have any other connections when this is performed.)

## Connectors

All signals to and from the player are available on the 8-pin connector J1. This is a standard 0.1" (2.54mm) pin-header.

J1 Connector	
Pin #	Function
1	GND
2	5-15V DC input
3	TXD
4	RXD
5	BUSY Out
6	Right Channel Out
7	GNDA
8	Left Channel Out

## Board Layout



Mounting holes diam. 3.2 mm  
 Height 6.2 mm, not including the J1 connector.