Lattice™
Semiconductor
Corporation

ISP Daisy Chain Download Reference Manual

Version 1.3

Limited Warranty

Lattice Semiconductor Corporation warrants the original purchaser that the Lattice Semiconductor software shall be free from defects in material and workmanship for a period of ninety days from the date of purchase. If a defect covered by this limited warranty occurs during this 90-day warranty period, Lattice Semiconductor will repair or replace the component part at its option free of charge.

This limited warranty does not apply if the defects have been caused by negligence, accident, unreasonable or unintended use, modification, or any causes not related to defective materials or workmanship.

To receive service during the ninety-day warranty period, contact Lattice Semiconductor at:

> Phone: 1-800-LATTICE
> Fax: 1 (408) 944-8450
> E-mail: applications@latticesemi.com

If the LSC support personnel are unable to solve your problem over the phone, we will provide you with instructions on returning your defective software to us. The cost of returning the software to the Lattice Semiconductor Service Center shall be paid by the purchaser.

Limitations on Warranty

Any applicable implied warranties, including warranties of merchantability and fitness for a particular purpose, are hereby limited to ninety days from the date of purchase and are subject to the conditions set forth herein. In no event shall Lattice Semiconductor Corporation be liable for consequential or incidental damages resulting from the breach of any expressed or implied warranties.

Purchaser's sole remedy for any cause whatsoever, regardless of the form of action, shall be limited to the price paid to LSC for the LSC software.

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This warranty provides you with specific legal rights. You may have other rights which vary from state to state.

Table of Contents

Preface

This preface contains sections about the following information:

- Purpose of this reference manual
- What is in this reference manual
- Where to look for information
- Documentation conventions
- Other related documentation

Purpose of this Reference Manual

This reference manual describes the capabilities and use of the in-system programmable Large Scale Integration (ispLSI®) circuit download software and procedures. It serves as a primary learning guide for downloading the JEDEC files with the configuration setup (.dld) files to programmable devices.

This reference manual is intended for use by design engineers who are knowledgable in system design and architecture and in the use of design programs. This manual contains information to guide you through the download process, using a single device or multiple devices daisy-chained together in-system in the PC Windows™ or MS-DOS® environments.

What is in this Reference Manual

This reference manual contains the following information and procedural tasks:

■ ISP Daisy Chain Download software structure

■ ISP Daisy Chain Download setup procedures

■ Managing ISP Daisy Chain Download files

■ Working with the Graphic User Interface (GUI)

■ Setting a User Electronic Signature (UES)

■ Device programming

■ Daisy-chaining multiple devices

■ Turbo downloading

■ Generating ATE Vector Files

■ Simulating ATE Functions

Where to Look for Information

Chapter 1, Introduction – Provides an introduction to the manual and gives the installation procedure for the ISP Daisy Chain Download software.

Chapter 2, ISP Daisy Chain Download Overview – Provides an overview of the download process using the ISP Daisy Chain Download software.

Chapter 3, Device Programming – Illustrates in concise detail how to perform device programming using the Lattice Semiconductor ISP Daisy Chain Download (IDCD) system software tool.

Documentation Conventions

The table below lists the documentation conventions used in this reference manual.

Convention	Definition and Usage

Italics	Italicized text represents variable input. For example:
	
	    design.dld
	
	This means you must replace *design* with the file name you have used for all the files relevant to your design.
	
	Valuable information may be italicized for emphasis.
	
	Book titles appear in italics. The beginning of a procedure also appears in italics. For example:
	
	    To create a new configuration:

Bold	Valuable information may be boldfaced for emphasis. Commands are shown in boldface. For example: 1. Select **C̲ommand** ⇒ **T̲urbo Download** ⇒ **B̲uild** from the ISP Daisy Chain Download menu.
`Courier Font`	Monospaced (Courier) font indicates file and directory names and text that the system displays. For example: The `C:\DDOWNLD\EXE` subdirectory contains...
`Bold Courier`	Bold Courier font indicates text you type in response to system prompts. For example: `C:>` **`dld <path_name><file_name>`**
|...|	Vertical bars indicate options that are mutually exclusive; you can select only one. For example: **`O̲K`**|**`C̲ancel`**
"Quotes"	Titles of chapters or sections in chapters in this reference manual are shown in quotation marks. For example: See Chapter 2, "ISP Daisy Chain Download Overview."
✍ *NOTE*	Indicates a special note.
▲ CAUTION	**Indicates a situation that could cause loss of data or other problems.**
❖ TIP	Indicates a special hint that makes using the software easier.
�	Indicates a menu option leading to a submenu option. For example: **C̲ommand** ⇒ **T̲urbo Download** ⇒ **B̲uild**

Mouse Terminology

The following conventions are used through out this manual to describe 3-button mouse techniques.

Term	Definition
Select	Highlight text and/or an option in a menu or dialog box using the mouse.
Press	Hold down a mouse button.
Click	Press and release the specified mouse button–once.
Double-click	Quickly press and release the specified mouse button–twice.

Other Related Documentation

Lattice Semiconductor

- *pLSI and ispLSI Development System User Manual*
- *pLSI and ispLSI Development System Reference Manual*
- *In-System Programmability Manual*
- *pDS+ Fitter User Manual*
- *Lattice Semiconductor Data Book*

Microsoft® Corporation

- *Microsoft® Windows® User's Guide and Supplement for the Windows Graphical Environment*
- *DOS User's Guide and Supplement for the DOS environment*

Chapter 1 *Introduction*

This chapter provides an introduction to the ISP Daisy Chain Download (IDCD) system hardware and software requirements, installation procedure, and how to get help. The Lattice Semiconductor Corporation (LSC) ISP Daisy Chain Download software supports both the Microsoft Windows and the MS-DOS environments.

System Requirements

To run the ISP Daisy Chain Download software you need a system comprised of the following hardware and software.

Hardware

- IBM® PC-AT™ 386/486 or compatible
- 1 serial port
- 1 parallel port
- 1MB RAM
- ISP Daisy Chain Download software occupies approximately 500 KB of disk space for either the DOS or Windows versions
- EGA/VGA display (VGA is recommended)
- 3-1/2" floppy disk drive (5-1/4" requires an optional disk set)
- Mouse, Microsoft Windows compatible

Software

- Microsoft Windows 3.x (including Windows Write) or Windows for Workgroups
- DOS 5.0 or later

Installation Procedure

Windows Version

The ISP Daisy Chain Download software setup program requires Microsoft Windows 3.1 (running in 386 enhanced mode) to be installed on the system. This software will run using Windows 95, but the timing information is not guaranteed to be accurate. The following procedure automatically installs the ISP Daisy Chain Download (IDCD) software, version 1.3, under the Microsoft Windows environment.

To set up the ISP Daisy Chain Download software:

Insert the auto-install diskette into the floppy drive and select **File** ⇒ **Run** from the Program Manager menu. Enter the following command at the prompt: (assuming your floppy drive is drive a.)

a:setup

The install program checks for any existing LSC pDS or pDS+ software. At this point, depending on which LSC fitter you are using, set the correct installation path corresponding to where you loaded the LSC fitter executables. The following subsections outline three possibilities:

- pDS Installation
- pDS+ Installation
- Stand-alone Installation

pDS Installation

Install the ISP Daisy Chain Download version 1.3 in the same directory as the pDS software. Make certain the `wdownld.sdn` device information file is copied there, also. For example, during the installation procedure, use the following path at the prompt:

C:*pds_install_path*

1. The program responds with a series of screens to guide you through the installation process. Continue the installation process by following the instructions on the screen.
2. The install program automatically includes the IDCD icon in the current LSC group in the Windows Program Manager.

pDS+ Installation

Install the ISP Daisy Chain Download version 1.3 in the directory which contains the pDS+ fitter executables for all LSC Windows-based applications. Make certain the `wdownld.sdn` device information file is copied there, also. For example, during the installation procedure, use the following path at the prompt:

C:*pdsplus_install_path*\\bin

1. The program responds with a series of screens to guide you through the installation process. Continue the installation process by following the instructions on the screen.
2. The install program automatically creates an LSC group in the Windows Program Manager; it contains the IDCD icon.

Stand-alone Installation

At the installation prompt:

1. Specify any location you choose for the IDCD software.
2. The install program automatically creates an LSC group in the Windows Program Manager; it contains the IDCD icon.

DOS Version

There is no installation required for the DOS version of the ISP Daisy Chain Download version 1.3 software. Launch the program at the DOS prompt by typing the following command:

```
C:\install_path\ddownld
```

Getting Help

Lattice Semiconductor Corporation provides assistance should you have questions about using the ISP Daisy Chain Download software. In most cases, this manual will answer your questions.

Readme File

To access the readme file:

1. Go to the Windows Program Manager.
2. Select the Lattice Semiconductor Group to display the icons (Figure 1-1).

Figure 1-1. The Lattice Semiconductor Group

3. Select the **IDCD Readme** icon.

Technical Support

Before contacting Lattice Semiconductor Technical Support, take a moment to review the following information for possible answers.

1. Check to see if the hardware meets the minimum system requirements listed under the "System Requirements" section.
2. Consult the Lattice Semiconductor documentation. It will answer most of your questions.
3. Verify the hardware and peripherals are set up according to their respective documentation and that all cable connections are secure.
4. Verify the proper installation of Microsoft Windows, running in enhanced mode.

Software Support

Software Update Service

You will receive free software updates for one year when you fill out and return to Lattice Semiconductor the License File/Registration Form included with your software. Extended maintenance agreements are available for purchase. Please contact your local Lattice Semiconductor Sales Representative for additional information.

Customer Hotline

If you have any questions or problems with this software, please call the Lattice Semiconductor Applications Hotline at **1-800-LATTICE** (1-800-528-8423) or (408) 428-6414. The Hotline is available Monday through Friday from 8:00 AM to 5:00 PM, Pacific Time. Or, send e-mail to applications@latticesemi.com.

For Information On	Customer Resource	USA & Canada	Other Locations
ispLSI/pLSI Applications Support	Telephone Hotline	1-800-LATTICE	(408) 428-6414
	Fax	(408) 944-8450	
	Bulletin Board System	(408) 428-6417	
	E-mail	applications@latticesemi.com	
	FTP Site	http://www.latticesemi.com/ftp/index.html	
	World Wide Web	http://www.latticesemi.com	
GAL/ispGAL/ispGDS Applications Support	Telephone Hotline	1-800-FASTGAL	(503) 681-0118
	Fax	(503) 681-3037	
	Bulletin Board System	(503) 693-0215	
	E-mail	gal@latticesemi.com	
	FTP Site	http://www.latticesemi.com/ftp/index.html	
	World Wide Web	http://www.latticesemi.com	
Literature	Telephone Hotline	1-800-327-8425	(503) 681-0118
	Fax	(503) 681-3037	
	E-mail	gal@latticesemi.com	
	FTP Site	http://www.latticesemi.com/ftp/index.html	

Chapter 2 *ISP Daisy Chain Download Overview*

The ISP Daisy Chain Download (IDCD) software is a comprehensive design download package for the Lattice Semiconductor ISP device families. The IDCD software provides an efficient method of programming the LSC devices using JEDEC files generated from any compatible software tool. This complete device programming tool helps you to quickly and easily program your devices with your designs. The Lattice Semiconductor IDCD software supports both the Microsoft Windows and DOS environments.

The ISP Daisy Chain Download software features the following:

- Supports the Microsoft Windows 3.1 design environment
- Support for the DOS environment
- A JEDEC file via a download cable directly from your system to a device
- A JEDEC file transfer to a third-party programmer
- Detection and identification of as many as 60 devices at once
- Easy set-up menus for multiple ports
- Simple device configuration menus
- Single ISP device programming
- Multiple ISP device daisy chain programming
- Turbo downloading of daisy chained devices
- ispSTREAM^{TM} bit building, saving and loading
- UES (User Electronic Signature) reading and coding
- ATE vector file generation and simulation support
- Online help

Software Design Flow

The ISP Daisy Chain Download software uses any JEDEC file in ASCII format to program in-system (on the board), a device or multiple devices. The "board" can be one device programmer or it can be inside your CPU on the board itself which requires no external programmer.

Once you attach the cables, the ISP Daisy Chain Download software can identify the number of devices you wish to program and be ready to accept your instructions for which files (designs) you want to load onto which device(s). For additional information on how to port the device programmers, see the *isp Engineering Kit Hardware Assembly Manual, Model 100.*

Programming Features

The object of the ISP Daisy Chain Download software is to program ISP devices with your designs on a board (or in system). In-system programming is advantageous because it alleviates the necessity of programming on a device programmer and mounting, plugging, and socketing the devices, thereby risking bent or broken pins from handling. The devices can be programmed again and again, depending on your system needs. Also, you can set the security bit ON or OFF so the device cannot be read once it is programmed.

You can quickly choose the port setup (with a pull-down menu for the Windows version or on the main window of the DOS version). For the Windows version, use the Configuration Setup window to provide the device type, the JEDEC file you want to load onto each particular device, and the operation you want to perform (e.g., **Program & Verify**, **Checksum**) for each device. For the DOS version, use any text editor. Once you supply the setup information, you should check your setup to identify any errors and resolve them prior to downloading. Then download the design files onto the appropriate devices as specified.

You can download as many as 60 chips at one time with various JEDEC files. It is recommended that the download cable (Part Number pDS4102-DL) be used with a maximum number of eight ISP devices in a daisy-chained configuration. The eight devices can be in any combination of ispLSI, ispGAL, and ispGDS devices in any order. The recommended number of devices is based on the typical system board environment with proper signal terminations and typical trace lengths. The actual number of devices may vary according to the system board environment. You must specify the file (design name with .jed extension) and function to be performed for each device. Once you run the download operation, the success or fail condition for each device prints to the screen. Each configuration setup can be named and saved wherever you choose (drive, directory, etc.). The ISP Daisy Chain Download software saves the configuration setup (file) with a .dld extension.

The ISP Daisy Chain Download software is very easy to use and provides you with a quick and comprehensive analysis of your device programming directions. Using the Windows version, one screen accesses everything you need to download all the devices.

Figure 2-1 illustrates a typical block diagram of multiple ISP devices cascaded together. The example shows the ISP aspects such as identifying the devices in the daisy chain, shifting commands, bypassing devices, and executing commands.
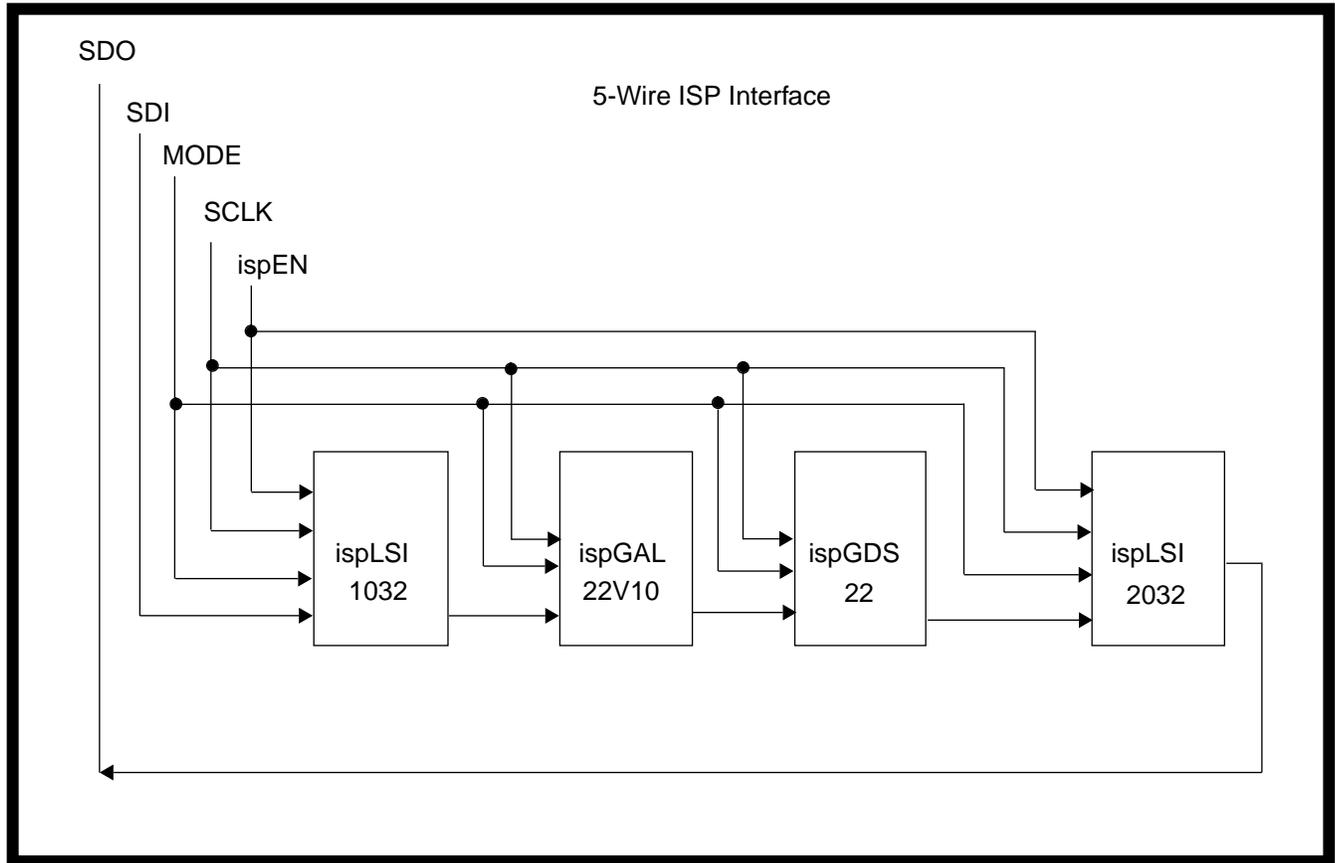
Figure 2-1. Multiple ISP Interface

Security Feature

The ispLSI and ispGAL22V10 devices contain a security bit that enables or disables program verification. If the security bit is enabled, you cannot read the device program, thus preventing unauthorized access to your design.

When you use the LSC pDS+ Fitter software, control the security bit through the SECURITY Device Control Option in a Parameter File. If there is no SECURITY statement in your parameter file, the security feature defaults to SECURITY=OFF. See the *pDS+ Fitter User Manual* for details on how to set the security bit using Device Control Options.

When you use the LSC pDS software, control the security bit through the Design Manager window **Design** ⇒ **Fuse Map** command or the **Fuse** icon. The Fuse Map Options window contains **Security On/Off** buttons you set for each JEDEC file. See the *pLSI and ispLSI Development System User Manual* for instructions on how to set the security bit.

ISP Download Support

There are three ways to program Lattice Semiconductor ISP devices:

■ In-system without removing them from the circuit board

■ The isp Engineering Kit

■ A third-party programmer

The ISP Daisy Chain Download software supports Windows and DOS environments. This software will run using Windows 95, but the timing information is not guaranteed to be accurate.

Windows Menu

Before you can program devices using the ISP Daisy Chain Download software, you must first have a JEDEC-format ASCII file to download onto a programmable device. When you invoke the download program, the LSC ISP Daisy Chain Download software windows appear. Figure 2-2 shows the parent windows. Use the pull-down menus or the tool bar icons to perform the various functions needed to supply the JEDEC files to the specific devices. The Messages window is part of the parent ISP Daisy Chain Download window and remains on the screen at all times. You cannot minimize it or close it, but you can resize it. It displays all the system messages and prints them to the screen for your convenience.
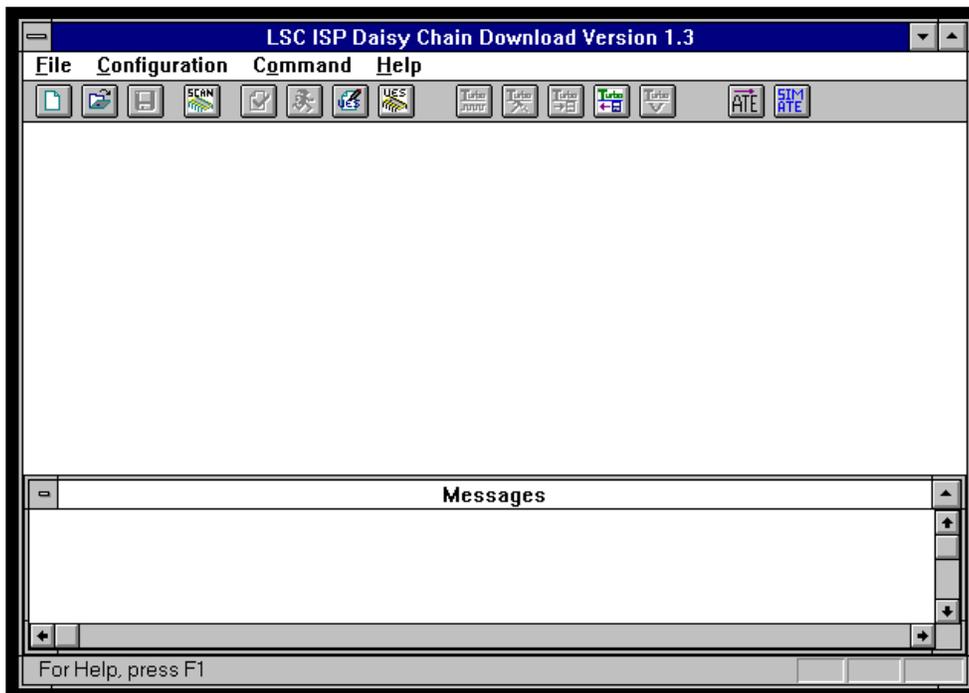
Figure 2-2. ISP Daisy Chain Download for Windows

DOS Menu

Initiate the DOS version of the ISP Daisy Chain Download software from the DOS prompt. Type: **ddownld**. Use the arrow keys to move the cursor down the menus, or use the hot keys. The hot keys are the first letter of each item or its number. Figure 2-3 shows the main window.

ISP Daisy Chain Download 1.3

1. Assign Port Number
2. Open Chain Configuration .DLD File
3. Scan Board Configuration
4. Verify Configuration Setup
5. User Electronic Signature Editor
6. Evaluation/Design Download
7. Turbo Daisy Chain Download
8. Quit

Press ↑↓ and ↵ to choose or Esc to Quit

(Message Display Area)
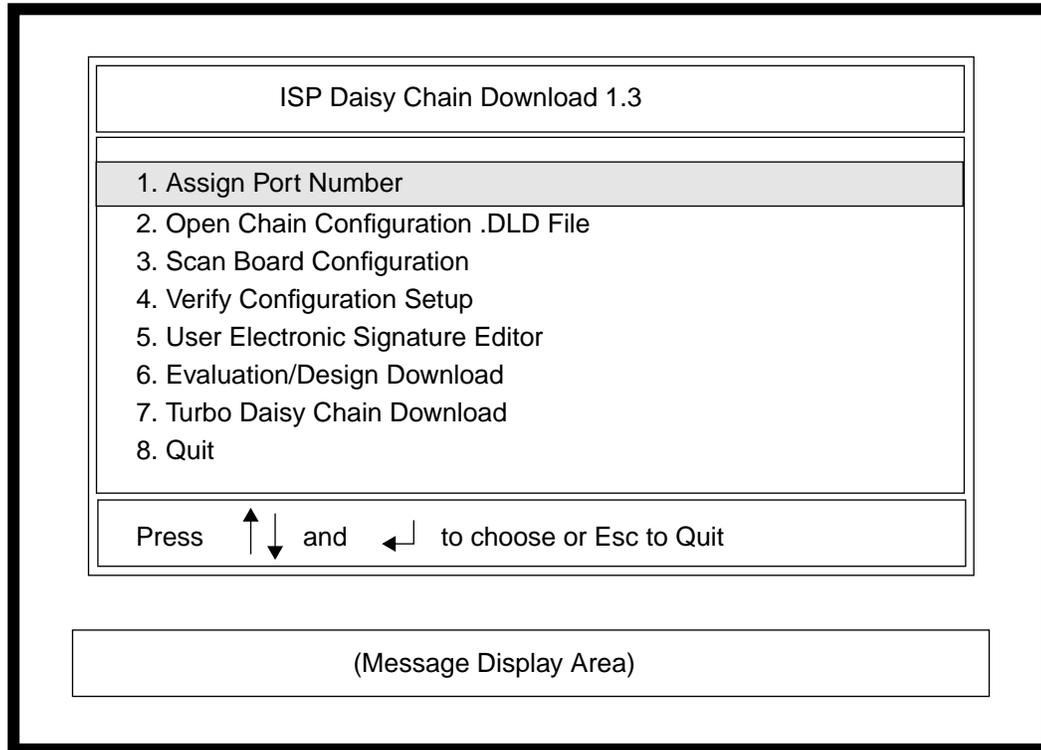
Figure 2-3. ISP Daisy Chain Download for DOS

Chapter 3 *Device Programming*

This chapter contains the ISP Daisy Chain Downloading procedure. The procedure supports both the Microsoft Windows and DOS environments. This chapter is organized into the following sections:

■   Programming ISP Devices

■   Windows Downloading

■   DOS Downloading

There are two methods you can use to program ISP devices. One method sends a JEDEC file to a third-party programmer. The second method is to send a JEDEC file via an ispDOWNLOAD™ cable directly from your system to a device. This chapter contains information about the following:

■   Options for programming a device using in-system programming (ISP) for ISP devices already installed on a printed circuit board

■   Programming a device using industry-standard, third-party PLD programmers

For additional information about using a device programmer for the PC, see the *isp Engineering Kit Hardware Assembly Manual*, *Model 100*. For additional information about how to program multiple ISP devices in a daisy-chained configuration, as well as general ISP interface and unique programming features of each ISP device, see the *Lattice Semiconductor Data Book*.

Programming ISP Devices

Using a PC

To program ISP devices in-system, you can either use the isp Engineering Kit Model 100 or implement the ISP algorithm for your own system and the ISP Daisy Chain Download software.

The isp Engineering Kit Model 100 contains the following:

■ Programming module

■ 25-pin parallel port adapter

■ ispDOWNLOAD cable

■ System cable

■ Power supply converter (110VAC/9VDC @ 200 mA) – North America and Asia only

■ *isp Engineering Kit Hardware Assembly Manual*, *Model 100*

A socket adapter board, which is purchased separately, is required if you want to program the ISP devices directly on the programming module. A unique socket adapter board is available for each package type. An ISP sample is included with each socket adapter board. Table 3-1 shows a partial list of the socket adapters now available from Lattice Semiconductor.

Table 3-1. Socket Adapter Boards

Socket Adapter Part Number	Pins	Device Type	Package Type
pDS4102-J44	44	ispLSI 1016 ispLSI 2032 ispLSI 2032LV	PLCC
pDS4102-T44	44	ispLSI 1016 ispLSI 1016E ispLSI 2032 ispLSI 2032LV	TQFP
pDS4102-J68	68	ispLSI 1024	PLCC
pDS4102-J84	84	ispLSI 1032	PLCC
pDS4102-T100	100	ispLSI 1032 ispLSI 1032E ispLSI 2064	TQFP
pDS4102-Q120	120	ispLSI 1048	PQFP
pDS4102-Q128	128	ispLSI 1048C ispLSI 1048E ispLSI 2096	PQFP
pDS4102-T176	176	ispLSI 2128	TQFP

Table 3-1. Socket Adapter Boards (Continued)

Socket Adapter Part Number	Pins	Device Type	Package Type
pDS4102-M160	160	ispLSI 2128 ispLSI 3256	MQFP
pDS4102-M208	208	ispLSI 6192	MQFP
pDS4102-M240	240	ispLSI 3192	MQFP

The part number for the isp Engineering Kit Model 100 is pDS4102-PM. To order the kit or the socket adapters, please contact an Lattice Semiconductor Sales Representative.

NOTE The isp Engineering Kit Model 100 is now offered in a European edition featuring AC Power Supply Converter compatibility. Order part number pDS4102E-PM for use in Europe.

Using Third-Party Programmers

Refer to the documentation for the particular programmer you are using to download the JEDEC file. Table lists LSC-qualified, third-party device programmers for the ISP families.

Table 3-2. LSC-Qualified Programmers

Vendor	Model
Advin Systems	Pilot GL/GCE, Pilot U40/U84/U168/U256
BP Microsystems	CP/PLD-1128, BP-1200
Data I/O	2900, 3900, ChipLab, Unisite 40, Unisite 48, Autosite
Logical Devices	Allpro 32/40, Allpro 88
SMS Microsystems	Sprint Expert
Stag	ZL30/A/B, System 3000, Quasar 1040/1084, Eclipse
System General	Turpro-1/FX, Turpro-1

> ✍ **NOTE**   High pin-count socket adapters are available from Emulation Technology, EDI Corporation, and PROCON Technologies.

For a complete listing of certified third-party PLD programmers which support the ISP families, please contact the Lattice Semiconductor Literature Department at 1-800-327-8425 and request a copy of the *Lattice Semiconductor Programming Tools.*

Windows Downloading

Lattice Semiconductor high-density ISP devices have an advanced feature that allows you to program and reprogram the parts in system without removing them. This feature eliminates using sockets for these devices, which avoids the common reliability problems associated with sockets. In-system programming can be done with an ispDOWNLOAD cable from the computer to the target device.

The software first scans to determine if there is a download cable connected to the device. If an ispDOWNLOAD cable is not attached, an alert message appears in the Messages window. When you invoke the download program, the ISP Daisy Chain Download window appears (Figure 3-1).
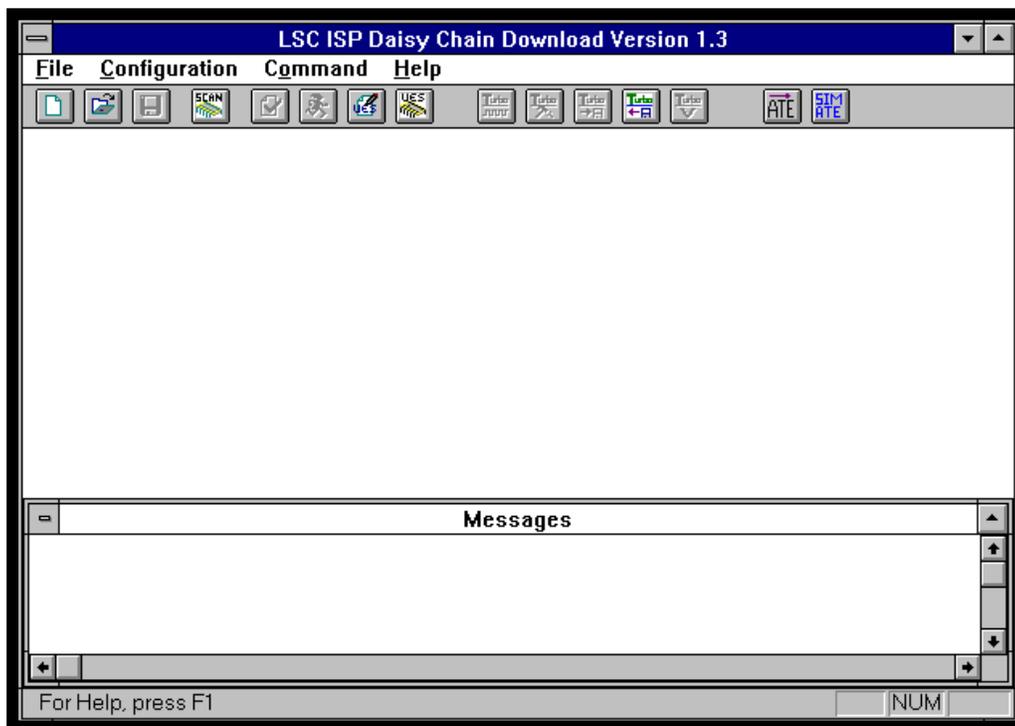
Figure 3-1. ISP Daisy Chain Download Window

The menu banner contains **File**, **Configuration**, **Command**, and **Help** pull-down options. Each menu option will be discussed briefly in the following sections.

The **File** menu contains the following options:

■ **New** – Creates a new configuration setup

■ **Open** – Opens a previously saved configuration setup

■ **Save** – Saves a named configuration setup

■ **Save As** – Names and saves a configuration setup

■ **Exit** – Exits the ISP Daisy Chain Download program

The **Configuration** menu contains the following options:

■ **Port Assignment** – Sets the parallel port(s) for the download configuration

■ **Scan Board** – Scans the board and detects the configuration setup

The ISP Daisy Chain Download software can detect the first port assignment if you have the cables connected properly when you start the program. Use **Configuration** ⇒ **Port Assignment** to *reset* the port.

The **Command** menu enables you to verify or download a configuration in the following two ways:

■ **Command** ⇒ **Check Configuration Setup**

■ **Command** ⇒ **Run Operation**

■ **Command** ⇒ **Turbo Download** ▶

■ **Command** ⇒ **Edit File UES** ▶

■ **Command** ⇒ **Display Board UES** ▶

■ **Command** ⇒ **Generate ATE Vectors**

■ **Command** ⇒ **Simulate ATE Testing**

Once you set up the configuration properly using the **File** menu, verify your setup configurations with **Command** ⇒ **Check Configuration Setup**. It is best to run the **Check Configuration Setup** operation before you download to check that your JEDEC device files are loading onto the correct devices, but that operation is optional. Execute the non-turbo downloading procedure by using **Command** ⇒ **Run Operation**. Your design files are programmed onto the devices to your specification. For more information about daisy-chaining your devices, see the *Lattice Semiconductor Data Book*.

The **Help** menu contains the following option:

■ **Index –** Lists the available topics

■ **Using Help –** Tells you how to use Windows Help

■ **About ISP Download** – Gives the version number of the ISP Daisy Chain Download software

Creating a New Configuration

To generate a new configuration:

1. Select **File** ⇒ **New** or click the **New** icon from the ISP Daisy Chain Download menu (Figure 3-2). The New Configuration dialog box appears (Figure 3-3).

   This dialog box allows you to set the number of devices you want to program. The limit is 60. If you use the download cable (part number pDS4102-DL), we recommend that you configure no more than eight ISP devices in a daisy chain.
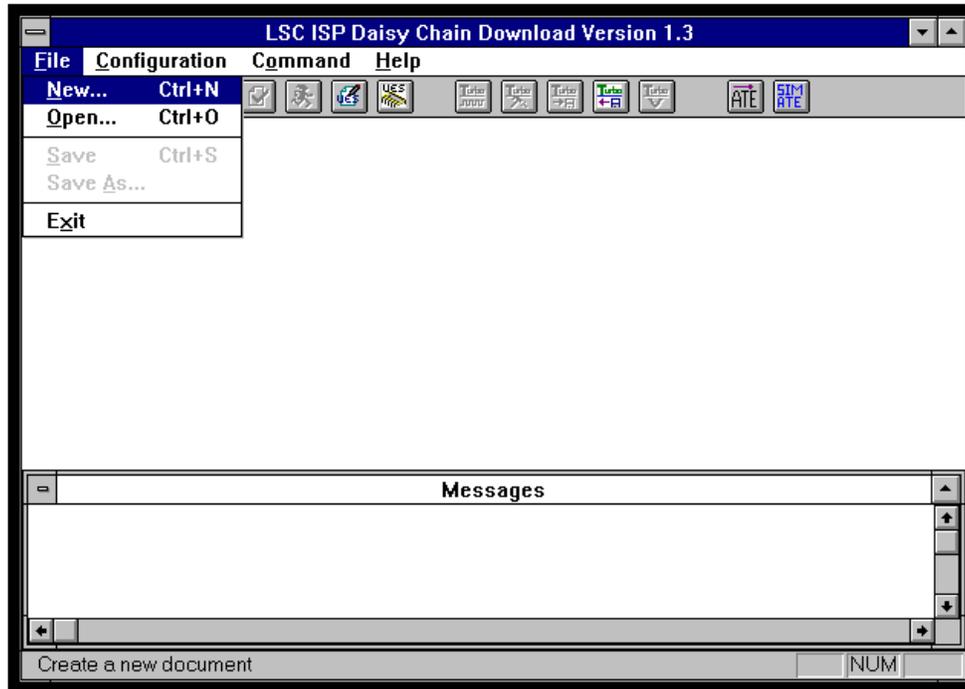
Figure 3-2. **File** ⇒ **New** Menu Option
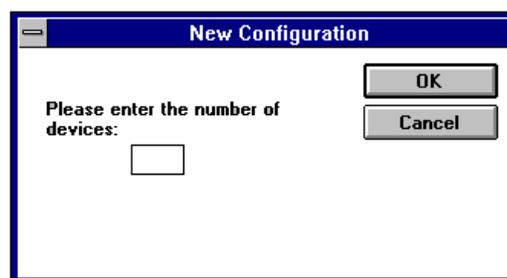
Figure 3-3. New Configuration Dialog Box

If you choose a number greater than 60, a dialog box appears (Figure 3-4) prompting you to re-enter a valid number of devices.

Figure 3-4. Invalid Input Dialog Box

2. Enter a number in the device field, click **OK** to execute, and Figure 3-5 appears. Select **Cancel** to close the dialog box and return to the ISP Daisy Chain Download window. The scroll arrows and box appear to the right of the Status column if you choose a number greater than six. The default device is the ispLSI1016.
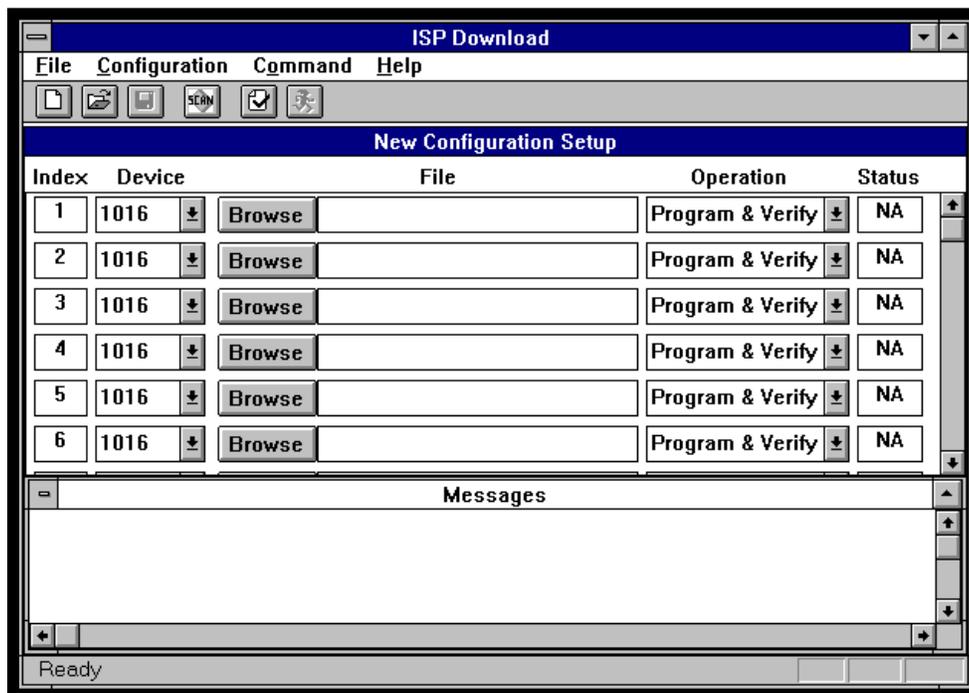
Figure 3-5. New Configuration Setup Dialog Box

The Configuration Setup dialog box includes the following features and options:

■ **Index Number** – Gives the order of the devices identified. As many as six are displayed per screen. This column is not editable.

■ **Device** – Gives the device(s) identified. Use the pull-down arrow to select the device type when creating a configuration.

■ **File** – Displays the file name (.jed). Choose **Browse** to locate a file or enter the file name in the field.

■ **Operation** – Lists the function to perform for each file. The default is Program & Verify. The Operation options include the following:

- Program & Verify
- Verify
- Checksum
- Read & Save
- Erase
- No Operation

■ **Status** – Shows the success factor after running a download procedure. The result possibilities include the following:

- Pass
- Fail
- Hexadecimal Value
- Done
- NA (not applicable)

The Status column displays NA until you execute the ISP Daisy Chain Download software for the configuration setup.

3. Select the device type in the **Device** field. Use the pull-down arrow to activate the pull-down menu (Figure 3-6).
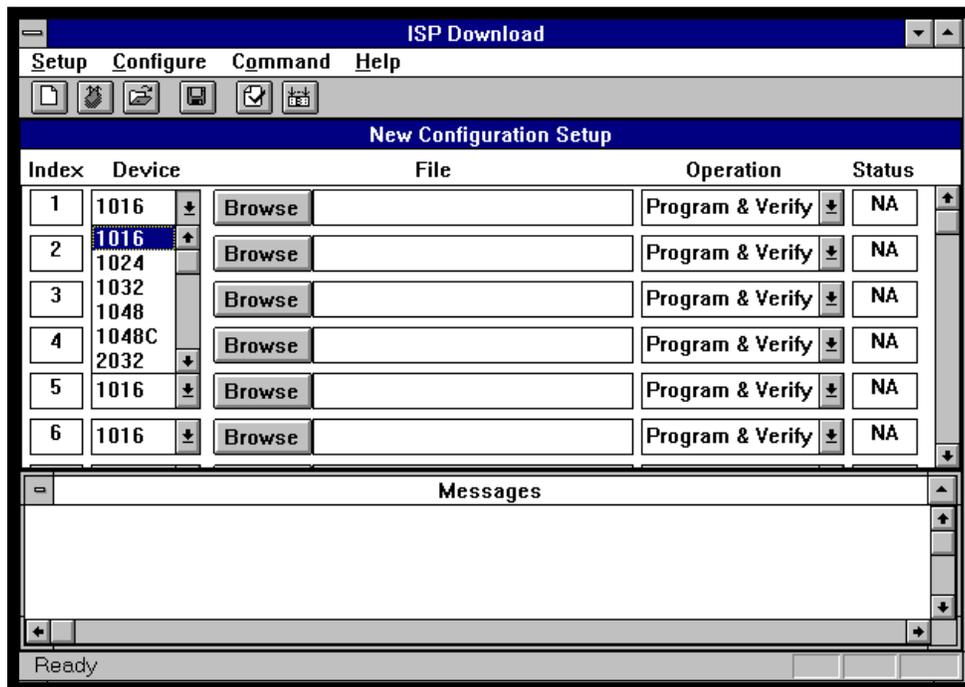
Figure 3-6. Device Pull-down Menu

4. Enter the file name or select **Browse** to find a file (Figure 3-7). Use the scroll down arrow keys to scroll through the lists. Make sure your choices are highlighted and choose **OK**. The Browse dialog box closes and the .jed file name you chose appears in the Configuration Setup dialog box for that device.
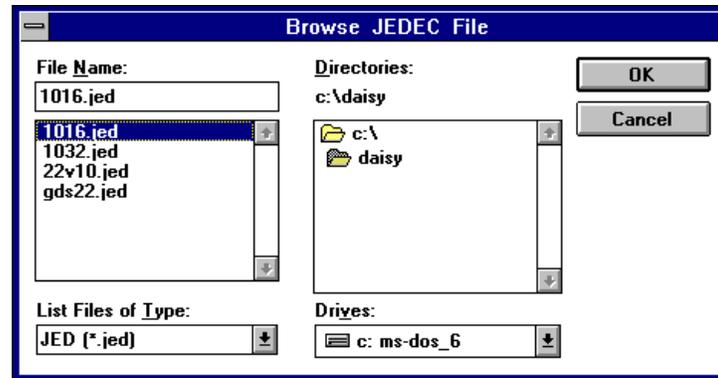
Figure 3-7. Browse JEDEC File Dialog Box

5. Select the **Operation** (Figure 3-8). Use the down arrow to activate the pull-down menu.

The **Operation** options are defined next.

■   **Program & Verify** – Performs a download of the design pattern, then verifies the chip program (device pattern) with the original .jed file to ensure the device was programmed correctly. The file name must be specified.

■   **Verify** – Compares the chip program (device pattern) with the specified .jed file.

■   **Checksum** – Computes the check sum value of the chip and sends the information to the Status field for the corresponding device.

■   **Read & Save** – Reads the chip program and writes it into the specified JEDEC file. The file name must be specified. If the file name already exists, a dialog box appears (Figure 3-9) asking if you want to overwrite the existing file.

■   **Erase** – Erases the chip program and the security fuse for the device you specify.

■   **No Operation** – Indicates no operation will be performed for that device.
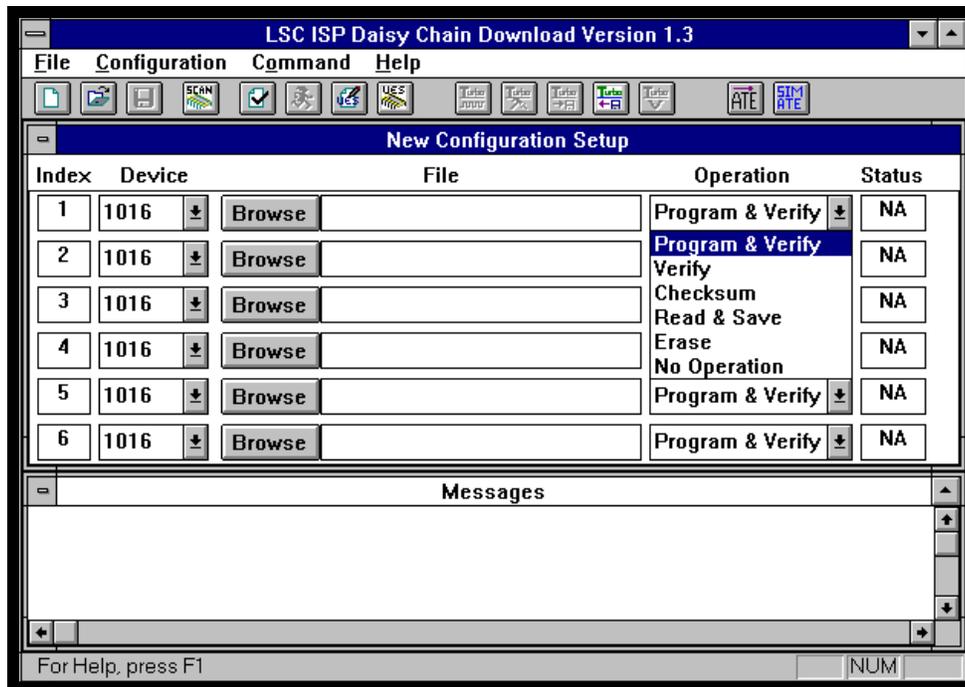
Figure 3-8. Operation Selection Options
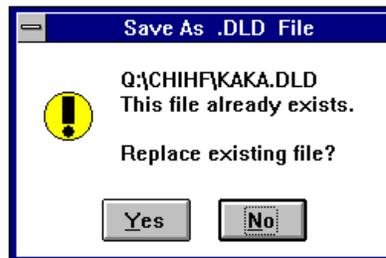
Figure 3-9. File Overwrite Dialog Box

Verifying a Configuration Setup

Once you enter all the specific information for each device, you should check your configuration to identify any errors before downloading.

> ☞ **NOTE**   The **Command** ⇒ **Run Operation** command will also run a verification of your setup prior to downloading each file to your specifications.

To check a configuration setup:

1. Select **Command** ⇒ **Check Configuration Setup** or click the **Check** icon from the ISP Daisy Chain Download menu (Figure 3-10).

> ❖ **TIP**   You can use **C<u>o</u>mmand** ⇒ **<u>C</u>heck Configuration Setup** to check your configuration setup and be certain you have all the information selected and the devices are ported properly. This process is particularly helpful if you do not want to download to an ISP device right then.
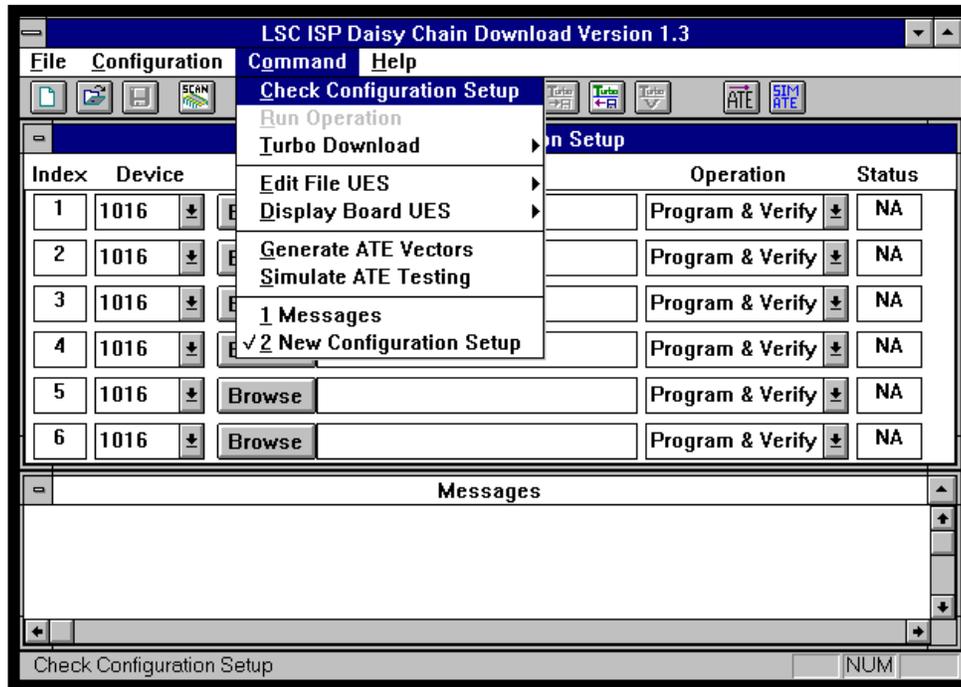
Figure 3-10. **C<u>o</u>mmand** ⇒ **<u>C</u>heck Configuration Setup** Menu Option

2. Check the Messages window and make any necessary corrections.

The Messages window is a clipboard for the log file created every time you perform either a **C<u>o</u>mmand** ⇒ **<u>C</u>heck Configuration Setup** or a **C<u>o</u>mmand** ⇒ **<u>R</u>un Operation**. Access the log file by typing `downld.log` from any text editor. The log file does not append itself; it only records the last function performed.

Downloading a File

To download a file:

1. Select **Command** ⇒ **Run Operation** or click the **Run** icon from the ISP Daisy Chain Download menu to program the device(s) with your design file(s) (Figure 3-11).
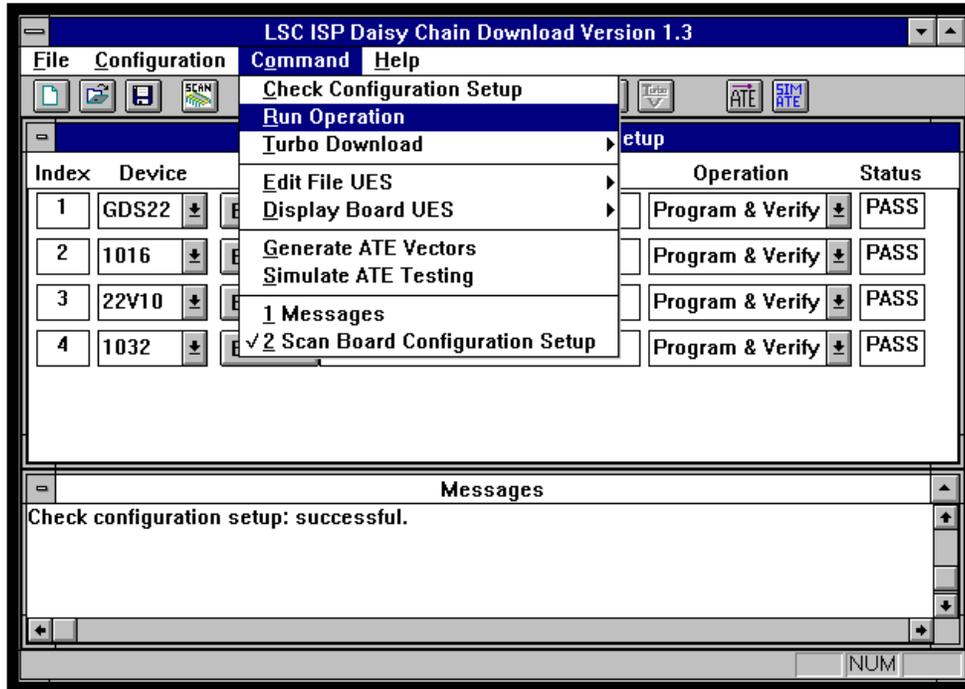
Figure 3-11. **Command** ⇒ **Run Operation** Menu Option

The software verifies that the configuration setup files and .jed files are compatible and performs the operation that you specified in the **Operation** field for each device. Check the Messages window for a successful notice.

Turbo Downloading a File

The turbo downloading feature differs from the **Run Operation** command in the way the ISP bit stream is read from the JEDEC files and sent to the daisy chain. Turbo Download is *much* faster. The more devices you have chained together, the more time you save. You can also retain your ISP bit stream so you can use it repeatedly—provided you are downloading the exact same configuration onto the devices.

The turbo downloading process requires a complete and accurate configuration setup file, just like a regular downloading process.

To perform a turbo download:

1. Select **Command** ⇒ **Turbo Download** ⇒ **Build** or the **Turbo Build** icon from the ISP Daisy Chain Download menu (Figure 3-12).

This process builds the ISP bit stream and stores it in a temporary buffer. You must perform the bit stream build to run turbo downloading. Until you build the ISP bit stream, the other download functions and icons are disabled (grey). Check the Messages window for important information and a finished message.
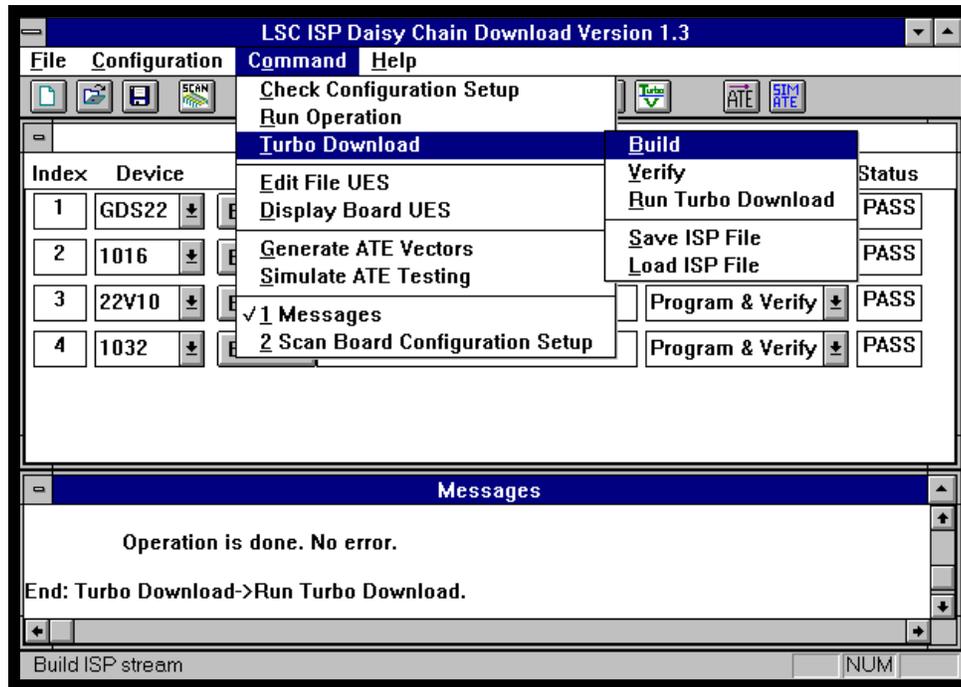
Figure 3-12. **Configuration** ⇒ **Turbo Download** ⇒ **Build** Menu Option

2. Select **Command** ⇒ **Turbo Download** ⇒ **Run Turbo Download** or the **Turbo Run** icon from the ISP Daisy Chain Download menu. This function checks the configuration setup file then downloads the ISP bit stream to the devices. The Message window reports that the software is checking your configuration setup for each device.

Saving a Bit Stream

If you want to retain this ISP bit stream, you can save it to a file.

To save an ISP bit stream:

1. Select **Command** ⇒ **Turbo Download** ⇒ **Save ISP File** or the **Turbo Save** icon from the ISP Daisy Chain Download menu (Figure 3-13). The Save As .ISP File dialog box appears (Figure 3-14).
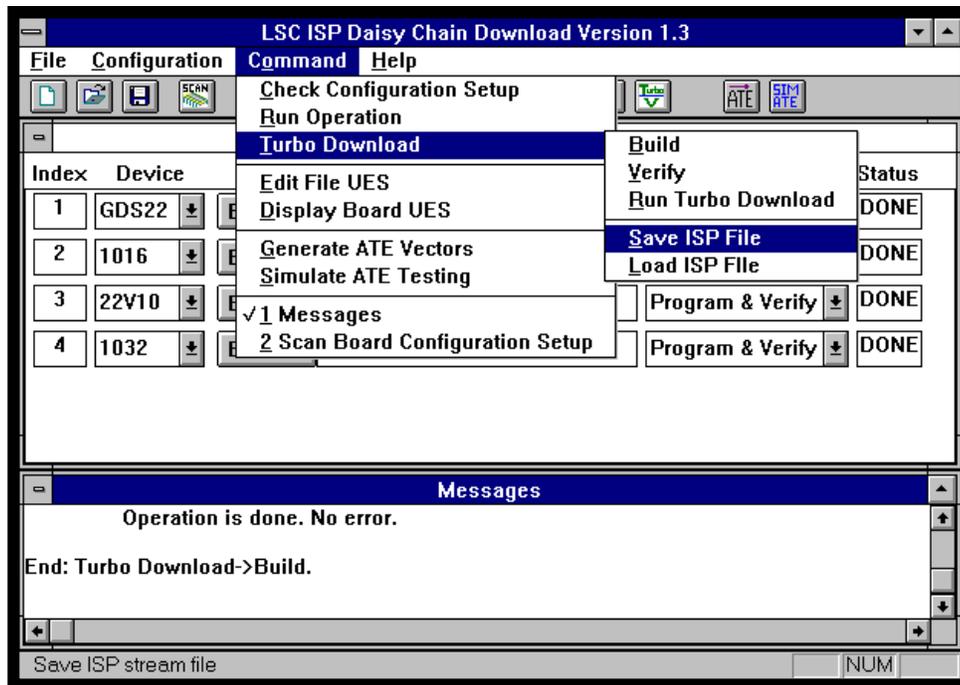
Figure 3-13. **Command** ⇒ **Turbo Download** ⇒
Save ISP File Menu Item
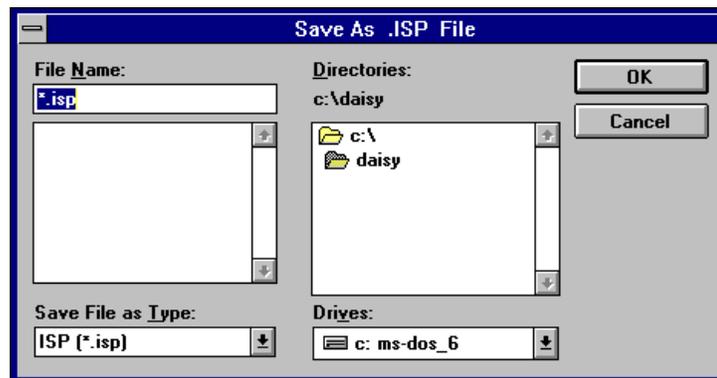
Figure 3-14. Save As .ISP File Dialog Box

2. Type in the name of your design file in the **File Name** field. It must have an .isp extension. If you enter more than eight characters, the file name is truncated. The full name of a file is not recognized against the truncated file name so the truncated file name overwrites itself each time you perform a save. If you forget to include the .isp extension, the file will not appear in the **Field Name** list. In that case, select all file types in the **Save File As Type** field.

3. Choose the directory and file type.

4. Click **OK**. The *name.*isp appears in the main ISP window.

   If the file name already exists, a warning box to overwrite the file appears. Click **Yes** to overwrite the existing file. Click **No** to return to the Save As dialog box and save the file with a new name.

   Click **Cancel** to close the Save As dialog box. The configuration setup is not saved.

5. Check the Messages window for a successful notice.

You can perform a turbo download without re-building the ISP bit stream. In this way, you can save multiple configuration setups (builds) to different file names.

Loading a Bit Stream

If you had previously saved an ISP bit stream, you can access it and you will not need to re-build the ISP bit stream. This function retrieves a named .isp file and loads it into the buffer for downloading.

To load an ISP bit stream:

1. Select **Command** ⇒ **Turbo Download** ⇒ **Load ISP File** or the **Turbo Load** icon from the ISP Daisy Chain Download menu (Figure 3-15). The Open .ISP File dialog box appears (Figure 3-16).
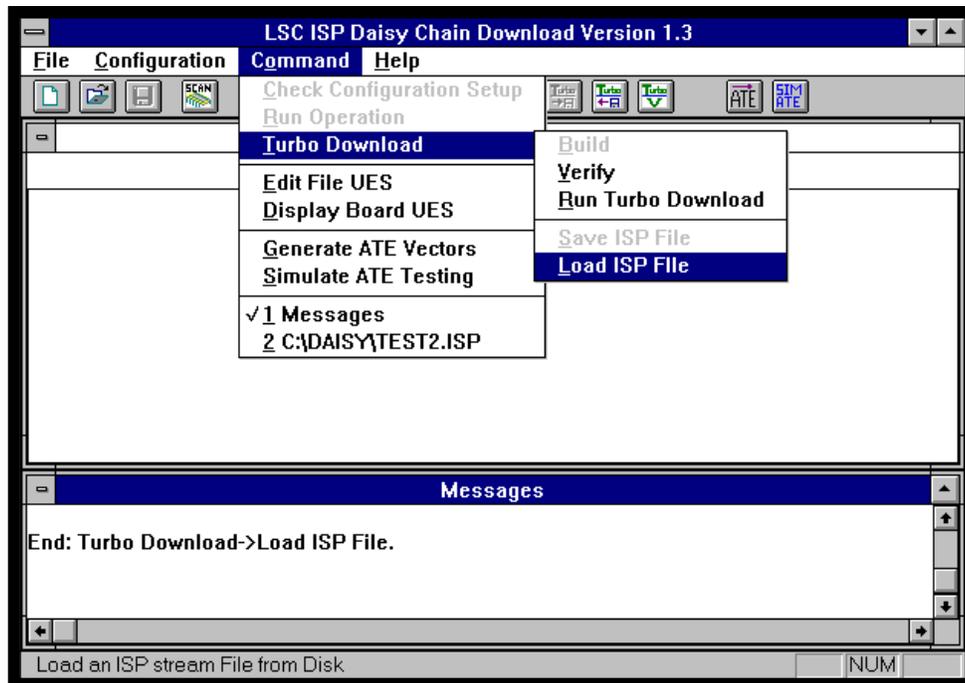
Figure 3-15. **C<u>o</u>mmand** ⇒ **<u>T</u>urbo Download** ⇒
<u>L</u>oad ISP File Menu Item
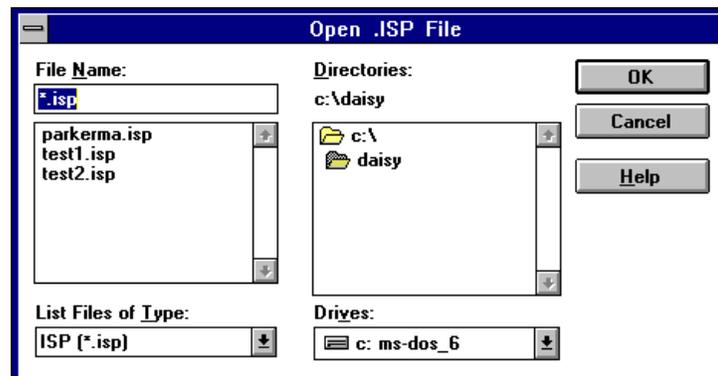
Figure 3-16. Open .ISP File Dialog Box

2. Type in the name of your design file in the **File <u>N</u>ame** field. It must have an .isp extension. If you enter more than eight characters, the file name truncates. The full name of a file is not recognized against the truncated file name so the truncated file name overwrites itself each time you perform a save. If you forget to include the .isp extension, the file will not appear in the **Field <u>N</u>ame** list. In that case, select all file types in the **List File As <u>T</u>ype** field.

3. Choose the directory and file type.

4. Click **OK**. The *name*.isp appears in the main ISP window. This function loads the ISP bit stream file into the buffer and removes the configuration setup window. It is ready for a device programming download.

Click **Cancel** to close the Open .ISP File dialog box.

5. Check the Messages window for a successful notice.

You will notice that the **Turbo Run**, **Turbo Verif**y, and the **Turbo Load** icons are all available. The ISP bit stream file loads into the buffer and is ready to access for a device programming download.

Verifying a Bit Stream

When you verify an ISP bit stream, the software checks the stream against the devices to verify that the .dld file (configuration setup) is present and accurate. If you have not performed a download, the verification process will fail because the stream is not present on the devices and cannot be verified.

To verify the ISP bit stream:

1. Select **Command** ⇒ **Turbo Download** ⇒ **Build** or the **Turbo Build** icon from the ISP Daisy Chain Download menu.

    Or:

    Select **Command** ⇒ **Turbo Download** ⇒ **Load ISP File** or the **Turbo Load** icon from the ISP Daisy Chain Download menu. The Open .ISP File dialog box appears. Choose an .ISP file. Click **OK**.

2. Select **Command** ⇒ **Turbo Download** ⇒ **Verify** or the **Turbo Verify** icon from the ISP Daisy Chain Download menu (Figure 3-17).
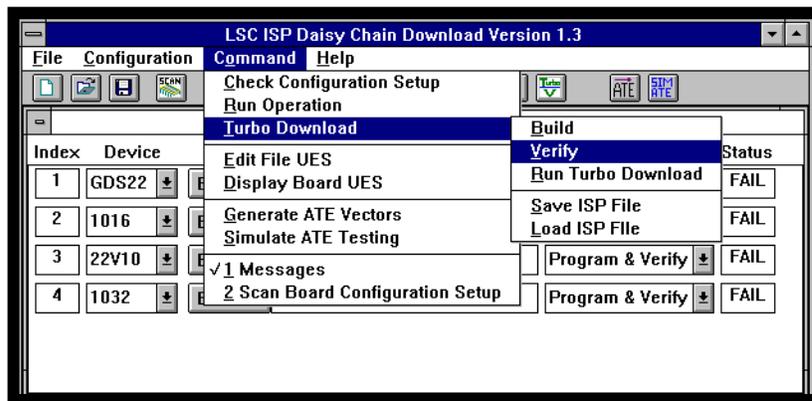
Figure 3-17. **Command** ⇒ **Turbo Download** ⇒ **Verify** Menu Item

3. Check the Messages window. It should list each device by index number, type, and state that the configuration setup check passed.

Loading a User Electronic Signature

The JEDEC file now contains User Electronic Signature (UES) data which you can edit or read in from the board. Set a signature using the hexadecimal or ASCII formats.

✍ **NOTE**   The transmission checksum is recalculated each time the UES is modified.

Editing a UES

To edit a signature using hexadecimal characters:

1. Select **Command** ➠ **Edit File UES** ⇒ **HEX** or the **write UES** icon from the ISP Daisy Chain Download menu to edit a UES (Figure 3-18). The icon defaults to hexadecimal format. You may also select the **ASCII** option. If the UES dialog box exists, this function brings the UES dialog box to the foreground. Otherwise, The Open .JED File dialog box appears (Figure 3-19).
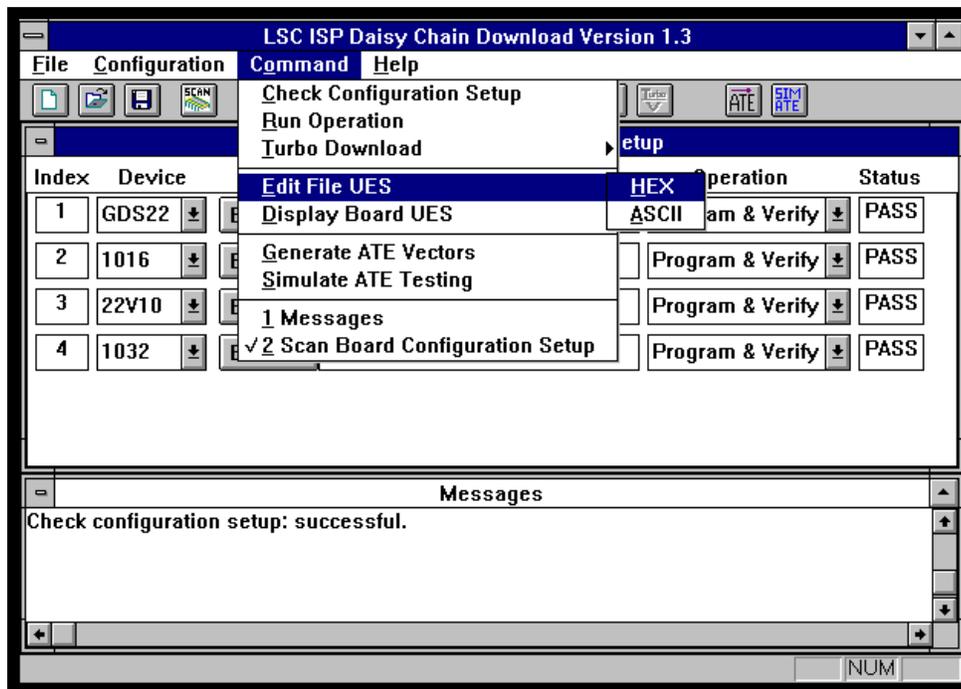
Figure 3-18. **Command** ⇒ **Edit File UES** ⇒ **HEX** Menu Option
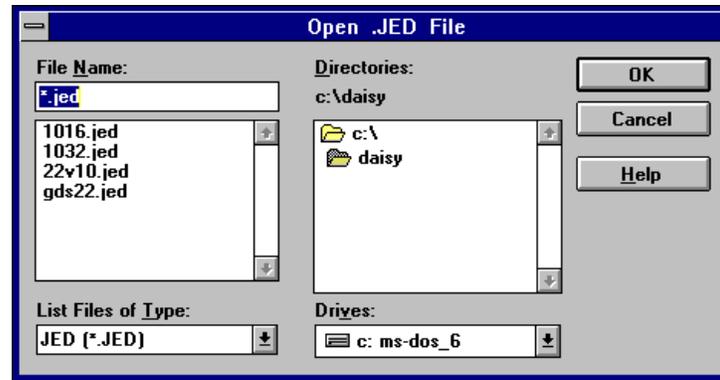
Figure 3-19. Open .JED File Dialog Box

2. Select a .jed file. Choose the directory and file type. Click **OK**. The UES dialog box
    appears (Figure 3-20).
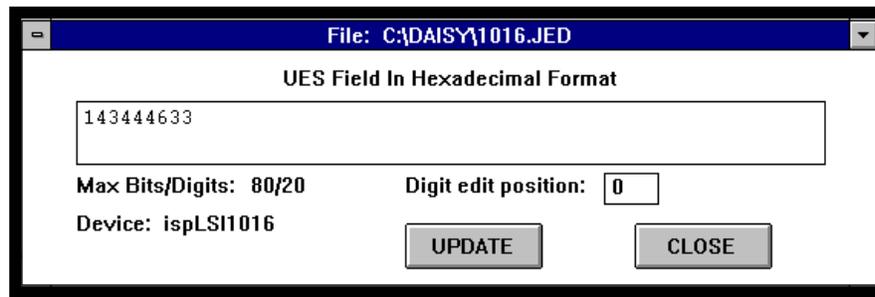
Figure 3-20. JEDEC File with UES Dialog Box

3. Type in the signature using only hexadecimal characters (0-9 and A-F). The Digit
    edit position field helps you while typing in the signature. Click **Update**. The UES
    Write Successful dialog box appears (Figure 3-21) telling you the signature was
    saved into the .jed file. Remember, the signature is only imbedded on the device
    after you perform a download.

    If you select the **Close** button before you press **Update**, the dialog box closes and
    the new signature is not saved to the .jed file.
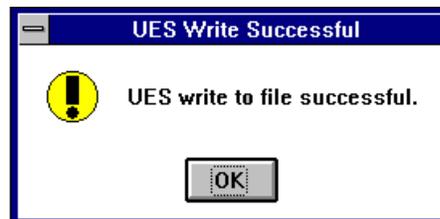
Figure 3-21. UES Write Successful Dialog Box

Editing a UES in ASCII format works exactly the same way, only you input any
printable character—except the control characters. The default ASCII signature for a
file is .... (the dot character).

Scanning the Board for the UES

To read the signature from the chip:

1. Select **Command** ⇒ **Display Board UES** ⇒ **HEX** or the **UES chip** icon from the ISP Daisy Chain Download menu (Figure 3-22). The icon defaults to hexadecimal format. You may also select the **ASCII** option. This function performs a scan of the board. The Display Board UES dialog box appears (Figure 3-23).

   You cannot edit the signatures on the devices with this box. This command only allows you to view the signature that you already downloaded onto the devices. If you have not downloaded a personal signature onto your devices, the *default* data will appear in the signature field.

   The **Close** button terminates the Display Board UES dialog box and the function.
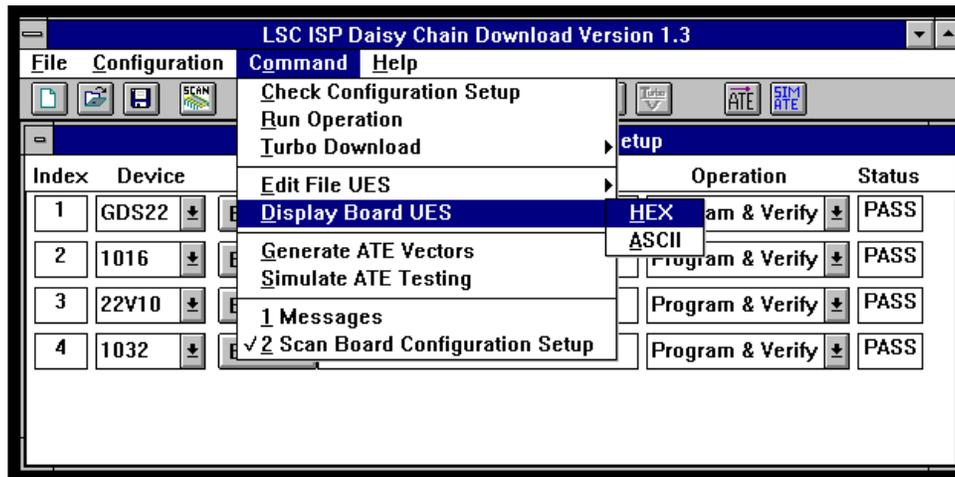
Figure 3-22. **Command** ⇒ **Display Board UES** ⇒ **HEX** Menu Option
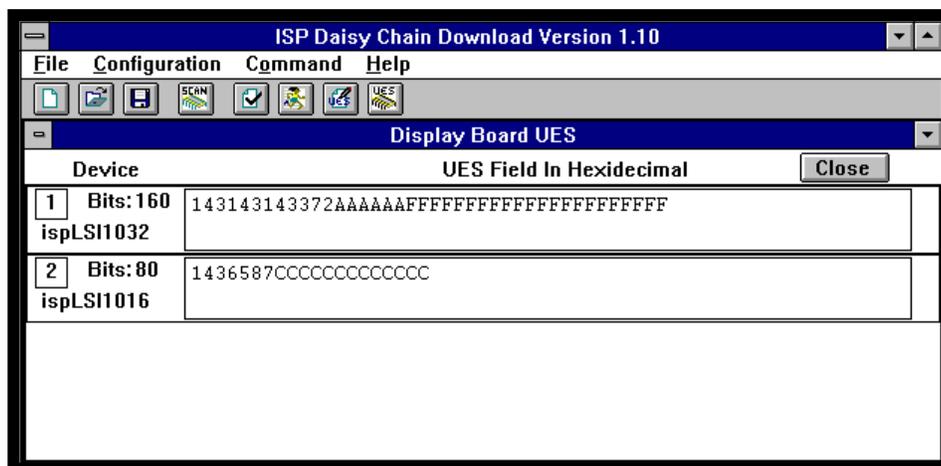
Figure 3-23. Display Board UES Dialog Box

> ☞ **NOTE**   The default signature for low-density devices is 0. The default signature for high-density devices is F in hexadecimal format.

2. Check the Messages window to confirm the scan function of the devices was successful.

Displaying a UES in ASCII format works exactly the same way, only you see the signature in ASCII characters.

Using ATE Vectors

You can use automatic test equipment (ATE) to program and verify ISP devices, instead of using stand-alone device programmers. Since you can customize your ISP device configurations specifically for board-level testing, you can enhance the testability of your product. Any ATE programming solution requires a JEDEC file, then a means of translating the JEDEC file into signals on the ISP interface driven by the ATE. The following two methods are available for performing this translation:

■ Create test vectors to program the devices using a translation tool from Lattice Semiconductor

■ Write an ATE program language

This section discusses how to use test vectors. For complete information on how to configure the ATE with Lattice Semiconductor software and devices, see "ATE Programming of Devices" in the Lattice Semiconductor *ISP Manual*. Currently, Table 3-3 shows the LSC-supported testers.

> ☞ **NOTE**   You must have an ISP bit stream file to create ATE vectors.

Table 3-3. LSC-Supported Testers

Company	Model
Hewlett Packard	All testers including: Models 3060, 3065, 3070, 3073
GenRad	GR228X/e Series
Teradyne	Z1800 Series & Z8000 Series –Vector Processor Option must be installed

To generate ATE vectors:

1. Select **Command** ⇒ **Generate ATE Vectors** or the **ATE** icon from the ISP Daisy Chain Download menu (Figure 3-24). The ATE Vector File Options dialog box appears (Figure 3-25).
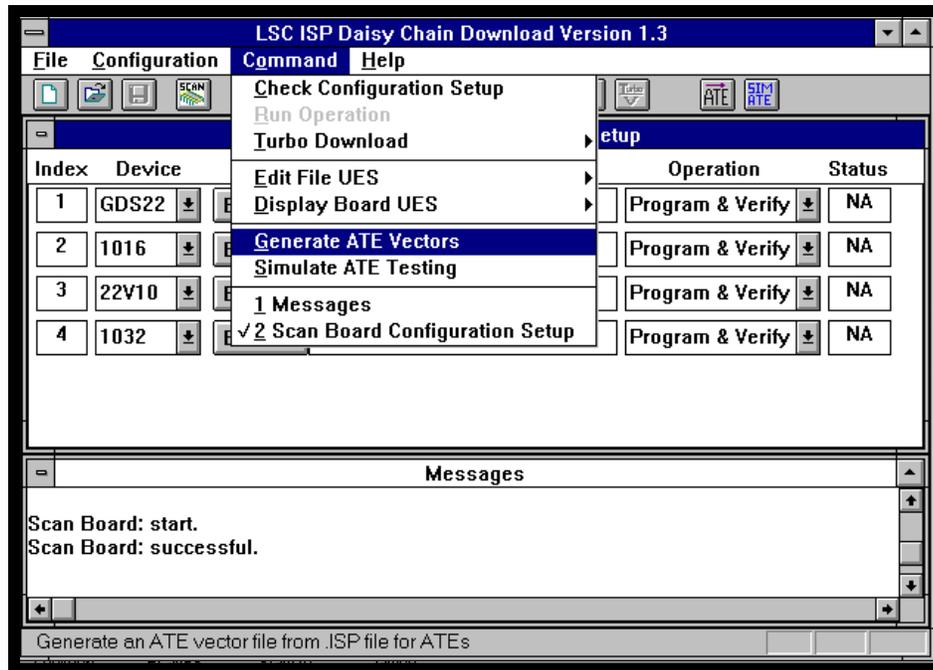
Figure 3-24. **Command** ⇒ **Generate ATE Vectors** Menu Item
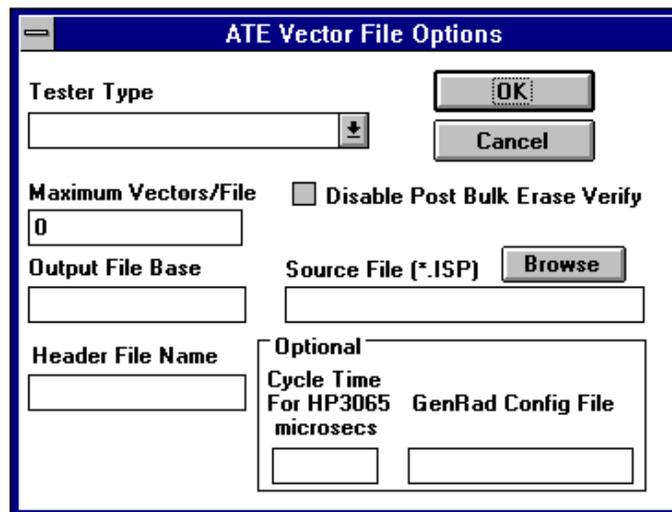
Figure 3-25. ATE Vector File Options Dialog Box

The following information explains what each menu option is:

■ Tester Type–Includes the Lattice Semiconductor supported and compatible testers currently available.

■ Maximum Vector/File–Includes the maximum number of vectors allowed in each vector file. This data can be obtained from the perspective ATE vendors. A default setting of 0 builds one ispVECTOR file.

■ Output File Base–Includes the six character or less file name base that will be appended incrementally by the ATE generation process. For example, if you enter "vec" as the base name and 128 files are created, the file names will appear as vec0, vec1, vec2, etc. The dot extension depends on the ATE vendor you choose.

■ Header File Name–Includes the file name (if the file is located in your current directory) or full path (if the file is located in another directory) for the header data that you type in any text editor file. The header data can include the author name, the type of configuration setup this header will appear with, pin definitions, signal names, timing information, etc. The IDCD software will affix this header data to the head of each ATE vector file it generates.

■ Disable Post Bulk Erase Verify–Determines if the post bulk erase verify vectors will be generated in each vector file. By checking this box, fewer vectors are generated and the file sizes are smaller. However, post bulk erase verify vectors help to confirm that the device is erased properly.

■ Source File–Includes the ISP bit stream file name you will use to create the ATE vector files. This file must be an ISP bit stream file. If you are unsure of the file name, click **Browse** for a selection. The file name must be eight characters or fewer, otherwise it is truncated.

■ Cycle Time–Includes the optional cycle time information that must be included if you are using a Hewlett Packard 3065 tester. Waits are implemented in the form or repeat loops. The number of times a vector is repeated in the loop is determined by the vector cycle time. IDCD will calculate the correct number of times to go through the loop; however, it is critical that you specify the correct cycle time in your header file. The ATE generation process does not read through the header to determine timing delays. Specify the cycle time in microseconds. Filling in this field is optional.

■ GenRad Config File–Includes the file name that is inserted after the header file for GenRad testers. Filling in this field is optional.

The following gives an example of how to fill out the ATE Vector File Options Dialog box.

2. Select the tester type with the Tester Type pull-down menu. This field must be set according to the ATE you are using. Select **ispVECTOR**.

3. Type in an .ISP file name in the **Source File** field or click **Browse**. The Open .ISP File dialog box appears (Figure 3-16). Once you select a file, the path appears in the **Source File** field. Type `ate1.isp`

4. Enter a number in the **Maximum Vectors/File** field. Obtain a valid number range from the ATE specifications for whichever tester type you are using. Type `128`.

5. Enter a file base name in the Output File Base field. Type `vec`.

6. Enter the header file name in the Header File Name field. Type `head` (Figure 3-26).
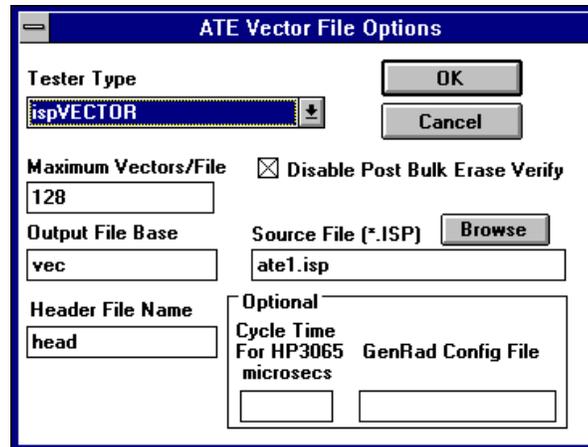
Figure 3-26. Filling in the ATE Vector FIle Options Dialog Box

7. Click the check box to disable the post bulk erase verify feature.

8. Click **OK**.

    Check the Messages window for a successful notice and to determine how many files were generated.

You can open and edit the vector files using any text editor. The dot extensions for vector files are determined by which type of ATE you used.

Simulating ATE Functions

Using your PC, you can simulate ATE tester functions. By simulating the test vector files, you can insure that the test vector files will program correctly. Using a parallel port, the simulation downloads the vectors from the ispVECTOR files (the ISP bit stream file) to your devices.

The following items are the ATE Download Simulation options:

■ Type of ATE File–Includes the type of ATE vector file you will simulate. Currently, Lattice Semiconductor supports the ispVECTOR file type *only*. These files have a .tst extension.

■ Base File Name of ATE File–Includes the base file name of the vector files you want to simulate. Enter a name that is six characters or fewer. The IDCD software assumes your vector file is located in your current working directory. Type in the same base file name that you used in the Output File Base field in Figure 3-26 (**vec**). Only ispVECTOR files can be used.

■ Number of Files–Includes the number of files into which the ispVECTOR file was split. The number of files is determined during the **Command** ⇒ **Generate ATE** function. Check the Messages window for the number of files. There is no limitation to the number of files.

To simulate ATE vectors:

1. Select **Command** ⇒ **Simulate ATE Testing** or the **ATE SIM** icon from the ISP Daisy Chain Download menu (Figure 3-27). The ATE Download Simulation dialog box appears (Figure 3-28).
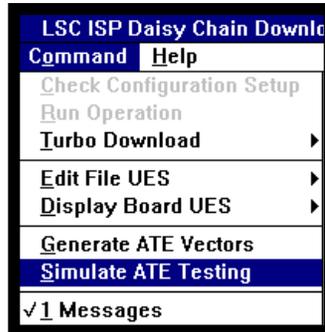

Figure 3-27. **Command** ⇒ **Simulate ATE Testing** Menu Item
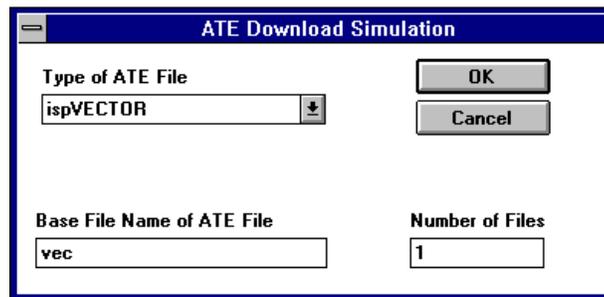
Figure 3-28. ATE Download Simulation Dialog Box

2. Select a file type from the Type of ATE File drop box.

3. Enter the base file name in the Base File Name of ATE File field. This base name should have a .tst file extension.

4. Specify the number of files in the Number of Files field. There is no limit.

5. Click **OK**.

    Check the Messages window for a successful notice.

Saving a New Download Configuration

Once you set all the parameters for the configuration, save it.

To save a new download configuration:

1. Select **File** ⇒ **Save As** or click the **Save** icon from the ISP Daisy Chain Download menu (Figure 3-29). The standard Save As dialog box appears.

2. Type in the name of your design file in the File Name field. It must have a .dld extension. If you enter more than eight characters, the file name is truncated. The full name of a file is not recognized against the truncated file name so the truncated file name overwrites itself each time you perform a save.

3. Choose the directory and file type.

4. Click **OK**. The *name*.dld appears in the main ISP window.

   If the file name already exists, a warning box to overwrite the file appears. Click **Yes** to overwrite the existing file. Click **No** to return to the Save As dialog box and save the file with a new name.

   Click **Cancel** to close the Save As dialog box. The configuration setup is not saved.
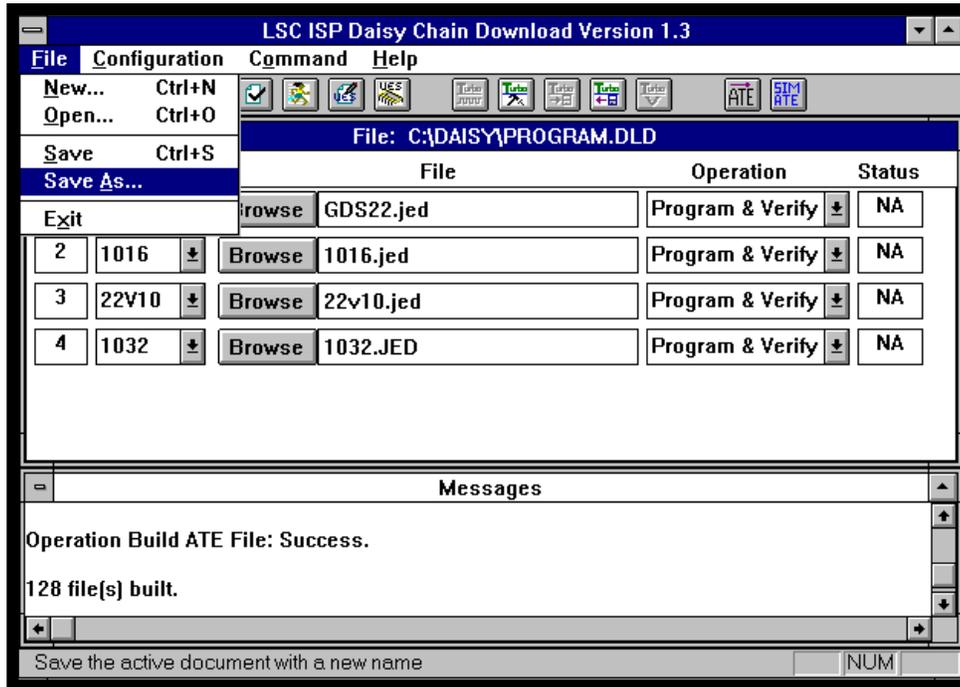
Figure 3-29. **File** ⇒ **Save As** Menu Option

Saving a Configuration

Save your *name*.dld file while you work to ensure no data are lost.

To save a .dld file:

1. Select **File** ⇒ **Save** or click the **Save** icon from the ISP Daisy Chain Download menu (Figure 3-30).

   If you have already named and saved the file before, the save takes place transparently and the icon dims.
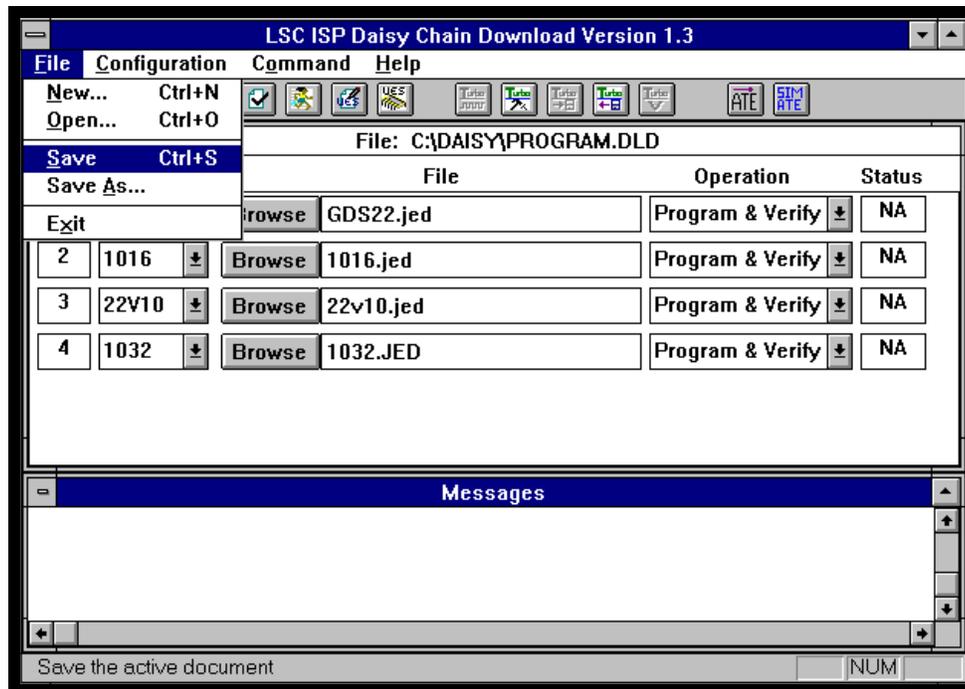
Figure 3-30. **File** ⇒ **Save** Menu Option

If you are working with a .dld file created with a text editor using the DOS environment, see "Creating a .DLD File" on page 54.

Detecting a Configuration

If you want the software to identify all the devices available for programming, regardless of how you have them ported or mounted, use the **Configuration** ⇒ **Scan Board** command. This command detects all the available ISP devices and lists their order and device type. Once the IDCD software identifies this information, complete the process by filling in the .jed file names and choosing the **Operation** for each device, exactly like the new configuration procedure beginning on page 25.

To identify the ISP devices automatically:

SCAN

1. Select **Configuration** ⇒ **Scan Board** or click the **Scan** icon from the ISP Daisy Chain Download menu (Figure 3-31). If you connected more than 60 devices to the board, an error message appears (Figure 3-32). The IDCD software can only detect and read as many as 60 devices per file. Otherwise, the Scan Board Configuration Setup dialog box appears (Figure 3-33) with the **Index** and **Device** fields filled.
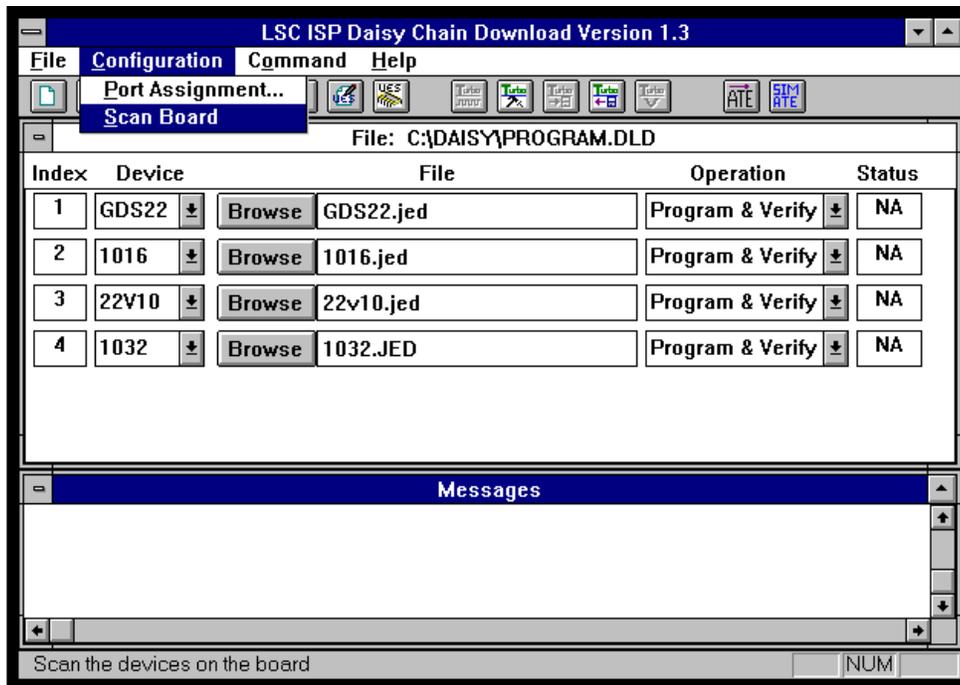
Figure 3-31. **Configuration** ⇒ **Scan Board** Menu Option
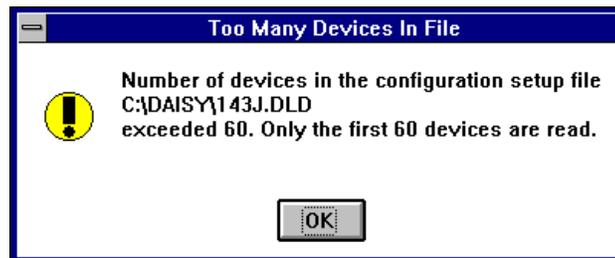
Figure 3-32. Number of Devices Detected Dialog Box

2. Enter the file name or select **Browse** to find a file. Use the down arrow keys to scroll through the lists. Make sure your choices are highlighted and choose **OK**. The Browse dialog box closes and the .jed file name you chose appears in the Scan Board Configuration Setup dialog box for that device.

3. Select the **Operation**. Use the down arrow to activate the pull-down menu.

The **Operation** options are defined starting on page 25.
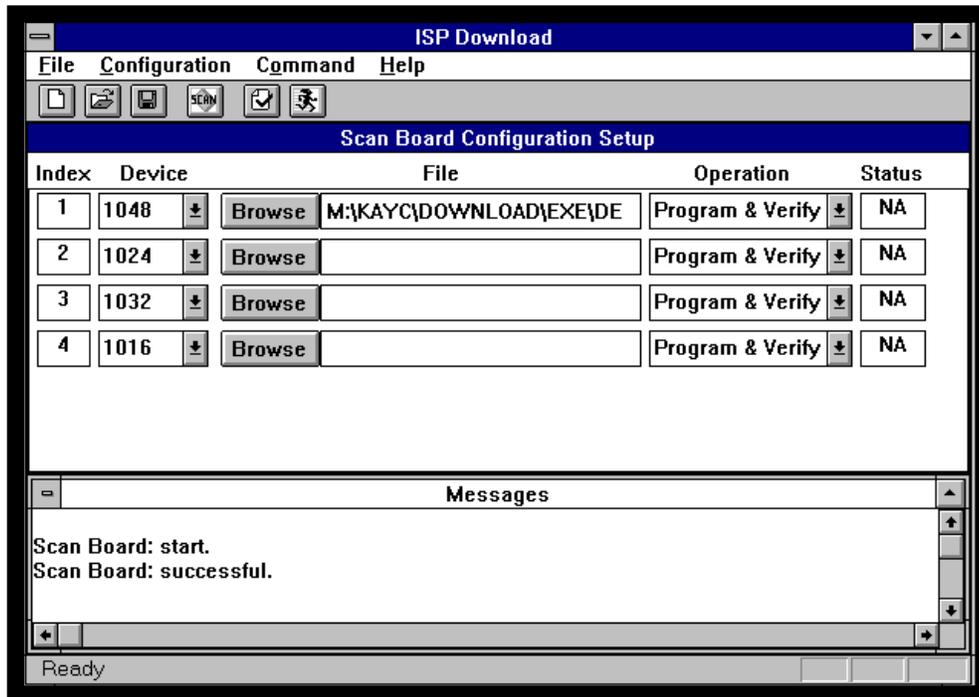
Figure 3-33. Scan Board Configuration Setup Dialog Box

When you perform a **Read & Save**, if the file name already exists, a dialog box appears (Figure 3-34) warning you that you are about to overwrite the existing file.
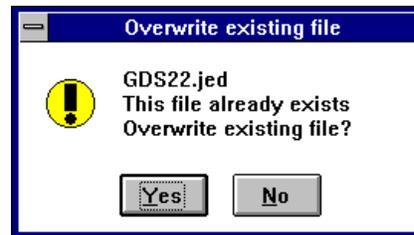
Figure 3-34. File Overwrite Dialog Box

Opening a Configuration

To open a configuration:

1. Select **File** ⇒ **Open** or click the **Open** icon in the IDCD menu (Figure 3-35). The standard Open dialog box appears.

2. Fill in the fields as required to access the file. Click **OK** to execute or **Cancel** to close the dialog box.
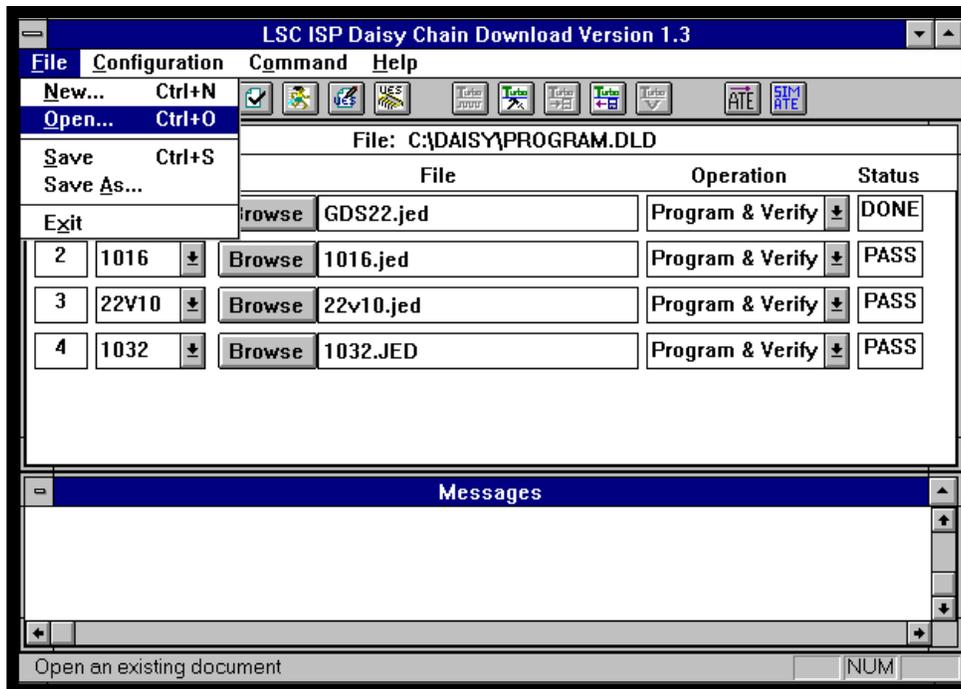
Figure 3-35. **File** ⇒ **Open** Menu Option

Changing the Port

When you launch the IDCD software with the cables properly connected, it identifies the first port it detects. This menu allows you to change the port setup to accommodate your porting needs.

To change the port setup:

1. Select **Configuration** ⇒ **Port Assignment** from the IDCD menu (Figure 3-36). The Port Assignment dialog box appears (Figure 3-37).
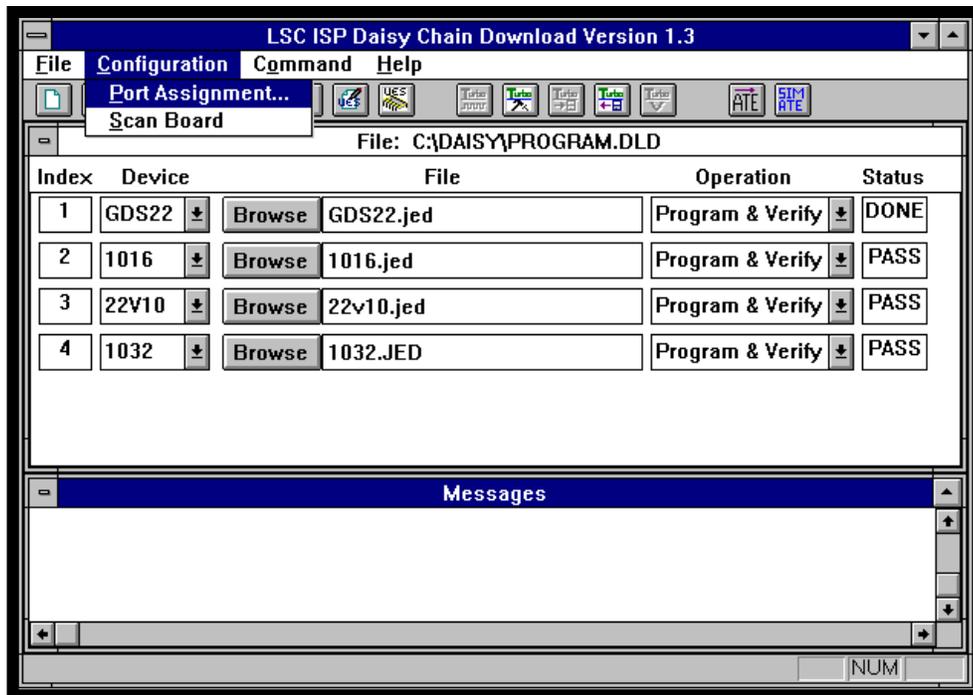
Figure 3-36. **Configuration** ⇒ **Port Assignment** Menu Option

2. Use the pull-down arrow to select a port. Make sure your choice is highlighted. It appears in the top of the box.

3. Click **OK** to execute with your changes or **Cancel** to close the box with no changes.
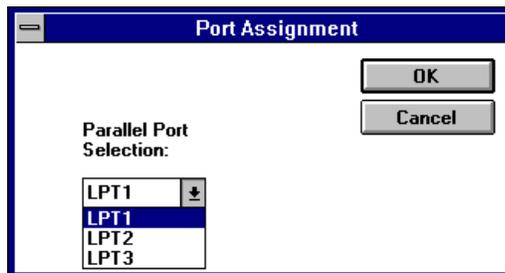
Figure 3-37. Port Assignment Dialog Box

If the cable is not connected or cannot be detected, the Port Error dialog box appears (Figure 3-38).

Figure 3-38. Cable Not Connected Dialog Box

If the cable is connected properly, but the power is not on, the dialog box in Figure 3-39 appears.

Figure 3-39. Cable Connected, Power Not On Dialog Box

Exiting the Program

To quit the ISP Daisy Chain Download software:

1. Select **File** ⇒ **Exit** from the ISP Daisy Chain Download menu (Figure 3-40). The Save Configuration Setup dialog box appears (Figure 3-41), if you have not previously saved this file.

2. Click **Yes** to save the changes and exit the ISP Daisy Chain Download program. Click **No** to exit without saving the changes. The changes are not saved to the file that was open and the application closes. If you created a new configuration and did not name it, the standard Save As dialog box appears. Fill in the fields and click **OK** to exit the ISP Daisy Chain Download software.
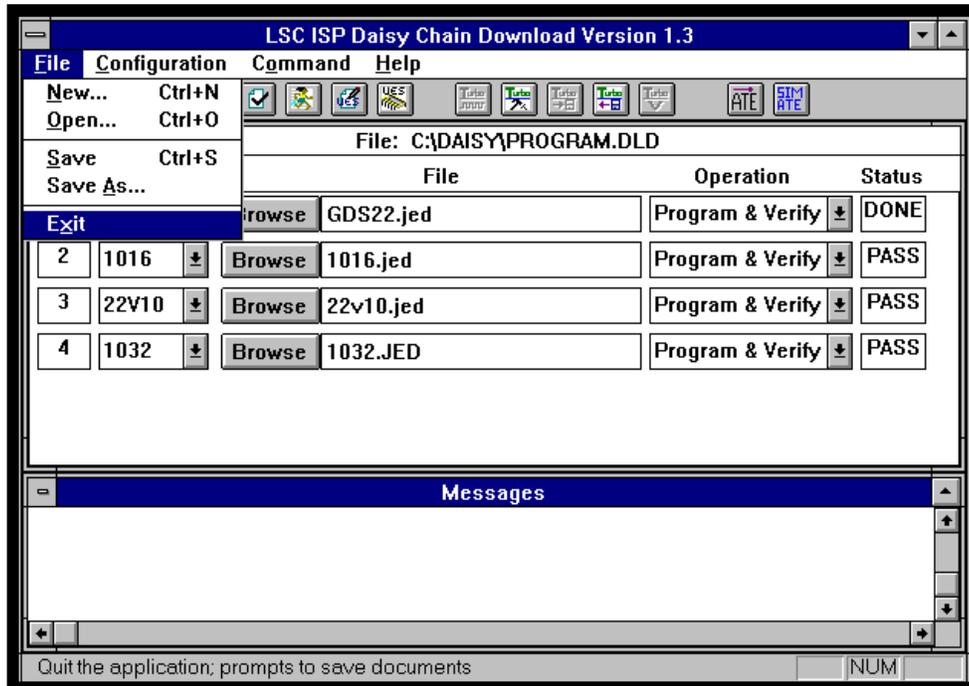
Figure 3-40. **File** ⇒ **Exit** Menu Option
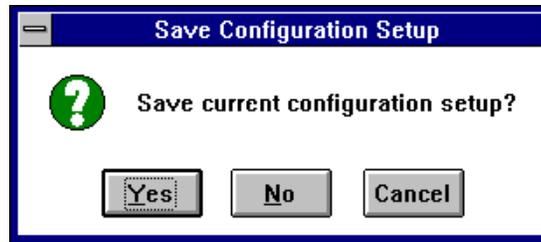
Figure 3-41. Save Configuration Setup Dialog Box

DOS Downloading

When you execute the ISP Daisy Chain Download software from the DOS prompt, you must launch it from your working directory to access all of your configuration setup files.

To access the Lattice Semiconductor IDCD software:

1. Enter the following instruction at the DOS prompt:

`C:\`***install_path***`\ddownld`

A menu similar to the following appears (Figure 3-42).


```
         LSC ISP Daisy Chain Download V1.3


  1. Assign Port Number
  2. Open Chain Configuration .DLD File
  3. Scan Chain Configuration
  4. Verify Configuration Setup
  5. User Electronic Signature Editor
  6. Evaluation/Design Download
  7. Turbo Daisy Chain Download
  8. Quit

  Press   ↑↓  and   ↵   to choose or Esc to Quit


         (Message Display Area)
```
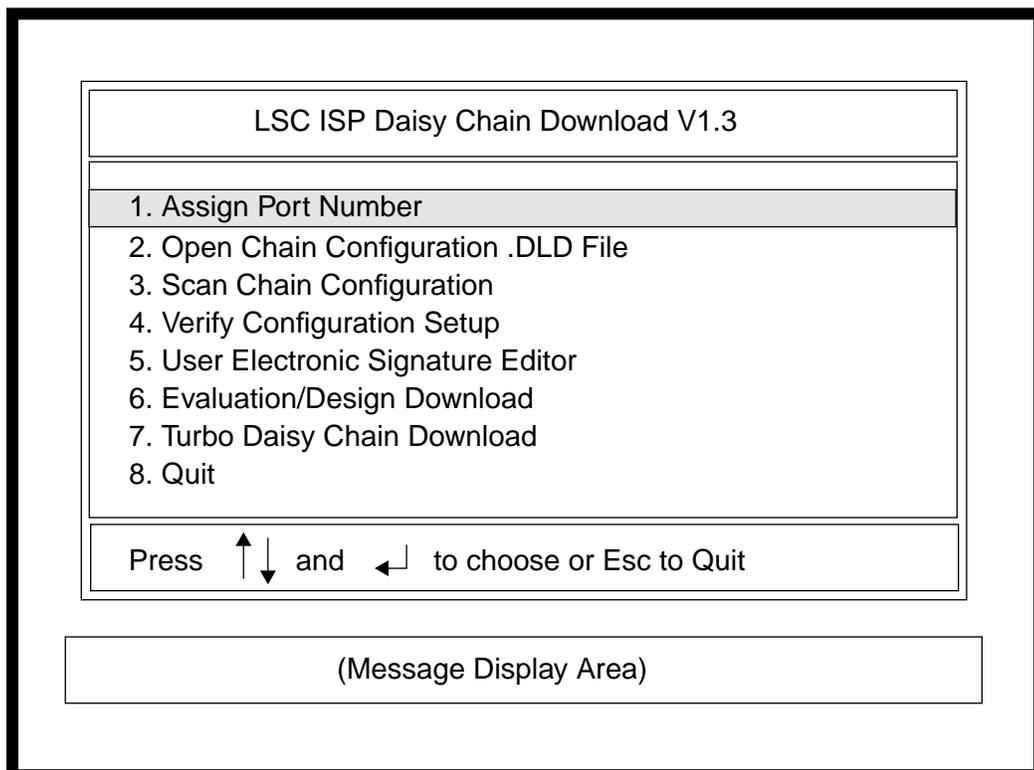
Figure 3-42. ISP Daisy Chain Download Screen

If you launch the program and the programmer power is not on, or the cable is not connected properly, the following message appears in the Message Display Area:

```
POWER SUPPLY IS OFF
```

Turn on the power and check the connections. Try again.

The DOS main menu options are discussed below.

- **Assign Port Number** – Sets the parallel ports for the download configuration
- **Open Chain Configuration .DLD File** – Opens a previously saved configuration setup
- **Scan Chain Configuration** – Scans the board and detects the configuration setup
- **Verify Configuration Setup** – Verifies the chip program against the .dld file to be certain there is no corruption
- **User Electronic Signature Editor** – Accesses the UES menus
- **Evaluation/Design Download** – Programs the device with the .dld file as specified
- **Turbo Daisy Chain Download** – Access the turbo daisy chain download menus
- **Quit** – Exits the program

Use the arrow keys to scroll down the list or use the hot keys or numbers that are highlighted on your screen. For example, press **1** or **A** to Assign the Port Number.

Choosing a Port

To choose a port:

1. Select **1** or **A** from the IDCD menu (Figure 3-43) and press **Enter**. The Message Display Area shows which port is active. Press **Enter** to return to the main menu.

```
┌─────────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────────┐  │
│  │        LSC ISP Daisy Chain Download V1.3        │  │
│  ├───────────────────────────────────────────────┤  │
│  │ ┌───────────────────────────────────────────┐ │  │
│  │ │ 1. Assign Port Number                     │ │  │
│  │   2. Open Chain Configuration .DLD File       │  │
│  │   3. Scan Chain Configuration                 │  │
│  │   4. Verify Configuration Setup               │  │
│  │   5. User Electronic Signature Editor         │  │
│  │   6. Evaluation/Design Download               │  │
│  │   7. Turbo Daisy Chain Download               │  │
│  │   8. Quit                                     │  │
│  │                                               │  │
│  ├───────────────────────────────────────────────┤  │
│  │  Press  ↑↓  and  ↵  to choose or Esc to Quit  │  │
│  └───────────────────────────────────────────────┘  │
│                                                     │
│  ┌───────────────────────────────────────────────┐  │
│  │             Cable is on Port 1                 │  │
│  └───────────────────────────────────────────────┘  │
└─────────────────────────────────────────────────────┘
```
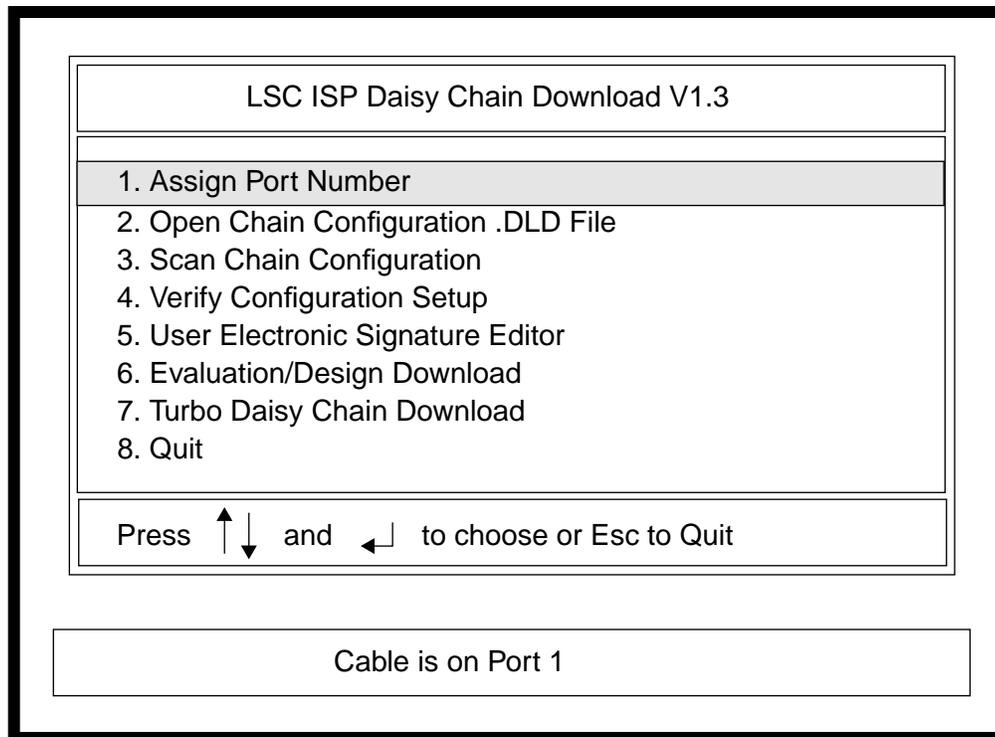
Figure 3-43. Assigning a Port Screen

Creating a .DLD File

Use any text editor to generate a .dld file for device programming; refer to section "Programming a Single Device" on page 63 if necessary. The .dld file must contain the ISP device type, the programming function for each device, and the full path to the JEDEC file. Figure 3-44 shows a .dld file to download five ISP devices.
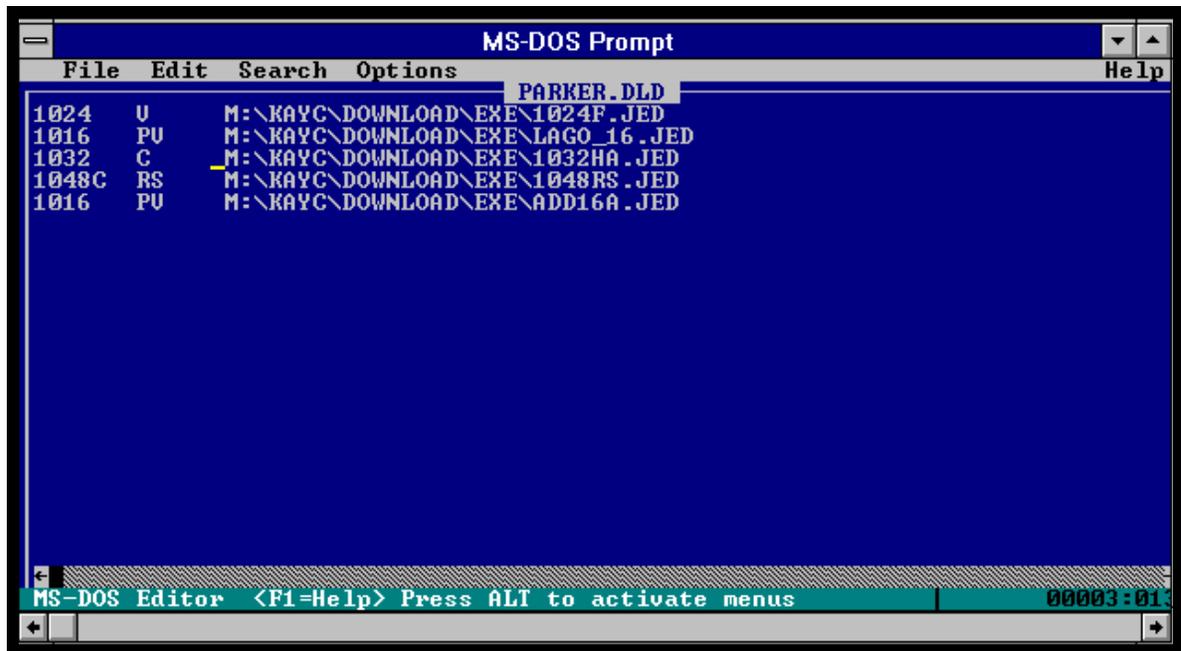
Figure 3-44. Sample .DLD File

You can specify **ispLSI** on the devices, or the program will accept the device type (for example: 1016) only. Use the following rules to identify ISP devices.

For the ispLSI devices:

■   ispLSI *1016, 1024,* etc.

■   or

■   *1016, 1024,* etc.

For the GAL devices:

■   *ispGAL22V10*
    or
■   *G22V10*

For the GD devices:

■   *ispGDS 14, 18, 22*
    or
■   *GDS14, 18, 22*

Use the following abbreviations for the download operations:

■   PV = Program and Verify

■   V = Verify

■   C = Checksum

■   RS = Read and Save

- ■ E = Erase
- ■ NOP = No Operation

If you do not use the full path name, the software assumes the truncated path name you provide is the working directory and defaults to the path you enter.

The data from the JEDEC files and .dld files can be accessed by either the Windows or the DOS version of the ISP Daisy Chain Download software, in case you need to cross operating systems.

Opening a Configuration File

To open a configuration file:

1. Select **2** or **O** from the IDCD menu (Figure 3-45) and press **Enter**. The available files display on the right of the main menu.

2. Select a file name from the list. Use the arrow keys and press **Enter**.

   The Message Display Area prints `Open Configuration Done`. The file you chose appears next to the Open Configuration menu item.

```
┌─────────────────────────────────────────────┐  ┌──────────────┐
│  LSC ISP Daisy Chain Download 1.3           │  │ SETUP1.DLD   │
│                                             │  │ SETUP2.DLD   │
├─────────────────────────────────────────────┤  │ SETUP3.DLD   │
│  1. Assign Port Number                      │  │ AUTOB1.DLD   │
│  2. Open Chain Configuration File (2032.DLD)│  │ AUTOB2.DLD   │
│  3. Scan Chain Configuration                │  │ LALA.DLD     │
│  4. Verify Configuration Setup              │  │ 2032.DLD     │
│  5. User Electronic Signature Editor        │  │ 20327.DLD    │
│  6. Evaluation/Design Download              │  │ 325614.DLD   │
│  7. Turbo Daisy Chain Download              │  │ 325626.DLD   │
│  8. Quit                                    │  │ 325611.DLD   │
├─────────────────────────────────────────────┤  └──────────────┘
│  Press ↑↓  and  ↵  to choose or Esc to Quit │
└─────────────────────────────────────────────┘

        ┌─────────────────────────────────────┐
        │      Open Configuration Done        │
        └─────────────────────────────────────┘
```

Figure 3-45. Open Configuration Screen

Scanning a Device

When you activate the scanning feature, a prompt to enter the device file name displays (Figure 3-46).

1. Select **3** or **S** from the IDCD menu. Press **Enter**.

2. Enter the file to save and press **Enter**. If you choose **Enter** without typing in a name, the Scan Board Configuration cancels.

```
            LSC ISP Daisy Chain Download 1.3

      1. Assign Port Number
      2. Open Chain Configuration File (2032.DLD)
      3. Scan Chain Configuration
      4. Verify Configuration Setup
      5. User Electronic Signature Editor
      6. Evaluation/Design Download
      7. Turbo Daisy Chain Download
      8. Quit

      Press  ↑↓  and  ↵  to choose or Esc to Quit


                DLD file to save:
```
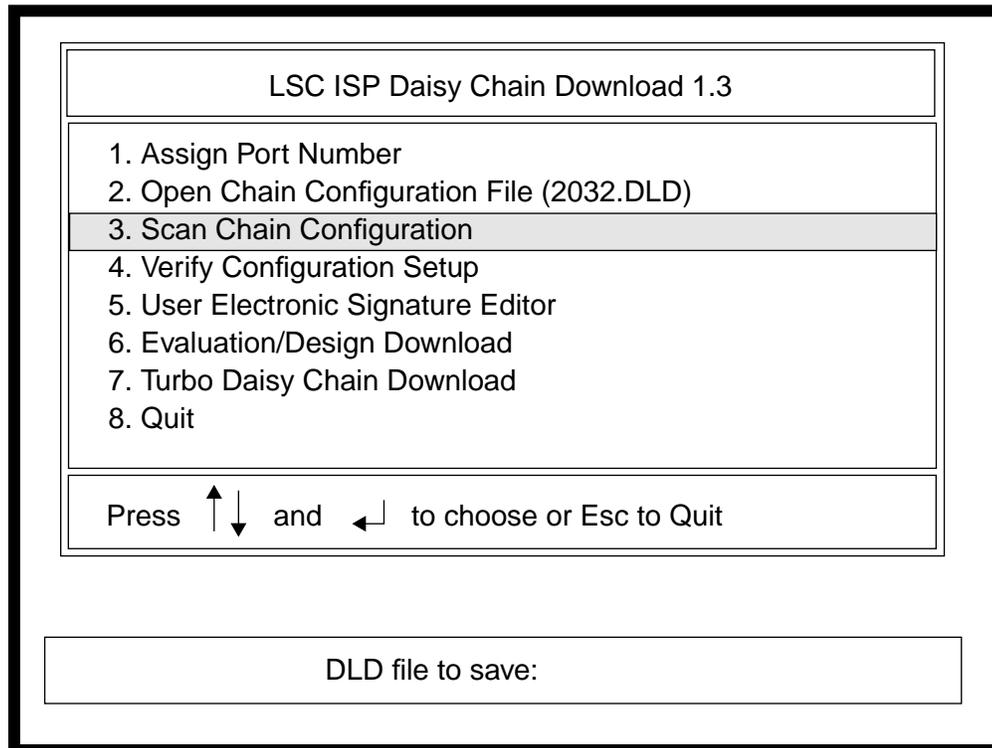
Figure 3-46. Scanning Screen

✍ **NOTE**   If you do not provide a dot extension, the program will append your selection with a .dld extension.

Checking a Configuration Setup

The **Verify Configuration Setup** command checks the chip program against the .dld file to be certain there is no corruption. **Verify Configuration Setup** defaults to the open .dld file.

✍ **NOTE**   You cannot run a verification if you have not opened a file with the Open Chain Configuration .DLD File command.

To run a verification:

1. Select **4** or **V** from the IDCD menu (Figure 3-47) and the following message appears in the Message Display Area:

```
Verify Configuration Setup Done
```

If the verification is unsuccessful, the following messages appears in the Message Display Area:

```
Failed to Verify Configuration Setup
```

```
┌─────────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────────┐  │
│  │       LSC ISP Daisy Chain Download 1.3         │  │
│  ├───────────────────────────────────────────────┤  │
│  │  1. Assign Port Number                         │  │
│  │  2. Open Chain Configuration File (2032.DLD)   │  │
│  │  3. Scan Chain Configuration                   │  │
│  │  4. Verify Configuration Setup                 │  │
│  │  5. User Electronic Signature Editor           │  │
│  │  6. Evaluation/Design Download                 │  │
│  │  7. Turbo Daisy Chain Download                 │  │
│  │  8. Quit                                       │  │
│  ├───────────────────────────────────────────────┤  │
│  │  Press  ↑↓  and  ↵  to choose or Esc to Quit   │  │
│  └───────────────────────────────────────────────┘  │
│  ┌───────────────────────────────────────────────┐  │
│  │         Verify Configuration Setup Done        │  │
│  └───────────────────────────────────────────────┘  │
└─────────────────────────────────────────────────────┘
```
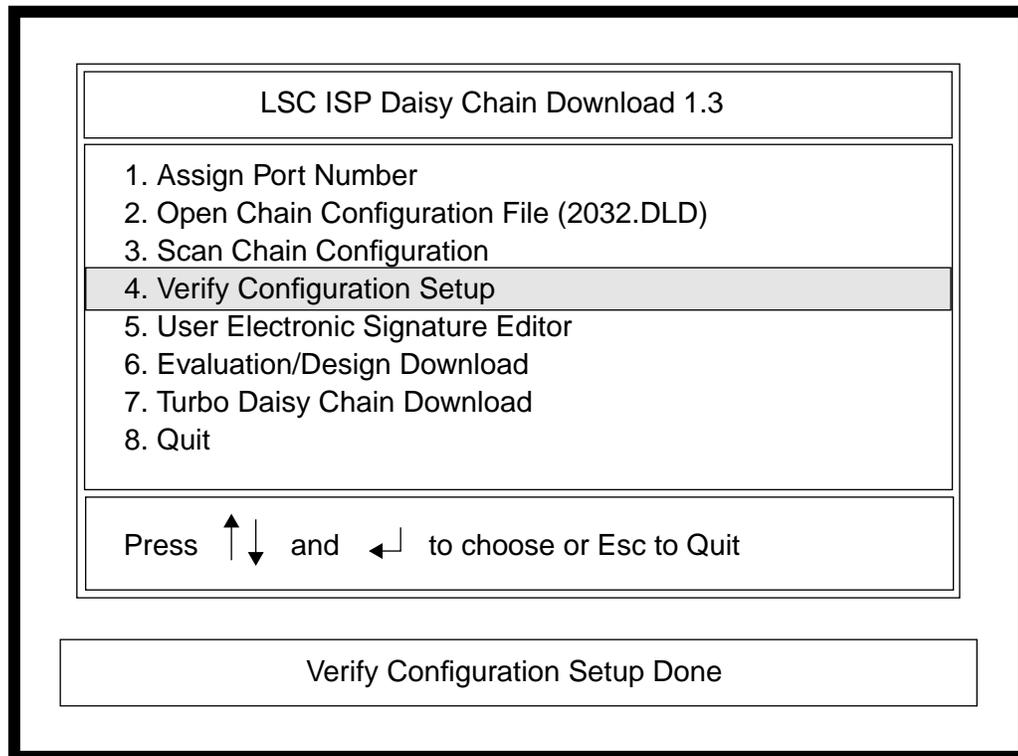
Figure 3-47. Verify Configuration Setup Screen

Setting the User Electronic Signature

The JEDEC file now contains User Electronic Signature (UES) data which you can edit or read in from the board. Using the DOS version of the IDCD software and any text editor, you can set a signature using the hexadecimal or ASCII formats.

To access the UES functions:

1. Select **5** or **U** from the IDCD menu (Figure 3-48). The UES Editor Option dialog box appears (Figure 3-49).

   The UES screen allows you to perform the following six options:

   - Edit the JEDEC file signature in hex format
   - Edit the JEDEC file signature in ASCII format
   - View (only) the JEDEC file signature in hex format
   - View (only) the JEDEC file signature in ASCII format

- Read the signature from the device(s) in hex format
- Read the signature from the device(s) in ASCII format
- Exit UES
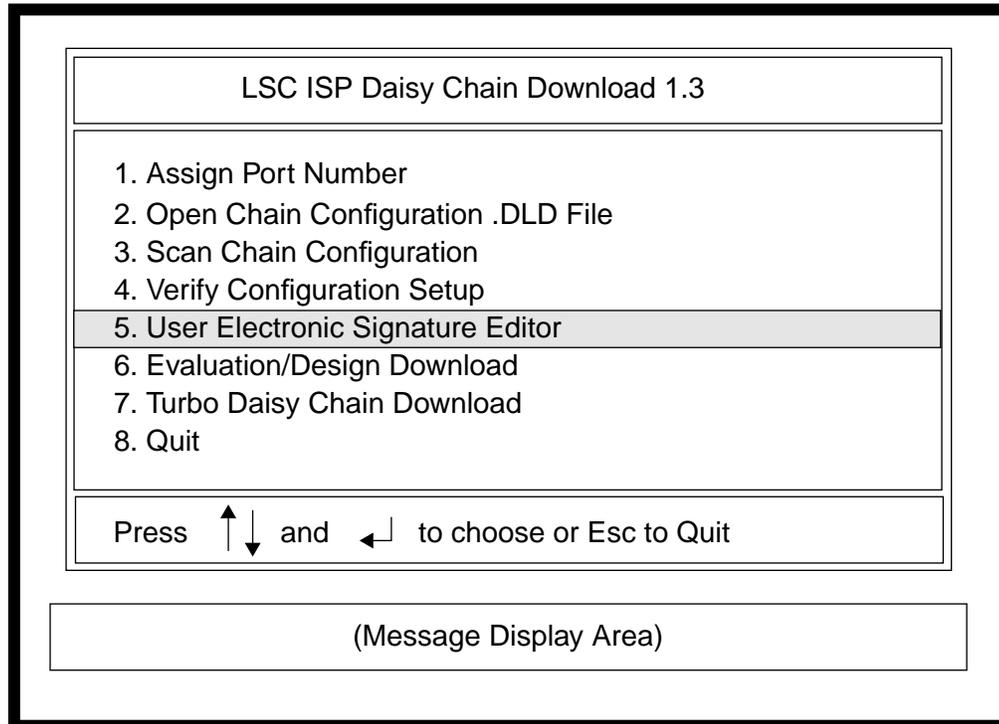
Figure 3-48. User Electronic Signature Editor Screen
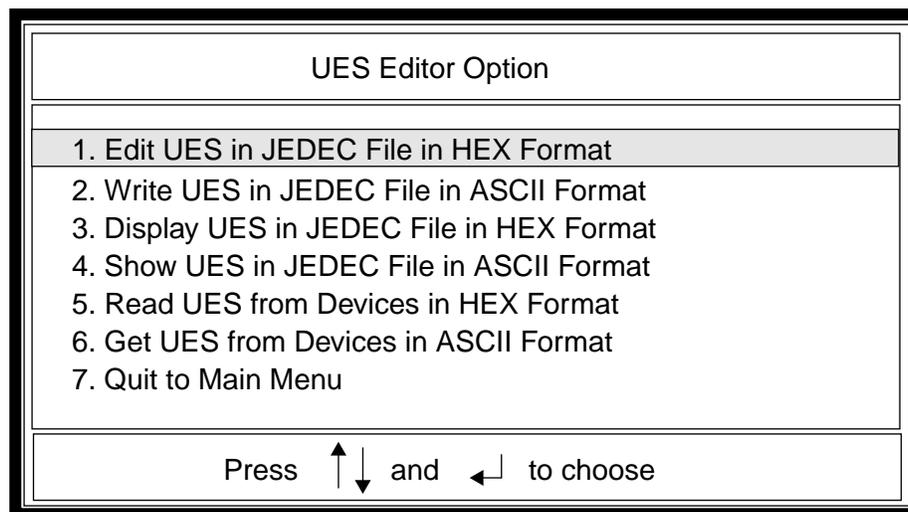
Figure 3-49. UES Editor Screen

2. Select an option from the screen by typing the highlighted character or its number.

3. When you are finished, press **Esc** to return to the main menu.

To edit the default UES in the JEDEC file in hex format:

1. Select **1** or **E**.

2. Type in the name of the JEDEC file to edit. If you want to edit a .jed file from another drive or directory besides your current working directory, type the full path in the box. If you cannot recall the name of your file, press **Return** and the .jed files available in your default (working) directory appear. Use the arrow keys to highlight a .jed file from the list box on the right. Press **Return** and Figure 3-50 appears.

3. Edit the signature using only allowable hex characters. Press **Return** to change the signature and write it into the JEDEC file. Press **Esc** to cancel the process. The signature does not change.

☞ **NOTE**   The transmission checksum is recalculated each time the UES is modified.

UES Editor Option

1. Edit UES in JEDEC File in HEX Format
2. Write UES in JEDEC File in ASCII Format
3. Display UES in JEDEC File in HEX Format
4. Show UES in JEDEC File in ASCII Format
5. Read UES from Devices in HEX Format
6. Get UES from Devices in ASCII Format
7. Quit to Main Menu

Press ↑↓ and ↵ to choose

Editing UES of JEDEC File (C:\DAISY\1016.JED)

Signature: 204C6966652B
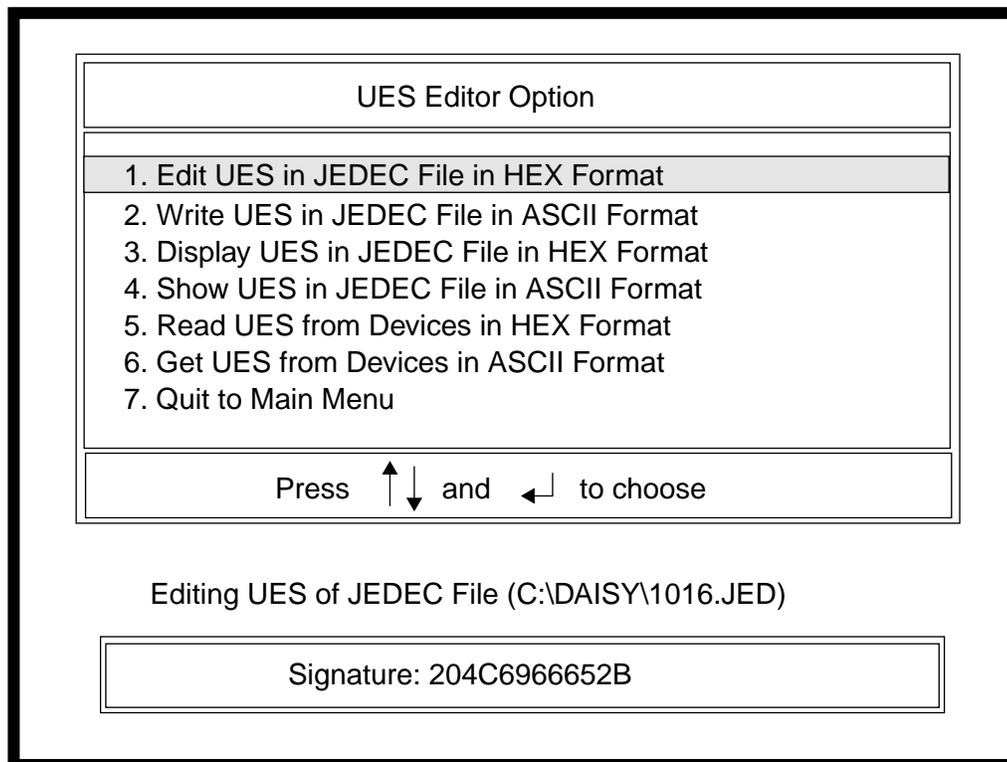
Figure 3-50. Editing a UES (Hex Format)

> ☞ ***NOTE***   Only hexadecimal or ASCII format input is allowed. The default ASCII signature for any device is .... (dot characters). ASCII format characters include any printable character except the control characters. The default hex signature for high-density devices is F. The default hex signature for low-density devices is 0.

The following message appears:

UES is written into JEDEC File ***path\jedec_file_name*.jed**

4. Press **7, Q,** or **Esc** to access the main menu.

> ☞ ***NOTE***   If the UES field does not exist for your .jed file, the signature that appears on the screen is the default value. Type in your personal signature.

The **View** and **Read** functions do not allow you to change the signature. Use **Edit** or **Write** to change the signature.

To edit the default UES in the JEDEC file in ASCII format:

1. Select **2** or **W**.

2. Type in the name of the JEDEC file to edit. If you want to edit a .jed file from another drive or directory besides your current working directory, type the full path in the box. If you cannot recall the name of your file, press **Return** and the .jed files available in your default (working) directory appear. Use the arrow keys to highlight a .jed file from the list box on the right. Press **Return** and Figure 3-51 appears.

3. Edit the signature using only allowable ASCII characters. Press **Return** to change the signature and write it into the JEDEC file. Press **Esc** to cancel the process. The signature does not change.

```
┌─────────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────────┐  │
│  │              UES Editor Option                │  │
│  ├───────────────────────────────────────────────┤  │
│  │                                               │  │
│  │  1. Edit UES in JEDEC File in HEX Format      │  │
│  │  2. Write UES in JEDEC File in ASCII Format   │  │
│  │  3. Display UES in JEDEC File in HEX Format   │  │
│  │  4. Show UES in JEDEC File in ASCII Format    │  │
│  │  5. Read UES from Devices in HEX Format       │  │
│  │  6. Get UES from Devices in ASCII Format      │  │
│  │  7. Quit to Main Menu                         │  │
│  │                                               │  │
│  ├───────────────────────────────────────────────┤  │
│  │        Press   ↑↓  and   ↵   to choose        │  │
│  └───────────────────────────────────────────────┘  │
│                                                     │
│   Editing UES of JEDEC File (C:\DAISY\1016.JED)     │
│  ┌───────────────────────────────────────────────┐  │
│  │              Signature: run fastest           │  │
│  └───────────────────────────────────────────────┘  │
└─────────────────────────────────────────────────────┘
```
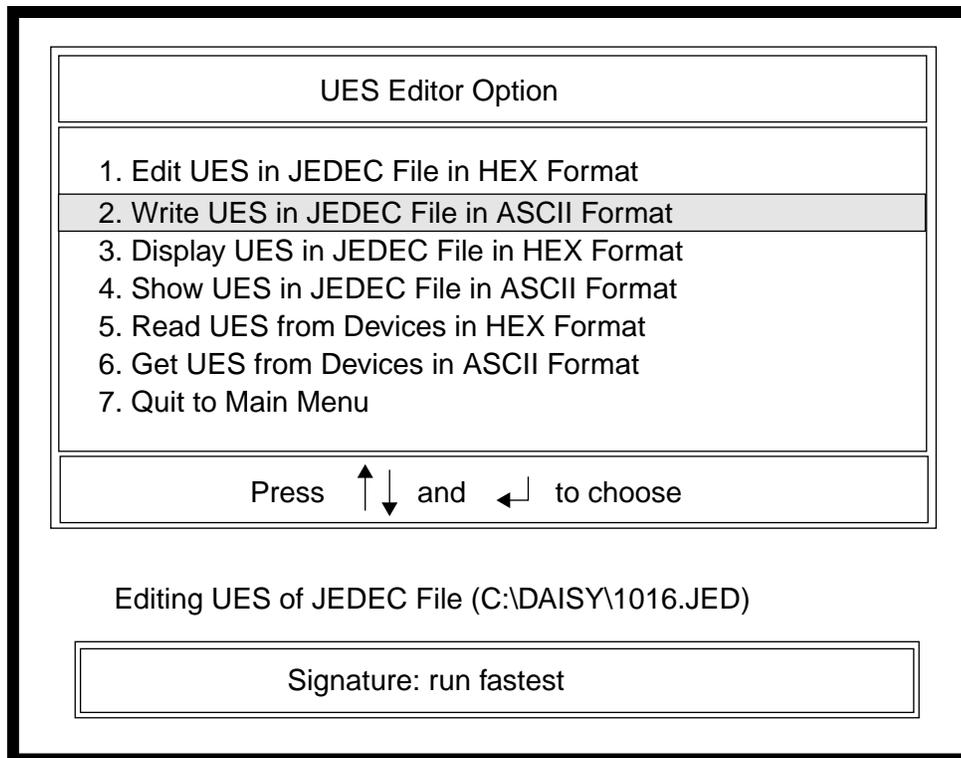
Figure 3-51. Editing a UES (ASCII Format)

To display the UES:

1. Select **3** or **D**. The JEDEC File to View UES message appears on the screen.

2. Type the JEDEC file name. Press **Return**. The signature for that JEDEC file appears on the screen. This function allows you to view the signature already embedded (or the default) in the JEDEC file, *not* what is physically programmed onto the chip.

To show the UES:

1. Select **4** or **S**. The JEDEC File to View UES message appears on the screen.

2. Type the JEDEC file name. Press **Return**. The signature for that JEDEC file appears on the screen. This function allows you to view the signature already embedded (or the default) in the JEDEC file, *not* what is physically programmed onto the chip.

To read the UES in hex format from the devices:

1. Select **5** or **R**. The Which Chip box appears.

2. Select a chip number from the daisy chain, if you are using one.

3. The UES appears on the screen. This signature *is* physically loaded onto the device(s). To change the signature, use the **Edit** function, **1** and then reprogram the device.

To get the UES in ASCII format from the devices:

1. Select **6** or **G**. The `Which Chip` box appears.

2. Select a chip number from the daisy chain, if you are using one.

3. The UES appears on the screen. This signature *is* physically loaded onto the device(s). To change the signature, use the **Edit** function, **2** and then reprogram the device.

Programming a Single Device

You must have performed an **Open Chain Configuration .DLD File** to successfully begin the download process.

To download to a device:

1. Type **6** or **E** from the IDCD menu (Figure 3-52). The Download Option screen appears (Figure 3-53.)

```
┌────────────────────────────────────────────────────┐
│        LSC ISP Daisy Chain Download 1.3            │
├────────────────────────────────────────────────────┤
│   1. Assign Port Number                            │
│   2. Open Chain Configuration File (2032.DLD)      │
│   3. Scan Chain Configuration                      │
│   4. Verify Configuration Setup                    │
│   5. User Electronic Signature Editor              │
│   6. Evaluation/Design Download                    │
│   7. Turbo Daisy Chain Download                    │
│   8. Quit                                          │
├────────────────────────────────────────────────────┤
│   Press  ↑↓  and  ↵  to choose or Esc to Quit      │
└────────────────────────────────────────────────────┘
```
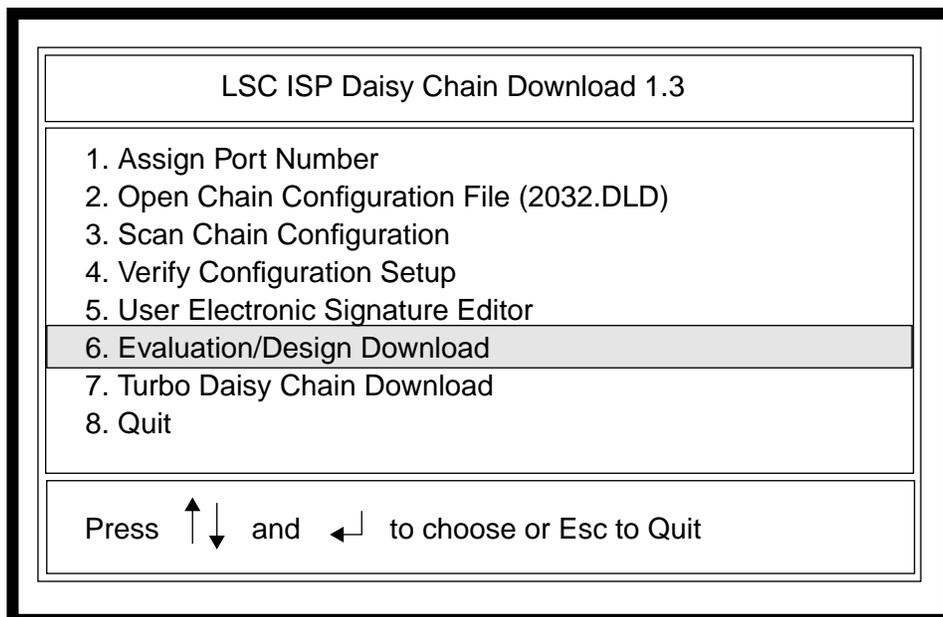
Figure 3-52. Single Device Programming Screen

```
┌────────────────────────────────────────────┐
│              Download Option               │
├────────────────────────────────────────────┤
│   1. Single Device Download                │
│   2. Daisy Chain Download                  │
│   3. Return to Main Menu                   │
├────────────────────────────────────────────┤
│   Press  ↑↓  and  ↵  to choose             │
└────────────────────────────────────────────┘
```
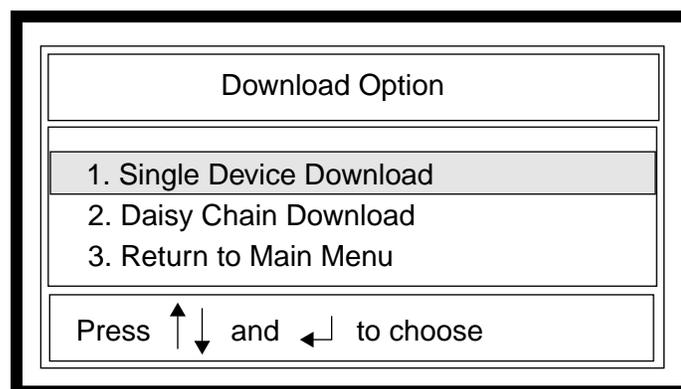
Figure 3-53. Download Option Menu

2. Select **1** or **S** from the Download Option menu. The Single Device Download Operation screen appears (Figure 3-54).

```
┌─────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────┐  │
│  │       Single Device Download Operation     │  │
│  ├───────────────────────────────────────────┤  │
│  │ ▓1. Program & Verify▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ │  │
│  │                                            │  │
│  │  2. Verify                                 │  │
│  │  3. Checksum                               │  │
│  │  4. Read & Save                            │  │
│  │  5. Erase                                  │  │
│  │  6. No Operation                           │  │
│  │  7. Quit                                   │  │
│  │                                            │  │
│  ├───────────────────────────────────────────┤  │
│  │  Press  ↑↓    and   ↵   to choose          │  │
│  └───────────────────────────────────────────┘  │
└─────────────────────────────────────────────────┘
```
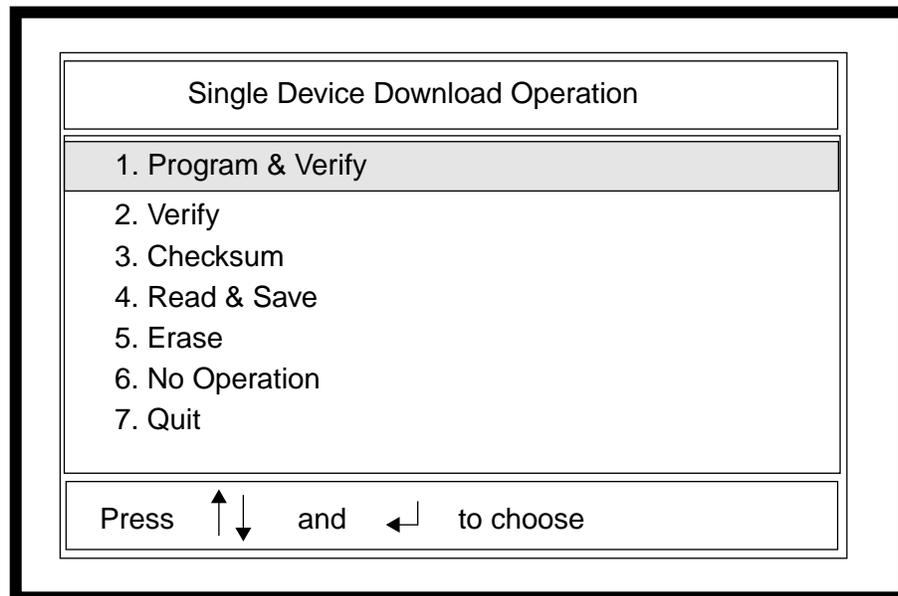
Figure 3-54. Single Device Download Screen

The options for this screen include the following:

- **Program & Verify** – Performs a download of the design pattern, then verifies the chip program (device pattern) with the original .jed file to ensure the device was programmed correctly. The file name must be specified.

- **Verify** – Compares the chip program (device pattern) with the specified .jed file.

- **Checksum** – Computes the check sum value of the chip and sends the information to the Status field for the corresponding device.

- **Read & Save** – Reads the chip program and writes it into the specified JEDEC file. The file name must be specified.

- **Erase** – Erases the chip program and the security fuse for the device you specify.

- **No Operation** – Indicates no operation will be performed for that device.

- **Quit** – Returns to the main menu.

3. Select **1** or **P** from the Single Device Download Operation menu. The screen displays the following message:

   `File to Program and Verify ISP Device: ` **name**

4. Enter the path information and JEDEC file name *(name.*jed) and press **Enter**. If the file is located in the current directory, no path information is required.

   Or, if you cannot remember the name of the JEDEC file, press **Enter**. The list box appears with all the .jed files in your current working directory. Use the arrow keys to move through the list and highlight your selection. Press **Enter**.

The fuse map information is downloaded when the operation is complete; the screen displays the following message:

```
ISP Device Program and Verify Result: PASSED | FAILED
```

When downloading is complete, the screen displays the following message:

```
Operation Successfully Done
```

If the IDCD software detects more than one device, the following error message will appear in the Messages Display Area:

```
Failed to Download (More than One Device Detected from Board)
```

Check your configuration and verify that only one device is connected.

To verify the device:

1. Type **2** or **V** from the Single Device Download Operation menu (Figure 3-55). The screen displays the following message:

   ```
   File to Verify ISP Device: name
   ```
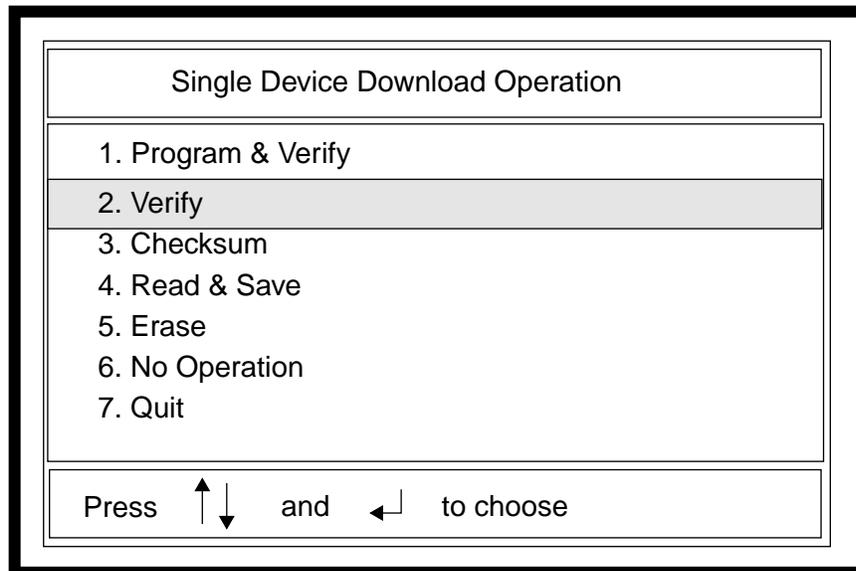

Figure 3-55. Verify Operation Screen

The file name you entered during the **Open Chain Configuration File** command appears as the default. You can change the name or press **Enter** to select the default. The screen displays the following message:

```
ISP Device Verify Result: PASSED | FAILED
Operation Successfully Done
```

> ✍ **NOTE**   If the security fuse is programmed ON, you will not be allowed to verify the device and the screen displays the following message:
>
> `Can't Verify Chip - Security Fuse is Set`

For more information on the Security Fuse, see the "Security Feature" on page 17 of Chapter 2.

To compute the checksum:

1. Type **3** or **C** from the Single Device Download Operation menu (Figure 3-56). The screen displays the following message:

    `Report Checksum for 1st `*`ISP Device`*`: `*`value`*` Done`

    `Operation Successfully Done`

Single Device Download Operation

1. Program & Verify
2. Verify
3. Checksum
4. Read & Save
5. Erase
6. No Operation
7. Quit

Press ↑↓ and ↵ to choose

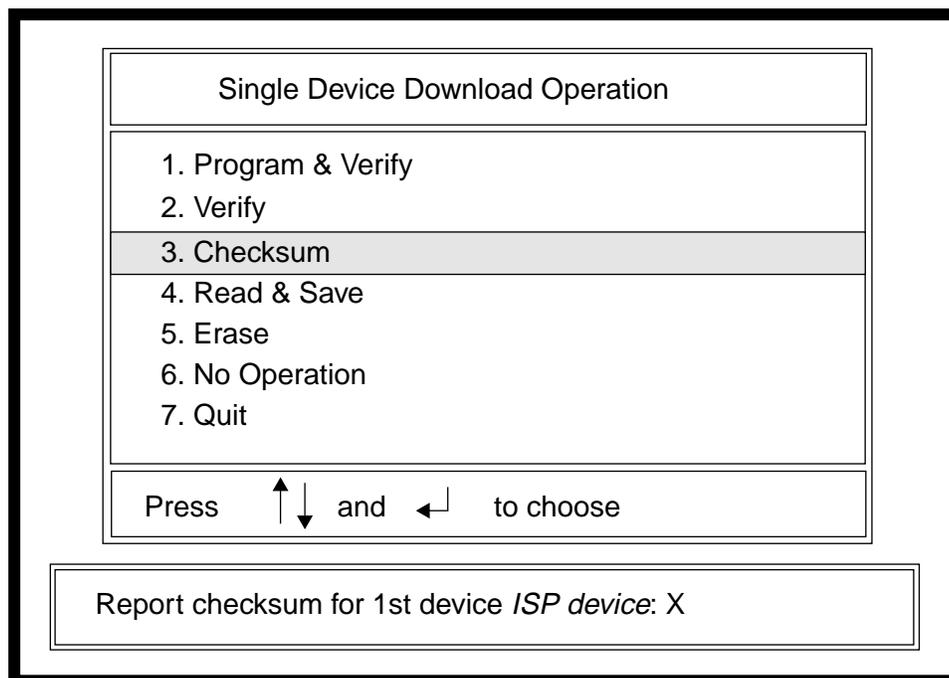Report checksum for 1st device *ISP device*: X

Figure 3-56. Verifying the Checksum

To read back and save a configuration:

1. Type **4** or **R** from the Single Device Download Operation menu (Figure 3-57).

```
┌─────────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────────┐  │
│  │        Single Device Download Operation        │  │
│  └───────────────────────────────────────────────┘  │
│  ┌───────────────────────────────────────────────┐  │
│  │   1. Program & Verify                          │  │
│  │                                                │  │
│  │   2. Verify                                    │  │
│  │   3. Checksum                                  │  │
│  │   4. Read & Save                               │  │
│  │   5. Erase                                     │  │
│  │   6. No Operation                              │  │
│  │   7. Quit                                      │  │
│  │                                                │  │
│  └───────────────────────────────────────────────┘  │
│  ┌───────────────────────────────────────────────┐  │
│  │   Press    ↑↓    and    ↵    to choose         │  │
│  └───────────────────────────────────────────────┘  │
└─────────────────────────────────────────────────────┘
```
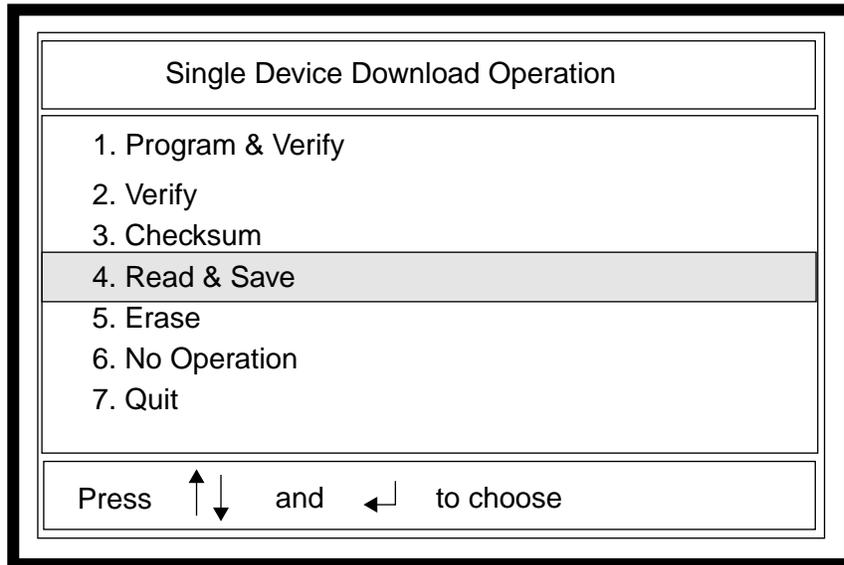
Figure 3-57. Read and Save Operation Screen

2. Enter the file name in which to save the fusemap information.

   Or, if you cannot remember the name of the JEDEC file, press **Enter**. The list box appears with all the .jed files in your current working directory. Use the arrow keys to move through the list and highlight your selection. Press **Enter**.

   If the device security fuse is OFF, this operation will read the device fuse map from the device and store it in JEDEC format. The Message Display Area displays the following message:

```
File to Save JEDEC from 1st ISP Device: path_name Done
Operation Successfully Done
```

To erase a device:

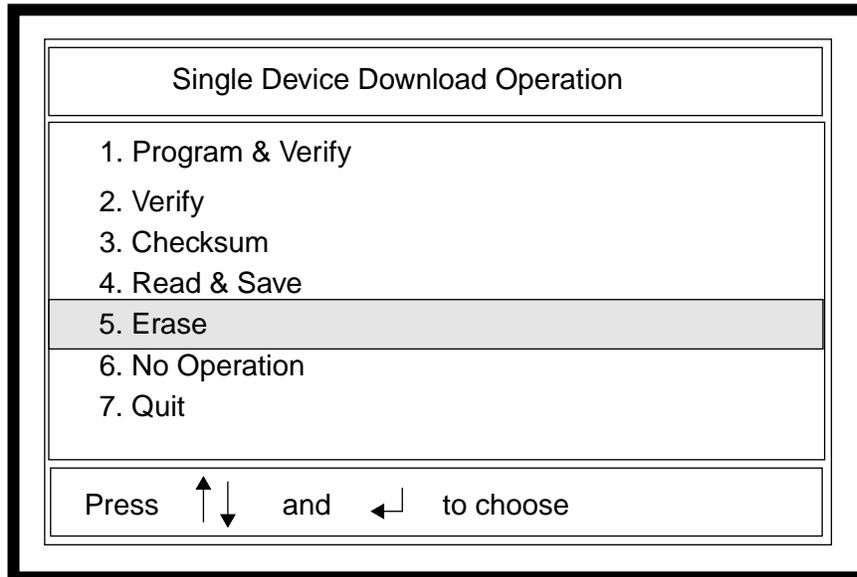1. Type **5** or **E** from the Single Device Download Operation menu (Figure 3-58).

```
┌─────────────────────────────────────────────┐
│  ┌───────────────────────────────────────┐  │
│  │        Single Device Download Operation │  │
│  ├───────────────────────────────────────┤  │
│  │  1. Program & Verify                    │  │
│  │  2. Verify                              │  │
│  │  3. Checksum                            │  │
│  │  4. Read & Save                         │  │
│  │  5. Erase                               │  │
│  │  6. No Operation                        │  │
│  │  7. Quit                                │  │
│  ├───────────────────────────────────────┤  │
│  │  Press  ↑↓   and   ↵    to choose       │  │
│  └───────────────────────────────────────┘  │
└─────────────────────────────────────────────┘
```

Figure 3-58. Erasing a Device

The Message Display Area shows the following:

```
Erase Fuses for 1st ISP Device Done
Operation Successfully Done
```

✍ **NOTE**   If the security fuse is programmed ON, the fuse map cannot be read and the screen displays the following message:

```
Can't Read Back Chip - Security Fuse is Set
```

For more information on the Security Fuse, see the section "Security Feature" on page 17 in Chapter 2.

To perform no operation for the device:

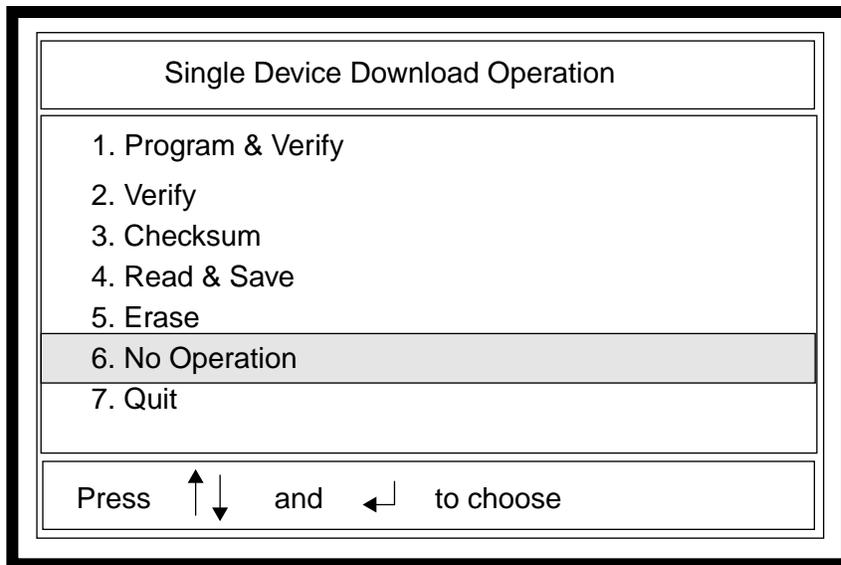1. Type **6** or **N** from the Single Device Download Operation menu (Figure 3-59).

```
┌──────────────────────────────────────────────────┐
│  ┌────────────────────────────────────────────┐  │
│  │      Single Device Download Operation      │  │
│  └────────────────────────────────────────────┘  │
│  ┌────────────────────────────────────────────┐  │
│  │   1. Program & Verify                      │  │
│  │                                            │  │
│  │   2. Verify                                │  │
│  │   3. Checksum                              │  │
│  │   4. Read & Save                           │  │
│  │   5. Erase                                 │  │
│  │   6. No Operation                          │  │
│  │   7. Quit                                  │  │
│  │                                            │  │
│  └────────────────────────────────────────────┘  │
│  ┌────────────────────────────────────────────┐  │
│  │   Press   ↑↓   and   ↵   to choose          │  │
│  └────────────────────────────────────────────┘  │
└──────────────────────────────────────────────────┘
```

Figure 3-59. No Operation Screen

The Message Display Area shows:

```
No Operation for 1st ISP Device Done
Operation Successfully Done
```

To quit the single device programming options:

1. Type **7** or **Q** from the Single Device Download Operation menu.

Look for additional programming information for the ISP devices in the *Lattice Semiconductor Data Book.*

Daisy Chain Programming

To access the daisy chain menu:

1. Type **6** or **E** from the IDCD menu (Figure 3-61). The Download Option screen appears (Figure 3-61).

```
┌─────────────────────────────────────────────────────────┐
│  ┌──────────────────────────────────────────────────┐   │
│  │          LSC ISP Daisy Chain Download 1.3         │   │
│  └──────────────────────────────────────────────────┘   │
│  ┌──────────────────────────────────────────────────┐   │
│  │   1. Assign Port Number                           │   │
│  │   2. Open Chain Configuration .DLD File           │   │
│  │   3. Scan Chain Configuration                     │   │
│  │   4. Verify Configuration Setup                   │   │
│  │   5. User Electronic Signature Editor             │   │
│  │   6. Evaluation/Design Download                   │   │
│  │   7. Turbo Daisy Chain Download                   │   │
│  │   8. Quit                                         │   │
│  └──────────────────────────────────────────────────┘   │
│  ┌──────────────────────────────────────────────────┐   │
│  │   Press  ↑↓  and  ↵  to choose or Esc to Quit     │   │
│  └──────────────────────────────────────────────────┘   │
│                                                          │
│  ┌──────────────────────────────────────────────────┐   │
│  │            (Message Display Area)                 │   │
│  └──────────────────────────────────────────────────┘   │
└─────────────────────────────────────────────────────────┘
```
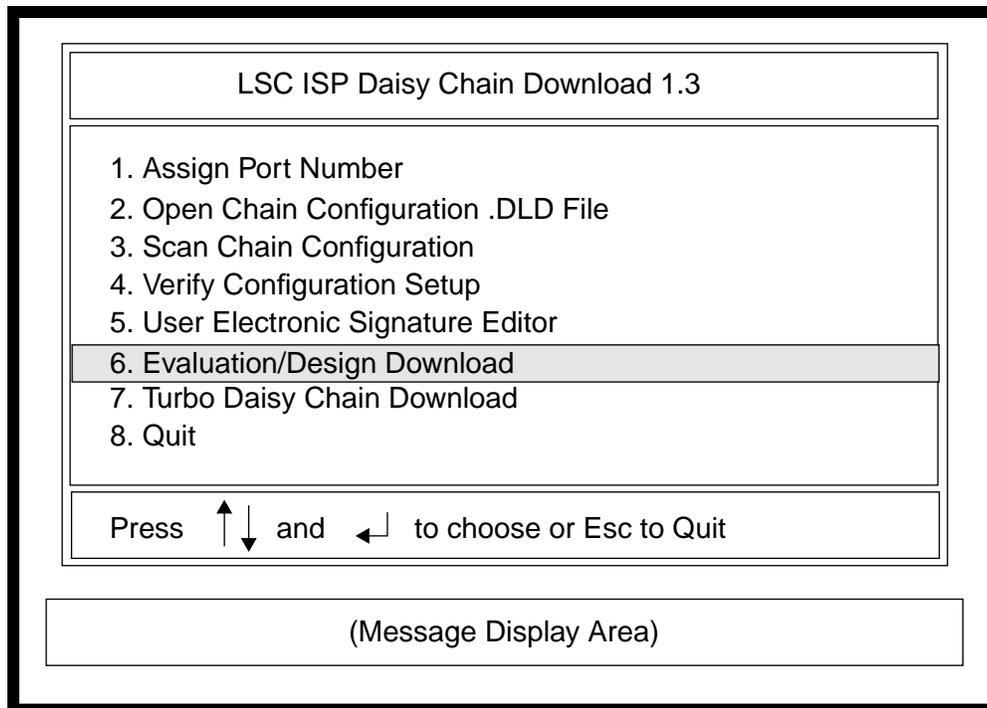
Figure 3-60. Evaluation/Design Download Option

2. Type **2** or **D** from the Download Option screen.

```
┌───────────────────────────────────────────┐
│  ┌─────────────────────────────────────┐  │
│  │         Download Option             │  │
│  └─────────────────────────────────────┘  │
│  ┌─────────────────────────────────────┐  │
│  │   1. Single Device Download         │  │
│  │   2. Daisy Chain Download           │  │
│  │   3. Return to Main Menu            │  │
│  │                                     │  │
│  │   Press  ↑↓  and  ↵  to choose      │  │
│  └─────────────────────────────────────┘  │
└───────────────────────────────────────────┘
```
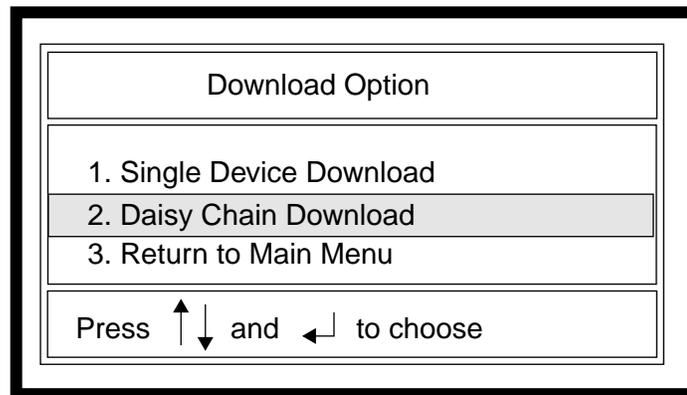
Figure 3-61. Download Option Screen

The operation function for each device is called from the .dld file that you created and saved in your working directory. If you did not include the .jed file names for each device, the list box appears to the right of the screen from which you choose a .jed file for each device (Figure 3-62).

If you did not store your .jed files in your current working directory, the program cannot access them and so the following failed messages appears:

```
Failed to Download: No .DLD File
```

```
┌─────────────────────────────────────────────────────────────────┐
│                                                                   │
│   ┌───────────────────────────────────┐   ┌───────────────────┐ │
│   │                                   │   │ SETUP1. JED       │ │
│   │          Download Option          │   │ SETUP2. JED       │ │
│   │                                   │   │ SETUP3. JED       │ │
│   ├───────────────────────────────────┤   │ AUTOB1. JED       │ │
│   │                                   │   │ AUTOB2.JED        │ │
│   │   1. Single Device Download       │   │ 143JNP. JED       │ │
│   │   2. Daisy Chain Download         │   │ 2032. JED         │ │
│   │   3. Return to Main Menu          │   │ 203217. JED       │ │
│   │                                   │   │ 325614. JED       │ │
│   ├───────────────────────────────────┤   │ 325626. JED       │ │
│   │   Press  ↑↓  and  ↵  to choose    │   │ 325611. JED       │ │
│   │                                   │   │                   │ │
│   └───────────────────────────────────┘   └───────────────────┘ │
│                                                                   │
│     File to *program and verify* the 1st *ISP device*:           │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```
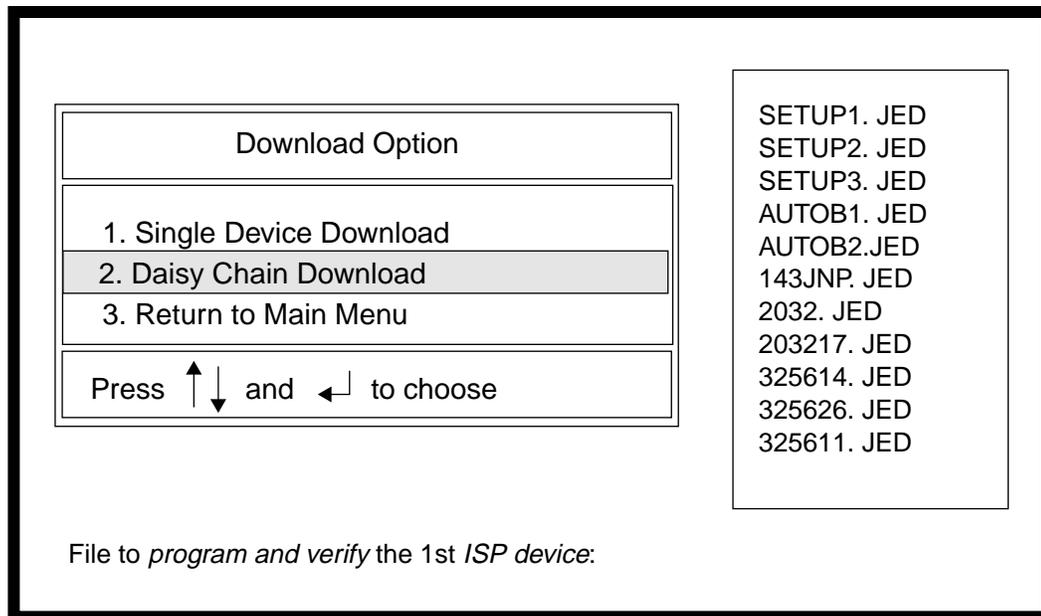
Figure 3-62. Selecting a .JED File

3. Use the arrow keys to select a JEDEC file. Press **Enter**.

    The Message Display Area shows that the system is packing the .jed file onto the device and the system gives the status of the function:

    ```
    PASSED | FAILED
    ```

    When all devices are loaded, the Message Display Area gives the following message:

    ```
    Operation Successfully Done
    ```

    The download operations (**Program & Verify, Checksum,** etc.) you specify are not saved to the .dld file unless you modify the .dld file. Figure 3-44 shows a sample .dld file with all the information needed. Use any text editor to modify the .dld file to include the device type, the operation you want to perform on that particular device, and the full path name for the .jed file.

Turbo Daisy Chain Downloading

The DOS version of turbo downloading also requires that you build the ispSTREAM™ before you begin.

To perform turbo downloading of your devices:

1. Select **7** or **T** from the IDCD menu (Figure 3-63). The Turbo Download menu appears (Figure 3-64).

```
┌─────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────┐  │
│  │      LSC ISP Daisy Chain Download 1.3      │  │
│  ├───────────────────────────────────────────┤  │
│  │                                           │  │
│  │   1. Assign Port Number                   │  │
│  │   2. Open Chain Configuration .DLD File   │  │
│  │   3. Scan Chain Configuration             │  │
│  │   4. Verify Configuration Setup           │  │
│  │   5. User Electronic Signature Editor     │  │
│  │   6. Evaluation/Design Download           │  │
│  │   7. Turbo Daisy Chain Download           │  │
│  │   8. Quit                                 │  │
│  │                                           │  │
│  ├───────────────────────────────────────────┤  │
│  │   Press  ↑↓  and  ↵  to choose or Esc to  │  │
│  │          Quit                             │  │
│  └───────────────────────────────────────────┘  │
│  ┌───────────────────────────────────────────┐  │
│  │           (Message Display Area)          │  │
│  └───────────────────────────────────────────┘  │
└─────────────────────────────────────────────────┘
```
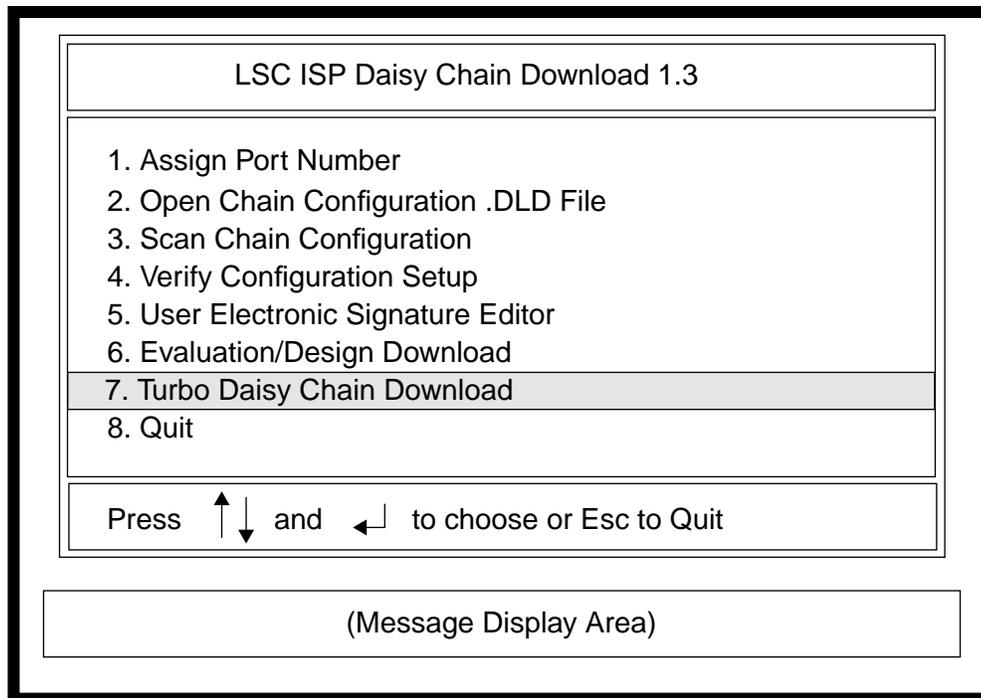
Figure 3-63. ISP Daisy Chain Download Menu

2. The number 1 option, **Build ispSTREAM** is highlighted. You must perform this step to continue. Select **Return** (**Enter**).

```
┌─────────────────────────────────────────┐
│  ┌───────────────────────────────────┐  │
│  │  Turbo Daisy Chain Download Options│  │
│  ├───────────────────────────────────┤  │
│  │   1. Build ispSTREAM              │  │
│  │                                   │  │
│  │   2. Save ispSTREAM               │  │
│  │   3. Load ispSTREAM               │  │
│  │   4. Program and Verify           │  │
│  │   5. Verify                       │  │
│  │   6. Return to Main Menu          │  │
│  ├───────────────────────────────────┤  │
│  │  Press  ↑↓  and  ↵  to choose     │  │
│  └───────────────────────────────────┘  │
└─────────────────────────────────────────┘
```
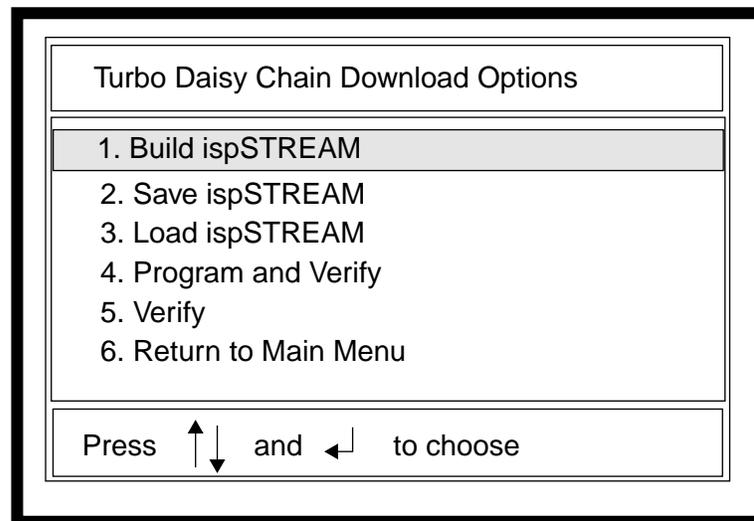
Figure 3-64. Turbo Download Menu

The .DLD File With Operations--PV, NOP, V: box appears (Figure 3-65). These are the *only* turbo download supported options: program and verify, no operation, or verify.
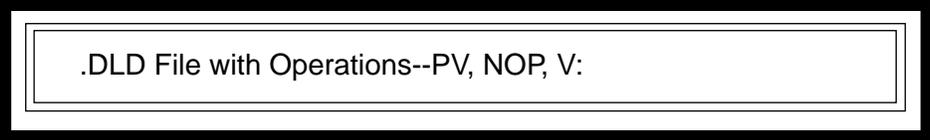
```
.DLD File with Operations--PV, NOP, V:
```

Figure 3-65. Set .DLD File Name

☞ **NOTE**   Since turbo download only supports the PV, NOP, and V options,
a .dld file with any other options selected will cause the bit stream
build to fail.

3. Type in the name of the .dld file you wish to download. If you do not know the
   name of the .dld file, press **Return** (**Enter**) and a list box will appear with all the
   available .dld files from your current working directory.

☞ **NOTE**   Use the arrow keys to move your selections up or down. If you
use the arrow keys, you must select the Return (Enter) key, also.

4. Select a file name from the list box. Use the arrow keys to move the cursor. Your
   selection is highlighted. Press **Return** (**Enter**). The IDCD software begins to pack
   the JEDEC files; you should see a successful message.

5. Type **4** or **P** from the menu to *program and verify* the JEDEC files and the .dld files
   onto the devices in the chain. The message
   `Begin Turbo Programming and Verification......`
   appears. Then a `PASS | FAIL` status appears telling you the turbo download
   process is complete.

   `Operation Successfully Done`

Verifying a Bit Stream

When you verify an ISP bit stream, the software checks the stream against the
devices to verify that the .dld file (configuration setup) is present and accurate. If you
have not performed a download, the verification process will fail because the stream
is not present on the devices and cannot be verified.

To verify the daisy chain against the ispSTREAM:

1. Type **1** or **B** from the Turbo Daisy Chain Download Option menu to build the
   ispSTREAM.

2. Type **5** or **V** from the menu to perform a verification (Figure 3-66). This step does
   not **program** (download) the devices, even though the PV operation was used in
   the configuration file on which the ispSTREAM is built.
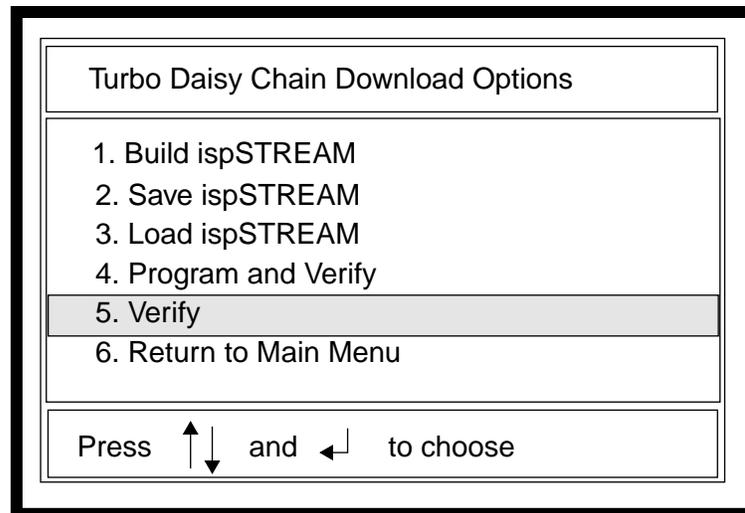
Figure 3-66. Turbo Download Menu

Saving a Bit Stream

Now you can save the current bit stream build to a file so you will not need to perform a build every time you want to program a device. Use this option in case you want to perform several bit stream builds on various daisy chain configurations.

To save a bit stream:

1. Select **1** or **B** from the Turbo Daisy Chain Download Option menu to build the ispSTREAM.

2. Select **2** or **S** from the Turbo Daisy Chain Options menu to save the stream to a file (Figure 3-67). The File to Save the ispSTREAM: box appears (Figure 3-68).
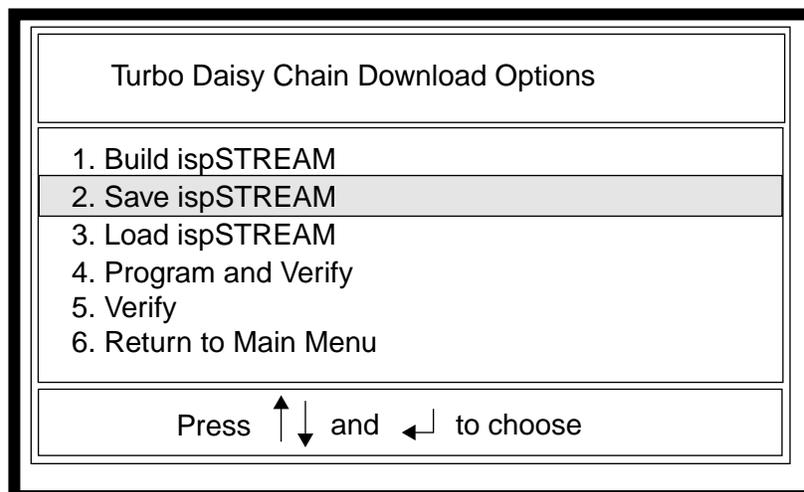
Figure 3-67. Saving ispSTREAM Option

File to Save the ispSTREAM:
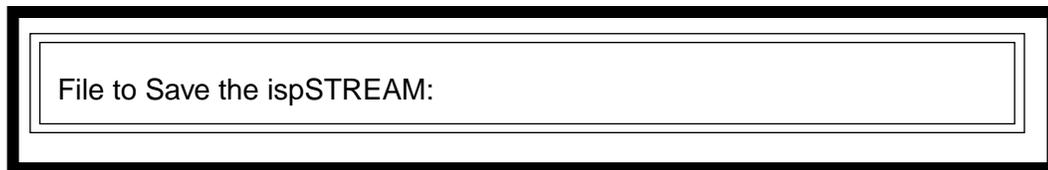
Figure 3-68. Naming the Bit Stream to a File

3. Type in a file name using eight or fewer characters. The file is saved in your current working directory unless you specify the full path name. If you choose a name that is longer than eight characters, it is truncated. Press **Return** (**Enter**). The full path name appears on the screen showing a .isp extension.

Loading a Bit Stream

If you had previously saved a bit stream to a file and want to access it to perform device programming, you can load the bit stream without having to rebuild the stream.

To load a bit stream:

1. Select **3** or **L** from the Turbo Daisy Chain Download Options menu to load the bit stream (Figure 3-69). The ispSTREAM File to Load: box appears (Figure 3-70).

Turbo Daisy Chain Download Options

1. Build ispSTREAM
2. Save ispSTREAM
3. Load ispSTREAM
4. Program and Verify
5. Verify
6. Return to Main Menu

Press ↑↓ and ↵ to choose
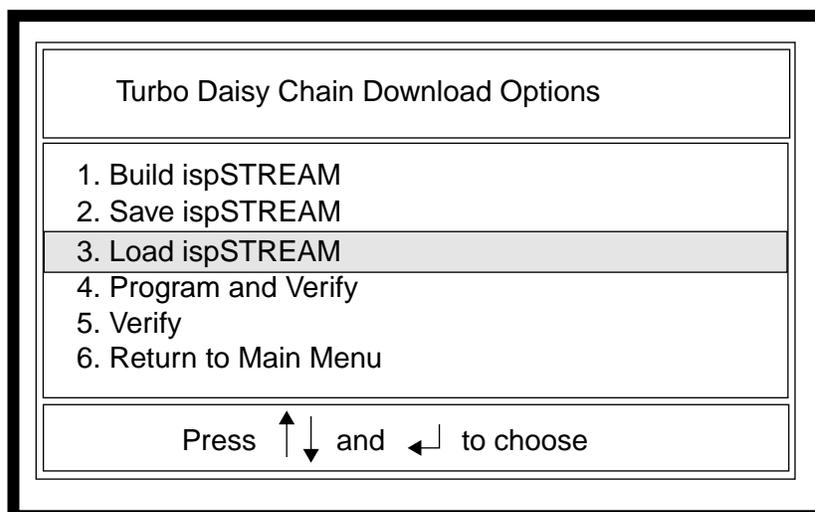
Figure 3-69. Load ispSTREAM Option

2. Type in the name of the bit stream file you wish to load and download onto the Lattice Semiconductor ispLSI devices. Press **Return** (**Enter**). If you do not remember the name of the file, press **Return** (**Enter**) and a current list of all the saved bit stream files in your working directory appears.

ispSTREAM File to Load:
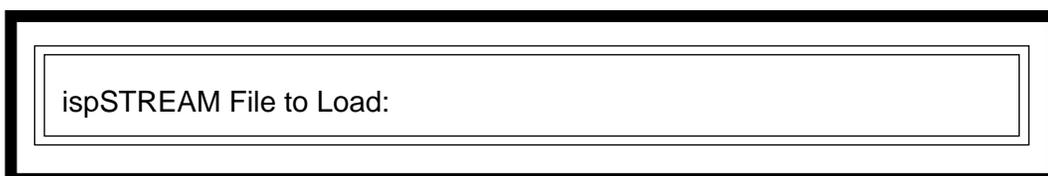
Figure 3-70. Loading a Specific File

Quitting the ISP Daisy Chain Program

To quit the program:

1. Select **Quit** or **Esc** (Escape) from any menu until you return to the ISP Daisy Chain Download menu. Select **8** or **Q** to return to the DOS prompt.

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