



Yampp-3U Reference Manual

Written by Eric Guérard
Version 1.11

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1 History

Date	Version	Written by	Notes
February 09, 2004	1.00	Eric Guérard	First Version
June 17, 2004	1.10	Eric Guérard	Color LCD, Minor Fixes
November 10, 2005	1.11	Jesper Hansen	Keyboard layout fix

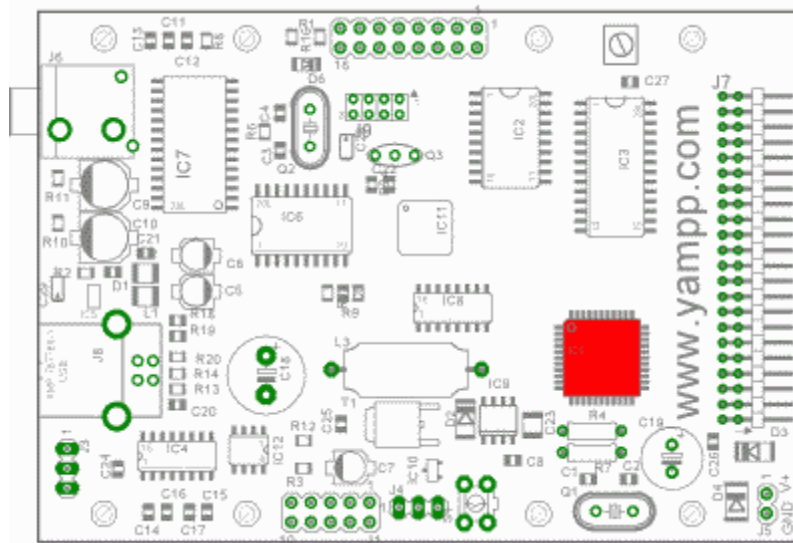
This document will guide you step by step to the building process of the yampp-3U Rev. D MP3 player. It is very important to follow each step. For further information go to the Yampp website <http://www.yampp.com/>

2 PCB Assembly

Here are the step-by-step instructions for the building process of the Yampp3U.

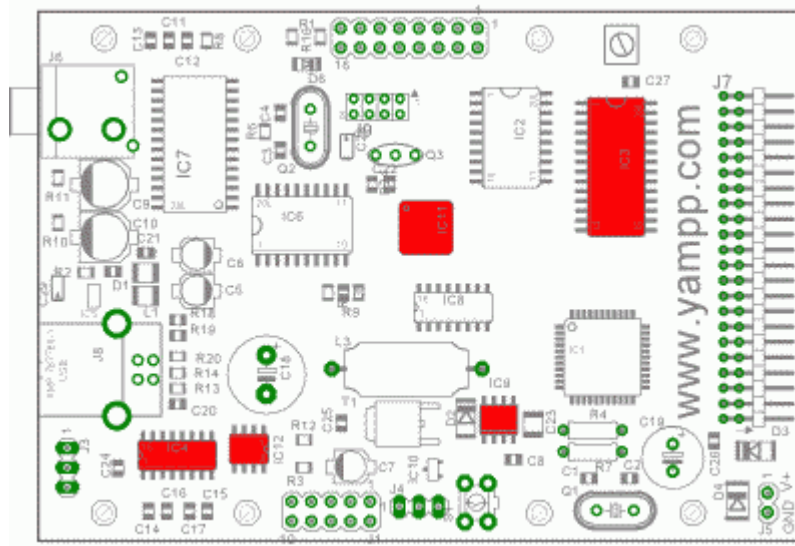
Step 1

Install the processor (ATMEGA162). Carefully verify the orientation of the processor before soldering it.



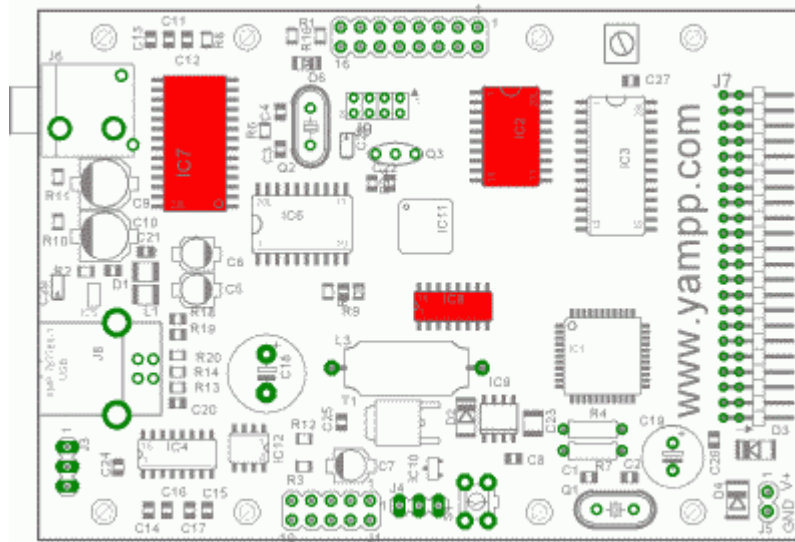
Step 2

Install the USB chip (FT245BM) and some surface mount IC. IC12 is **optional**. Mount either IC4 or IC12 **but not both together**. Once again don't forget to verify the parts orientations.



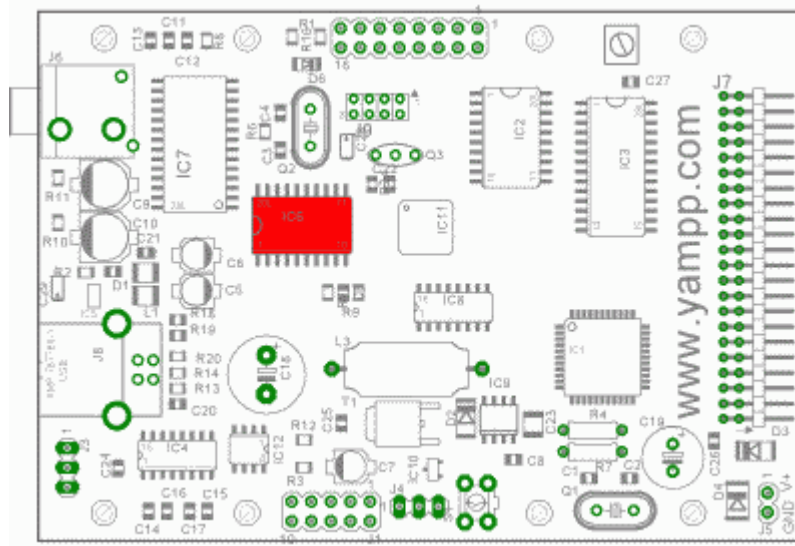
Step 3

Install the MP3 Decoder (VS1001K) and some surface mount IC.



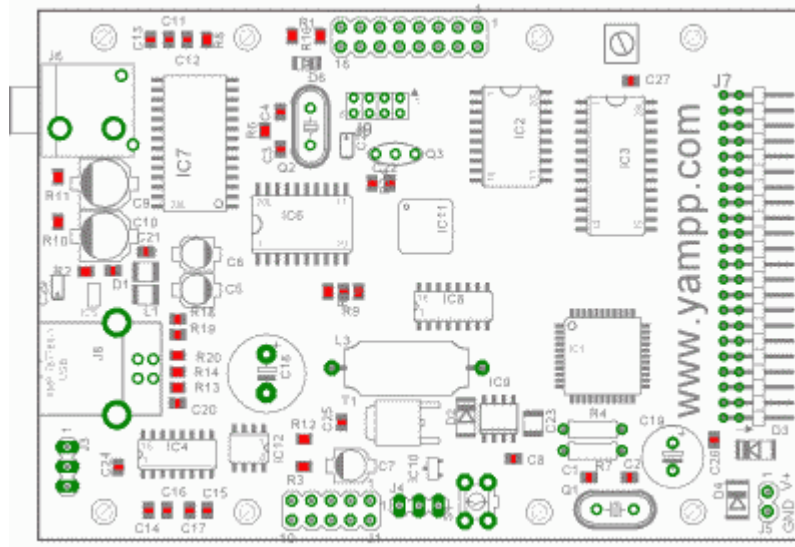
Step 4

Install the buffer IC (74LVC245)



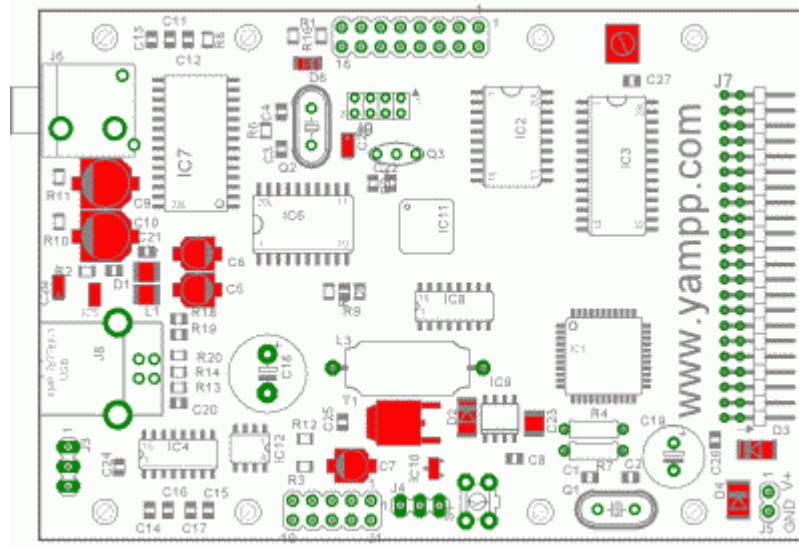
Step 5

Install all the small surface mount parts such as resistors and capacitors.



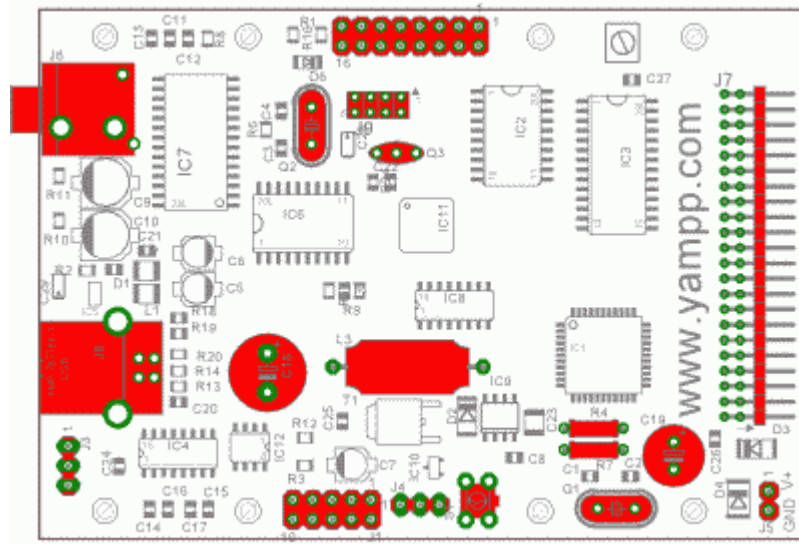
Step 6

Install the larger surface mount parts.



Step 7

Install the entire thru-hole components.

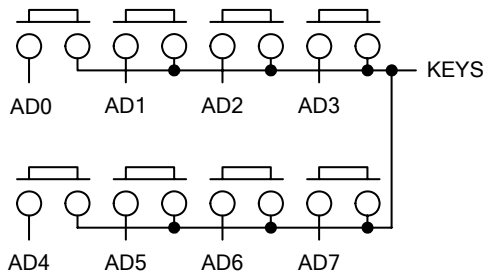


3 Keyboard Assembly

This table shows the installation of the keyboard and shows the basic functionality. It is possible to add and/or change the functionality of the buttons. You simply have to edit the "constant.h" in the firmware package, rebuild and update the firmware. The procedure of updating the firmware is explained in section 8.1.

Note: It's not possible to press 2 buttons at the same time. This will cause a bus conflict.

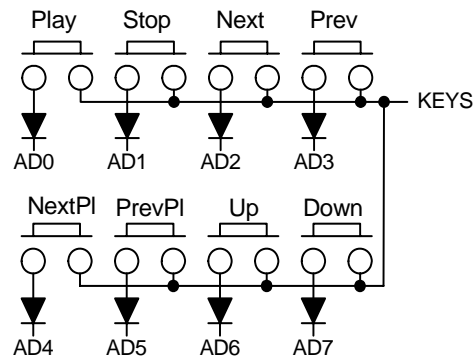
Keyboard + Display



TX_EN	16	○	○	15	KEYS
AD7	14	○	○	13	AD6
AD5	12	○	○	11	AD4
AD3	10	○	○	9	AD2
AD1	8	○	○	7	AD0
LCD_E (E)	6	○	○	5	A1 (R/W)
A0 (RS)	4	○	○	3	V0 (VEE)
VCC	2	○	○	1	GND

J2

Here is an alternative to correct the bus conflict problem. You simply have to add a diode for each line of data. You can use 1N4148 diode or equivalent.



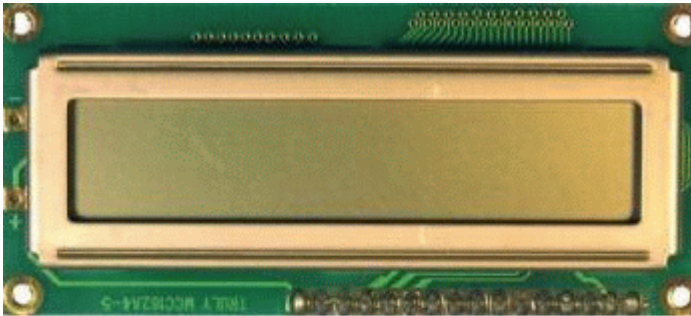
4 LCD Assembly

Several types of LCD can be installed on the Yampp-3U player. Here is the instruction to install a character LCD module and the Nokia graphic LCD.

4.1 Character LCD Installation

It's possible to install different kind and size of character display module. Actually, Yampp-3U can support 2x16, 2x20, 2x24, 2x40, 4x16 and 4x20 characters displays. You must edit the "constant.h" in the firmware package to define the display that will be use and you must rebuild and update the firmware. The procedure of updating the firmware is explained in section 8.1.

The next table shows you how to connect the character LCD module. The pinout of the LCD module can be different from a model to another one. So it is **very important** to check the LCD datasheet for the correct pinout.



GND
VDD
VEE
E
RS
R/W
AD0
AD1
AD2
AD3
AD4
AD5
AD6
AD7

Keyboard + Display

TX_EN	16	○	○	15	KEYS
AD7	14	○	○	13	AD6
AD5	12	○	○	11	AD4
AD3	10	○	○	9	AD2
AD1	8	○	○	7	AD0
LCD_E (E)	6	○	○	5	A1 (R/W)
A0 (RS)	4	○	○	3	V0 (VEE)
VCC	2	○	○	1	GND

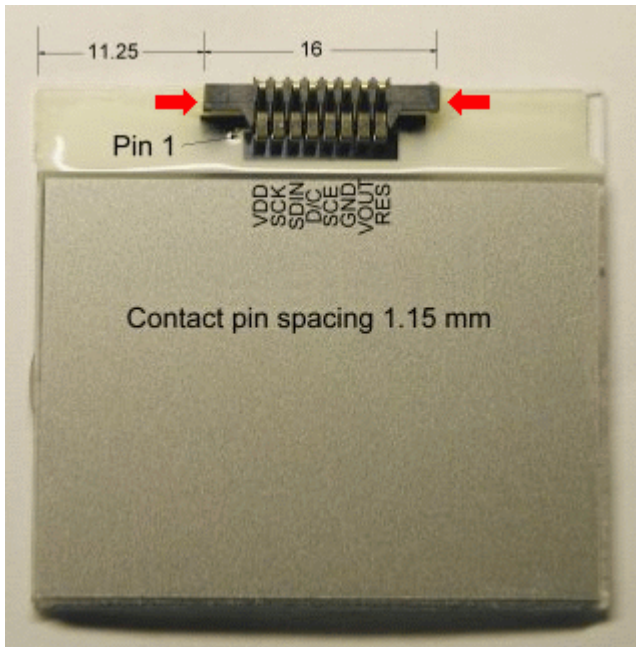
J2

4.2 Nokia 3310 Graphic LCD Installation

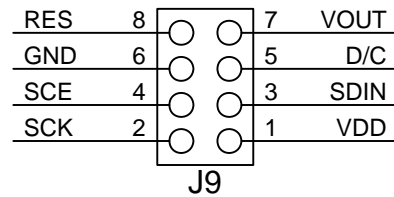
Here is the installation instruction to install the Nokia 3310 graphic LCD. The LCD is connected via J9 on the Yampp3U board. Be **very careful** when soldering on the LCD.

You must edit the "constant.h" in the firmware package to define the display that will be use and you must rebuild and update the firmware. The procedure of updating the firmware is explained in section 8.1.

Tips: I suggest you to apply 2 little drops of epoxy glue on each side of the connector. See the red arrows.



NOKIA DISPLAY



4.3 Color Graphic LCD Installation

Here is the installation instruction to install the Nokia 6610 color graphic LCD. You will need a different firmware package for the color LCD.

4.3.1 What you need

- Yampp3U revision C or newer.
- Nokia 6610 Color LCD using the Phillips or Epson controller.
- Firmware version 3.00 or higher.
- 330 ohm / 0.5w resistor for the display backlight or a white led driver module.
- One 1N4148 diode, only if you have Epson based display module.

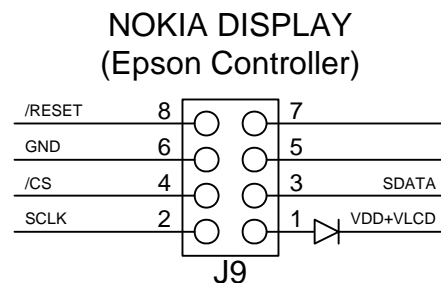
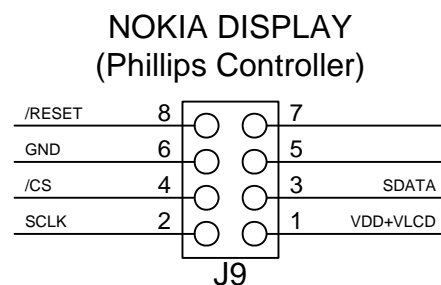
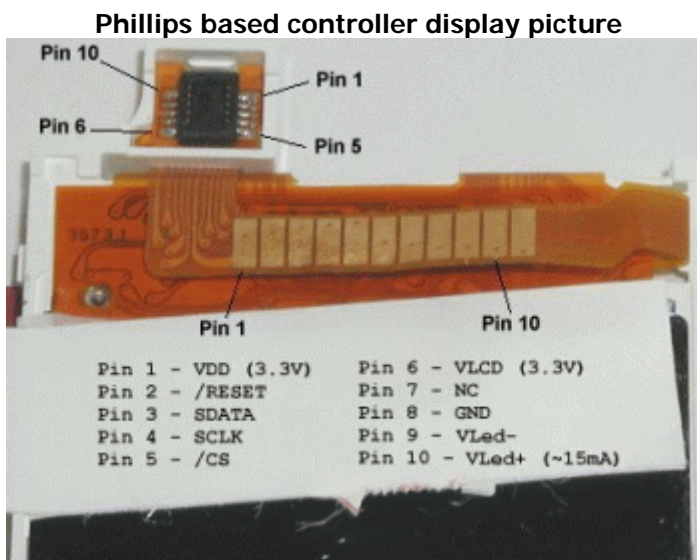
4.3.2 Display Connections

If you have the Phillips based controller, you should see 11 gold pads after removing the sticker on the backside of the display. You can solder wires directly on these gold pads. Solder carefully without using too much heat. Pin 9 and pin 10 from LCD are used for backlight connections.

If you have the Epson based controller, you will not find the gold pads. You must use a connector or you can solder the wires directly on it. Additionally you must insert a 1N4148 diode in series with the display power lines. Connect anode to pin1 of J9 and connect cathode to pins 1+6 of the display.

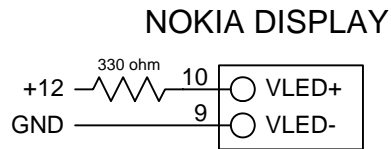
4.3.2.1 Display Signal

The next picture will guide you to connect display wires on the Yampp connector (J9).



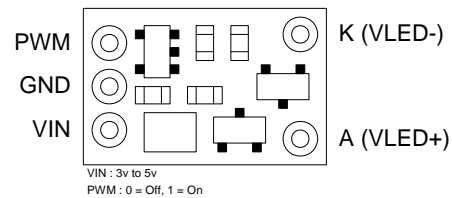
4.3.2.2 Display backlight (Option 1)

The white LED backlight needs a supply voltage of 6.5v at 15ma. You can power the backlight from the unregulated YAMPP input power source. I.E. If you power up the YAMPP3/U from 12V supply, you simply have to connect VLED+ to the supply thru 330-ohm resistor, and VLED- to the GND.



4.3.2.3 Display backlight (Option 2)

It's also possible to power up the white led with this driver module. This module can be found on the web shop. The diagram shows the pin connections. The VIN pin should be connected to +5V VCC*. The PWM pin can be connected to the pin 5 of J9 but currently the firmware does not support the backlight control.



4.3.3 Firmware





Step 1: Download the latest firmware in the software section of the YAMPP web page. The firmware package you need is: "Yampp3U with color LCD firmware version 3.10b or above".

This version of Y3U firmware has a special definition for characters table. This definition is "#define ROM_CHARS" located in "Constant.h" file. This option provides two ways for storing the characters table in the player. The characters table can be stored in Flash memory of the microcontroller or in the hard disk. If this definition is uncommented, the characters table will be located in the flash memory of the microcontroller. Unfortunately this option will consume about 1720 bytes of code space memory. For code space problem, you can disable some other options. By default, UART INFO and IR numerical keys are disabled.


Enabling this option is recommended according to these actions.

- First time display connection.
- Not sure about the setup.
- Installation and format a new drive.

If you need a lot of options and/or you have a code space problem, you can disable the special definition. If you comment the "#define ROM_CHARS" definition, the characters table will be located in the disk drive. The characters table will be loaded inside the RAM memory of the microcontroller during startup. The display will stay dark until the initialization of the hard disk and the file system. If something fails during initialization, you will not able to see something on the display except if the hard disk is not in YADL format. In this case you will see the progress bar and the player will step into the boot loader mode. Additionally, there's no disk format function when you select RAM character generator mode.

-  **Step 2:** Choose your firmware options inside the definition file "constant.h".
-  **Step 3:** If you use Epson based LCD, don't forget to uncomment the "#define EPSON_LCD" definition inside the definition file "constant.h".
-  **Step 4:** Recompile the firmware using AVR-GCC version 3.3. After the recompilation, check the "yampp3_usb.bin" file size!!! This file **MUST BE LESS** than 15360 bytes or you will overwrite the boot loader.
-  **Step 5:** Update the firmware. This procedure is explained in section 8.1.







Now, if you use fonts on hard disk ("#define ROM_CHARS" commented), you will need to transfer the characters table into your hard disk. If you look inside the "RAM_ASCII" folder, you will find the "ascii.bin" file. This file must be transfer into 3 sectors starting from the first physical sector of your hard disk (sector 1, 2 and 3). To do the transfer, you will need a software called YLINK version 0.9.5b or above or you can use the old "RdWrTest.exe" program. The "YLINK" software has a special command called "put-colorchar". You can use this command to do the job.

-  **Step 6:** Execute "YLINK -d COM5 put-colorchar ascii.bin" (if you're player use COM5) or edit the "download.bat" file to setup the COM number and the YLINK path then run the batch file.

4.3.4 Graphics Skin Upload

The display is connected and the new firmware is burned into the chip? Now it's time to upload the graphic layout into the Hard disk. You can find the default graphic files (Skins) inside the "SKINS" folder. If you don't upload any graphics, you will only see a black screen and nothing else. If you want use the default skin, you may skip steps 1, 2 and 3 from procedure described bellow.

If you want to install another skin than the default skin, you can download some from Yampp web page. The use of another skin will require some additional configuration to do.

-  **Step 1:** Download your favorite skin in the software page. Unzip the package into Yampp firmware folder.
-  **Step 2:** Find out the "lcd_layout.h" file from the skin folder and copy this file to the main firmware folder. You have to replace the original file.
-  **Step 3:** Recompile and program this new firmware.
-  **Step 4:** Power up the player and connect the USB cable.
-  **Step 5:** Edit the "download.bat" file and setup the COM port and setup the path of YLINK.
-  **Step 6:** Run the "download.bat" file. After a moment the player will restart and you should see the startup screen.

There are more information on graphic layout inside "bitmaps.txt" file. This file can help you to design your own graphic layout.

5 Power up the player

Here are some **VERY IMPORTANT** tips when powering the player.

Do not connect the hard disk for the moment. We must verify if the board work perfectly before.

Connect a 7-15V supply to the power connector (J5). **DON'T connect** your 30 Amps PC supply or similar, but use a power supply with current limiting, or use a series resistor of about 22 - 33 Ohms. This will limit the current to about 50mA.

When the power is connected, D1 should be lit. If not, there's a power short circuit somewhere, or the LED is mounted the wrong way. Next, check the VCC* voltage value. This should be near to 5V.

But I'll assume that all goes well, and you can probably remove the series resistor. Now check the voltage from the LP2980 regulator (IC5). Measure the voltage at the wires between L1/C5 and L2/C6. You should measure 3.0 Volt.

6 Program the boot loader

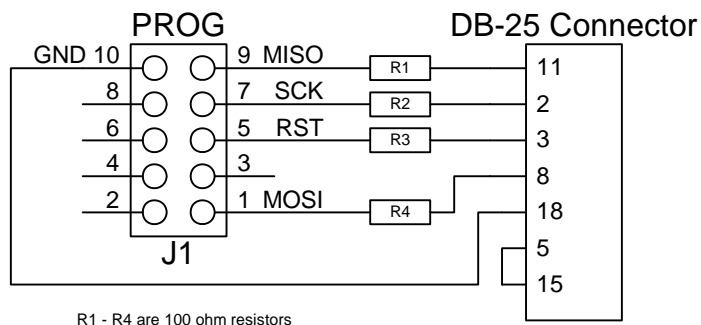
Before you can download the firmware via USB, you need to program the player with the boot loader code. This has to be done using the in-circuit programming interface, which you can get access with the programming connector (J1).

To program the bootloader you will need a piece of Windows software called "YAAP", a parallel port driver software and a programming adapter. You can download the application and the parallel port driver here: <http://www.myplace.nu/avr/yaap/index.htm>. You can download the latest version of the boot loader in the software section of this page: <http://www.myplace.nu/mp3/index2.htm>. If you are using the Nokia display, use the boot loader including the character set (V3.00).

Step 1: Download and install DLPortIO Driver.

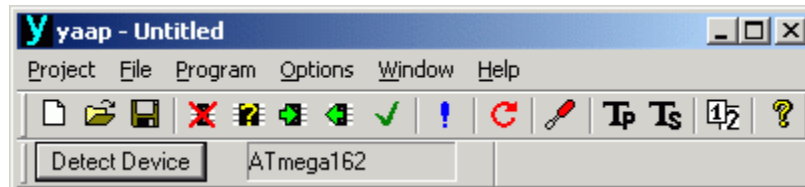
Step 2: Download the YAPP application, unzip and copy all the files to a directory of your choice.


Step 3: Build and connect this programming adaptor to your YAMPP-3U. This programming adaptor is derived from the Jesper's Original programming adaptor.





Step 4: Power-up the player in proper way.

Step 5: Start the yapp application. Press the "Detect Device" button located in the toolbar. YAPP should detect the ATMEGA162.





 **Step 6:** Create a new project. Select the "Project, New Project" menu. This step will create a project window, a Flash window and an EEPROM window.

 **Step 7:** Erase the contents of the ATmega162. Select the "Program, Erase Chip" menu and follow the directions.

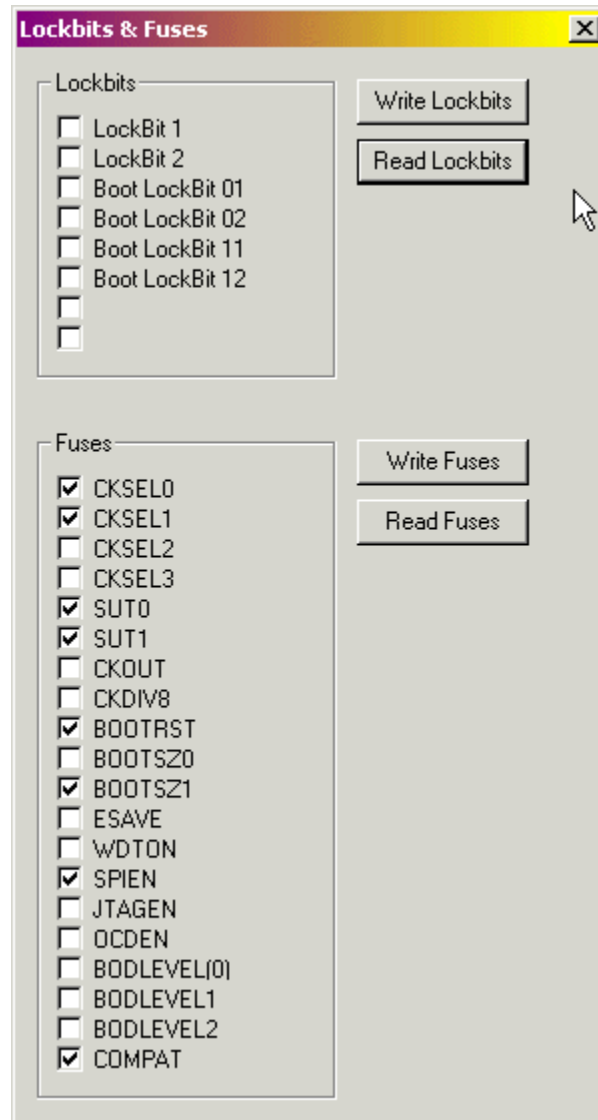
 **Step 8:** To make sure everything is blank. Select the "Program, Blank Check" menu and follow the directions.

Step 9: Program the Boot loader. Click anywhere in the Flash window then select the "File, Load" menu. Choose the "y3_boot_M161C_mode.hex" File. The Boot loader should be in the computer memory.

 **Step 10:** Now it's time to transfer the Boot loader into the ATmega162. Select "Program, Write Flash" menu and follow the directions.

 **Step 11:** Verification of the flash integrity. Select "Program, Verify Flash" menu and follow the directions.

Step 12: Program the fuses. Select the "Program, Lock bits & Fuses" menu. Select the fuses to be programmed and press the "Write Fuses" button. The next image shows the exact fuse setting you should use.



Step 13: Close the program and disconnect the programming cable.

7 USB Drivers installation

You need the [VCP Drivers](#) from [FTDI](#) for the USB to work. The installation is standard. Download and unpack the drivers on a directory on your PC. Plug in the yampp-3U player and you should be prompted for the location of the drivers. **(You must power-up the player before connecting the USB cable)**. Browse to the drivers and follow the installation instructions. You should see the USB device in the USB Controller section as "USB High Speed Serial Controller", and you should have a new comport too. **You need to set the COM port to COM5**. You do this through the device manager.

8 Program Test Firmware

8.1 Programming

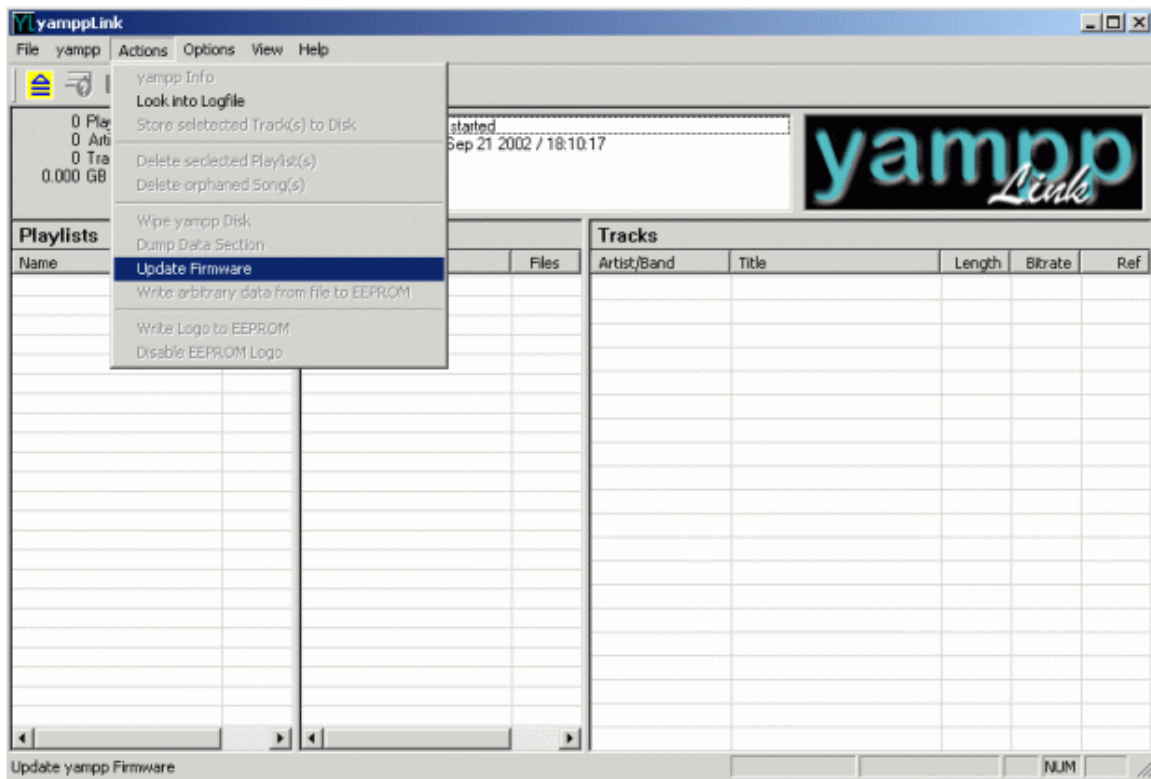
This Section describes the procedure to upload the test firmware in the player. The purpose of the software test is to test all the peripheral of the player such as MP3 decoder, Memory and so.

Step 1: Power up the player without the USB cable.

Step 2: Press the "STOP" button or short pin 8 and 15 of J2 while resetting the player (reset button). You should see the LED (D5) blinking. This will indicate that the player is ready to receive the new firmware.

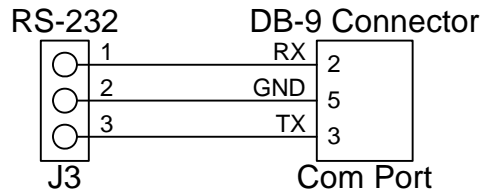
Step 4: Reconnect the USB cable.

Step 5: Start the [yamppLink](#) application and select "Update Firmware" on the "Actions" menu. You will be prompted for a **.BIN** file to download. Browse to the file you want and press Ok. The file will be downloaded and the download progress shown in the progress bar at the lower right of the window.



8.2 Hardware Testing

To perform hardware test you will need to connect the player to a PC serial port. The next figure will show you how to build the cable. Then you will need a good terminal program. The settings of the terminal program are 115200 bauds, 8 bits, No parity and 1 stop bit.



Step 1: Start and setup the terminal program.

Step 2: Power-up the player.

Step 3: Press "?" to display the main menu. You should see the test menu on the screen.

Step 4: Do the entire hardware test.

9 Program Player Firmware

To program the latest firmware you simply have to do the procedure explained in section 8.1. Once the firmware is up and running, you are ready to transfer songs with the help of Yampplink software.

10 General Characteristics

	Min	Typ	Max	Units
USB Transfer Speed	TBD	230	-	KB/s
Power consumption playing **	TBD	250	TBD	mA
Power consumption in power-down mode	TBD	TBD	TBD	mA

** Depending of the hard disk