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# NI AudioMASTER Installation Guide



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# Document History

| Revision | Date | By | Comments |
|---|---|---|---|
| 1.0.0 | 2007-04-16 | TLA | 1. Version. |
| 2.0.0 | 2009-03-04 | TLA | Updated for AudioMASTER 6.0.0.<br>Added sections on configuring multiple PXI/PXIe boards. |
| 3.0.0 | 2009-09-16 | TLA | Updated for AudioMASTER 6.1.0<br>Updated pictures for new installer skin. |



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# Table of Contents

**Document History** ..... **5**

**Table of Contents** ..... **6**

**1 AudioMASTER installation** ..... **9**

1.1 System Requirements ..... 9

**2 First time installation** ..... **11**

2.1 Pre-installation ..... 11
2.1.1 Installing for TestStand ..... 11
2.2 Welcome ..... 12
2.3 Customer information ..... 12
2.4 Choose destination ..... 13
2.5 User data destination ..... 14
2.6 Select features ..... 15
2.7 Copy files ..... 16
2.8 AudioMASTER configuration ..... 18
2.9 Installation complete ..... 19
2.9.1 Copy license file ..... 19
2.9.2 Update older AudioMASTER sequence files ..... 19
2.9.3 End of installation ..... 20
2.10 Finalizing installation ..... 20
2.10.1 Update NI DAQmx libraries ..... 21
2.10.2 Update NI-RIO libraries ..... 23
2.11 Supported Hardware ..... 25

**3 Manual configuration** ..... **27**

3.1 Changing device address ..... 27
3.2 Mass compilation ..... 27

**4 AudioMASTER configuration** ..... **29**

4.1 Configuring for multiple boards - DAQmx44 platform ..... 29
4.1.1 Configuration of PXI based system ..... 30
4.1.2 Multiple PXI boards requires Master/Slave configuration ..... 31
4.1.3 Configuration of PCI based system ..... 31
4.2 AudioMASTER settings in the Windows registry ..... 32
4.2.1 Platform registry keys ..... 32



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4.3 SequenTEST configuration ..... 33

**5 Update and un-installation ..... 35**

5.1 Installing over earlier versions of AudioMASTER ..... 35
5.2 Maintenance installation ..... 35
5.2.1 Remove ..... 36

**6 Troubleshooting the installation ..... 37**

6.1 License manager ..... 37
6.1.1 Required license files ..... 37
6.1.2 Demo license ..... 38

**Index ..... 39**



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# 1 AudioMASTER installation

The software is distributed on DVD or downloaded from the Internet.

When the DVD is inserted it should automatically start the setup.exe program, if that does not happen, perform the installation by running the setup.exe program.

The installation program will guide you through the required steps. In the following system requirements, the installation process and configuration is explained.

## 1.1 System Requirements

The following minimum requirements must be met to use AudioMASTER:

| Item | Requirement. |
|---|---|
| Operating System | Windows XP or Windows 2000, service pack 2 or later.<br>Windows Vista and Windows NT is not supported<br>Windows 95 and 98 cannot be used. |
| DirectX | DirectX 9.0c or later must be installed manually on Windows 2000 if using the digital audio option with encoded audio files. |
| CPU | Minimum Pentium III 500MHz.<br>Pentium 4 or better recommended. |
| Memory | Minimum 512 Mbytes.<br>1Gbytes is recommended. |
| Monitor | Minimum 1024x768. |
| Graphic Adapter | Absolute minimum 256 colours, 16K colours are recommended as normal minimum.<br>The performance of the total system depends on the performance on the graphic adapter, so test programs run faster with a good graphic adapter. |
| DVD | For software installation. The DVD does not have to be on the target computer, but then it must be accessible through a mapped network connection. |
| LabVIEW | LabVIEW 8.2.1 must be installed on the system ***before*** SequenTEST or AudioMASTER is installed. If LabVIEW is not present the installer will automatically install LabVIEW Run-time. |
| NI-DAQmx | Version 8.6 or later when using an analog hardware platform like NI-4461. |
| NI-RIO | Version 3.0.0 or later when using digital hardware platform like NI-78xxR. |
| TestStand or SequenTEST | A test sequencer is required to handle test program development and execution. The following versions are supported:<br>TestStand 3.5, 4.0.1, 4.1, 4.1.1, 4.2<br>SequenTEST 4.10 |



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# 2 First time installation

Before the installation is started check that:

1. LabVIEW is installed on the target computer if LabVIEW development system is needed. If LabVIEW is not installed the AudioMASTER installer will install a LabVIEW Run-time engine.
2. National Instruments drivers for relevant hardware are installed.
3. TestStand 4.2, 4.1.1, 4.1, 4.0.1, 3.5 or SequenTEST 4.1 is installed.

If these software packages are not installed before installing AudioMASTER it will require a great effort to re-install and configure some components manually.

## 2.1 Pre-installation

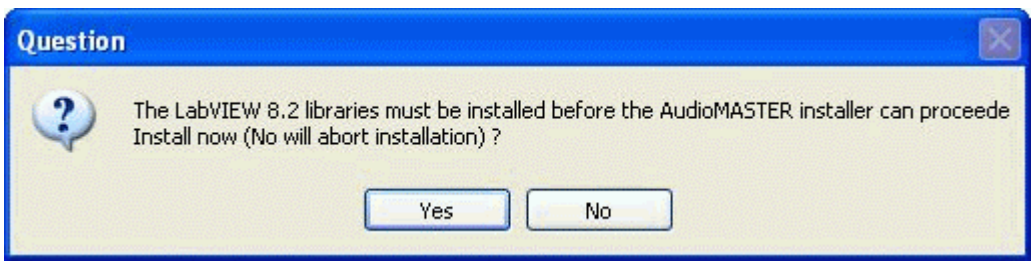
When the setup program is started it will first extract the installation file.




The installer checks that some of the required software has been installed and is capable of installing LabVIEW Run-time engine if needed.

### 2.1.1 Installing for TestStand

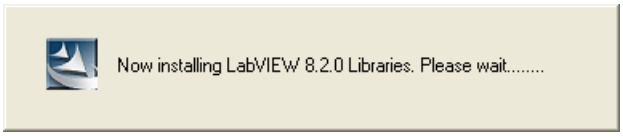
When TestStand is detected and LabVIEW is not installed, the AudioMASTER installer will install the LabVIEW libraries. If LabVIEW Developer system or SequenTEST is installed this dialog is skipped because the LabVIEW libraries are already installed.




After selecting ‘Yes’, the libraries are installed. This will take a few minutes.

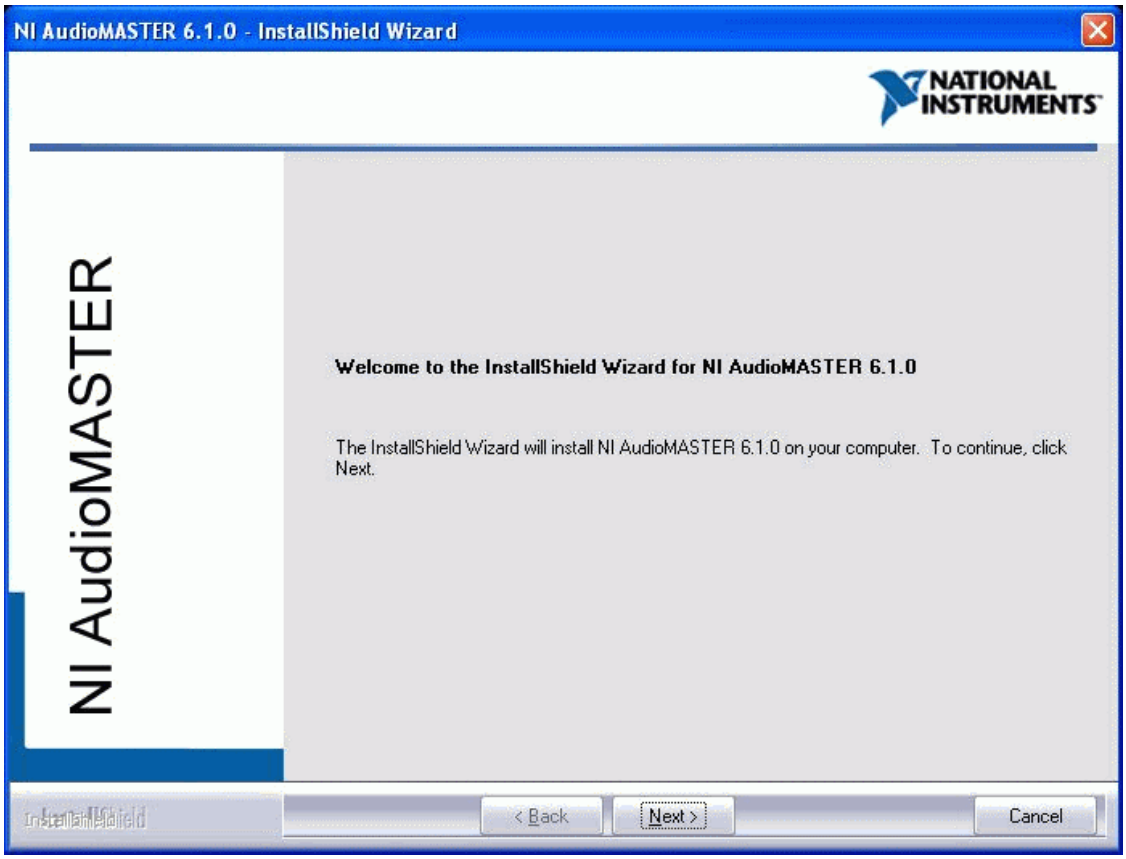


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## 2.2 Welcome

This is the start window of the AudioMASTER installer.

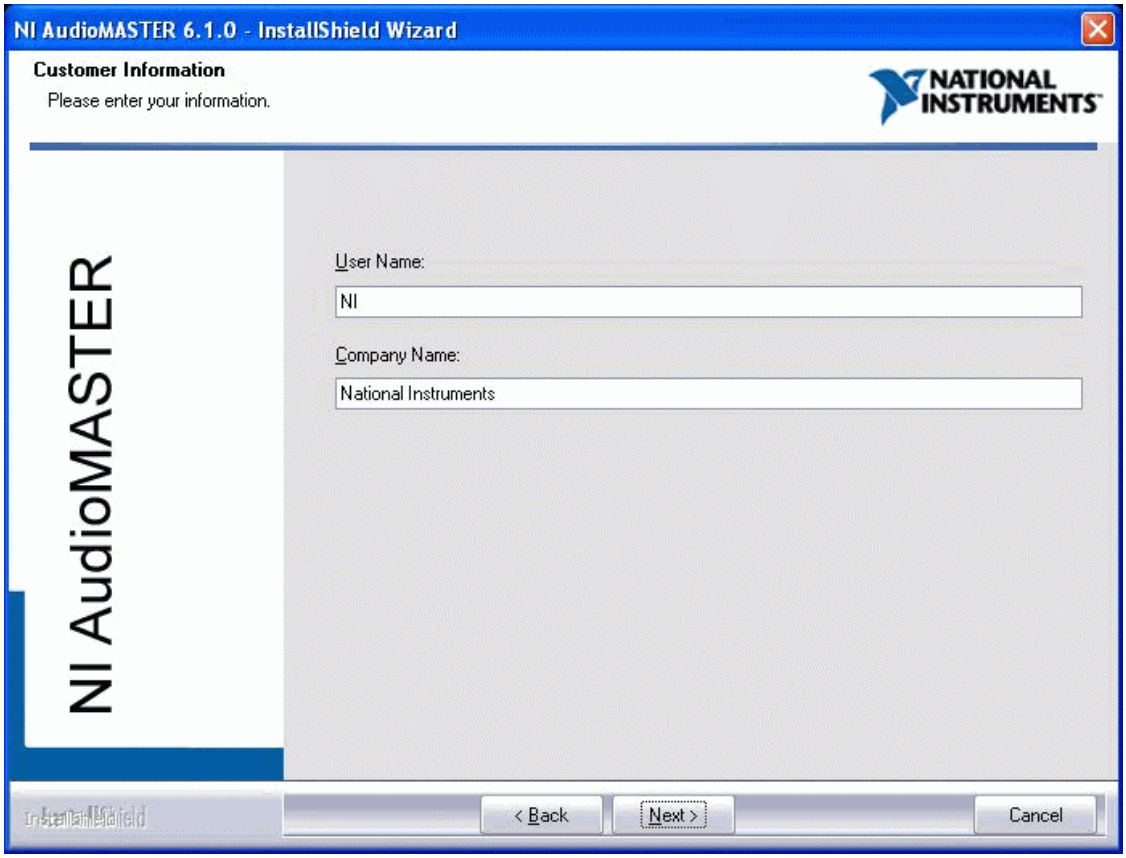



## 2.3 Customer information

Enter user name and company name. When all fields have been filled out the Next button will be enabled.



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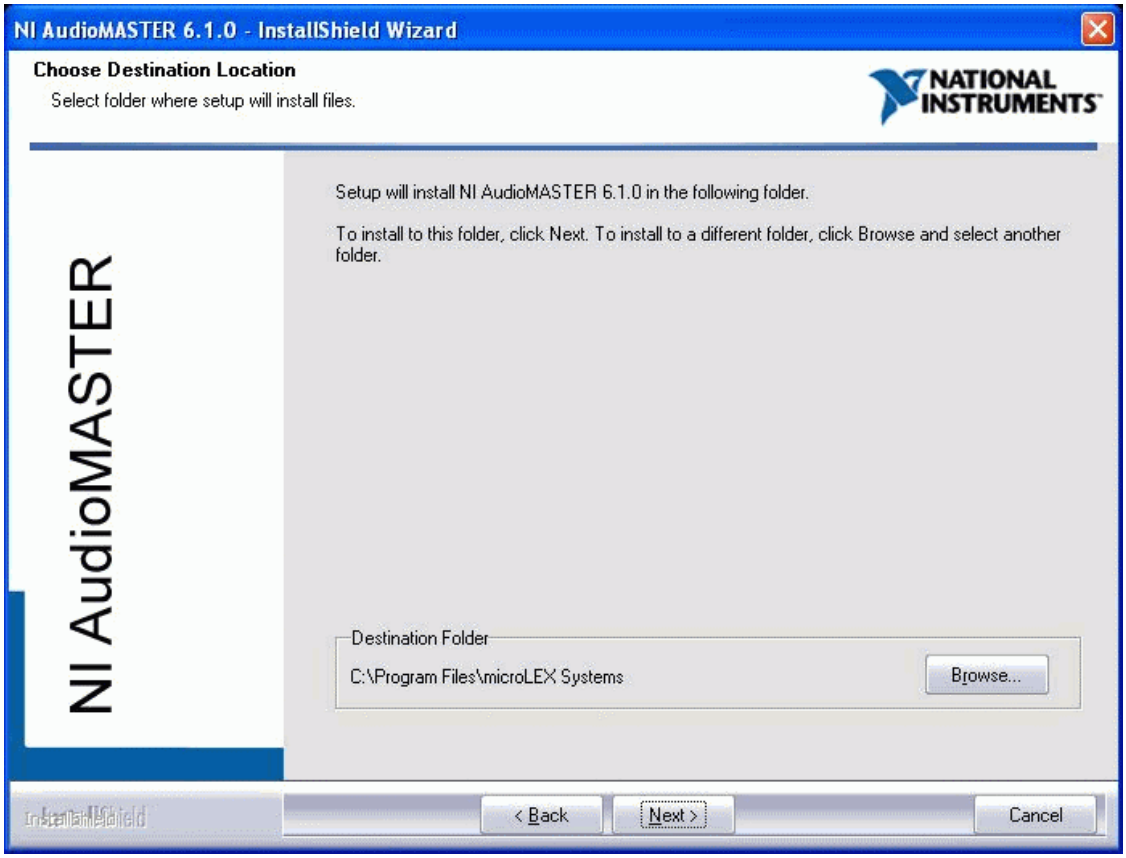



## 2.4 Choose destination

AudioMASTER is installed to the microLEX Systems folder unless this is changed in the Destination Location dialog. It is recommended to install AudioMASTER to the proposed disk and folder.



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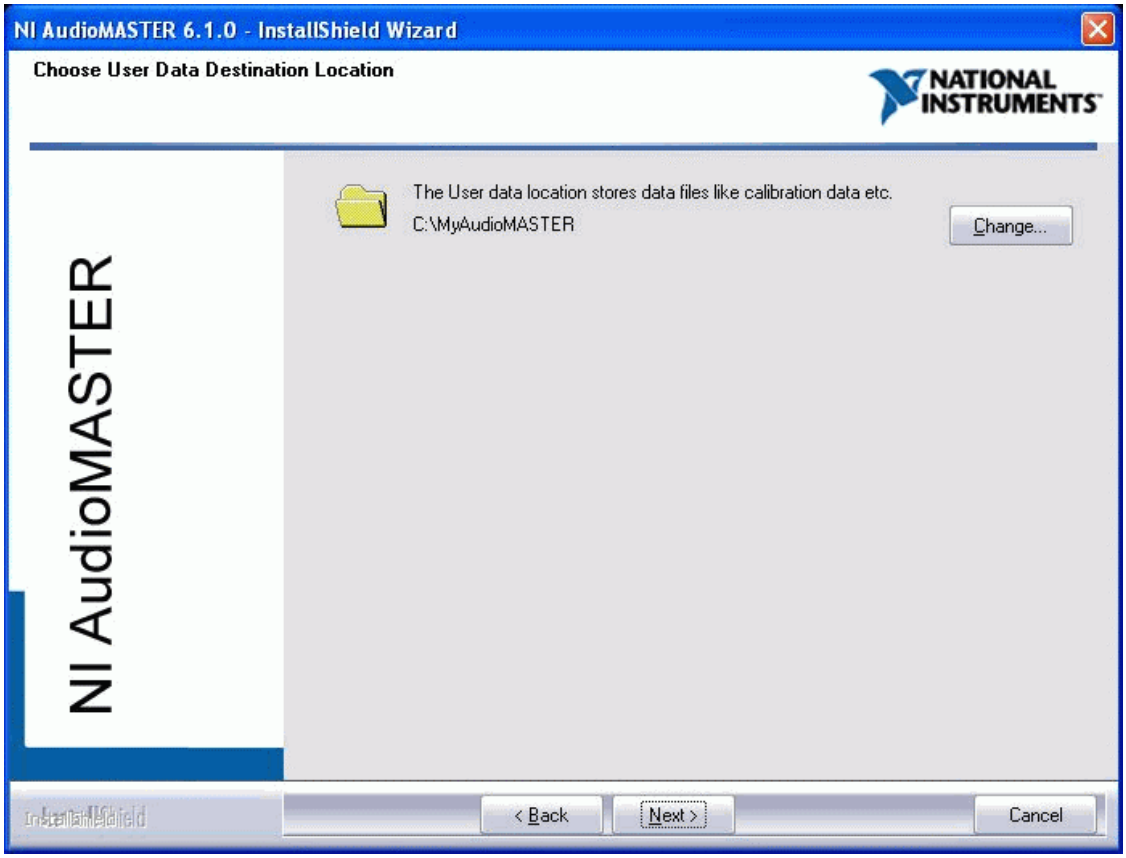



## 2.5 User data destination

Select the folder where AudioMASTER can store calibration files etc. This folder must be accessible to all users.



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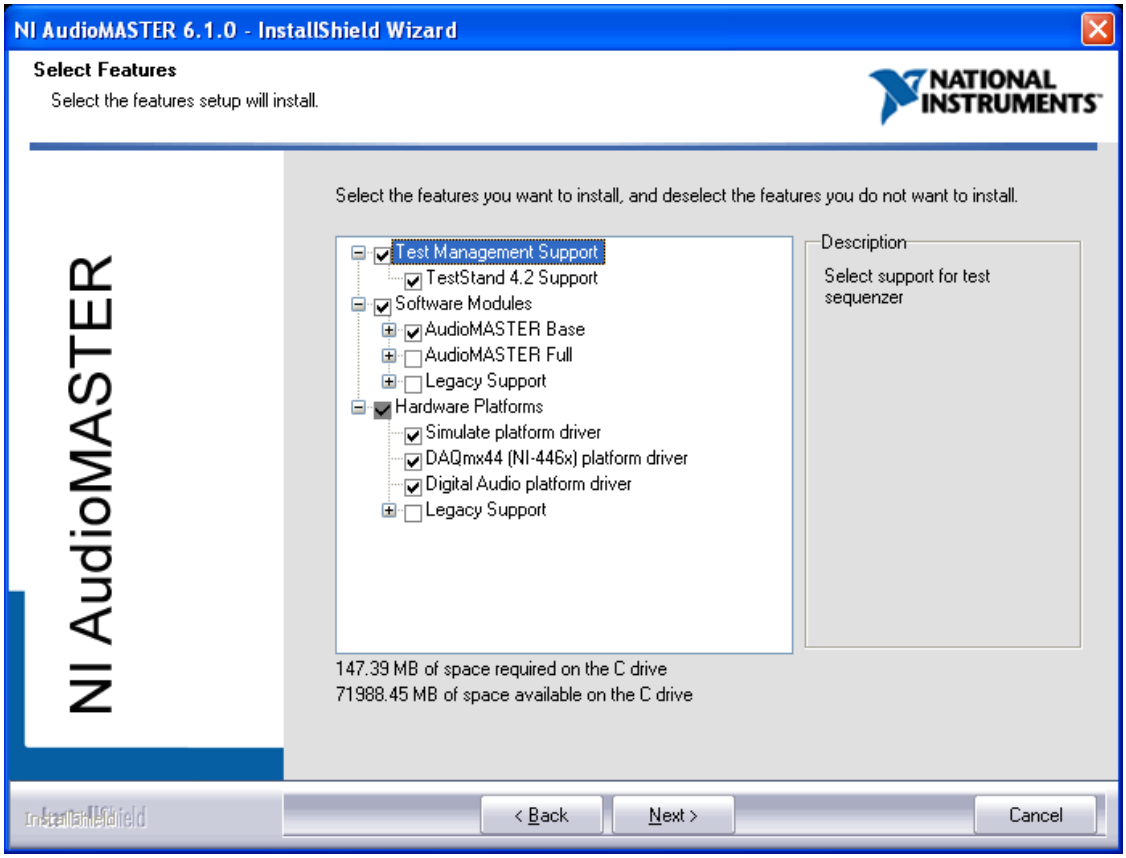

On Windows XP and 2000 the Program Files folder should not be used for user data.

## 2.6 Select features

Select which features of AudioMASTER to install. Note that each module requires its own license file. The easiest way is to un-select modules that are not listed in your license files.



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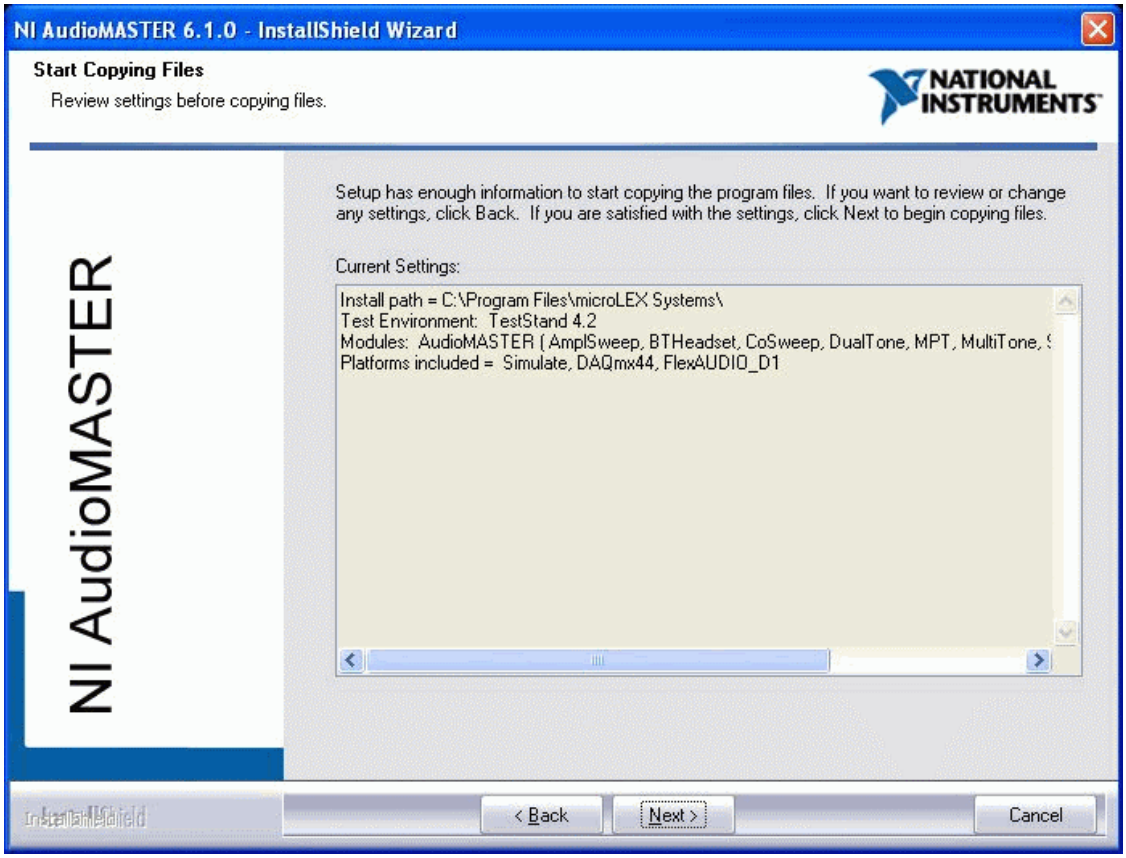

For demo installation with no hardware select only the ‘Simulate’ platform.

## 2.7 Copy files

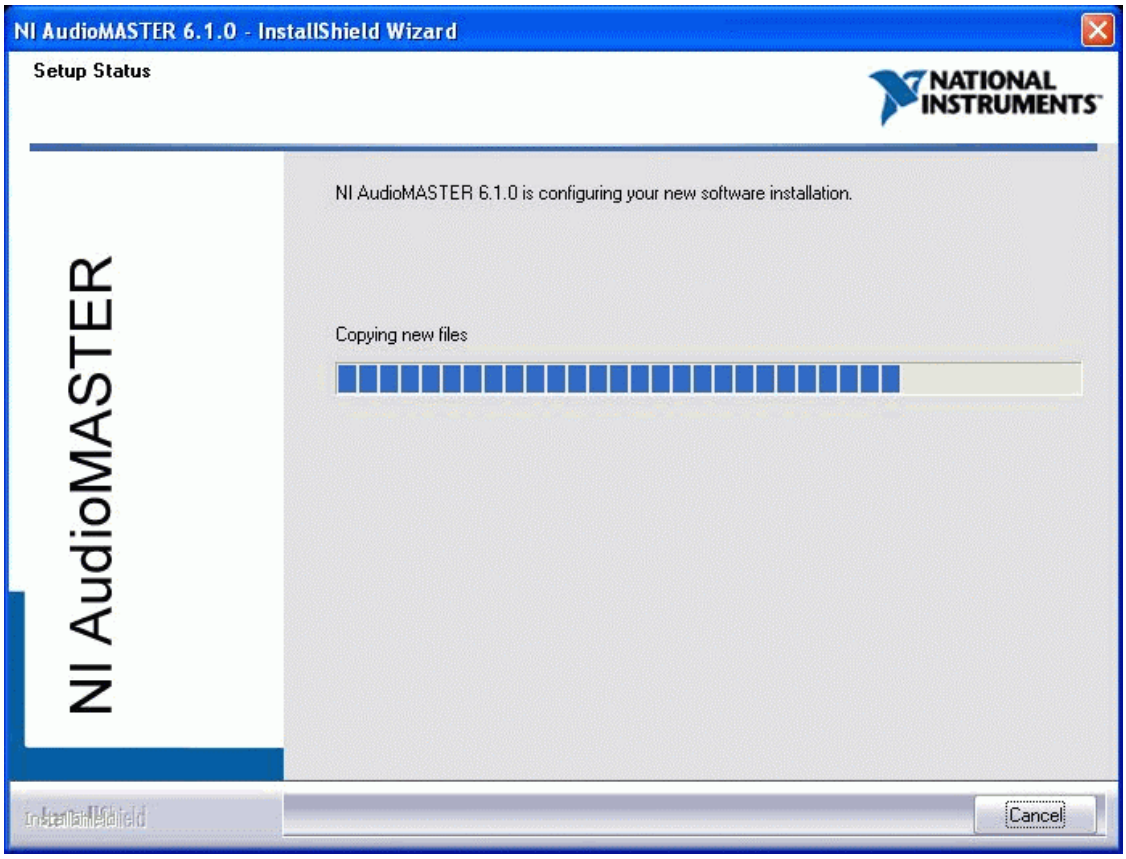
Before starting to copy the files, the selected features can be reviewed in this short form list shown in the figure below.



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Select next to start installing the files.



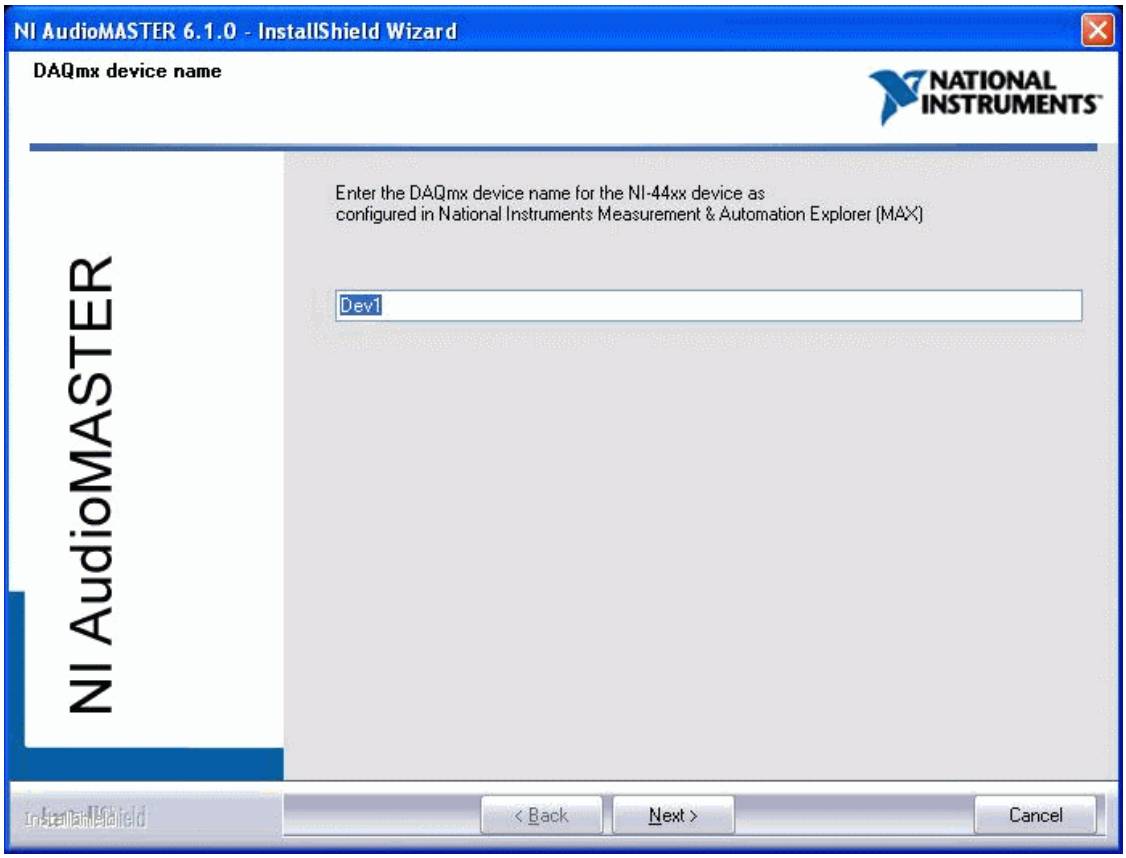



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## 2.8 AudioMASTER configuration

Depending on the selected hardware platforms a sequence of configuration dialogs are shown. Some platforms require no configuration.

Read the text carefully to determine which hardware device is being configured and type the device name identical to the device name found in NI-MAX[1].

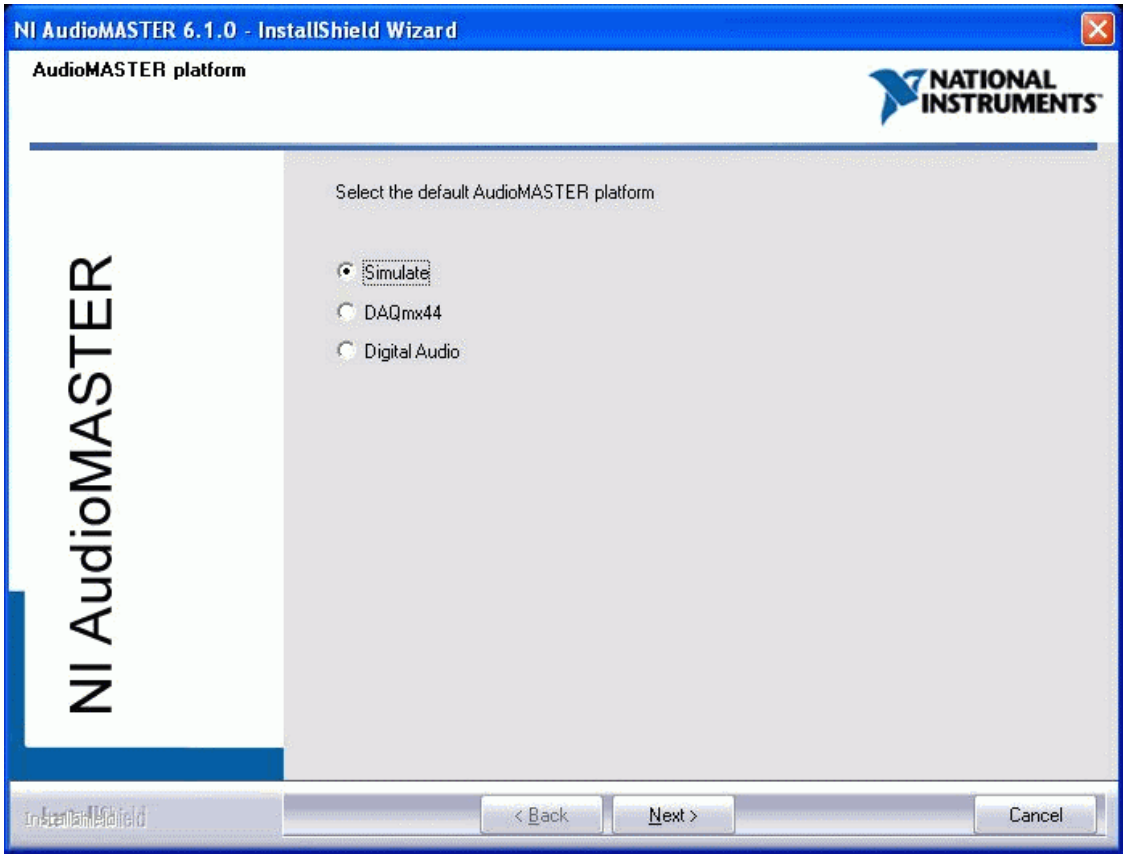



To change the device name after installation please refer to section 3.1. If more that one hardware platform is installed a configuration for each will be shown. After that the default platform can be selected.

[1] National Instruments Measurement and Automation Explorer.



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## 2.9 Installation complete

At the end of the installation two reminder dialogs are shown to emphasise two important steps to perform before using AudioMASTER.

### 2.9.1 Copy license file

The license file must be copied to the license folder as shown in the dialog.



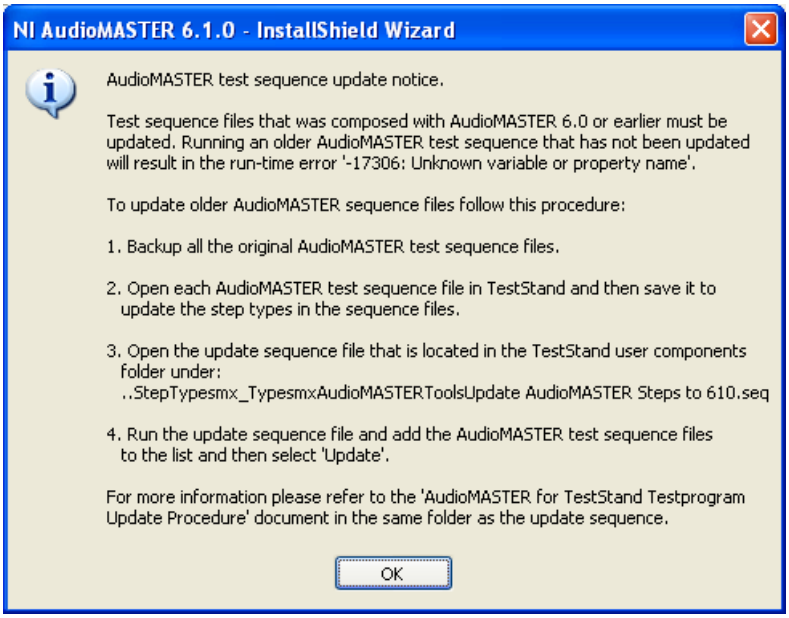

If AudioMASTER does not find a valid license an error message is shown.

### 2.9.2 Update older AudioMASTER sequence files

This dialog is to remind users of older AudioMASTER versions to update their TestStand sequence files.

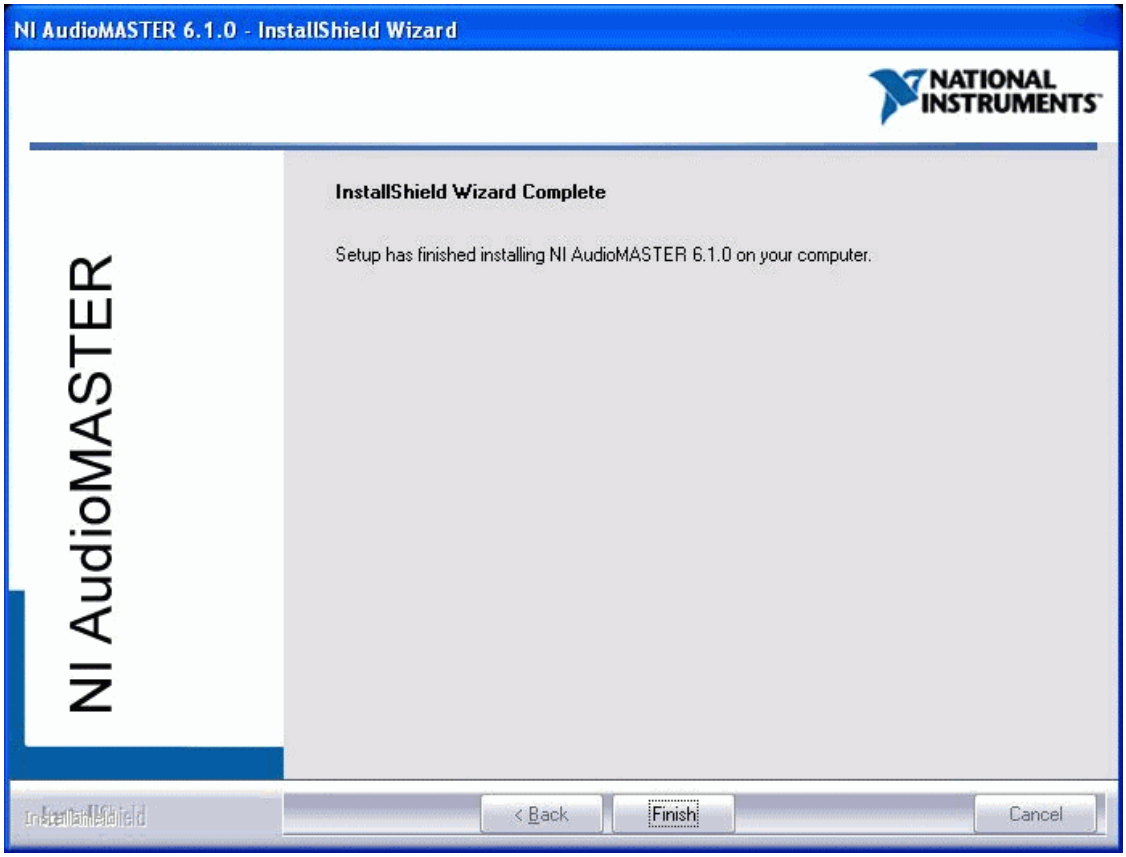


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### 2.9.3 End of installation

Then the installation process is done.




## 2.10 Finalizing installation

If the installed path to AudioMASTER differs from the default path:

```
C:\Program Files\microLEX Systems\AudioMASTER
```



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it is recommended to run the LabVIEW mass compiler. This will update all internal file references to the installed location and test sequences will load faster.

Note that mass compile is only needed if LabVIEW development system is used. (A LabVIEW Run-Time installation does not need mass compilation).

After installing AudioMASTER on a system with only LabVIEW Run-time, the hardware support library must be updated to include all required items.

Follow these steps:

Open Add/Remove Programs and select the National Instrument software item:

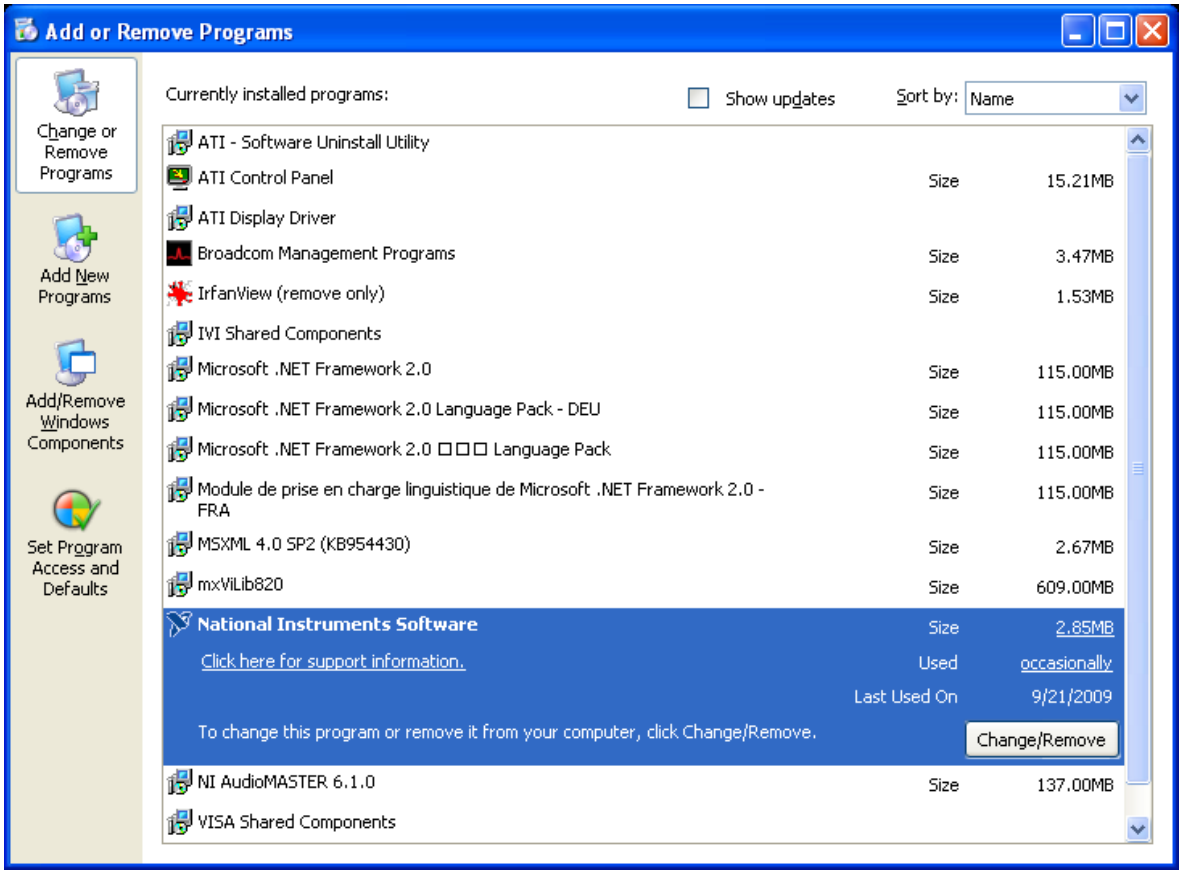



*Figure 1: Update hardware support libraries - Add/Remove Programs.*

Click “Change” button and then select the NI product that needs to be updated.

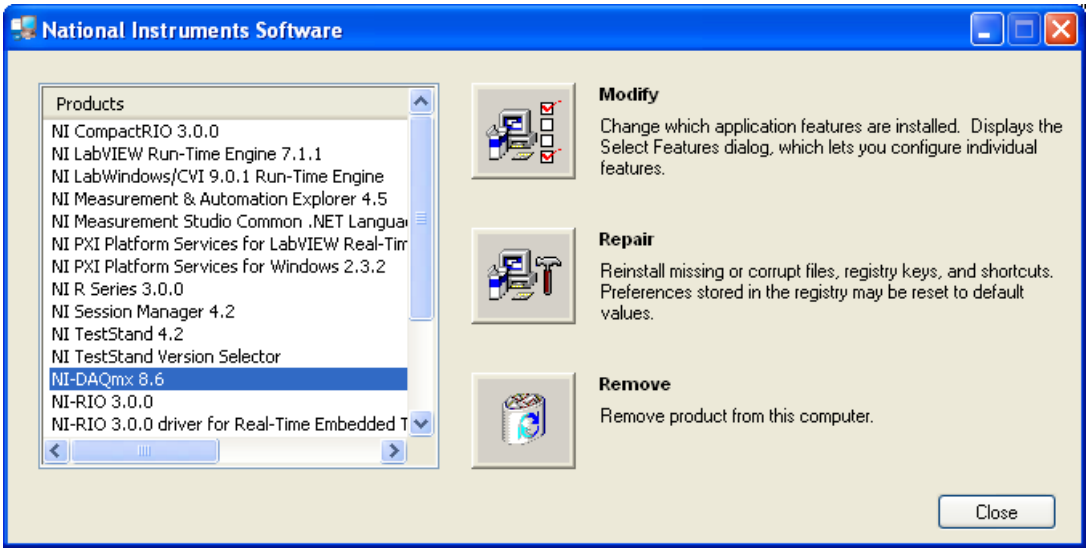
### 2.10.1 Update NI DAQmx libraries

When using the AudioMASTER analog platform the NI-DAQmx 8.6 drivers must be installed.

Select the ‘NI DAQmx’ product at click the ‘Modify’ button to start the update process.



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You will be prompted to insert the NI Device Driver CD that was used when installing the drivers in the first place:

Insert the CD and click “OK” When the driver CD has been detected the installation is started:

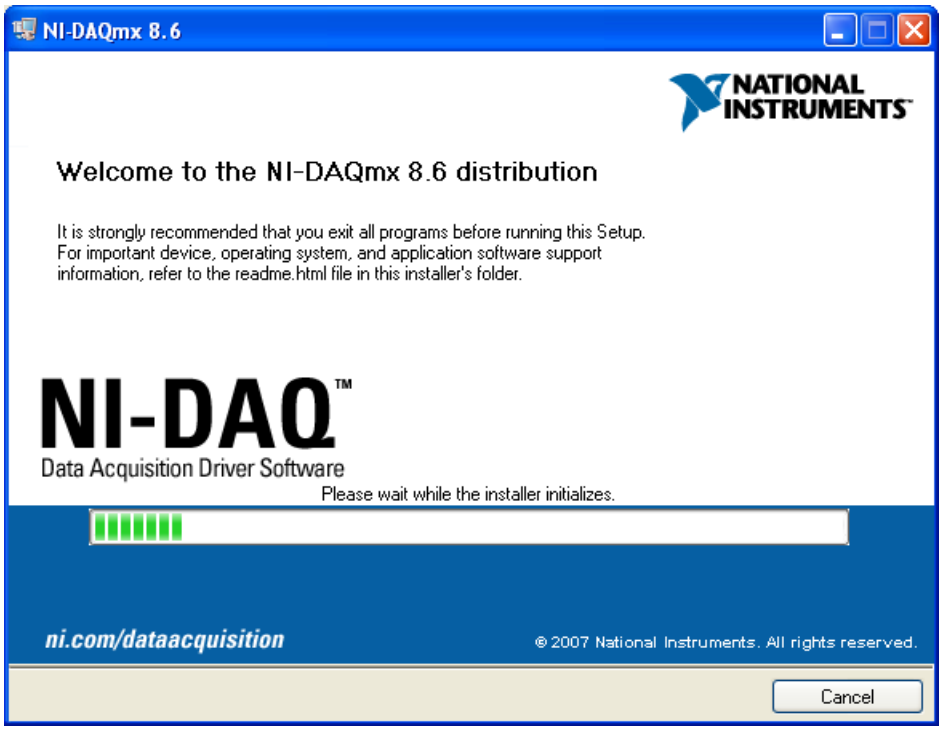



*Figure 2: NI Driver CD initializing installation.*

If the Device Driver CD splash screen is popped up by Windows Auto-run feature, simply exit the splash screen.

Go through the installation – selecting default options is normally suitable.



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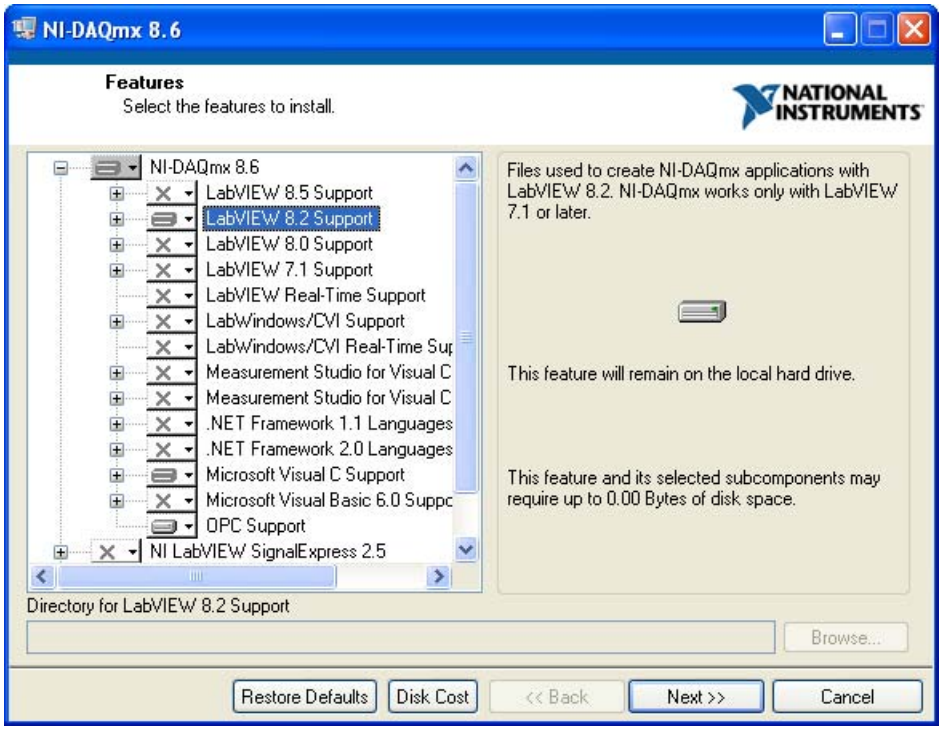
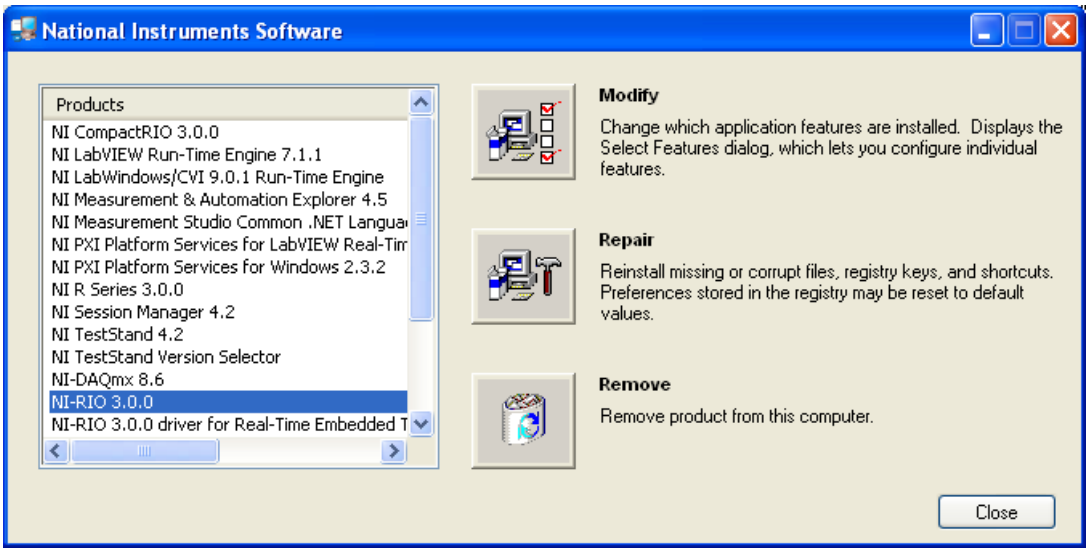



*Figure 3: Selecting default options will install LabVIEW support.*

### 2.10.2 Update NI-RIO libraries.

When using the AudioMASTER Digital Audio platform the NI-RIO 3.0.0 drivers must be installed.

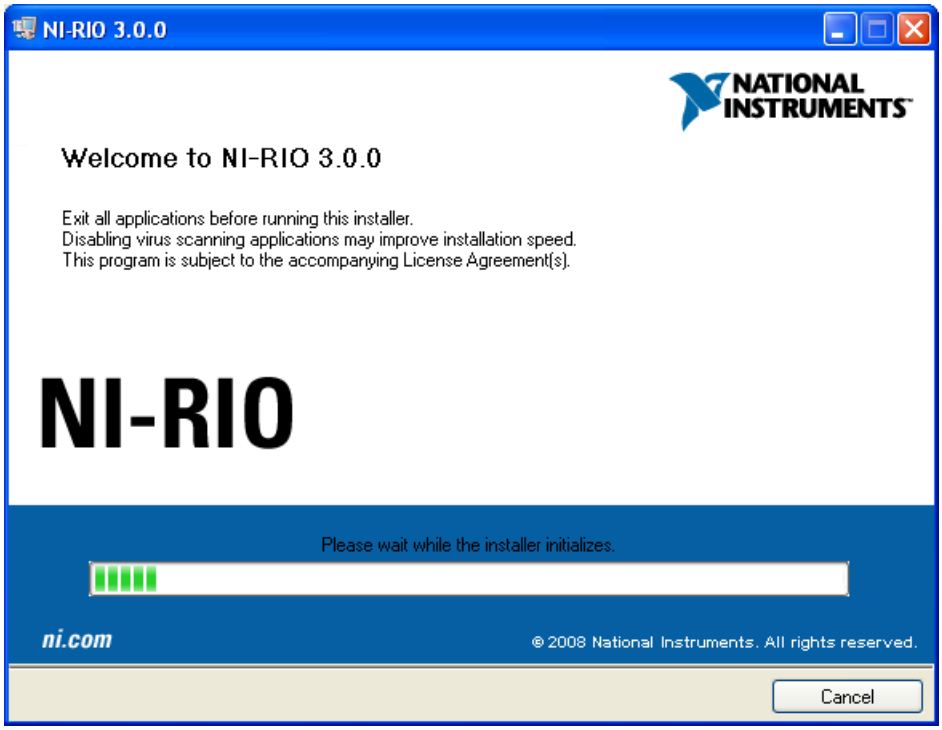
From the Add/Remove Program window shown in Figure 1 select the ‘NI RIO’ product and click the ‘Modify’ button.



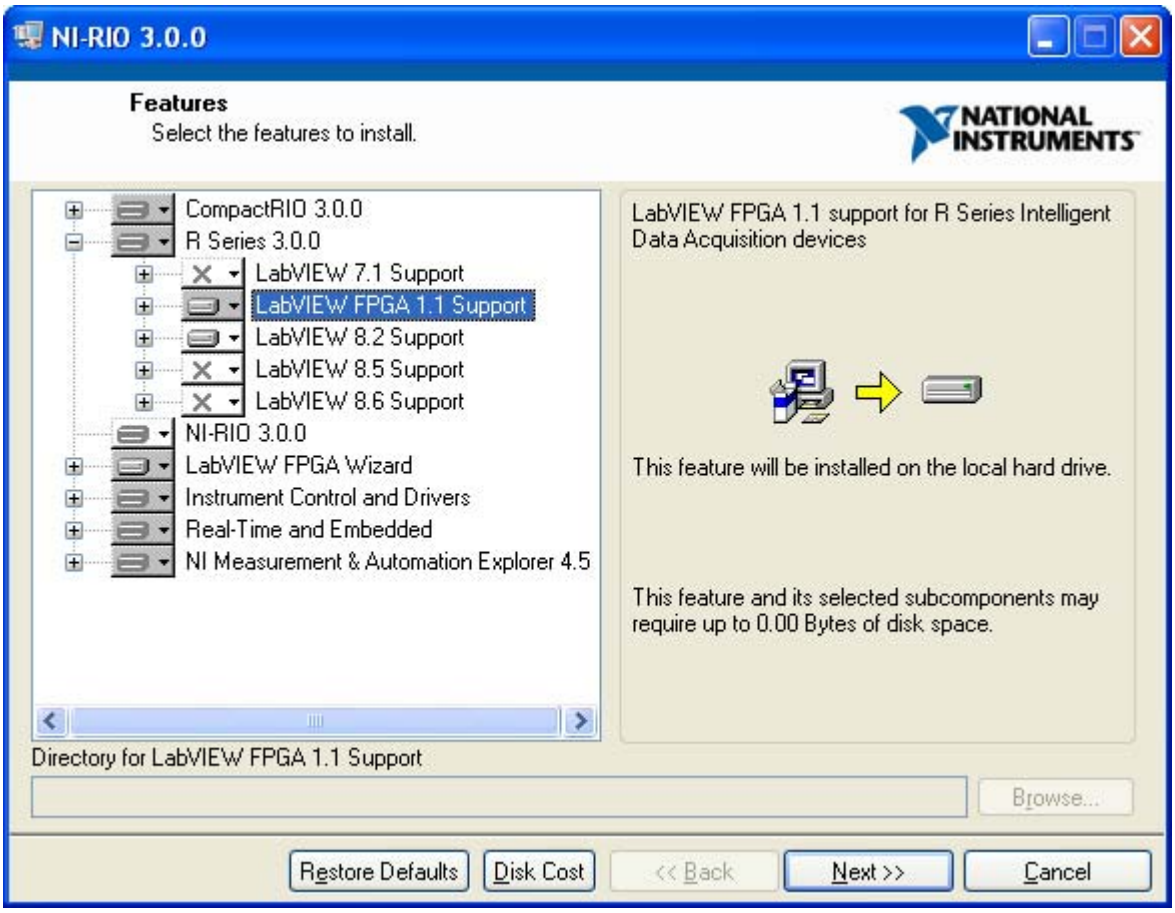

You will be prompted to locate the driver installation. When the installer has been located the NI-RIO driver installation is started.



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It is recommended to use default settings and ensure that *LabVIEW FPGA 1.1 Support* and *LabVIEW 8.2* is selected for installation.






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## 2.11 Supported Hardware

AudioMASTER supports the following hardware:

- *NI-4461/4462 PCI or PXI board.*
- *NI-7813/7833 PCI or PXI board.*

And some legacy hardware:

- *NI-9233 USB decive.*
- *NI-62xx series board.*
- *NI-4451/4551 PCI board.*
- *Sound Card (for demonstration).*

AudioMASTER also includes a Simulate platform that enables the user to use the software without any hardware.

Note: That the PXI-4461/4462 exist in two versions with different back-plane connector layout – a standard PXI layout and a hybrid PXI-express (PXIe) ready layout. Please refer to section 4.1 for installation details.



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# 3 Manual configuration

AudioMASTER stores all configuration info in the Windows registry. All settings should be set automatically during installation and there is usually no need for manual configuration.

## 3.1 Changing device address

If the device address of hardware supported by AudioMASTER is changed within NI-MAX, the new address must be updated in the AudioMASTER configuration using the 'Regedit' program.

The AudioMASTER configuration is found under:

```
HKEY_LOCAL_MACHINE\SOFTWARE\microLEX Systems\AudioMASTER\
```

Only Windows administrator can change the values. Please refer to the AudioMASTER user manual for details.

NOTE: Changing the Windows registry is very risky and involves the possibility to destroy the entire Windows installation.

## 3.2 Mass compilation

The software located in the microLEX Systems folder is mass compiled on installation, for operation under run-time engine. Mass compile is not possible when using the run-time environment.

However when installing on LabVIEW development system a mass compile may increase loading speed.

A mass compilation can be performed by opening the LabVIEW Development tool. From the menu bar select Tools | Advanced | Mass compile… and find the directory in which you installed AudioMASTER (default C:\Program files\microLEX Systems).

Select current dir and wait for LabVIEW to finish. This can take some time depending on the computer performance.



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# 4 AudioMASTER configuration

Normally AudioMASTER is configured automatically during installation, but in some situations the configuration must be updated or changed manually, as described in the following sections.

AudioMASTER uses a special plug-in device model to allow running the measurement functions with different types of hardware. It also opens the possibility to support new hardware in the future. The platform selection and other configurations are set up in the Windows registry.

Currently the following platforms are available:

- Simulate – no hardware.
- DAQmx44 – NI-4461/4462 boards, PCI or PXI.
- FlexAUDIO-D1 – NI-7813R/7833R boards, PCI or PXI.
- DAQmx62 – NI-62xx boards, PCI o PXI.
- SoundCard – standard sound card.
- DAQ4451 – NI-4451/4551 boards.

The Simulate platform actually involves no hardware but is very practical for demonstration and off-line programming.

The FlexAUDIO-D1 platform (Digital Audio) includes an interface box and is used for digital audio in SPDIF-format, including Linear PCM and AC3 (5.1 channel surround).

Sound card platform is useful for some applications where trigger capabilities are not needed and when the possible influence of the Windows system is acceptable.

Other platforms are supported for legacy test systems and demonstration purposes only.

## 4.1 Configuring for multiple boards - DAQmx44 platform

An AudioMASTER system for analog audio analysis can be set up to employ multiple DSA modules (NI-4461 and NI-4462). It facilitates a system configuration with more input/output channels than what is conceivable using just a single DSA module. This is achieved by combining two or more DSA modules in one AudioMASTER system configuration.

However, an AudioMASTER system configuration based upon multiple DSA modules requires specific setups due to the nature of the DSA modules. For PXI based systems, the configuration must e.g. respect some limitations present due to different physical connector structures in PXI Express ready DSA modules. Below, we will discuss the background for this and how to configure a system correctly.



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### 4.1.1 Configuration of PXI based system

The NI 4461 and 4462 devices are offered in both standard PXI and PXI Express-ready (PXIe-ready) versions. The latter is also referred to as a “hybrid slot” module. To understand this, we need to divide into the differences of the PXI and PXIe modules. All NI-446x modules are PXI modules, but a small modification on the back plane connector of a DSA module, A “hybrid” version, allows it to be used in a PXI chassis that has “hybrid” slot configurations. The PXI chassis NI-1062 is one such “hybrid” chassis that supports both PXI and PXIe modules. Some slots are PXI slots, others PXIe, and yet others are hybrid slots that will allow the use of both PXI based and PXIe modules. The configuration of the “hybrid” PXI is seen from the figure below:

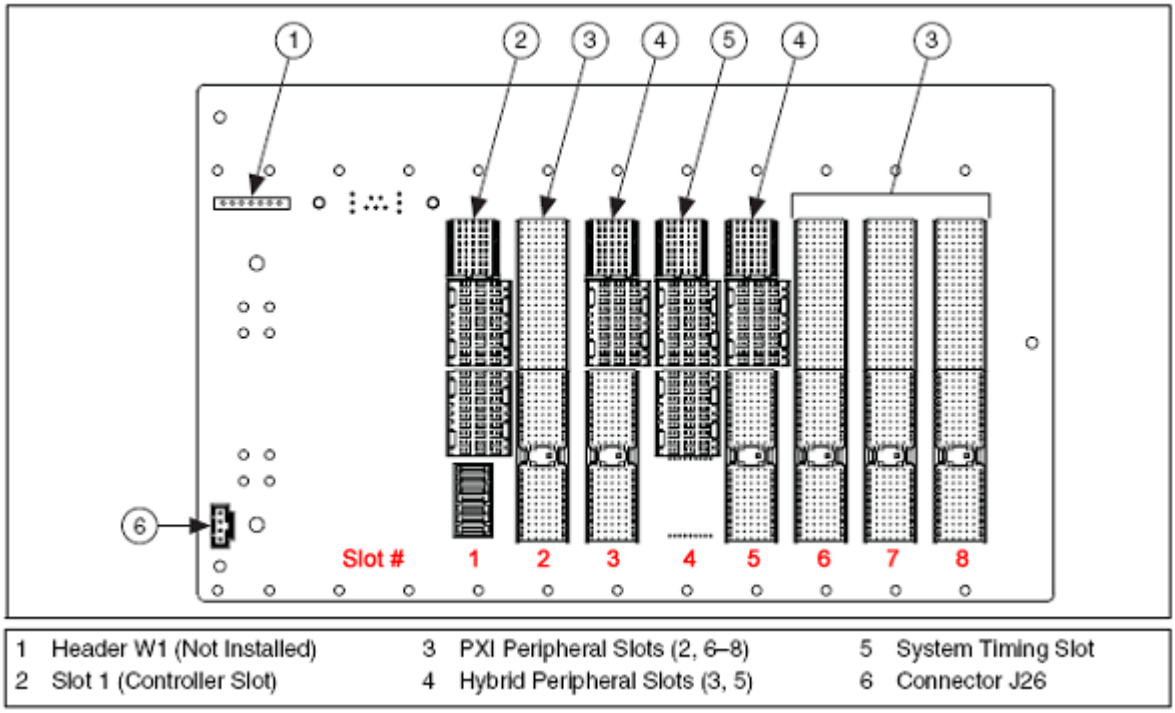



*Figure 4: An 8-slot PXI/PXIe back-plane as found in the NI-1062 PXI chassis. The Slot# positions are shown in red in the lower part of the PXI back-plane.*

From Figure 4, it can be seen that slot 2 and slots 6 through 8 are traditional PXI slots, where any NI-446x module will fit, slots 3 and slot 5 are “hybrid slots” where only the PXIe ready NI-446x modules (“hybrid versions”) will fit. Finally, slot 4 is a PXIe only slot, where no DSA module will fit.

Each NI-446x module has a lower D1 back-plane connector and an upper D2 back-plane connector. However, for the “hybrid” version of the NI-446x, a part of the upper D2 connector is removed to ensure that the module does not have a conflict when inserted in a PXI/PXIe hybrid slot position.

*Note 1: The DSA module that is delivered as part of AudioMASTER is a “hybrid slot” module that fits into about 80% of all chassis. “Hybrid” refers to that some slots in PXI chassis are made for adoption of both PXI modules and PXIe modules.*



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The PXIe-ready (hybrid-slot compatible) NI-446x devices have slightly less functionality only regarding synchronization schemes in comparison with standard PXI 446x devices.

Standard PXI NI-446x devices can be synchronized with either of two methods: Clk10 or PXI Star Trigger. The Clk10 method uses the 10 MHz clock in the PXI back-plane as the base clock. The PXI Star Trigger method requires one NI-446x (Master) to route its clock to the others (Slaves) as the base clock for synchronization. In either case, the synchronization results (drift, phase shift, etc.) are identical.

*Note 2:* *With the PXIe-ready devices (hybrid version), some pins are removed from the connector, including the PXI Star Trigger pin. Thus the PXI Star Trigger method of synchronization is not possible in PXIe-ready 446x*

### 4.1.2 Multiple PXI boards requires Master/Slave configuration

When using multiple DSA modules in conjunction with AudioMASTER in a single system configuration, the modules must be configured in a Master/Slave configuration. AudioMASTER uses the PXI Star trigger for the synchronization of multiple DSA modules in a single system configuration. Due to this, the Master module in the configuration must be positioned in slot 2 of the PXI chassis, regardless of whether the PXI chassis is traditional PXI chassis or a “hybrid chassis”. From slot 2, the Star-trigger is routed to the other slots of a PXI back-plane:

*Note 3:* *The PXI Specification defines only 13 Star trigger lines, therefore, the Star trigger is only available in Slots 3 through slot 15 in larger PXI chassis, e.g. the NI-1045 where the last 3 slots do not receive a star trigger.*

Because the default configuration of an AudioMASTER system, ref. Note 1, is always a “hybrid“ module, this cannot serve as Master in a configuration of multiple DSA modules in an AudioMASTER system, and it will always have to be used in a Slave configuration.

Hence, at least one of the additional DSA modules used in a Multiple DSA configuration of AudioMASTER must be of a configuration having a full D2 connector, i.e. PXI only, for its use as Master in the configuration.

*Note 4:* *It is important that the DSA module that serves as Master for a multiple DSA configuration has a full D2 connector, i.e.:*
*778442-01 Board only, if it is NI-4461, or*
*779131-01 Board only, if it is NI-4462*

### 4.1.3 Configuration of PCI based system

PCI based DSA modules continue to use RTSI connections for synchronization and therefore are unaffected of the problems listed above due to “hybrid” PXI modules.

If you use PCI, then in principle you just need to employ the RTSI cable between the two modules instead of using the star trigger in PXI. The rest of the configuration is identical to that of PXI.



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## 4.2 AudioMASTER settings in the Windows registry

Settings in the registry controls how applications operate. Changing these settings may cause applications to stop working. Therefore never change any settings without backing up the values.

The AudioMASTER settings are located under:

`HKEY_LOCAL_MACHINE\SOFTWARE\microLEX Systems\AudioMASTER`

| *Key values* | *Description* |
|---|---|
| `CalibFile` | Relative path and file name to the calibration file |
| `CurrentPlatform` | Name of currently selected platform |
| `Feature` | Name of installed AudioMASTER feature |
| `InstallPath` | Path to where AudioMASTER is installed |
| `UserDataPath` | Path to users data, like calibration file |

Paths are relative to the AudioMASTER install folder.

### 4.2.1 Platform registry keys

Each platform has is own keys in the registry that specifies which device driver to use and resource ID's for the physical devices.

| *Key values* | *Description* |
|---|---|
| `CurrentDevDriverFunc` | Relative path and file name to the platform current measurement device driver vi. At present time this is only used by the DAQ4451 platform. |
| `CurrentDevID` | Resource identification for the current measurement device. At present time this is only used by the DAQ4451 platform. |
| `CurrentDevPropFunc` | Relative path and file name to the vi that returns properties for the platform current measurement device. At present time this is only used by the DAQ4451 platform. |
| `Name` | Platform name that is shown on the front panel. |
| `PowerDevDriverFunc` | Relative path and file name to the platform power device driver vi. At present time this is only used by the DAQ4451 platform. |
| `PowerDevID` | Resource identification for the power setup device. At present time this is only used by the DAQ4451 platform. |
| `PowerDevPropFunc` | Relative path and file name to the vi that returns properties for the platform power device. At present time this is only used by the DAQ4451 platform. |
| `WaveDevAdv` | Relative path and file name to vi that is used to set advanced settings for the platform driver. |
| `WaveDevDriverFunc` | Relative path and file name to the platform wave device driver vi |
| `WaveDevPropFunc` | Relative path and file name to the vi that returns properties for the platform wave device |
| `WaveInDevID` | Resource identification for the wave device input channels. |



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| *Key values* | *Description* |
|---|---|
| `WaveOutDevID` | Resource identification for the wave device output channels. |

If a platform does not use the Power and Current devices, the Device ID's can be set to 'None' and the relevant paths should be set to point to the associated driver function belonging to the simulate platform.

The DAQmx platform drivers support cascading physical devices to provide more channels. The waveform device ID's must be formatted like this:

| *Platform class* | *Resource ID's* |
|---|---|
| DAQmx | `None`<br>`DAQmx::<Device name>;`<br>`DAQmx::<Device name 1>;<Device name 2>;` |
| RIO | `None`<br>`VISA::<Device name>::INSTR;` |
| Traditional DAQ | `None`<br>`DAQ::<Device number>;`<br>`DAQ::<Device number 1>;<Device number 2>;` |
| Simulate | `None` |
| Sound card | `None`<br>`DAQ::<Device number>;` |

Device names and numbers are the names of the hardware resources that are specified in the NI-MAX software (not including the sound card).

The first device is the master, and the following devices are slaves. Please note that there is a "semicolon" between names and at the end as well.

Note that all resource ID's end with a semicolon (;) except when the value is *None* that has no termination character.

## 4.3 SequenTEST configuration

When SequenTEST support is selected during installation the Calibration tool is added to the SequenTEST Tools menu.

If needed to reinsert the menu item for the Calibration tool, it can be added manually inserting following settings into the seqtest.ini file:

```
[Tools]

Entry1=Calibration tool,C:\Program Files\microLEX Systems\
AudioMASTER\PrivateSupport\Calibration\mlxHM Calibration
tool.vi
```



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# 5 Update and un-installation

AudioMASTER is removed or changed using ‘Add/Remove Programs’ from the Windows control panel.

## 5.1 Installing over earlier versions of AudioMASTER

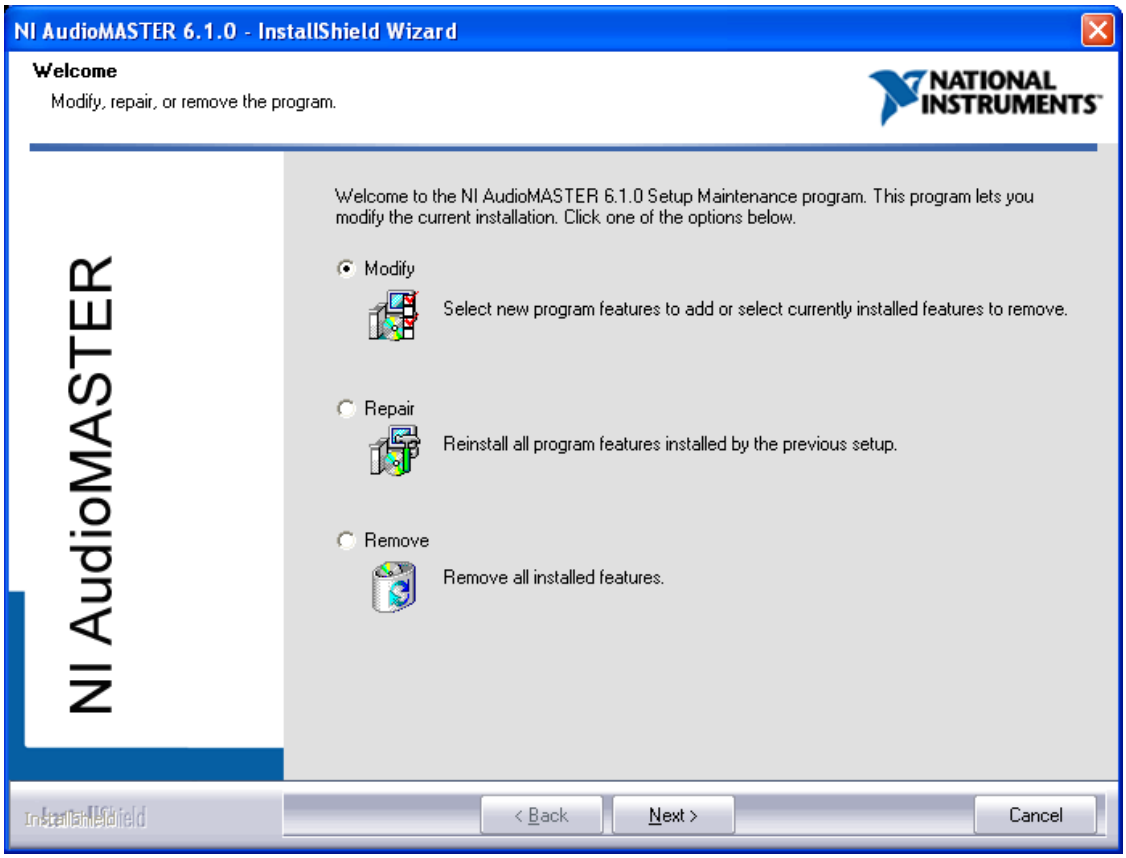
If the installer detects an earlier version of the AudioMASTER software it will be un-installed automatically before installing the new version.

Any settings in the previous version will be lost.

If an earlier version of the HearMASTER software is detected, the installation will stop and prompt for manual un-installation of HearMASTER.

## 5.2 Maintenance installation

During maintenance installations the following dialog box will appear:




There are tree options:

- **Modify** should be selected if you want to add or remove components to the installation. When next is pressed, a custom selection dialog box is displayed and the required changes can be made. Only differences to the current installation will be applied.



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- **Repair**, should be selected if the current installation is broken due to user edits or something has crashed the files. The repair option will reinstall all files originally installed.
- **Remove**, will remove all files and configurations belonging to the current installation from the local computer.

### 5.2.1 Remove

When un-installing AudioMASTER only the AudioMASTER components are removed. The Run-time engine and the libraries are not un-installed automatically because they might be needed for other microLEX Systems software.

Other software modules that were installed by the AudioMASTER installer can be removed by opening the Add/Remove Programs in the Control panel.

NOTE: If the LabVIEW Run-time engine is installed this can be removed by opening the Add/Remove Programs in the Control panel. From the list of applications select National Instruments Software and select 'NI LabVIEW Run-Time Engine 8.2.1'.



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# 6 Troubleshooting the installation

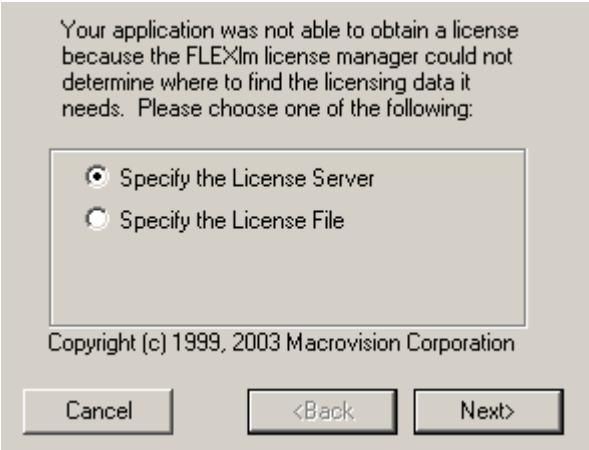
## 6.1 License manager

FLEXlm is the license manager for AudioMASTER. The license system requires a valid license file for each product or module to be installed in the folder (Default installation path shown here as example):

```
C:\Program Files\microLEX Systems\License Files
```

The license files can be obtained from National Instruments. See page 3 for contact information.

If AudioMASTER fails to locate a license file FLEXlm will show the following dialog:




If this dialog is shown select "Specify the License File" and press Next.

Now browse to the directory with the license file. For a default installation path this is:

```
C:\Program Files\microLEX Systems\License Files.
```

### 6.1.1 Required license files

AudioMASTER relies on a special FlexLM license manager in order to check the validity of the installed software. Each module requires its own set of license features. All license features are typically stored in one license file:

- AudioMASTER – Plug-in shell
- Each plug-in function
- FlexAUDIO-D1 – Digital Audio Interface platform driver.
- Calibration functions
- mxLimiTEST when using TestStand.
- AudioMASTER legacy test functions (HearMASTER)



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A valid license is usually delivered with the software. If a valid license file is not available please contact National Instruments to acquire a license. See page 3 for contact information.

### 6.1.2 Demo license

Demo licenses are also available. Demo licenses usually runs for a limited period of time. Please refer to page 3 for contact information.



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# Index

**A**
AudioMASTER configuration, 18, 29
AudioMASTER installation, 9
AudioMASTER settings in the Windows registry, 32

**C**
Changing device address, 27
Choose destination, 13
Configuration of PCI based system, 31
Configuration of PXI based system, 30
configuration, AudioMASTER, 29
configuration, SequenTEST, 33
Configuring for multiple boards, 29
Copy files, 16
Copy license file, 19
Customer information, 12

**D**
Demo license, 38
device ID, 33
Device names, 33

**E**
earlier versions of AudioMASTER, 35

**F**
Finalizing installation, 20
First time installation, 11

**H**
hardware support library, 21
hybrid slots, 30

**I**
Installation complete, 19
Installing for TestStand, 11

**L**
License manager, 37

**M**
Maintenance installation, 35
Manual configuration, 27
Mass compilation, 27
Master/Slave configuration, 31

**N**
NI Device Driver CD, 22
NI-MAX, 33

**P**
Platform registry keys, 32
Pre-installation, 11
PXI Express, 30

**R**
Remove, 36
Required license files, 37

**S**
Select features, 15
sequence files
update, 19
SequenTEST configuration, 33
Supported Hardware, 25
System Requirements, 9

**T**
Trouble shooting the installation, 37

**U**
update
sequence files, 19
Update and un-installation, 35
Update NI-DAQmx libraries, 21
Update NI-RIO libraries, 23
User data destination, 14

**W**
Welcome, 12



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