



Welcome to LabVIEW — graphical programming for data acquisition, instrument I/O, measurement analysis, and visualization. This card provides information about getting started with LabVIEW quickly.

## Installing LabVIEW

Complete the following steps to install LabVIEW.

1. Run the setup program on the CD.
2. Be sure to register online on [www.ni.com/register](http://www.ni.com/register). You also can fill out the LabVIEW **Product Registration Card** and return it to National Instruments. Registering qualifies you for support, upgrades, and other important product information.
3. If you are new to LabVIEW, complete the **LabVIEW Tutorial** by starting LabVIEW and clicking the **LabVIEW Tutorial** button.



Read and complete the exercises in the **Getting Started with LabVIEW** manual. For data acquisition or instrument I/O examples, click the **DAQ Solutions** button. The **DAQ Solutions** button is available on Windows and Macintosh only. For other examples, click the **Search Examples** button.

## Where to Go Next

While you are in LabVIEW, select **Help»Show Context Help** to display the **Context Help** window. Select **Help»Contents and Index** to display the *LabVIEW Help*. Refer to the following manuals for additional LabVIEW information:

- Data Acquisition.....*LabVIEW Measurements Manual*
- Instrument Control.....*LabVIEW Measurements Manual*
- LabVIEW programming.....*LabVIEW Help* or *LabVIEW User Manual*

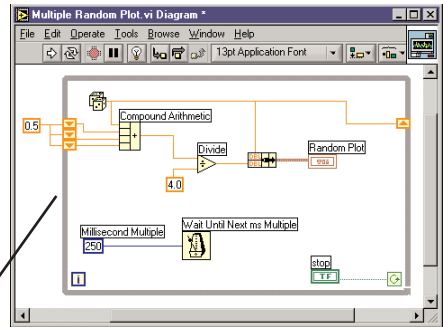
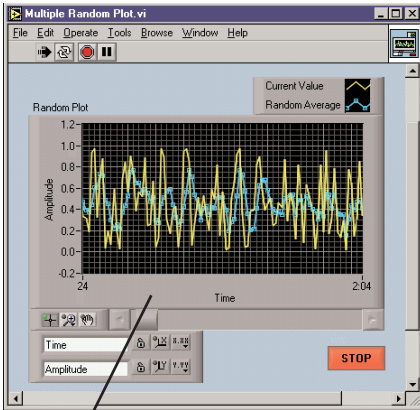
Refer to [www.ni.com/library](http://www.ni.com/library) for LabVIEW books and other resources.



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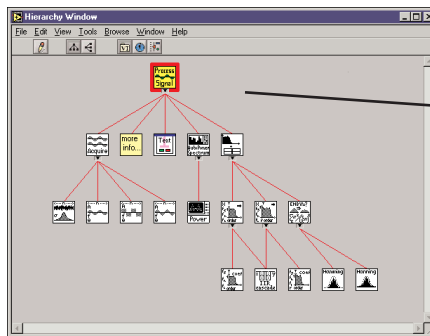


# LabVIEW Environment



The block diagram is the source code for the VI. You build the block diagram by wiring together objects that send or receive data, perform specific tasks, and control the flow of execution.

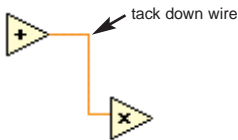
The front panel contains controls that supply data to the block diagram of the VI. Indicators display data the block diagram acquires or generates.



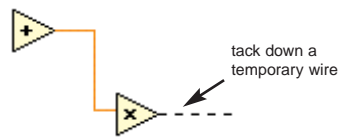
The **VI Hierarchy** window displays a graphical representation of the calling hierarchy for all VIs in memory. Select **Browse»Show VI Hierarchy** to display the VI hierarchy.

## Wiring Techniques

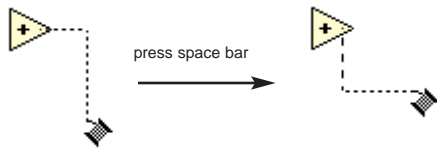
1 Click to tack down a wire



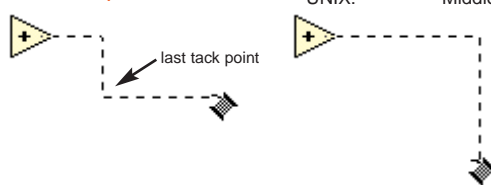
2 Double-click to tack down a temporary wire



3 Use space bar to change direction of wire

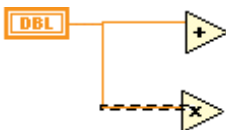


4 Remove last tack point

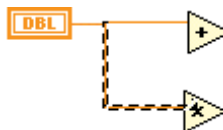


Windows: Ctrl-left-click  
Macintosh: Option-click  
UNIX: Middle-click

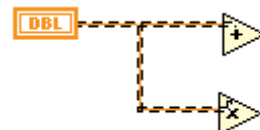
5 Highlight wire segments



single-click



double-click



triple-click

# Functions, Controls, & Tools Palettes

**Functions**

- Numeric
- Structures
- Boolean
- Array
- String
- Cluster
- Time & Dialog
- Comparison
- File I/O
- Waveform
- Data Acquisition
- Analyze
- Motion & Vision
- Instrument I/O
- Mathematics
- Application Control
- Communication
- Graphics & Sound
- Report Generation
- Tutorial
- Advanced
- Select a VI...
- User Libraries

**Controls**

- Boolean
- Numeric
- String & Path
- List & Table
- Array & Cluster
- Graph
- I/O
- Ring & Enum
- Refnum
- Classic Controls
- Dialog Controls
- Active X
- Select a Control
- Decorations
- User Controls

**Tools**



**Operating Tool**—Changes the value of a control or selects the text within a control.



**Positioning Tool**—Positions, resizes, and selects objects.



**Labeling Tool**—Edits text and creates free labels.



**Wiring Tool**—Wires objects together on the block diagram and connects control to connector pane.



**Object Shortcut Menu Tool**—Opens the shortcut menu of an object.



**Scroll Tool**—Scrolls the window without using the scroll bars.



**Breakpoint Tool**—Sets breakpoints on VIs, functions, wires, loops, sequences, and cases.



**Probe Tool**—Creates probes on wires.



**Color Copy Tool**—Copies colors for pasting with the Color Tool.












**Color Tool**—Sets the foreground and background colors.

# VI Navigation

Description	Technique
1. Find terminals, local variables, references, invoke nodes, and property nodes on the block diagram associated with a front panel control	Right-click the control on the front panel and select <b>Find</b> from the shortcut menu to locate the terminal, local variable, reference, invoke node, or property node on the block diagram.
2. Find text and objects in memory	Select <b>Edit»Find</b> or: Windows: Ctrl-f Macintosh: Command-f UNIX: meta-f
3. Find a VI, global variable, or type definition in the VI hierarchy	Select <b>Browse»Show VI Hierarchy</b> then select <b>Edit»Find</b> or type object name
4. Open subVI front panel	Double-click subVI
5. Open subVI block diagram	Double-click subVI while pressing: Windows: Ctrl Macintosh: Option UNIX: meta

# Debugging Techniques

Technique	Icon	Description	Shortcut Keys
Probe Tool		Displays intermediate values on a wire in a running VI. 	
Breakpoint Tool		Specifies node you pause on during execution.	
Execution Highlighting		Animates the movement of data on the block diagram using bubbles that move along the wires.	
Pause		Temporarily stops execution to debug a portion of VI.	
Step Into		Single-steps into a subVI or structure to debug it.	Windows: Ctrl-↓ Macintosh: Command-↓ Sun: Meta-↓ HP-UX: Alt-↓
Step Over		Executes a subVI or structure and resumes single-stepping in next main function.	Windows: Ctrl-→ Macintosh: Command-→ Sun: Meta-→ Windows: Alt-→
Step Out		Executes a subVI or structure and resumes single-stepping in calling VI or structure.	Windows: Ctrl-↑ Macintosh: Command-↑ Sun: Meta-↑ Windows: Alt-↑
Call Chain		Lists the chain of callers from the top-level VI down to the opened subVI. When you choose a VI from the ring control, the block diagram of the VI opens. The ring control is in the toolbar when the subVI executing or running is in Execution Highlighting on single-step mode. If a subVI has multiple instances, you can observe which instance is executing.	

# Block Diagram Navigation

## Description

## Technique

1. Create subVI from selected block diagram objects.

Select block diagram objects and select **Edit»Create SubVI**.


2. Create constant, control, or indicator on block diagram

Right-click terminal and select **Create»Constant, Control, or Indicator** from the shortcut menu.

Create a constant on the block diagram  
Create a control on the front panel!

Drag front panel control to block diagram.  
Drag block diagram constant to front panel.

3. List errors

Right-click broken wire and select **List Errors** from shortcut menu  
-or-  
click the **Run** arrow that appears broken. 

4. Delete broken wires

Windows: Ctrl-b  
Macintosh: Command-b  
Sun: Meta-b  
UNIX: Meta-b  
HP-UX: Alt-b  
-or-  
select **Edit»Remove Broken Wires**.

# Wire Types

## Scalars



Controls

Data Source

Indicators

Data Display

## 1D Array



## 2D Array



NOTE: Array wires are thicker than scalar wires, and array terminals have [ ] around base type



NOTE: Controls have thicker borders

## Terminal Data Types wire styles and colors are unique for each data type

### Signed Integers

8-bit 

16-bit 

32-bit 

### Unsigned Integers

8-bit 

16-bit 

32-bit 

### Real Floating-Point

Single 

Double 

Extended 

### Complex Floating-Point

Single 

Double 

Extended 

Boolean 


String 

Path 

Variant 

Refnum 

Cluster of numerics 

Cluster of mixed data type 

Waveform 

Polymorphic 

I/O Name Control 



NOTE: The Polymorphic Terminal Data Type represents a terminal to which multiple data types can be input or output.

# Keyboard Shortcuts

## File

<b>Ctrl-N</b>	New VI (skips <b>New</b> dialog box)
<b>Ctrl-O</b>	Opens file
<b>Ctrl-W</b>	Closes file
<b>Ctrl-S</b>	Saves VI
<b>Ctrl-P</b>	Prints
<b>Ctrl-I</b>	Displays VI properties
<b>Ctrl-Q</b>	Quits LabVIEW

## Edit

<b>Ctrl-V</b>	Pastes object
<b>Ctrl-Shift-F</b>	Displays search results
<b>Ctrl-B</b>	Removes broken wires
<b>Ctrl-C</b>	Copies an object
<b>Ctrl-D</b>	Allows you to redraw ( <b>VI Hierarchy</b> window only)
<b>Ctrl-F</b>	Finds a terminal, local variable, reference, invoke node or property node
<b>Ctrl-X</b>	Cuts object
<b>Ctrl-Z</b>	Allows you to undo last action
<b>Ctrl-Shift-Z</b>	Allows you to redo last action

## Operate

<b>Ctrl-R</b>	Runs VI
<b>Ctrl-M</b>	Changes to run/edit mode
<b>Ctrl-.</b>	Aborts VI

## Tools

<b>Ctrl-Y</b>	Adds to VI Revision History
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## Window

<b>Ctrl-E</b>	Displays block diagram/front panel
<b>Ctrl-L</b>	Displays error list
<b>Ctrl-T</b>	Tiles the block diagram and front panel windows
<b>Ctrl-/</b>	Adjusts window to full size

## Help

<b>Ctrl-H</b>	Displays context help
<b>Ctrl-?</b>	Displays help contents and index
<b>Ctrl-Shift-L</b>	Locks context help

## Font

<b>Ctrl-0</b>	Displays <b>Font</b> dialog box
<b>Ctrl-1</b>	Changes Application font
<b>Ctrl-2</b>	Changes System font
<b>Ctrl-3</b>	Changes Dialog font
<b>Ctrl-4</b>	Changes Current font

## Other Shortcuts

<b>Ctrl-A</b>	Adds a comment ( <b>VI Revision History</b> window only) Shows all VIs ( <b>VI Hierarchy</b> window only) Performs last alignment
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# LabVIEW Web Resources

## Support

### [www.ni.com/support](http://www.ni.com/support)

- KnowledgeBase – searchable database of tips, common questions, and more
- Troubleshooting Wizards
- Application notes and white papers
- Wishlist (online suggestions)

## Training

### [www.ni.com/custed](http://www.ni.com/custed)

- Course schedules, descriptions, and registration information
- Self-paced training information

## Consulting

(Alliance Program Members)  
[www.ni.com/alliance](http://www.ni.com/alliance)

## Instrument Drivers

[www.zone.ni.com/idnet](http://www.zone.ni.com/idnet)

## Additional LabVIEW-Related Sites

[www.vimarket.com](http://www.vimarket.com)  
[www.ltrpub.com](http://www.ltrpub.com)

## Developer Resources

### [zone.ni.com](http://zone.ni.com)

- Resource Library – example programs, technical presentations, and tutorials
- Developer Exchange
- Product Advisor
- Measurement Glossary