

# LabVIEW™ DSP Module Release and Upgrade Notes

Version 2.5

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# Introduction

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The LabVIEW DSP Module supports the design, implementation, and analysis of digital signal processor-based algorithms and systems. You can apply the concepts of digital signal processing techniques, such as spectral analysis or filtering, with the DSP Module and one of the following evaluation boards:

- National Instruments SPEEDY-33
- Spectrum Digital 6416 DSK
- Spectrum Digital 6713 DSK
- Texas Instruments 6711 DSK

The DSP Module adds features and VIs to LabVIEW that focus on creating signal processing applications that run on embedded digital signal processors (DSPs). With LabVIEW and the DSP Module you can focus on concepts and results rather than on implementation details.

## System Requirements

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The DSP Module has the following requirements:

- A desktop computer with Windows Vista/2000 or Windows XP SP 2 or later
- LabVIEW 8.5 Full or Professional Edition
- One of the following evaluation boards and corresponding driver:
  - National Instruments SPEEDY-33
  - Spectrum Digital 6416 DSK
  - Spectrum Digital 6713 DSK
  - Texas Instruments 6711 DSK



**Note** The Texas Instruments 6711 DSK is not compatible with Windows Vista.

Refer to the *LabVIEW Release Notes*, available by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and opening `LV_Release_Notes.pdf`, for standard LabVIEW development system requirements.

# Installation

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Complete the following steps to install the DSP Module. After you install the DSP Module, you must install the driver(s) for the DSP target.

1. Log on as an administrator or as a user with administrator privileges.
2. Unplug the DSP device from the host computer if the device is connected.
3. Insert the LabVIEW DSP Module CD and follow the instructions that appear on the screen.



**Note** The DSP Module installation process installs the NI SPEEDY-33 driver by default.

## Installing the Drivers

You must install the appropriate driver for the DSP target.

- National Instruments SPEEDY-33—Install the SPEEDY-33 driver during the DSP Module installation process. Do not plug in the SPEEDY-33 device to the host computer until after you install the DSP Module software. Refer to the *NI SPEEDY-33 Installation Guide* for more information about setting up the SPEEDY-33.
- Spectrum Digital 6416 DSK—Refer to the 6416 DSK documentation from Spectrum Digital for information about installing the drivers.
- Spectrum Digital 6713 DSK—Refer to the 6713 DSK documentation from Spectrum Digital for information about installing the drivers.
- Texas Instruments 6711 DSK—Refer to the *Setting Up the Texas Instruments 6711 DSK Target* document, available by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and opening `DSP_6711DSK_Setup.pdf`, for information about setting up the 6711 DSK target.



**Note** The Texas Instruments 6711 DSK is not compatible with Windows Vista.

## Setting Up the Hardware

Refer to the documentation that came with your DSP hardware for information about setting up and configuring the hardware. You can use the default configuration for the DSP Module.

**(6711 DSK Only)** Refer to the *Setting Up the Texas Instruments 6711 DSK Target* document, available by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and opening `DSP_6711DSK_Setup.pdf`, for information about setting up the 6711 DSK target.

## Installing Third-Party Tools to Use the MIDI Read Control

You must install MIDI Yoke and MIDI-OX to use the new MIDI Read control on the **Mixed Target** palette for DSP targets. The MIDI Read control reads MIDI data that MIDI-OX generates.

If you do not plan to use the MIDI Read control in a DSP application, you do not need to install MIDI Yoke or MIDI-OX.

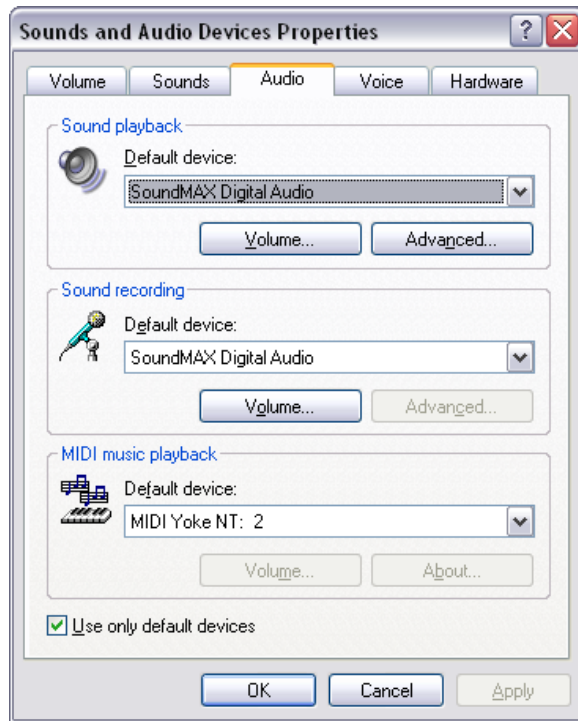
### Installing and Configuring MIDI Yoke

MIDI Yoke is free software that you can download from [www.midiox.com/myoke.htm](http://www.midiox.com/myoke.htm). Refer to the Web site for special instructions on installing MIDI Yoke with Windows Vista.

Complete the following steps to install and configure MIDI Yoke on Windows XP/2000.

1. Log on as an administrator or as a user with administrator privileges.
2. Download the MIDI Yoke NT 1.74 installer (`MidiYokeSetup.msi`) from the [www.midiox.com/myoke.htm](http://www.midiox.com/myoke.htm) Web site.
3. Run the MIDI Yoke installer and follow the instructions on the screen.
4. Restart your computer when the installer prompts you.
5. Open Windows Control Panel.
6. **(Windows XP)** Double-click **Sound and Audio Devices**.  
**(Windows 2000)** Double-click **Sounds and Multimedia**.
7. Click the **Audio** tab.

8. Select a MIDI Yoke device from the **(Windows XP) Default device** pull-down menu or the **(Windows 2000) Preferred device** pull-down menu in the **MIDI music playback** section as shown in Figure 1, and click the **OK** button. LabVIEW can use any MIDI Yoke device.



**Figure 1.** Selecting a MIDI Yoke Device in the Windows XP Control Panel



**Note** If you do not see any MIDI Yoke devices in the pull-down menu, you might need to reinstall MIDI Yoke manually. Download the MIDI Yoke NT 1.74 manual installer (`myokent.exe`) from the [www.midiox.com/myoke.htm](http://www.midiox.com/myoke.htm) Web site and follow the instructions.

## Installing and Configuring MIDI-OX

Complete the following steps to install and configure MIDI-OX.

1. Log on as an administrator or as a user with administrator privileges.
2. Download the MIDI-OX 7.0 installer (`midioxse.exe`) from the [www.midiox.com](http://www.midiox.com) Web site.
3. Run the MIDI-OX installer and follow the instructions on the screen.
4. Launch MIDI-OX after the installation is complete.
5. Select **Options»MIDI Devices** to open the **MIDI Devices** dialog box.

- Select a MIDI device in the **MIDI Inputs** list as shown in Figure 2 and click the **OK** button. You must select the same device you selected in step 8 of the *Installing and Configuring MIDI Yoke* section.

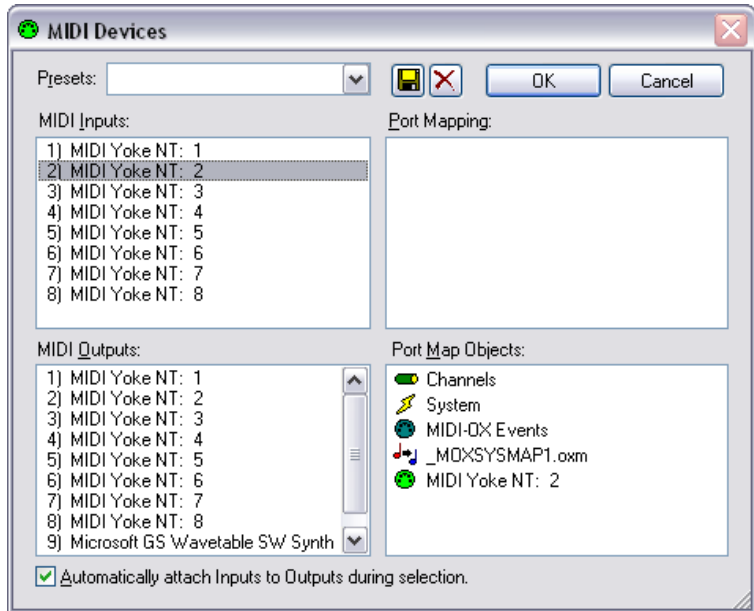


Figure 2. Selecting a MIDI Input Device

## Testing the Configuration of MIDI Yoke and MIDI-OX

Complete the following steps to make sure MIDI-OX can play MIDI files properly.

- Launch MIDI-OX if it is not running already.
- Select **Actions»Play MIDI** to open MIDIBar.

If MIDIBar does not open, you might need to reinstall MIDI Yoke. Refer to the *Installing and Configuring MIDI Yoke* section for information about installing MIDI Yoke.



- Click the **Open** button, shown at left, in MIDIBar and browse to the MIDI file you want to play.
- Select the file you want to play and click the **OK** button.
- Select **View»Input Monitor** in MIDI-OX if the **Monitor - Input** window is not already visible.



- Click the **Play** button, shown at left, in MIDIBar to play the file. If the installation and configuration of MIDI-OX and MIDI Yoke is correct, data displays in the MIDI-OX **Monitor - Input** window.



7. Click the **Stop** button, shown at left, in MIDIBar to stop the playback.
8. Close MIDI-OX and MIDIBar before launching LabVIEW.

## Upgrading from the DSP Module 2.0

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DSP VIs and projects you created with the DSP Module 2.0 are compatible with the DSP Module 2.5.

## Upgrading from the DSP Module 1.0

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If you created DSP VIs using the DSP Module 1.0, you must create projects and update the VIs for use with LabVIEW 8.5 and the DSP Module 2.5.



**Caution** National Instruments recommends you back up your files before you begin updating your DSP Module 1.0 VIs for use with the DSP Module 2.5. For example, DSP-specific Express VIs and Elemental I/O Nodes are not backward-compatible so you cannot save DSP VIs that use those items in a previous version of LabVIEW.

## Managing DSP Targets and VIs in LabVIEW Projects

LabVIEW 8.x features the **Project Explorer** window and the LabVIEW project to manage applications that include multiple VIs and resources, such as DSP targets. The DSP Module 2.5 uses the **Project Explorer** window to manage the components of a DSP application, including DSP VIs and Elemental I/O items.

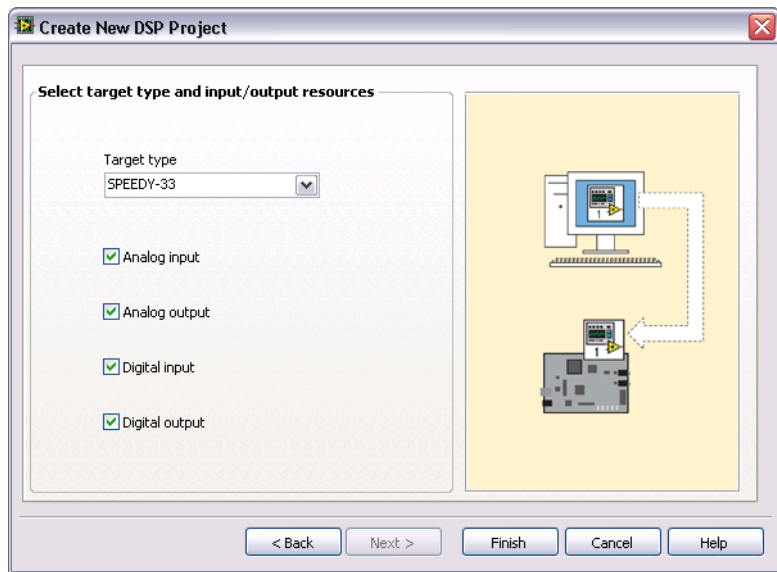


**Note** You must create projects to create DSP VIs. You can use the DSP Project Wizard, available by selecting **DSP Project** from the **Targets** pull-down menu in the **Getting Started** window and clicking the **Go** button, if you want to create a new project that includes a DSP target.

## Adding I/O to the Project

You first must add Elemental I/O items to the DSP project to use the analog input and output resources available on the DSP target or to access the LEDs and switches on the DSP target.

You can add Elemental I/O items to a project when you create the project using the DSP Project Wizard. The DSP Project Wizard adds all available I/O resources by default, as shown in Figure 3. Click the **Finish** button to create the project with the I/O resources you select.



**Figure 3.** Adding I/O Resources through the Wizard



**Tip** You also can add Elemental I/O items by right-clicking a DSP target in the **Project Explorer** window and selecting **New»Elemental I/O** from the shortcut menu.

To use the Elemental I/O item in a DSP VI, place an Elemental I/O Node on the block diagram of a DSP VI. To configure the Elemental I/O Node, right-click the terminal name in the Elemental I/O Node and select **Properties** from the shortcut menu.



**Tip** You can use the same Elemental I/O Node on the block diagram to access all of the Elemental I/O items in the **Project Explorer** window. Refer to the *LabVIEW Help* for more information about using Elemental I/O Nodes.

## New Features in the DSP Module 2.5

The DSP Module 2.5 includes the following new features:

- **Customizable Lesson Manager Window**—Provides a way to organize and present custom example VIs to students in a lab situation. Refer to the *Customizing and Using the LabVIEW Lesson Manager* manual, available by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and opening



LabVIEW includes the following new Mixed Target controls to use with VIs for DSP targets:

- **2D Spectrograph**—Appears as an intensity chart in a front panel window. The 2D Spectrograph control displays two-dimensional data as a spectrograph of a signal.
- **Keyboard Input**—Appears as a custom text control in a front panel window. Use the Keyboard Input control to type text using the computer keyboard so that the DSP target can process the text. The output of this control is the ASCII character value for the last keyboard entry.
- **MIDI Read**—Appears as a custom numeric control in a front panel window. This control works with the MIDI-OX software. The MIDI Read control reads MIDI data for any MIDI file the MIDI-OX software plays. The output of the MIDI Read control is an array of five notes that represent the musical content of a MIDI file that MIDI-OX generates.
- **Multipurpose Display**—Appears as a graph display in a front panel window. The display provides a method of displaying waveform data in both the time and frequency domains. Click the tabs to switch between time and frequency domains. You can select user options including manual or auto-scaling of the y-axis and cursor readout of waveform data.
- **Sketchwave**—Appears as a graph display in a front panel window. With the Sketchwave control you can generate an arbitrary custom waveform by using the computer mouse to drag the shape of the waveform directly in the graph display. Click the buttons on the Sketchwave control to use pre-defined waveform signals, including sine waveform, triangle waveform, positive ramp, negative ramp, and empty waveform.
- **Receive Character**—Allows for a scrolling history of up to twenty letters of the alphabet. The letters scroll from right to left until the characters scroll off the left side of the indicator. Input values for the letters a to z range from 10 to 35, where 10 = a and 35 = z. Use a value of 36 for a space. Separate identical consecutive input values with a value of zero. For example, to scroll the word `hello` on the indicator, use the following input sequence: 17 14 21 0 21 24.

# Where to Go from Here

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National Instruments provides many resources to help you succeed with your NI products. Use the following resources as you start exploring LabVIEW and the DSP Module.

## Examples and Tutorials

Many of the features of the DSP Module include corresponding examples. You can start with an existing example and use it as a framework for developing DSP VIs. From LabVIEW, launch the NI Example Finder by selecting **Help»Find Examples**. Browse the examples by task or by directory structure. You can locate example VIs specifically for the DSP Module in the `EmbeddedDSP` directory.

The *Getting Started with the DSP Module* manual contains step-by-step exercises to teach you how to create a DSP application with the **Project Explorer** window. From Windows, select **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and open `DSP_Getting_Started.pdf` to view this manual.

## Software- and Web-Based Resources

Refer to the *LabVIEW Help* for information about LabVIEW and the DSP Module, and refer to the **Context Help** window for information about using VIs and functions.

- **LabVIEW Help**—Available by selecting **Help»Search the LabVIEW Help** in LabVIEW. Browse the **DSP Module** book in the **Contents** tab for an overview of the **DSP Module**.
- **Context Help** window—Available by selecting **Help»Show Context Help** or by pressing the <Ctrl-H> keys.

Visit [ni.com](http://ni.com) for the latest NI Developer Zone examples, Knowledgebase articles, and support information for the DSP Module. Refer to [ni.com/info](http://ni.com/info) and enter the info code `dspsupport` to access Web-based resources.

## Academic Resources

The *Customizing and Using the LabVIEW Lesson Manager* manual describes how you can organize and present custom LabVIEW-based labs in a classroom setting. From Windows, select **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and open `LV_Custom_Lesson_Manager.pdf` for information about using the LabVIEW Lesson Manager.

Visit [ni.com/dsp](http://ni.com/dsp) for other academic and training resources.

## Known Issues

Refer to the `readme_dsp.html` file on the LabVIEW DSP Module installation CD for information about known issues with the DSP Module. You also can find the `readme_dsp.html` file installed in the `labview\readme` directory. Select **Start»All Programs»National Instruments»LabVIEW»Readme** to open the `labview\readme` directory.

## Where to Go for Support

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The National Instruments Web site is your complete resource for technical support. At [ni.com/support](http://ni.com/support) you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at [ni.com/support](http://ni.com/support) and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 662 457990-0,  
Belgium 32 (0) 2 757 0020, Brazil 55 11 3262 3599,  
Canada 800 433 3488, China 86 21 5050 9800,  
Czech Republic 420 224 235 774, Denmark 45 45 76 26 00,  
Finland 385 (0) 9 725 72511, France 01 57 66 24 24,  
Germany 49 89 7413130, India 91 80 41190000, Israel 972 3 6393737,  
Italy 39 02 413091, Japan 81 3 5472 2970, Korea 82 02 3451 3400,  
Lebanon 961 (0) 1 33 28 28, Malaysia 1800 887710,  
Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466,  
New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60,  
Poland 48 22 3390150, Portugal 351 210 311 210, Russia 7 495 783 6851,  
Singapore 1800 226 5886, Slovenia 386 3 425 42 00,  
South Africa 27 0 11 805 8197, Spain 34 91 640 0085,  
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Turkey 90 212 279 3031, United Kingdom 44 (0) 1635 523545

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