XILINX®

ONLINE

TIMING ANALYZER

REFERENCE/USER GUIDE

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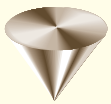

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XACT™ STEP

Contents

Chapter 4 How to Use the Timing Analyzer

Chapter 1

Introduction

This chapter briefly describes the Timing Analyzer's function, place in the design flow, major features, inputs and outputs, and the architectures with which it works. It also outlines the basic procedure for using the tool.

Function

The Timing Analyzer performs a static timing analysis of a routed FPGA design. A static timing analysis is a point-to-point analysis of a design network. It does not include insertion of stimulus vectors.

The Timing Analyzer verifies that the delay along a given path or paths meets your specified timing requirements. It organizes and displays data that allows you to analyze the critical paths in your circuit, the cycle time of the circuit, the delay along any specified paths, and the paths with the greatest delay. It also provides a quick analysis of the effect of different speed grades on the same design.

The Timing Analyzer works with synchronous systems composed of flip-flops and combinatorial logic. In synchronous design, the Timing Analyzer takes into account all path delays, including clock-to-Q and setup requirements, while calculating the worse-case timing of the design. However, the Timing Analyzer does not perform setup and hold checks; you must use a simulation tool to perform these checks.

Design Flow

You use the Timing Analyzer after design entry, functional simulation, mapping, placing, and routing, but before timing simulation, as shown in Figure 1-1.

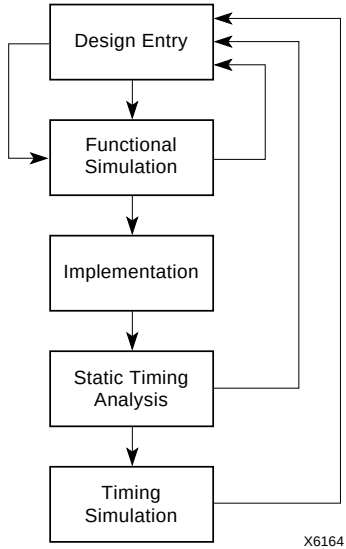

Figure 1-1 Timing Analyzer in the Design Flow

Inputs and Outputs

The Timing Analyzer accepts an LCA file output by PPR or APR as input and creates Xilinx report (XRP) files as output. It can also create macro (XTM) files.

Architectures

You can use the Timing Analyzer with Xilinx XC2000, XC3000/A, XC3100/A, XC4000/A/H/E, and XC5200 devices.

XDelay

The Timing Analyzer is similar to its predecessor, XDelay. However, where XDelay was based on DOS or UNIX, the Timing Analyzer is based on the Microsoft Windows graphical user interface.

If you used XDelay with a previous version of the Xilinx software, refer to the “XDelay Command Equivalents” appendix, which lists

the XDelay commands and their corresponding Timing Analyzer commands.

Features

The Timing Analyzer offers the following features.

Interface

You can issue Timing Analyzer commands from the menus, toolbar, or Console window. You can also activate commands by running macros. The instructions in this user guide use only the menu commands or toolbar icons, but the equivalent command-line syntax is given in the "Keyboard Commands" chapter.

Reports

The Timing Analyzer creates the following five reports.

- The Performance To TimeSpecs report indicates whether the design meets the timing specifications entered using XACT-Performance™.
- The Performance Summary report displays the maximum clock frequencies for all synchronous paths in the design and the worst-case timing for all clocked paths. Synchronous paths include clock-to-setup, clock-to-pad, pad-to-setup, pad-to-pad, and clock input paths.
- The Detailed Path report displays a detailed analysis of all specified paths and includes the worst-case path delays for all paths in the design.
- The Check for Asynchronous Logic report contains the results of a check that the Timing Analyzer performs on the LCA file for logic that is not controlled by a register.
- The Show Clocks report lists the names of all clocks in the design.

The content of these reports is described in the "How to Use the Timing Analyzer" chapter.

Path Filters

You can customize the Timing Analyzer reports by selecting certain path filters in the Path Filters menu, which include or exclude specific path types and/or nets. You can apply three types of filters.

- Timing specification filters report only those paths constrained by timing specifications entered with XACT-Performance. These filters apply to the Performance To TimeSpecs report.
- Path analysis filters report specific paths whose starting points, ending points, and types you can define. These filters apply to the Detailed Path report.
- Common filters can exclude or include specific nets, avoid tracing false paths, and break combinatorial logic loops to treat them as synchronous timing elements. Common filters apply to the Performance to TimeSpecs, Performance Summary, and Detailed Path reports.

Once the filters are set, you can generate reports for the specified paths using the options under the Analyze menu.

Macros

You can create macros that run several Timing Analyzer commands in one step. Macros are script files for running Timing Analyzer commands and options. The Console window records all the commands that you select in any Timing Analyzer session. After entering the desired series of commands in this window, you can copy and paste the sequence to a macro window, and save the macro.

Timing Analysis Procedure

The typical procedure for using the Timing Analyzer is as follows.

1. Open the Timing Analyzer and load a design.
2. If you are unfamiliar with the Timing Analyzer, explore its features. You can use the Timing Analyzer tutorial to help you with this process. To run the tutorial, select **`Help`** → **`Tutorial`**.

3. You can optionally generate a report to obtain a basic overview of the design's timing before you begin to analyze it in detail. The Performance Summary report is well-suited to this purpose. Choose this report from the Analyze menu.
4. Select filters from the Path Filters menu to determine which types of paths will be analyzed and reported. You can filter out paths you are not interested in.
5. Select options from the Options menu to fine-tune the analysis.
6. Choose the kind of report you want from the Analyze menu.
7. Use the report window commands to view the report in more detail, save the report, and print the report.
8. Optionally, you can create macros comprising the commands just issued.

These steps are all described in the "How to Use the Timing Analyzer" chapter. Steps 2, 3, 4, and 5 are optional.

Online Help

The Timing Analyzer offers both context-sensitive help and a Help menu. See the "Getting Started" chapter for more information on the online help available and instructions for accessing it.

Tutorial

An online tutorial demonstrating some of the Timing Analyzer's major functions is also available. For instructions on loading it on your machine's hard-disk drive, see the release notes accompanying the software. To invoke the tutorial, click on **`Help`** → **`Tutorial`**.

In addition, the "XACT-Performance and Timing Analyzer Tutorial" chapter of the *Viewlogic Tutorials* manual demonstrates how to verify path timing using the Timing Analyzer.

Chapter 2

Timing Analysis

This chapter explains some of the concepts involved in static timing analysis and how to use the Timing Analyzer to resolve key analysis issues.

Basic Path Types

Once your design has been implemented, you can use the Timing Analyzer to calculate your design's system performance, which is limited by five basic types of timing paths. Each of these paths goes through a sequence of logic, routing, and logic. Since these path delays are affected by the results of the placement and routing that implement the design connectivity, these sequences can vary.

To prepare you to read the Timing Analyzer reports, the following sections describe the basic path types in a design and discuss clock skew.

Clock to Setup

A clock-to-setup (C2S) path starts at the Q output of a flip-flop or latch and ends at an input to another flip-flop, latch, or RAM, where that pin has a setup requirement before a clocking signal. It includes the clock-to-Q delay of a flip-flop, the path delay from that flip-flop to the next flip-flop, and the setup requirement of the next flip-flop. The clock-to-setup path time is the maximum time required for the data to propagate through the source flip-flop, travel through the logic and routing, and arrive at the destination before the next clock edge occurs. Figure 2-1 shows a basic clock-to-setup path, along with a timing diagram describing the path.

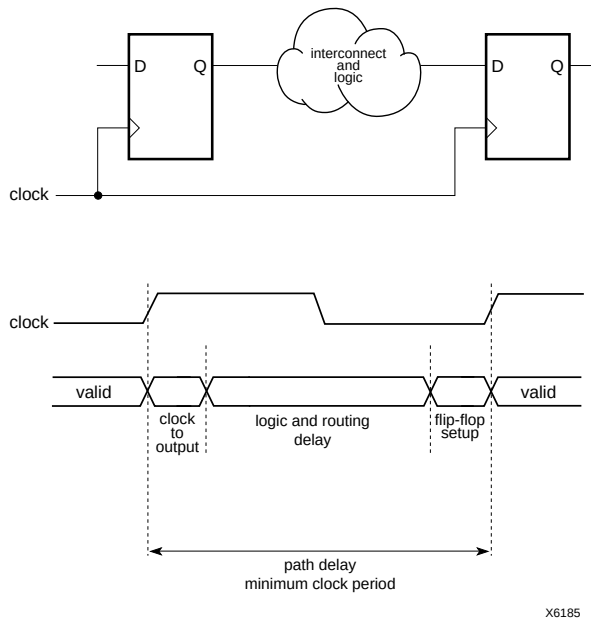

Figure 2-1 Clock-to-Setup Path (Same Clock)

Source and destination flip-flops can be clocked by the same clock on different clock edges. In these cases, the path delay limits the minimum clock high or clock low time, as seen in Figure 2-2 and Figure 2-3.

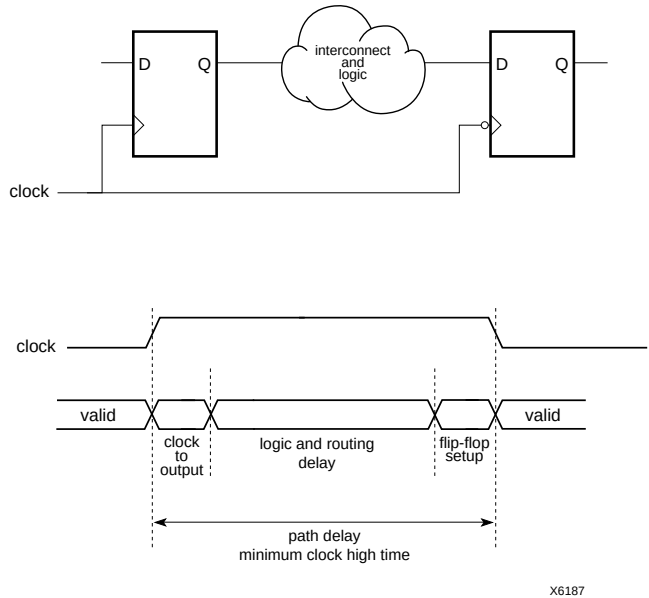

Figure 2-2 Clock-to-Setup Path (Rising to Falling Edge)

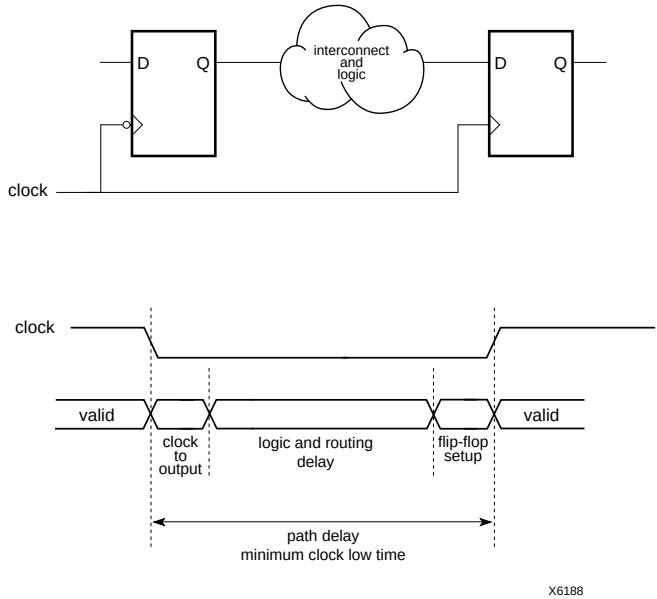

Figure 2-3 Clock-to-Setup Path (Falling to Rising Edge)

If the source and destination are clocked by different clock nets, both clock nets must have a clock period greater than the path delay. The Timing Analyzer does not calculate the path delay between different clock nets. Figure 2-4 shows a path of this type.

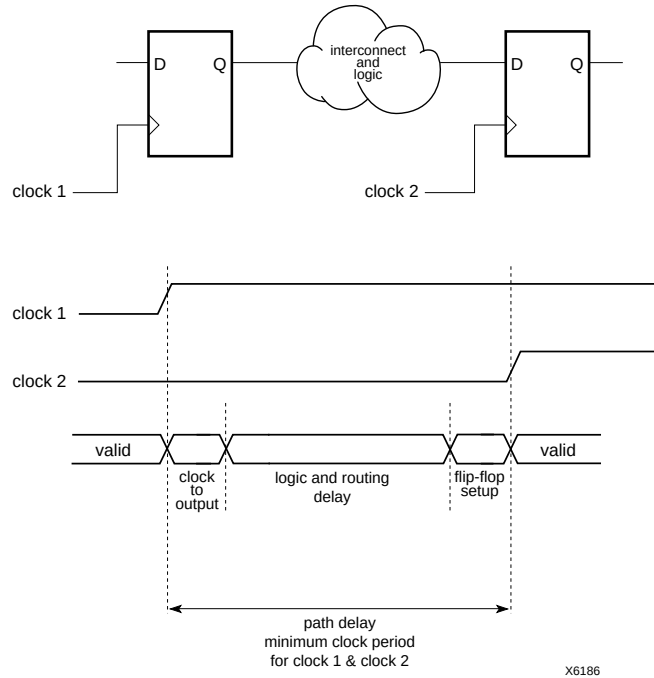

Figure 2-4 Clock-to-Setup Path (Different Clocks)

Clock to Pad

A clock-to-pad (C2P) path starts at the Q output of a flip-flop or latch and ends at an output of the chip. It includes the clock-to-Q delay of the flip-flop and the path delay from that flip-flop to the chip output. The clock-to-pad path time is the maximum time required for the data to leave the source flip-flop, travel through logic and routing, and leave the chip. Figure 2-5 illustrates a clock-to-pad path.

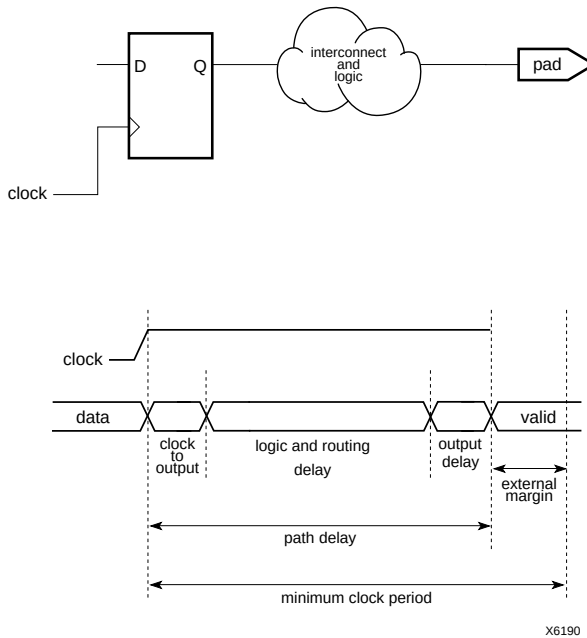

Figure 2-5 Clock-to-Pad Path

Pad to Setup

A pad-to-setup (P2S) path starts at an input of the chip and ends at an input to a flip-flop, latch, or RAM — wherever there is a setup time against a control signal. The pad-to-setup path time is the maximum time required for the data to enter the chip, travel through logic and routing, and arrive at the output before the clock or control signal arrives. A pad-to setup path is shown in Figure 2-6.

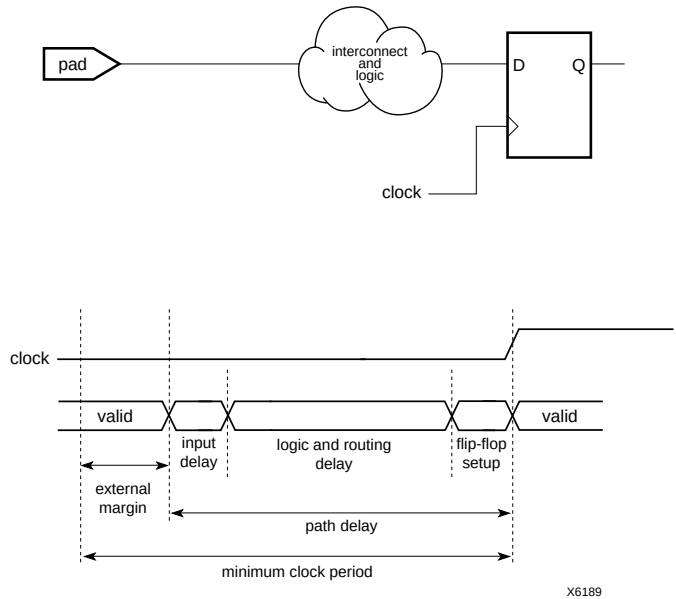

Figure 2-6 Pad-to-Setup Path

Pad to Pad

A pad-to-pad (P2P) path starts at an input of the chip and ends at an output of the chip. The pad-to-pad path time is the maximum time required for the data to enter the chip, travel through logic and routing, and leave the chip. It is not controlled or affected by any clock signal. A pad-to-pad path is displayed in Figure 2-7.

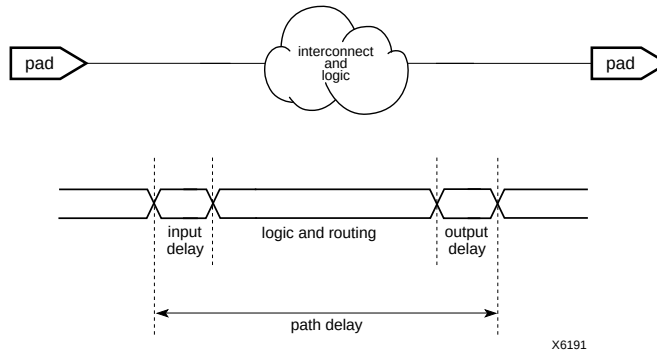

Figure 2-7 Pad-to-Pad Path

Clock Input

A clock input path starts at either an input of the chip or at the output of a flip-flop, latch, or RAM. It ends at any clock pin on a flip-flip or latch enable. The clock input path time is the maximum time required for the signal to arrive at the flip-flop clock input. Clock input paths help to determine system-level design timing. Figure 2-8 shows a clock input path.

The clock input time is the maximum time only; the Timing Analyzer does not currently calculate minimum clock times.

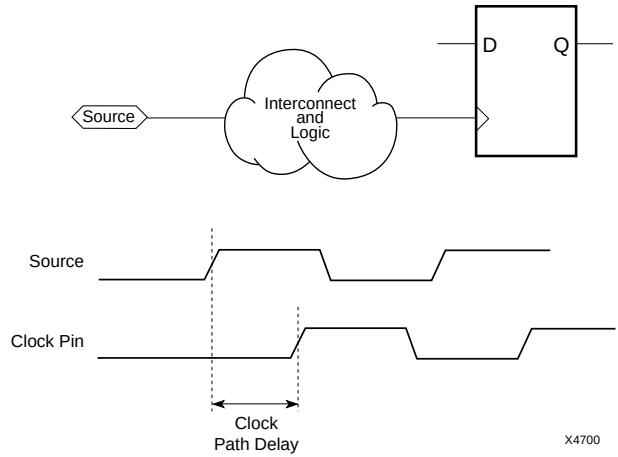

Figure 2-8 Clock Input Path

Clock Skew

In the Timing Analyzer, clock skew is the difference in arrival time for clocks that are on the same clock net. Clock skew occurs most often when global routing is not used to route clock nets, since other routing is less predictable. The arrival of clock signals at different times can affect the required clock period.

When the destination is clocked before the source, the clock skew is called negative clock skew. When the source is clocked first, the clock skew is called positive clock skew. Negative clock skew means that the clock period must be longer than the path delay plus the amount of clock skew between the flip-flops. Positive clock skew means that the clock period could be shorter than the path delay by the minimum amount of clock skew. Because the Timing Analyzer does not produce minimum numbers, this shortened clock period is unreliable; do not depend on it. Figure 2-9 and Figure 2-10 illustrate paths with negative and positive clock skew.

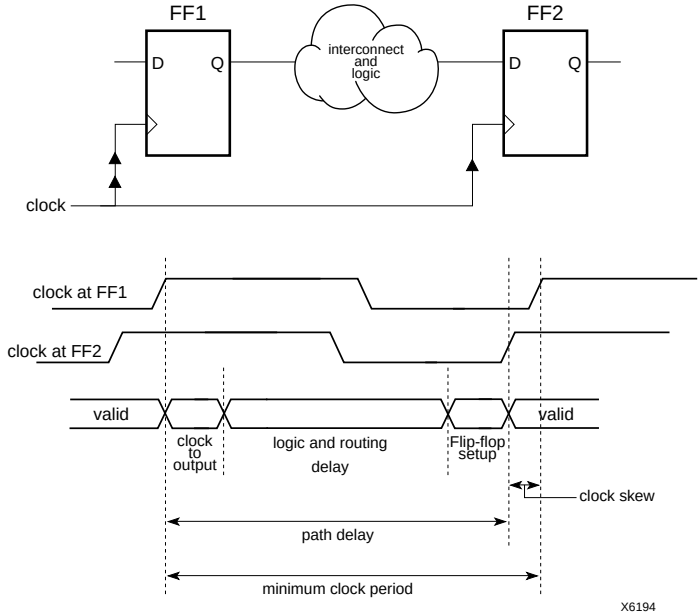

Figure 2-9 Negative Clock Skew

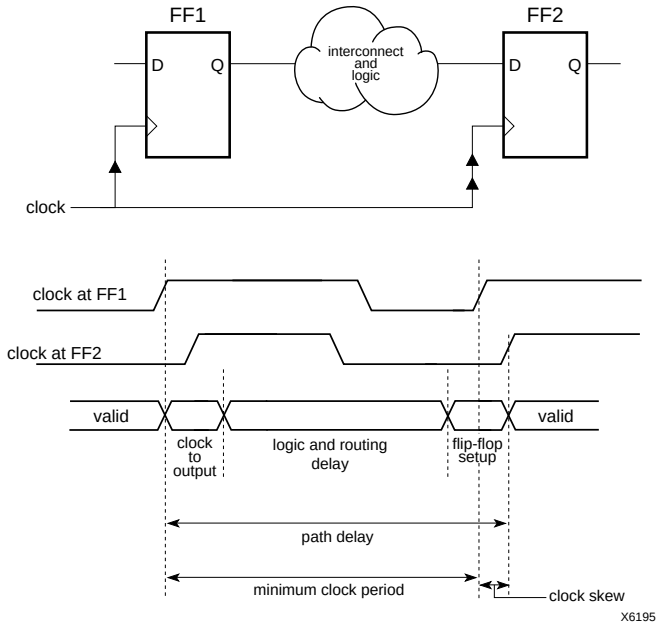

Figure 2-10 Positive Clock Skew

Design Analysis Issues

The Timing Analyzer can help you resolve some of the most frequently encountered design problems. This section describes these solutions.

Feedback Loops

Asynchronous feedback paths in a design can cause many paths to be reported that may not actually be timing problems. The most common cases are feedback paths through asynchronous Set or Reset to banks of flip-flops, like a state machine or a counter. Another example is the construction of latches from function generators, which are built using asynchronous feedback paths. When you use the Break Logic Loops command, the Timing Analyzer can treat latches built from combinatorial logic like synchronous points, so that paths stop and start at these points but do not go through them.

To exclude specific nets that create feedback paths, such as an illegal-state Reset logic loop for a state machine, you can use the Exclude Paths With Nets command. It excludes from the timing report any paths that contain those nets.

With the Control Possible False Paths command, you can control some asynchronous points through logic; for example, you can exclude the asynchronous Reset of a flip-flop or bidirectional I/O.

Timing Specifications

If you entered timing constraints before compiling your design with PPR, you can use the Timing Analyzer to verify whether your constraints were met. Figure 2-11 shows how the Timing Analyzer finds a path that did not meet the timing specification.

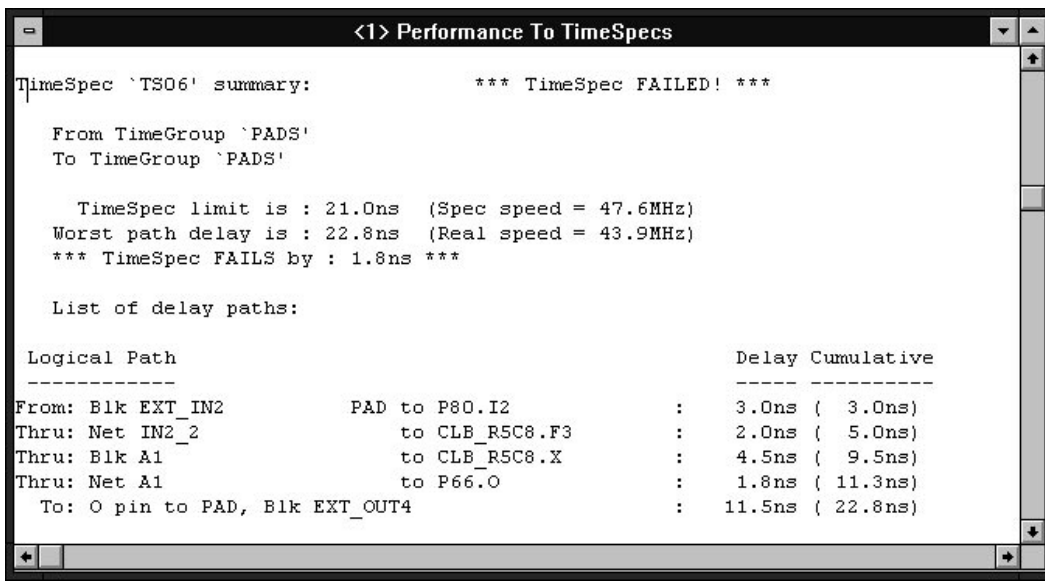

Figure 2-11 Failed Timing Specification

Asynchronous Logic

The Check for Asynchronous Logic command creates a report showing all of the asynchronous logic feedback loops in your design. These loops can cause design problems or create false timing paths. The "Feedback Loops" section of this chapter discusses some of the ways that you can correct feedback loops.

Clock Skew

The Timing Analyzer can report clock skew, which is the difference between the time a clock signal arrives at the source flip-flop in a path and the time it arrives at the destination flip-flop. Normally clock skew does not arise if you use global clock routing for all the clocks in a design. As the report in Figure 2-12 demonstrates, the Performance To TimeSpecs command generates a report that displays the clock skew for individual paths starting and ending at flip-flops on the same clock net.

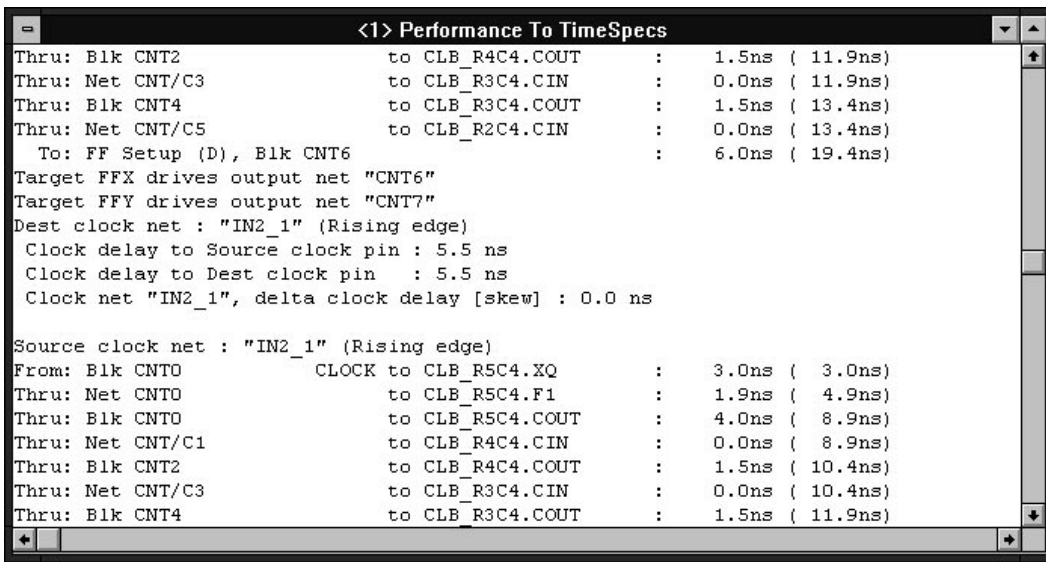

Figure 2-12 Clock Skew on Performance To TimeSpecs Report

You can use the Options → Query → Nets command to see the clock skew across specific clock nets. Figure 2-13 gives an example for the CLK1 and CLK2 nets.

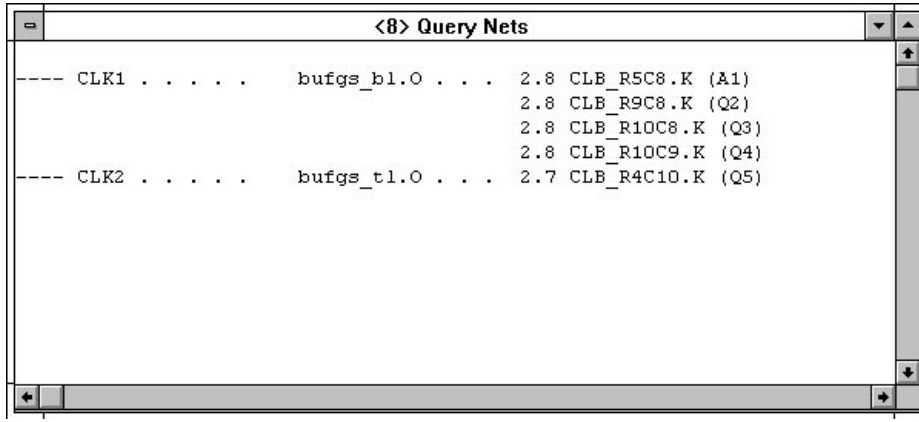

Figure 2-13 Clock Skew on Query Nets Report

Off-Chip Delay

To determine system-level clock speed, you must add any external delay to paths that travel off-chip. This way, the Timing Analyzer includes this external delay when calculating the delay for the path. You can assign input/output delay margin values to the pad-to-setup and clock-to-pad path types with the Set Delay Margins for I/O command. There is no default delay; the Timing Analyzer does not add off-chip delay unless you specify it with this command.

Getting Started

This chapter describes how to access and exit the Timing Analyzer; how to use its menus, icons, Console window, dialog boxes, and filters; and how to use its online help facility.

Invoking the Timing Analyzer

You can invoke the Timing Analyzer from either the Windows Program Manager or the Design Manager.

From the Windows Program Manager

To invoke the Timing Analyzer from the Windows Program Manager, click on the Timing Analyzer icon, shown in Figure 3-1.

Figure 3-1 Timing Analyzer Icon

From the Design Manager

To invoke the Timing Analyzer from the Design Manager window, click on the Timing Analyzer icon, which is the same as that shown in Figure 3-1, or click on the **`Tools`** → **`Timing Analyzer`** menu command.

Exiting the Timing Analyzer

To exit the Timing Analyzer, select **File → Exit**.

If you have unsaved reports open, a prompt box similar to that in Figure 3-2 appears:

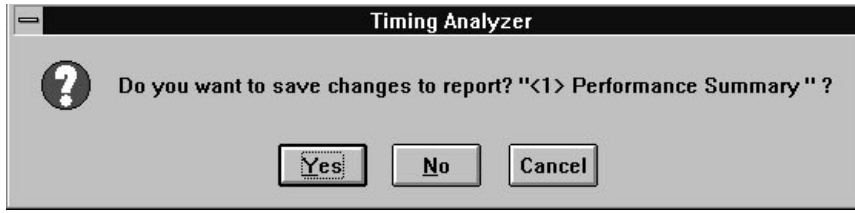

Figure 3-2 Exit Prompt Box

Click on **Yes** to save the report, then follow the procedure described in the "Saving a Report" section of the "How to Use the Timing Analyzer" chapter.

Navigating in the Timing Analyzer

This section describes the Timing Analyzer's main window, its Console window, and its menus and dialog boxes.

Timing Analyzer Window

When you invoke the Timing Analyzer, the Timing Analyzer window appears, as illustrated in Figure 3-3.

Figure 3-3 Timing Analyzer Window

By default, the toolbar appears at the top of the window, and the status bar appears at the bottom of the window; however, you can hide them from view by selecting the Toolbar or Status Bar commands, respectively, on the View menu. When you move the cursor over a menu command or select a menu command, a brief description of the command's function appears in the status bar. As the Timing Analyzer processes, status messages also appear in the status bar.

You can access Timing Analyzer commands from the menus, toolbar, or Console window.

Menus

All of the Timing Analyzer commands are available on the graphical interface menus. However, most of the commands are grayed out and therefore unavailable unless a design is loaded.

You can select menu commands with the mouse or the keyboard. With the mouse, click the left mouse button on the desired command.

With the keyboard, press the Alt key and type in the letter underlined in the command.

When you select a menu command with either method, a brief description of the command's function appears in the status bar at the bottom of the Timing Analyzer window.

For complete command descriptions, select the Contents command from the Help menu or see the "Menu Commands" chapter of this manual.

Toolbar Icons

You can access some of the Timing Analyzer commands through toolbar icons. These icons are listed and described in the "Menu Commands" chapter of this manual. When you move the cursor over each icon, an identifying label appears.

Console Window

The Console window records the sequence of commands that you have used in a Timing Analyzer session. It offers a command line where you can enter Timing Analyzer commands, but it is basically used for creating macros. For information on creating and using macros, see the "How to Use the Timing Analyzer" chapter of this manual.

The commands that you can enter in the Console window are described in the "Keyboard Commands" chapter.

You can open a Console window by selecting View → Console.

Dialog Boxes

An ellipsis (...) following a Timing Analyzer menu command indicates that the command activates a dialog box in which you can enter information and set options.

Common Fields in Dialog Boxes

The following fields are common to many of the Timing Analyzer dialog boxes.

- OK closes the dialog box and implements the intended action according to the settings in the dialog box.
- Cancel closes the dialog box without effecting any action.
- Help gives you information on how to use the dialog box.

Selecting Objects in Dialog Boxes

Many of the dialog boxes in the Timing Analyzer feature list boxes, such as those shown under "Available Nets" and "Selected Nets" in Figure 3-4. You can move items from one list box to another using either the mouse or the keyboard, or a combination of these methods.

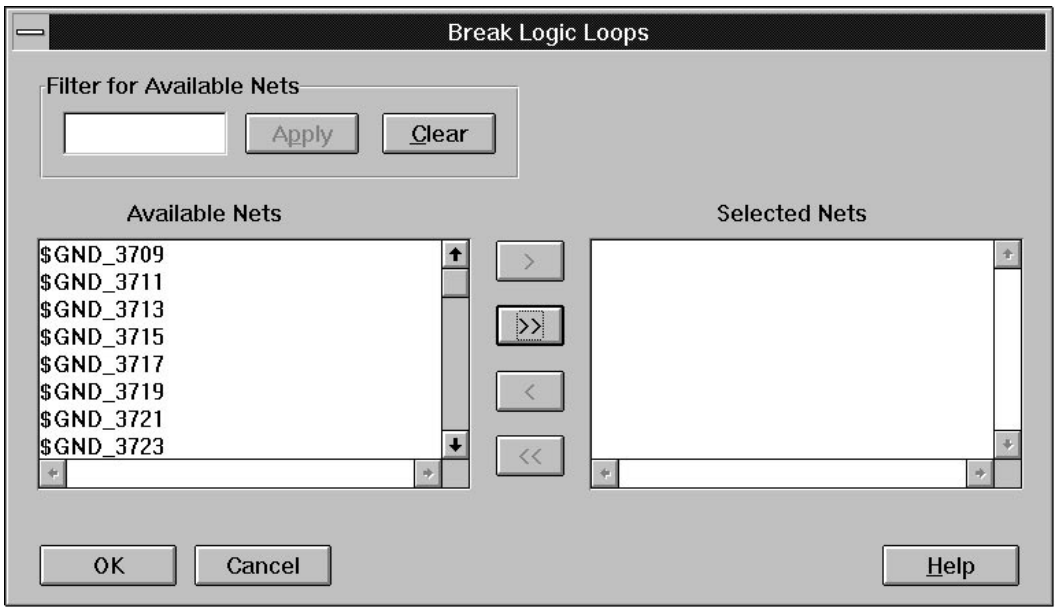

Figure 3-4 List Boxes in Dialog Box

Using the Mouse

Using the mouse, you can select items in list boxes with the following methods.

- To select one object, select the object with the left mouse button. Click on the Add (>) button.

- To select all objects, click on the Add All (>>) button.
- To select multiple objects in a row, select the first object with the left mouse button. Hold down the Shift key. Select the last object and release the Shift key. Click on the Add (>) button.

  You can also drag the cursor up or down until all the appropriate objects are highlighted and then click the Add (>) button.
- To select multiple objects in any order, hold down the Control key while clicking on individual objects. When you are finished selecting objects, release the Control key and click on the Add (>) button.

Using the Keyboard

Using the keyboard, you can select items in list boxes with the following methods.

Note: The Return key is the same as the Enter key in the following procedures.

- To select one object, press the Tab key until the first item in the list box is underlined. Use the down arrow key to select the desired item. Tab to the Add (>) button. Press the Return key.
- To select all objects, tab to the Add All (>>) arrow and press the Return key.
- To select multiple objects in a row, tab to the first line in the list box. Use the down arrow key to move to the first object. Press and hold the Shift key while using the down arrow key to select the other objects in the row. Tab to the Add (>) button. Press the Return key.
- To select multiple objects in any order, tab to the list box and press Shift F8. Use the up and down arrow keys to navigate within the list box. Press the space bar to select each item. Tab to the Add (>) button. Press the Return key.

To tab from right to left, press the Shift key, then press the Tab key.

To scroll down the list box to select items that are not visible in the list box, tab to the list box and click on the Pg Dn key.

You can select options in a dialog box by pressing Alt and typing the character underlined in the option.

Pressing the Escape key closes the dialog box.

Using Filters in Dialog Boxes

Many of the commands in the Timing Analyzer allow you to filter a list of choices, that is, to display a subset of the listed items. The dialog boxes associated with these commands contain a filter area, such as the space below "Filter for Available Nets" in Figure 3-4. In this space, you enter a text string consisting of characters and wildcards.

Characters can be any alphanumeric characters, text spaces, and the characters that appear on the top of the number keys on a normal keyboard. Alphabetic characters are case-sensitive. No control characters are permitted.

A wildcard can be an asterisk (*), which can represent any number of characters, or a question mark (?), which represents a single character.

You cannot enter a range of items in the filter space.

The Timing Analyzer does not strictly match patterns; it does not find the desired string if it is embedded in a larger string. For example, it does not find $1N36 if it is embedded in ABC$1N36XYZ. However, if you searched for *$1N36*, it would find the desired string in ABC$1N36XYZ.

After typing in the filter information, click on **Apply** or press the Return key to apply the filter.

To clear the filter, click on **Clear** or backspace over the information in the filter text box.

Following is an example showing you how to use filters.

The Path Filters → Common Filters → Include Paths With Nets command selects the nets to be analyzed. It brings up the Include Paths With Nets dialog box, shown in Figure 3-5. All the elements of the design are included in the Excluded Nets list box.

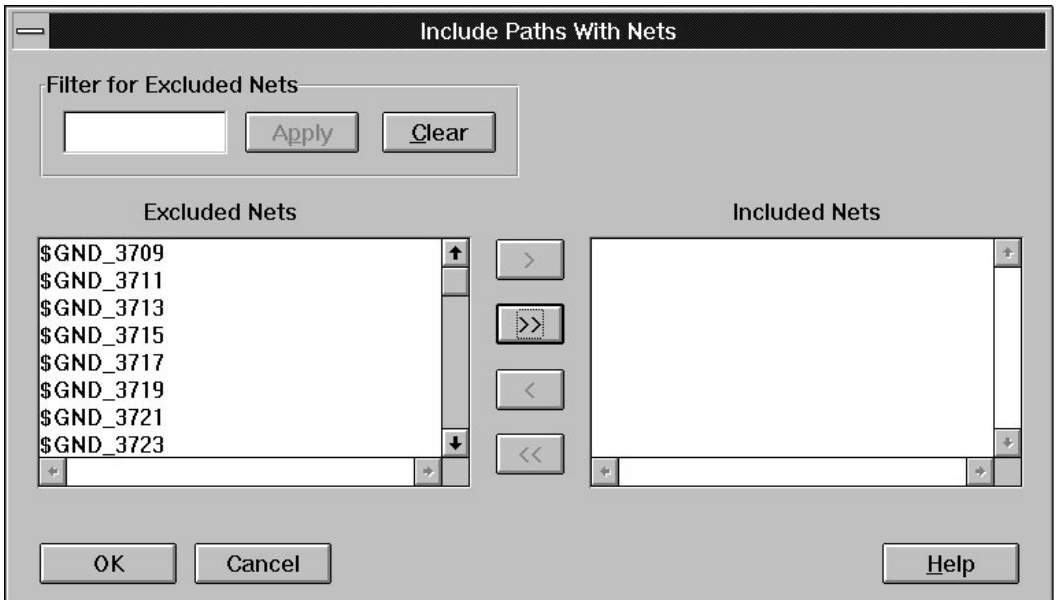

Figure 3-5 Original Include Paths With Nets Dialog Box

Because the number of nets in the design can be cumbersome, a filter, \$2N*, is applied to reduce the number of elements in the Excluded Nets list box, as indicated in Figure 3-6. Only the elements whose names begin with \$2N now appear in this list box.

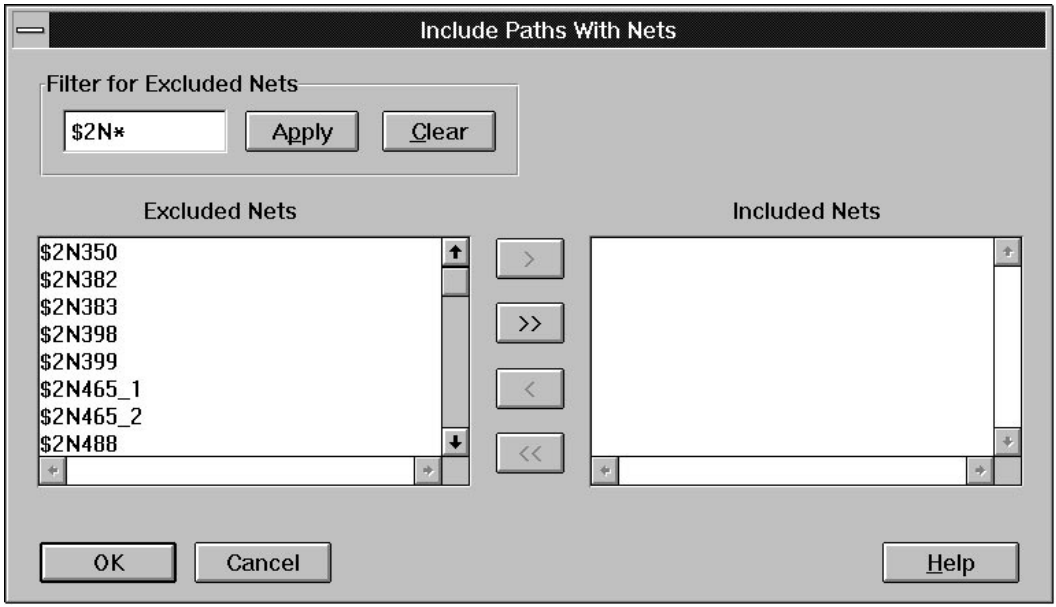

Figure 3-6 Specifying the Filter

Finally, only elements $2N350 through $2N399 are of interest in this analysis, so they are moved to the Included Nets list box, as illustrated in Figure 3-7.

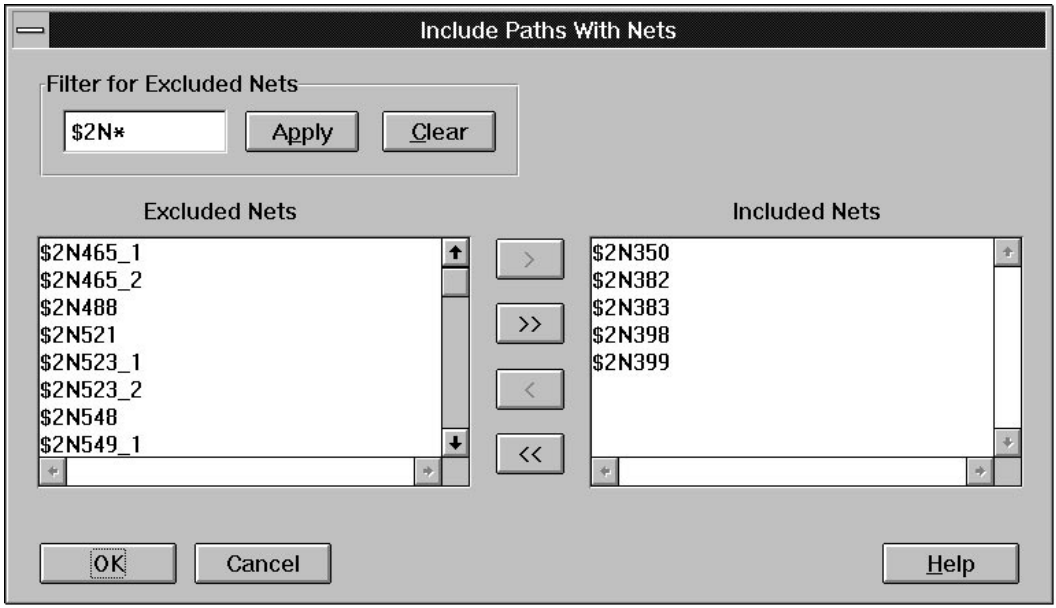

Figure 3-7 Elements Included in Analysis

Obtaining Help

You can obtain help on the Timing Analyzer's commands and procedures by selecting commands on the Help menu or by selecting the Help icon in the toolbar. In addition, the dialog boxes associated with some commands offer a Help button that you can click on to obtain context-sensitive help.

Help Menu

The Help menu displays the following commands.

- The Contents command lists the online help topics available for the Timing Analyzer. From the opening screen, you can jump to command information or step-by-step instructions for using the

Timing Analyzer. Once you open help, you can click the Contents button (first button on the left) in the Help window whenever you want to return to the help topic list.

Pressing the F1 key is the same as selecting the Contents command.

- The Search for Help On command brings up a pop-up window that lets you search for a specific topic.
- The Tutorial command activates an interactive tutorial demonstrating some of the procedures available in the Timing Analyzer.
- The About Timing Analyzer command brings up a pop-up window that displays the version number of the Timing Analyzer software.

Toolbar Icon

You can obtain context-sensitive help from the toolbar.

1. Click on the Help icon from the toolbar, shown in Figure 3-8:

Figure 3-8 Help Icon

   The cursor changes to a question mark.

2. Click once with the left mouse button on the menu item or toolbar icon for which you want information.

   The Timing Analyzer displays information about the selected command or option in a pop-up window.

Help Button in Dialog Boxes

Many of the dialog boxes in the Timing Analyzer offer a Help button, such as that shown in in the lower right corner of Figure 3-9, that you can click on to obtain help on that dialog box. A window opens that gives you information.

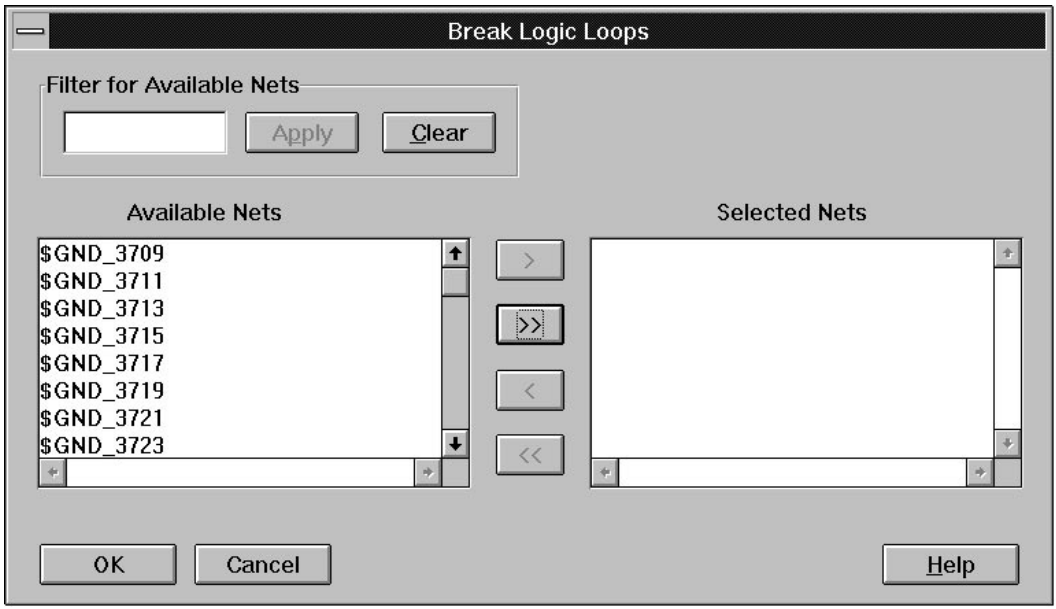

Figure 3-9 Help Field on Dialog Box

How to Use the Timing Analyzer

This chapter describes all the functions that you can perform with the Timing Analyzer.

Note: The commands and dialog boxes in this chapter are used in the context of procedures, but they are not explained in detail. For a detailed explanation of them, see the "Menu Commands" chapter.

Opening a Design

Before you can create a timing report using the Timing Analyzer, you must load a routed LCA design file. To open a design for timing analysis, follow these steps.

1. Select **File → Open**, or double-click on the Open Design File toolbar icon, shown in Figure 4-1.

Figure 4-1 Open Design File Icon

The Open Design/Report File dialog box appears, as shown in Figure 4-2.

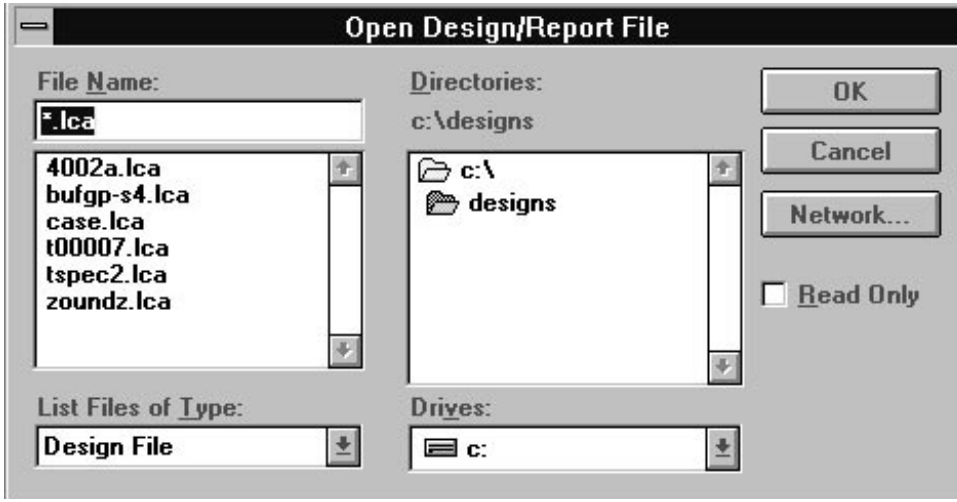

Figure 4-2 Open Design/Report File Dialog Box

2. In the Drives field, select the name of the drive containing the LCA file to load.
3. In the Directories list box, click on the directory containing the LCA file to load.
4. Make sure that Design File is displayed in the List Files of Type box; if not, select it.

   All the available LCA files are now displayed in the list box.
5. Select a placed and routed LCA file from the list box, or type it in the space below File Name after backspacing over the asterisk.
6. Click on **OK**.

   The Timing Analyzer reads the die and package files, reads the design, processes any timing specifications, and then loads the design. It displays a progress meter that charts the progress for each step. When the design is loaded, a dialog box appears with the following message:

   ```
   Design is loaded successfully
   ```

You can now create a timing report. Refer to the next section, "Creating a Report," for instructions on this procedure.

Warning: If you load a different design, the Timing Analyzer resets the current settings to the defaults.

Creating a Report

Once you load the LCA design file, you can decide what kind of report you want to generate. This section describes how to create all the reports available in the Timing Analyzer as well as how to save and print them.

With the Find command on the Analyze menu, you can search for specific text strings in the reports. Directions for this procedure are given in the "Searching for Text in a Report" section later in this chapter.

The Timing Analyzer has default settings that you can change using path filters. Path filters narrow the scope of the report by selecting which paths you want to analyze. For more information, refer to the "Filtering Paths" section of this chapter. To view the default settings, refer to the "Viewing Timing Analyzer Settings" section towards the end of this chapter.

Creating a Performance To TimeSpecs Report

The Performance To TimeSpecs report compares the design's performance to the timing specifications entered using XACT-Performance.

Select **`Analyze`** → **`Performance To TimeSpecs`**, or double-click on the Performance To TimeSpec icon in the toolbar, shown in Figure 4-3.

Figure 4-3 Performance To TimeSpec Icon

After processing the design, the Timing Analyzer displays the timing report in a pop-up window, as shown in Figure 4-4.

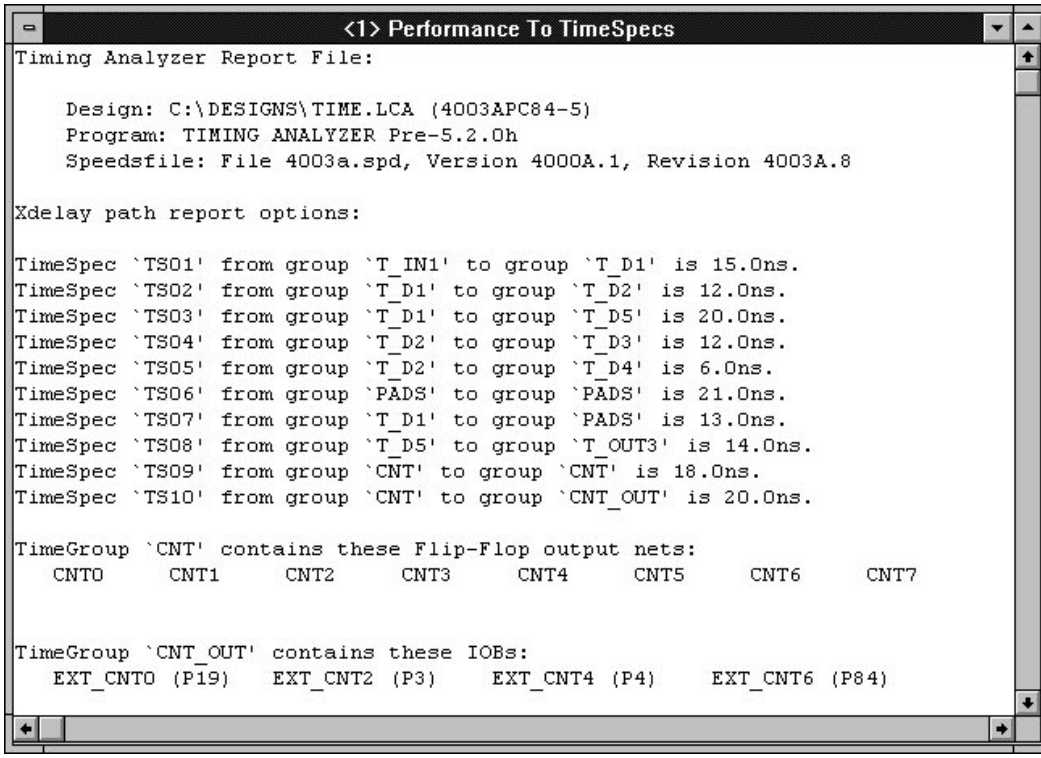

Figure 4-4 Performance To TimeSpecs Report

You can use the following path filters to narrow the scope of this report:

- Report Paths Failing TimeSpec
- Report Paths With No TimeSpec
- Ignore TimeSpecs
- Include Paths With Nets
- Exclude Paths With Nets
- Control Possible False Paths
- Break Logic Loops

Creating a Performance Summary Report

The Performance Summary report displays the maximum clock frequencies for all clocks in the design and the worst-case timing for all clock paths.

Select **Analyze → Performance Summary**, or double-click on the Design Performance Summary icon in the toolbar, shown in Figure 4-5.

Figure 4-5 Design Performance Summary Icon

After processing the design, the Timing Analyzer displays the Performance Summary report in a pop-up window. It is shown in Figure 4-6.

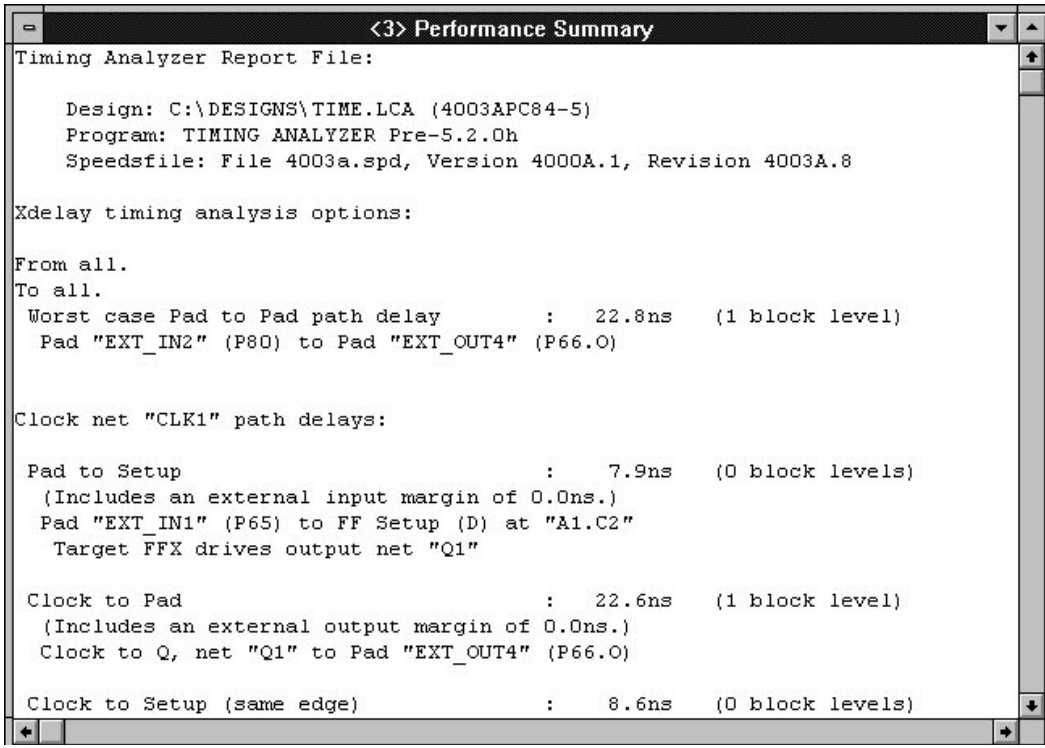

Figure 4-6 Performance Summary Report

You can use the following path filters to narrow the scope of this report:

- Select Sources
- Select Destinations
- Select Path Types
- Include Paths With Nets
- Exclude Paths With Nets
- Control Possible False Paths
- Break Logic Loops

Creating a Detailed Path Report

The Detailed Path report displays a detailed analysis of all specified paths. It contains the worst-case path delays for all paths in the design.

Select **Analyze → Detailed Path Report**, or double-click on the Detailed Analysis icon in the toolbar, shown in Figure 4-7.

Figure 4-7 Detailed Analysis Icon

After processing the design, the Timing Analyzer displays the Detailed Path report in a pop-up window, as Figure 4-8 illustrates.

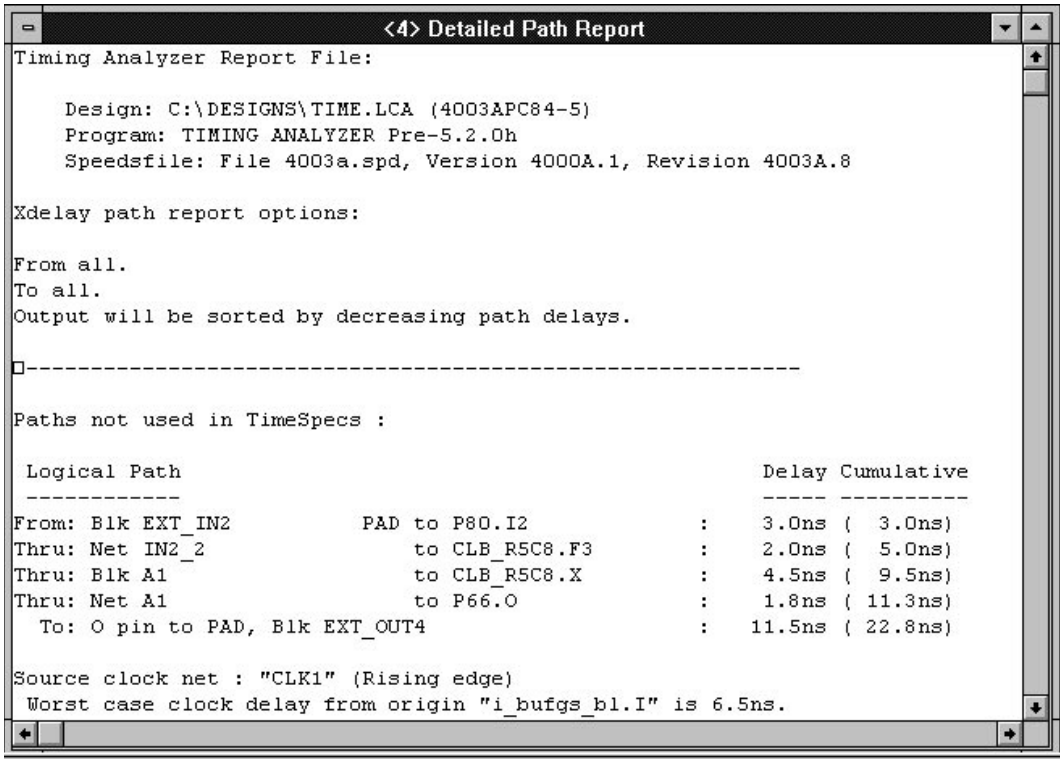

Figure 4-8 Detailed Path Report

You can use the following path filters to narrow the scope of this report:

- Select Sources
- Select Destinations
- Select Path Types
- Include Paths With Nets
- Exclude Paths With Nets
- Control Possible False Paths
- Break Logic Loops

Creating a Check for Asynchronous Logic Report

The Check for Asynchronous Logic command checks the LCA file for logic that is not controlled by a register. It issues the results in the Check for Asynchronous Logic report.

Select **Analyze → Check for Asynchronous Logic**.

After processing the design, the system displays the report in a secondary window, as shown in Figure 4-9.

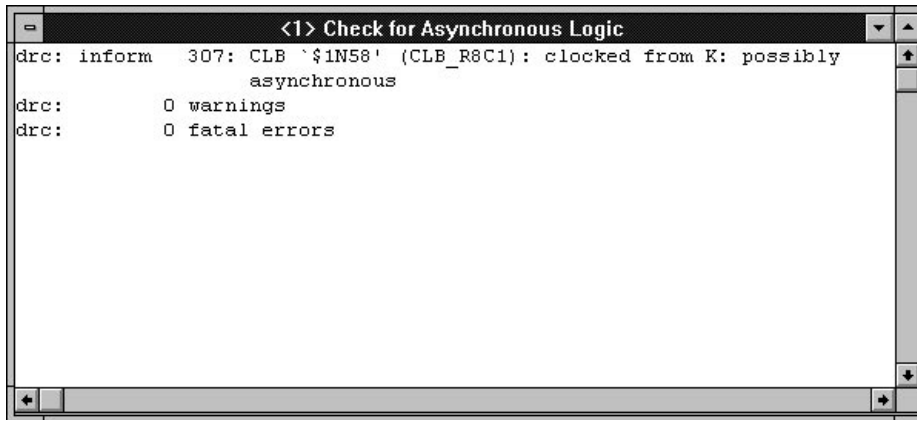

Figure 4-9 Check for Asynchronous Logic Report

Creating a Show Clocks Report

The Show Clocks command creates a report that lists the names of all clocks in the design.

Select **Analyze → Show Clocks**.

After processing the design, the system displays the clock names in a secondary window. An example of the Show Clocks report is given in Figure 4-10.

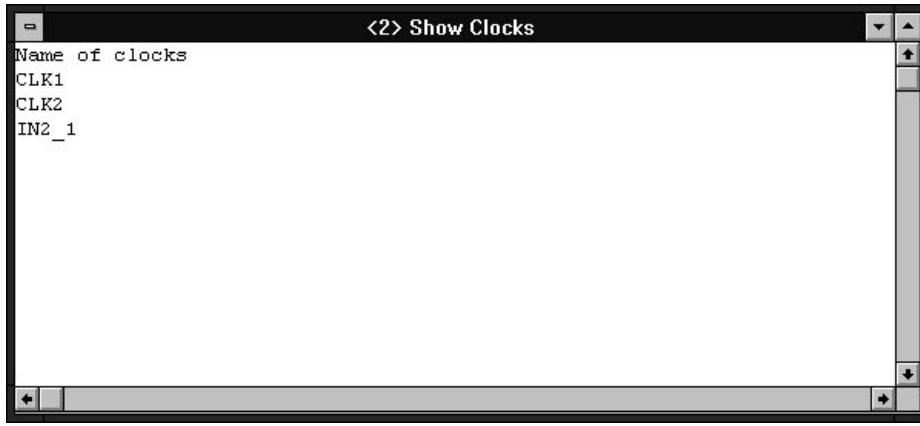

Figure 4-10 Show Clocks Report

Searching for Text in a Report

You can use the Find command to search for any text string in the active report window, including normal grammatical symbols like hyphens or underscores. You cannot search for special characters like tabs or hard returns, however.

To search for a text string in a report, do the following.

1. Open or select the report window in which you want to search.
2. Select **Analyze** → **Find**.

   The Find dialog box appears, as shown in Figure 4-11.

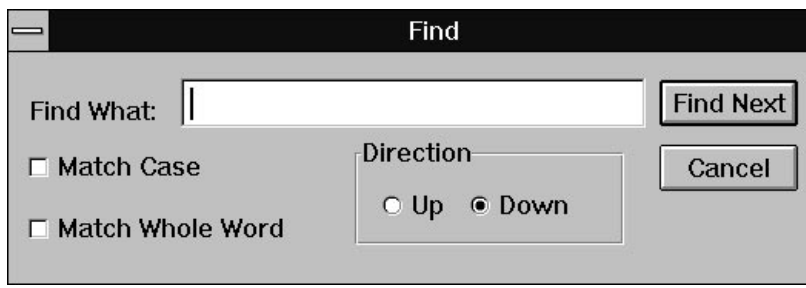

Figure 4-11 Find Dialog Box

3. Enter the text string that you want to search for in the Find What box.

   You can also select either of the following options.

   - Match Case finds only instances that have the same case as the text string. By default, it ignores the case of the text.
   - Match Whole Word finds only instances of the text string that are whole words, not part of a larger word. By default, it finds any instance of the text string, whether the instance is embedded in another word or not.

4. Indicate the search direction.

   - Up searches backward from the present location of the cursor to the beginning of the report. It stops at the beginning of the report.
   - Down searches forward from the present location of the cursor to the end of the report. It stops at the end of the report. This direction is the default.

5. Click the **`Find Next`** button to find the next instance of the text string.
6. Click on **`Cancel`** to close the Find dialog box.

Customizing a Report

You can determine the appearance and the content of the reports that the Timing Analyzer generates.

To change the report options, select **`Options`** → **`Report Options`**.

The Timing Analyzer displays the Report Options dialog box, shown in Figure 4-12, which contains the following options.

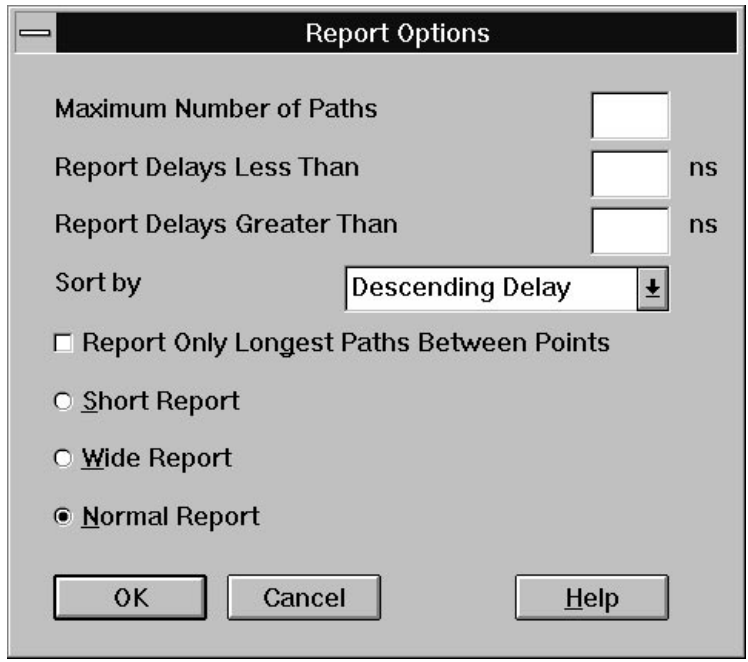

Figure 4-12 Report Options Dialog Box

Setting the Maximum Number of Paths

By default, the Timing Analyzer analyzes all paths. To limit the total number of paths that the Timing Analyzer reports, select **Maximum Number of Paths**, and enter a value in the box. Values can be between 0 and 999, inclusive. The Timing Analyzer uses the criterion set in the Sort By field to select the paths to report.

You can use this option with the Detailed Path report. For example, if you enter 10 in the Maximum Number of Paths field and set the Sort By option to Descending Delay, the Timing Analyzer reports the 10 paths with the longest delay.

This option can be useful when system memory is limited because it limits the number of paths stored in memory.

Reporting Delays Less Than a Value

By default, the Timing Analyzer reports all paths regardless of their delay, but you can instruct the Timing Analyzer to report only those paths that have a delay less than or equal to the specified value. To do so, select **Report Delays Less Than**, and enter a value, in nanoseconds, in the box.

Reporting Delays Greater Than a Value

By default, the Timing Analyzer reports all paths regardless of their delay, but you can instruct the Timing Analyzer to report only those paths that have a delay greater than or equal to the specified value. To do so, select **Report Delays Greater Than**, and enter a value, in nanoseconds, in the box.

Setting Path Report Order

You can define the order in which the Timing Analyzer reports the paths. In the **Sort By** field, select one of the following six options.

- Ascending Delay lists paths in order from shortest to longest delays.
- Descending Delay, the default, lists paths in order from longest to shortest delays.
- Source Block sorts path delays by the source block name, which is useful when trying to determine the worst-case delay from a given block.
- Destination Block sorts path delays by the destination block name, which can help determine the worst-case path to each block.
- Source Clock Net sorts path delays by the clock name that sources the first element in a path, which separates delay information for two or more clock nets in a design.
- Destination Clock Net sorts path delays by the clock name that sources the last element in a path.

Reporting Only Longest Paths Between Points

By default, the Timing Analyzer reports all paths. However, if there is more than one path between two end points, you can direct the

Timing Analyzer to report only the path with the longest delay. Select the **Report Only Longest Paths Between Points** check box.

Setting Report Format

The Timing Analyzer contains three report output options as follows. The default is Normal Report. Click on the option button or adjacent text to select the report output format.

- Short Report generates a report containing only the path source and end point. This report lists one delay path per line and does not display cumulative delays through CLBs.
- Wide Report creates a report formatted into 132 characters per line, which prevents long block and net names from being truncated.
- Normal Report, the default, produces a report displaying a detailed list of path delays.

Printing a Report

You can send a Timing Analyzer report to your default printer, or you can send it to a printer that you specify.

Sending a Report to the Default Printer

To send any report to the default printer, follow these instructions.

1. Select **File** → **Print**, or click on the Print Report icon, shown in Figure 4-13.

Figure 4-13 Print Report Icon

   The Timing Analyzer displays the Print dialog box, illustrated in Figure 4-14, which indicates the default printer.

Note: When you invoke this command from the toolbar, the system does not display the Print dialog box. It sends one copy to the default printer.

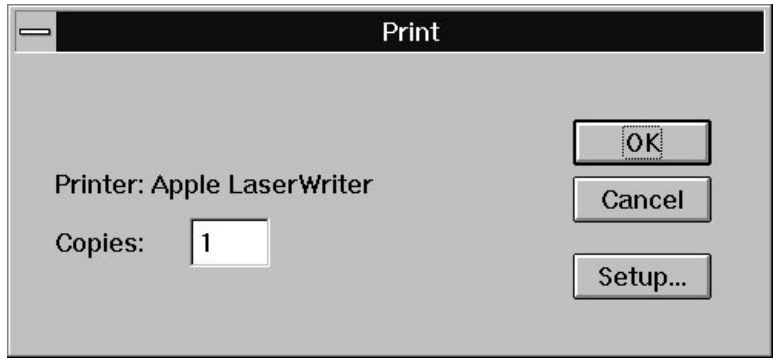

Figure 4-14 Print Dialog Box

2. If you want to print more than one copy, enter the number of copies that you want to print.
3. Select **OK**.

Sending a Report to an Alternate Printer

To send any report to a printer other than the default printer for your site, select **File → Printer Setup**.

The Print Setup dialog box appears, as shown in Figure 4-15. Follow the instructions in the Microsoft Windows documentation to set any of the options in this dialog box.

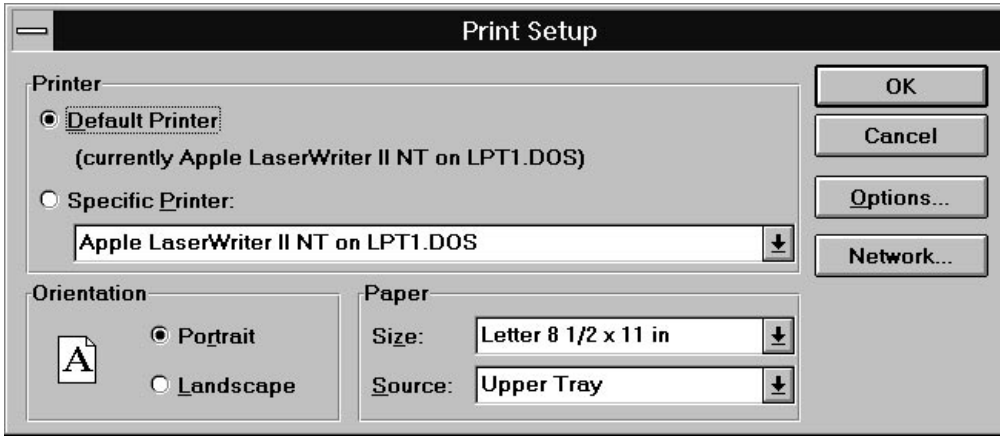

Figure 4-15 Print Setup Dialog Box

Saving a Report

Follow this procedure to save a report.

1. Make sure the report that you want to save is in the active window.
2. Click on **`File`** → **`Save Report`**, or select the Save Report icon, shown in Figure 4-16.

Figure 4-16 Save Report Icon

The Timing Analyzer displays the Save Report dialog box, illustrated in Figure 4-17.

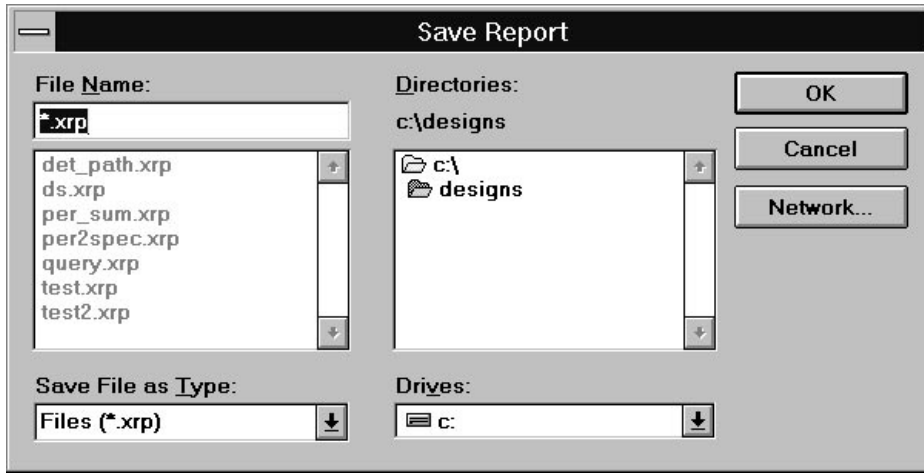

Figure 4-17 Save Report Dialog Box

3. In the Drives field, select the drive in which you want to save the report.
4. In the Directories list box, select the directory in which you want to save the report.
5. In the File Name field, backspace over the asterisk and type in the name of the file in which to store the report. By default, if you do not specify a file extension, the Timing Analyzer saves the file as an XRP file, that is, as a file with an .xrp extension.

   If you want to overwrite an existing file with the new report, click on the Save File as Type field to select a category of file type to display in the File Name list box, then click on the name of the existing file in the list box.

   You can also use word processor applications such as MS-Word or Notepad to open and edit the report file.
6. Click on **OK**.

   The Save Report dialog box closes.

Closing a Report

To close a report, do one of the following.

- Select **File → Close Report**.

  The report closes.

- Double-click on the bar in the upper left-hand corner of the report pop-up window.

  The following prompt appears:

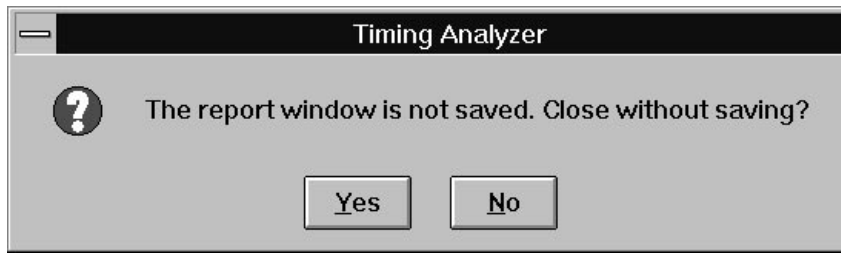

Figure 4-18 Save Prompt Box

Click on **Yes** to save the report window.

Opening a Saved Report

You can open a previously saved report to view or print by following these steps.

1. Click on **File → Open**.

   The Open Design/Report File dialog box appears, as shown in Figure 4-19.

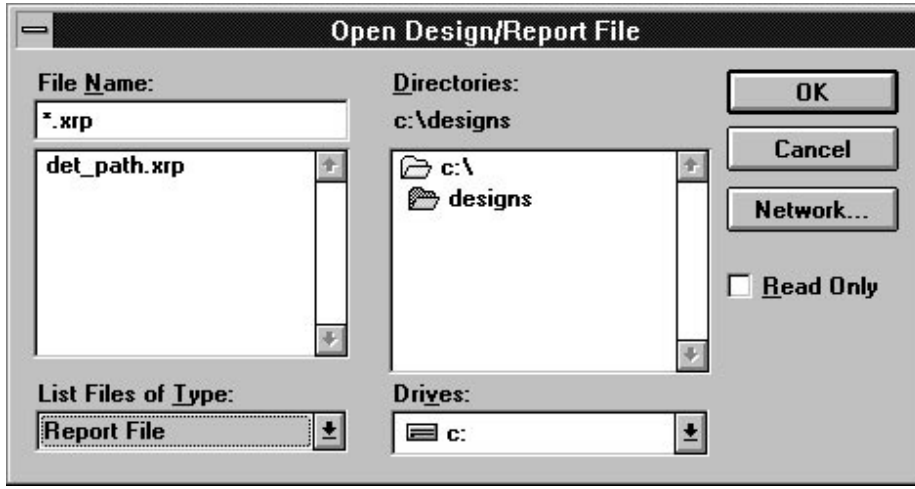

Figure 4-19 Open Design/Report File Dialog Box

2. In the Drives field, select the name of the drive containing the report file to load.
3. In the Directories list box, click on the directory containing the report file to load.
4. In the List Files of Type box, select **`Report File`**.

   All the available report files are now displayed in the list box.
5. Select a report file from the list box, or type it in the space below File Name after backspacing over the asterisk. If you do not specify a file extension, the Timing Analyzer loads an XRP file by default.
6. Click on **`OK`**.

Filtering Paths

By default, the Timing Analyzer reports the path delays for all paths in the design. The Path Filters menu contains commands that enable you to select a subset of paths for analysis. It consists of three submenus: TimeSpec Filters, Path Analysis Filters, and Common Filters. These filters are described in the "Introduction" chapter.

Once the filters are set, you can generate reports for the specified paths using the options under the Analyze menu. Refer to the Creating a Report" section for more information on report generation.

You can select more than one filter from same filter menu.

The procedures in the following sections often direct you to specify a filter in in a dialog box or to move items in a dialog box. Refer to the "Using Filters in Dialog Boxes" section of the "Getting Started" chapter for instructions on specifying a filter. For information on selecting and moving items in dialog boxes, refer to the "Selecting Objects in Dialog Boxes" section in the "Getting Started" chapter.

The following sections describe the filters that you can set to narrow the scope of the analysis.

Filtering Designs with Timing Specifications

If your design contains XACT-Performance timing specifications, you can choose any of the following commands to narrow the scope of the information specified in the Performance To TimeSpecs report. These options do not alter the Performance Summary report or the Detailed Path report.

Reporting Paths That Do Not Meet Timing Specifications

You can instruct the Timing Analyzer to generate a report containing only the paths that do not meet your timing specifications. Follow these steps:

1. Select **`Path Filters → TimeSpec Filters → Report Paths Failing TimeSpec`**.

   A check mark appears to the left of the menu item to indicate that the item is selected.

2. Create a Performance To TimeSpecs report, as described earlier in this chapter, or select additional path filters.

Reporting Paths with No Timing Specifications

You can restrict the Timing Analyzer to reporting only those paths without timing specifications. Use the following procedure.

1. Select **Path Filters → TimeSpec Filters → Report Paths With No TimeSpec**.

   A check mark appears to the left to indicate that the item is selected.

2. Create a Performance To TimeSpecs report, as described in this chapter, or select additional path filters.

PPR automatically assigns timing specifications to paths that do not have user-assigned timing specifications, but the Timing Analyzer ignores them when it generates its reports.

Ignoring Timing Specifications

To prevent the Timing Analyzer from analyzing the specified timing specifications, perform the following steps.

1. Select **Path Filters → TimeSpec Filters → Ignore TimeSpecs**.

   The Ignore TimeSpecs dialog box appears, as shown in Figure 4-20.

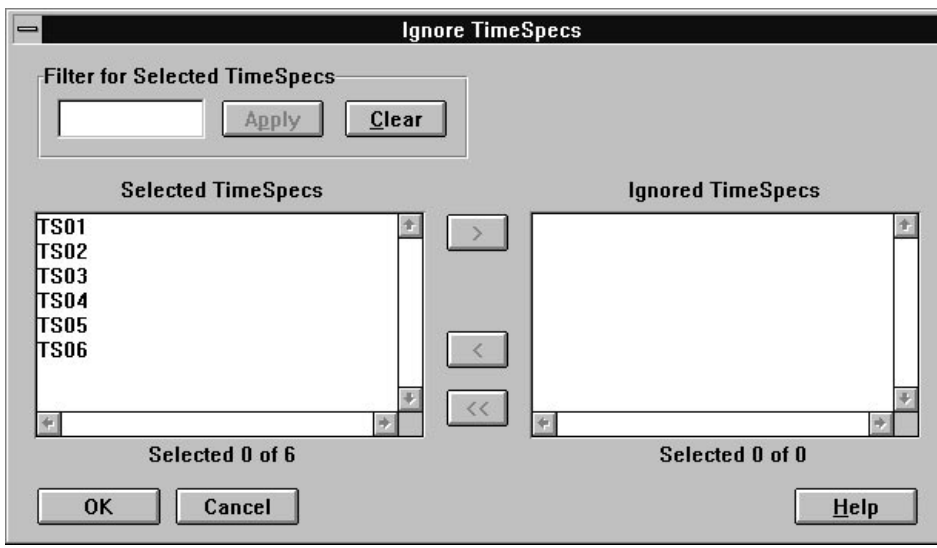

Figure 4-20 Ignore TimeSpecs Dialog Box

2. Enter a filter in the Filter for Selected TimeSpecs field to display a subset of timing specifications, if desired, and click on **Apply**.

   The subset of timing specifications is displayed in the Selected TimeSpecs list box.

3. Move the timing specifications that you want to exclude from the Performance To TimeSpecs report to the Ignored TimeSpecs list box.

4. Click on **OK**.

   The Ignore TimeSpecs dialog box closes. You can now select another filter or generate a Performance To TimeSpecs report.

Limiting Number of Paths Per Timing Specification

You can limit the number of paths reported per timing specification. However, you can only set this limit in the Console window, not with a menu command.

1. Click on **View** → **Console**.
2. In the bar at the bottom of the Console window, type in the following:

   MaxNoPathsPerTimespec *number_of_paths*

3. Run a Performance To TimeSpecs report.

You can also use the MaxNoPathsPerTimespec command in a macro.

Selecting Sources and Destinations

You can select the starting points and ending points for path analysis by selecting the Select Sources or Select Destinations filter on the Path Analysis Filters menu, as described in the following sections. By default, the Timing Analyzer selects all sources and all destinations for path analysis.

Once you select sources or destinations to include, you can generate a Detailed Path report.

Selecting Sources

Sources can be flip-flops, IOBs, clocks, nets, pins, CLBs, or all types. To select specific sources for path analysis, follow these steps.

1. Select **Path Filters → Path Analysis Filters → Select Sources**.

   The Select Sources dialog box appears, as shown in Figure 4-21.

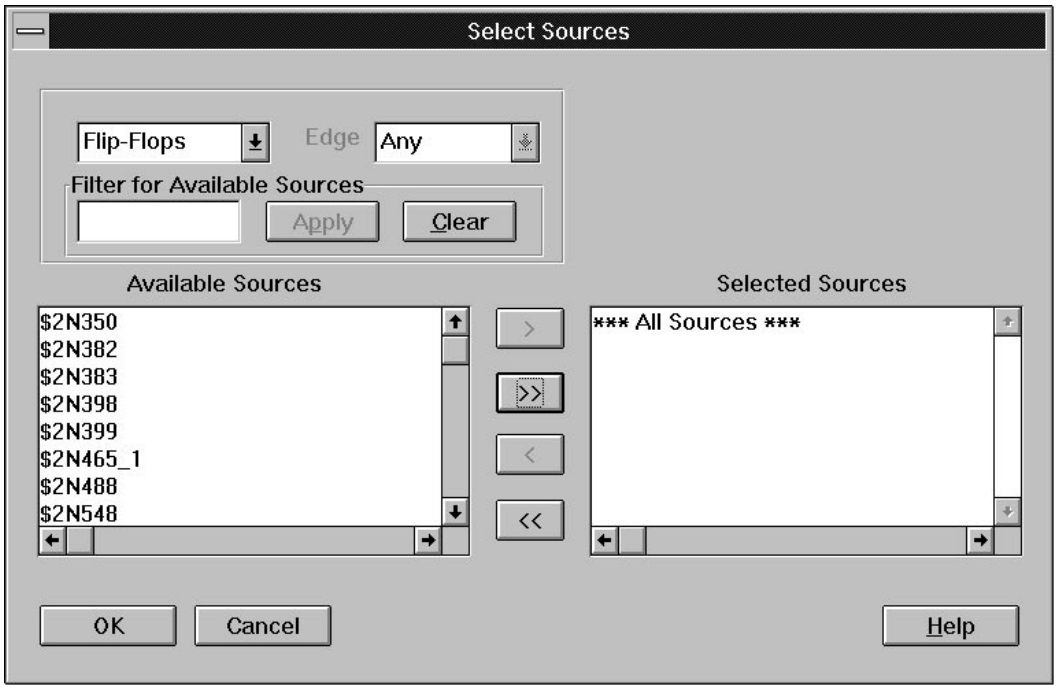

Figure 4-21 Select Sources Dialog Box

2. In the box in the upper left-hand corner, select the starting point type by clicking on the down arrow to display the list of options: Flip-Flops, IOBs, Clocks, Nets, Pins, CLBs, or All. The default is Flip-Flops.
3. If you selected Clocks, indicate in the Edge field whether the source is a clock's rising edge, falling edge, or either edge.
4. Enter a filter in the Filter for Available Sources field to display a subset of the specified source type, if desired, and click on **Apply**.
5. Highlight All Sources and remove it from the Selected Sources list box by pressing the Remove (<) button.

6. Select the sources that you want to include in your timing analysis by using the Add (>) button to move them from the Available Sources list box to the Selected Sources list box.
7. Repeat steps 2 through 6 until you have moved all the desired elements to the Selected Sources list box.
8. Click on **OK**.

   The Select Sources dialog box closes. You can now select another filtering command or generate a timing report.

Selecting Destinations

Destinations can be flip-flops, IOBs, clocks, nets, pins, CLBs, or all types. To select specific destinations, follow these instructions.

1. Select **Path Filters → Path Analysis Filters → Select Destinations**.

   The Select Destinations dialog box comes up, as Figure 4-22 illustrates.

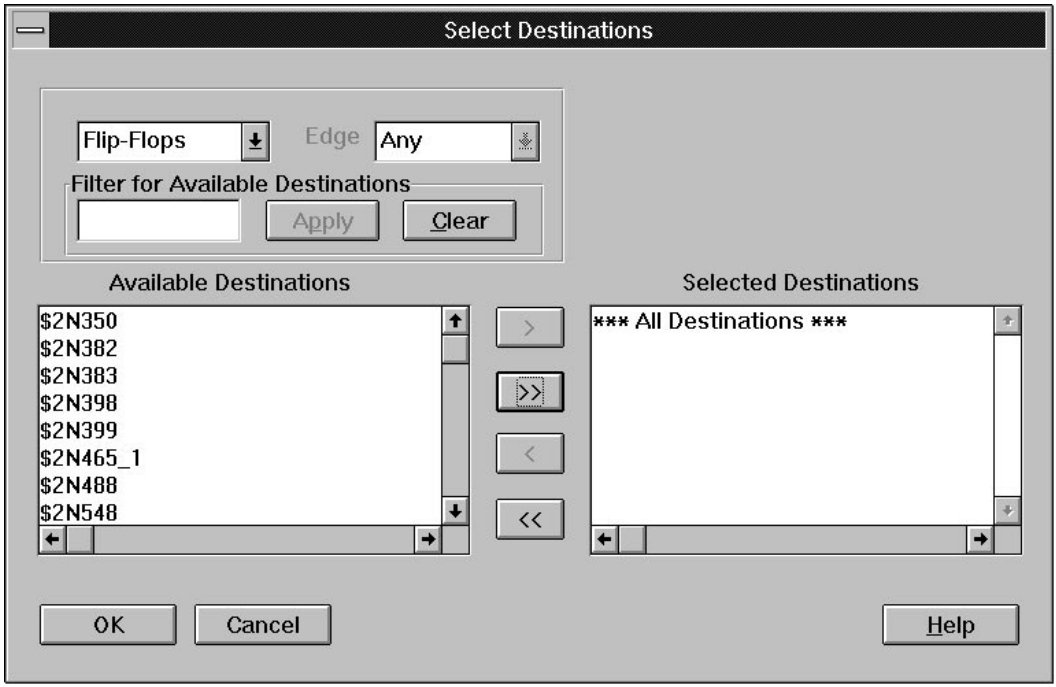

Figure 4-22 Select Destinations Dialog Box

2. In the box in the upper left-hand corner, select the ending point type by clicking on the down arrow to display the list of options: Flip-Flops, IOBs, Clocks, Nets, Pins, CLBs, or All. The default is Flip-Flops.
3. If you selected Clocks, indicate in the Edge field whether the destination is a clock's rising edge, falling edge, or either edge.
4. Enter a filter in the Filter for Available Destinations field to display a subset of the specified destination type, if desired, and click on **`Apply`**.
5. Highlight All Destinations and remove it from the Selected Destinations list box by pressing the Remove (<) button.
6. Select the end points that you want to include in your timing analysis by moving them from the Available Destinations list box to the Selected Destinations list box.

7. Repeat steps 2 through 6 until you have moved all the desired elements to the Selected Destinations list box.
8. Click on **OK**.

   The Select Destinations dialog box closes. You can now select another filtering command or generate a timing report.

Selecting Specific Path Types

By default, the Timing Analyzer analyzes all path types; however, you can restrict the types of paths that it reports. For more information on the five basic path types, refer to the "Basic Path Types" section of the "Timing Analysis" chapter.

Once you select the path types to analyze, you can generate a Detailed Path report or a Performance Summary report.

Use this procedure to select specific path types for analysis.

1. Click on **Path Filters → Path Analysis Filters → Select Path Types**.

   The Timing Analyzer displays the Select Path Types dialog box, as shown in Figure 4-23

Figure 4-23 Select Path Types Dialog Box

You can select the following path types:

- Clock To Setup reports clock-to-setup paths.
- Clock To Pad reports clock-to-pad paths.
- Pad To Setup reports pad-to-setup paths.
- Paths Ending At Clock Pin of Flip-flop reports clock input paths.
- Pad To Pad reports pad-to-pad paths.

By default, all path types are selected.

2. Deselect any path types that you do not want to analyze by clicking on them with the left mouse button or entering the underlined letter that represents that option.

Note: Click on an object to reselect it.

3. Press **OK**.

   The Select Path Types dialog box closes. You can now select another filtering command or generate a Performance Summary report or a Detailed Path report.

Including and Excluding Paths with Nets

You can include or exclude paths with nets by selecting the Include Paths With Nets or Exclude Paths With Nets commands, as described in the following sections.

Although the two filters appear to be similar, they are not mutually exclusive. For example, you may want to exclude any path that goes through the synchronous Reset net of the counter but include all paths that go through bit 1 of the counter. This way, you can include or exclude specific nets that are attached to the counter.

Once you select which paths with nets to include or exclude, you can generate the Performance To TimeSpecs, Performance Summary, or Detailed Path reports.

Including Paths with Nets

With the Include Paths With Nets command, you can select specific nets to be analyzed.

1. Select **Path Filters → Common Filters → Include Paths With Nets**.

   The Include Paths With Nets dialog box appears, as shown in Figure 4-24.

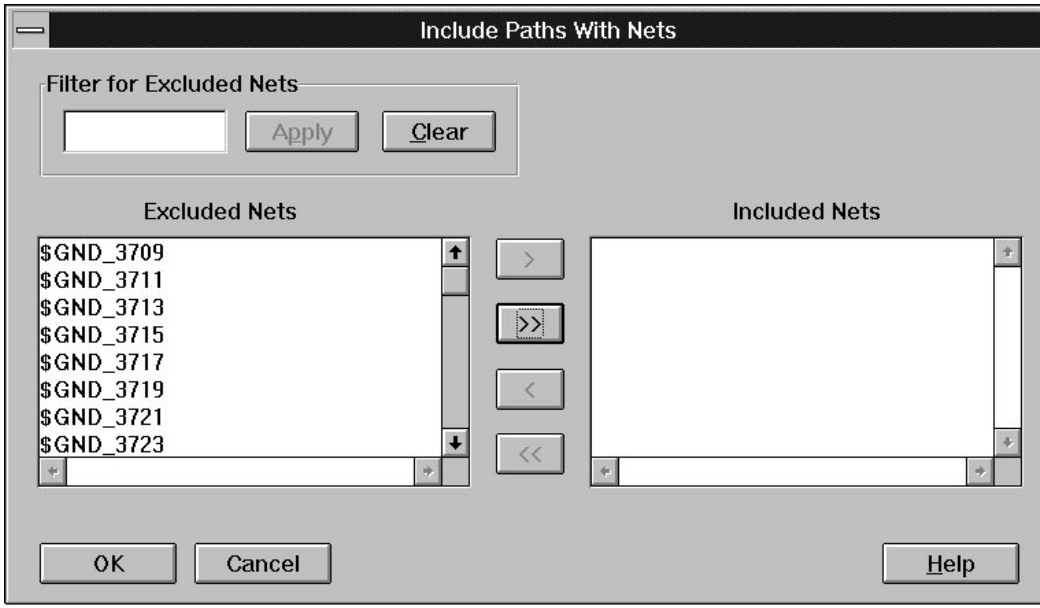

Figure 4-24 Include Paths With Nets Dialog Box

2. Enter a filter in the Filter for Excluded Nets field to display a subset of included nets, if desired, and click on **Apply**.
3. Select the nets that you want to include in your timing analysis by moving them from the Excluded Nets list box to the Included Nets list box.
4. Click on **OK**.

   The Include Paths With Nets dialog box closes. You can now select another filtering command or generate any timing report.

Excluding Paths with Nets

The Exclude Paths With Nets command enables you to exclude specific nets from the timing analysis.

1. Select **Path Filters → Common Filters → Exclude Paths With Nets**.

   The Exclude Paths With Nets dialog box comes up, as demonstrated in Figure 4-25.

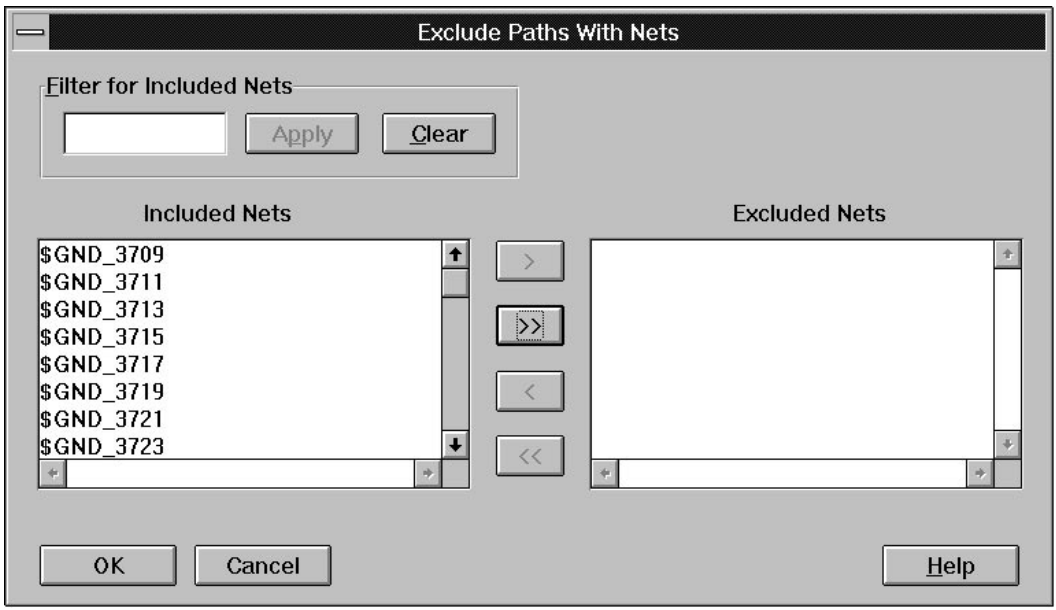

Figure 4-25 Exclude Paths With Nets Dialog Box

2. Enter a filter in the Filter for Included Nets field to display a subset of included nets, if desired, and click on **Apply**.
3. Select the nets that you want to exclude in your timing analysis by moving them from the Included Nets list box to the Excluded Nets list box.
4. Click on **OK**.

The Exclude Paths With Nets dialog box closes. You can now select another filtering command or generate any timing report.

Controlling Possible False Paths

You can prevent the Timing Analyzer from tracing false paths through RAM, 3-state buffers, input and output pins, and Set/Reset logic.

Once you select the false paths to control, you can generate the Performance To TimeSpecs, Performance Summary, or Detailed Path report.

1. Select **`Path Filters → Common Filters → Control Possible False Paths`**.

   The Timing Analyzer displays the Control Possible False Paths dialog box, illustrated in Figure 4-26.

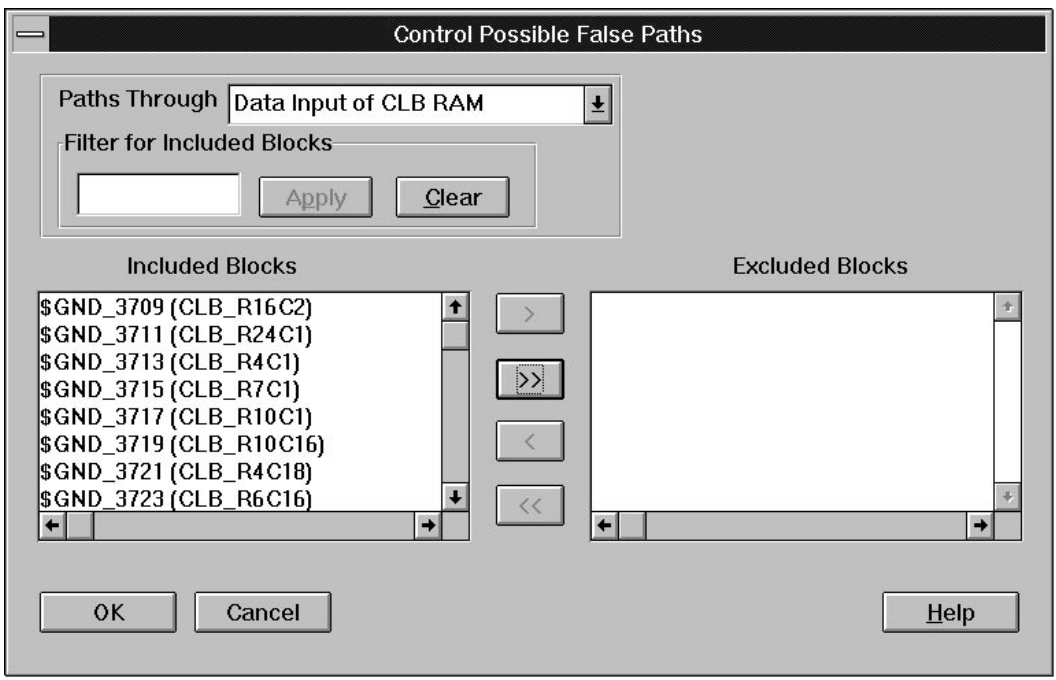

Figure 4-26 Control Possible False Paths Dialog Box

2. Select the block type that you want to control in the Paths Through field; the following types are available.
   - Data Input of CLB RAM allows or prohibits paths through the data inputs of a CLB RAM. By default, the Timing Analyzer prohibits these paths.
   - Write Enable of CLB RAM allows or prohibits paths through the write-enable input of a CLB RAM. By default, the Timing Analyzer prohibits these paths.
   - Tristate to Output Pin of BUFT allows or prohibits paths that go through a BUFT T pin to the BUFT O pin. By default, the Timing Analyzer allows these paths.
   - Input Pin to Output Pin of BUFT allows or prohibits paths that go through the BUFT I pin to the BUFT O pin. By default, the Timing Analyzer allows these paths.
   - Output Pin to Input Pin of IOB allows or prohibits paths that go from the IOB O pin to the pad and back into the chip through the IOB I pin. By default, the Timing Analyzer prohibits these paths.
   - Tristate Pin to Input Pin of IOB allows or prohibits paths that go from the IOB T pin to the pad and back into the chip through the IOB I pin. By default, the Timing Analyzer prohibits these paths.
   - Set/Reset to Q Pin of Flip-flops allows or prohibits paths through CLB flip-flop asynchronous Set or Reset inputs. By default, the Timing Analyzer allows these paths.

   The Timing Analyzer displays all blocks of that type in the Included Blocks field. The name of this field changes to Excluded Blocks when you select the last three block types.
3. Enter a filter in the Filter for Included/Excluded Blocks field to display a subset of blocks of the specified type, if desired, and click on **Apply**. For the first four selections in the Paths Through field, this filter applies to the items that appear in the Included Blocks list box. For the last three selections in the Paths Through field, it applies to the items that appear in the Excluded Blocks list box.

4. Select the blocks that you want to exclude by moving them from the Included Blocks list box to the Excluded Blocks list box.
5. Click on **OK**.

   The Control Possible False Paths dialog box closes. You can now select another filtering command or generate any timing report.

Breaking Logic Loops

The Break Logic Loops command instructs the Timing Analyzer to treat combinatorial logic as synchronous timing elements, for example, latch-based designs implemented with primitive gates. To break logic loops, perform the following steps.

Once you select which logic loops to break, you can generate the Performance To TimeSpecs, Performance Summary, or Detailed Path report.

1. Select **Path Filters → Common Filters → Break Logic Loops**.

   The Timing Analyzer displays the Break Logic Loops dialog box, as shown in Figure 4-27.

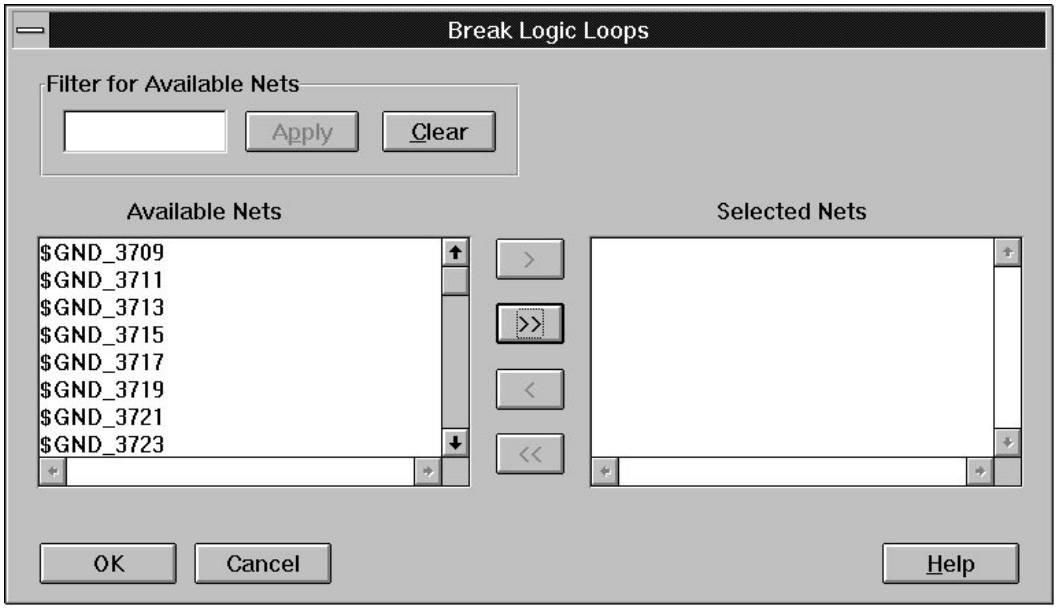

Figure 4-27 Break Logic Loops Dialog Box

2. Enter a filter in the Filter for Available Nets field to display a subset of available nets, if desired, and click on **Apply**.
3. Select the nets that you want to treat as synchronous timing elements by moving them from the Available Nets list box to the Selected Nets list box.
4. Click on **OK**.

   The Break Logic Loops dialog box closes. You can now select another filtering command or generate any timing report.

Resetting Path Filters to Defaults

You can reset the path filters to the defaults. For more information on the Timing Analyzer default settings, refer to the "Viewing Timing Analyzer Settings" section later in this chapter.

Note: To view current settings, select **Analyze** → **Show Settings**.

To reset the path filters, select **Path Filters → Reset Path Filters**.

Using the Console Window

The Console window records all the commands that you have used in a Timing Analyzer session. You can use these commands to form macros, as described in the next section, "Using Macros." In addition, it provides an alternative to using the menu commands by allowing you to enter commands from the keyboard.

To open the Console window, click on **View → Console**.

The Console window appears, as shown in Figure 4-28.

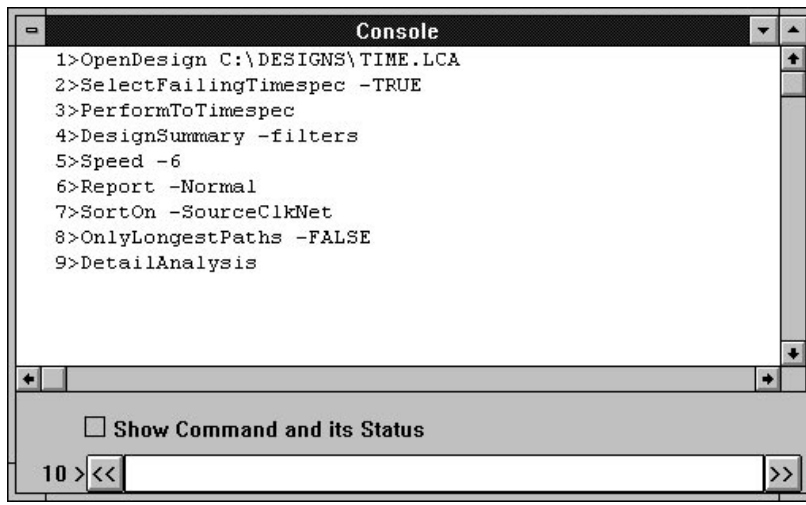

Figure 4-28 Console Window

You cannot delete text from the Console window.

You can add a command manually by typing it in the bar at the bottom of the window below the Show Command and Its Status box. Use the syntax given for the command in the "Keyboard Commands" chapter of this manual. After you enter the command and press the Return key, the command is reflected in the Console window.

If you want to re-execute a command shown in the Console window, you can use one of the following three methods in the bar at the bottom of the window:

- Use the up or down arrow keys to move to the command, and press the Return key.
- Type an exclamation point (!) and the number of the command.
- Type in an exclamation point (!) and the first letter or first few letters of the command name.

With all these methods, the Timing Analyzer starts the search from the bottom of the command list.

To see if the system issued a response to the command, such as an error or warning message, click on the **Show Command and its Status** box.

Using Macros

The Macro commands on the File menu enable you to create, open, and save a macro, which is a script file for running Timing Analyzer commands and options.

You can use the Macro commands in conjunction with the Console window, which records a history of all commands executed during the current session.

Creating a Macro

To create a macro, perform the following steps.

1. Click on **View** → **Console** to open the Console window.
2. From the menus, select the commands that will constitute the macro.

   These commands are recorded in the Console window.
3. Select **File** → **New Macro**.

   The New Macro window appears, as shown in Figure 4-29. The three macro icons now appear on the toolbar.

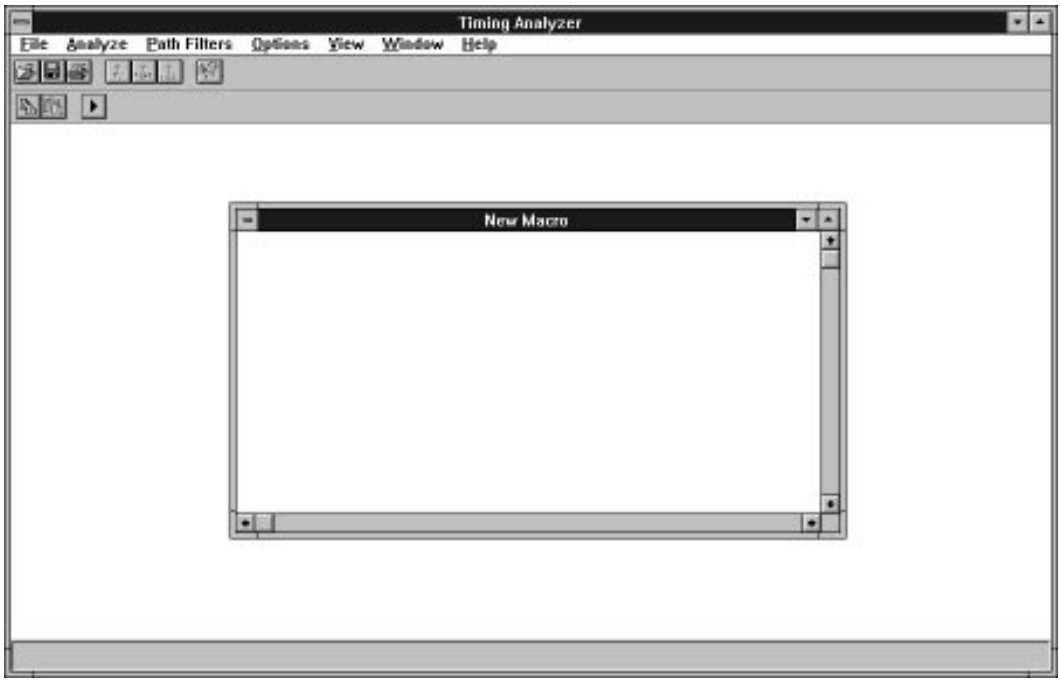

Figure 4-29 New Macro Window and Icons

4. In the Console window, hold down the left mouse button and highlight the sequence of commands that will constitute the macro.
5. Click on the Copy icon, shown in Figure 4-30, in the upper left corner of the Timing Analyzer screen.

Figure 4-30 Copy Icon

6. Position the cursor in the New Macro window and click on the Paste icon, located just to the right of the Copy icon.

   Figure 4-31 illustrates the Paste icon.

Figure 4-31 Paste Icon

The lines from the Console window are now pasted into the New Macro window.

You can also highlight, copy, and paste individual lines from the Console window to the New Macro window.

You can add text in the New Macro window by inserting the cursor and typing. Delete text by pressing the backspace key or by highlighting and pressing the Delete key.

7. Save the new macro by following the instructions in the "Saving a New Macro"section, following.

Saving a Macro

You can save a macro in a new file, the same file, or another existing file.

Saving a New Macro

To save a new macro, follow these steps.

1. Click on **`File`** → **`Save Macro`**.

   The Save Macro As dialog box appears, as shown in Figure 4-32.

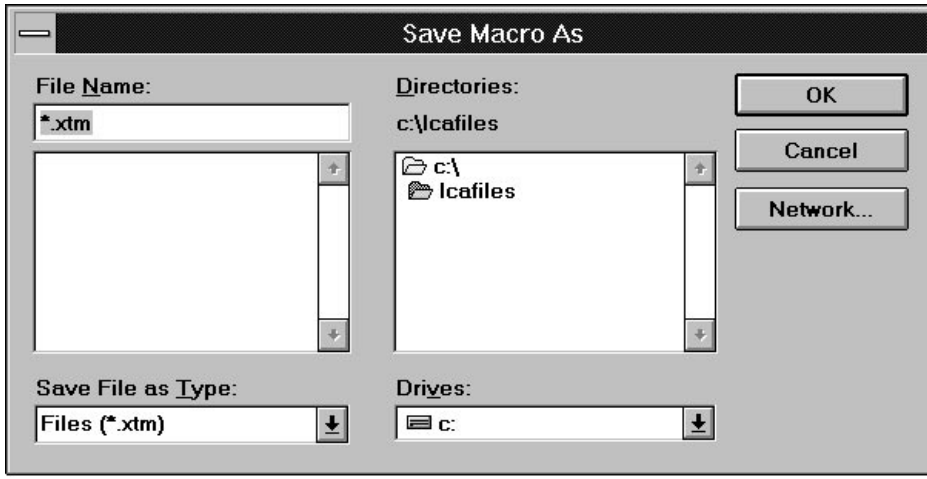

Figure 4-32 Save Macro As Dialog Box

2. In the Drives field, select the drive in which you want to save the macro.
3. In the Directories list box, select the directory in which you want to save the macro.
4. In the File Name field, backspace over the asterisk and type in the name of the file in which to save the macro.

   You must save the macro in an XTM file, that is, a file with an .xtm extension.
5. Click on **OK**.

Saving an Edited Macro to the Same File

If you want to save an edited macro in the same file, click on **File → Save Macro**.

If you have saved the macro once, the Save Macro command saves the macro in the specified file without activating the Save Macro As dialog box.

Saving an Edited Macro to a Different File

Follow this procedure if you want to save an edited macro to another file.

1. Select **File → Save As Macro**.

   The Save Macro As dialog box appears, as shown earlier in Figure 4-32.

2. In the Drives field, select the drive in which you want to save the macro.

3. In the Directories list box, select the directory in which you want to save the macro.

4. If you want to save the macro in a new file, backspace over the asterisk in the File Name field, and type in the name of the file in which to store the macro. If you want to save the macro to the existing file, click on the Save File as Type field, select the XTM file type, then click on the name of the current file in the list box to overwrite the existing macro.

   A prompt asks you if you want to overwrite the current macro; click on **Yes**.

   You must save the macro in an XTM file, that is, a file with an .xtm extension.

5. Click on **OK**.

Running a Macro

Follow these instructions to run an existing macro.

1. Select the **File → Open Macro** command.

   The Open Macro File dialog box comes up, as indicated in Figure 4-33.

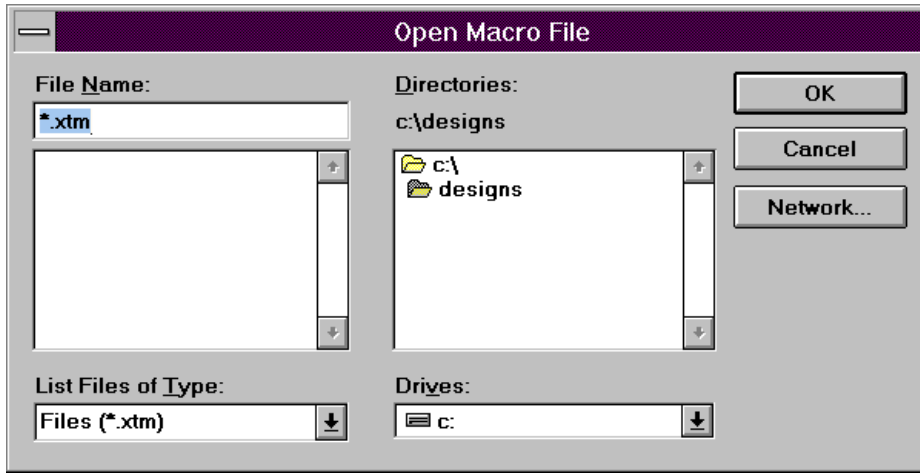

Figure 4-33 Open Macro File Dialog Box

2. In the Drives field, select the drive in which the macro file is located.
3. In the Directories list box, select the directory in which the macro file is located.
4. In the File Name field, backspace over the asterisk and type in the name of the macro file that you want to open. Alternatively, click on the List File as Type field and select the XTM file type category. Then click on the name of the XTM file in the list box.
5. Click on **OK**.

   The macro window opens and remains highlighted.
6. Select **File → Run Macro**, or click on the Run Macro icon, shown in Figure 4-34:

Figure 4-34 Run Macro Icon

Editing a Macro

You can also edit an existing macro.

1. Click on **File → Open Macro**.

   The Open Macro File dialog box appears, which is shown in the "Running a Macro" section.

2. In the Drives field, select the drive in which the macro file is located.

3. In the Directories list box, select the directory in which the macro file is located.

4. In the File Name field, backspace over the asterisk and type in the name of the macro file that you want to open. Alternatively, click on the List Files of Type field and select the XTM file type. Then click on the name of the XTM file in the list box.

5. Click on **OK**.

   The Open Macro File dialog box closes, and the macro window appears.

6. Edit the macro, using the information in the "Creating a Macro" section in this chapter to add, delete, copy, and paste commands in the macro window.

7. If you want to save the edited macro in the same file, click on **File → Save Macro**.

   If you have saved the macro once, the Save Macro command saves the macro in the specified file without activating the Save Macro As dialog box.

   If you want to save the edited macro to another file, follow the instructions in the "Saving an Edited Macro to a Different File" section.

Suppressing Informational Messages

When you run a macro, the commands in the macro file can generate informational, confirmational, and error messages. However, you can suppress the informational and confirmational messages by using the following procedure. You cannot suppress these messages with menu commands, however.

1. Click on **View** → **Console**.
2. In the bar at the bottom of the Console window, type in the following:

   ```
   Force -on
   ```

3. If you are creating a new macro, follow the procedure given in the "Creating a Macro" section.
4. If you wish to suppress the messages for an existing macro, open the macro, and cut and paste the Force command into the macro using the instructions given in the "Creating a Macro" section.
5. Run the macro by selecting the **File** → **Run Macro** command or the Run Macro icon.
6. To restore the informational and confirmational messages, type the following:

   ```
   Force -off
   ```

Changing the Speed Grade

The speed grade is usually set during the design implementation process. Changing the speed grade helps you determine if you need to target a faster device to meet your timing requirements. To change the speed grade, perform the following steps.

1. Click on **Options** → **Change Speed Grade**.

   The Change Speed Grade dialog box appears, as shown in Figure 4-35.

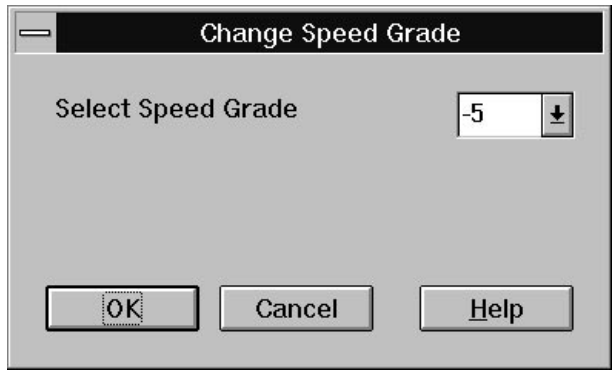

Figure 4-35 Change Speed Grade Dialog Box

2. Select a speed grade from the list of available speed grades using one of the following methods.
   - If you are using the mouse, click on the selection arrow and select a speed grade.
   - If you are using the keyboard, tab until the speed grade is highlighted, and press the up or down arrow keys until the appropriate speed grade appears.
3. Select **OK**.

Setting Delay Margins for the I/O

You can specify external delays for clock-to-setup or pad-to-setup paths entering or exiting the device. This way, the Timing Analyzer includes this external delay when calculating the delay for the path. There is no default delay; the Timing Analyzer does not consider off-chip delay unless you specify it with the following procedure.

To set the delay margins, perform the following steps.

1. Select **Options → Set Delay Margins for I/O**.

   The Set Delay Margins for I/O dialog box appears, as shown in Figure 4-36.

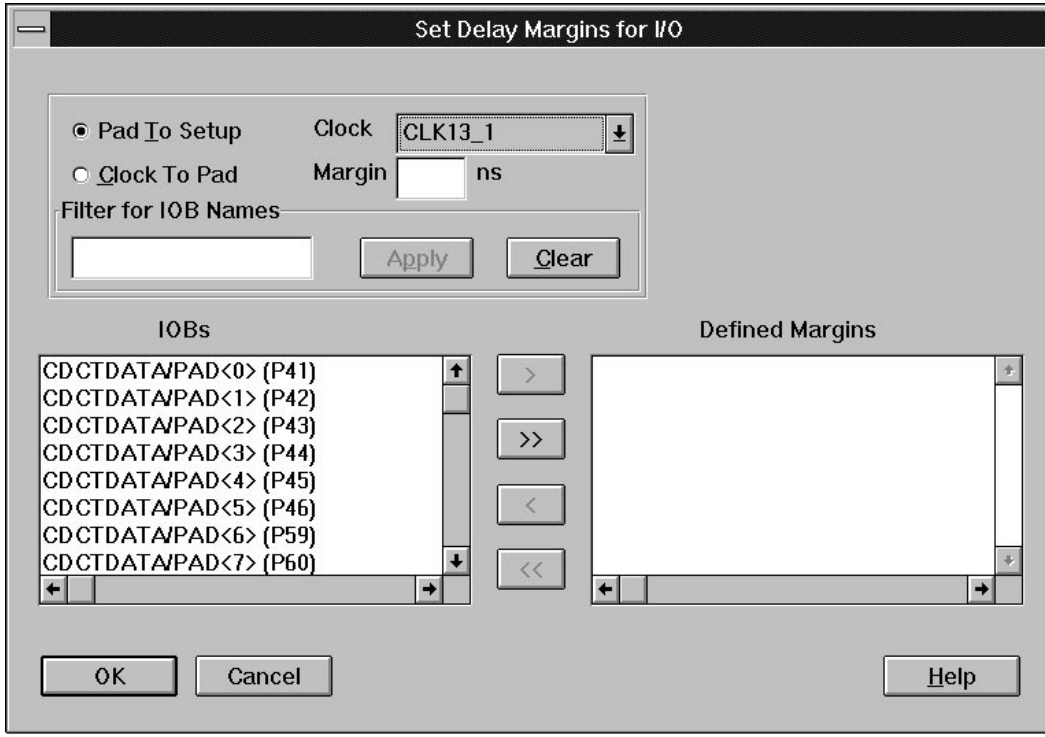

Figure 4-36 Set Delay Margins for I/O Dialog Box

2. Select the clock using either of the following methods.
   - If you are using the mouse, click the down arrow by the Clock field and select the appropriate clock.
   - If you are using the keyboard, press the down arrow until the appropriate clock appears in the Clock field. The Clock field must be highlighted.

   If the design has only one clock, it is displayed.
3. Select the path type: Pad To Setup or Clock to Pad. Pad To Setup is the default.

   The Timing Analyzer displays all the paths for the selected path type.

4. Enter a filter in the Filter for IOB Names field to display a subset of the specified path type, if desired, and click on **Apply**.
5. Enter a delay margin value from 1 through 999 ns in the Margin box.
6. Select the IOBs for which you want to set this delay margin.
7. Repeat steps 2 through 6 to select a different clock, change path type, or change the delay margin.
8. Select **OK** to close the Set Delay Margins for I/O dialog box.

Viewing Timing Analyzer Settings

To view the Timing Analyzer default settings, select **Analyze** → **Show Settings**.

The Timing Analyzer displays a pop-up window with the current settings. Figure 4-37 gives an example of the Show Settings window.

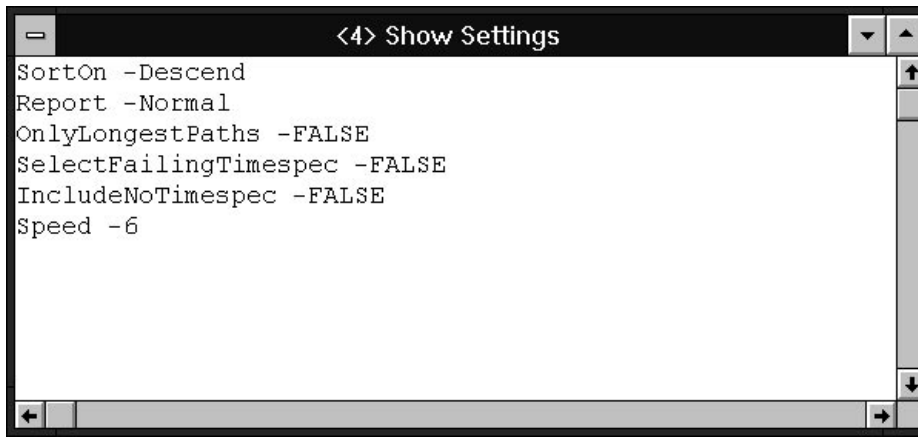

Figure 4-37 Show Settings Window

When this window is the active window and you change an option setting or a path filter, the change is immediately reflected in the window. If it is not the active window and you change an option or a filter, you must click inside the Show Settings window to update it automatically.

The default settings are as follows.

- Sort On –Descend

  The Descending Delay option in the Sort By field in the Report Options dialog box lists paths in order from longest to shortest delays.

- Report –Normal

  The Normal Report option in the Report Options dialog box generates a report displaying a detailed list of path delays.

- OnlyLongestPaths –False

  The Timing Analyzer reports all paths. If the Report Only Longest Paths Between Points option in the Report Options dialog box is set to True, the Timing Analyzer reports only the path with the longest delay if there is more than one path between two end points.

- SelectFailingTimespec –False

  The Timing Analyzer reports all paths with timing specifications. If you select the Report Paths Failing TimeSpec command from the Path Filters menu, this option is set to True, indicating that the Timing Analyzer reports the paths that do not meet the timing specifications entered using the XACT-Performance utility.

- IncludeNoTimespec –False

  The Timing Analyzer reports all timing specifications. If you select the Report Paths With No TimeSpec command, this option is set to True, indicating that the Timing Analyzer reports the paths without timing specifications.

- Speed *speedgrade*

  The default speed grade is derived from the LCA file, but you can change the speed grade by selecting Change Speed Grade from the Options menu.

You can change these settings using the commands on the Path Filters and Options menus.

Querying for Information

You may want to focus on the source, destination, and timing of a particular net. You can obtain information about nets, blocks, timing specifications, and timing groups by using the Query command. To perform a query, follow this procedure.

1. Select **Options → Query**.

   The Query dialog box appears, as shown in Figure 4-38.

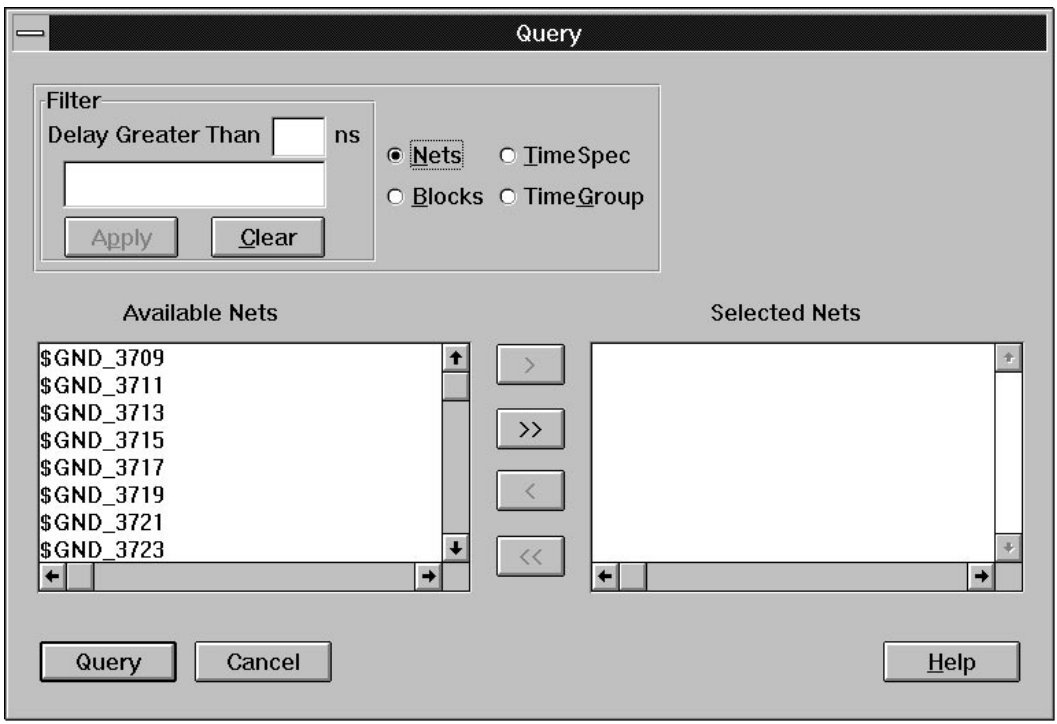

Figure 4-38 Query Dialog Box

2. Select the subject of the query by clicking on Nets, Blocks, TimeSpec, or TimeGroup. Nets is the default.

   The following information is displayed for each option.

   - Nets — The Timing Analyzer shows the fanout, the timing

from the source CLB to each of the destination CLBs, and the CLB names.

- Blocks — The Timing Analyzer displays the CLB names, the pins on the CLBs, and the names of the clocks and signals attached to these pins. In a net binding table, it shows which nets are attached to the pins on a CLB, the function of each function generator in the CLB, the internal blocks in the CLB, and the external connections. It indicates if the block is unconfigured and unused in the design, and notes the configuration options used. For more information on all of these elements, consult the "XACT Design Editor" chapter of the *Development System Reference Guide*.
- TimeSpec — The Timing Analyzer lists the timing specifications defined in XACT-Performance.
- TimeGroup — The Timing Analyzer lists the elements and the output nets in the specified timing groups.

3. Enter a filter, if desired, and click on **Apply**.

   You can specify a minimum net delay in nanoseconds in the Delay Greater Than field, but only if you selected Nets. The Timing Analyzer displays only those paths that have a delay greater than or equal to the specified value. If you enter a value in both the Delay Greater Than and filter field, the Timing Analyzer lists the nets that meet both criteria.

4. Select the nets, blocks, timing specifications, or timing groups that you want to query.

5. Click on **Query**.

   The Timing Analyzer displays the Query report in a pop-up window.

Chapter 5

Menu Commands

This chapter lists and describes all the commands available in the menus of the Timing Analyzer window. They are listed in alphabetical order. It also lists the Timing Analyzer toolbar icons.

For a description of the fields that are common to many Timing Analyzer dialog boxes, such as OK and Cancel, see the "Dialog Boxes" section of the "Getting Started" chapter.

Menus

The Timing Analyzer has seven menus, which are described in the following sections.

File Menu

The File menu contains commands that load a design, save and print reports on that design, and exit the Timing Analyzer. It also contains macro commands. The commands on the File menu are the following:

Open	Loads design for timing analysis or opens existing report
Close Report	Closes file
Save Report	Saves report in active window to specified file
New Macro	Creates new macro
Open Macro	Opens existing macro
Run Macro	Runs macro
Save Macro	Saves new macro to specified file
Save As Macro	Saves edited macro to specified file
Print	Sends report in active window to default printer

Printer Setup	Specifies printer settings
Exit	Exits the Timing Analyzer

Analyze Menu

The Analyze menu contains commands that generate timing reports and display the settings of the Timing Analyzer options.

Performance to TimeSpecs	Generates report indicating whether design meets timing specifications
Performance Summary	Generates report indicating overall design performance
Detailed Path Report	Generates report containing worst-case path delays for all paths in design
Check for Asynchronous Logic	Generates report indicating whether LCA file contains logic not controlled by a register
Show Clocks	Generates report listing all clocks in design
Show Settings	Lists option settings
Find	Finds text string in report files

Path Filters Menu

The Path Filters menu contains commands that enable you to select a subset of information when generating a timing report.

TimeSpec Filters	Reports paths constrained by timing specifications
Report Paths FailingTimeSpec	Lists paths not meeting timing specifications
Report Paths With No TimeSpec	Lists paths with no timing specifications
Ignore TimeSpecs	Ignores timing specifications
Path Analysis Filters	Defines paths to be analyzed
Select Sources	Defines path starting points
Select Destinations	Defines path ending points
Select Path Types	Selects path type to analyze
Common Filters	Applies filters common to Performance To TimeSpecs,

	Performance Summary, and Detailed Path reports
Include Paths With Nets	Selects specific nets to be analyzed
Exclude Paths With Nets	Ignores specific nets during analysis
Control Possible False Paths	Prevents tracing of false paths
Break Logic Loops	Treats combinatorial logic as synchronous timing elements
Reset Path Filters	Causes path filters to revert to default

Options Menu

The Options menu contains commands that you can use to change the speed grade, delay margins, and report options.

Change Speed Grade	Selects speed grade
Set Delay Margins for I/O	Adds extra delay to input and output paths
Report Options	Determines format and content of reports
Query	Displays information about groups of elements

View Menu

The View menu contains commands that govern the appearance of Timing Analyzer window.

Toolbar	Displays or hides toolbar
Status bar	Displays or hides status bar
Console	Displays or hides Console window

Window Menu

The Window menu contains commands that control the placement of the windows on the main screen.

Tile	Arranges open windows in rows
Cascade	Arranges open windows diagonally

Arrange Icons	Arranges icons in row at bottom of screen

Help Menu

The Help menu contains commands that enable you to access online help for the Timing Analyzer.

Contents	Lists online help topics
Search for Help On	Searches for specific topic
Tutorial	Activates interactive tutorial
About Timing Analyzer	Shows current software version

Commands

The following commands are available in the menus of the Timing Analyzer's graphical user interface.

About Timing Analyzer (Help Menu)

The About Timing Analyzer command brings up a pop-up window that displays the version number of the Timing Analyzer software.

Arrange Icons (Window Menu)

The Arrange Icons command arranges the icons in the Timing Analyzer window in a row along the bottom of the window.

Break Logic Loops (Path Filters Menu)

The Break Logic Loops command treats combinatorial logic as synchronous timing elements.

Use this path filter in conjunction with any of the following reports:

- Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints
- Performance Summary report, which indicates overall design performance
- Detailed Path report, which contains detailed timing information for all paths in the design

This command activates the Break Logic Loops dialog box, shown in Figure 5-1.

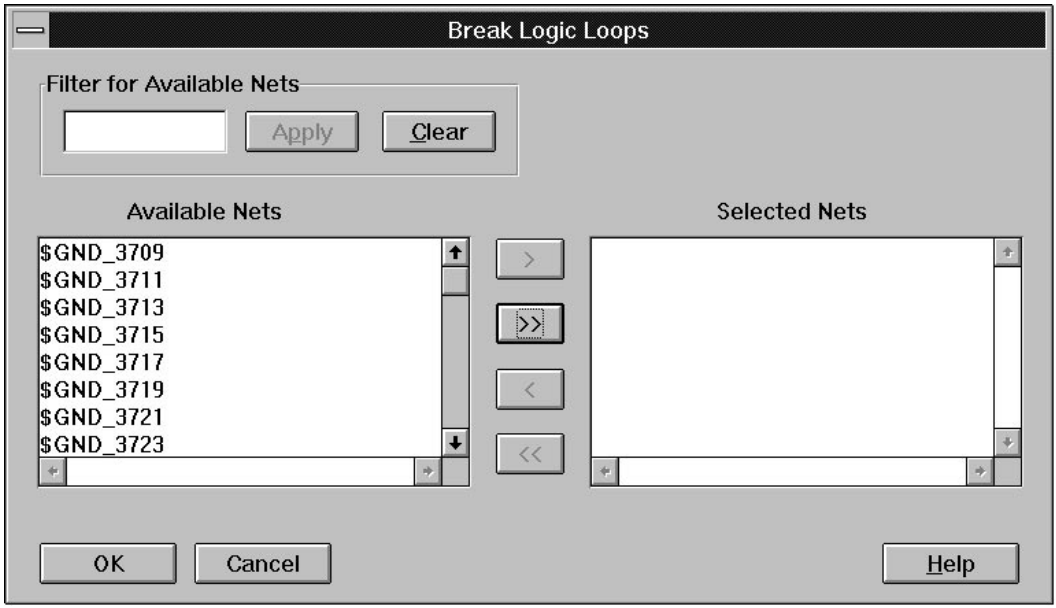

Figure 5-1 Break Logic Loops Dialog Box

The Break Logic Loops dialog box displays the following fields.

- Filter for Available Nets limits the nets displayed in the Available Nets list box to those you specify.
  - Apply executes the filter indicated in the Filter for Available Nets box and displays the subset in the Available Nets list box.
  - Clear deletes the filter and redisplays all the nets in the Available Nets list box.
- Available Nets lists the nets to be treated as synchronous timing elements, which you select in the Filter for Available Nets field. If you do not specify a filter, it lists all the nets in the design.
- Selected Nets lists the nets to be treated as synchronous timing elements.

- Add (>) moves the selected nets from the Available Nets list box to the Selected Nets list box.
- Add All (>>) moves all the listed nets from the Available Nets list box to the Selected Nets list box.
- Remove (<) moves the selected nets from the Selected Nets list box to the Available Nets list box.
- Remove All (<<) moves all listed nets from the Selected Nets list box to the Available Nets list box.

Cascade (Window Menu)

The Cascade command arranges the open windows diagonally down the screen so that they overlap one on top of another, as shown in Figure 5-2. The active window is on top.

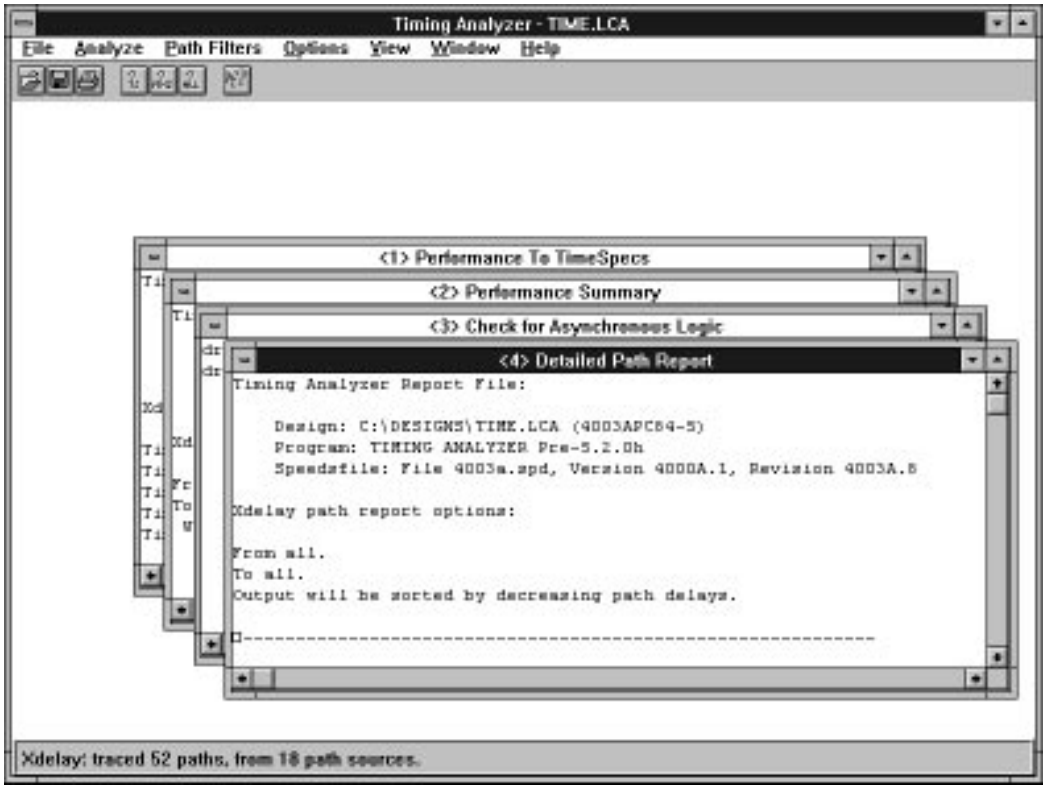

Figure 5-2 Cascaded Windows

Change Speed Grade (Options Menu)

The Change Speed Grade command allows you to select a speed grade in the Change Speed Grade dialog box, shown in Figure 5-3. The default is the speed grade set in the LCA file.

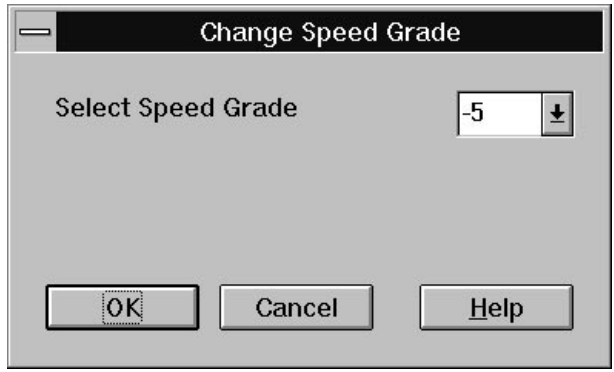

Figure 5-3 Change Speed Grade Dialog Box

Check for Asynchronous Logic (Analyze Menu)

The Check for Asynchronous Logic command checks the LCA file for logic that is not controlled by a register. It issues the results in the Check for Asynchronous Logic report.

Close Report (File Menu)

The Close Report command closes the active report window.

Common Filters (Path Filters Menu)

The Common Filters command brings up a submenu containing the following filtering commands, which apply to the Performance To TimeSpecs, Performance Summary, and Detailed Path reports.

- Include Paths With Nets
- Exclude Paths With Nets
- Control Possible False Paths
- Break Logic Loops

Refer to the alphabetical listings of these commands for an explanation of their functions.

Console (View Menu)

The Console command displays the Console window, shown in Figure 5-4, which records all the commands that you have used in a Timing Analyzer session.

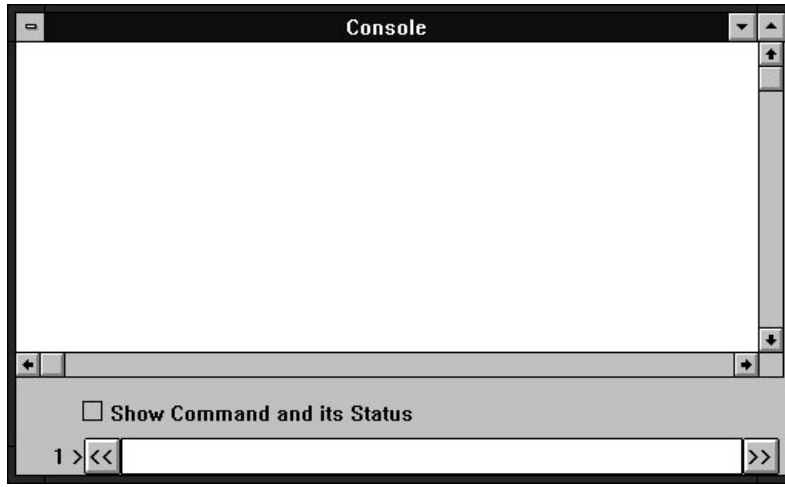

Figure 5-4 Console Window

You cannot delete text from the Console window.

You can add a command manually by typing it in the bar at the bottom of the window below the Show Command and Its Status box. Use the syntax given for the command in the "Keyboard Commands" chapter of this manual. After you enter the command and press the Return key, the command is reflected in the Console window.

If you want to re-execute a command shown in the Console window, you can use one of the following three methods in the bar at the bottom of the window:

- Use the up or down arrow keys to move to the command, and press the Return key.
- Type an exclamation point (!) and the number of the command.
- Type an exclamation point (!) and the first letter or first few letters of the command name.

With all these methods, the Timing Analyzer starts the search for the command from the bottom of the command list.

When you click on the Show Command and Its Status box, the Timing Analyzer displays any responses to a command, such as an error or warning message.

Contents (Help Menu)

The Contents command lists the online help topics available for the Timing Analyzer. From the opening screen, you can jump to command information or step-by-step instructions for using the Timing Analyzer. Once you open help, you can click the Contents button (first button on the left) in the Help window whenever you want to return to the help topic list.

Pressing the F1 key is the same as selecting the Contents command.

Control Possible False Paths (Path Filters Menu)

The Control Possible False Paths command controls whether the Timing Analyzer traces false paths through RAM, 3-state buffers, input and output pins, and Set/Reset logic.

Use this path filter in conjunction with any of the following reports.

- Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints
- Performance Summary report, which indicates overall design performance
- Detailed Path report, which contains detailed timing information for all paths in the design

It activates the Control Possible False Paths dialog box, shown in Figure 5-5.

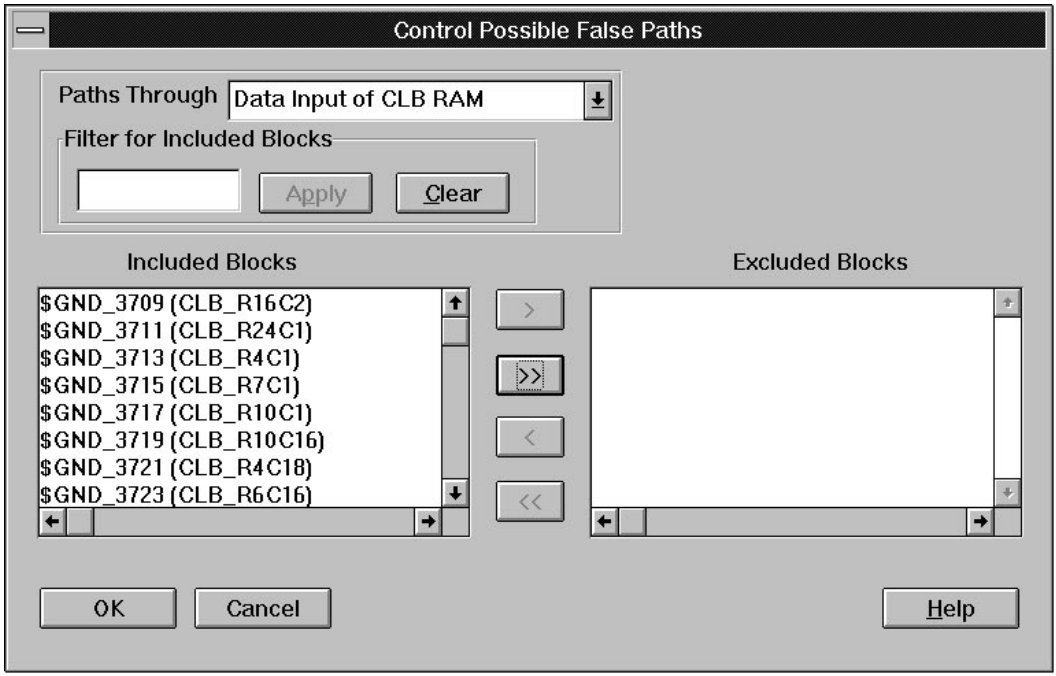

Figure 5-5 Control Possible False Paths Dialog Box

This dialog box displays the following fields.

- Paths Through specifies the paths that the Timing Analyzer can trace. The paths can be the following.
  - Data Input of CLB RAM allows or prohibits paths through the data inputs of a CLB RAM. By default, the Timing Analyzer allows these paths.
  - Write Enable of CLB RAM allows or prohibits paths through the write-enable input of a CLB RAM. By default, the Timing Analyzer allows these paths.
  - Tristate to Output Pin of BUFT allows or prohibits paths that go through a BUFT T pin to the BUFT O pin. By default, the Timing Analyzer allows these paths.

- Input Pin to Output Pin of BUFT allows or prohibits paths that go through the BUFT I pin to the BUFT O pin. By default, the Timing Analyzer allows these paths.
- Output Pin to Input Pin of IOB allows or prohibits paths that go from the IOB O pin to the pad and back into the chip through the IOB I pin. By default, the Timing Analyzer prohibits these paths.
- Tristate Pin to Input Pin of IOB allows or prohibits paths that go from the IOB T pin to the pad and back into the chip through the IOB I pin. By default, the Timing Analyzer prohibits these paths.
- Set/Reset to Q Pin of Flip-flops allows or prohibits paths through CLB flip-flop asynchronous Set or Reset inputs. By default, the Timing Analyzer prohibits these paths.

Once you select a block type, the Timing Analyzer displays all blocks of that type in the Included Blocks list box. The name of this field changes to Excluded Blocks when you select the last three block types.

- Filter for Included/Excluded Blocks limits the blocks that the Timing Analyzer can trace paths through to those you specify.
  - Apply executes the filter indicated in the Filter for Included Blocks box and displays the subset in the Included Blocks list box.
  - Clear deletes the filter and redisplays all the blocks in the Included Blocks list box.

  For the first four selections in the Paths Through field, this filter applies to the items that appear in the Included Blocks list box. For the last three selections in the Paths Through field, it applies to the items that appear in the Excluded Blocks list box.
- Included Blocks lists the blocks that the Timing Analyzer can trace paths through, which you select in the Filter for Included Blocks field. If you do not specify a filter, it lists all the blocks in the design.
- Excluded Blocks lists the blocks that the Timing Analyzer will not trace paths through.

- Add (>) moves the selected blocks from the Included Blocks list box to the Excluded Blocks list box.
- Add All (>>) moves all the listed blocks from the Included Blocks list box to the Excluded Blocks list box.
- Remove (<) moves the selected blocks from the Excluded Blocks list box to the Included Blocks list box.
- Remove All (<<) moves all listed blocks from the Excluded Blocks list box to the Included Blocks list box.

Detailed Path Report (Analyze Menu)

The Detailed Path Report command generates the Detailed Path report, which contains a detailed analysis of all specified paths and includes the worst-case path delays for all paths in the design.

You can use the following path filters to narrow the scope of this report:

- Select Sources
- Select Destinations
- Select Path Types
- Include Paths With Nets
- Exclude Paths With Nets
- Control Possible False Paths
- Break Logic Loops

Exclude Paths With Nets (Path Filters Menu)

The Exclude Paths With Nets command excludes the specified nets from timing analysis.

Use this path filter in conjunction with any of the following reports:

- Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints
- Performance Summary report, which indicates overall design performance

- Detailed Path report, which contains detailed timing information for all paths in the design

This command activates the Exclude Paths With Nets dialog box, shown in Figure 5-6.

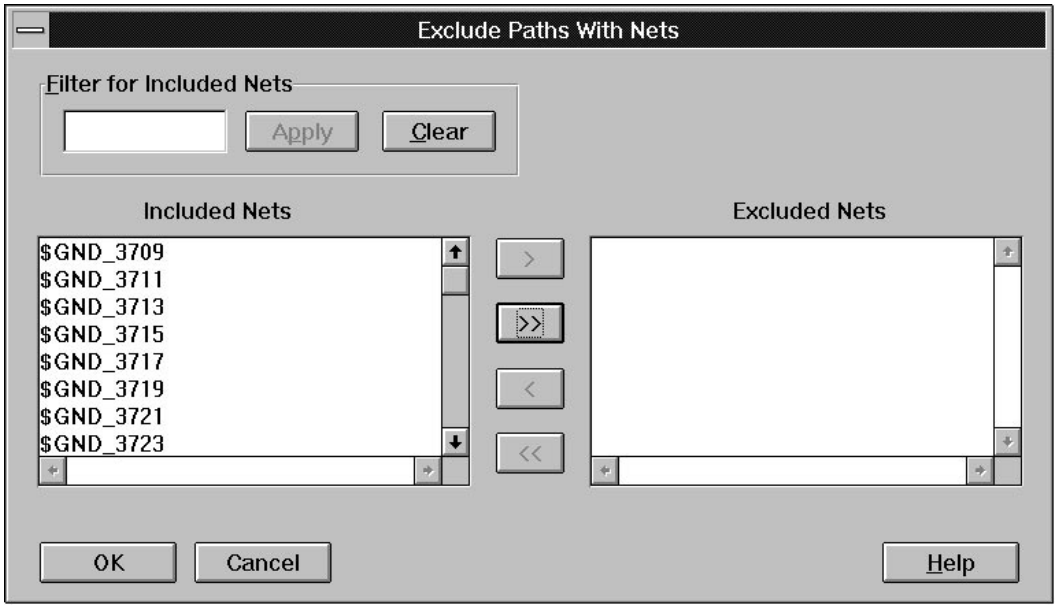

Figure 5-6 Exclude Paths With Nets Dialog Box

This dialog box includes the following fields.

- Filter for Included Nets limits the nets displayed in the Included Nets list box to those you specify.
  - Apply executes the filter indicated in the Filter for Included Nets box and displays the subset in the Included Nets list box.
  - Clear deletes the filter and redisplays all the nets in the Included Nets list box.
- Included Nets lists the nets to be included in the timing analysis, which you select in the Filter for Included Nets field. If you do not specify a filter, it lists all the nets in the design.
- Excluded Nets lists the nets to be ignored in the timing analysis.

- Add (>) moves the selected nets from the Included Nets list box to the Excluded Nets list box.
- Add All (>>) moves all the listed nets from the Included Nets list box to the Excluded Nets list box.
- Remove (<) moves the selected nets from the Excluded Nets list box to the Included Nets list box.
- Remove All (<<) moves all listed nets from the Excluded Nets list box to the Included Nets list box.

Exit (File Menu)

The Exit command exits the Timing Analyzer. If you have unsaved reports open, a prompt box similar to that in Figure 5-7 appears.

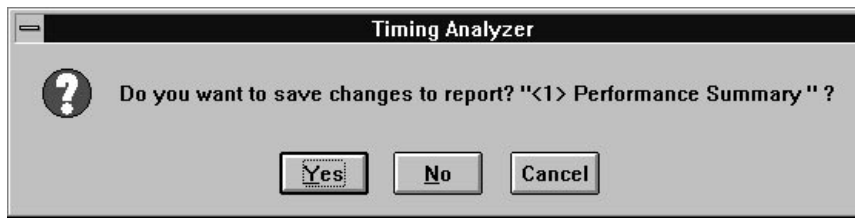

Figure 5-7 Exit Prompt Box

The three options on this prompt box are the following.

- Yes brings up the Save Report dialog box, shown in Figure 5-21, so you can specify a file name.
- No exits the Timing Analyzer without saving the report.
- Cancel cancels the exit operation.

Find (Analyze Menu)

The Find command brings up the Find dialog box, pictured in Figure 5-8, which allows you to search for a text string within a Timing Analyzer report.

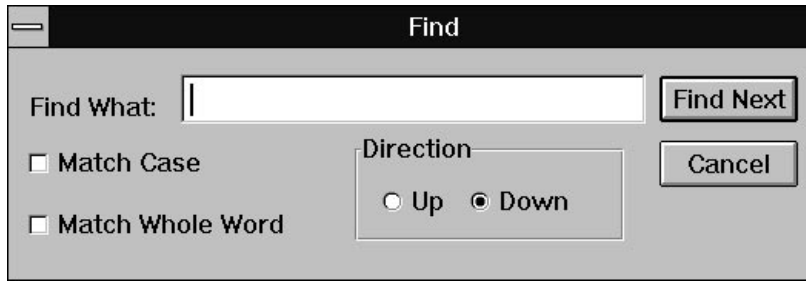

Figure 5-8 Find Dialog Box

The Find dialog box contains the following fields:

- Find What allows you to enter the text string to search for.
- Match Case finds only instances that have the same case as the text string. By default, it ignores the case of the text.
- Match Whole Word finds only instances of the text string that are whole words, not part of a larger word. By default, it finds any instance of the text string, whether the instance is embedded in another word or not.
- Direction indicates the direction to search:
  - Up searches backwards from the present location of the cursor to the beginning of the report. It stops at the beginning of the report.
  - Down searches forwards from the present location of the cursor to the end of the report. It stops at the end of the report. This direction is the default.
- Find Next finds the next instance of the text string you are searching for.

Ignore TimeSpecs (Path Filters Menu)

The Ignore TimeSpecs command prevents the Timing Analyzer from reporting selected timing specifications.

Use this path filter in conjunction with the Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints.

The Ignore TimeSpecs command activates the Ignore TimeSpecs dialog box, shown in Figure 5-9.

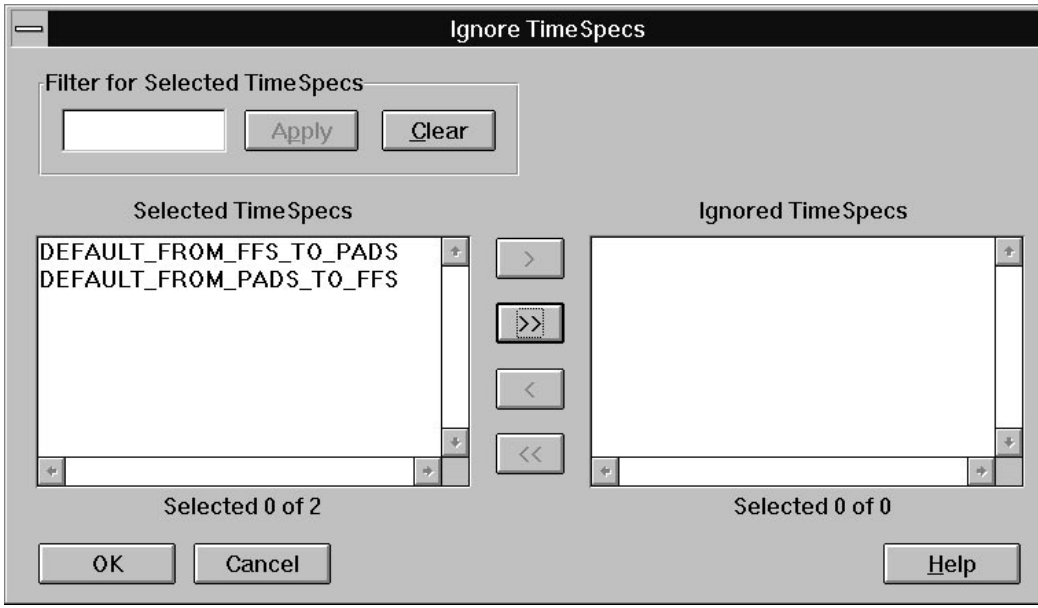

Figure 5-9 Ignore TimeSpecs Dialog Box

The Ignore TimeSpecs dialog box displays the following fields.

- Filter for Selected TimeSpecs limits the timing specifications displayed in the Selected TimeSpecs list box to those you specify.
  - Apply executes the filter indicated in the Filter for Selected TimeSpecs box and displays the subset in the Selected TimeSpecs list box.
  - Clear deletes the filter and redisplays all the timing specifications in the Selected TimeSpecs list box.
- Selected TimeSpecs lists the timing specifications to be included in the timing analysis, which you selected in the Filter for Selected TimeSpecs field. If you do not specify a filter, it lists all the timing specifications in the design.

- Ignored TimeSpecs lists all the timing specifications to be ignored in the current timing analysis.
- Add (>) moves the selected timing specifications from the Selected TimeSpecs list box to the Ignored TimeSpecs list box.
- Add All (>>) moves all listed timing specifications from the Selected TimeSpecs list box to the Ignored TimeSpecs list box.
- Remove (<) moves the selected timing specifications in the Ignored TimeSpecs list box to the Selected TimeSpecs list box.
- Remove All (<<) moves all listed timing specifications in the Ignored TimeSpecs list box to the Selected TimeSpecs list box.

Include Paths With Nets (Path Filters Menu)

The Include Paths With Nets command selects specific nets to be analyzed.

Use this path filter in conjunction with any of the following commands:

- Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints
- Performance Summary report, which indicates overall design performance
- Detailed Path report, which contains detailed timing information for all paths in the design

This command activates the Include Paths With Nets dialog box, shown in Figure 5-10.

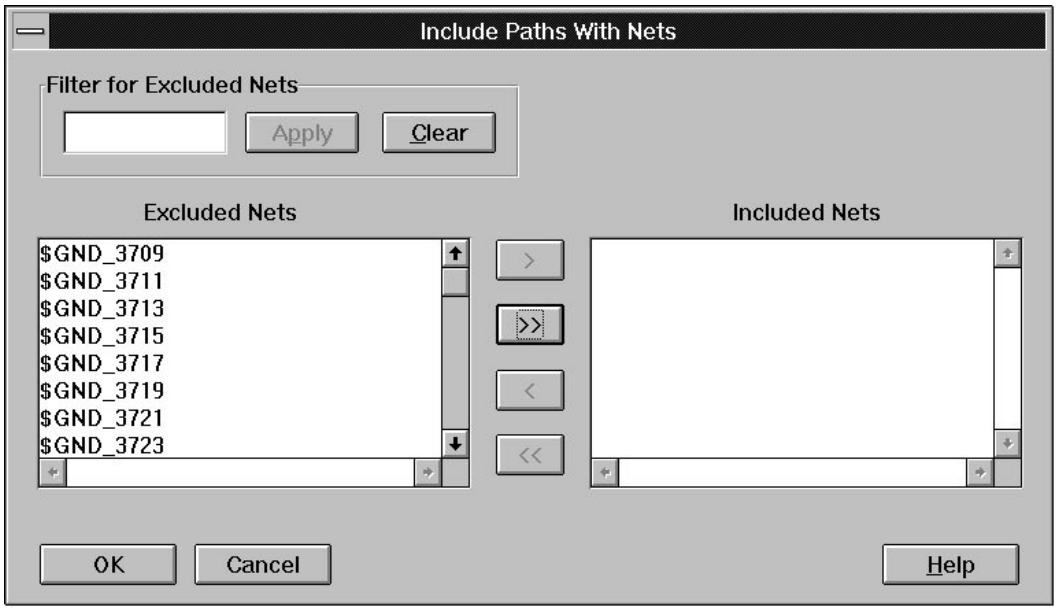

Figure 5-10 Include Paths With Nets Dialog Box

This dialog box includes the following fields.

- Filter for Excluded Nets limits the nets displayed in the Excluded Nets list box to those you specify.
  - Apply executes the filter indicated in the Filter for Excluded Nets box and displays the subset in the Excluded Nets list box.
  - Clear deletes the filter and redisplays all the nets in the Excluded Nets list box.
- Excluded Nets lists the nets to be ignored in the timing analysis, which you select in the Filter for Excluded Nets field. If you do not specify a filter, it lists all the nets in the design.
- Included Nets lists the nets to be included in the timing analysis.
- Add (>) moves the selected nets from the Excluded Nets list box to the Included Nets list box.

- Add All (>>) moves all the listed nets from the Excluded Nets list box to the Included Nets list box.
- Remove (<) moves the selected nets from the Included Nets list box to the Excluded Nets list box.
- Remove All (<<) moves all listed nets from the Included Nets list box to the Excluded Nets list box.

New Macro (File Menu)

The New Macro command enables you to create a new macro by cutting the appropriate sequence of commands from the Console window and pasting it in the New Macro window, shown in Figure 5-11.

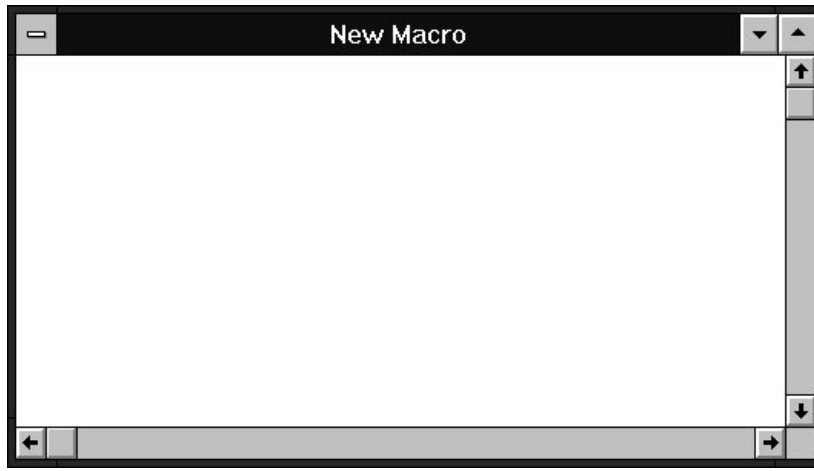

Figure 5-11 New Macro Window

Open (File Menu)

The Open command loads a routed LCA design file for timing analysis, or loads a report (XRP) file. It brings up the Open Design/ Report File dialog box, shown in Figure 5-12.

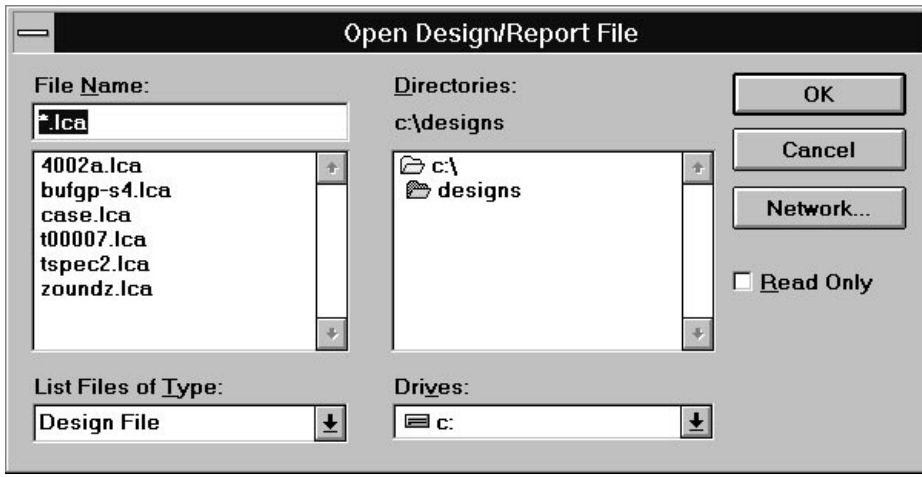

Figure 5-12 Open Design/Report File Dialog Box

This dialog box contains the following fields.

- File Name consists of a space for you to type in the name of the design (LCA) file or report (XRP) file that you want to load (backspace over the asterisk) or a list box where you can click on the name of the design.
- List Files of Type indicates whether the file to be opened is a design file or a report file.
- Directories lists the directories for the specified drive so you can select the directory that contains the design or report file that you want to load.
- Drives lists the drives to which the PC is connected so you can select the drive on which the file is located.
- Network accesses the network drive so you can connect to a printer on the network. It activates the Printers - Network Connections dialog box, shown under the Printer Setup command in this chapter. Consult the Microsoft Windows documentation or click on the Help button for an explanation of the fields on this dialog box. The Network option is only available if you are running Windows for Workgroups.

- Read Only has no function in the Timing Analyzer.

Open Macro (File Menu)

The Open Macro command opens an existing macro (XTM) file. It brings up the Open Macro File dialog box, shown in Figure 5-13:

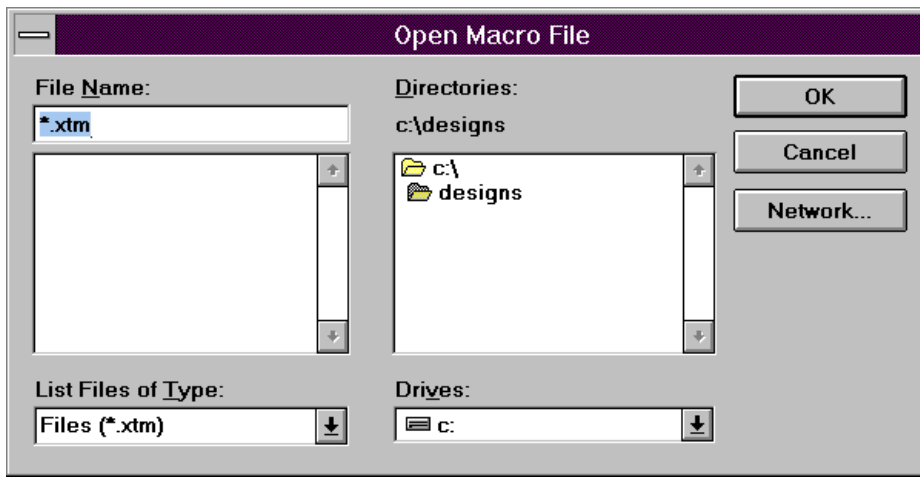

Figure 5-13 Open Macro File Dialog Box

This dialog box contains the following fields.

- File Name consists of a space for you to type in the name of the macro file that you want to load (backspace over the asterisk) or a list box where you can click on the name of the macro file.
- List Files of Type indicates the category of file to be listed in the File Name list box; it must be an XTM file.
- Directories lists the directories for the specified drive so you can select the directory where your macro file is located.
- Drives lists the drives to which the PC is connected so you can select the drive where your macro file is located.
- Network accesses the network drive so you can connect to a printer on the network. It activates the Printers - Network Connections dialog box, shown under the Printer Setup command

in this chapter. Consult the Microsoft Windows documentation or click on the Help button for an explanation of the fields on this dialog box. The Network option is only available if you are running Windows for Workgroups.

Path Analysis Filters (Path Filters Menu)

The Path Analysis Filters command brings up a submenu containing the following commands, which allow you to the define paths that you want to analyze.

- Select Sources
- Select Destinations
- Select Path Types

Refer to the alphabetical listings of these commands for an explanation of their functions.

Performance Summary (Analyze Menu)

The Performance Summary command generates the Performance Summary report, which displays the maximum clock frequencies for all clocks in the design and the worst-case timing for all clock paths.

You can use the following path filters to narrow the scope of this report:

- Select Sources
- Select Destinations
- Select Path Types
- Include Paths With Nets
- Exclude Paths With Nets
- Control Possible False Paths
- Break Logic Loops

Performance To TimeSpecs (Analyze Menu)

The Performance To TimeSpecs command generates the Performance To TimeSpecs report, which indicates whether the design meets the timing specifications entered using XACT-Performance.

You can use the following path filters to narrow the scope of this report:

- Report Paths Failing TimeSpec
- Report Paths With No TimeSpec
- Ignore TimeSpecs
- Include Paths With Nets
- Exclude Paths With Nets
- Control Possible False Paths
- Break Logic Loops

Print (File Menu)

The Print command displays the Print dialog box, which sends the report that is displayed in the active window to the default printer and allows you to indicate how many copies to print. Figure 5-14 shows an example of this dialog box.

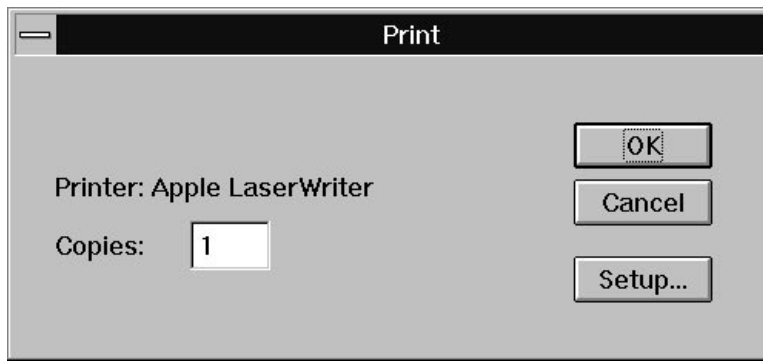

Figure 5-14 Print Dialog Box

The three options on this prompt box are the following.

- OK exits the dialog box and prints the specified file.
- Cancel exits the dialog box without printing the file.

- Setup activates the Print Setup dialog box, shown in Figure 5-15.

Printer Setup (File Menu)

The Printer Setup command sends any report to a printer other than the default printer for your site and allows you to change printer options. It activates the Print Setup dialog box, shown in Figure 5-15.

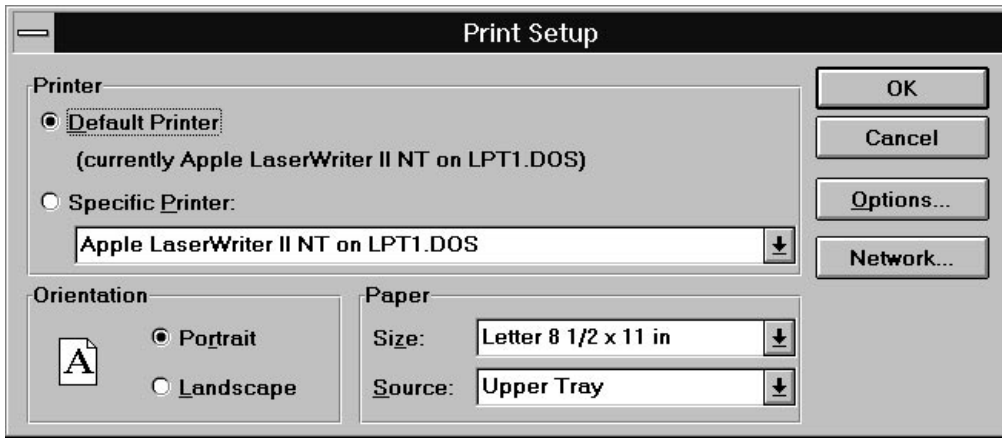

Figure 5-15 Print Setup Dialog Box

This dialog box contains the following fields.

- Default Printer allows you to select the default printer for your site.
- Specific Printer allows you to specify an alternative printer.
- Orientation allows you to print in either portrait (vertical) mode or landscape (horizontal) mode.
- Paper consists of the following two fields.
  - Size allows you to select the size of paper to print on.
  - Source determines whether the paper to be printed on is automatically or manually fed to the printer. Select Upper Tray for automatic feed or Manual Feed for manual feed.

- Options brings up the Options dialog box, shown in Figure 5-16.

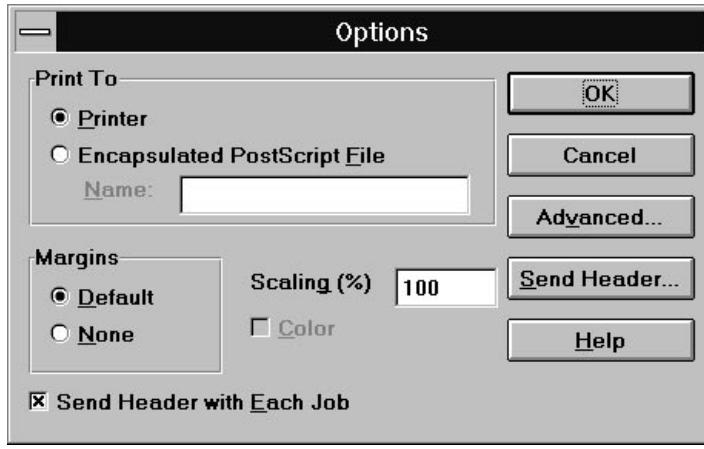

Figure 5-16 Options Dialog Box

Consult the Microsoft Windows documentation or click on the Help button for an explanation of the fields on this dialog box.

- Network accesses the network drive so you can connect to a printer on the network. It activates the Printers - Network Connections dialog box, shown in Figure 5-17. Consult the Microsoft Windows documentation or click on the Help button for an explanation of the fields on this dialog box. The Network option is only available if you are running Windows for Workgroups.

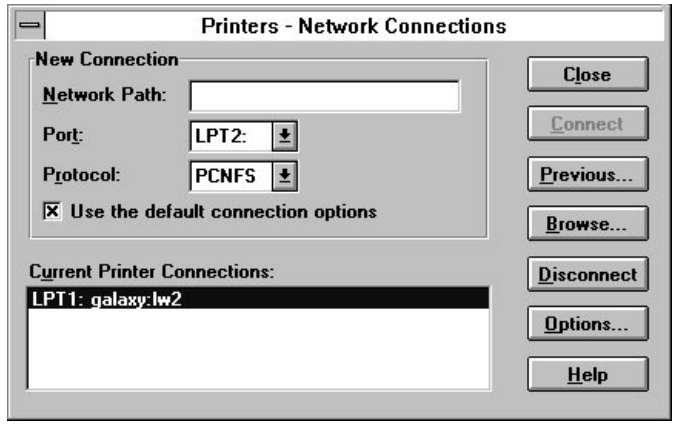

Figure 5-17 Printers - Network Connections Dialog Box

Query (Options Menu)

The Query command displays information about the specified delay group, that is, nets, blocks, timing specifications, or timing groups. It activates the Query dialog box, shown in Figure 5-18.

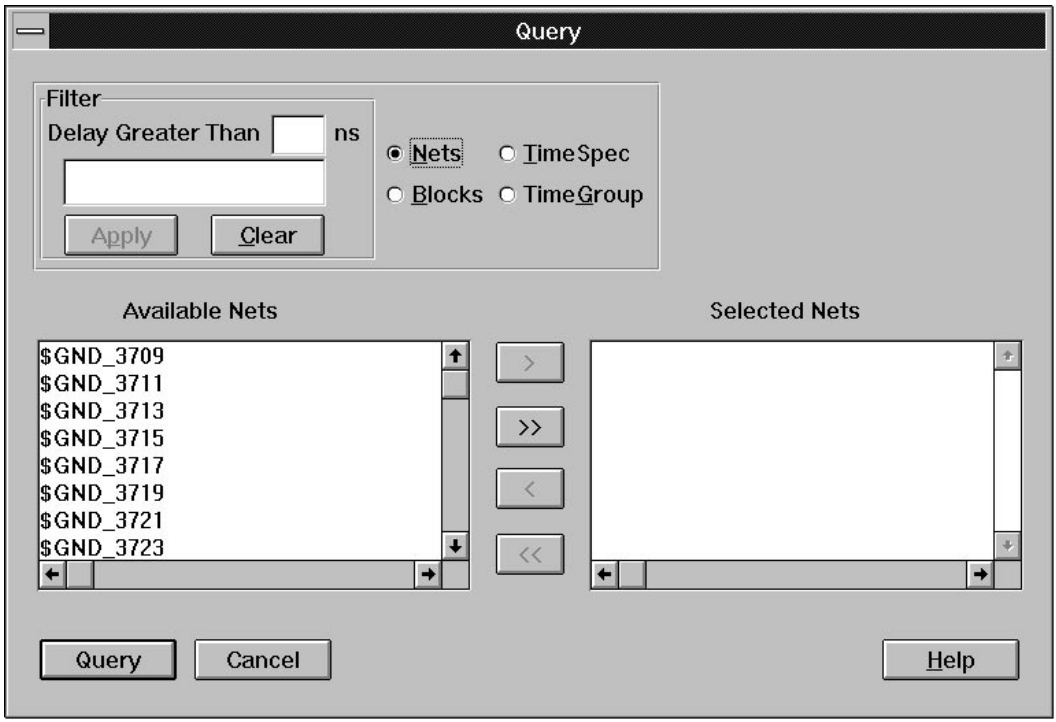

Figure 5-18 Query Dialog Box

The Query dialog box contains the following fields:

- Filter provides a space in which to specify a subset of nets, blocks, timing specifications, or timing groups.
- Delay Greater Than specifies a minimum net delay in nanoseconds. The Timing Analyzer displays only those paths that have a delay greater than or equal to the specified value. You can enter a value in this field only when you select Nets. If you enter a value in both the Delay Greater Than and the filter field, the Timing Analyzer lists the nets that meet both criteria.
    - Apply executes the filter indicated in the Filter box and displays the subset in the Available Nets/Blocks/TimeSpecs/TimeGroups list box.

  - Clear deletes the filter and redisplays all the nets in the Available Nets/Blocks/TimeSpecs/TimeGroups list box.

- Nets requests information about nets. When you select this option, the Timing Analyzer shows the fanout, the timing from the source CLB to each of the destination CLBs, and the CLB names.
- Blocks requests information about blocks, or CLBs. The Timing Analyzer displays the CLB names, the pins on the CLBs, and the names of the clocks and signals attached to these pins. In a net binding table, it shows which nets are attached to the pins on a CLB, the function of each function generator in the CLB, the internal blocks in the CLB, and the external connections. It indicates if the block is unconfigured and unused in the design and notes the configuration options used. For more information on all of these elements, consult the "XACT Design Editor" chapter of the *Development System Reference Guide*.
- TimeSpec requests information about timing specifications. The Timing Analyzer lists the timing specifications defined in XACT-Performance.
- TimeGroup requests information about timing groups. The Timing Analyzer lists the elements and the output nets in the specified timing groups.
- Available Nets/Blocks/TimeSpecs/TimeGroups displays all the available net, block, timing specification, or timing group elements on which you can obtain information.
- Selected Nets/Blocks/TimeSpecs/TimeGroups displays only those net, block, timing specification, or timing group elements that you have selected.
- Query exits the dialog box and displays the requested information in a pop-up window.
- Add (>) moves the selected elements from the Available Nets/Blocks/TimeSpecs/TimeGroups list box to the Selected Nets/Blocks/TimeSpecs/TimeGroups list box.
- Add All (>>) moves all the listed elements from the Available Nets/Blocks/TimeSpecs/TimeGroups list box to the Selected Nets/Blocks/TimeSpecs/TimeGroups list box.

- Remove (<) moves the selected elements from the Selected Nets/Blocks/TimeSpecs/TimeGroups list box to the Available Nets/Blocks/TimeSpecs/TimeGroups list box.
- Remove All (<<) moves all listed elements from the Selected Nets/Blocks/TimeSpecs/TimeGroups list box to the Available Nets/Blocks/TimeSpecs/TimeGroups list box.

Report Options (Options Menu)

The Report Options command determines the appearance of a report and the information that it contains. It activates the Report Options dialog box, shown in Figure 5-19, so you can customize the Timing Analyzer reports.

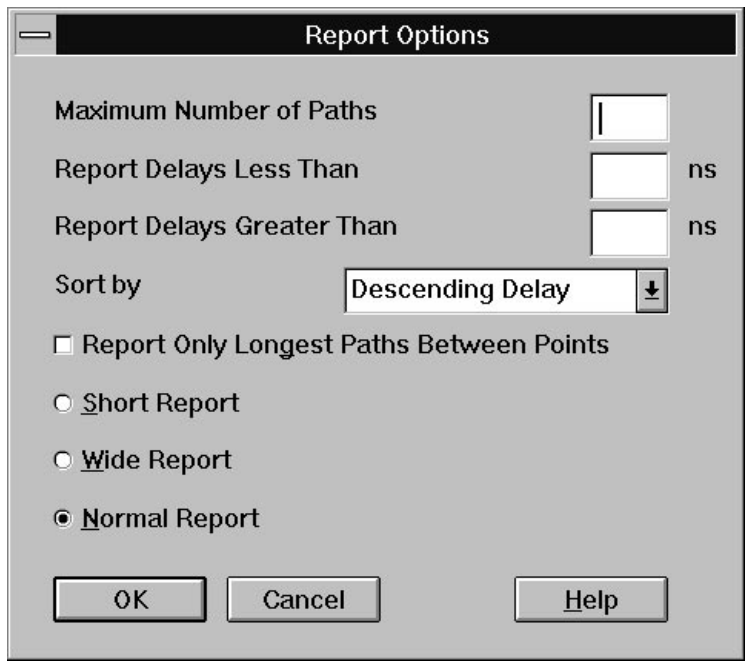

Figure 5-19 Report Options Dialog Box

The Report Options dialog box contains the following fields.

- Maximum Number of Paths limits the total number of paths that the Timing Analyzer reports. This option can be useful when system memory is limited because it limits the number of paths stored in memory. By default, the Timing Analyzer analyzes all paths in the design.
- Report Delays Less Than instructs the Timing Analyzer to report only those paths that have a delay less than or equal to the specified value. By default, the Timing Analyzer reports all paths regardless of their delay.
- Report Delays Greater Than instructs the Timing Analyzer to report only those paths that have a delay greater than or equal to the specified value. By default, the Timing Analyzer reports all paths regardless of their delay.
- Sort By defines the order in which the paths are reported. It offers the following six options.
    - Ascending Delay lists paths in order from shortest to longest delays.
    - Descending Delay, the default, lists paths in order from longest to shortest delays.
    - Source Block sorts path delays by the source block name, which is useful when trying to determine the worst-case delay from a given block.
    - Destination Block sorts path delays by the destination block name, which can help determine the worst-case path to each block.
    - Source Clock Net sorts path delays by the clock name that sources the first element in a path, which separates delay information for two or more clock nets in a design.
    - Destination Clock Net sorts path delays by the clock name that sources the last element in a path.
- The Report Only Longest Paths Between Points check box directs the Timing Analyzer to report only the path with the longest delay if there is more than one path between two end points. By default, the Timing Analyzer reports all paths.

- Short Report generates a report containing only the path source and end point. This report lists one delay path per line and does not display cumulative delays through CLBs.
- Wide Report creates a report formatted into 132 characters per line, which prevents long block and net names from being truncated.
- Normal Report, the default, produces a report displaying a detailed list of path delays.

Report Paths Failing TimeSpec (Path Filters Menu)

The Report Paths Failing TimeSpec command lists only the paths that do not meet the timing specifications entered using XACT-Performance.

Use this path filter in conjunction with the Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints.

Report Paths With No TimeSpec (Path Filters Menu)

The Report Paths With No TimeSpec command reports paths that do not have timing specifications.

Use this path filter in conjunction with the Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints.

Reset Path Filters (Path Filters Menu)

The Reset Path Filters command causes path filters to revert to the defaults. For the defaults, see the Show Settings command.

Run Macro (File Menu)

The Run Macro command runs the specified macro, which is a script file that contains Timing Analyzer commands, filters, and/or report options.

Save As Macro (File Menu)

The Save As Macro command saves the edited macro to another file. It brings up the Save Macro As dialog box, which is the same dialog box activated by the Save Macro command. This dialog box is displayed in Figure 5-20.

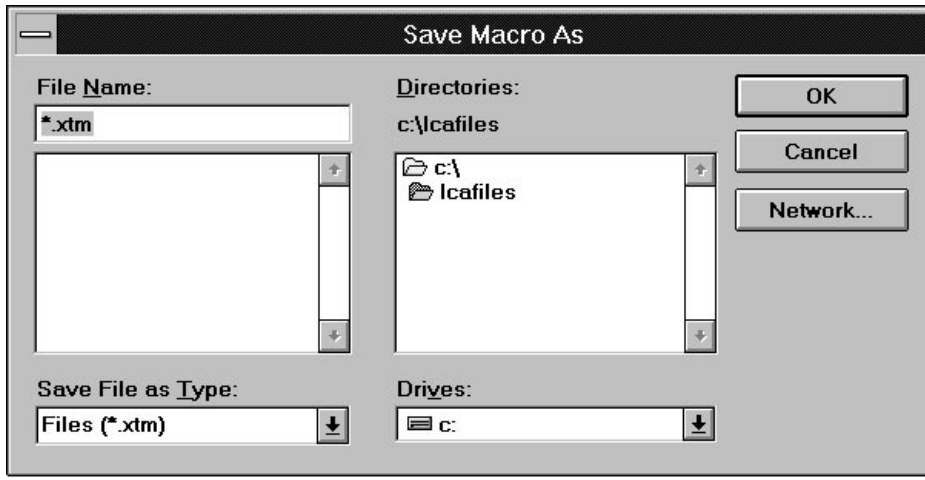

Figure 5-20 Save Macro As Dialog Box

The Save Macro As dialog box contains the following fields:

- File Name consists of a space for you to type in the name of the file in which to store the macro (backspace over the asterisk). It also offers a list box where you can click on the name of an existing file to overwrite with a new macro.
- Save File as Type allows you to select a category of file type to display in the File Name list box. XTM files are the only category available for macros.
- Directories lists the directories for the specified drive so you can select the directory in which to save your macro file.
- Drives lists the drives to which the PC is connected so you can select the drive on which to save the macro file.

- Network accesses the network drive so you can connect to a printer on the network. It activates the Printers - Network Connections dialog box, shown under the Printer Setup command in this chapter. Consult the Microsoft Windows documentation or click on the Help button for an explanation of the fields on this dialog box. The Network option is only available if you are running Windows for Workgroups.

Save Macro (File Menu)

The Save Macro command saves macros created with the New Macro command. It activates the Save Macro As dialog box, shown in Figure 5-20. If you have saved the macro once, the Save Macro command saves the macro in the specified file without activating the Save Macro As dialog box.

Save Report (File Menu)

The Save Report command saves the report in the active window to a specified file. It brings up the Save Report dialog box, shown in Figure 5-21.

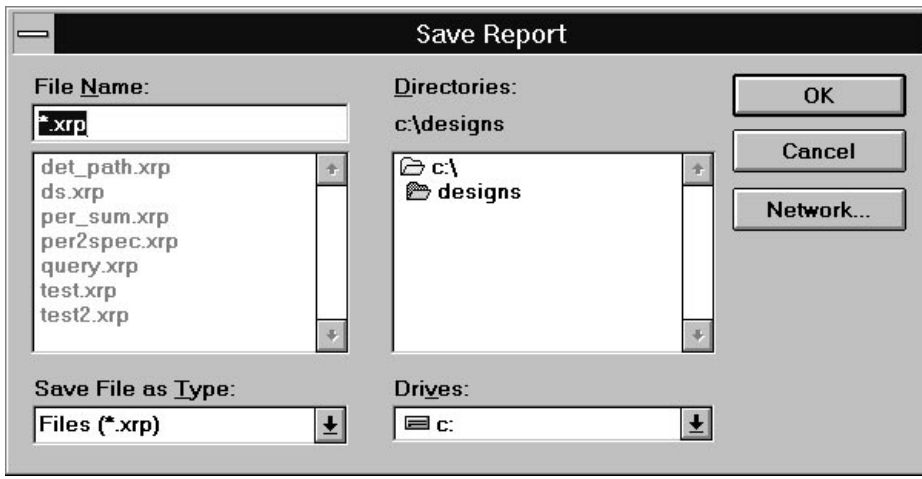

Figure 5-21 Save Report Dialog Box

This dialog box contains the following fields.

- File Name consists of a space for you to type in the name of the file in which to store the report (backspace over the asterisk). It also offers a list box where you can click on the name of an existing file to overwrite with a new report.
- Save File as Type allows you to select a category of file type to display in the File Name list box. By default, if you do not specify a file extension, the Timing Analyzer saves the file as an XRP file, that is, as a file with an .xrp extension.
- Directories lists the directories for the specified drive so you can select the directory in which to save the report file.
- Drives lists the drives to which the PC is connected so you can select the drive on which to save the report file.
- Network accesses the network drive so you can connect to a printer on the network. It activates the Printers - Network Connections dialog box, shown under the Printer Setup command in this chapter. Consult the Microsoft Windows documentation or click on the Help button for an explanation of the fields on this dialog box. The Network option is only available if you are running Windows for Workgroups.

Search for Help On (Help Menu)

The Search for Help On command brings up a pop-up window that lets you search for a specific topic.

Select Destinations (Path Filters Menu)

The Select Destinations command allows you to define a path's ending points, which can be flip-flops, IOBs, clocks, nets, pins, CLBs, or all types.

Use this path filter in conjunction with the Performance Summary report, which indicates overall design performance. You can also use this filter with the Detailed Path report, which contains detailed timing information for all paths in the design.

This command brings up the Select Destinations dialog box, shown in Figure 5-22.

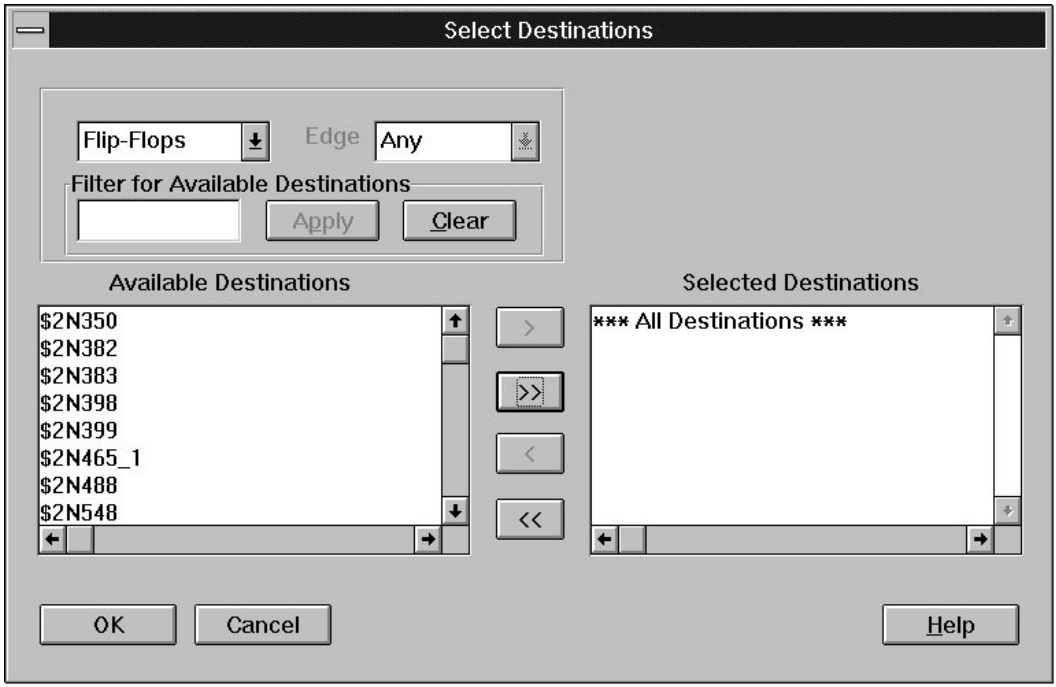

Figure 5-22 Select Destinations Dialog Box

This dialog box contains the following fields:

- Destination Type in the upper left-hand corner lists the destination type, that is, Flip-Flops, IOBs, Clocks, Nets, Pins, CLBs, or All. The default is Flip-Flops.
- Edge determines whether the destination is a clock's rising edge, falling edge, or either edge. This option is available only when you select Clocks in the Destination Type field.
- Filter for Available Destinations allows you to limit the destination to a particular element or elements within the indicated category.
    - Apply executes the filter indicated in the Filter for Available Destinations box and displays the subset in the Available Destinations list box.

- Clear deletes the filter and redisplays all the destinations of the default type in the Available Destinations list box.

- Available Destinations lists all the individual destinations for the specified destination type. You can display a subset by entering a filter in the Filter for Available Destinations box.
- Selected Destinations displays all the individual destinations that you selected for the specified destination type.
- Add (>) moves the selected elements from the Available Destinations list box to the Selected Destinations list box.
- Add All (>>) moves all the listed elements from the Available Destinations list box to the Selected Destinations list box.
- Remove (<) moves the selected elements from the Selected Destinations list box to the Available Destinations list box.
- Remove All (<<) moves all listed elements from the Selected Destinations list box to the Available Destinations list box.

Select Path Types (Path Filters Menu)

The Select Path Types command selects the path types to report. By default, the Timing Analyzer reports timing delays for all path types.

Use this path filter in conjunction with the Performance Summary report, which indicates overall design performance. You can also use this filter with the Detailed Path report, which contains detailed timing information for all paths in the design.

This command brings up the Select Path Types dialog box, shown in Figure 5-23.

Figure 5-23 Select Path Types Dialog Box

The Select Path Types dialog box contains the following fields. For a description of these paths, see the "Timing Analysis" chapter.

- Clock To Setup reports clock-to-setup paths.
- Clock To Pad reports clock-to-pad paths.
- Pad To Setup reports pad-to-setup paths.
- Paths Ending At Clock Pin of Flip-flop reports clock input paths.
- Pad To Pad reports pad-to-pad paths.

Select Sources (Path Filters Menu)

The Select Sources command allows you to define a path's starting points, which can be flip-flops, IOBs, clocks, nets, pins, CLBs, or all types.

Use this path filter in conjunction with the Performance Summary report, which indicates overall design performance. You can also use this filter with the Detailed Path report, which contains detailed timing information for all paths in the design.

The Select Sources command activates the Select Sources dialog box, shown in Figure 5-24.

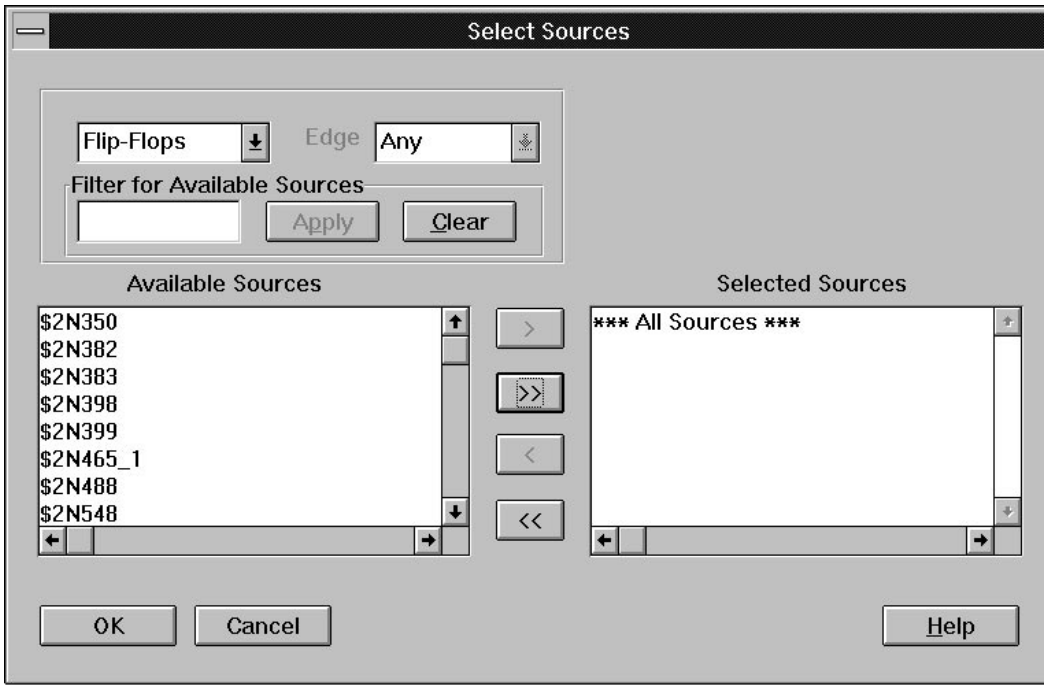

Figure 5-24 Select Sources Dialog Box

The Select Sources dialog box displays the following fields:

- Source Type in the upper left-hand corner lists the source type, that is, Flip-Flops, IOBs, Clocks, Nets, Pins, CLBs, or All. The default is Flip-Flops.
- Edge determines whether the source is a clock's rising edge, falling edge, or either edge. This option is available only when you select Clocks in the Source Type field.
- Filter for Available Sources allows you to limit the source to a particular element or elements within the indicated source type.
  - Apply executes the filter indicated in the Filter for Available Sources box and displays the subset in the Available Sources list box.

- Clear deletes the filter and redisplays all the sources of the default type in the Available Sources list box.

- Available Sources lists all the individual sources for the specified source type. You can display a subset by entering a filter in the Filter for Available Sources box.
- Selected Sources displays all the individual sources that you selected for the specified source type.
- Add (>) moves the selected elements from the Available Sources list box to the Selected Sources list box.
- Add All (>>) moves all the listed elements from the Available Sources list box to the Selected Sources list box.
- Remove (<) moves the selected elements from the Selected Sources list box to the Available Sources list box.
- Remove All (<<) moves all listed elements from the Selected Sources list box to the Available Sources list box.

Set Delay Margins for I/O (Options Menu)

The Set Delay Margins for I/O command adds extra delay to input and output paths that travel off-chip. Setting a delay margin enables you to determine a more realistic clock speed. This command activates the Set Delay Margins for I/O dialog box, shown in Figure 5-25.

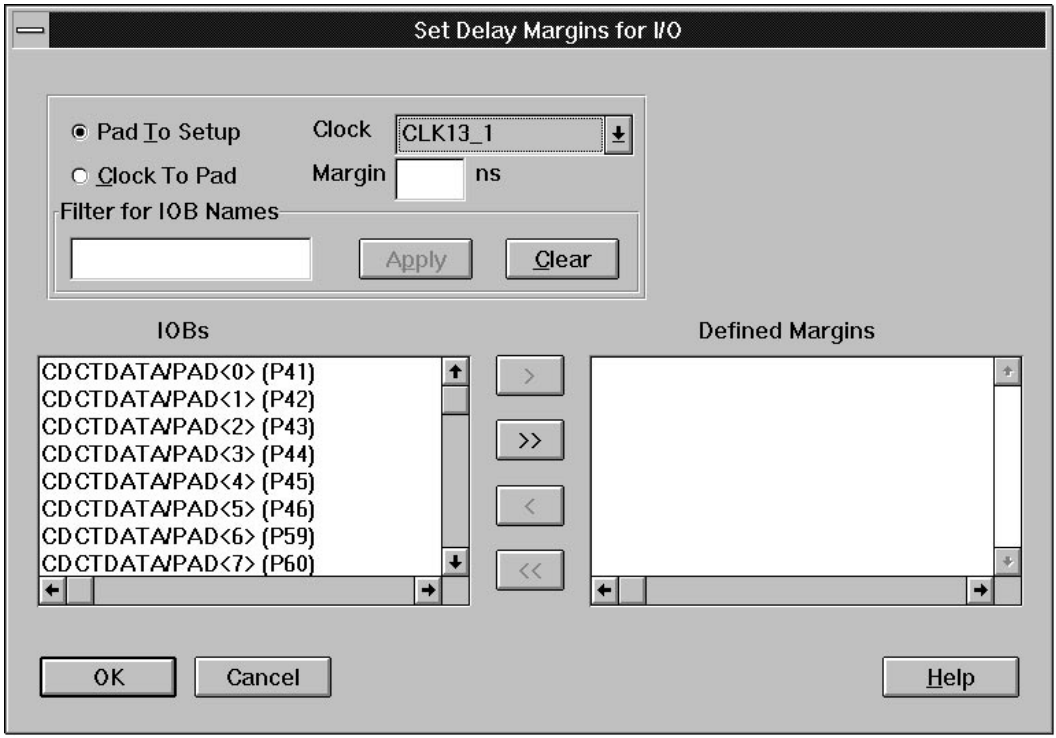

Figure 5-25 Set Delay Margins for I/O Dialog Box

This dialog box contains the following fields.

- Pad To Setup displays the pad-to-setup paths for the specified clock in the IOBs list box. It is selected by default.
- Clock To Pad displays the clock-to-pad paths for the specified clock in the IOBs list box.
- Clock lists the clocks in the design. You can set delay margins for each clock in the design.
- Margin specifies the amount of delay to add to the delay from the source to the pad. It can be a value from 1 through 999 ns.
- Filter for IOB Names limits the IOBs driven by the clock that you selected to those that you specify.

- Apply executes the filter indicated in the Filter for IOB Names box and displays the subset in the IOBs list box.
- Clear deletes the filter and redisplays all the IOBs in the IOBs list box.

- IOBs lists the IOBs driven by the clock that you specified in the Clock field.
- Defined Margins lists the IOBs to which the delay is to be applied.
- Add (>) moves the selected elements from the IOBs list box to the Defined Margins list box.
- Add All (>>) moves all the listed elements from the IOBs list box to the Defined Margins list box.
- Remove (<) moves the selected elements from the Defined Margins list box to the IOBs list box.
- Remove All (<<) moves all listed elements from the Defined Margins list box to the IOBs list box.

Show Clocks (Analyze Menu)

The Show Clocks command creates the Show Clocks report, which lists the names of all clocks in the design.

Show Settings (Analyze Menu)

The Show Settings command lists the settings of the Timing Analyzer options set with the commands on the Path Filters and Options menus. The "How to Use the Timing Analyzer" chapter gives an example of the window that appears when you select this command.

The default settings are as follows.

- Sort On –Descend

  The Descending Delay option in the Sort By field in the Report Options dialog box lists paths in order from longest to shortest delays.

- Report –Normal

  The Normal Report option in the Report Options dialog box generates a report displaying a detailed list of path delays.

- OnlyLongestPaths –False

  The Timing Analyzer reports all paths. If the Report Only Longest Paths Between Points option in the Report Options dialog box is set to True, the Timing Analyzer reports only the path with the longest delay if there is more than one path between two end points.

- SelectFailingTimespec –False

  The Timing Analyzer reports all paths with timing specifications. If you select the Report Paths Failing TimeSpec command from the Path Filters menu, this option is set to True, indicating that the Timing Analyzer reports the paths that do not meet the timing specifications entered using the XACT-Performance utility.

- IncludeNoTimespec –False

  The Timing Analyzer reports all timing specifications. If you select the Report Paths With No TimeSpec command, this option is set to True, indicating that the Timing Analyzer reports the paths without timing specifications.

- Speed *speedgrade*

  This option lists the speed grade specified in the LCA file, but you can change the speed grade by selecting Change Speed Grade from the Options menu.

Status Bar (View Menu)

The Status Bar command controls whether or not the status bar is displayed. It is displayed by default.

Tile (Window Menu)

The Tile command arranges the open windows in rows across the Timing Analyzer screen. The windows are fitted into all available screen space without overlapping, as Figure 5-26 demonstrates.

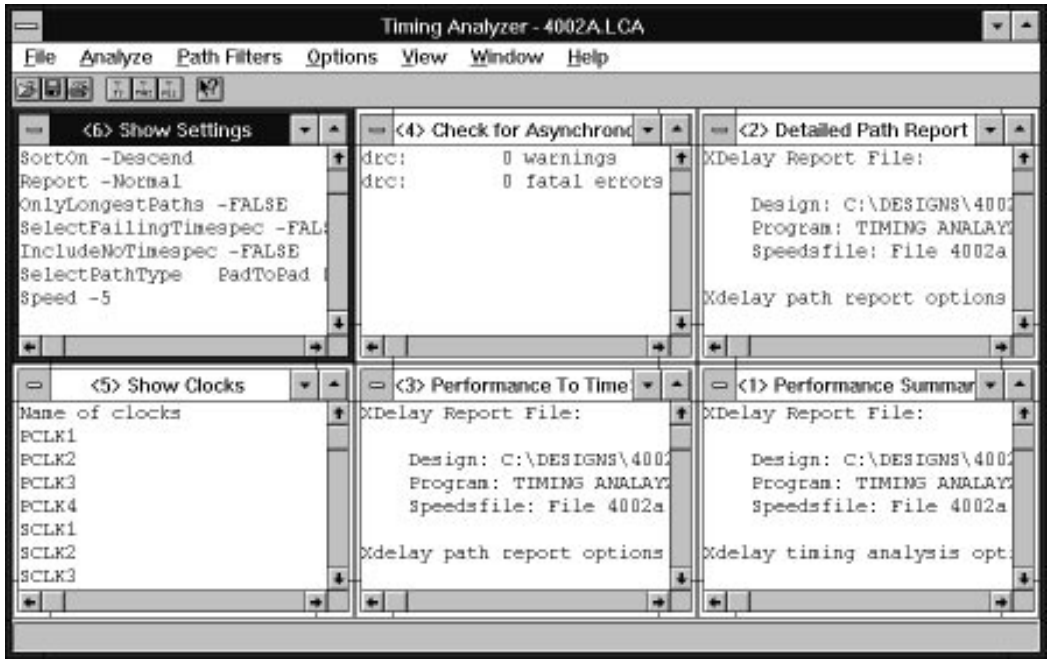

Figure 5-26 Tiled Windows

TimeSpec Filters (Path Filters Menu)

The TimeSpec Filters command brings up a submenu containing the following commands, which report paths constrained by timing specifications entered with XACT-Performance.

- Report Paths Failing TimeSpec
- Report Paths With No TimeSpec
- Ignore TimeSpecs

Refer to the alphabetical listings of these commands for an explanation of their functions.

Toolbar (View Menu)

The Toolbar command controls whether or not the toolbar is displayed. It is displayed by default. See the "Toolbar Icons" section, following, for a description of the icons on the toolbar.

Tutorial (Help Menu)

The Tutorial command activates an interactive tutorial demonstrating some of the procedures available in the Timing Analyzer.

Toolbar Icons

You can access some of the Timing Analyzer commands through toolbar icons. The Timing Analyzer window displays the following icons. The Copy, Paste, and Run Macro icons appear only when you click on the File → New Macro command. When you move the cursor over each icon, an identifying label appears over it and in the status bar. These icons are discussed in the order that they appear on the toolbar.

Open Design File Icon

The Open Design File icon, shown in Figure 5-27, opens a design for timing analysis. It is equivalent to the File → Open command.

Figure 5-27 Open Design Icon

Save Icon

The Save icon, shown in Figure 5-28, saves the active report window to a specified file. It is equivalent to the File → Save Report command.

Figure 5-28 Save Report Icon

Print Report Icon

The Print Report icon, shown in Figure 5-29, sends the report displayed in the active window to the default printer. It is equivalent to the File → Print command.

Figure 5-29 Print Report Icon

Performance To Timespec Icon

The Performance To Timespec icon, shown in Figure 5-30, generates the Performance To TimeSpecs report, which compares the implementation of the design to the XACT-Performance constraints. It is equivalent to the Analyze → Performance To TimeSpecs command.

Figure 5-30 Performance To TimeSpec Icon

Design Performance Summary Icon

The Design Performance Summary icon, shown in Figure 5-31, generates the Performance Summary report, which indicates overall design performance. It is equivalent to the Analyze → Performance Summary command.

Figure 5-31 Design Performance Summary Icon

Detailed Analysis Icon

The Detailed Analysis icon, shown in Figure 5-32, generates the Detailed Path report, which contains worst-case path delays for all

paths in the design. It is equivalent to the Analyze → Detailed Path Report command.

Figure 5-32 Detailed Analysis Icon

Help Icon

The Help icon, shown in Figure 5-33, displays information about a menu command or option when you click on it. The information is displayed in a pop-up window. See the "Obtaining Help" section of the "Getting Started" chapter for more information.

Figure 5-33 Context-Sensitive Help Icon

Copy Icon

The Copy icon, shown in Figure 5-34, copies the highlighted commands in the Console window so that you can paste them into the New Macro window to form a new macro. The Copy icon appears only when you click on the New Macro command from the File menu.

Figure 5-34 Copy Icon

Paste Icon

The Paste icon pastes the commands highlighted in the Console window into the New Macro window to form a new macro. This icon is shown in Figure 5-35. It appears only when you click on the New Macro command from the File menu.

Figure 5-35 Paste Icon

Run Macro Icon

The Run Macro icon runs an existing macro, which you open with the File → Open Macro command. The Run Macro icon appears only when you click on the New Macro command from the File menu. It is equivalent to the File → Run Macro command. Figure 5-36 displays this icon.

Figure 5-36 Run Macro Icon

Keyboard Commands

This chapter describes all the commands that you can enter from the keyboard in the Timing Analyzer's Console or New Macro window. They are listed in alphabetical order.

The syntax of these commands is case-insensitive.

For more information on issuing commands through the Console window, see the "Using the Console Window" section of the "How to Use the Timing Analyzer" chapter. For instructions on using these commands to build macros, see the "Using Macros" section of the same chapter.

BreakLogicLoop	Treats combinatorial logic as synchronous timing elements
CheckAsynch	Generates report indicating whether LCA file contains logic not controlled by a register
ControlPathTracing	Prohibits tracing of false paths
DefineEndpts	Defines path starting and ending points
DelayGreaterThan	Specifies minimum delay
DelayLessThan	Specifies maximum delay
DesignSummary	Generates report indicating overall design performance
DetailAnalysis	Generates report containing worst-case path delays for all paths in design
ExcludeNets	Ignores specific nets during analysis
Exit	Exits the Timing Analyzer
Force	Suppresses messages when macro is run
IgnoreTimespec	Ignores timing specifications
IncludeNet	Selects specific nets to be analyzed
IncludeNoTimespec	Lists paths with no timing specifications
MaxNoPaths	Limits the total number of paths that

	Timing Analyzer reports
MaxNoPathsPerTimespec	Limits number of paths reported per timing specification
OnlyLongestPaths	Reports only paths with longest delay
OpenDesign	Loads a design for timing analysis
PerformToTimespec	Generates report indicating whether design meets timing specifications
Query	Displays information about groups of elements
Report	Determines format of reports
ResetFilters	Causes path filters to revert to default
RunMacro	Runs macro
SelectFailingTimespec	Lists paths not meeting timing specifications
SelectPathType	Selects path type to analyze
SetMargins	Adds extra delay to input and output paths
ShowClockNets	Generates report listing all clocks in design
SortOn	Defines order in which paths are reported
Speed	Selects speed grade

BreakLogicLoop

The BreakLogicLoop command allows combinatorial logic to be treated as synchronous timing elements, for example, latch-based designs implemented with primitive gates.

This command corresponds to the Path Filters → Common Filters → Break Logic Loops menu command.

Syntax

The syntax of the BreakLogicLoop command is the following:

`BreakLogicLoop {-net}` *element_name element_name* **`...`**

- –Net indicates that the logic loop is to be broken at a net.
- *Element_name* is the names of the nets or blocks where the logic loop is to be broken.

Abbreviation

You can abbreviate the BreakLogicLoop command syntax as follows:

`bll {-n}` *element_name*

Example

Following is an example of the BreakLogicLoop command:

```
breaklogicloop -net $1N24
```

CheckAsynch

The CheckAsynch command checks the LCA file for logic that is not controlled by a register. It issues the results in the Check for Asynchronous Logic report.

This command corresponds to the Analyze → Check for Asynchronous Logic menu command.

Syntax

The syntax of the CheckAsynch command is the following:

`CheckAsynch [-save` *filename*`]`

- –Save indicates that you can optionally save the output of the CheckAsynch command in a file. If this option is not specified, the report appears in a window.
- *Filename* is the name of the saved file.

Abbreviation

You can abbreviate the CheckAsynch command syntax as follows:

`ca [-save` *filename*`]`

Example

Following is an example of the CheckAsynch command:

```
checkasynch -save predesign.xrp
```

ControlPathTracing

The ControlPathTracing command controls whether the Timing Analyzer traces false paths through RAM, 3-state buffers, input and output pins, and Set/Reset logic.

This command corresponds to the Path Filters → Common Filters → Control Possible False Paths menu command.

Syntax

The syntax of the ControlPathTracing command is the following:

`ControlPathTracing {-DataInput|-WriteEnable|-TristateToOutput|-TristateToInput|-SetResetToQ|-OutputToInput|-InputToOutput}` *block_name block_name ...*

- –DataInput allows or prohibits paths through the data inputs of a CLB RAM. By default, the Timing Analyzer allows these paths.
- –WriteEnable allows or prohibits paths through the write-enable input of a CLB RAM. By default, the Timing Analyzer allows these paths.
- –TristateToOutput allows or prohibits paths that go through a BUFT T pin to the BUFT O pin. By default, the Timing Analyzer allows these paths.
- –TristateToInput allows or prohibits paths that go from the IOB T pin to the pad and back into the chip through the IOB I pin. By default, the Timing Analyzer prohibits these paths.
- –SetResetToQ allows or prohibits paths through CLB flip-flop asynchronous Set or Reset inputs. By default, the Timing Analyzer prohibits these paths.
- –OutputToInput allows or prohibits paths that go from the IOB O pin to the pad and back into the chip through the IOB I pin. By default, the Timing Analyzer prohibits these paths.
- –InputToOutput allows or prohibits paths that go through the BUFT I pin to the BUFT O pin. By default, the Timing Analyzer allows these paths.
- *Block_name* is the names of the CLBs that the path goes through.

Abbreviation

You can abbreviate the ControlPathTracing command syntax as follows:

cpt {-di|-we|-tto|-tti|-srq|-oti|-ito} *block_name block_name ...*

Example

Following is an example of the ControlPathTracing command:

```
controlpathtracing -writeenable CLB_R4C4
```

DefineEndpts

The DefineEndpts command selects the starting points and ending points of the paths that you want to analyze.

This command corresponds to the Path Filters → Path Analysis Filters → Select Sources and the Path Filters → Path Analysis Filters → Select Destinations menu commands.

Syntax

The syntax of the DefineEndpts command is the following:

DefineEndpts {-FromIOBs|-ToIOBs} *IOB_name*
DefineEndpts {-FromCLB|-ToCLB} *CLB_name*
DefineEndpts {-FromNet|-ToNet} *net_name*
DefineEndpts {-FromPin|-ToPin} *pin_name*
DefineEndpts {-FromFlipflop|-ToFlipflop} *flip-flop_name*
DefineEndpts {-FromRising|-ToRising} *clock_name*
DefineEndpts {-FromFalling|-ToFalling} *clock_name*
DefineEndpts {-FromAny|-ToAny} {*pin_name*|*CLB_name*|*net_name*}
DefineEndpts {-FromAll|-ToAll}

- –FromIOBs selects IOBs as starting points for the path to be analyzed.
- –ToIOBs selects IOBs as ending points for the path to be analyzed.

- –FromCLB selects CLBs as starting points for the path to be analyzed.
- –ToCLB selects CLBs as ending points for the path to be analyzed.
- –FromNet selects nets as starting points for the path to be analyzed.
- –ToNet selects nets as ending points for the path to be analyzed.
- –FromPin selects pins as starting points for the path to be analyzed.
- –ToPin selects the ending points for the path to be analyzed.
- –FromFlipflop selects flip-flops as starting points for the path to be analyzed.
- –ToFlipflop selects flip-flops as ending points for the path to be analyzed.
- –FromRising selects rising clock edges as starting points for the path to be analyzed.
- –ToRising selects rising clock edges as ending points for the path to be analyzed.
- –FromFalling selects falling clock edges as starting points for the path to be analyzed.
- –ToFalling selects falling clock edges as ending points for the path to be analyzed.
- –FromAny selects any clock edges as starting points for the path to be analyzed.
- –ToAny selects any clock edges as ending points for the path to be analyzed.
- –FromAll selects paths that begin at any path source.
- –ToAll selects paths that end at any path destination.
- *CLB_name* is the name of the CLB that is the starting or ending point of the path to be analyzed.
- *IOB_name* is the name of the IOB that is the starting or ending point of the path to be analyzed.

- *Flip-flop_name* is the name of the flip-flop that is the starting or ending point of the path to be analyzed.
- *Net_name* is the name of the net that is the starting or ending point of the path to be analyzed.
- *Clock_name* is the name of the clock that is the starting or ending point of the path to be analyzed.
- *Pin_name* is the name of the pin that is the starting or ending point of the path to be analyzed.

The defaults are –FromAll and –ToAll.

Abbreviation

You can abbreviate the DefineEndpts command syntax as follows:

def {-fiobs|-tiobs} *IOB_name*
def {-fclb|-tclb} *CLB_name*
def {-fnet|-tnet} *net_name*
def {-fpin|-tpin} *pin_name*
def {-fff|-tff} *flip-flop_name*
def {-fris|-tris} *clock_name*
def {-ffal|-tfal} *clock_name*
def {-fany|-tany} {*pin_name*|*CLB_name*| *net_name*}
def {-fall|-tall}

These parameters have the same respective meanings as the parameters in the longer form of the syntax.

Example

Following are examples of the DefineEndpts command:

```
defineendpts -fromflipflop CNT3Q0 CNT3Q1
defineendpts -toiobs P80 P68
```

DelayGreaterThan

The DelayGreaterThan command specifies a minimum delay in nanoseconds. The Timing Analyzer reports only those paths that have a delay greater than or equal to the specified value. By default, the Timing Analyzer reports all paths regardless of their delay.

This command corresponds to the Report Delays Greater Than field on the Report Options dialog box, which is activated by the Options → Report Options menu command.

Syntax

The syntax of the DelayGreaterThan command is the following:

`DelayGreaterThan` *delay*

Delay is the minimum delay in nanoseconds.

Abbreviation

You can abbreviate the DelayGreaterThan command syntax as follows:

`dg` *delay*

Example

Following is an example of the DelayGreaterThan command:

```
delaygreaterthan 30
```

DelayLessThan

The DelayLessThan command specifies a maximum delay in nanoseconds. The Timing Analyzer reports only those paths that have a delay less than or equal to the specified value. By default, the Timing Analyzer reports all paths regardless of their delay.

This command corresponds to the Report Delays Less Than option on the Report Options dialog box, which is activated by the Options → Report Options menu command.

Syntax

The syntax of the DelayLessThan command is the following:

`DelayLessThan` *delay*

Delay is the maximum delay in nanoseconds.

Abbreviation

You can abbreviate the DelayLessThan command syntax as follows:

dl *delay*

Example

Following is an example of the DelayLessThan command:

```
delaylessthan 30
```

DesignSummary

The DesignSummary command creates the Performance Summary report, a short report that calculates the maximum clock frequencies for all clocks in the design and displays the worst-case timing for all clock paths.

This command is equivalent to the Analyze → Performance Summary menu command.

Syntax

The syntax of the DesignSummary command is the following:

DesignSummary -filters [**-save** *filename*]

- –Filters is a keyword that is required when you use the DesignSummary command.
- –Save indicates that you can optionally save the Performance Summary report in a file. If this option is not specified, the report appears in a window.
- *Filename* is the name of the file in which the Performance Summary report is saved.

Abbreviation

You can abbreviate the DesignSummary command syntax as follows:

ds -fil [**-s** *filename*]

Example

Following is an example of the DesignSummary command:

```
designsummary -save postdesign.xrp
```

DetailAnalysis

The DetailAnalysis command creates the Detailed Path report, a long report that displays a detailed analysis of all specified paths.

This command is equivalent to the Analyze → Detailed Path Report menu command.

Syntax

The syntax of the DetailAnalysis command is the following:

`DetailAnalysis` [**`-save`** *filename*]

- –Save indicates that you can optionally save the Detailed Path report in a file. If this option is not specified, the report appears in a window.
- *Filename* is the name of the file in which the Detailed Path report is saved.

Abbreviation

You can abbreviate the DetailAnalysis command syntax as follows:

`da` [**`-s`** *filename*]

Example

Following is an example of the DetailAnalysis command:

```
detailanalysis -save xredesign.xrp
```

ExcludeNets

The ExcludeNets command excludes specific nets from being analyzed.

This command corresponds to the Path Filters → Common Filters → Exclude Paths With Nets menu command.

Syntax

The syntax of the ExcludeNets command is the following:

`ExcludeNets` [*net_name1 net_name2 ...*]

Net_name1, *net_name2*, and so forth are the names of the nets to be excluded.

Abbreviation

You can abbreviate the ExcludeNets command syntax as follows:

`exnet` [*net_name1 net_name2 ...*]

Example

Following is an example of the ExcludeNets command:

```
excludenets $1N95 CNT5 CNT6 CNT7 EXT_CLK1
EXT_CLK2
```

Exit

The Exit command exits the Timing Analyzer.

This command is equivalent to the File → Exit menu command.

Syntax

The syntax of the Exit command is the following:

`exit`

Abbreviation

You can abbreviate the Exit command syntax as follows:

`e`

Example

Following is an example of the Exit command:

```
exit
```

Force

When you run a macro, the commands in the macro file can generate informational, confirmational, and error messages. When the Force command is set to –On, the Timing Analyzer suppresses the informational and confirmational messages. Only error messages continue to appear. Force –Off restores the appearance of all three types of message.

This command does not have an equivalent menu command.

Syntax

The syntax of the Force command is the following:

```
Force {-on|-off}
```

–On suppresses the informational and confirmational messages, and –Off restores them. –On is the default.

Abbreviation

You can abbreviate the Force command syntax as follows:

```
fr {-on|-off}
```

Example

Following is an example of the Force command:

```
force -on
```

IgnoreTimespec

The IgnoreTimespec command prevents the Timing Analyzer from analyzing the specified timing specifications.

This command corresponds to the Path Filters → TimeSpec Filters → Ignore TimeSpecs menu command.

Syntax

The syntax of the IgnoreTimespec command is the following:

IgnoreTimespec [*timespec1 timespec2 ...*]

Timespec1, *timespec2*, and so forth are the names of the timing specifications to be ignored.

Abbreviation

You can abbreviate the IgnoreTimespec command syntax as follows:

`ignt` [*timespec1 timespec2 ...*]

Example

Following is an example of the IgnoreTimespec command:

```
ignoretimespec TS08 TS09 TS10
```

IncludeNet

The IncludeNet command specifies the nets to be analyzed.

This command corresponds to the Path Filters → Common Filters → Include Paths With Nets menu command.

Syntax

The syntax of the IncludeNet command is the following:

`IncludeNet` [*net_name1 net_name2*]

Net_name1, *net_name2*, and so forth are the nets to be analyzed.

Abbreviation

You can abbreviate the IncludeNet command syntax as follows:

`incn` [*net_name1 net_name2 ...*]

Example

Following is an example of the IncludeNet command:

```
includenet in2_1 in2_2
```

IncludeNoTimespec

The IncludeNoTimespec command restricts the Timing Analyzer to reporting paths without timing specifications.

This command is equivalent to the Path Filters → TimeSpec Filters → Report Paths With No TimeSpec menu command.

Syntax

The syntax of the IncludeNoTimespec command is the following:

```
IncludeNoTimespec {-true|-false}
```

- –True reports the paths with no timing specifications.
- –False does not report the paths with no timing specifications. This option is the default.

Abbreviation

You can abbreviate the IncludeNoTimespec command syntax as follows:

```
int {-t|-f}
```

Example

Following is an example of the IncludeNoTimespec command:

```
includenotimespec -true
```

MaxNoPaths

The MaxNoPaths command limits the total number of paths that the Timing Analyzer reports. This option can be useful when system memory is limited because it limits the number of paths stored in memory. By default, the Timing Analyzer analyzes all paths.

The command corresponds to the Maximum Number of Paths field on the Report Options dialog box, which is activated by the Options → Report Options menu command.

Syntax

The syntax of the MaxNoPaths command is the following:

MaxNoPaths *number_of_paths*

Number_of_paths is the maximum number of paths that the Timing Analyzer reports.

Abbreviation

You can abbreviate the MaxNoPaths command syntax as follows:

mnp *number_of_paths*

Example

Following is an example of the MaxNoPaths command:

```
maxnopaths 20
```

MaxNoPathsPerTimespec

The MaxNoPathsPerTimespec command limits the number of paths reported per timing specification.

This command does not have an equivalent menu command.

Syntax

The syntax of the MaxNoPathsPerTimespec command is the following:

MaxNoPathsPerTimespec *number_of_paths*

Number_of_paths is the maximum number of paths per timing specification that the Timing Analyzer reports.

Abbreviation

You can abbreviate the MaxNoPathsPerTimespec command syntax as follows:

mnppt *number_of_paths*

Example

Following is an example of the MaxNoPathsPerTimespec command:

```
maxnopathspertimespec 5
```

OnlyLongestPaths

The OnlyLongestPaths command restricts the Timing Analyzer to reporting only the path with the longest delay if there is more than one path between two end points. By default, the Timing Analyzer reports all paths.

This command corresponds to the Report Only Longest Paths Between Points check box on the Report Options dialog box, which is activated by the Options → Report Options menu command.

Syntax

The syntax of the OnlyLongestPaths command is the following:

```
OnlyLongestPaths {-true|-false}
```

- –True includes only the longest paths; it is the default when you generate the Performance Summary report.
- –False includes all paths; it is the default when you generate any report except the Performance Summary report.

Abbreviation

You can abbreviate the OnlyLongestPaths command syntax as follows:

```
olp {-t|-f}
```

Example

Following is an example of the OnlyLongestPaths command:

```
OnlyLongestPaths -false
```

OpenDesign

The OpenDesign command opens a placed and routed LCA file for timing analysis.

This command corresponds to the File → Open menu command.

Syntax

The syntax of the OpenDesign command is the following:

`OpenDesign` *drive:\pathname\filename*`.lca`

- *Drive* is the letter of the drive containing the directory in which the LCA file is located.
- *Pathname* is the directory in which the LCA file is located.
- *Filename* is the name of the LCA file.

This command does not open a report (XRP) file.

Abbreviation

You can abbreviate the OpenDesign command syntax as follows:

`od` *drive:\pathname\filename*`.lca`

Example

Following is an example of the OpenDesign command:

```
opendesign h:\berkeley\ta\4002a.lca
```

PerformToTimespec

The PerformToTimespec command generates the Performance To TimeSpecs report, which compares design performance to the timing specifications entered using XACT-Performance.

This command is equivalent to the Analyze → Performance To TimeSpecs menu command.

Syntax

The syntax of the PerformToTimespec command is the following:

PerformToTimespec [-save *filename*]

- –Save indicates that you can optionally save the Performance to Timespecs report in a file. If this option is not specified, the report appears in a window.
- *Filename* is the name of the file in which the Performance to Timespecs report is saved.

Abbreviation

You can abbreviate the PerformToTimespec command syntax as follows:

ptt [-s *filename*]

Example

Following is an example of the PerformToTimespec command:

```
performtotimespec -save mercury.xrp
```

Query

The Query command reports information about nets, blocks, timing specifications, and timing groups. See the section describing the Query command in the "Menu Commands" chapter for the specific information that this command reports.

This command is the same as the Options → Query menu command.

Syntax

The syntax of the Query command is the following:

query {-net|-block|-timespec|-timegroup}
element_name

- –Net reports information about nets.
- –Block reports information about blocks.
- –Timespec reports information about timing specifications.

- –Timegroup reports information about timing groups.
- *Element_name* can be the following:
  - Net name when you select the –Net option.
  - Block name when you select the –Block option.
  - Timing specification, or TS*id* number, when you select the –Timespec option.
  - Timing group name when you select the –Timegroup option.

Abbreviation

You can abbreviate the Query command syntax as follows:

`qy {-n|-b|-tp|-tg}` *element_name*

Example

Following are examples of the Query command:

```
query -timespec 05
query -block CLB_R1C1
```

Report

The Report command determines the format of the report output.

This command corresponds to the Short Report, Wide Report, and Normal Report options on the Report Options dialog box, which is activated by the Options → Report Options menu command.

Syntax

The syntax of the Report command is the following:

`report {-short|-wide|-normal}`

- –Short displays only the path source and end point. This format lists one delay path per line and does not display cumulative delays through CLBs.
- –Wide sets a format of 132 characters per line, which prevents long block and net names from being truncated.

- –Normal, the default, displays a detailed list of path delays.

Abbreviation

You can abbreviate the Report command syntax as follows:

```
r {-s|-w|-n}
```

Example

Following is an example of the Report command:

```
report -short
```

ResetFilters

The ResetFilters command resets the path filters to the system defaults. Refer to the "Show Settings" section of the "Main Window Commands" chapter for a listing of these defaults.

This command is equivalent to the Path Filters → Reset Path Filters menu command.

Syntax

The syntax of the ResetFilters command is the following:

```
ResetFilters
```

Abbreviation

You can abbreviate the ResetFilters command syntax as follows:

```
rf
```

Example

Following is an example of the ResetFilters command:

```
resetfilters
```

RunMacro

The RunMacro command runs an existing macro.

This command corresponds to the File → Run Macro menu command.

Syntax

The syntax of the RunMacro command is the following:

`RunMacro` *filename*

Filename is the name of the macro file.

Abbreviation

You can abbreviate the RunMacro command syntax as follows:

`runm` *filename*

Example

Following is an example of the RunMacro command:

```
runmacro timespec.xtm
```

SelectFailingTimespec

The SelectFailingTimespec command lists only the paths that do not meet the timing specifications entered using XACT-Performance.

This command corresponds to the Path Filters → TimeSpec Filters → Report Paths Failing TimeSpec menu command.

Syntax

The syntax of the SelectFailingTimespec command is the following:

`SelectFailingTimespec {-true|-false}`

- –True includes only the paths that do not meet your timing specifications.
- –False includes all paths. This setting is the default.

Abbreviation

You can abbreviate the SelectFailingTimespec command syntax as follows:

```
sft {-t|-f}
```

Example

Following is an example of the SelectFailingTimespec command:

```
selectfailingtimespec -true
```

SelectPathType

The SelectPathType command selects the types of paths reported by the Timing Analyzer. By default, the Timing Analyzer analyzes all path types.

This command is equivalent to the Path Filters → Path Analysis Filters → Select Path Types menu command.

Syntax

The syntax of the SelectPathType command is the following:

```
SelectPathType
[ClockToSetup|ClockToPad|PadToSetup|
PadToPad|PathsEndingAtFF]
```

- ClockToSetup is a clock-to-setup path.
- ClockToPad is a clock-to-pad path.
- PadToSetup is a pad-to-setup path.
- PadToPad is a pad-to-pad path.
- PathsEndingAtFF is a clock input path.

For information about these path types, see the “Timing Analysis” chapter. By default, all path types are selected.

Abbreviation

You can abbreviate the SelectPathType command syntax as follows:

```
spt [cts|ctp|pts|ptp|peaff]
```

These parameters have the same respective meanings as the parameters in the longer form of the syntax.

Example

Following is an example of the SelectPathType command:

```
selectpathtype padtosetup
```

SetMargins

The SetMargins command specifies external delays for clock-to-pad or pad-to-setup paths entering or exiting the device. This way, the Timing Analyzer includes this external delay when calculating the delay for the path.

This command corresponds to the Options → Set Delay Margins for I/O menu command.

Syntax

The syntax of the SetMargins command is the following:

SetMargins {**-P2S** *block_name clock_name delay_margin*|
-C2P *clock_name block_name delay_margin*}

- –P2S is a pad-to-setup path.
- –C2P is a clock-to-pad path.
- *Block_name* is the name of the IOB for which you want to set the delay margin.
- *Clock_name* is the name of the clock.
- *Delay_margin* is the delay margin value; it can be from 1 to 999 ns, inclusive.

There is no default delay; the Timing Analyzer does not consider off-chip delay unless you specify it.

Abbreviation

You can abbreviate the SetMargins command syntax as follows:

sm {**-P2S** *block_name clock_name delay_margin*|
-C2P *clock_name block_name delay_margin*}

Example

Following is an example of the SetMargins command:

```
setmargins -c2p CLK1 EXT_IN1 10
```

ShowClockNets

The ShowClockNets command creates the Show Clocks report, which lists the names of all clocks in the design.

This command is the same as the Analyze → Show Clocks menu command.

Syntax

The syntax of the ShowClockNets command is the following:

ShowClockNets [**-save** *filename*]

- –Save indicates that you can optionally save the Show Clocks report in a file. If this option is not specified, the report appears in a window.
- *Filename* is the name of the saved file.

Abbreviation

You can abbreviate the ShowClockNets command syntax as follows:

scn [**-s** *filename*]

Example

Following is an example of the ShowClockNets command:

```
showclocknets -save triad1.xrp
```

SortOn

The SortOn command defines the order in which the paths are reported.

This command is equivalent to the Sort By option on the Report Options dialog box, which is activated by the Options → Report Options menu command.

Syntax

The syntax of the SortOn command is the following:

```
SortOn {-Ascend|-Descend|-SourceBlk|-DestBlk|
-SourceClkNet|-DestClkNet}
```

- –Ascend lists paths in order from shortest to longest delays.
- –Descend, the default, lists paths in order from longest to shortest delays.
- –SourceBlk sorts path delays by the source block name, which is useful when trying to determine the worst-case delay from a given block.
- –DestBlk sorts path delays by the destination block name, which can help determine the worst-case path to each block.
- –SourceClkNet sorts path delays by the clock name that sources the first element in a path, which separates delay information for two or more clock nets in a design.
- –DestClkNet sorts path delays by the clock name that sources the last element in a path.

Abbreviation

You can abbreviate the SortOn command syntax as follows:

```
sort {-a|-d|-sb|-db|-scn|-dcn}
```

Example

Following is an example of the SortOn command:

```
sorton -sourceblk
```

Speed

The Speed command sets the speed grade. Changing the speed grade helps you determine if you need to target a faster device to meet your timing requirements. The default speed grade is set in the LCA file.

This command is the same as the Options → Change Speed Grade menu command.

Syntax

The syntax of the Speed command is the following:

speed *speedgrade*

Speedgrade can be any of the speed grades available for the architecture used. You can obtain this information from the Design Manager or the Timing Analyzer's graphical interface.

Abbreviation

You can abbreviate the Speed command syntax as follows:

sp *speedgrade*

Example

Following is an example of the Speed command:

```
speed -5
```

Appendix A

Glossary

This chapter defines the key terms and concepts that you must understand to use the Timing Analyzer effectively. The terms are listed in alphabetical order.

Clock Input Path

A clock input path starts at either an input of the chip or at the output of a flip-flop, latch, or RAM. It ends at any clock pin on a flip-flip or latch enable. The clock input path time is the maximum time required for the signal to arrive at the flip-flop clock input. Clock input paths help to determine system-level design timing.

Clock-to-Pad Path

A clock-to-pad (C2P) path starts at the Q output of a flip-flop or latch and ends at an output of the chip. It includes the clock-to-Q delay of the flip-flop and the path delay from that flip-flop to the chip output. The clock-to-pad path time is the maximum time required for the data to leave the source flip-flop, travel through logic and routing, and leave the chip.

Clock-to-Setup Path

A clock-to-setup (C2S) path starts at the Q output of a flip-flop or latch and ends at an input to another flip-flop, latch, or RAM, where that pin has a setup requirement before a clocking signal. It includes the clock-to-Q delay of a flip-flop, the path delay from that flip-flop to the next flip-flop, and the setup requirement of the next flip-flop. The clock-to-setup path time is the maximum time required for the data to propagate through the source flip-flop, travel through the logic

and routing, and arrive at the destination before the next clock edge occurs.

Clock Skew

Clock skew is the difference between the time a clock signal arrives at the source flip-flop in a path and the time it arrives at the destination flip-flop. It is also referred to as clock delay.

Critical Path

A critical path is a signal in a section of combinatorial logic that limits the speed of the logic. Storage elements start and end a critical path, which may include I/O pads.

Hold Time

Hold time is the time following a clock event during which the data input to a latch or flip-flop must remain stable in order to guarantee that the latched data is correct.

Pad-to-Pad Path

A pad-to-pad (P2P) path starts at an input of the chip and ends at an output of the chip. The pad-to-pad path time is the maximum time required for the data to enter the chip, travel through logic and routing, and leave the chip. It is not controlled or affected by any clock signal.

Pad-to-Setup Path

A pad-to-setup (P2S) path starts at an input of the chip and ends at an input to a flip-flop, latch, or RAM — wherever there is a setup time against a control signal. The pad-to-setup path time is the maximum time required for the data to enter the chip, travel through logic and routing, and arrive at the output before the clock or control signal arrives.

Setup Time

Setup time is the time prior to a clock event during which the data input to a latch or flip-flop must remain stable in order to guarantee that the latched data is correct.

Static Timing Analysis

A static timing analysis is a point-to-point delay analysis of a design network. It does not include insertion of stimulus vectors.

Timing Specifications

Timing specifications define the maximum allowable delay on any given set of paths in a design. They are entered on the schematic with the XACT-Performance utility.

XDelay Command Equivalents

XDelay Equivalents in the Timing Analyzer

If you previously used XDelay, the following table lists the XDelay commands and options and their Timing Analyzer equivalents.

Note: The commands on the Profile menu in XDelay have no equivalent in the Timing Analyzer.

Table 6-1 XDelay Commands and Timing Analyzer Equivalents

XDelay Command	Timing Analyzer Keyboard Command	Timing Analyzer Menu Command
Analyze	DesignSummary –filters	Analyze → Performance Summary
ClearMargins	SetMargins	Options → Set Delay Margins for I/O
ClearTemplate	ResetFilters	Path Filters → Reset Path Filters
DeleteGroup	No equivalent	No equivalent
DeleteSpec	IgnoreTimespec	Path Filters → TimeSpec Filters → Ignore TimeSpecs
Design	OpenDesign	File → Open *design_name*
Directory	OpenDesign	File → Open → Directories
DOS	No equivalent	No equivalent
DRC	CheckAsynch	Analyze → Check for Asynchronous Logic
Execute	RunMacro	No equivalent

XDelay Command	Timing Analyzer Keyboard Command	Timing Analyzer Menu Command
Exit	Exit	File → Exit
Flagblk	ControlPathTracing	Path Filters → Common Filters → Control Possible False Paths
IOB_Enable_O_I IOB_Disable_O_I	ControlPathTracing –OutputToInput	Path Filters → Common Filters → Control Possible False Paths → Output Pin to Input Pin of IOB
IOB_Enable_T_I IOB_Disable_T_I	ControlPathTracing –TristateToInput	Path Filters → Common Filters → Control Possible False Paths → Tristate Pin to Input Pin of IOB
TBUF_Enable_I_O TBUF_Disable_I_O	ControlPathTracing –InputToOutput	Path Filters → Common Filters → Control Possible False Paths → Input Pin to Output Pin of BUFT
TBUF_Enable_T_O TBUF_Disable_T_O	ControlPathTracing –TristateToOutput	Path Filters → Common Filters → Control Possible False Paths → Tristate to Output Pin of BUFT
CLB_Enable_WE CLB_Disable_WE	ControlPathTracing –WriteEnable	Path Filters → Common Filters → Control Possible False Paths → Write Enable of CLB RAM
CLB_Enable_DIN CLB_Disable_DIN	ControlPathTracing –DataInput	Path Filters → Common Filters → Control Possible False Paths → Data Input of CLB RAM
CLB_Enable_SR_Q CLB_Disable_SR_Q	ControlPathTracing –SetResetToQ	Path Filters → Common Filters → Control Possible False Paths → Set/Reset to Q Pin of Flip-flops
Synchronous Not_Synchronous	No equivalent	No equivalent
Help	No equivalent	Help → Contents

XDelay Command	Timing Analyzer Keyboard Command	Timing Analyzer Menu Command
Print	No equivalent	File → Print
Printer	No equivalent	File → Printer Setup
QueryBlk	Query –Block	Options → Query → Blocks
QueryGroup	Query –Timegroup	Options → Query → Time-Group
QueryMargins	No equivalent	Options → Set Delay Margins for I/O → Defined Margins
QueryNet	Query –Net	Options → Query → Nets
QuerySpec	Query –Timespec	Options → Query → TimeSpec
QueryTemplate	No equivalent	Analyze → Show Settings
ReadMargins	SetMargins	Options → Set Delay Margins for I/O
ReadTemplate	No equivalent	File → Open Macro
Report	Report	Options → Report Options
SaveMargins	SetMargins	Options → Set Delay Margins for I/O
SaveTemplate	No equivalent	File → Save Macro, File → SaveAs Macro
SetMargins	SetMargins	Options → Set Delay Margins for I/O
Speed	Speed	Options → Change Speed Grade
TimeGroup	No equivalent	No equivalent
TimeSpec	No equivalent	No equivalent
XDelay-TimeSpec	PerformToTimeSpec	Analyze → Performance To TimeSpecs
–BreakLoop	BreakLogicLoop	Path Filters → Common Filters → Break Logic Loops

XDelay Command	Timing Analyzer Keyboard Command	Timing Analyzer Menu Command
–ClearOptions	ResetFilters	Path Filters→ Reset Path Filters
–ClockInput	SelectPathType –PathsEndingAtFF	Path Filters → Path Analysis Filters → Select Path Types → Paths Ending At Clock Pin of Flip-flop
–ClockToPad	SelectPathType –ClockToPad	Path Filters → Path Analysis Filters → Select Path Types → Clock To Pad
–ClockToSetup	SelectPathType –PadToSetup	Path Filters → Path Analysis Filters → Select Path Types → Pad To Setup
–Delaygreater	DelayGreaterThan	Options → Report Options → Report Delays Greater Than
–Delayless	DelayLessThan	Options → Report Options → Report Delays Less Than
–DestClock	DefineEndpts –ToRising or –ToFalling	Path Filters → Path Analysis Filters → Select Destinations → Clocks
–FailedSpec	SelectFailingTimespec	Path Filters → TimeSpec Filters → ReportPathsFailing-TimeSpec
–From	DefineEndpts	Path Filters → Path Analysis Filters → Select Sources
–FromAll	DefineEndpts –FromAll	Path Filters → Path Analysis Filters → Select Sources → All
–FromFF	DefineEndpts –FromFlip-flop	Path Filters → Path Analysis Filters → Select Sources → Flip-Flops
–FromIOB	DefineEndpts –FromIOBs	Path Filters → Path Analysis Filters → Select Sources → IOBs

XDelay Command	Timing Analyzer Keyboard Command	Timing Analyzer Menu Command
–IgnoreNet	ExcludeNets	Path Filters → Common Filters → Exclude Paths With Nets
–Maxpaths	MaxNoPaths	Options → Report Options → Maximum Number of Paths
–Netfilter	No equivalent	No equivalent
–NoBreakLoop	BreakLogicLoop	Path Filters → Common Filters → Break Logic Loops
–NoDestClock	DefineEndpts –ToRising or –ToFalling	Path Filters → Path Analysis Filters → Select Destinations → Clocks
–NoIgnoreNet	IncludeNet	Path Filters → Common Filters → Include Paths With Nets
–Nonetfilter	No equivalent	No equivalent
–NoSourceClock	DefineEndpts –FromRising or –FromFalling	Path Filters → Path Analysis Filters → Select Sources → Clocks
–NoTimeGroups	No equivalent	No equivalent
–PadToPad	SelectPathType –PadToPad	Path Filters → Path Analysis Filters → Select Path Types → Pad To Pad
–PadToSetup	SelectPathType –PadToSetup	Path Filters → Path Analysis Filters → Select Path Types → Pad To Setup
–SelectSpec	IgnoreToTimeSpec	Path Filters → TimeSpec Filters → Ignore TimeSpecs
–Shortreport	Report –Short	Options → Report Options → Short Report
–Sort	SortOn	Options → Report Options → Sort By

XDelay Command	Timing Analyzer Keyboard Command	Timing Analyzer Menu Command
–SourceClock	DefineEndpts –FromRising or –FromFalling	Path Filters → Path Analysis Filters → Select Sources → Clocks
–To	DefineEndpts	Path Filters → Path Analysis Filters → Select Destinations
–ToAll	DefineEndpts –ToAll	Path Filters → Path Analysis Filters → Select Destinations → All
–ToFF	DefineEndpts –ToFlipflop	Path Filters → Path Analysis Filters → Select Destinations → Flip-Flops
–ToIOB	DefineEndpts –ToIOBs	Path Filters → Path Analysis Filters → Select Destinations → IOBs
–TSMaxpaths	MaxNoPathsPerTimespec	No equivalent
–Unspecified	IncludeNoTimespec	Path Filters → TimeSpec Filters → ReportPathsWithNoTimeSpec
–Widereport	Report –Wide	Options → Report Options → Wide Report
–WorstCase	OnlyLongestPaths	Options → Report Options → Report Only Longest Paths Between Points

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Trademark Information

4,855,619; 4,855,669; 4,902,910; 4,940,909; 4,967,107; 5,012,135; 5,023,606; 5,028,821; 5,047,710; 5,068,603; 5,140,193; 5,148,390; 5,155,432; 5,166,858; 5,224,056; 5,243,238; 5,245,277; 5,267,187; 5,291,079; 5,295,090; 5,302,866; 5,319,252; 5,319,254; 5,321,704; 5,329,174; 5,329,181; 5,331,220; 5,331,226; 5,332,929; 5,337,255; 5,343,406; 5,349,248; 5,349,249; 5,349,250; 5,349,691; 5,357,153; 5,360,747; 5,361,229; 5,362,999; 5,365,125; 5,367,207; 5,386,154; 5,394,104; 5,399,924; 5,399,925; 5,410,189; 5,410,194; 5,414,377; RE 34,363, RE 34,444, and RE 34,808. Other U.S. and foreign patents pending. Xilinx, Inc. does not represent that devices shown or products described herein are free from patent infringement or from any other third party right. Xilinx assumes no obligation to correct any errors contained herein or to advise any user of this text of any correction if such be made. Xilinx will not assume any liability for the accuracy or correctness of any engineering or software support or assistance provided to a user.

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