



# **Q1aUpgrade User Manual**

Version 1.0.3  
21-July-08

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# Introduction

The Q1aUpgrade application is used together with a Quantum Programmer to upgrade the firmware in your Quantum HO locomotive.

In order for the upgrade to proceed, your locomotive must already contain version 7 firmware, also referred to as "Q1a" firmware. If your locomotive does not contain version 7 firmware, you must purchase a version 7 upgrade chip from QSI Solutions. See <http://qsisolutions.com/> for further information.

Q1aUpgrade works only with ".q1a" files which can be downloaded from QSI Solutions. Each Q1a file contains a binary image of the flash memory for a specific Quantum HO locomotive, along with additional information describing the type of locomotive for which this binary image was constructed.

In general, you should upgrade your locomotive with a Q1a file constructed for your particular locomotive. Q1aUpgrade allows you some leeway when it comes to upgrading with a binary image constructed for a different model, but it will first warn you about potential problems that might result.

Q1aUpgrade will prevent you from upgrading a locomotive equipped with a Volume Pot and Reset Jumper with a binary image constructed for a locomotive with a Reed Switch, and vice-versa. If you attempt to run Volume Pot / Reset Jumper firmware on the Reed Switch locomotive, or vice-versa, the results are unpredictable. Usually you will experience start up problems, system volume problems, and loss of data stored in Long Term Memory.

There are two types of Q1a files. The first type has the letter 's' appended to the file name, as in "100-0v7-2-0s.q1a". The binary image in this type of Q1a file will only run on a special flash memory chip, the "Lucky Flash" chip. The second type does not have the letter 's' appended, as in "407-0v7-8-0.q1a". The binary image in this type of Q1a file is not restricted to Lucky Flash chips. This generic firmware will run on any chip.

If you purchased a Q1a upgrade chip from QSI Solutions, that chip is a Lucky Flash chip. You can upgrade that chip with either type of Q1a file. For example, either "100-0v7-12-0s.q1a" or the generic "100-0v7-12-0.q1a" will work.

If your locomotive came from the manufacturer already programmed with version 7 firmware, in most cases the flash memory chip is not a Lucky Flash chip. Q1aUpgrade will not allow you to reprogram this type of chip with firmware constructed to run only on Lucky Flash chips. For example, the generic "100-0v7-12-0.q1a" will work but "100-0v7-12-0s.q1a" will not.

Recent versions of Q1aUpgrade support the SiLabs Virtual Comm Port Driver as well as the standard SiLabs USB Driver. The SiLabs Virtual Comm Port Driver for the Quantum Programmer is provided for use with applications that do not support USB drivers. If you want to run such applications with the Quantum Programmer you must use the Virtual Comm Port Driver. In that case, you can either switch back to the USB Driver when you want to run Q1aUpgrade or you can configure Q1aUpgrade to use the Virtual Comm Port Driver.

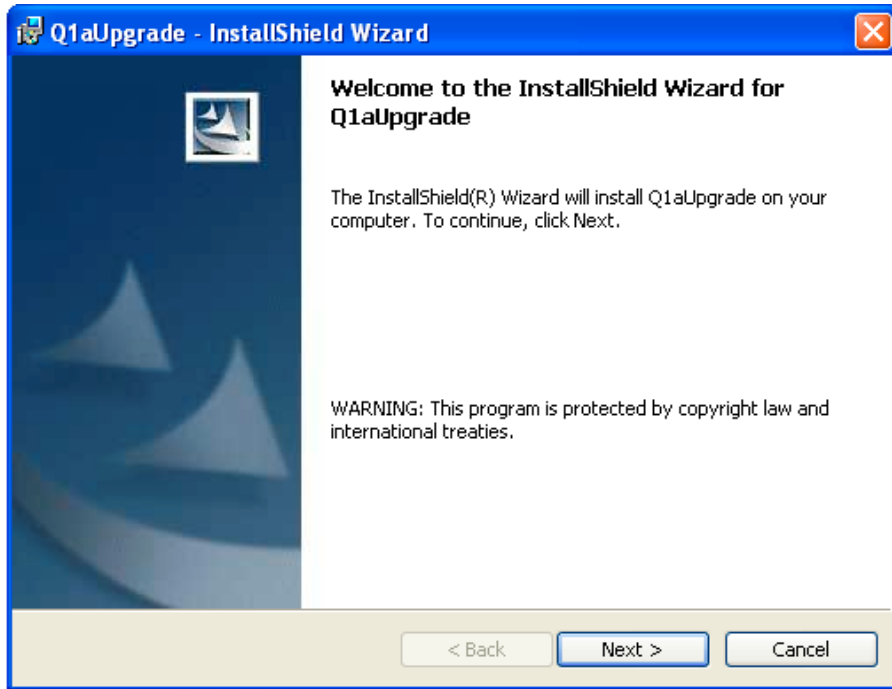
To configure Q1aUpgrade to use the Virtual Comm Port Driver, see the section on "Quantum Programmer Options".


# Installing Q1aUpgrade

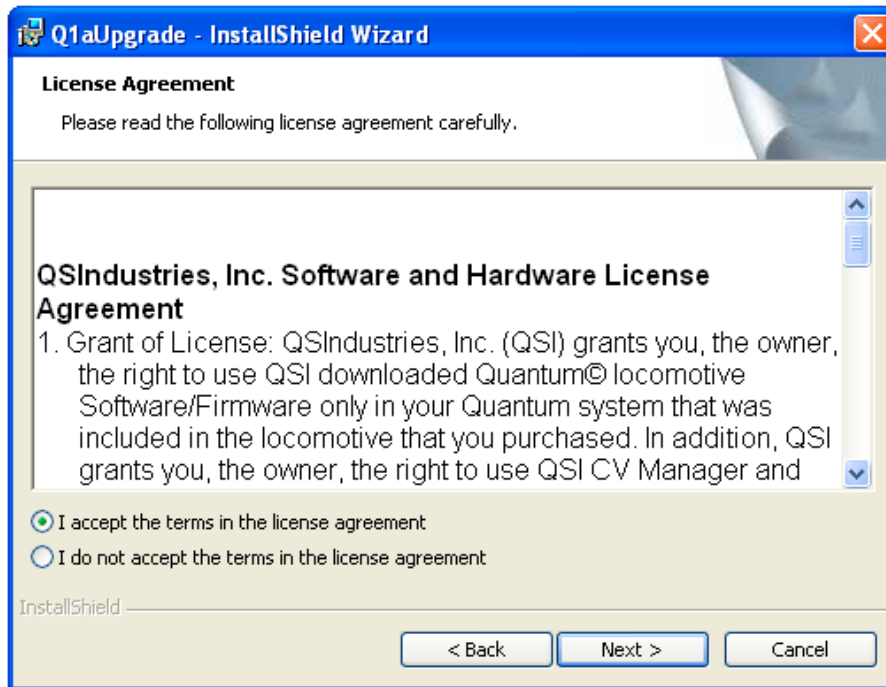
Get the install file for latest version of Q1aUpgrade from the QSI Solutions website at:  
<http://www.qsisolutions.com/products/q-programmer.html>

Double click on the install file.

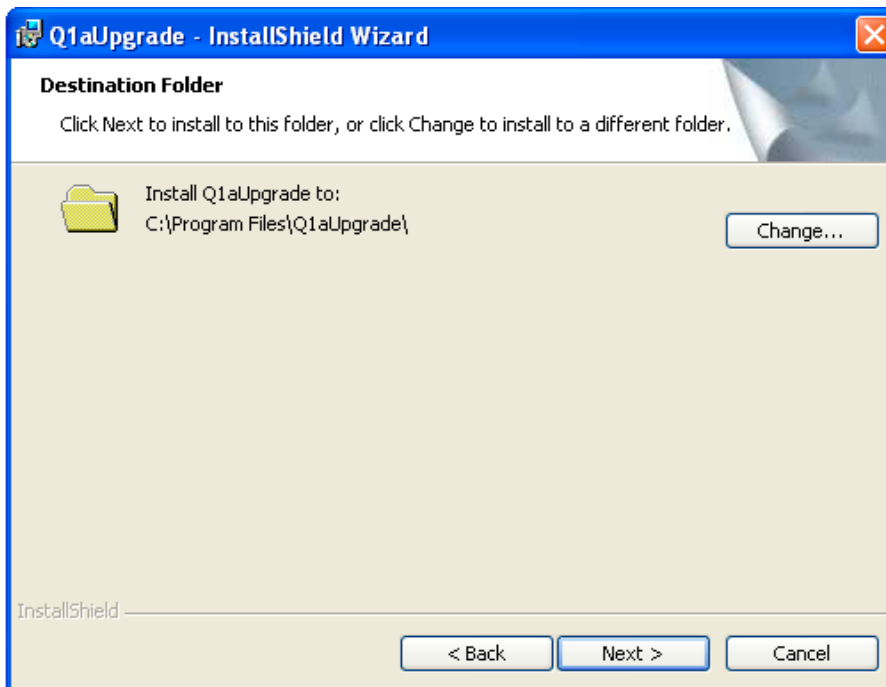
The install screen will appear.



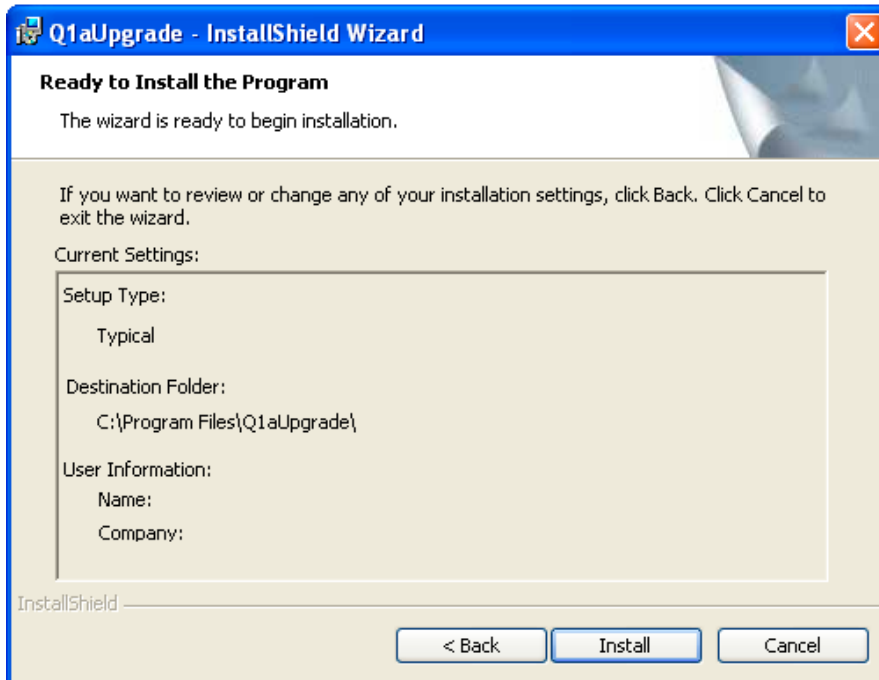
Click 



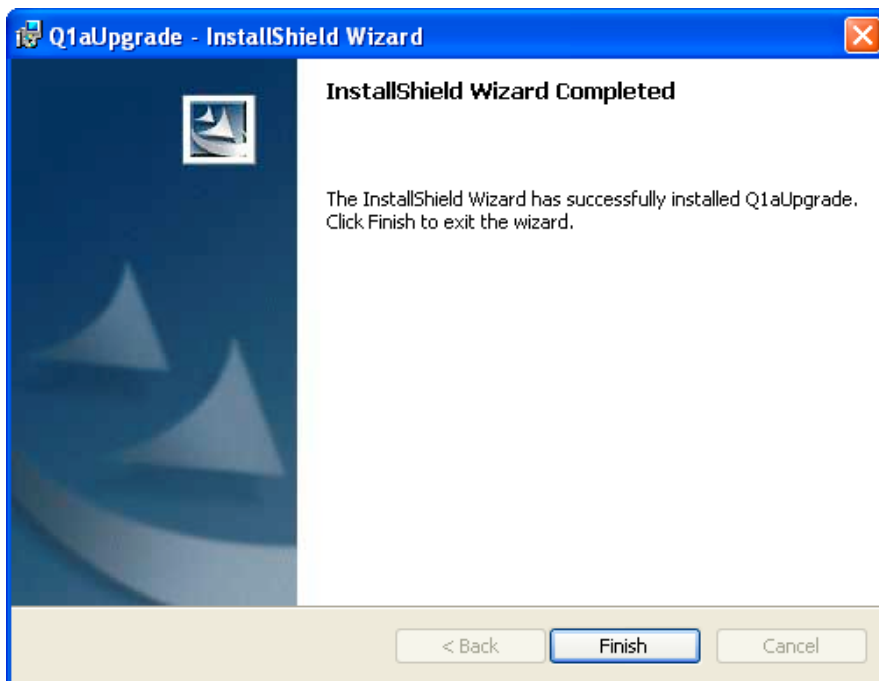
Click  I accept the terms in the license agreement and then click



Click



Click



Click

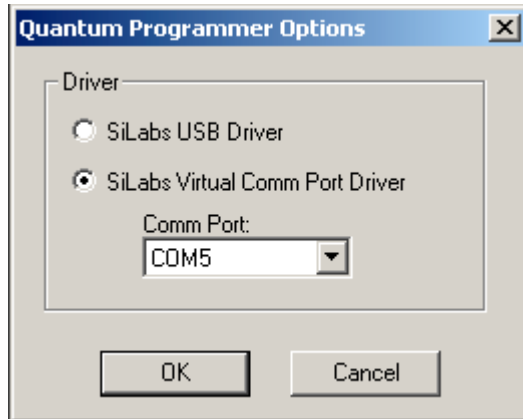


Q1aUpgrade is now installed.

# Quantum Programmer Options

To display the Quantum Programmer Options dialog:

- 1) Click on the QSI icon at the upper left of the Q2Upgrade window. The system menu will be displayed.
- 2) Click on "Quantum Programmer..." to display the Quantum Programmer dialog.
- 3) Click on "Options..." to display the Quantum Programmer Options dialog.



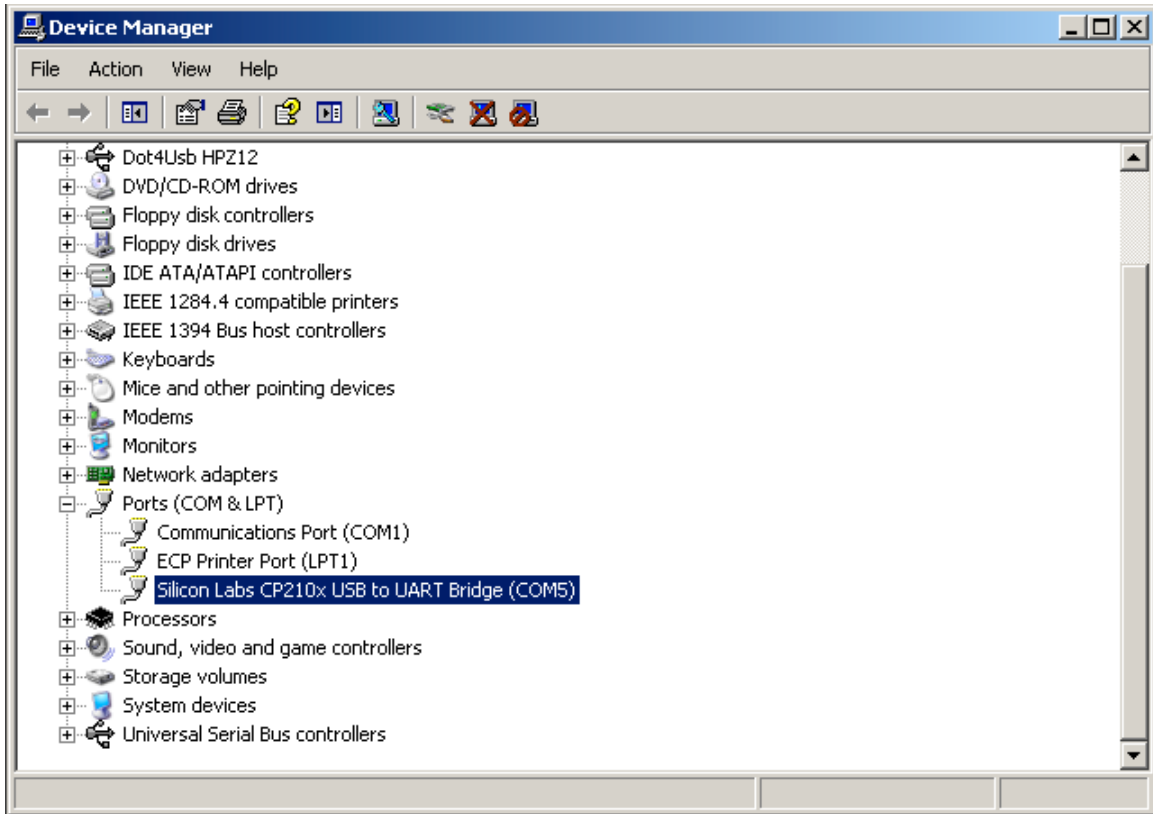
Select the driver that you have installed for use with the Quantum Programmer.

If you select "SiLabs Virtual Comm Port Driver", then specify the Comm Port that this driver uses.

You can find out which Comm Port the driver uses by running the Device Manager and looking under "Ports (COM & LPT)" for "Silicon Labs CP210x USB to UART Bridge".

To run the Device Manager:

- 1) Right mouse button click on the "My Computer" icon on your desktop.
- 2) Click on "Properties" to display the System Properties dialog.
- 3) Click on the "Hardware" tab.
- 4) Click on "Device Manager".



## Starting Q1aUpgrade

You can start Q1aUpgrade by double clicking on the Q1aUpgrade shortcut on the desktop. In this case Q1aUpgrade initially displays the "Help" page. You must proceed to the "Load Q1a File" in order to open a Q1a file.

You can also start Q1aUpgrade by dragging the name of a Q1a file onto the Q1aUpgrade desktop shortcut. In this case, the Q1a file is opened and Q1aUpgrade initially displays the "Load Q1a File" page. (Note: the desktop shortcut created by the InstallShield Wizard may not allow you to do this. You may have to create your own desktop shortcut by clicking the right mouse button on the Q1aUpgrade.exe file name and selecting "Create Shortcut".)

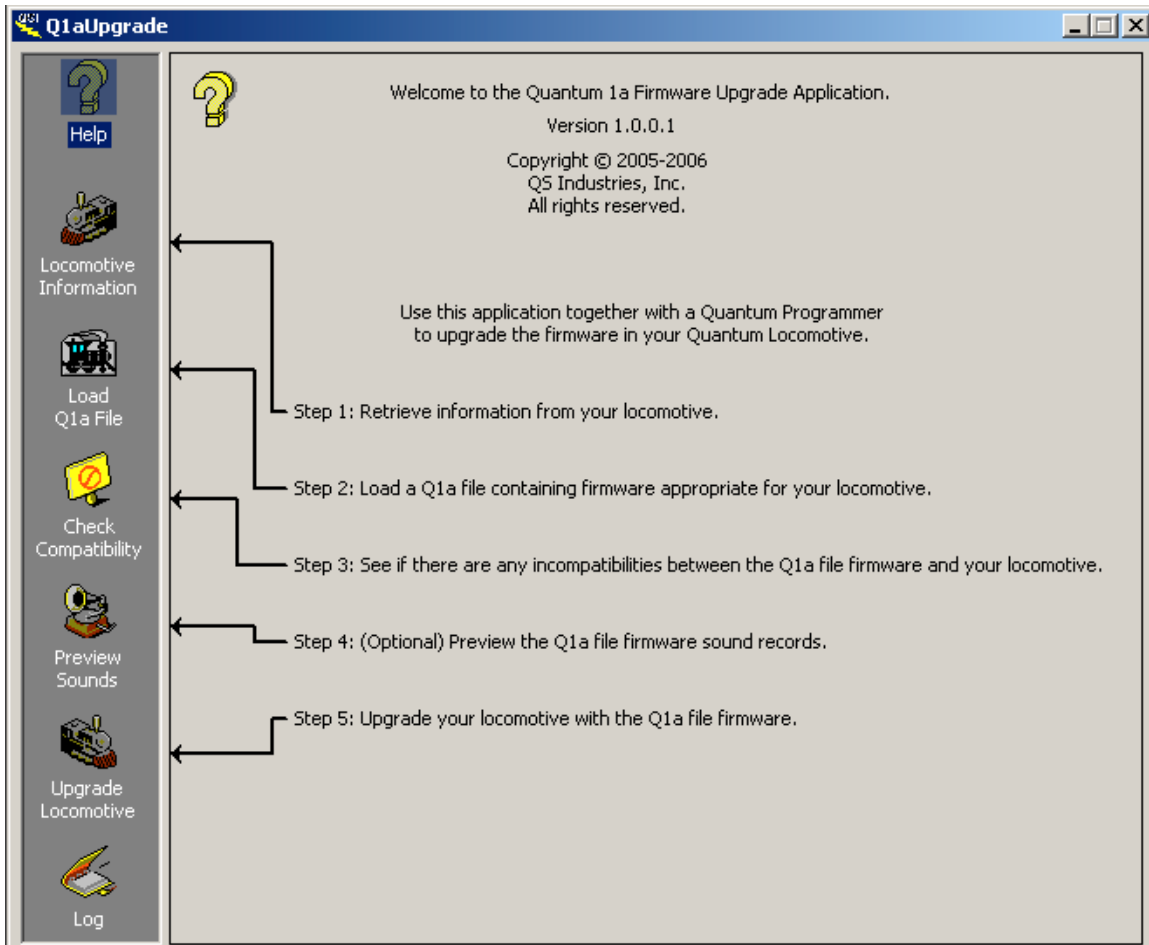
You can also start Q1aUpgrade by double clicking on a Q1a file name. The Q1a file is opened and Q1aUpgrade initially displays the the "Load Q1a File" page. This will not work, however, if Q1aUpgrade is already running, since when you double click on the Q1a file name, the system attempts to start a second instance of Q1aUpgrade.

Because Q1aUpgrade acquires the connection to the Quantum Programmer, only one instance of Q1aUpgrade can run at a time.

# Help Page

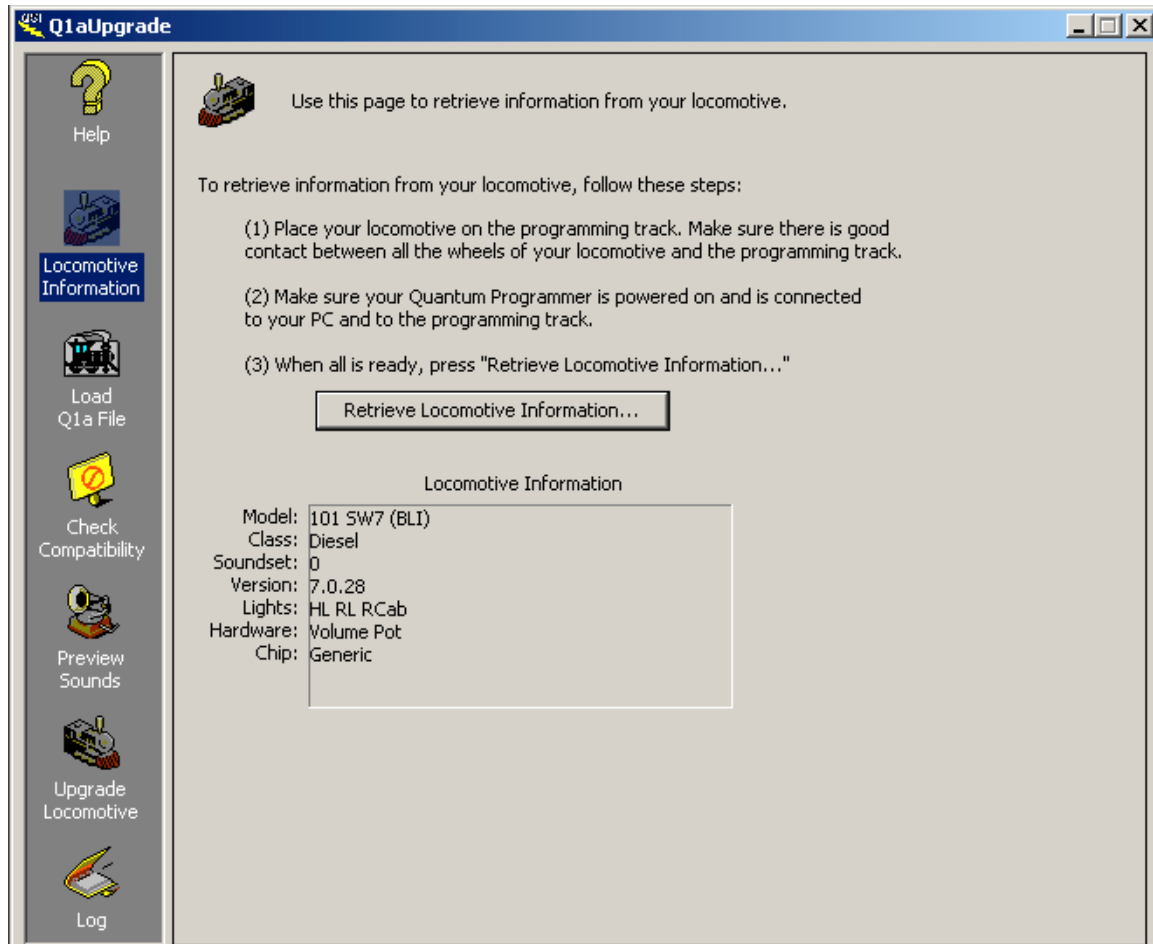
This page shows how to use Q1aUpgrade. Whenever you are uncertain what to do next, return to this page by clicking on the "Help" icon in the vertical control bar to the left.

The first step is to retrieve information from your locomotive so that you can determine what firmware to download. To proceed, click on the "Locomotive Information" icon in the vertical control bar to the left.



# Locomotive Information

If you follow the instructions on this page, the Locomotive Information box will be filled in. This information will help you to select an appropriate upgrade file for your locomotive.



To the right of "Model:" the model number, descriptive name and manufacturer are shown. In this example, the model number is "101", which is a BLI SW7.

To the right of "Class:" will be shown either "Diesel", "Electric", "Steam", "Articulated Steam", or "Gas Turbine".

To the right of "Soundset:" will be shown a number, "0", "1", etc. A soundset number of "0" indicates the locomotive's firmware contains the original sound records as specified by the manufacturer. A soundset number of "1", "2", etc., indicates the firmware contains different sound records, a different horn for example.

To the right of "Version:" is the major version number, minor version number and build number of the locomotive's firmware. In this example, the major version is 7, the minor version is 0, and the build number is 28. If your locomotive's current firmware has a major version number less than 7, then Q1aUpgrade cannot upgrade your locomotive's firmware. You must purchase and install a Version 7 upgrade chip.

To the right of "Lights:" is a list of lights supported by the locomotive's firmware. In this example, the locomotive has a Headlight, Reverse Light, and Rear Cab Lights.

The complete list of abbreviations of possible lights is

HL	Headlight
RL	Reverse Light
Mars	Mars Light
Ditch	Ditch Lights
F#B	Front Number Board Lights
R#B	Rear Number Board Lights
FMrkr	Front Marker Lights
RMrkr	Rear Marker Lights
FCab	Front Cab Lights
RCab	Rear Cab Lights

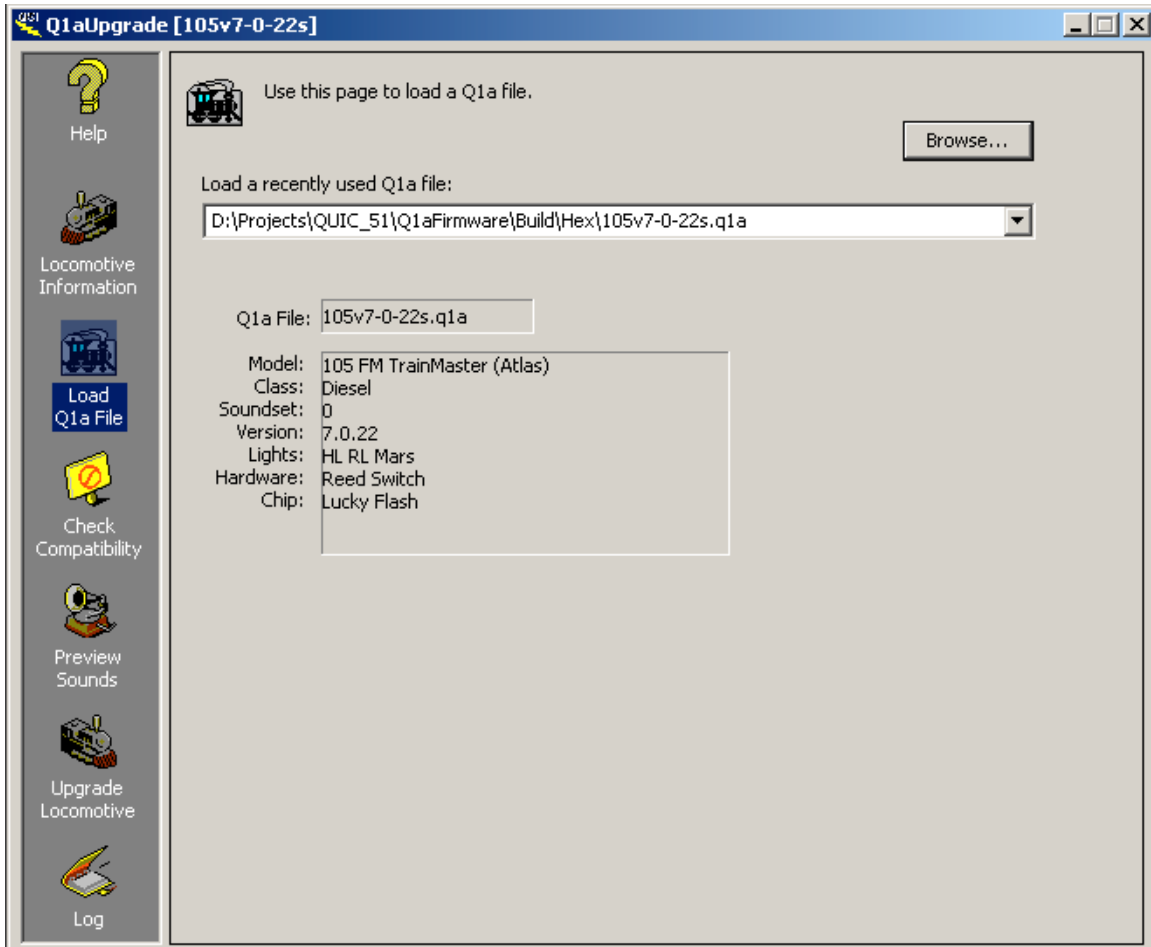
To the left of "Hardware:" you will see either "Volume Pot" or "Reed Switch".

To the left of "Chip:" you will see either "Generic" or "Lucky Flash".

The relevance of this information will become clearer as you proceed to the next step by clicking on the "Load Q1a File" icon in the vertical control bar to the left.

# Load Q1a File

You can click on the “Browse...” button to navigate your computer’s directory to find a file or you can select a file from the recently used list. You can also load a file by dragging a file name from a directory listing onto the Q1aUpgrade window.



Once a file is loaded, information about the firmware it contains is displayed. The model, class, soundset number, version numbers, supported lights, supported hardware, and chip requirement are shown.

To see whether this firmware is suitable for your locomotive, proceed to the next step by clicking on the “Check Compatibility” icon in the vertical control bar to the left.

# Check Compatibility

The information gathered from steps 1 and 2 is compared on this page. Incompatibilities between your locomotive and the loaded Q1a file are marked with brackets "< >".

There are 4 levels of incompatibility:

- "< >" indicates a minor incompatibility. The Q1a file firmware will run on your locomotive, but the sounds may not be appropriate for this model. Because different models often have different motor characteristics, the BEMF vs. scale MPH calibration may not be correct. Your locomotive may not run smoothly without programming many CV's related to motor control.
- "<< >>" indicates a significant incompatibility. The Q1a file firmware is for a different class of locomotive, and thus the sounds will not be appropriate even if the firmware will run on your locomotive.
- "<<< >>>" indicates a serious incompatibility. The Q1a file firmware may run on your locomotive, but the type and number of lights supported by your locomotive may not be the same as that supported by the Q1a file firmware.
- "<<<< >>>>" indicates total incompatibility. The Q1a file firmware will not run on your locomotive either because of a Volume Pot / Reed Switch mismatch or because a special chip is required.

This example shows both minor, serious, and total incompatibilities:

The screenshot shows a software window titled "Q1aUpgrade [105v7-0-22s]". The main content area displays a comparison of firmware compatibility between a locomotive and a Q1a file. The locomotive details are: Model: <101 SW7 (BLI)>, Class: Diesel, Soundset: 0, Version: 7.0.28, Lights: <<<HL RL RCab>>>, Hardware: <<<<Volume Pot>>>>, Chip: <<<<Generic>>>>. The Q1a file details are: <105 FM TrainMaster (Atlas)>, Diesel, 0, 7.0.22, <<<HL RL Mars>>>, <<<<Reed Switch>>>>, <<<<Lucky Flash>>>>. Below the comparison, there are three explanatory paragraphs: the first explains that "< >" indicates a minor incompatibility where sounds may not be appropriate; the second explains that "<<< >>>" indicates a serious incompatibility where lighting controls are not supported; the third explains that "<<<< >>>>" indicates total incompatibility where the firmware will not run due to hardware mismatches. A sidebar on the left contains icons for Help, Locomotive Information, Load Q1a File, Check Compatibility (highlighted), Preview Sounds, Upgrade Locomotive, and Log.

	Locomotive	105v7-0-22s.q1a
Model:	<101 SW7 (BLI)>	<105 FM TrainMaster (Atlas)>
Class:	Diesel	Diesel
Soundset:	0	0
Version:	7.0.28	7.0.22
Lights:	<<<HL RL RCab>>>	<<<HL RL Mars>>>
Hardware:	<<<<Volume Pot>>>>	<<<<Reed Switch>>>>
Chip:	<<<<Generic>>>>	<<<<Lucky Flash>>>>

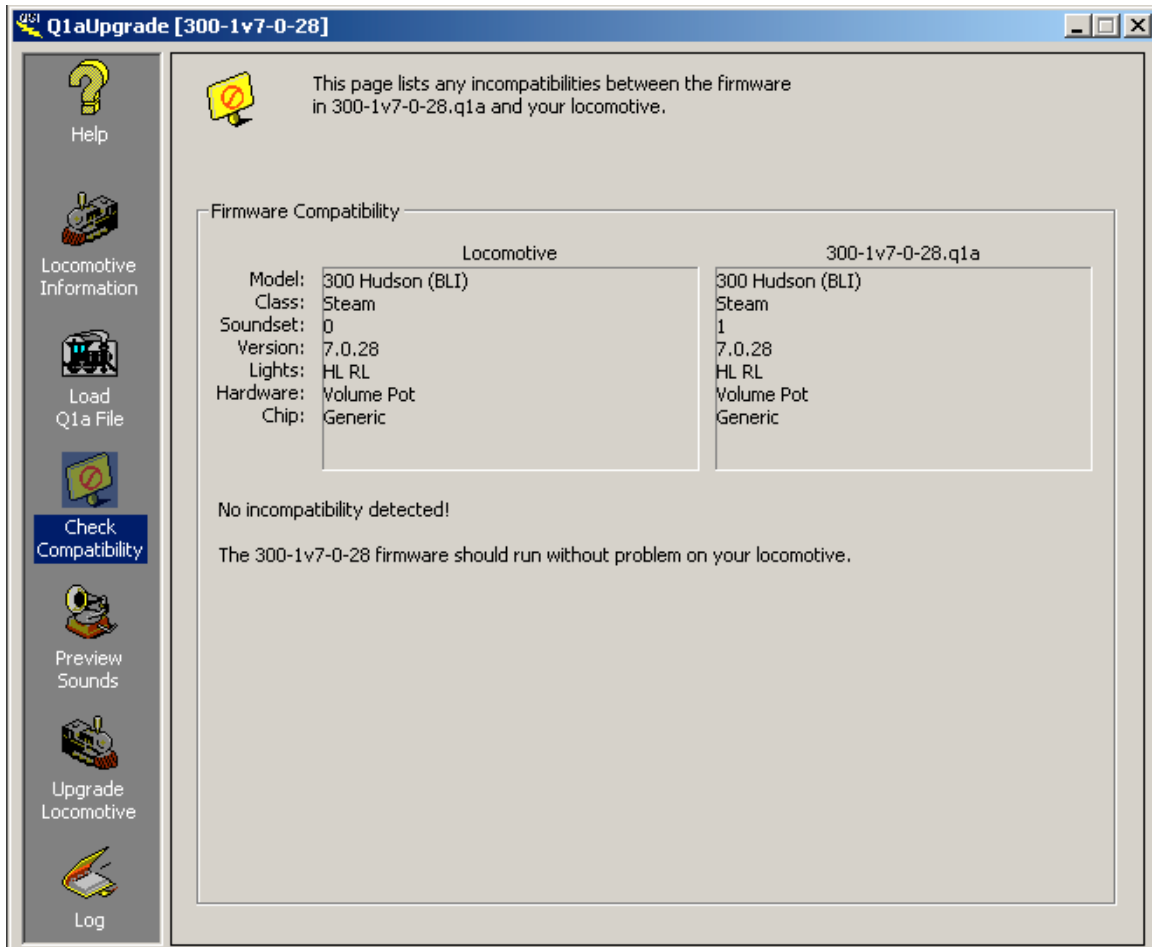
In this example, the 105v7-0-22s.q1a firmware is ill suited for this locomotive. The Q1a file firmware is for a different model and a different lighting package is supported. Most important is that this locomotive has a Volume Pot and the

Q1a file firmware supports a Reed Switch. Finally, the Q1a file firmware is built specifically to run on a Lucky Flash chip which your locomotive does not contain.

In general, if you choose a Q1a file for the same model number as your locomotive, there will be no incompatibilities. The one exception is the Chip requirement. If your locomotive does not have a Lucky Flash chip and the Q1a file firmware expects such a chip, then the Q1a file firmware will not run on your locomotive. You can tell if a Q1a file firmware is built to run on a Lucky Flash chip by looking for an 's' as the last character of the file name. In this example, the 's' in "105v7-0-22s.q1a" indicates it requires a Lucky Flash chip. If the file name were "105v7-0-22.q1a" without the 's', then it does not require the Lucky Flash chip.

If your locomotive's current firmware has a major version number less than 7, then Q1aUpgrade cannot upgrade your locomotive's firmware. You must purchase and install a Version 7 upgrade chip.

This example shows no incompatibilities:

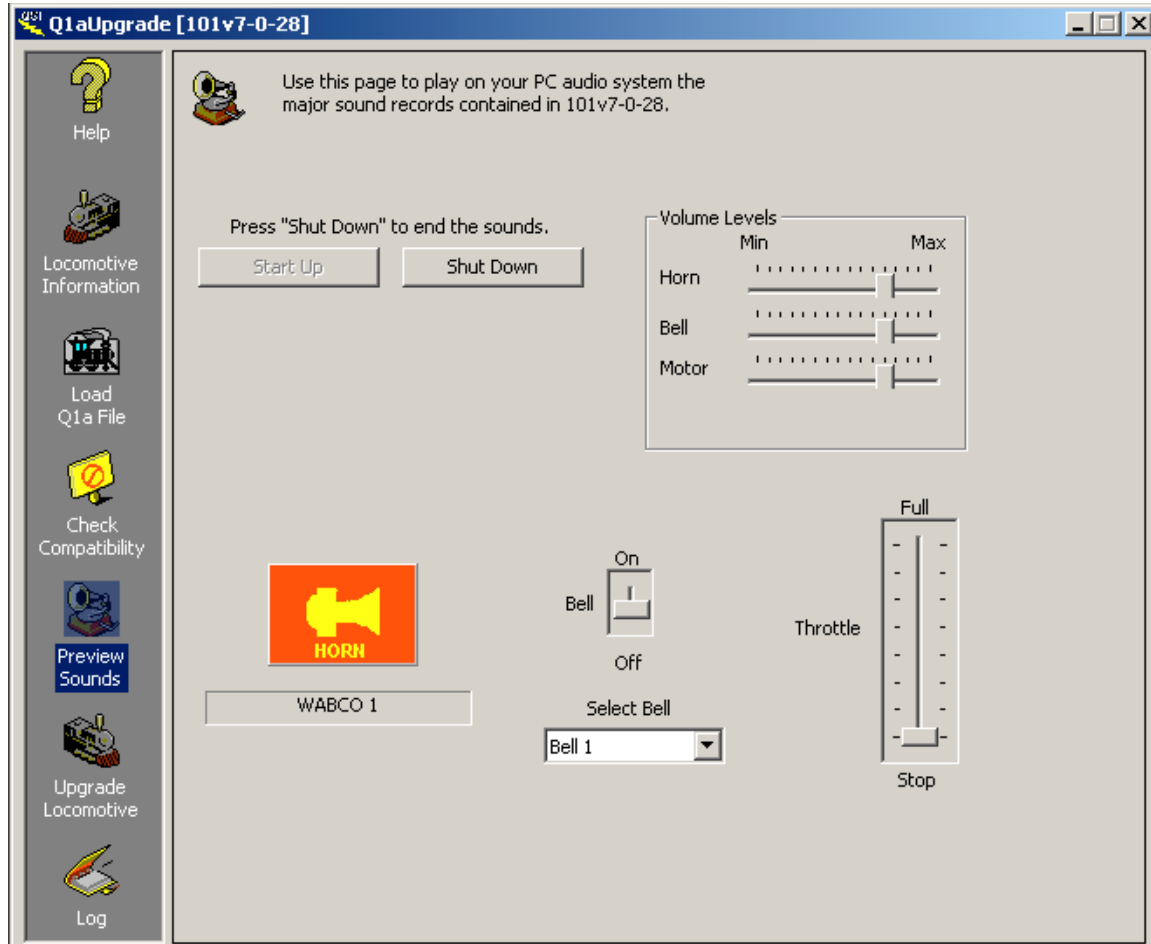


In this case, the Locomotive and the Q1a file firmware differ only in the sound set number.

After determining that the Q1a file firmware is compatible with your locomotive, you may want to preview the sound records contained in the Q1a file firmware. To do this click on the "Preview Sounds" icon in the vertical control bar to the left.

# Preview Sounds

You can listen to the major sound records in the Q1a file you loaded before downloading to your locomotive. First, click on the "Start Up" button to obtain a screen similar to the following.



After pressing "Start Up", you should be able to hear locomotive idling sounds on your PC audio system.

Press the "HORN" button to play the horn. The name of the horn, if known to Q1aUpgrade, is displayed beneath the HORN button.

Move the "Bell" switch to "On" to play the bell. If the Q1a file firmware supports more than 1 prototypical bell, then you may select among the available bells from the list below the Bell On/Off switch.

To rev the motor up increase the Throttle.

You can use the slide bars at the upper right to adjust the relative volume levels of the Horn, Bell and Motor.

To stop the sounds, click on the "Shut Down" button. The sounds automatically shut down if you move to a different page.

When you are certain these are the sounds you want in your locomotive, click on the "Upgrade Locomotive" icon in the vertical control bar at the left.

# Upgrade Locomotive

Follow the instructions on this page to upgrade your locomotive with the loaded Q1a file firmware.

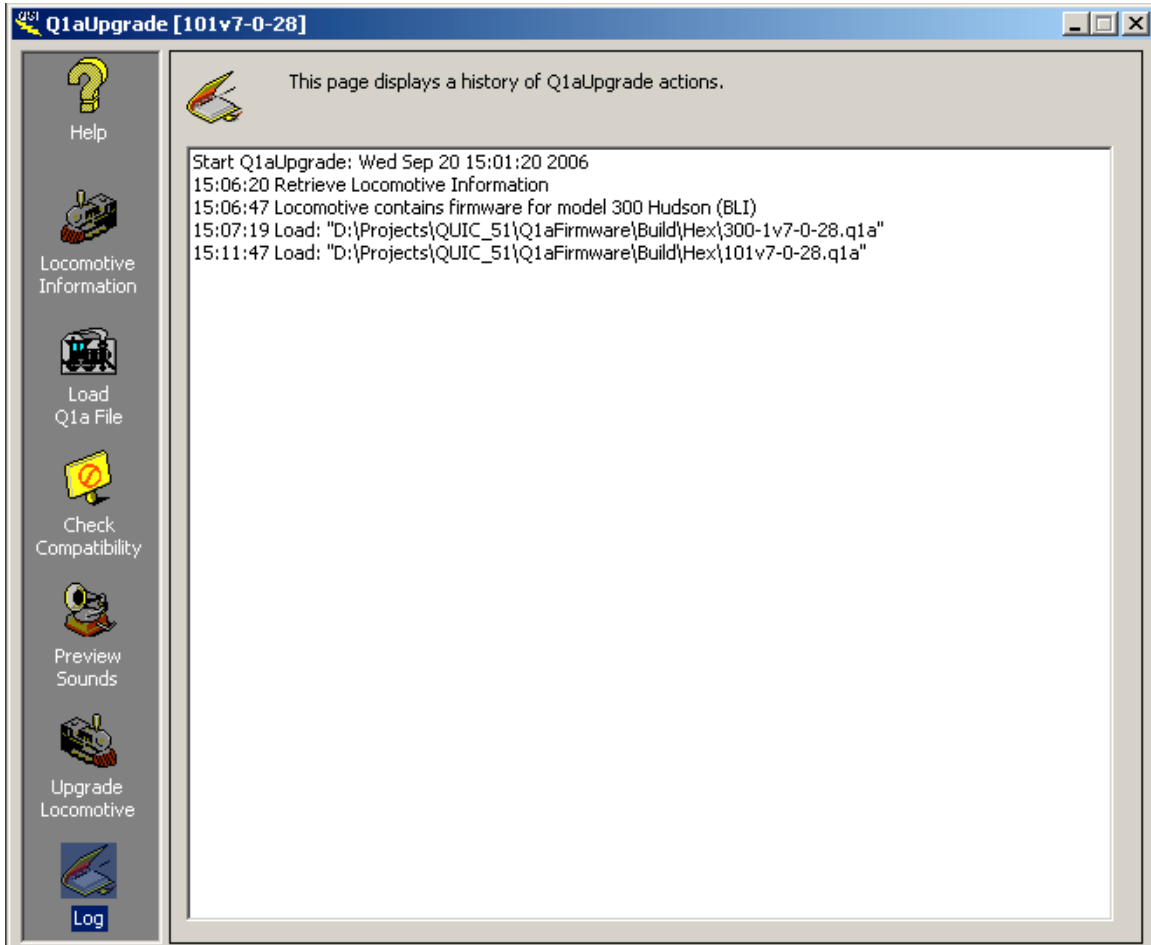


The Upgrade Confidence Test is optional. Run this test if you are not certain of the electrical connections between your PC and the Quantum Programmer or between the Quantum Programmer and your locomotive. The Confidence Test goes through the motions of upgrading your locomotive, testing the communication links, but without doing anything destructive like erasing your locomotive's flash memory.

Click on "Upgrade Locomotive Firmware..." to actually upgrade your locomotive with the Q1a file firmware. The process takes slightly more than 5 minutes. Your locomotive's flash memory is erased and then reprogrammed with the Q1a file firmware. During this time it is critical that none of the electrical connections between your PC and your locomotive are broken. Do not remove your locomotive from the programming track until Q1aUpgrade says it is safe to do so. If the reprogramming process is interrupted for any reason, your locomotive's flash memory could become corrupted, requiring removal of the chip for reprogramming by a certified dealer.

# Log

This page displays a history of Q1aUpgrade actions for the current session.

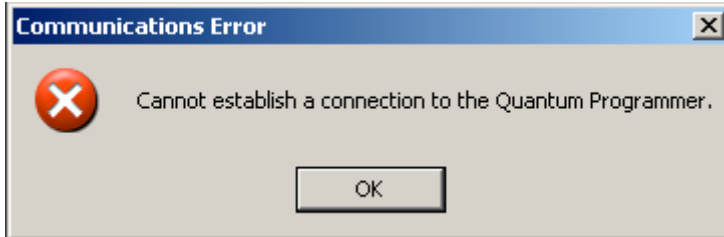


An accumulated history of Q1aUpgrade actions is found in the file "Q1aUpgradeHistoryLog.txt" located in the same directory as Q1aUpgrade.exe.

# Troubleshooting

## Cannot establish a connection to the Quantum Programmer

When I press "Retrieve Locomotive Information...", this message box is displayed



Make sure the USB cable is connected to your PC and to the Quantum Programmer. Make sure that another program which connects to the Quantum Programmer, such as QuantumCVManager, is not running.

## Unable to read Mfg ID

When I press "Retrieve Locomotive Information...", this message box is displayed



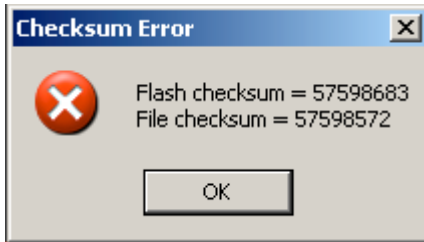
Press "Retrieve Locomotive Information..." a second time. Possibly the first "Retrieve" operation failed because the locomotive was executing an automatic reset to factory defaults, which can happen when you first install a new chip or upgrade the chip to new firmware.

If you get this error after repeated attempts, make sure your locomotive is making good contact with the programming track. Possibly your programming track needs to be cleaned. Possibly your locomotive's wheels need to be cleaned. Make sure the Quantum Programmer is connected to the programming track.

If your locomotive begins to play sound records when you press "Retrieve Locomotive Information...", your locomotive's firmware is probably an early version (version 1...6) which is not detecting DCC Service Mode properly. You must physically replace your locomotive's flash memory chip with one already programmed with version 7 firmware.

## Checksum Error

At the end of the flash chip reprogramming, I get this message box:



This indicates that the flash chip reprogramming may not have been successful because the flash memory contents apparently do not match the binary image in the Q1a file. This is a rare event. Repeating the upgrade process again should fix the problem. First press "Run Confidence Test..." If that operation is successful, perform the "Upgrade Locomotive Firmware..." operation again.

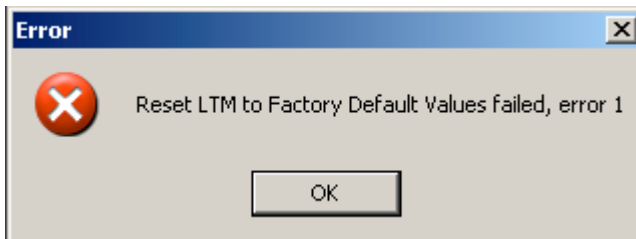
## Locomotive Hoots 3 Times

After upgrading my locomotive's flash memory, my locomotive hoots 3 times when I power up in Operations Mode. Does this indicate something is wrong?

The 3 hoots after upgrading are normal. At the end of the upgrade procedure, Q1aUpgrade commands the locomotive to reset its LTM to factory default values. The reset operation takes place in Service Mode with sounds turned off. When you first power up in Operations Mode and sounds are turned on, your locomotive hoots 3 times to signal that the reset to factory default values was carried out successfully.

## Reset LTM to Factory Default Values failed

At the end of the flash chip reprogramming, I get this message box:



At the end of the upgrade procedure, Q1aUpgrade commands the locomotive to reset its LTM to factory default values. This command may fail with some locomotives due to a long power up cycle. If this error occurs, it is not a big problem. Merely perform a manual reset to factory defaults using the reset jumper or reed switch as described in your locomotive's operating manual.