H0420

Programmable MP3 Audio Player for Exhibitions and Kiosk Applications

Firmware Update: Version 1.2 Build 3508

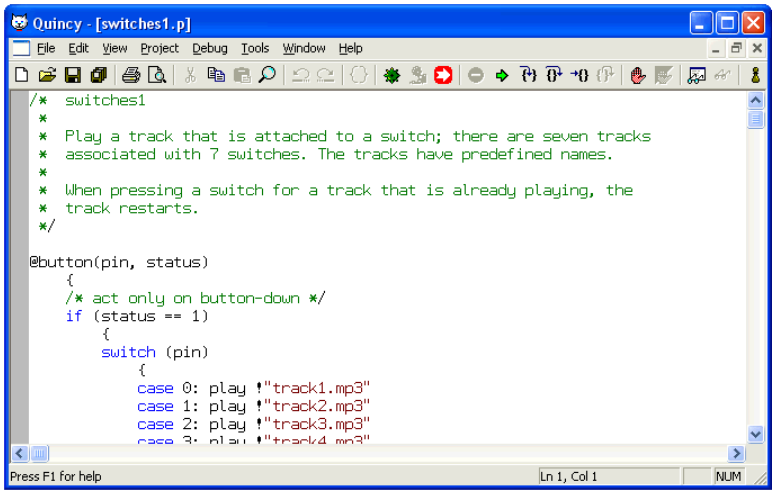
For upgrading to the new firmware, please see page 4 for the procedure.

This document describes the changes since version 1.1 of the firmware (build 3444). If you want to review the changes between versions 1.0 and 1.1, please see the document “h0420_3444.pdf”.

New functionality

1. Quincy: an IDE for PAWN

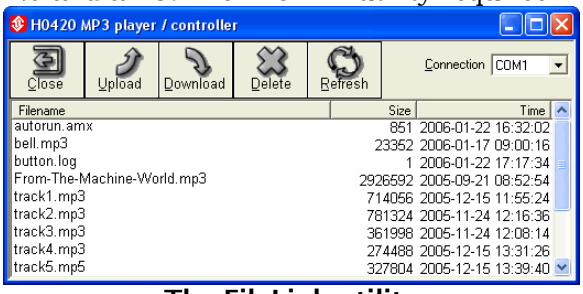
The PAWN toolkit now comes with the Quincy IDE, an open source “Integrated Development Environment” published in Dr. Dobb's Journal. The version of Quincy that comes with PAWN is modified to better suit the rest of the PAWN toolkit. Quincy integrates a code editor, a debugger, the compiler and file upload utilities. The Quincy IDE requires Microsoft Windows.



The Quincy IDE for PAWN

2. New utility: FileLink for transferring files

The PAWN debugger and the Quincy IDE can transfer compiled scripts over the RS232. The new utility FileLink that comes with the H0420 software allows to transfer other files over the RS232 connection between the H0420 and a PC. The FileLink utility requires Microsoft Windows.



The FileLink utility

3. Ready-made scripts

This release of this firmware upgrade contains a few complete scripts, compiled and ready for use.

The scripts are configurable with an “INI” file, and they are separately documented.

4. Seek to a position in an MP3 file

The new function seekto() allows you seek to a position in an MP3 file that is currently playing. You can seek forward or backward in the track. If the MP3 track uses variable bitrate (VBR), it needs a Xing/VBR header for accurate positioning. See the programmer's “Guide & Reference” for details.

5. Packet recognition and filtering for received RS232 data

The new function **`packetfilter()`** allows to set definitions for a format of a data “packet” of a serial protocol. When a full packet is received, the new public function **`@receivepacket()`** is called with the full packet as a parameter. This relieves the script from assembling packets from individual bytes and, as a result, it also gives better performance. The **`packetfilter()`** function can also be set up so that it filters incoming packets and only leaves through those that match the filter. This is convenient if the H0420 MP3 player is connected to a data bus that transports data and commands for multiple devices. The H0420 can then be set up to monitor only the commands that are addressed to it.

6. Signal / wave generator on the analogue pin

The H0420 supports a continuous wave signal on the analogue output pin, using the new function **`wavegenerator()`**. The frequency can be set between 0.001 Hz and 5 kHz. The supported wave forms are sine, triangle, square, sawtooth and inverted sawtooth.

7. The device now always polls for an external debugger to connect

After a power-up and after a reset, the H0420 polls for a period of 2 to 3 seconds for an external debugger to attach, provided that a Compact Flash card is present in the device. In the old behaviour, the H0420 only polled for a debugger if the script (“AUTORUN.AMX”) on the Compact Flash card included debugging information. The new behaviour allows the debugger to upload new scripts over a serial line (RS232) regardless of whether the script that is currently present on the card contains debugging information. It also allows uploading a script to a blank Compact Flash card.

8. New function volumebounds() to set the low and high volume limits

Audio volume is a complex subject, insofar as that the lowest audible volume depends on environmental sound. The **`volumebounds()`** function allows to set a low and high bounds, so that the function **`setvolume()`** adjusts the volume in this range.

The Programmer's “Guide & Reference” documents the behaviour of the **`volumebounds()`** and how it interacts with **`setvolume()`**.

9. New native function settimestamp() to set date and time

The new function **`settimestamp()`** sets the date and time using a single numeric parameter. The parameter is the number of seconds since 1 January 1970 (the Unix epoch).

10.Precision time stamp of a I/O pin change

The new function **`inputlapse()`** returns the number of milliseconds between the most recent I/O pin change (for an input pin) and a base time stamp (e.g. of an earlier pin change). The returned value is in milliseconds, but it has a microsecond resolution.

11.The firmware now also supports version 2.2 of the ID3 tag

Previous releases only supported the versions 2.3 and 2.4 of the ID3 tag. Since version 2.2 of the ID3 tag standard is still widely used (but it is incompatible with version 2.3 and 2.4), the firmware was updated to support ID3 version 2.2 as well.

12.PAWN scripting language

The compiler and toolkit have been improved in various areas, especially in the integration with the Quincy IDE.

13.Miscellaneous new functionality

The new **`strformat()`** function is similar to **`printf()`**, but it stores the formatted result in a string rather than sending it to the LCD. The function **`headerinfo()`** now supports a new code, **`MP3_Length`**, which returns the duration of the track in milliseconds.

14.More scripting examples

New examples on logging, play lists, storing configuration settings, and receiving commands from a remote control were already mentioned. Other new examples illustrate using switches and synchronizing digital output (e.g. turning on LEDs or relays) with music. More examples will be published on our web site in the coming months, please see http://www.compuphase.com/mp3/ for more information.

Corrections and behavioural changes

1. Timer resolution and performance

The timer resolution (or "granularity") is changed from 1 ms to 10 ms. The time functions still take parameters in milliseconds and return the timestamps in milliseconds too, but all timestamps will be rounded to intervals of 10 ms. This change was implemented to significantly reduce the time needed to obtain a time stamp.

2. Large ID3 tags caused failure

An MP3 file that contained an ID3 tags that was several hundreds of kilobytes big could cause the H0420 to drop into a reset. This issue was due to a programming error, which has now been fixed. Note that the H0420 may need several seconds to parse through very large ID3 tags.

3. Overall improvement of the performance of events

Due to internal delays in the sequencing of public ("event") functions, no more than 100 events per second could technically be handled. With the modified scheduler, we have achieved up to 5000 events per second. The number of events that can be handled in a second depends, of course, on the performance of the public function itself.

4. Resetting the H0420 to "Boot Loader Mode" sometimes failed

Under specific circumstances, the H0420 could not be switched to the special "Boot Loader Mode" (see page 6); only a power cycle would then be effective. This issue has been fixed. Note that if you wish to start the H0420 in Boot Loader Mode, for trouble shooting, it is still recommended to "power cycle" the device first.

5. The RS232 port is closed when the Baud rate is set to zero

When you pass a Baud rate of zero to the function **`setserial()`**, the serial port is now closed down. This reduces power usage of the device and removes RS232-compatible voltages from the pins of the RS232 connector.

Upgrading the Firmware

When upgrading firmware, the scripts in the PAWN language should also be recompiled with the latest release of the PAWN compiler. Any "**amx**" file built for earlier versions of the firmware may not function accurately with the new firmware. The new release of the PAWN toolkit is included in each firmware update.

The procedure below describes how to upgrade the firmware using a PC running Microsoft Windows. When you do not run Microsoft Windows, please contact us for an alternative upgrade procedure.

We advise you to read through this procedure before starting the upgrade, so that you have a mental picture of the steps that are involved in the procedure.

1. Install the software

If you have not done so already, download the firmware update and then "open" or "run" the file. The firmware update file is a *setup* program that installs the required components. If you received the firmware update on CD-ROM, you can install it directly from the CD-ROM.

2. Connect the H0420 to a PC & remove the Compact Flash card

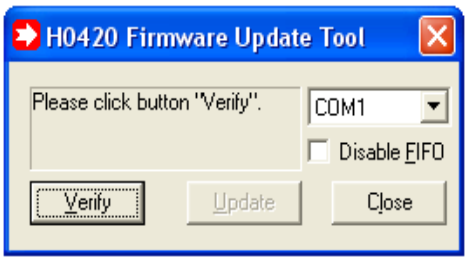
First unplug the H0420 MP3 player from the 5V power. Then remove the Compact Flash card from the H0420, and connect a standard RS-232 cable (not a null-modem cable) between a PC and the H0420. Plug the power connector back into the H0420 once the serial cable is connected. Do not re-insert the Compact Flash card (this is done in step 5).

If you are using a simulated RS-232 port (for example, through an USB-to-RS232 adapter), it is best to wait a few seconds between inserting the RS-232 plug and the power plug —10 seconds should always be sufficient.

If the device was already connected to the PC through the RS-232 cable and the Compact Flash card had already been removed, it is still advised to remove the power plug for a few seconds, so that the device does a full restart.

3. Run the "Firmware Update Tool"

Locate the "Firmware Update Tool" in the *Start Menu* (under *Programs / H0420 MP3 Controller)*, and run it —this tool was installed in step 1. See the screen shot below for the appearance of the Firmware Update Tool.



Make sure that the correct COM port (RS-232) is selected in the update tool.

Some simulated RS-232 ports (USB-to-RS232 adapters) do not properly simulate the RS-232 FIFO buffers. For these devices, you may set a check-mark in the "Disable FIFO" option.

4. First click "Verify", then click "Update"

Click on the button "Verify" and allow it to complete. This function checks the current firmware version and the device model and reports these to you. If all is well, it will tell you the version number of the firmware that is currently in the H0420, as well as the version number of the latest firmware. If the device already has the latest firmware, this tool will tell you so.

If the “Verify” button found no error, you can click on the button “Update”. Updating the firmware may take a minute. Do not abort the program while the firmware update is processing.

After the update has completed, the program will inform you that the device will automatically reset itself after a time-out of a few seconds. If you wish to check that the firmware has indeed been uploaded correctly, you will have to wait at least this number of seconds before clicking on the button “Verify”.

5. Recompile the PAWN script

Recompile the script and store the resulting file AUTORUN.AMX on the Compact Flash card. Make sure that the script is compiled with the up-to-date PAWN compiler. You can now re-insert the Compact Flash card in the H0420 player.

Trouble shooting — when uploading fails

If the “Verify” button times out and responds with the error message:

Unable to synchronize with the device.
Please check the serial connection.

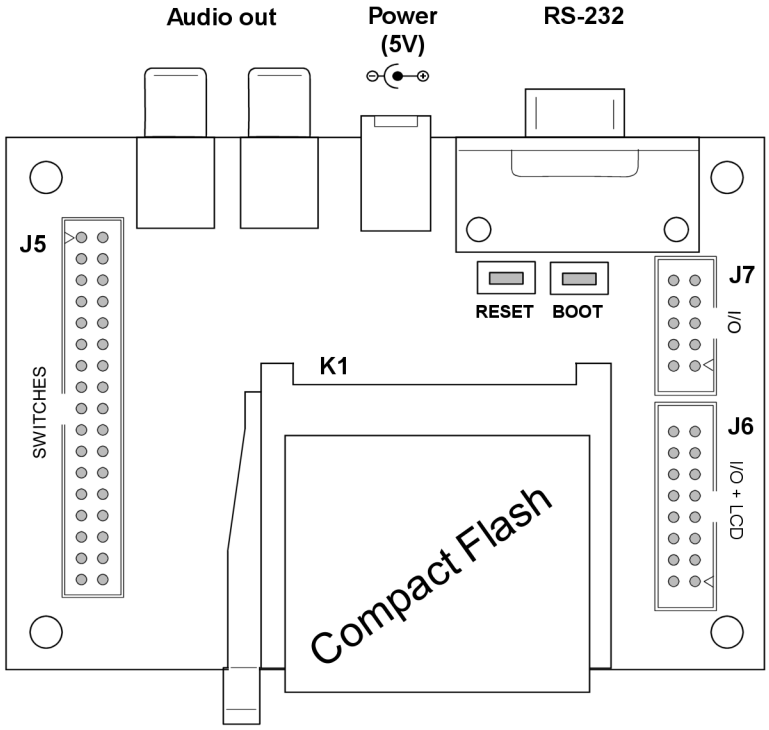
- check the RS-232 cabling
- “power cycle” the H0420 MP3 player (remove the power plug from the device for a few seconds and then re-insert it)
- run the above procedure again.

If this fails again, try to reset the H0420 while the Update Tool is busy verifying the device. That is: click on the button “Verify” and then press the “**RESET**” switch on the H0420. See below for the location of the reset button. You may also want to try to perform the procedure after a reboot of the PC, or from a different PC.

If all fails, a last option that you can try is to set the H0420 in “Boot Loader mode” (see below), and run the procedure again. In this case, the “Verify” button will inform you that it cannot find the “current” version of the firmware in the H0420, but it still allows you to update to the latest revision. Resetting the H0420 to Boot Loader mode is typically necessary when an earlier upload has been aborted or interrupted.

Resetting the H0420 to “Boot Loader mode”

The H0420 has two switches, behind the connector of the RS-232. In order to gain access to these switches, it may be necessary that you open the case in which the H0420 is mounted.



These switches must be pressed and released in the correct order:

- Press (and hold) “**RESET**”
- Press (and hold) “**BOOT**”
- Release “**RESET**”
- Release “**BOOT**”

It is advised to “power cycle” the device before resetting it to boot loader mode, and to remove the Compact Flash card.