Getting Started with HP VEE-Test and HP VEE-Engine

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Preface

This manual is written for engineers and scientists who have minimal programming experience. It assumes some knowledge of HP-UX. It does not assume any knowledge of HP VEE-Test, HP VEE-Engine, or X Window system (X11).

About This Manual. This guide contains simple, hands-on exercises which quickly show you how to work within HP VEE and create HP VEE models. It contains information for both the HP VEE-Engine and the HP VEE-Test products. Any differences between the use of the products are noted in the text.

To best learn how to use HP VEE, follow this manual sequentially, from Chapter 1 to Chapter 4, and complete all exercises. You will need two or three hours to complete all the exercises in this guide. However, you can do these exercises at your own pace, and you can stop at any time for breaks.

This manual is structured as follows:

Content of this Manual

Chapter	Summary
1:"Introduction"	An introduction to HP VEE, its interface, and some HP VEE concepts.
2:"Interacting with HP VEE"	An introduction to the basic interactioin techniques you need to work within HP VEE.
3:"Creating Models"	An introduction to building and running models in HP VEE.
4:"Exploring Instruments in HP VEE-Test"	An introduction to configuring and communicating with instruments with HP VEE-Test.
5:"Common Problems"	A listing of some common problems and rescue procedures.
Glossary	
Index	

After you've completed the exercises in this manual, you'll know how to work with HP VEE menus, select and operate on graphical objects, and create and run simple models. These skills will let you start using HP VEE to build your own models. The exercises, however, cover only a subset of HP VEE's functionality. For complete descriptions of all the HP VEE features, please refer to the *Using HP VEE* and *HP VEE Reference* manuals.

Conventions Used in this Manual

This manual uses the following typographical conventions:

Example	Represents
Installing HP VEE	Italicized words are used for book titles and for emphasis.
`File`	Computer font represents text you will see on the screen, including menu names, features, or text you have to enter.
`cat` *filename*	In this context, the word in computer font represents text you type exactly as shown, and the italicized word represents an argument that you must replace with an actual value.
`File` ⟹ `Open`	Features separated with the arrow indicate the order of selection from a menu.
`Zoom Out | In 2x | In 5x`	Choices in computer font, separated with a bar (|), indicates that you should choose one of the options.
Return	The keycap font graphically represents a key on the workstation's keyboard.
Press Ctrl-O	Dash-separated keys represent a combination of keys on the workstation's keyboard that you should press at the same time.
Dialog Box	Bold font indicates the first instance of a word defined in the glossary.

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1

Introduction

What is HP VEE?

Welcome to HP's visual engineering environment, the "programming-less" application for engineering problem solving. HP's visual engineering environment includes both HP VEE-Test and HP VEE-Engine, collectively referred to in this manual as HP VEE. HP VEE gives you the ability to gather, analyze, and display data without programming. HP VEE increases your productivity by shortening the time it takes you to solve engineering problems.

The HP VEE family includes two separate products:

- HP VEE-Engine

  Designed for the engineer and scientist. It allows you to analyze and display data stored in a file, input by the user, or generated mathematically.

- HP VEE-Test

  Designed for the test and measurement professional. It includes everything in HP VEE-Engine, plus it allows you to communicate visually with instruments.

What Are Models?

Before you begin the exercises in this manual, please take a moment to become familiar with the fundamental basis of HP VEE: models.

Models are a method of solving engineering problems. As an engineer or scientist, you might often model your problems with block diagrams. In the past, once you had modeled your problem, you then needed to write a computer program to re-create the model represented in the block diagram. Now, with HP VEE, you can lay out the block diagram by selecting and placing graphical objects on the screen and connecting them with lines. Together, the connected objects represent the model for a particular engineering application.

In HP VEE, you build, modify, and run models by selecting from menus and manipulating objects—without ever writing a single line of programming code! This lets you spend more time concentrating on solving your engineering problems.

Example Model

The next two figures show first the detail view, then the panel view, of a Lissajous model.

The detail view is where you enter and modify your model.

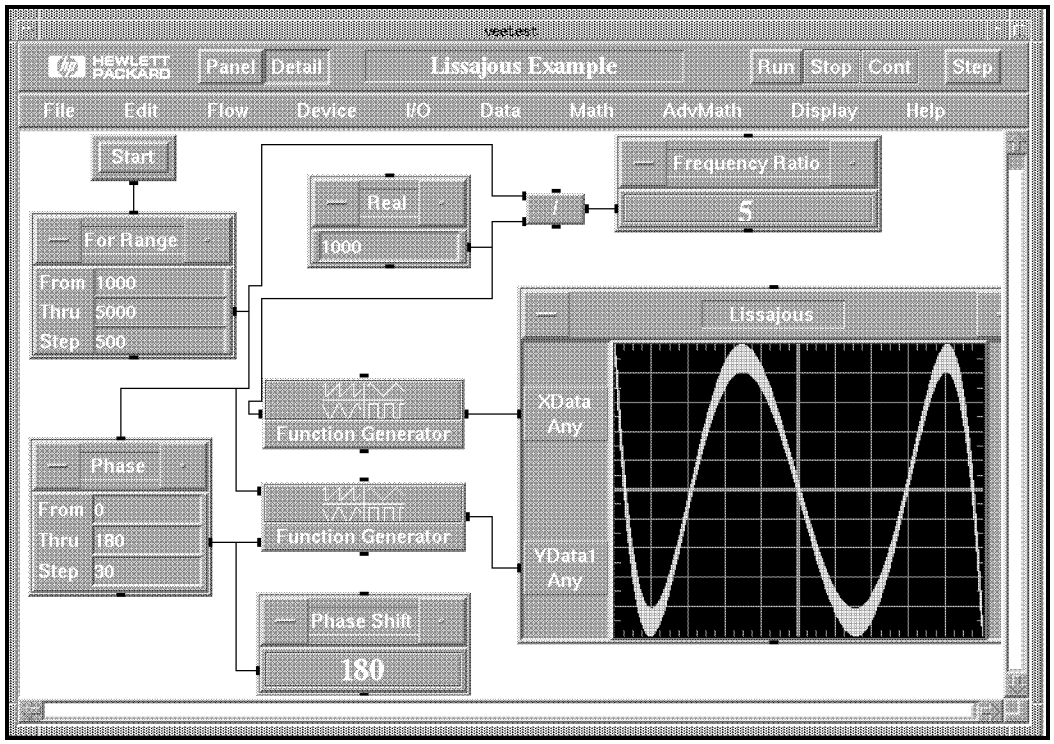

Figure 1-1. Example Model, Detail View

The panel view is the view of a model in HP VEE that shows only those objects needed to run the model and view the resultant data.

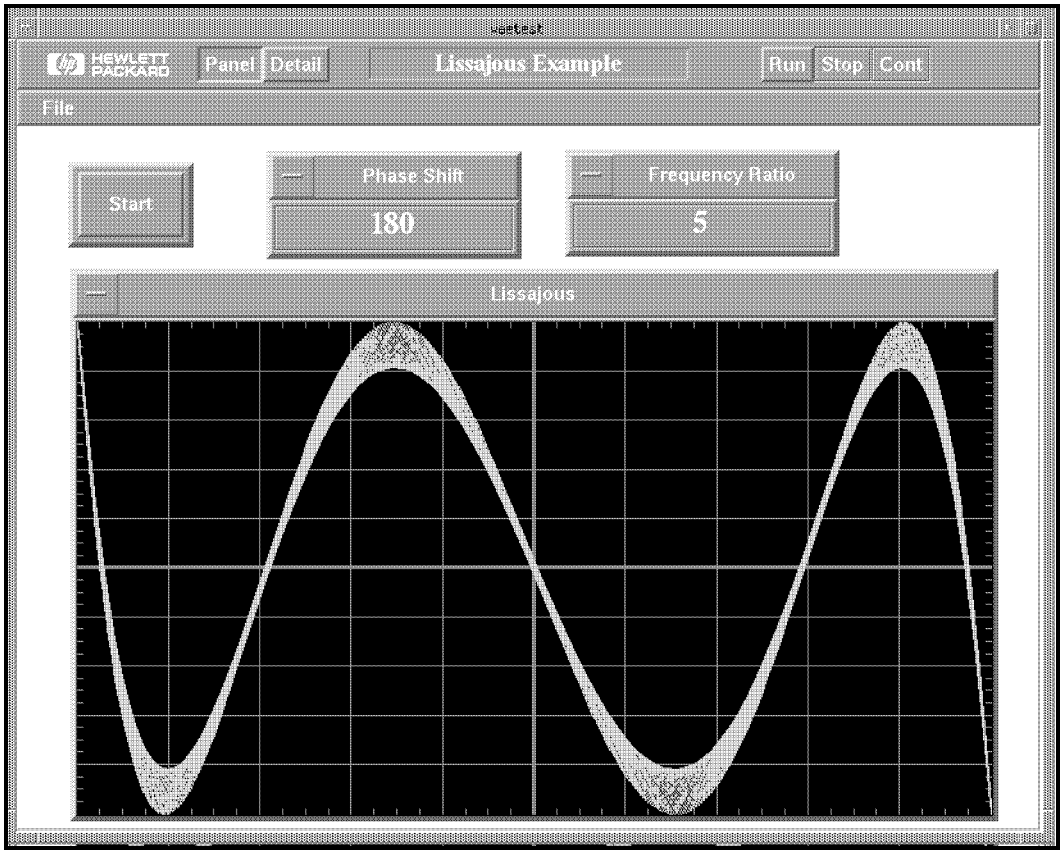

Figure 1-2. Example Model, Panel View

Ready to Begin?

There are a few prerequisites for the exercises in this guide:

- You must be running the X Window System (X11) on HP-UX.
- HP VEE must be installed. If HP VEE is not installed, your system administrator should follow the instructions in the *Installing HP VEE* manual to install HP VEE on your system.
- You must know HP-UX basics. This guide assumes you know how to perform simple operations with the HP-UX operating system, such as logging in and out and working with files and directories. If you don't know how to do these tasks, ask your system administrator or refer to the manual titled *A Beginner's Guide to HP-UX* to learn these operations.
- You must know how to start X11. This may happen automatically when you log in. If you're not sure, ask your system administrator.

Note

Although you're not required to have extensive HP-UX or X11 knowledge to use HP VEE, the more you know about HP-UX and X11, the more you can accomplish with HP VEE.

To learn more about HP-UX or X11, refer to the following manuals: *A Beginner's Guide to HP-UX* and *A Beginner's Guide to the X Window System*.

Now turn to Chapter 2.

2 Interacting with HP VEE

This chapter contains seven exercises which teach you the basic interaction techniques you need to work with HP's visual engineering environment (HP VEE):

1. "Starting HP VEE"
2. "Using Your Mouse in HP VEE"
3. "Opening Menus and Selecting Features"
4. "Manipulating Objects"
5. "Working with Open Views"
6. "Building a Simple Model"
7. "Saving Your Work and Exiting HP VEE"

The best way to *learn* HP VEE is to *interact* with HP VEE. These exercises take you through parts of HP VEE and teach you basic principles used to interact with HP VEE. At certain points you will complete tasks without step-by-step instructions through "On Your Own" exercises.

It should take you about one hour to complete all the exercises in this chapter.

2

What If You Need to Stop?

If you need to stop during the exercises to take a break or leave work for the day, you have two choices. If you will take only a short break, complete your latest exercise and leave the system in its current state. When you return, you can simply continue where you left off.

However, if you will take a long break or you need to leave for the day, you may want to exit HP VEE and log off of your system. If you need to exit HP VEE before finishing the exercises, come back to this section and follow the instructions below.

Exiting HP VEE

To exit HP VEE before you've finished the exercises, follow these steps:

1. Save any current work you have in the HP VEE window to a file, as follows:

   a. From the `File` menu, select `Save As`.

      A dialog box appears, where you can specify the file to which you can save the current work.

   b. Type a unique filename into the entry field at the bottom of the dialog box. For example, you could use the filename `temporary`. Then press the Return key on the keyboard (or click the `OK` button with the mouse).

      The current work in the HP VEE window is saved to that file.

2. From the `File` menu, select `Exit`.

   You exit HP VEE, and the HP VEE window disappears.

3. You may now exit from X11 and log out of your system if you wish.

To Continue with the Exercises

When you want to continue where you left off in the exercises, do the following:

1. Log in to your system (if you're not already) and start HP VEE. For more specific procedures, see Exercise 1 in this chapter.
2. From the `File` menu, select `Open`.

   A dialog box appears, which lists the files you can choose to open.
3. Type the filename that you used to save the work you had completed before you exited (for example, `temporary`). Then press Return (or click on `OK` with the mouse).

   Your work appears in the HP VEE window again. You may now continue where you left off in the exercises.

What If You Have Problems?

If you have any problems while doing these exercises, please refer to Chapter 5: "Common Problems". Chapter 5 lists the problems you are most likely to encounter while doing these exercises and how you can recover from them.

If you do not understand a term or phrase used in the exercises, please refer to the Glossary located at the back of this guide.

2

Exercise 1: Starting HP VEE

First, you need to be logged in to HP-UX and have X11 started. If you're not sure how to log in or start X11, refer to *A Beginner's Guide to HP-UX* or *A Beginner's Guide to the X Window System*. Then start HP VEE, as follows:

1. Move your mouse so that the pointer on the screen moves into one of the X terminal windows. If your window border changes color, it is activated and you can go to the next step. Otherwise, click (press and release) the left mouse button to activate the window (the window border will change color).
2. At the prompt in the window, start HP VEE.
   - If you are using HP VEE-Test, type:

     `veetest` Return
   - If you are using HP VEE-Engine, type:

     `veeengine` Return

   After a few seconds you'll see the HP VEE window open, as shown in Figure 2-1. Notice the different areas of the HP VEE window.

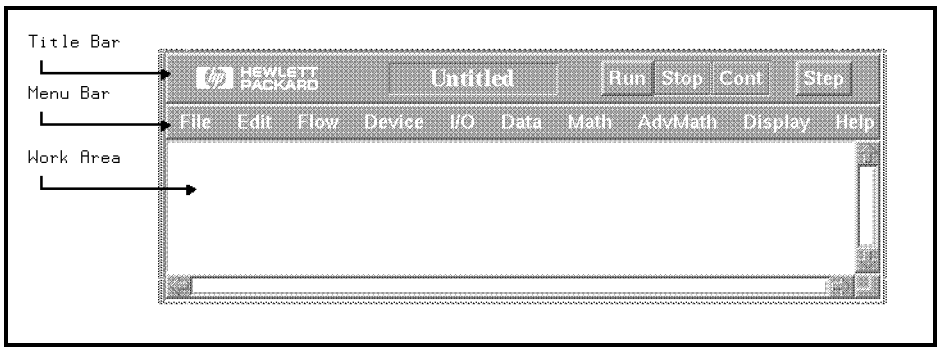

Figure 2-1. Areas in the HP VEE Window

Exercise 2: Using Your Mouse in HP VEE

You can use either a 2- or 3-button mouse with HP VEE. This short exercise shows you how to position and move your mouse.

If you have used a mouse before, you can skip this exercise and go on to Exercise 3: "Opening Menus and Selecting Features".

1. First, if you are right-handed, place your mouse on the desk to the right of your keyboard; if you are left-handed, place it to the left of the keyboard. Position your mouse as shown here, with the cable leading away from you.

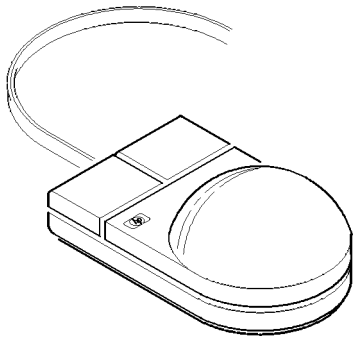

Figure 2-2. Positioning the Mouse

2. Rest the palm of your hand on the hump, with your index and middle fingers on the left and right buttons. If you have a three-button mouse, you won't use the middle button.
3. Now move the mouse over the surface of your desk and notice how the crosshairs (the pointer shaped like a plus-sign) in the HP VEE window moves accordingly.

4. Try picking up the mouse and moving it around in the air. As you see, the crosshairs remain in the same position in the window when you do this. Therefore when you need to reposition the mouse on your mouse pad or desk, you can lift it up without changing the position of the pointer on the screen.

Exercise 3: Opening Menus and Selecting Features

This exercise shows you how to select features from menus.

1. Move your mouse so the crosshairs are located on top of the `File` menu title in the menu bar at the top of the HP VEE window.
2. Click (press and release) the left mouse button to open the `File` pull-down menu, as shown in Figure 2-3.

Note

You will use the left mouse button to make most of the selections needed to complete the exercises in this manual. There will be explicit instructions in those instances when you will need to use the right mouse button. The left button selects menu features or objects; the right button pops up menus as a shortcut.

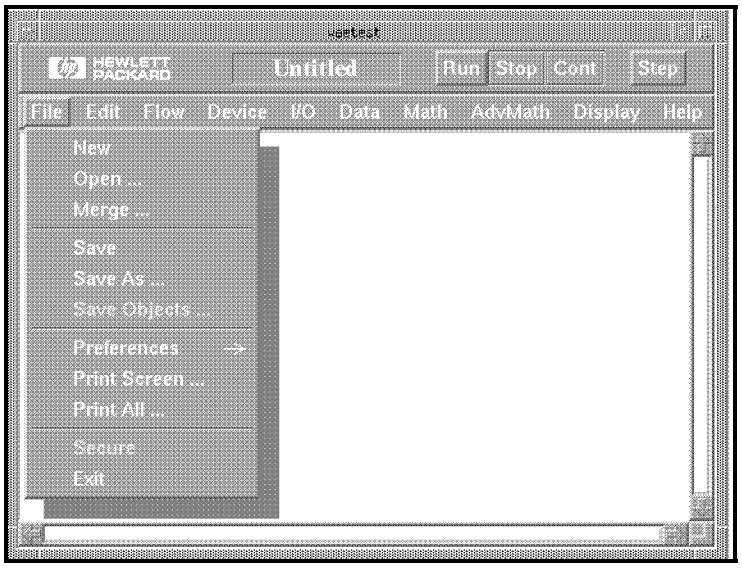

Figure 2-3. The `File` Pull-Down Menu

The items listed in this menu are file-related and configuration features. Notice that the crosshairs have now turned into an arrow. Move the arrow up and down and notice that menu features become highlighted. You can **select**, or choose, features that highlight.

Please do *not* select any features (by clicking on them) from this or any other menu right now.

Note

Notice that you can't highlight `Save Objects` or `Secure`. These features are **grayed** to indicate that you cannot select them now.

3. Move the arrow horizontally across the menu bar over the other menu titles (`Edit`, `Flow`, and so forth).

   Notice that the other menus open. Take some time to become familiar with the features available in each menu.

4. Move the arrow outside the current pull-down menu, so that the arrow is in an empty area of the work area. Then click (press and release) the left mouse button.

   You have closed the menu. If you ever open a menu by accident and do not wish to select any feature from it, simply move the arrow into a blank area in the work area and click the left mouse button.

5. Open the `Flow` menu. Notice that the `Repeat` menu feature has an arrow on the right. That arrow indicates that there is a cascading menu off of that feature.

   Move the arrow pointer down the `Flow` menu and to the right of the `Repeat` feature, so that the pointer moves on top of the arrow to the right of `Repeat`. You do not need to click any mouse button.

   A cascading menu appears, as shown in Figure 2-4.

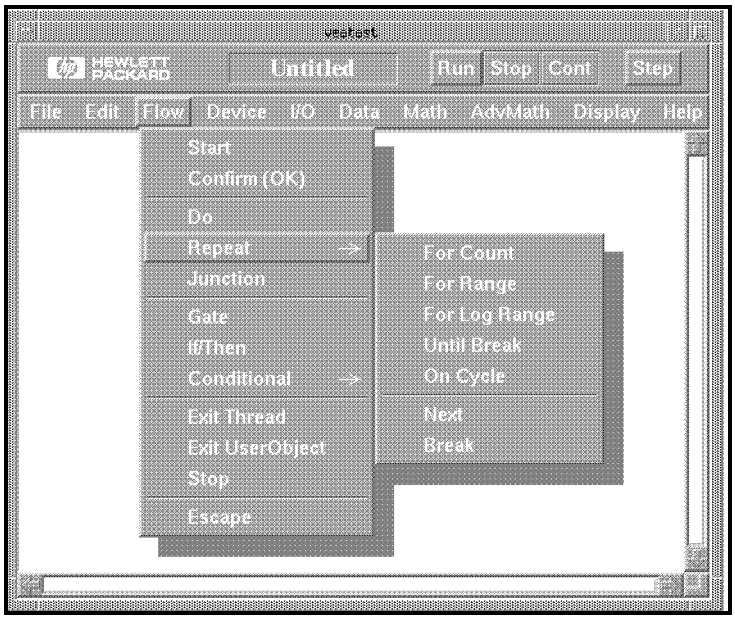

Figure 2-4. The `Repeat` Feature's Cascading Menu

6. Close the cascading menu and the `Flow` menu. To do this, move the arrow outside both the menus into the work area and click the mouse button.
7. Open the `Help` menu by positioning the crosshairs on the menu bar over `Help` and clicking. Notice that the features have ellipses (...) on the right. The ellipses indicate that you'll get a dialog box when you choose that feature. A **dialog box** is a window that is displayed when HP VEE requires information from you before it can continue.

8. Click on `On Features`. You get a dialog box that displays the terms that are described in `On Features`. This particular type of dialog box is called a **list box** because it presents a list of choices. At the bottom of the list box there are two buttons. All dialog boxes have buttons to accept actions and to cancel the dialog box.

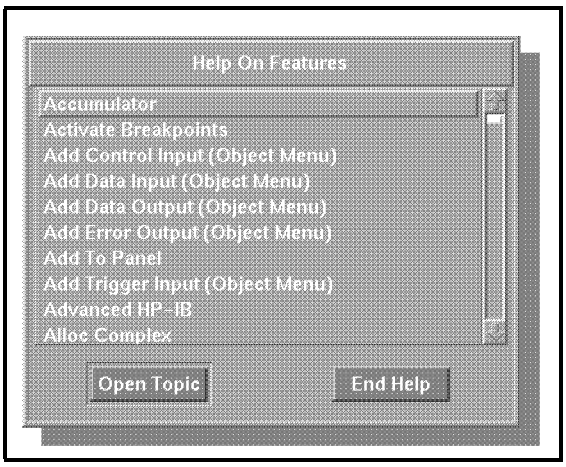

Figure 2-5. `On Features` **Dialog Box**

9. Click on the `End Help` button to leave the help facility.

Once you select a `Help` feature, you can leave it on the screen while working with other objects. This allows you to read online help information while creating your models.

On Your Own

Explore the Help facility.

- From the `Help` menu select `Glossary`.
- In the list box, click on the word `Button` and click on the `Open Topic` button (as a shortcut, you can double-click on the word `Button`).
- Press the `Next` and `Prev` buttons to look at other definitions.
- Select another topic from the list box.
- When you're finished browsing through the `Glossary`, click on `End Help` to exit `Help`.

Now that you know the basics about opening menus and selecting features in HP VEE, you are ready to start working with HP VEE objects in the next exercise.

Exercise 4: Manipulating Objects

Objects are the graphical building blocks of models. In HP VEE, objects represent a number of different things, such as math functions, controls, and displays.

This exercise shows you the basic techniques for interacting with objects: placing them in the work area, as well as deleting, moving, and sizing them.

1. From the `Flow` menu, select `Start`.

   You see a small outline box that represents the `Start` object.

2. Move your mouse to move the outline box to any position you wish within the work area, then click the left mouse button.

   The object for the `Start` feature appears on the screen. Notice that this object looks like a real-life button you can press.

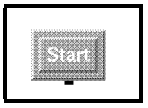

Figure 2-6. The `Start` Object

   Click on the word `Start` and you will see it depress and raise like a real button. Once you click on the object it becomes shadowed, which indicates that it has been selected.

   To deselect it, click on the empty work area.

Deleting and Recovering Objects

Before you do anything else with objects, you should learn how to delete, or remove, them. That way, if you ever select an object by mistake and need to delete it, you will know how. To delete the `Start` object from the work area:

1. Position the crosshairs over the `Start` object.

2. Click the *right* mouse button. You'll see a menu pop up, as shown in Figure 2-7. This menu is called the **object menu**. The object menu contains a set of features that operate on that object. Every object has an object menu.

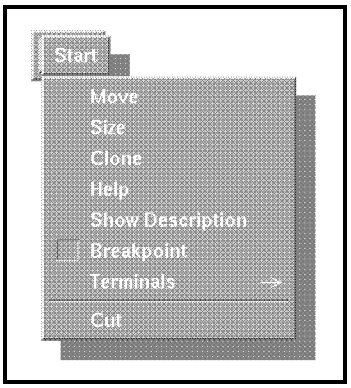

Figure 2-7. The Object Menu

3. Select `Cut` by moving the pointer down the menu until `Cut` is highlighted and then clicking the left mouse button. Note that this is the same way you select features from the menu bar menus.

   The object is removed from the work area.

If you ever remove an object by mistake, you can recover it easily. Try this:

1. Open the `Edit` menu.
2. Select `Paste`.

   The outline of the `Start` object appears. Place it on the work area in the same way you did before.

Using the Pop-up Edit Menu

A shorthand method of accessing the `Edit` menu is to use the pop-up `Edit` menu. The pop-up `Edit` menu allows you to access all the various editing features more easily when you are interacting with objects in the work area.

1. Click on an empty area in the work area to deselect any objects.
2. Position the pointer over an empty space in the work area and click the *right* mouse button. Notice that you get a pop-up `Edit` menu. This is exactly the same menu as the `Edit` menu that you can pull down from the menu bar.

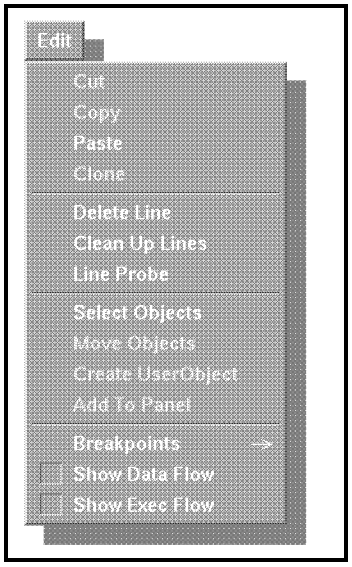

Figure 2-8. Pop-up `Edit` Menu

3. Close this pop-up menu without selecting from it by moving the arrow pointer into the work area and clicking the mouse button (just as with pull-down menus).

Moving and Sizing Objects

Once you have an object in the work area, you often need to move the object or make the object larger or smaller. These actions help you manage the available work area space.

1. Position the pointer over the `Start` object and click the right mouse button to get the object menu.
2. Select `Move` from the object menu. Notice that the pointer changes.
3. Press and *continue to hold* the mouse button down. While holding the mouse button down, move the mouse around. This action is called **dragging**. As you drag the pointer around, notice that an outline of the object moves.

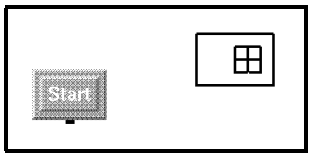

Figure 2-9. Moving an Object

4. Release the mouse button and the `Start` object moves to where you placed the outline.
5. To move the object another way, position the pointer at the edge of the `Start` object, then drag the object (press and continue to hold the mouse button down). This is a shortcut method of moving the object without accessing the object menu.
6. Select `Size` from the object menu. Notice that the pointer changes.

7. Press and *hold* the mouse button down. Drag the pointer around and notice that the outline of the object stretches.

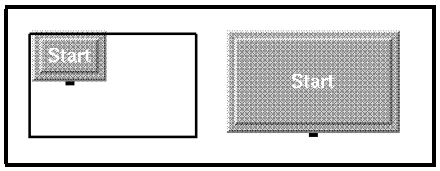

Figure 2-10. Sizing an Object

8. Release the mouse button and the object resizes to the size of the stretched outline.

On Your Own

Try using the other features on the object menu and see what they do.

- Create many `Start` objects by using the `Clone` feature.
- Create a description of the `Start` object by selecting `Show Description`, clicking in the center area of the description box, and typing a description (such as `This is a Start object`). Note that it scrolls if you type beyond the right margin or below the bottom margin. It does not automatically wrap to the next line. When you are finished, click on `OK`.
- Click on the object menu's `Help` feature to read about using the `Start` object.

Please do not select the `Terminals` feature from the object menu right now.

Manipulating Multiple Objects

Now that you know how to manipulate a single object, you can learn how to manipulate a group of objects. For example, instead of moving objects individually, you can move them as a group.

Make sure you have several `Start` objects on your work area.

1. From the `Edit` menu, select `Select Objects`. Notice the following message is displayed on the HP VEE title bar: `Select desired objects`.

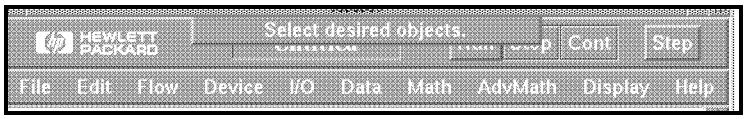

Figure 2-11. Multiple Object Selection Message

2. Follow the message instructions by clicking on several of the `Start` objects that you created. Each will highlight.
3. Click on an empty area in the work area to end `Select` mode.
4. From the `Edit` menu, select `Move Objects`. An outline box appears that represents the set of `Start` objects you selected.

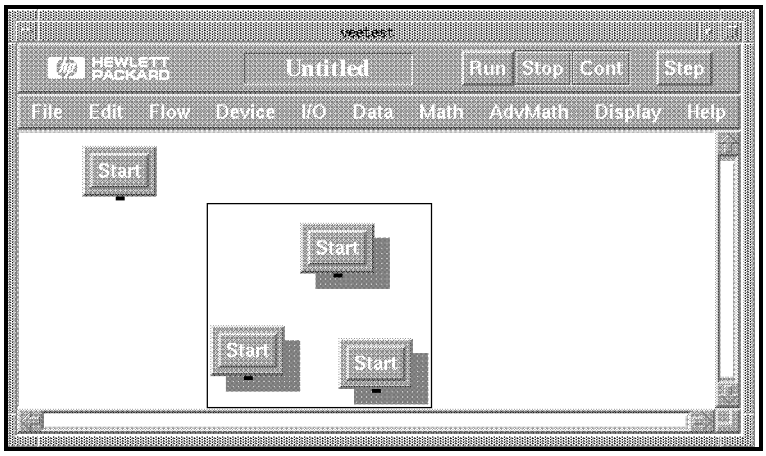

Figure 2-12. Multiple Object Move

5. With the left mouse button, drag the outline box to any position within the work area. Release the left mouse button to place the group of objects.

On Your Own

Explore other multiple object manipulations. Use the pop-up `Edit` menu.

- Select a group of objects and `Cut` them. (Remember to use the multiple `Select` from the `Edit` menu.) Now `Paste` them back. Now `Paste` again.
- Select a group of objects and `Copy` them. Now `Paste` them.

Make sure you leave at least one `Start` object on the work area before continuing to the next task.

Moving the Work Area

You can also move the work area itself which will, in turn, move the objects placed on the work area. This is helpful when you run out of space on the visible work area and need more space to place more objects, or when an object is initially placed so that some part of it is hidden past the border of the work area. There are two ways to move the work area:

1. Moving the work area by scrolling.

   The bottom and right borders of the HP VEE window contain the **scroll bar**.

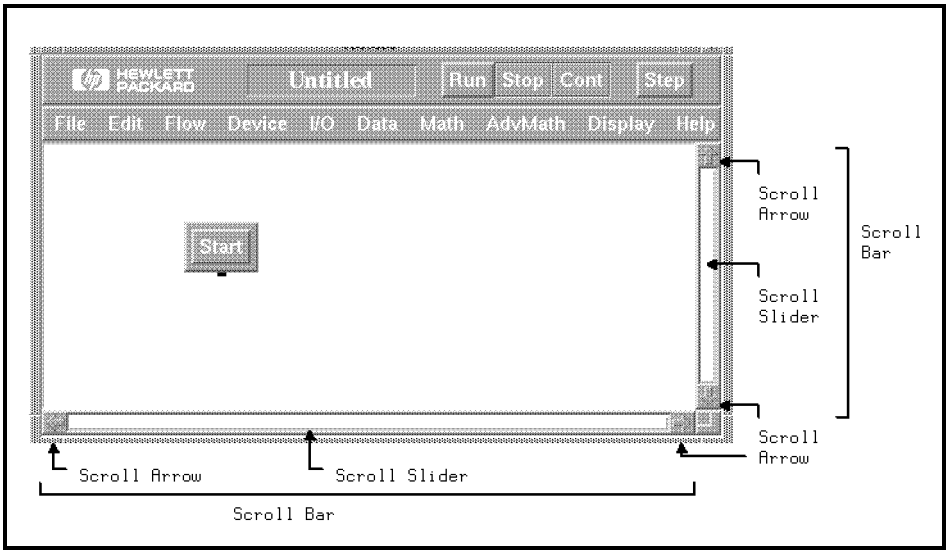

Figure 2-13. Scroll Areas

Move the crosshairs over any one of the arrows in the scroll bar. These arrows are **scroll arrows**. Press *and continue to hold down* the left mouse button without moving the crosshairs, then release the mouse button. Now drag the bar on the side of the window up and down. This bar is called the **scroll slider**.

While you hold down the mouse button on the arrow or drag the scroll slider, the *view* of the work area moves in the direction of the arrow. This means that the work area moves in the opposite direction of the arrow.

If you wish, try each of the arrows in the borders to get a feel for moving the work area. If you get confused and can not see where your objects are, click in the center of each scroll slider and the objects will re-appear.

2. Moving the work area directly.

   The most direct way to move the work area is to position the crosshairs over any empty space in the work area and drag the crosshairs in any direction.

   Again, the work area moves accordingly.

Clearing the Work Area

The last part of this exercise clears the work area in preparation for your next set of tasks.

From the `File` menu, select `New`. Answer the dialog box you get by clicking on the `Clear (don't save)` button.

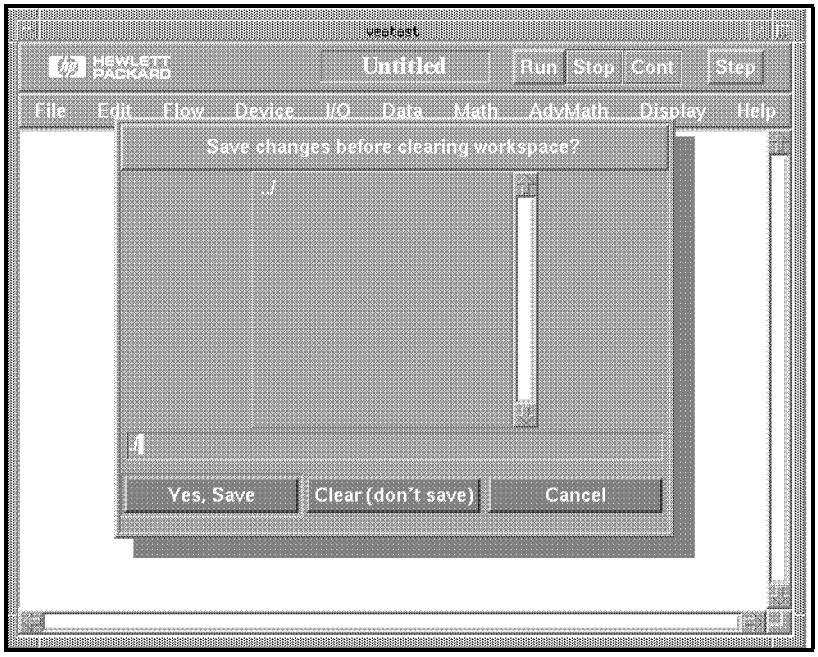

Figure 2-14. Clearing the Work Area

This action removes all objects from your work area and gives you a new, empty work area.

You now have learned how to interact with objects. The next exercise shows you how to work with the open views of objects.

Exercise 5: Working with Open Views

HP VEE can display every object as either an icon or as an open view. An **icon** is the small representation of the object. An **open view** is the expanded representation of the object, which shows the details of the object.

Exploring an Open View

Some objects in HP VEE are first displayed as open views, and some as icons. In this exercise you will learn how to **open** an icon, then **minimize** it again.

1. From the `Device` menu, to the `Virtual Source` cascading menu, select `Function Generator` and place it in the work area. It is displayed as an open view.

   Notice the different parts of the title bar of the open view as shown in Figure 2-15.

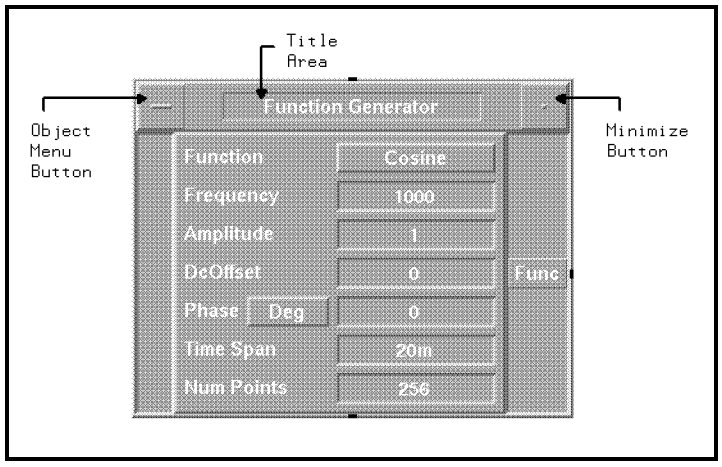

Figure 2-15. Open View Title Bar

2. Change the name of the `Function Generator` object by clicking on the words `Function Generator` in the open view's title bar, typing `Example Function Generator`, and pressing Return. Notice that the area you typed in looks recessed. HP VEE lets you know where you can type information by showing a recessed rectangle.
3. Click on the minimize button which is located in the upper right corner of the open view's title bar. This action turns the open view into the icon (the minimized view). Notice that the name of the icon is also `Example Function Generator`. You can change the title of any object to something that has more meaning for you.

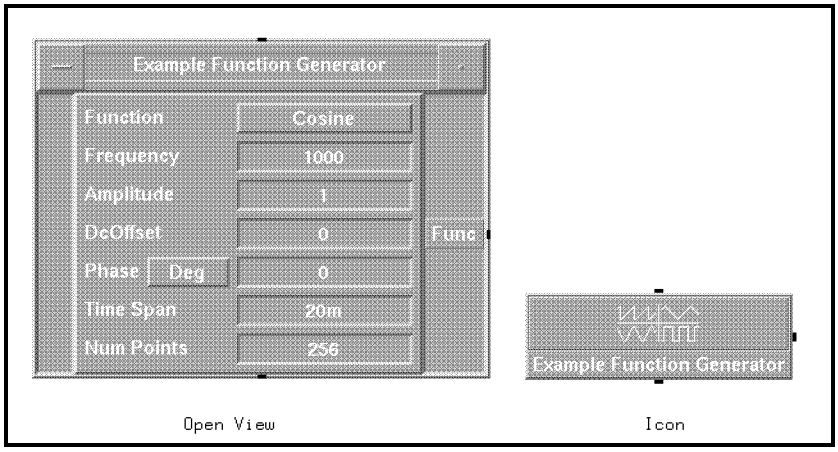

Figure 2-16. An Icon Replaces the Open View

4. Open the `Function Generator` icon by positioning the pointer on the icon and clicking twice in rapid succession (this action is called **double-clicking**).
5. Move the pointer to the `Function` field. Click on `Cosine`. You will see a list box of choices.

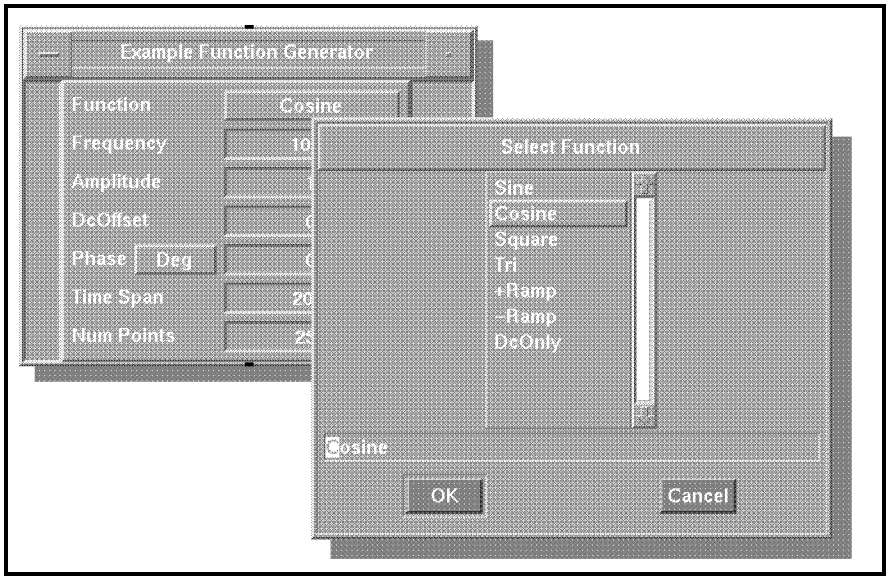

Figure 2-17. List Box

6. Set `Function` to a square wave by double-clicking on `Square`.

Exploring Pins and Terminals

To connect objects, you will draw lines between the objects. The "connection points" are **input and output pins**.

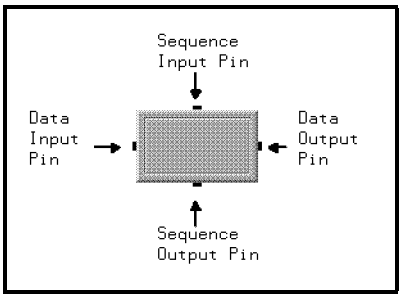

Figure 2-18. Input and Output Pins

There can be pins on the top, bottom, left, and right of objects. These are called the **sequence input pin**, **sequence output pin**, **data input pin**, and **data output pin**, respectively. You connect sequence input and output pins with lines create a specific sequence of operation in your models. You connect data input and output pins to carry data between objects.

Input terminals and **output terminals** are the open view's representation of input and output pins—they display information about the pin. To change terminal information, you will use the `Terminals` feature from the object menu.

In the following exercise you will add a data input and explore some of the features of data inputs.

1. Open the `Example Function Generator` object menu.

   To open the object menu from the open view, click on the object menu button, which is located in the upper left corner of the open view's title bar. You can also pop up the object menu by clicking the right mouse button when the pointer is positioned over the object.

2. From the `Example Function Generator` object menu, to the `Terminals` cascading menu, select the `Add Data Input` feature.

3. Double-click on `Amplitude`. You will now see a new data input terminal, labeled `Amplitude`, in the `Example Function Generator`.

4. Double-click on the `Amplitude` input terminal. The dialog box you now see lists the input terminal information.

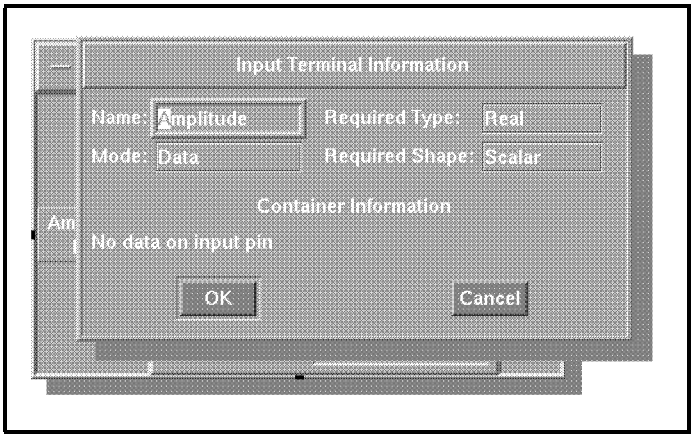

Figure 2-19. Terminal Information

Notice that the field after `Name` looks recessed, which means you can change the name of the input

terminal. If there is any data at this terminal, it will be listed under the words `Container Information`.

5. Click on the `Cancel` button on the `Input Terminal Information` dialog box.
6. Click on the minimize button to close the open view.

On Your Own

Explore the open view of the `Function Generator`.

- Open `Example Function Generator`.
- Add a `Frequency` data input terminal.
- Change the name of the `Frequency` input.
- Delete the `Frequency` input.
- Click on `Show Terminals` from the cascading `Terminals` menu. Select `Show Terminals` again. Notice that the checkmark in the `Show Terminals` check box indicates that the object's terminals are displayed.

Do not delete the `Example Function Generator` from the work area, as you will use this object in the next exercise.

Exercise 6: Building a Simple Model

In this exercise, you will learn how to connect objects together to form a simple model and to add and use data input controls.

1. Verify that you have the `Example Function Generator` object from the previous exercise in your work area. If you do not, work through Exercise 5 again. When you build your model in this exercise, you will use the `Amplitude` input terminal you added to the function generator in Exercise 5.
2. Place the function generator to the left of the work area and minimize it (click on the minimize button).
3. From the `Display` menu, select `Waveform (Time)`.
4. Place the display to the right of the `Example Function Generator` object in the work area.

Notice that `Displays` are initially displayed as open views because you'll usually want to use them in their open views.

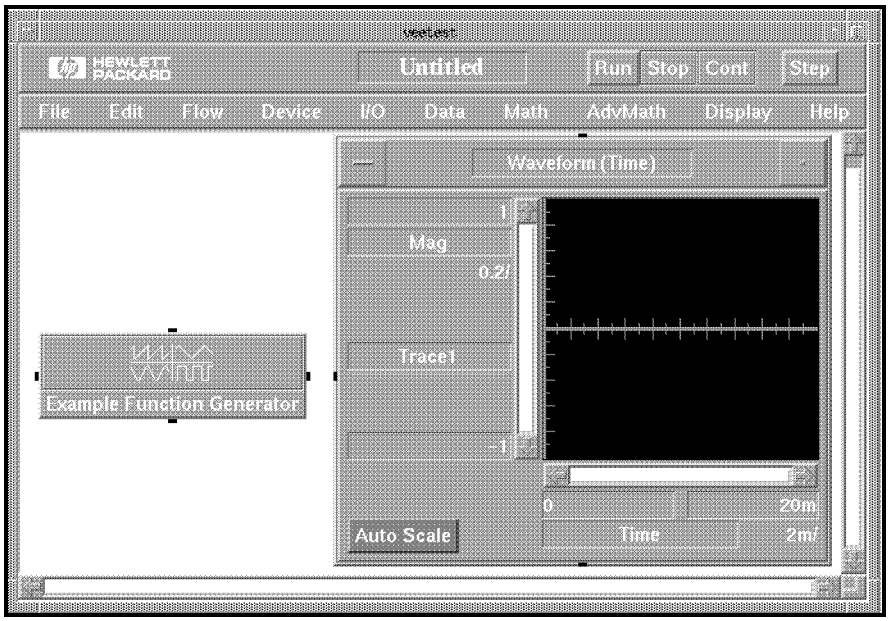

Figure 2-20. Unconnected Objects

Connecting Objects

Notice the data output pin on the right side of the `Example Function Generator` and the data input pin on the left side of the `Waveform (Time)`. In HP VEE, data flows from left to right through an object, so pins on the left side of an object are data input pins and those on the right side are data output pins.

Follow these steps to connect the `Example Function Generator`'s data output pin to the `Waveform (Time)`'s data input pin.

1. Move the crosshairs close to the output pin on the right side of the `Example Function Generator`. The crosshairs should still be over the work area, not within the border of the object. Then click the left mouse button.

   Notice the little box that appears over the crosshairs. This box indicates that you are in **line drawing mode**.

In line drawing mode, the line follows the box around the work area when you move the mouse.

If you do not see the line and the little box, you may have clicked on the wrong place. Try again.

2. Move the crosshairs over an empty area of the work area and double-click. Note that the line disappears. If you ever click close to a pin by mistake and start the beginning of a line, you can exit line drawing mode by double-clicking in this way.
3. Start the line again from the right, output pin of the `Example Function Generator`.
4. Move the box close to the input pin on the left of the `Waveform (Time)` display, and the box will "jump" to the pin on the display.
5. Once the box jumps to the display's pin, click the left mouse button to complete connecting the line between the two objects.

Adding Data Input Controls to Your Model

In this exercise you will use an object called a slider to specify the amplitude to the `Example Function Generator` in your model.

1. From the `Data` menu, click on `Real Slider` and place the slider above or to the left of `Example Function Generator`. You may need to enlarge the size of your HP VEE window or move the objects within the work area to make room for the slider.

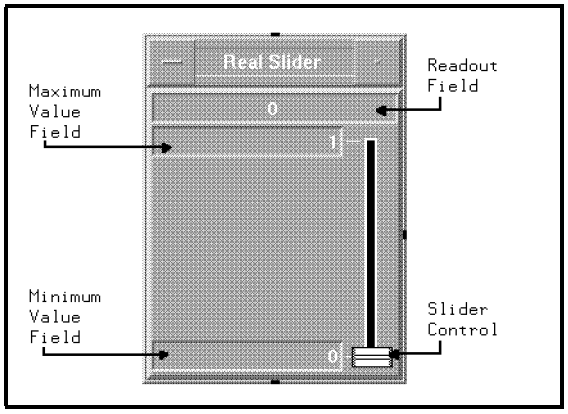

Figure 2-21. A `Real Slider`

2. Move the pointer to the maximum value field. Click on this field and type `5`.
3. You can change the value of the slider in two ways:
   a. Move the pointer over the white slider control. By dragging the left mouse button, move the slider control up and down. Note that the readout field indicates the new value. Release the mouse button to set the new value.
   b. Click over the readout field, type `1`, and press Return.

      Notice that the slider control moves to indicate the position of `1`, as you specified in the readout field.

4. Connect the `Real Slider` data output pin to the `Example Function Generator`'s data input pin.

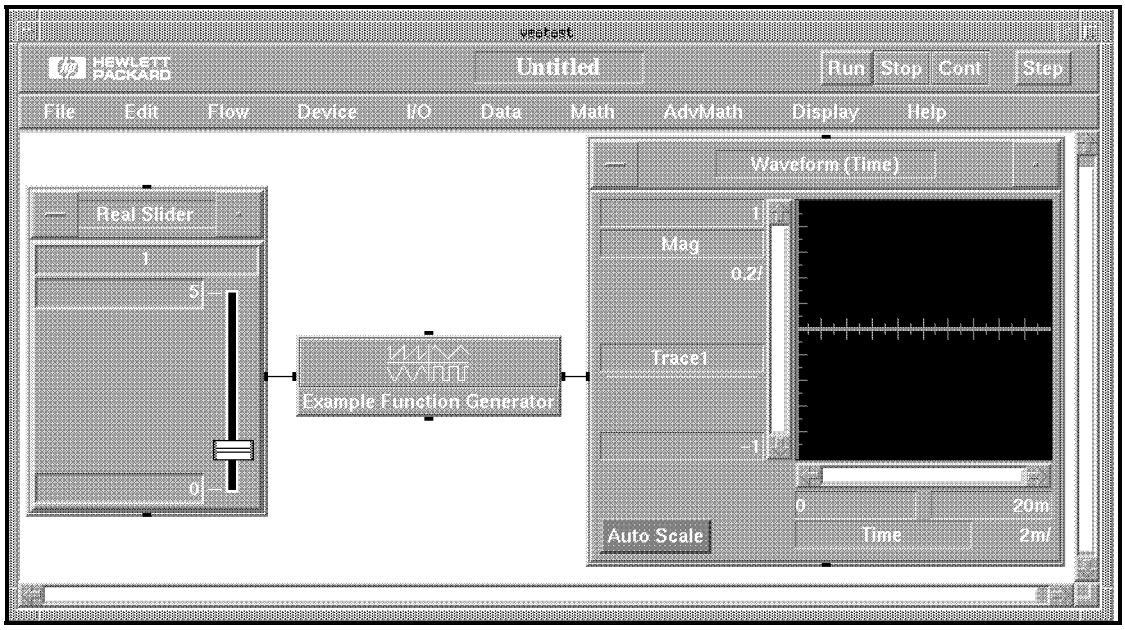

Figure 2-22.
Connected Model Using `Real Slider` as an Input

Running the Model

You have just built your first, simple model by connecting the objects together. Now you can run the model to see the results.

1. Click on the **Run** button at the top right of the HP VEE window.

   The **Waveform (Time)** display shows the waveform that was created by the function generator.

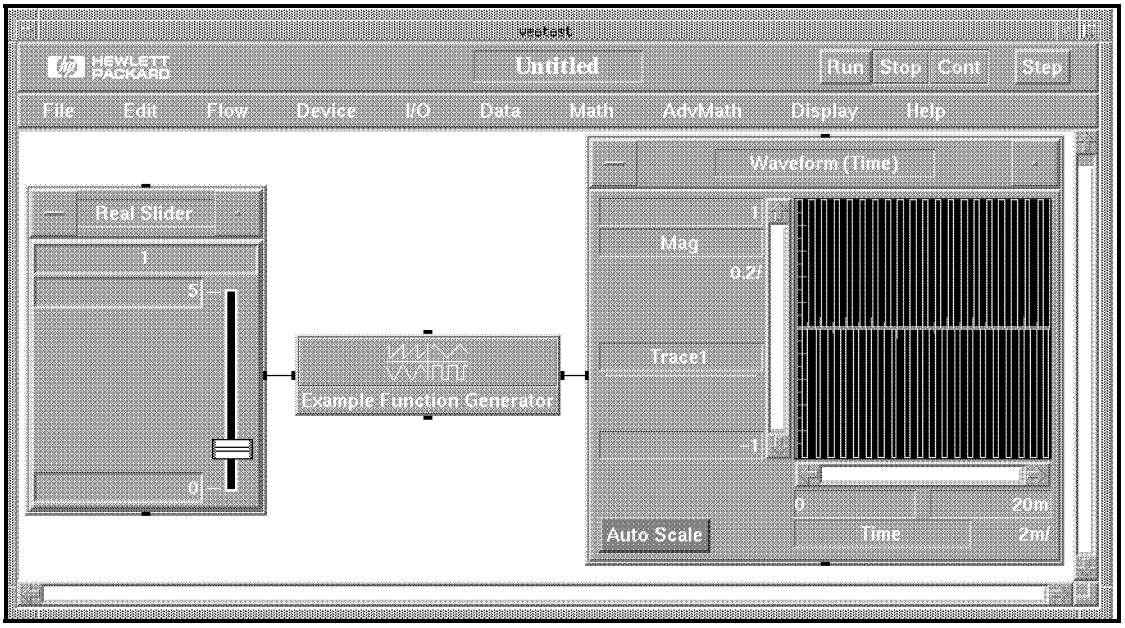

Figure 2-23. A Simple Model After It Was Run

Deleting Lines Between Objects

Before you continue, you need to know how to delete lines between objects.

1. From the `Edit` menu, select `Delete Line`. Notice the prompt displayed on the title bar.
2. Click the pointer on or near the line between `Example Function Generator` and `Waveform (Time)` display. The line disappears.

Now you know how to delete lines between objects. Before you continue, reconnect `Example Function Generator` and `Waveform (Time)`.

On Your Own

- Clear the `Waveform (Time)` display. Hint: use the object menu.
- Change the `Example Function Generator` frequency to `500`. Hint: open the `Example Function Generator` object.
- Change the `Amplitude` to `5`.
- Run the model.
- Press the `AutoScale` button on the `Waveform (Time)` display to automatically scale the display to the waveform amplitude.
- Add a `Start` to your model and connect its bottom, sequence output pin to the top, sequence input pin on the `Example Function Generator`. Run your model by pressing the `Start` object.

Exercise 7: Saving Your Work and Exiting HP VEE

This short exercise shows you how to save the work you did in Exercise 6, which is the same procedure you should follow to save any model for the first time. Since this is the final exercise in this chapter, this exercise then shows you how to exit HP VEE as well.

To save your work and exit HP VEE, do the following:

1. From the `File` menu, select `Save As`.

   A dialog box appears, in which you specify the file where you want to save the current work.

2. The cursor is automatically placed on the entry field at the bottom of the dialog box, awaiting your input. Type the filename `model1`, then either click on the `OK` button or press the Return key.

   The model in the HP VEE window is saved to that file.

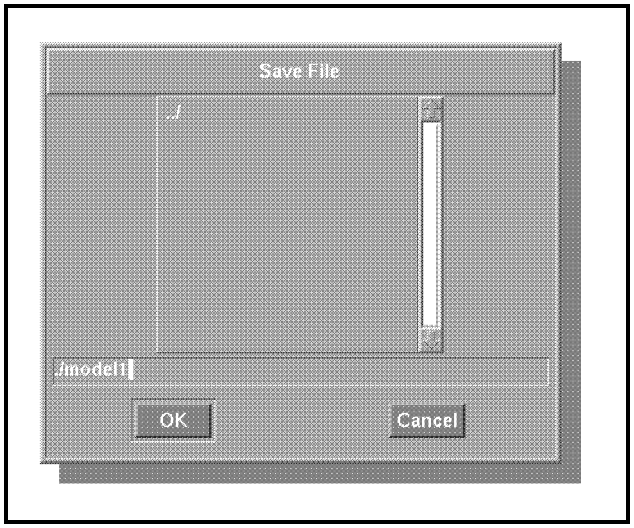

Figure 2-24. `Save` **Dialog Box**

Note

As you work on models, it is very important that you get in the habit of saving your work on a regular basis. After doing an initial `Save As`, periodically select `Save` from the `Edit` menu to save your work.

3. Now, from the `File` menu, select `Exit`.

   You exit HP VEE, and the HP VEE window disappears.

Congratulations! You have now completed all the exercises in this chapter.

Before going on to the next chapter, try the quiz on the next page to make sure you have mastered the skills that were taught in the last seven exercises.

Quiz

If you can complete the following tasks, you have successfully gained the basic skills you need to interact with HP VEE. The answers for this quiz are provided in the next section.

In the following quiz, you will display random X and Y data.

1. Start HP VEE again.
2. Get a `Start` object and place it in the work area.
3. Get an `Until Break` object and place it in the work area.
4. Get two `Random Number` objects and place them in the work area.
5. Get an `X vs Y Plot` and place it in the work area.
6. Connect the `Start` sequence output pin to the `Until Break` sequence input pin. Connect the data output from `Until Break` to the sequence inputs of both the `Random Number` objects. Connect the data outputs from the `Random Number` objects to the data inputs of the `X vs Y Plot`.
7. Run the model for a few seconds, then stop it.
8. Clear the `X vs Y Plot`.
9. Change the X and Y scales of the display to be from `-1` to `2` in both the X and Y directions.
10. Change the trace color on the `X vs Y Plot`. Hint: look in the `X vs Y Plot`'s object menu.
11. Run the model for a few more seconds, then stop it.
12. Change the name in the HP VEE title bar to be `Quiz Model`.
13. Save the model to the filename `quiz1`.

Answers to the Quiz

Your model should look similar to the following figure:

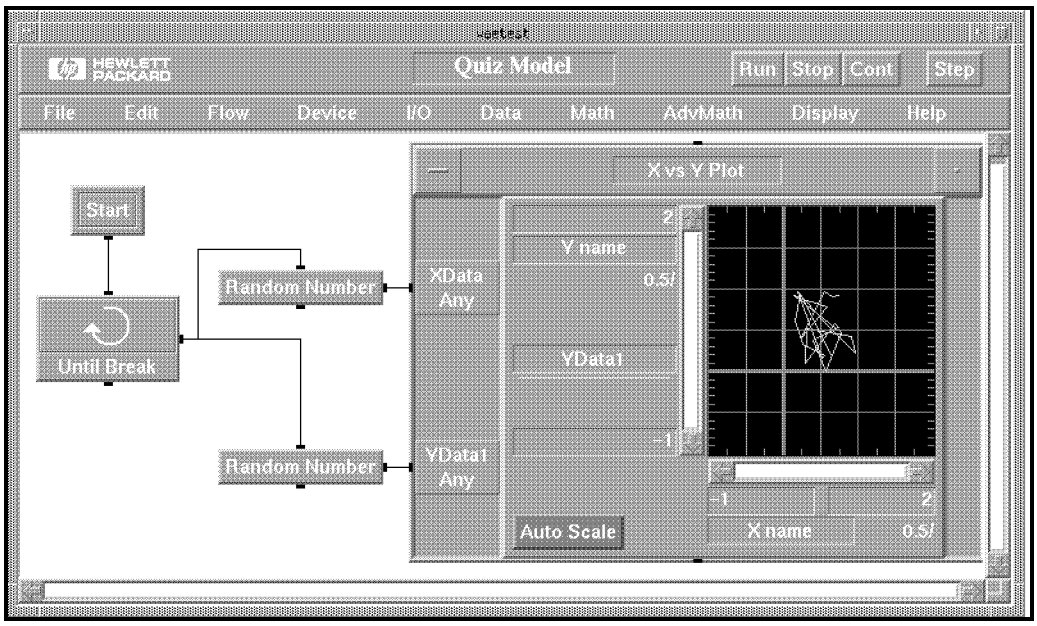

Figure 2-25. Quiz Model

1. Start HP VEE again.

   Log on (if you need to). Type `veeengine` Return *or* `veetest` Return.

2. Get a `Start` object and place it in the work area.

   From the `Flow` *menu, select* `Start` *and click to place the object in the work area.*

3. Get an `Until Break` object and place it in the work area.

   From the `Flow` *menu, to the* `Repeat` *cascading menu, select* `Until Break` *and click to place the object in the work area.*

4. Get two `Random Number` objects and place them in the work area.

   From the `Device` *menu, select* `Random Number` *and click to place the object in the work area. If you have trouble finding which menu holds the* `Random Number` *feature, you can access* `Help`. *You can use* `Clone` *to get the second* `Random Number` *object.*

5. Get an `X vs Y Plot` and place it in the work area.

   From the `Display` *menu, select* `X vs Y Plot`. *Place the object in the work area.*

6. Connect the `Start` sequence output pin to the `Until Break` sequence input pin. Connect the data output from `Until Break` to the sequence inputs of both the `Random Number` objects. Connect the data outputs from the `Random Number` objects to the data inputs of the `X vs Y Plot`.

   Move the objects so that `Until Break` *is on the left side of the work area,* `Start` *is above* `Until Break`, *the two* `Random Number` *objects are in the middle of the work area, one above the other, and the* `X vs Y Plot` *object is at the right of the work area.*

   Connect the sequence output pin (on the bottom) of the `Start` *object to the sequence input pin (on the top) of the* `Until Break` *object. Connect the data output pin (on the right) of the* `Until Break` *object to the sequence input pins of both the* `Random Number` *objects. Connect the data output pin (on the right) of the top* `Random Number` *object to the* `XData` *input pin (on the left) of the* `X vs Y Plot`. *Then connect the*

data output pin of the bottom `Random Number` *object to the* `YData1` *input pin of the display.*

7. Run the model for a few seconds, then stop it.

   To run the model, click on `Start` *To stop the model, press the* `Stop` *button.*

8. Clear the `X vs Y Plot`.

   From the `X vs Y Plot` *object menu, to the* `Clear Control` *cascading menu, select* `Clear`.

9. Change the X and Y scales of the display to be from `-1` to `2` in both the X and Y directions.

   Click on the fields for the display limits. Change `0` *to* `-1` *and change* `1` *to* `2` *for both the X and Y scales. Click outside the fields or press* Return *to stop editing.*

10. Change the trace color on the `X vs Y Plot`. Hint: look in the `X vs Y Plot`'s object menu.

    From the `X vs Y Plot` *object menu, select* `Traces & Scales`. *In the resulting dialog box, click on* `Yellow`, *the value in the* `Color` *field. Choose a color from the list box of colors by clicking on the color you wish. Click on* `OK`.

11. Run the model for a few seconds again, then stop it.

    To run the model, click on `Start`. *To stop the model, press the* `Stop` *button.*

12. Change the name in the HP VEE title bar to be `Quiz Model`.

    Click on the word `Untitled` *in the HP VEE title bar and type* `Quiz Model` Return.

13. Save the model to the filename `quiz1`.

    From the `Edit` *menu, select* `Save As`. *Type* `quiz1` *in the dialog box and click on* `OK` *or press* Return.

What's Next?

This is the end of the exercises to help you become comfortable interacting with HP VEE. The next chapter takes you through exercises that teach you more about creating models.

If you had any problems with these tasks, please review the exercises in this chapter before going on.

3

Creating Models

This chapter contains six exercises which show you how to build models:

1. "Understanding Data Flow"
2. "Using Data Files"
3. "Creating a UserObject"
4. "Creating a Panel View"
5. "Working with Data"
6. "Using HP VEE Examples"

It should take you about one hour to complete all the exercises in this chapter.

Exercise 1: Understanding Data Flow

When models run, they follow certain rules (just as written programs do). This exercise introduces you to some of these rules.

Note

The model built in this exercise will be used in the next three exercises. Make sure you complete this exercise before going on to Exercise 2: "Using Data Files".

In this exercise you will use an iterator to plot ten random numbers. If HP VEE is not running, start it now. If you have any objects on your work area, clear the work area by selecting `New` from the `File` menu.

1. From the `Device` menu, select `Random Number`. Place it in the center of your work area.
2. From the `Flow` menu, to the `Repeat` cascading menu, select `For Count`. Place it to the left of the work area.

   Notice that `For Count` is set to `10`. This tells the object to operate 10 times before it is finished.
3. From the `Flow` menu, select `Start`, and place it on the top left of your work area, above the `For Count` object.
4. From the `Display` menu, select `XY Trace`. Place it on the right of your work area.
5. Connect the `Start` sequence output pin to the top, sequence input pin of `For Count`.
6. Connect the data output pin of `For Count` to the sequence input pin on the top of `Random Number`.
7. Connect the data output pin of `Random Number` to the data input pin of the `XY Trace` display.

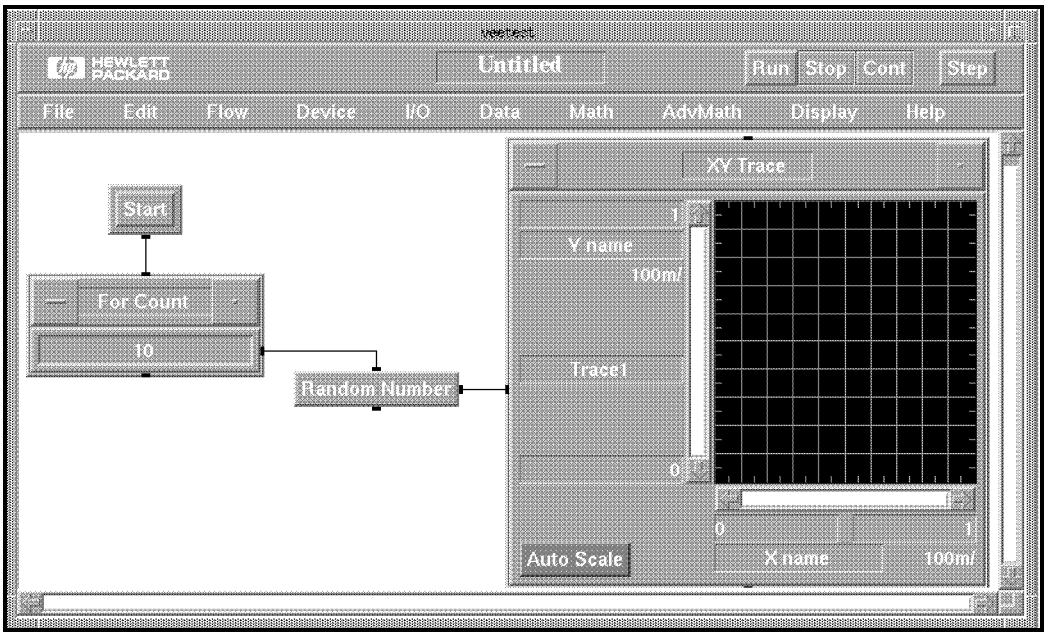

Figure 3-1. Plotting Random Numbers

Whenever you connect objects, you must understand the first rule of data flow within the model:

Rule 1

Data flows from left to right through an object. This means that on all objects with data pins, the left data pins are inputs and the right data pins are outputs.

8. From the `Edit` menu, click on `Show Exec Flow`.

   Although the menu immediately goes away, if you bring it up again you will see that the `Show Exec Flow` check box is checked, or selected.

   `Show Exec Flow` is a feature that allows you to see the order that objects operate by highlighting the object that is currently operating.

9. Click on `Start`. You will see each object highlight, which indicates the object that is currently operating.
10. Click on `Auto Scale` in the `XY Trace` so the graph area automatically scales to include your data.
11. Turn off the `Show Exec Flow` feature and run the model again. Notice that the objects no longer highlight.
12. Turn on `Show Exec Flow` again.

If you wish to see the execution flow explicitly, in slow motion, press the `Step` button to step your way through the model's execution.

With the first `Step` you will see the plot clear and an arrow will appear that points to the `Start` object. The arrow shows the *next* object that will execute. With the second `Step` you will see `Start` highlight, and the arrow will point to `For Count`. With the third step you will see `For Count` highlight, and the arrow will point to `Random Number`. Then `Random Number` highlights and the arrow points to `XY Trace`. Then `XY TRACE` highlights and the arrow points back to `For Count` as the first point is plotted. And so on until all ten points have plotted. When the model is finished executing, the arrow goes away.

As you continue stepping through the model's execution you will notice that the `For Count` remains highlighted, and therefore is operating, the entire time.

Rule 2

An object finishes operating only after all appropriate data outputs have been activated.

Before continuing with the next exercise, press the `Cont` button to allow the model to finish running, in case you did not step through the entire model.

Exercise 2: Using Data Files

One of the powerful features of HP VEE is its ability to easily create and read from data files. The following exercise shows how to create a data file and then how to read from the file.

Writing to a File

1. Minimize `For Count` and decrease the size of the `XY Plot` by using the `Size` feature from the `XY Plot` object menu.
2. From the `I/O` menu, to the `To` cascading menu, select `File` and place it close to the `XY Trace`.
3. Enter the name of the file in which you wish to store data. To do so, click on `myDatafile`. You will see a list box of existing filenames. To create a new file, backspace over `myDatafile`, and type a new filename (for example, `RandomData`), then click on `OK`.
4. Click on the check box titled `Clear File At PreRun`.

   By default, the file is created in append mode. This means that each time you write to the file, HP VEE will add data to the end of the file. In this exercise you need to clear the file each time before you write to the file. Checking the `Clear File at PreRun` option changes the writing mode of the file.
5. Minimize the `To File` object and place its icon above the `XY Trace`.
6. Connect the right, data output pin from `Random Number` to the left, data input pin of `To File`. This means that the same data that is plotted on the `XY Trace` is also written to the file.
7. Click on `Start`. You will see a similar execution as before, but HP VEE is writing the data to your file, in addition to plotting the data on the `XY Trace`.

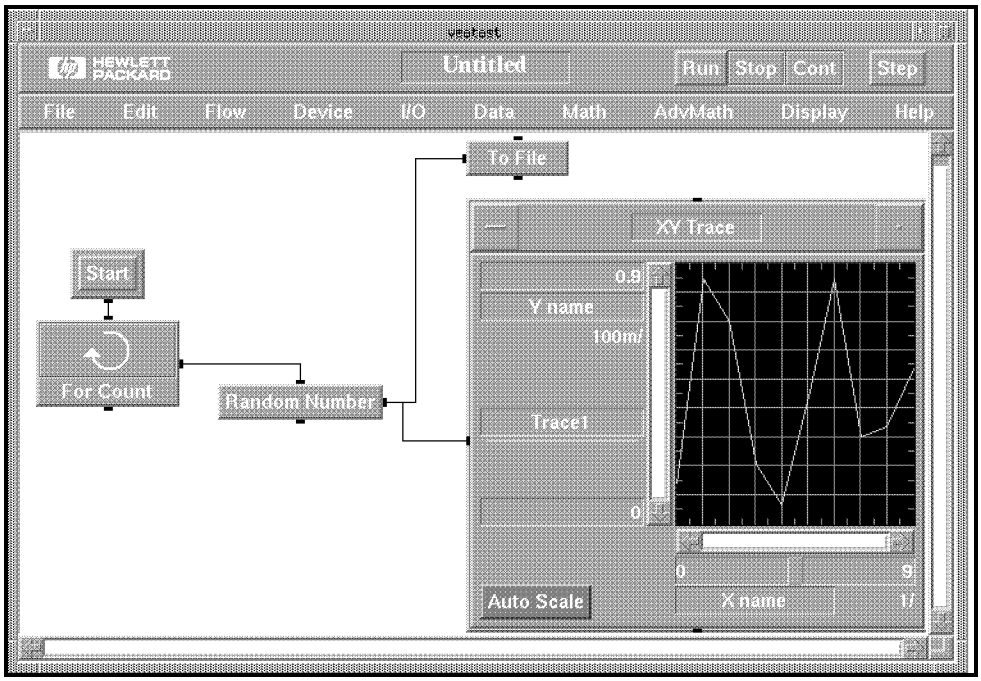

Figure 3-2. Writing Random Numbers to a File

8. To verify the data written to the file, go to another X11 window and show the contents of the file using the HP-UX `cat` command: `cat RandomData` (Return). If you do not see any data listed, verify that you are in the same directory as the `RandomData` file, and verify that all your objects are properly connected.

Reading from a File

You can easily read data from a file. In this exercise you will read data from a file and plot the data.

1. From the `I/O` menu, to the `From` cascading menu, select `File`. Place the object below the `For Count`.
2. Change the name of the file to the same file you created in the previous section (`RandomData`). Notice that `RandomData` is one of the files in the list box that

appears. You can select it by scrolling through the list of files and double-clicking on `RandomData`.

3. Click on `COUNT:1`, then click on the entry field to the right of the `Num Elements` field, and type `10` followed by (Return). This tells HP VEE to read an array of exactly ten elements.
4. Minimize `From File`.
5. Connect the bottom, sequence output pin of `For Count` to the top, sequence input pin of `From File`.
6. Clone the `XY Trace` and place the clone next to the `From File`. Connect the data output pin from `From File` to the data input pin of `XY Trace`. Change the name of the display to `File Data`.
7. Click on `Start`. You should see the same plot on both displays. If you do not, check the `To File` to verify that you set it to `Clear File At Prerun`.

   The model finishes generating data and writing it to both the `To File` and the `XY Trace` *before* it begins reading the `From file` and plotting that data.

Rule 3

The sequence output (bottom) pin activates only after all appropriate data outputs have activated, and even then only after normal propagation along all standard output lines has continued as far as possible.

8. To prepare for the next exercise, clear the `XY Trace` and delete the `To File`, `From File`, and second `XY Trace` (titled `File Data`). Notice that the lines disappear when you delete the object.

Exercise 3: Creating a UserObject

HP VEE provides a means for you to construct your own objects, called `UserObjects`. A `UserObject` has a work area identical to that of the main work area and it allows you to place and connect various objects (including other "nested" `UserObjects`). `UserObjects` also have a user-definable set of input and output pins.

A `UserObject` is not simply a method to help you conserve screen "real estate". Rather, as you will see in the following example, a `UserObject` is a true object that functions under the same set of rules as any other object such as `Formula`. Once created, you can use a `UserObject` like any other object in terms of sizing, moving, and operating.

In the following exercise you will create a `UserObject` from objects that are already on in your HP VEE window.

1. Select the `For Count` and `Random Number` objects. (Remember to use `Select Objects`.)
2. From the `Edit` menu, select `Create UserObject`.

   All the objects you've selected will be included in the `UserObject`. (It will take a few seconds for your display to change.)

   Notice how the connections to the `Start` object and the `XY Trace` are shown by input and output terminals on the `UserObject`. If you cannot see the connections you may need to move the work area.

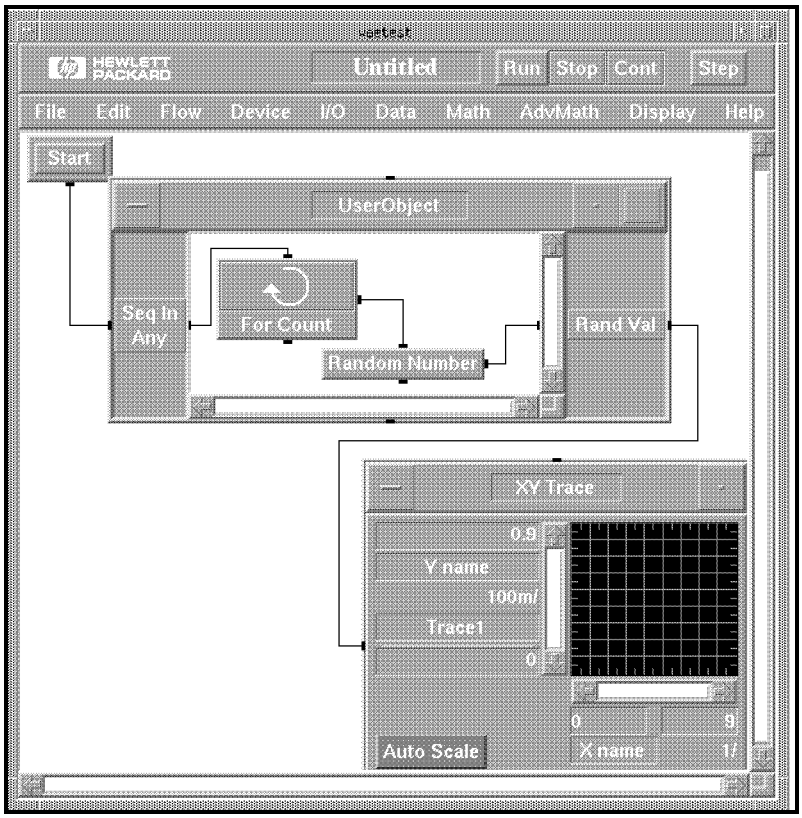

Figure 3-3. `UserObject` **Example**

3. In the upper right corner of the `UserObject` is a square button, called the **maximize button**. Click on the maximize button. The `UserObject` now expands to the full size of your HP VEE window.

   Use the maximize button to enlarge a `UserObject` when you need to work on the details of the `UserObject`, or when you have many objects in the `UserObject`.

4. Click on the maximize button again. The `UserObject` returns to its original size.

5. Press Start.

   Notice that the UserObject operates the For Count ten times, then sends a single data point to the XY Trace. This is because each output from a UserObject is activated once and only once when the UserObject finishes operating—*not* each time a UserObject output terminal is activated from within the UserObject.

6. To capture all ten data points and then send them on to the XY Trace, collect the ten data points into an array, then send the array to be plotted:

   a. Delete the line from Random Number to the Rand Val output terminal of the UserObject.

   b. From the Data menu, select Collector and place it in the UserObject between Random Number and the UserObject's data output terminal.

   c. Connect the Random Number data output pin to the Collector's top, left data input pin.

   d. Connect the For Count sequence output pin to the Collector's bottom, left input pin. This input pin indicates to the Collector when all input data has been input.

   e. Connect the Collector data output pin to the UserObject's output pin (Rand Val).

7. Press Start. The model now runs correctly and all ten values are plotted.

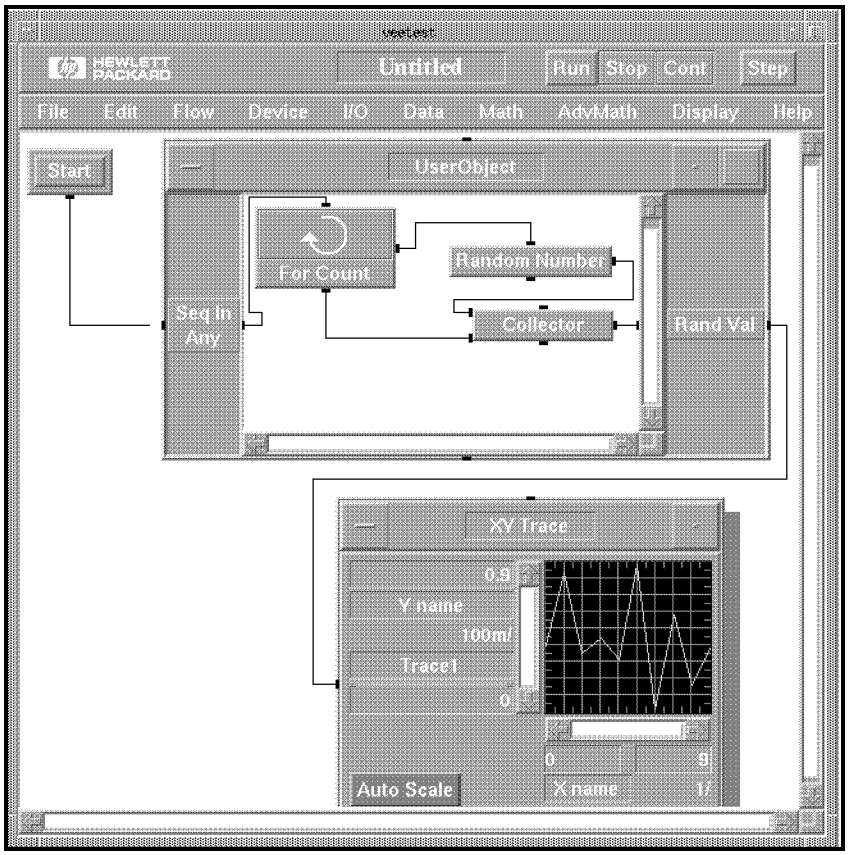

Figure 3-4. A Working `UserObject`

8. Close the `UserObject` by clicking on the minimize button. Notice that it saves space and it can be easily moved or copied like any simple object.
9. Press `Start`, notice that the model runs the same way as before.

Exercise 4: Creating a Panel View

HP VEE allows you to hide parts of the detailed model from a user through a feature called a **panel view**. A panel view allows you to simplify your interface and to secure the detail view from a user if you wish. When you create a panel view, you choose the objects from the detail view that you want the user to see on the panel view. These dual modes of operation allow security and ease of use in applications where the user is not necessarily the developer.

In this exercise you will select objects to put into the panel view.

1. Change the name in the HP VEE title bar to be `Random Plot`.
2. Select the `Start` and `XY Trace` objects.
3. From the `Edit` menu, select `Add To Panel`.

   The panel view replaces your detail view. Notice that in the menu bar, the `Panel` button is recessed. The panel view should look similar to the following figure.

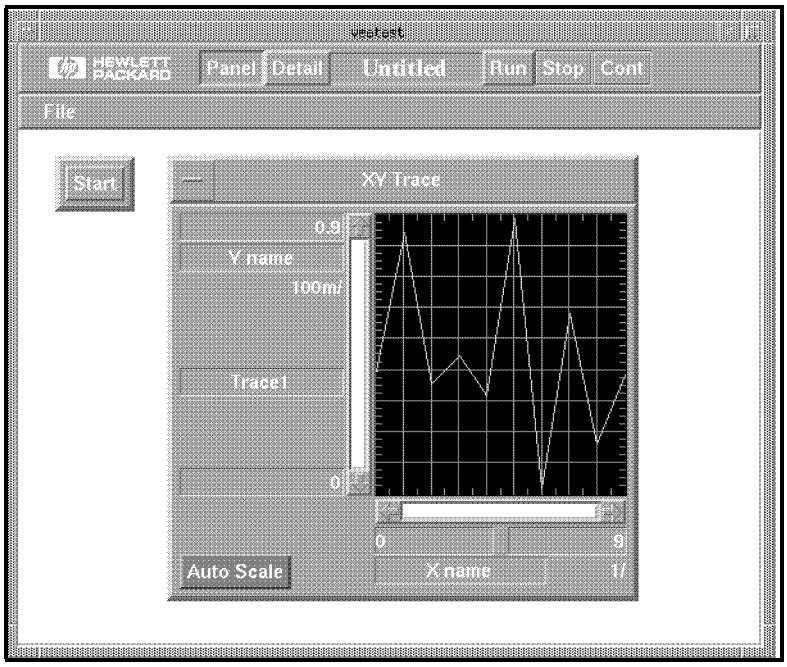

Figure 3-5. The Panel View

4. Press `Start` and notice that the model runs the same way as before except the objects don't highlight to show execution flow. Because `Show Exec Flow` is a debugging tool, it highlights only in the detail view.
5. Go between the detail and the panel views by pressing the `Panel` and `Detail` buttons.

Securing the Panel View

Next you will secure the panel view so that people who use it cannot modify it. This is useful if several people will use the model, and you wish to remain in control of the model's functionality. Although in this exercise you will save the detail view during the `Secure` step, you can also save the model (which consists of both the detail and the panel view) without securing the model.

1. Secure the panel view by clicking on `Secure` from the `File` menu. HP VEE asks if you wish to save the unsecured version.
2. Save the unsecured version by typing a filename, `mod.unsec` Return. You should always save the unsecured version. If you do not, you can never modify your model again. By saving the unsecured version, you can still make changes to the model.

   HP VEE removes the `Panel/Detail` buttons; you can no longer switch back to the detail view.
3. Save the secured version by selecting `Save As` from the `File` menu, and typing `mod.sec` Return.

On Your Own

- Clear the work area by selecting `New` from the `File` menu.
- Open the secured version of the model.
- Open the unsecured version of the model. Go between the panel and detail views.
- Clear the work area again.

Exercise 5: Working with Data

This exercise explains how to use data in different ways as inputs and outputs.

Converting Data Types

The ways that data are represented (such as in a waveform, an array, or as a complex number) are all very different. Explicitly declaring each data type is a complicated and tedious exercise, overshadowing many productivity gains. HP VEE automatically converts data as necessary so that in most cases you don't have to be concerned about the different data types and data shapes when you're building a model.

1. From the `Data` menu, to the `Constant` cascading menu, select `Real` and place it on the left side of the work area.
2. From the `Data` menu, to the `Constant` cascading menu, select `Complex` and place it below the `Real`.
3. From the `Math` menu, to the `+ - * /` cascading menu, select `+`. Place it in the middle of your work area.
4. From the `Flow` menu, select `Start` and place it above the `+`.
5. From the `Display` menu, select `AlphaNumeric` and place it on the right side of the work area.
6. Open the `+` object. The data input terminals are called `X Any` and `Y Any`.

   HP VEE includes a data type labeled `Any` that takes any type of incoming data and attempts to convert the data to the type the object needs or expects. If the object cannot convert the data, a clear error message will suggest the data type required. This is among the most powerful features of HP VEE.
7. Minimize `+`.
8. Connect the objects as shown in the following figure.

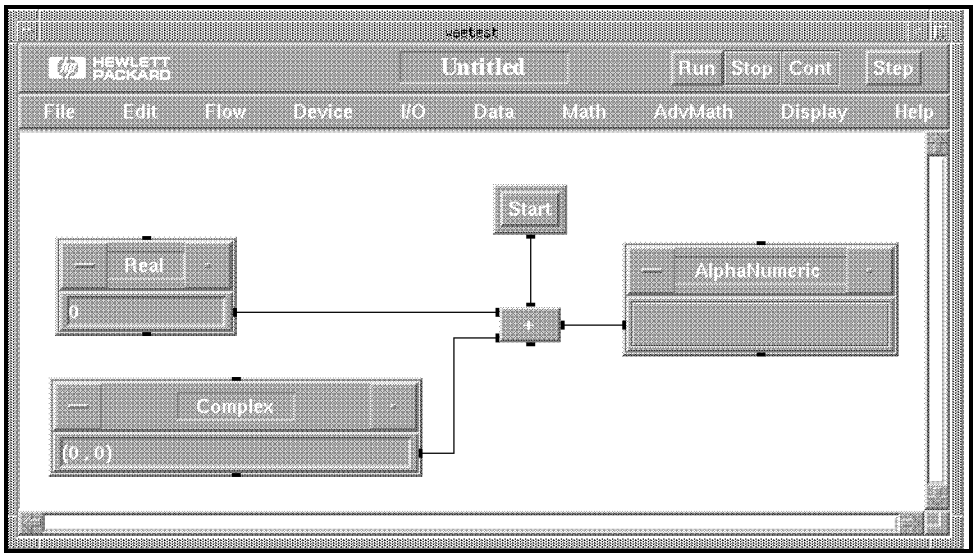

Figure 3-6. Data Conversion Example

9. Click on the recessed field of the `Real` and type a real value (such as `23.5`).
10. In the `Complex`, type a complex value such as `10,5`.
11. Click on `Start` to run the model.

    HP VEE automatically converts the data as needed, then performs the addition in the `+` object, then writes the result to the `AlphaNumeric`.

On Your Own

- Open the `+` object.
- Double click on the `X Any` input terminal. You now see a box that shows the input terminal's information, including the actual data and data type that came in.
- Add a `Text` to an `Integer`.
- Clear the work area before you continue.

Using Data Shapes

HP VEE supports a variety of data shapes (such as scalars and arrays) just as in any programming language. Unlike most programming languages, HP VEE objects can operate on an entire array instead of only one element.

The following model creates a one-dimensional ten-element array, calculates the median of the ten values, and prints the median.

1. From the `Flow` menu, to the `Repeat` cascading menu, select `For Range`. Place it on the left side of the work area. Notice that the `Thru` value is `9` (by default). Arrays are 0-based.
2. From the `Flow` menu, select `Start` and place it above `For Range`.
3. From the `Data` menu, select `Sliding Collector`. Place it to the right of `For Range`. Note that the `Trigger Every` value is `10` (by default). This collector creates a one-dimensional array with ten elements. It will output the array after all ten values are input.
4. Minimize the `Sliding Collector`.
5. From the `Adv Math` menu, to the `Statistics` cascading menu, select `median(x)`. Place it to the right of `Sliding Collector`.
6. From the `Display` menu, select `AlphaNumeric`. Place it to the right of `median(x)`.
7. Connect the data pins as shown and run the model.

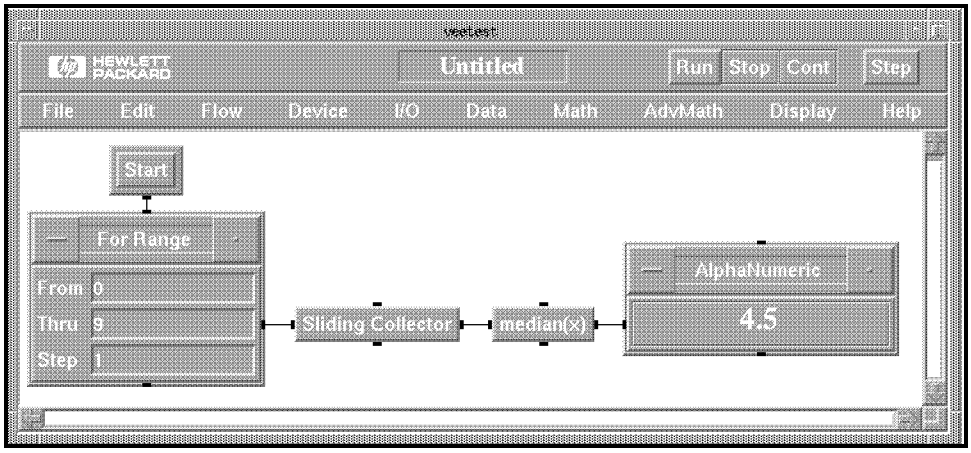

Figure 3-7. Data Shape Example

Notice that the median object operated on the entire array at once. This is because HP VEE objects support parallel operations.

8. Open `median(x)`, and open the `X Any` data input terminal. Under `Container Information`, you can see the data that came into the object.

Now clear the work area.

Exercise 6: Using HP VEE Examples

Included in the HP VEE-Engine and HP VEE-Test products are HP VEE examples that you can use. The `examples` directory has the following four sub-directories:

`applications`	Complete models of different types of engineering problems.
`concepts`	Models to demonstrate general concepts about how to use HP VEE.
`demos`	Provided with HP Vee-Test only.
`games`	Models that are games. Try them, they are fun!

The following exercise shows you how to access the example models. Before you begin, make sure your work area is clear.

1. From the `File` menu, select `Open`. In the list box that appears, backspace over the path in the entry field and type the correct directory (*do not press* Return):

   - If you have HP VEE-Engine, type:

     ```
     /usr/lib/veeengine/examples/
     ```

   - If you have HP VEE-Test, type:

     ```
     /usr/lib/veetest/examples/
     ```

   Notice that the list box now shows the `examples` sub-directories.

2. Type `applications/` to see the names of the example models in this directory. *Do not press* Return or you will get an error. Notice that the file names end in `.ex` and `.icon`.

   If you get the error message, click on `Cancel` and bring up the `Open File` list box again (`File` ⟹ `Open`).

3. Backspace over `applications/` and type `concepts/`. In this directory, example models also end in `.bas` and `.c`. The file names that end in `.dat` are data files.
4. Return to the `applications/` directory.
5. Double-click on `CONTENTS`. The object that appears has scroll bars so you can scroll through the list of file names and descriptions. Read the description of each example in this directory. If you do not see the scroll bars of this object, enlarge your HP VEE window.
6. Clear the work area.
7. From the `File` menu, select `Open` again. HP VEE should still be pointing to the `applications` example directory.
8. Choose one of the examples by double-clicking on the filename.

   Look through the examples to see what you can do in HP VEE. There is much to learn from seeing how features are used in working examples.
9. Clear the work area.

In addition to examples, there is a `libraries` directory which contains pieces of models (as objects) you can incorporate in your models using the `File` ⟹ `Merge` feature. `Merge` lets you add outside models into the model you currently have in your work area.

Quiz

In this quiz, you will create a model that calculates the angular deflection of a round shaft.

1. Place a `Start` at the top left of your work area.
2. Place an `Real` constant below `Start`. Change the name to be `Length, in.` Type in a value of `10`.
3. Place 3 more `Real` constants below `Length, in.`, and name them and set values, from top to bottom, `Diameter, in.` (value of `1`), `Torque, in-lb.` (value of `2500`), and `Shear Modulus, psi` (value of `12M`).
4. Place a `Formula` object to the right of the integer objects. Edit the formula as follows:
   a. Add data input terminals so you have 4, and label them, from top to bottom: `L, D, T, G`.
   b. Enter the following formula:
   `583.6*T*L/(G*(D^4))`
5. Place an `AlphaNumeric` display to the right of the `Formula` object, and change the name to be `Deflection, Deg.`
6. Connect the objects as follows:
   a. Sequence output pin of `Start` to sequence input pin of `Length`.
   b. Data output pins of the constants to the data input pins of the `Formula`, as follows:

      ```
      Length -> L
      Diameter -> D
      Torque -> T
      Shear Modulus -> G
      ```

   c. Data output pin of `Formula` to data input pin of `Deflection`.
7. Run the model.

8. Put the following objects into a panel view: `Start`, `Length`, `Diameter`, `Torque`, `Shear Modulus`, and `Deflection`.
9. Run the model from the panel view.
10. Save your panel and detail views and clear the work area.

Answers to the Quiz

This model is one of the example models in the `applications` directory. To see the model (and check it against yours):

1. From the `File` menu, select `Open`.
2. Enter the name of the example:
   a. If you are using HP VEE-Engine, type the following into the file entry field:

```
/usr/lib/veeengine/examples/applications/torsionbar.ex
```

      Make sure your path and filename begin with `/`, not `./`.

   b. If you are using HP VEE-Test, type the following into the file entry field:

```
/usr/lib/veetest/examples/applications/torsionbar.ex
```

      Make sure your path and filename begin with `/`, not `./`.

3. Click on the `Detail` button.

You should see the model shown in Figure 3-8.

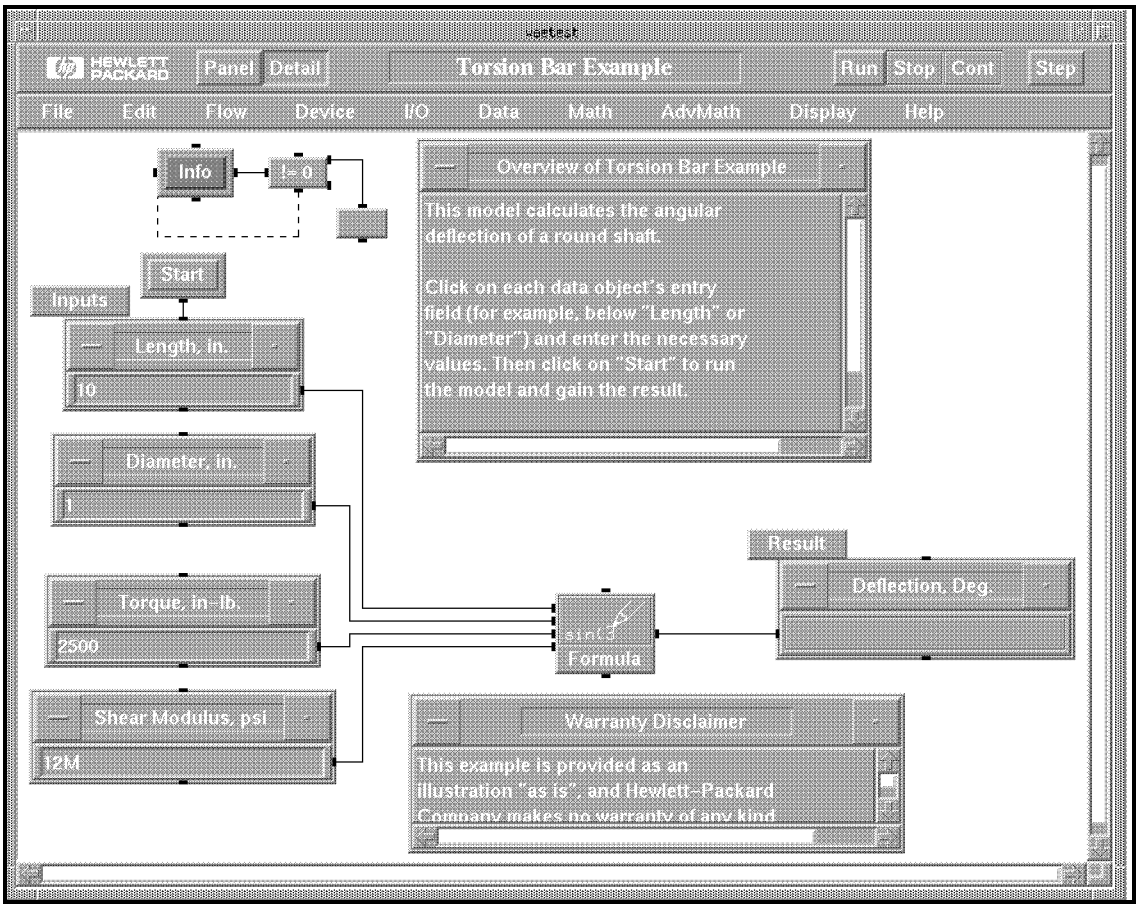

Figure 3-8. Torsion Bar Example

What's Next?

For more information about any topic in this manual, refer to *Using HP VEE*.

If you have HP VEE-Engine, you are finished working through this manual. Now that you're familiar with HP VEE's terminology, interface, and basic modeling techniques, you're ready to build your own models with HP VEE.

If you have HP VEE-Test, go to the next chapter.

4

Exploring Instruments in HP VEE-Test

HP VEE-Test includes the ability to communicate with test and measurement instruments. This ability is supported by HP VEE-Test only; it is not supported by HP VEE-Engine.

HP VEE-Test contains objects that communicate with instruments directly (with `Direct I/O` objects) or through drivers (with `State Driver` or `Component Driver` objects). If you have an instrument for which HP VEE-Test does not supply a driver, you can access it with a `Direct I/O` object. Please refer to *Using HP VEE* for information on `Direct I/O` and `Component Driver`. This chapter shows you how to use `State Driver` objects.

This chapter contains three exercises which show you how to use instruments within your HP VEE-Test model:

1. "Configuring Instruments"
2. "Using State Drivers Interactively"
3. "Using State Drivers in a Model"

It will take you about 30 minutes to complete the exercises in this chapter.

Note

Before you can communicate with instruments, your computer must be configured with both the proper HP-UX interface (or kernel) drivers and `/dev` files to support the interfaces you use. Check with your system administrator to see if your computer is configured for HP-IB instruments, which are used in the examples in this chapter. Guidelines for configuring device drivers are given in *Installing HP VEE*.

Exercise 1: Configuring Instruments

In this exercise you will configure an HP 3325B Function Generator and add it to the list of instruments from which you can later choose for your models.

Please work through this exercise even if you do not have an HP 3325B Function Generator connected to your computer; from it you will learn the basics of how to configure an instrument. You will use this, a `State Driver` object, in Exercises 2 and 3.

1. From the `I/O` menu, select `Configure I/O`. You will see a list box containing the already-configured instruments.

   Please do not delete `fgen`, `dvm`, or `scope` from the list, now or later, since these drivers are used in example models using instruments.

2. Click on the `Add` button. You will see a dialog box similar to the following.

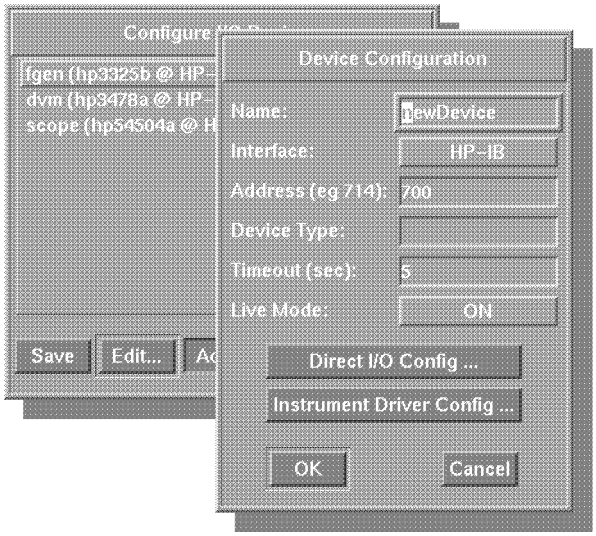

Figure 4-1. Configuring a `State Driver`

You will edit the fields in this dialog box to add a function generator to your list of instrument drivers.

Note

When changing the values, do not press (Return) as that will cause you to exit the dialog box. Instead, when you have edited a field, use the (Tab) key to move to the next field ((Shift-Tab) to move to the previous field), or click on the field you need to edit next.

3. Click on the `Name` field and type `Func-Gen` (remember, *do not* use the (Return) key).
4. Click on the work `ON` in the `Live Mode` field to change the value from `ON` to `OFF`. In HP VEE, instruments not in `Live Mode` do not need to be connected to the computer. This means you can build models using instruments you don't currently have connected to your workstation.

Note

When you work with a live instrument, you will set the `Address` value to be that of the actual address of the instrument.

5. Click on the `Instrument Driver Config` button. You will see a dialog box that you will use to configure `Func-Gen` as a state driver instrument.
6. Click on `ID Filename`. Now you will see a list box containing a scrollable list of instrument driver file names.

Figure 4-2. `ID Filename` **List Box**

Scroll the list until you see the file named `hp3325b.cid`. Click on the file name and then click on the `OK` button at the bottom of the dialog box.

7. Click on `OK` to close the `Instrument Driver Configuration` box and return to the `Device Configuration` dialog box. Notice that `hp3325b` now appears as the `Device Type`.
8. Click on `OK` to return to the `Configure I/O Devices` dialog box. You will see the new driver choice, `Func-Gen`.
9. Click on `Save`. The `Configure I/O Devices` dialog box will disappear. You have configured a `State Driver` instrument. The driver configuration is saved with the other drivers in a file called `.veeio` in your HP-UX `$HOME` (login) directory.

On Your Own

- If you have an HP 3325B Function Generator connected to your computer, set the `Address` field to the HP-IB address to which the instrument is set (the factory default is `717`). To do this, `Edit` the `Func-Gen` driver from the `Configure I/O Devices` dialog box.
- Configure an instrument that you have connected to your workstation.

Exercise 2: Using State Drivers Interactively

The open view of a `State Driver` object in HP VEE-Test represents the front panel that you see on your physical instrument. Just as you can change the settings on your physical instrument's panel, you can change the settings on your HP VEE-Test instrument's panel. In this exercise you will see how to use the `State Driver` object interactively.

1. From the `I/O` menu, select `Instrument`. The device, `Func-Gen`, that you configured in the previous section appears in the dialog box.
2. Select `Func-Gen` by clicking on it, then clicking on `State Driver`.

   The pointer changes to a pair of glasses while HP VEE "looks" for the driver file.
3. Place the object for the `Func-Gen` on the right side of your work area.

   You see the main panel for this instrument driver. This panel works exactly the same way as the front panel on the instrument itself.

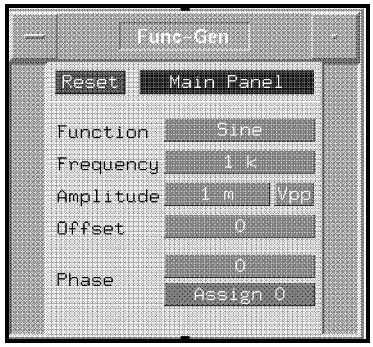

Figure 4-3. Main Panel for HP 3325B `State Driver`

4. Click on `Sine`. You see a dialog box of choices for the shape of the `Function`.

5. Double-click on `Square`.

   The `Function` field changes from `Sine` to `Square`.

   If this instrument was connected, the address configured into the driver, and `Live Mode` set to `ON`, this and every action you performed on the object would occur on the physical instrument itself.

6. Click on the `Main Panel` field.

   The dialog box you see lists the panels for this particular instrument. Each panel contains additional functionality for the instrument.

7. Go to another panel, such as the `Sweep` or `Modulation` panel, to see what is on that panel. To do this, either double-click on the panel's name in the dialog box, or click on the panel's name and then click the `OK` button.

   The panel you selected appears in place of the main panel.

8. Return to `Main Panel` by clicking on the panel field and selecting `Main Panel` from the dialog box.

Adding an Input to Your State Driver Object

To programmatically change instrument panel settings, you need to add inputs to the object. The following exercise shows you how to add an input to your instrument panel and set values.

1. Open the object menu.
2. From the `Add Terminals` cascading menu, click on `Select Input Component`.

   You see the following message in the message box on top of the HP VEE-Test window: `Component for input?`

3. Click on the value in the `Frequency` field (do not click on the word `Frequency`). You will see a new input terminal, `FREQUENCY (Real)`. You've created an input that will specify the frequency of this function generator. The data type of the input is `Real`.

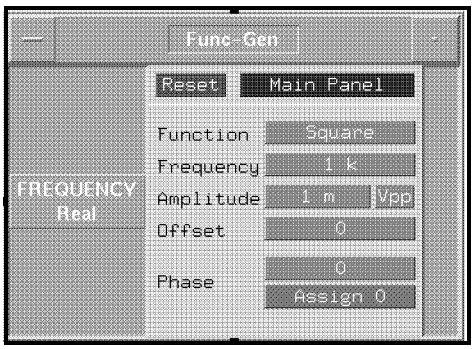

Figure 4-4. HP 3325B with an Added Input

On Your Own

Change the values on `Func-Gen`.

- Display the `About` panel.
- Add a `PHASE` input.
- Delete the `PHASE` input. (Hint: look on the object menu, the `Terminals` cascading menu)

When you're finished with this exercise, leave the `Func-Gen` object on the work area. You will use it in the next exercise.

Exercise 3: Using State Drivers in a Model

If you have an HP 3325B Function Generator connected to your computer and have it configured into HP VEE, you can see the following interaction on the instrument. If not, what you see on the HP VEE screen is exactly what you would see on your physical instrument.

1. From the `Flow` menu, select `Start` and place it in the upper left of the work area.
2. From the `Flow` menu, across the `Repeat` cascading menu, select `For Range` and place it below `Start`. Set the following values:
   a. `From: 10k`
   b. `Thru: 100k`
   c. `Step: 10k`
3. From the `Device` menu, select `Delay` and place it above `Func-Gen`. Set the delay value to `.3`. This is in units of seconds.
4. Connect the model as shown in the Figure 4-5.

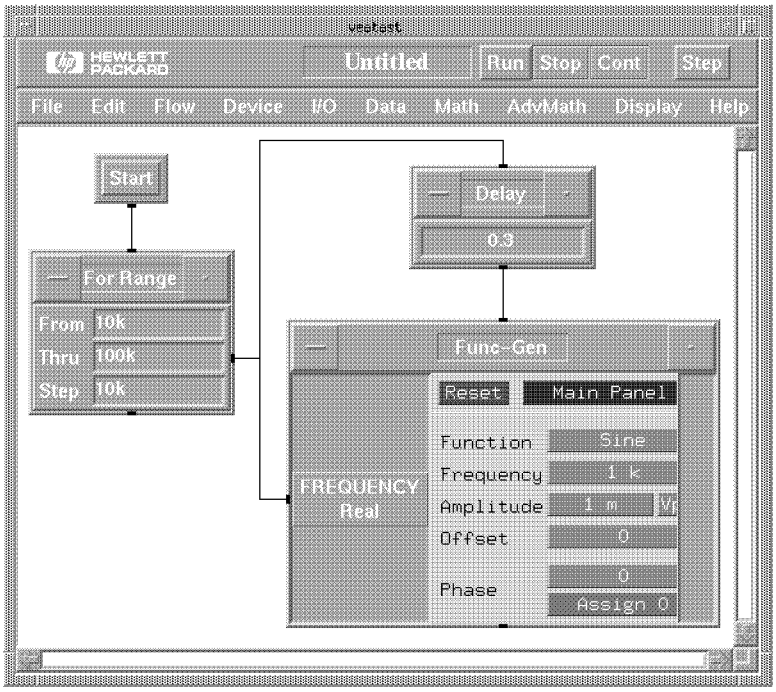

Figure 4-5. Instrument Example

5. Click on `Start`.

   Watch the `Frequency` field in `Func-Gen`. Notice that it steps from 10 k to 100 k, as you specified in the `For Range` object.

6. If you have an HP 3325B Function Generator connected to your computer, change `Func-Gen` to live mode and specify the correct HP-IB address if you have not already done so. To make these changes, go back to the `I/O` ⟹ `Configure I/O` feature. These changes will automatically be reflected in the `Func-Gen` object.

When you have made the changes, click on `Start`. Notice that the `Frequency` readout field on both your HP 3325B Function Generator, and on the `Func-Gen` panel, steps from 10 k to 100 k.

On Your Own

- From the `Func-Gen` object, change other settings to see what effect it has on your HP 3325B Function Generator.
- If you have any other instruments configured or connected, select that instrument object and interact with the instrument.

What's Next?

Now that you're familiar with using instruments in HP VEE-Test, you're ready to build your own testing models with HP VEE. Refer to *Using HP VEE* to learn the details about the following features:

- `State Drivers`
- `Component Drivers`
- `Direct I/O`

For more information about any topic in this manual, refer to *Using HP VEE*. For object-specific information go refer to the *HP VEE Reference* manual.

5

Common Problems

If you have any problems while doing the exercises in this manual, refer to the following table for possible rescue procedures to follow. If you cannot find the problem listed here, please refer to the *Using HP VEE* manual.

Common Problems and Possible Rescues

Problem	Rescue Procedure
You selected the wrong feature from a menu, and you need to undo what you selected.	If by selecting the wrong feature you got: ■ A dialog box: click on the `Cancel` button in the dialog box. The dialog box will close. If you get a second dialog box, click on `Cancel` to close the second dialog box. You can now select the correct feature. ■ An object outline box: you must remove the object. If you have not already done so, move the outline box into the work area and click the mouse button to place the object in the work area. Bring up the object menu by moving the pointer over the object and pressing the right mouse button. Then, from the object menu, select `Cut`. ■ A prompt at the top of the HP VEE window telling you to do some action: simply move the pointer into the work area and click the mouse button to end the feature. You can now select the correct feature.
You've selected line-draw mode accidentally.	Position the pointer over an empty area of the work area and double-click the left mouse button to delete the line.

Common Questions and Possible Rescues (continued)

Problem	Rescue Procedure
You are trying to draw a line, but keep moving the object instead.	■ If your pointer is on the object, click farther away from the object's pin. ■ If your pointer is too far from the object, and you are scrolling the work area, click closer to the object's pin.
A model is not running as you expected.	From the `Edit` menu, select `Show Data Flow` and `Show Exec Flow`. Now when you run the model, you can see which objects are operating and in what order they are operating.
You need to delete a data input or output pin.	Move the pointer over the object, and press the right mouse button to bring up the object menu. From the object menu, to the `Terminals` cascading menu, select `Delete Input` or `Delete Output`.
When you start to pull down a menu after clicking on it, it disappears.	Do either of the following: ■ After you click on the menu title, wait a little longer before you pull down to see menu features. ■ Drag the menu down (keep the mouse button down as you select the menu and pull down for the choices). In this case, you select the feature by *releasing* the mouse button when it is over the feature that you want to select.
A line won't connect to the pin of an object.	You must get close enough so the line box jumps to the pin. Another possible reason for non-connection is that the pin may be already connected (there can be only one connection per input pin).

Common Questions and Possible Rescues (continued)

Problem	Rescue Procedure
You've accidentally removed (or cut) an object.	Under the `Edit` menu, select `Paste`. Once your object reappears, re-connect the lines. This will only work for the last object(s) cut.
HP VEE seems "frozen" and will not accept any input from your mouse or keyboard.	1. Make sure there is no dialog box open, or prompt in the title bar, in the HP VEE window that is waiting for your input. If there is one, answer the dialog box or prompt as appropriate. This will "unfreeze" HP VEE. 2. If there is no dialog box or prompt, move the pointer into the main HP VEE window, if possible. Then press the following two keyboard keys simultaneously: CTRL - C. This should "unfreeze" HP VEE. 3. If HP VEE still will not accept any input, you will have to close the HP VEE window by using the X11 window menu. *Please note,* however, that doing so will cause you to lose all your work and data back to the point of your last save. To close the X11 window, move your pointer over the object menu button in the top, upper left corner of the HP VEE window, press and hold the left mouse button, highlight `Close`, and release the left mouse button to select it. To run HP VEE again, follow the procedures in "Exercise 1: Starting HP VEE" in Chapter 2.

Glossary

This Glossary contains the definitions of terms used in this guide. For other definitions that describe graphical objects and processes in HP VEE, refer to the *Using HP VEE* manual.

Dummy
The name of this glossary.

Contents

Glossary

This Glossary contains the definitions of terms used in this guide. For other definitions that describe graphical objects and processes in HP VEE, refer to the *Using HP VEE* manual.

Application
A software program that completes work directly for the user. For example, HP VEE-Engine is a general purpose engineering application, and HP VEE-Test is a test and measurement application.

Array
A data shape that contains a systematic arrangement of data items in one or more dimensions. The data items are accessed via indexes. See also **Data Shape**.

Arrow
1. An arrow-shaped pointer. See **Pointer**.

2. A scroll arrow that is a part of a scroll bar and is used either to scroll a list box, or to pan the work area.

Button
1. A button on a mouse. See **Mouse Button**.

2. A graphical object in HP VEE that simulates a real-life pushbutton and appears to pop-out from your screen. When a button is "pressed" in HP VEE, by clicking on it with a mouse, an action occurs.

Cascading Menu

A submenu on a pull-down or pop-up menu that provides additional selections to a menu selection (feature).

Checkbox

A recessed square box on HP VEE menus and dialog boxes that allows you to select a setting. To select a setting, click on the box and a checkmark appears in the box to indicate a selection has been made. To cancel the setting, simply click on the box again to remove the checkmark.

Click

To press and release a mouse button quickly. Clicking usually selects a menu feature or object in the HP VEE window. See also **Double-Click** and **Drag**.

Component Driver

An instrument control object that reads and writes values to components you specifically select. Use `Component Drivers` to control an instrument using a driver by setting the values of only a few components at a time. See also **Driver Files** and **State Driver**.

Configure

To arrange or modify software, hardware, or both in a computer system. In HP VEE, a menu selection with which you may change transaction array formats, the number of elements in a constant, and so forth.

Crosshairs
A cross-shaped pointer in HP VEE that indicates that the software is waiting for your action. For example, when you see the crosshairs, you can select an object in the work area to perform some action on it, select a menu feature, or select any of the window controls (such as the scroll arrows, minimize or maximize buttons, and so forth).

Cursor
A white rectangular pointer in an entry field that shows where alphanumeric data will appear when you type information from the keyboard.

Data Flow
The direction in which data moves in HP VEE. Data flow is from left to right through an object, then from the data output pin of that object to the data input pin of the next object. Compare with **Sequence Flow**.

Data Input Pin
A connection point on the left side of an object that permits data to flow into the object.

Data Output Pin
A connection point on the right side of an object that propagates data flow to the next object and passes the results of the first object's operation on to the next object.

Data Shape
A pre-defined structure that defines how data is grouped together. See also **Array** and **Data Type**.

Data Type
A pre-defined structure that determines how data is organized and treated by HP VEE, and supports common engineering constructs. See also **Data Shape**.

Default
A value or action that HP VEE automatically selects.

Detail View
A view of a model in HP VEE that shows all the objects and the lines between them. Compare with **Panel View**.

Dialog Box
A secondary window displayed when HP VEE requires information from you before it can continue. For example, a dialog box may contain a list of files from which you must choose a file before HP VEE can perform a particular operation.

Directory
A collection of files. For example, your HP-UX `/users` directory usually contains all the files you have created.

Double-Click
To press and release a mouse button twice in rapid succession. Double-clicking is usually a short-cut to selecting and performing an action.

Drag
To press *and continue to hold down* a mouse button while moving the mouse. Dragging moves something (for example, an object or scroll slider) within the HP VEE window. A drag ends when you release the mouse button.

Driver
Software that allows a computer to communicate with other software or hardware more easily than with raw reads and writes. See also **Component Driver**, **Driver Files**, **Interface Driver**, and **State Driver**.

Driver Files
A set of files included with HP VEE-Test that contain the information needed to create `State Driver` and `Component Driver` objects for instrument control. These files (`.cid` files) are copied to your system's hard disk automatically when you install HP VEE-Test.

Edit
To make changes in a file or entry field containing text or data.

Entry Field
A field that is typically part of a dialog box or an editable object and is used for text entry. An entry field appears recessed. For example, the open view of the `For Range` object has entry fields where you type values that specify the beginning, ending, and step values.

Error Message
Information that explains that a problem has occurred and appears in a special type of dialog box in the HP VEE window.

Execute
The action of a model, or parts of a model, running.

Execution Flow
The order in which objects operate. See also **Data Flow** and **Sequence Flow**.

Feature
An item on a menu that you select to cause a particular action to occur (for example, to open a file), or to get a particular object.

File
A set of information (such as a model or data) that is stored in an area of computer storage.

Flow
See **Data Flow**, **Execution Flow**, and **Sequence Flow**.

Grayed Feature
A menu feature that is not currently available for use. For example, `Move Object` is grayed when no objects are selected.

Highlight
1. The colored band or shadow around an object that provides a visual cue to the status of the object.

2. The change of color on a menu feature that indicates you are pointing to that feature.

HP-UX
Hewlett-Packard Company's enhanced version of the UNIX™ operating system. (UNIX is a registered trademark of UNIX System Laboratories Inc. in the U.S.A. and other countries.)

Icon
The small, graphical representation of an HP VEE object, such as the representation of an instrument, a control, or a display. Compare with **Open View**.

Instrument Driver
This term is not used in HP VEE. See **Driver Files**, **Component Driver**, and **State Driver**.

Interface Driver
Software that allows a computer to communicate with a hardware interface, such as HP-IB or RS-232. Also called "device driver" in the HP-UX operating system, interface drivers are configured into the kernel of the operating system.

Label
The text area or name on an icon or button that identifies that object or button.

Library
A collection of often-used objects or small models grouped together for easy access.

Line
A link between two objects in HP VEE.

Log In
The process of typing in a valid user name and its associated password (if one exists) to gain access to a computer system.

Login
A valid name and password (if one exists) that you use to log in to a computer system.

Main Menu
A menu accessed from the HP VEE title bar. The main menu may be opened by clicking or dragging on the menu titles in the menu bar.

Main Work Area
The area where you create a model.

Maximize
To enlarge a window to its maximum size. You maximize a window by selecting the square button on the right side of the window's title bar. In HP VEE, the `UserObject` has a maximize button.

Menu
A collection of features that are presented in a list. See also **Cascading Menu**, **Main Menu**, **Object Menu**, **Pop-Up Menu**, and **Pull-Down Menu**.

Menu Bar
A rectangular bar at the top of the HP VEE window that contains titles of the pull-down, main menus from which you select features.

Menu Title
The name of a menu within the HP VEE menu bar. For example, `File` or `Edit`.

Minimize
1. To reduce an open view of an object to its smallest size—an icon.

2. To reduce an X window to its smallest size—an icon.

Model
In HP VEE, a set of objects connected with lines that simulates an engineering problem and, when run, provides a solution to that problem. You build, modify, and run models in HP VEE by selecting objects from menus and connecting them in the work area.

Mouse
A pointing device that you move across a surface to move a pointer within the HP VEE window.

Mouse Button
One of the buttons on a mouse that you can click, double-click, or drag to perform a particular action with the corresponding pointer in the HP VEE window.

Object
A graphical representation of an element in a model, such as an instrument, control, display, or mathematical operator. An object is placed on the work area and connected to other objects to create a model. Objects can be displayed as icons or as open views. See **Icon** and **Open View**.

Object Menu
The menu associated with an object that contains features that operate on the object such as moving, sizing, copying, deleting, and adding inputs to the object. It is accessed by clicking on the upper-left corner of an open view or clicking the right mouse button on any non-field area on the object.

Open
To start an action or begin working with a text, data, or graphics file. When you select `Open` from HP VEE, a model is loaded into the work area.

Open View
The representation of an HP VEE object that is more detailed than an icon. Within the open view, you can modify the operation of the object and change the object's title. Compare with **Icon**. See also **Object**.

Operate
The action of an object processing data and outputting a result. An object operates when it's data and sequence input pins have been activated.

Outline Box
A box that represents the outer edges of an object or set of objects and indicates where the object(s) will be placed in the work area.

Panel
Information displayed in the center of the object's open view. In a `UserObject`, the panel contains a work area. In a `For Count` object, the panel contains an entry field. Compare with **Panel View**.

Panel View

The view of a model in HP VEE that shows only those objects needed for the user to run the model and view the resultant data. You create a panel view to meet the needs of your users. Compare with **Detail View** and **Panel**.

Pin

An external connection point on an object to which you can attach a line. See also **Data Input Pin**, **Data Output Pin**, **Sequence Input Pin**, **Sequence Output Pin**, and **Terminal**.

Pointer

The graphical image that maps to the movement of the mouse. A pointer allows you to make selections and provides you feedback on a particular process underway. HP VEE has pointers of different shapes that correspond to process modes, such as an arrow, crosshairs, and hourglass. See also **Arrow** and **Crosshairs**. Compare with **Cursor**.

Pop-Up Menu

A menu that provides no visual cue to its presence, but simply pops up when you perform a particular action. For example, the `Edit` menu in HP VEE pops up when you position the pointer in the work area and then click the right mouse button.

Pull-Down Menu

A menu that is pulled down from the menu bar when you position the pointer over a menu title and click or drag the left mouse button.

Restore

To return a minimized window (an icon) to its full size as an open view by double-clicking on it.

Run
To start operating the objects on a model.

Save
To write a file to a storage device, such as a hard disk, for safekeeping.

Scalar
A data shape that contains a single number. See also **Data Shape**.

Scroll
The act of using a scroll bar either to move through a list of data files or other choices in a dialog box or to pan the work area.

Scroll Arrow
An arrow that is part of a scroll bar and, when clicked on, moves you through a list of data files or other choices in a dialog box or pans the work area.

Scroll Bar
A graphical device used either to move through a list of data files or other choices in a dialog box or to pan the work area. A scroll bar consists of one or more scroll sliders and scroll arrows.

Scroll Slider
A rectangular bar that is part of a scroll bar and, when dragged, moves you through a list of data files or other choices in a dialog box or pans the work area.

Select
To choose an object, an action to be performed, or a menu item. Usually you select by clicking with your mouse.

Selection

1. A menu selection (feature).

2. An object or action you have selected in the HP VEE window.

Sequence Flow

The direction in which sequence impulses move in HP VEE, which is from the top to the bottom within an object, and from the sequence output pin of one object to the sequence input pin of another object, and so on. See also **Data Flow**.

Sequence Input Pin

The top pin of an object. When connected, this input pin must be activated before the object will operate.

Sequence Output Pin

The bottom pin of an object. When connected, this output pin is activated when the object and all data flow propagation from that object finishes executing.

Software

Computer programs (applications) that let users perform specific tasks with the computer.

State Driver

An instrument control object that forces all the function settings in the corresponding physical instrument to match the settings in the control panel displayed in the open view of the object. See also **Component Driver** and **Driver Files**.

Terminal

The internal representation of a pin that displays information about the pin and the data held by the pin.

Title Bar
The rectangular bar at the top of the HP VEE window or the object's open view where the model's or object's name is shown.

User Interface
The part of an application that permits a user and the application to communicate with each other to perform certain tasks. HP VEE uses a graphical user interface, which includes windows, menus, dialog boxes, and objects.

UserObject
An object that can encapsulate a group of objects that perform a particular function. A `UserObject` allows you to use top-down design techniques when building a model and to build user-defined objects that can be saved in a library and reused.

View
See **Detail View**, **Icon**, **Open View**, and **Panel View**.

Window
A rectangular area on the screen that contains a particular application program, such as HP VEE or the HP-UX shell.

Window Frame
The area surrounding a window that contains a resize border, window menu button, minimize and maximize buttons, and a title area.

Work Area
The area within the HP VEE window or the open view of a `UserObject` where you group objects together. When you open a model, it is loaded into the main work area. The panel of a `UserObject` is a work area. See also **Panel**.

X Window System (X11)
An industry-standard windowing system used on HP-UX computer systems.

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