

HW-130 Programmer User Guide

Getting Started

Programmer Operations

Command Reference

Keyboard Reference

Diagnostics Procedures

Automation

Wiring Conventions

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Declaration of Conformity

Manufacturer's name and address:

Xilinx Inc.
2100 Logic Drive
San Jose, CA 95124
U.S.A.

declares that the product:

Product name: Programmer
Model number: HW-130

conforms to the following standards:

EMC:
EN55022:1995 Class B ITE
EN50082-1:1992
IEC 1000-4-2:1995 Level 3
IEC 1000-4-3:1995 Level 2
IEC 1000-4-4:1995 Level 2

Safety: EN60950:1992/A1:1993/A2:1993/A3:1995

This product complies with the requirements of the EMC Directive 89/336/EEC, and the Low Voltage Directive 73/23/EEC.

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Preface

About This Manual

This manual describes Xilinx's HW-130 Programmer and its interface software. The HW-130 Programmer is a tool used for programming Xilinx programmable devices on a PC in a DOS or Windows environment or on a UNIX workstation. Although this manual emphasizes Windows PC installations, DOS and UNIX differences are noted where applicable.

Manual Contents

This manual covers the following topics.

- Chapter 1, "Getting Started," describes the HW-130 Programmer hardware and explains how to install the hardware and its accompanying software.
- Chapter 2, "Programmer Operations," is a step-by-step description of all software procedures for the programmer.
- Chapter 3, "Command Reference," lists and describes the programmer commands alphabetically.
- Appendix A, "Keyboard Reference," lists the keyboard shortcuts used to interface with the programmer and to navigate on the programmer display.
- Appendix B, "Diagnostics Procedures," covers auto-calibration and diagnostics.

- Appendix C, “Automation,” explains how to use the programmer with an autohandler to automate device programming.
- Appendix D, “Wiring Conventions,” covers power plug and serial connector drawings.

Conventions

The following conventions are used in this manual's syntactical statements:

Courier font regular	System messages or program files appear in regular Courier font.
Courier font bold	Literal commands that you must enter in syntax statements are in bold Courier font.
<i>italic font</i>	Variables that you replace in syntax statements are in italic font.
[]	Square brackets denote optional items or parameters. However, in bus specifications, such as bus [7:0], they are required.
{ }	Braces enclose a list of items from which you must choose one or more.
.	A vertical ellipsis indicates material that has been omitted.
...	A horizontal ellipsis indicates that the preceding can be repeated one or more times.
	A vertical bar separates items in a list of choices.
↵	This symbol denotes a carriage return.

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HW-130
Programmer
User Guide

Getting Started

Chapter 1

Getting Started

This manual covers installation and use of the HW-130 Programmer and its interface software, which are designed to program Xilinx programmable device families on PCs running DOS, Windows, SunOS, Sun Solaris, HP, or IBM UNIX workstations.

- Installation of the HW-130 Programmer and interface software is covered in this chapter.
- Programming procedures are covered in the “Programmer Operations” chapter.
- An alphabetical list and description of commands are included in the “Command Reference” chapter.

The HW-130 Programmer is a desktop unit that communicates with a host computer system by means of an RS-232 serial port using the HW-130 Programmer software.

The interface software enables you to select a device and download its algorithm to the HW-130 Programmer, ensure that the device is blank, program the device, and verify that the device has been programmed correctly.

Hardware and Software Requirements

The following are the minimum requirements needed for the different systems.

PC Installations

If you have a PC, ensure your system meets the following system requirements.

- PC 80286 and higher

- DOS Version 3.3 or higher (DOS installations only)
- Windows 95 or Windows NT or Windows 3.1x (Windows installations only)
- RS-232 serial port
- 495 KB conventional memory (DOS only)
- 2 MB of hard disk space available
- Serial mouse (recommended)

The HW-130 Programmer software controls the HW-130 Programmer from the keyboard or the mouse. See Appendix A for a summary of keyboard quick keys.

Workstation Installations

If you have a workstation, ensure your system meets the following system requirements.

- 6 MB of hard disk space available
- DB25 or DB9 serial port with read and write permissions
- X-based Windows Manager (X11R5 or higher)
- Operating System:

SunOS:	SunOS 4.1.3 or higher
Solaris:	SunOS 5.3 or higher (Solaris 2.3 or higher)
HP9000/700:	HP-UX 09.05 or higher
IBM RS6000:	AIX 3.2.5.0 or higher

The HW-130 Programmer software controls the HW-130 Programmer from the keyboard or the mouse. See Appendix A for a summary of keyboard quick keys.

Hardware Installation

This section explains how to install and configure the HW-130 Programmer.

HW-130 Programmer Description

The HW-130 Programmer comes with the following items:

- RS-232 9-to-9-pin data cable and 9-to-25-pin adapter
 - 25-pin female adapter for PC and IBM workstation users
 - 25-pin male adapter for Sun workstation users
 - HP workstation users do not need a 9-to-25-pin adapter
- Universal Power Supply
- Power Cord
- Software
- User Guide
- Vacuum Handling Tool Kit

The HW-130 Programmer consists of a base with a 96-pin connector on top of the case to attach the different socket adapters for each device and package type.

Socket adapters are available for each of the different product families.

As indicated in Figure 1-1, the top of the programmer case has three LEDs: red (fail), green (pass), and a power indicator. A push-button is used for operator responses.

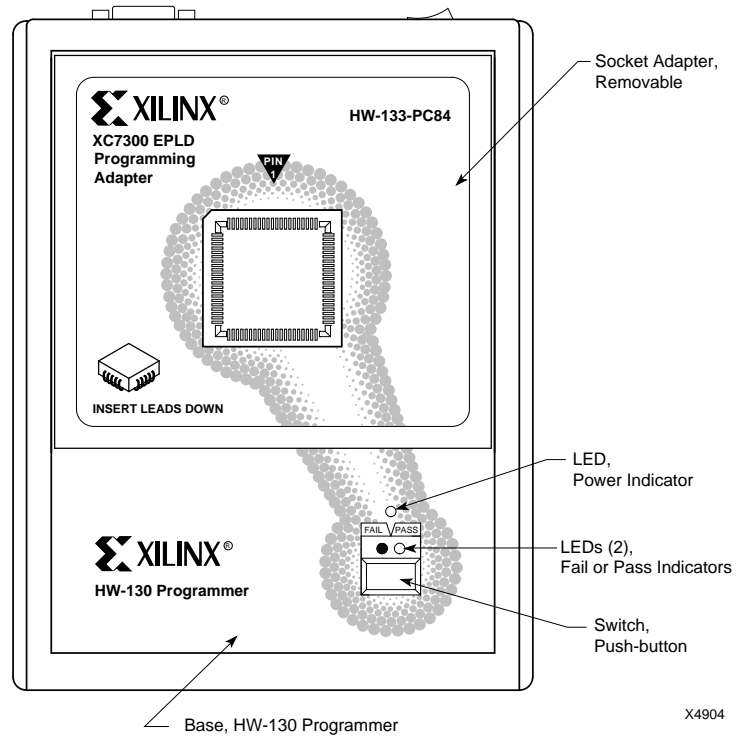


Figure 1-1 Top Panel of Programmer

On the back panel of the programmer, there is a power jack, an ON-OFF power switch, a female DB9 serial port connector, and a Ground jack for use with an ESD wrist strap. Figure 1-2 illustrates these features.

Caution: The Programmer may be damaged by static discharge into the adapter connector or socket. Please follow normal Electro Static Discharge (ESD) precautions when handling devices and the programmer in order to avoid damage or misprogramming. Use a ground strap when loading and unloading devices into the socket on the adapter. Use caution when inserting or removing the socket adapters.

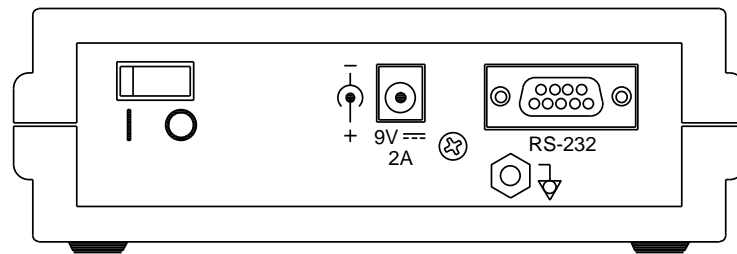


Figure 1-2 Rear Panel of Programmer

Installation

Use the following instructions to set up the HW-130 Programmer using Figure 1-1 and Figure 1-2 to guide you.

1. Turn off the power switch on the rear panel of the programmer.
2. Connect the RS-232 cable to the DB9 or the DB25 serial port on your PC or workstation and the programmer DB9 serial port.
3. Connect the AC adapter to the power connector input and AC line source.
4. Install the appropriate socket adapter onto the programmer 96-pin connector as shown in Figure 1-1. Ensure that there is no device in the socket, or the power-on self-test (POST) will not function.
5. Turn on the programmer power switch.

After the power is turned on, the POST takes a few seconds to test the hardware. The Power Indicator LED flashes during the POST and then remains lit.

The Fail indicator LED flashes during the POST if there is a hardware problem. Refer to Table 1-1 to determine the nature of the problem.

Table 1-1 HW-130 Programmer Troubleshooting

Fail Indicator Flashing	Problem
1 time	Socket adapter not empty
2 times	EPROM checksum failure
3 times	Voltage DAC calibration failure
4 times	PVpp current measurement failure
5 times	Memory banks 0 and 1 failures
6 times	Memory banks 2 and 3 failures

Resetting the HW-130 Programmer

If for any reason, the programmer stops responding, the keyboard locks up, or you wish to abort all operations, select the Reset Programmer command from the Options menu to execute a hardware reset. This command causes the HW-130 Programmer to run its POST and display the test results listed in Table 1-1 if a hardware error occurs. POST runs only once for each invocation of Reset and is only active if there is no device in the socket adapter.

Software Installation

This section covers installation of the HW-130 Programmer software. Go to the section for the environment you are using, Windows, UNIX, or DOS.

Installing Software from Windows

Use the information in this section to install and run the program from Windows.

Installing Software

To install the software, follow these instructions:

1. If you are using a diskette, insert the diskette into the appropriate

drive (typically A:). If you are using a CD-ROM, insert the CD into the CD-ROM drive (typically D:).

2. Type the following to invoke Windows:

win.␣

3. Select **R**un from the File menu of the Program Manager.

4. Type the following information in the Run dialog box.

a: \setup.exe.␣ (diskette)

d: \windows\setup.exe (CD-ROM)

The HW-130 Installation dialog box is displayed as shown in Figure 1-3.

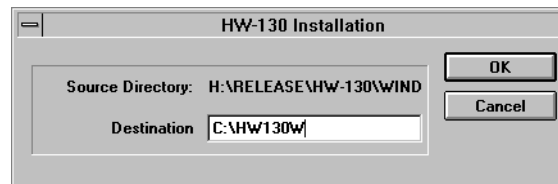


Figure 1-3 Installation Dialog Box

5. Click **OK** to accept the default installation directory or type the name of the drive and directory in which you want to install the HW-130 Programmer software.

Starting the Program

After finishing the installation, start the program as follows:

1. Turn on the power on the HW-130 Programmer.
2. Open the Xilinx HW-130 Programmer group and click on the following icon within that program group.



Figure 1-4 HW-130 Programmer Icon

Note: If the software cannot establish communication with the programmer, a message is displayed and indicates possible reasons for the communication failure.

The HW-130 screen is displayed. It consists of a menu bar and toolbar buttons. The toolbar buttons allow you to interface directly with the programmer operations.

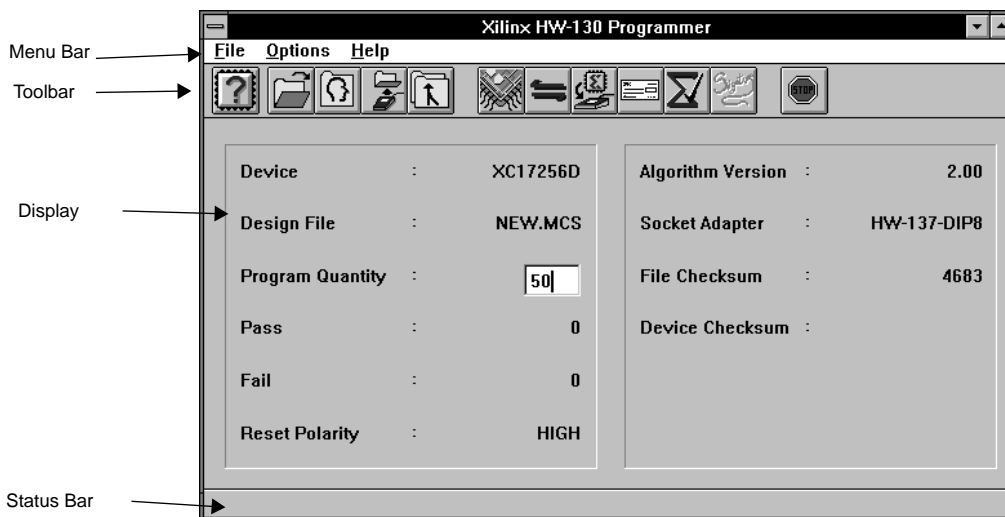


Figure 1-5 Main Window (Windows)

Menu Bar

The *menu bar* is located at the top of the HW-130 Programmer window. It includes the File, Options, and Help menus.

Toolbar

The *toolbar* is located at the top of the screen below the menu bar. It displays several icons, which you can use to specify commands directly. The toolbar offers an alternative to the menu commands.

Note: In the DOS version of the program, the command buttons, located at the bottom of the screen, replace the toolbar. See Figure 1-7.

Display

The *display* includes fields that are updated with the device type, the design name, and the device quantity that you select. Additional information appears as you perform programmer operations.

Status Bar

The *status bar* is located at the bottom of the HW-130 Programmer window. It provides information about the commands that you are about to select or that are being processed.

Installing Software on a Workstation from CD-ROM

This section explains how to install and run the HW-130 software on a Sun4 (SunOS and Solaris), HP9000/700 and IBM RS6000 workstations. The HW-130 software product has a graphical interface and requires an X-based Windows Manager.

These instructions describe how to:

- Load the CD-ROM
- Check whether the CD-ROM drive is mounted.
- Mount the CD-ROM drive, if necessary.
- Run the CD-ROM installation script to install the HW-130 software.
- Starting the program.

Note: The commands in these instructions show the default device name for a CD-ROM drive. Device names may be different on your system. If you encounter problems, check your hardware reference manuals or ask your system administrator.

Loading the CD-ROM into the Drive

Put the CD-ROM in a caddy and insert the caddy into the drive. A caddy is a plastic case that holds the disk. Load the disk so the printed side is facing up.

Checking Whether the CD-ROM Drive is Mounted

You need to have the CD-ROM drive mounted before you can install

the software. To determine if the drive has already been mounted, type:

```
/etc/mount
```

You should see a list of mounted devices. If a line similar to one of the following lines appears in the list, the CD-ROM drive has already been mounted on your system.

```
Sun OS    /cdrom on /dev/sr0
Solaris   /cdrom on /dev/sr0 or
          /cdrom on /dev/dsk/c0t6/
          hw130 if vold (Volume Management
          Daemon) is running.
HP        /cdrom on device where
          device depends on your system.
IBM       /cdrom on /dev/cd0
```

If the drive has been mounted, continue to “Running the CD-ROM installation script.”

Mounting the CD-ROM on a Local System

To mount a CD-ROM on a local system, follow these steps:

Note: You must have root access. Contact your system administrator if you need help.

1. Create the mounting point by creating a ‘cdrom’ directory. If the directory /cdrom does not already exist, enter:

```
mkdir cdrom
```

2. Enter the mount command for your platform.

```
Sun OS    /etc/mount -r -t hsfs /dev/sr0/cdrom
Solaris   /etc/mount -F hsfs -r /dev/sr0/cdrom
HP        /etc/mount device /cdrom -r -t cdfs
          where device depends on your system. Check your
          hardware reference manuals or ask your system
          administrator.
IBM       /etc/mount -v `cdrfs` -r /dev/cd0/cdrom
```


3. Verify that the drive was mounted correctly by typing:

```
/etc/mount
```

The displayed list of mounted devices should include the drive you just mounted.

Running the CD-ROM Installation Script

The easiest way to install the software is to run the installation script from the CD-ROM.

1. Type the CD-ROM installation command for your platform:

Sun OS: `/cdrom/install`

Solaris: `/cdrom/install`

Note: Vold (Volume Management Daemon) might have mounted the CD-ROM to `/cdrom/hw130` or `/cdrom/cdrom0` in which case you should run `/cdrom/hw130/install` or `/cdrom/cdrom0/install`

HP: `/cdrom/install`

IBM: `/cdrom/install.rs6`

2. The CD-ROM installation script will un-tar a file `hw130` located in the `/cdrom/<platform_dir>` to the target directory or `install_dir`. The script will also allow you to change the `install_dir` if you do not agree with the displayed default directory. Follow the instructions on the screen.

Note: If the install script fails to install the software, you may manually un-tar the HW-130 software from the appropriate sub-directory to the `install_dir`. Create an `install_dir` target directory and change directory (`cd`) to it.

```
mkdir <install_dir>
```

```
cd <install_dir>
```

3. To manually copy the files to your current directory, enter the following tar command at the command line:

Sun OS: `tar xvf/cdrom/sn2/hw130`

Solaris: `tar xvf/cdrom/sol/hw130`

or

Note: Vold (Volume Management Deamon) might have mounted the CD-ROM to `/cdrom/hw130` or `/cdrom/cdrom0` in which case you should run

`'tar xvf /cdrom/hw130/sol/hw130'` or

`'tar xvf /cdrom/cdrom0/sol/hw130'`

HP: `tar xvf /cdrom/hp7/hw130`

IBM: `tar xvf /cdrom/rs6/hw130`

No further setup is required for the software.

Starting the Program

After finishing the installation, start the program as follows:

1. Launch the X-based Windows Manager (e.g. OpenLook, OpenWindows or Motif Window Manager) on your system if it is not already running.

Note: The HW-130 software has a graphical interface and requires an X-based Windows Manager.

2. Connect the programmer to the serial port of the workstation and to the power supply of the programmer.
3. Turn on the power switch at the back of the HW-130 Programmer.
4. Change directory to the *install_dir* (the directory where the software was installed) and type the following at the command line:

```
hw130 &
```

Note: If the software cannot establish communication with the programmer, a message is displayed and indicates possible reasons for the communication failure.

The HW-130 screen is displayed. It consists of a menu bar and toolbar buttons. The toolbar buttons allow you to interface directly with the programmer operations.

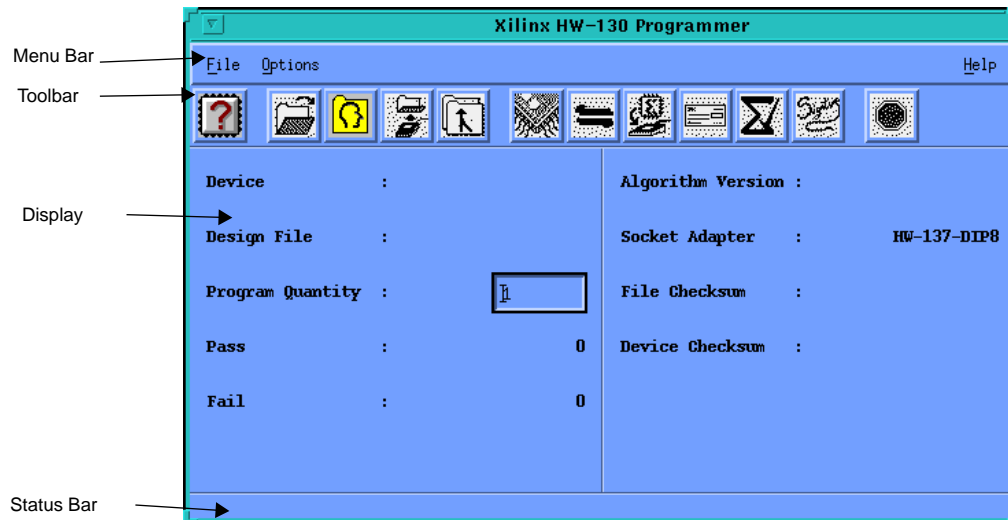


Figure 1-6 Main Window (UNIX Workstations)

Menu Bar

The *menu bar* is located at the top of the HW-130 Programmer window. It includes the File, Options, and Help menus.

Toolbar

The *toolbar* is located at the top of the screen below the menu bar. It displays several icons, which you can use to specify commands directly. The toolbar offers an alternative to the menu commands.

Display

The *display* includes fields that are updated with the device type, the design name, and the device quantity that you select. Additional information appears as you perform programmer operations.

Status Bar

The *status bar* is located at the bottom of the HW-130 Programmer window. It provides information about the commands that you are about to select or that are being processed.

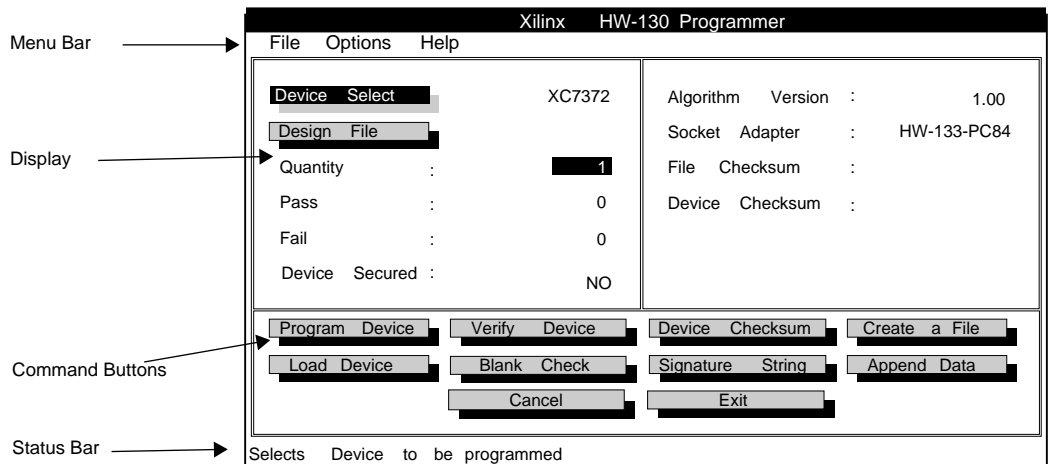
Installing Software from DOS

This section covers installation and program start-up from DOS.

Installing Software

To install the software, follow these instructions:

1. Insert the HW-130 Programmer software diskette into the appropriate drive and select that drive (typically A:). If you are using a CD-ROM, insert the CD into the CD-ROM drive (typically D:).
2. At the DOS prompt, type the following:
a: /install.exe (diskette)
d: /dos/install.exe (CD-ROM)
3. Follow the instructions on your screen.



X6034

Figure 1-7 Main Screen (DOS)

Use the menus and command buttons to interface to the HW-130 Programmer. In general, menu commands are for software configuration and diagnostics, and command buttons are for programmer operations. Refer to the online help for a detailed

description of the menus and command buttons.

Configuring Software

The HW-130 software *automatically* configures the programmer and your host computer for reliable communications. The default ports that the PC or Workstation uses to find the HW130 programmer, are listed in Table 1-2. Once configured, the communications settings can be saved by selecting Save Settings from the File menu.

If the software cannot find the programmer, a dialog box is displayed with a list of possible causes. Check to see that you have read and write permissions on the serial ports for the workstation.

Table 1-2 Default Ports

Platform	Default Ports Used			
PC	COM1	COM2	COM3	COM4
Sun4	ttya	ttyb		
Solaris	ttya	ttyb		
HP700	ttya	ttyb	tt00	tt01
IBM RS6000	ttya	ttyb	tty0	tty1

Setting the Communications Options Manually

Once configured the HW-130 Programmer software operates at standard baud rates that include: Auto, 1200, 2400, 4800, 9600, 19200, and 38400 baud. Use the HW-130 Programmer software to change the baud rate and the communications port if necessary.

Note: The DOS version also supports the 57600 and 115200 baud rates.

1. Select **Options** → **Communications** to display the

Communications dialog box.

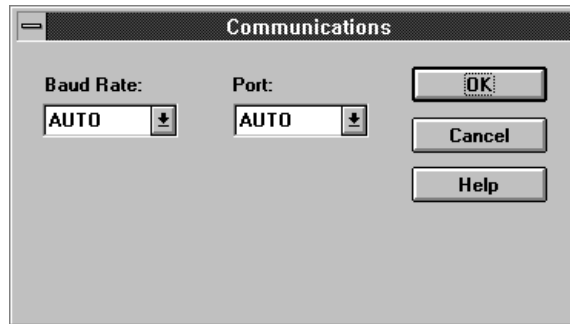


Figure 1-8 Communications Dialog Box (Windows)

2. Select the baud rate you want.
3. Select the port type you want.

On a *PC*, the serial port options include AUTO, COM1, COM2, COM3, and COM4. On a Sun Workstation, the serial port options include AUTO, ttya, ttyb or any user defined serial device. On HP workstations, the serial port options include AUTO, ttya, ttyb, tty00, tty01 or any user defined serial device. On IBM workstations, the serial port options include AUTO, ttya, ttyb, tty0, tty1, or any user defined serial device. The software displays only the port options for the ports available on your PC or workstation. AUTO is the default. If you use the default, the software searches for the programmer through all available communications ports and negotiates the highest available baud rate between the PC or workstation and the programmer.

On a *workstation*, select the port type you want by specifying the path and device name for that port in the Serial Port Device name box of the Communications dialog box, for example, /dev/ttya. From the specified serial port box, you can also access different serial device drivers, provided your system is configured to use them.

4. Click on the **OK** button to exit from this window.
5. You can save these settings by selecting **Save Settings** in the File menu. These settings will be used with your next programming session.

Selecting Commands and Dialog Box Options

To choose a menu item or an option in a dialog box, you can use the mouse or the keyboard.

Using the Mouse

Use the following guidelines when using the mouse to select menu options or dialog box options.

1. Move the mouse pointer over a toolbar button or a menu name and click on the left mouse button to select the object.

If you clicked on a toolbar button, a list box or a dialog box appears if appropriate. If you clicked on a menu, menu options are displayed.

2. Click on the option you want to use.
3. To exit a list box or a dialog box without selecting anything, press Cancel. To exit a dialog box you can also double-click on the upper left corner of the dialog box.

Using the Keyboard

Use the following guidelines when using the keyboard to select menu options or dialog box options.

1. To choose a menu item, first select a menu by pressing the Alt key and the highlighted letter key for that menu.

Note: On a workstation, use the F10 function key instead of the Alt key to select the first menu, then use the arrow keys to select the other menus.

The menu options are displayed.

2. Use the arrow keys to scroll down the list of menu or list items.

The status bar describes the option that is currently highlighted.

3. Press Enter when the option you want to use is highlighted or type the underlined letter in the menu item name.
4. To exit a list box or dialog box without selecting anything, press Escape or use Tab to position the cursor on the Cancel button and press the Enter key.

The DOS quick keys are also supported in Windows and UNIX. To select a programmer operation, press the appropriate quick key. Refer to the “Keyboard Reference” appendix for a complete list of keyboard commands and programmer quick keys.

Invoking Help

There are several ways of getting Help from the HW-130 program.

- To get help from the main screen, select the Contents option of the Help menu.
- To get help from the dialog boxes, click on the Help button located on these dialog boxes. Alternatively, on a PC, you can use the Alt-H key combination to access the help page for that dialog box.
- On a PC, to get information about the menu commands, highlight the menu option and press the F1 key. The help page corresponding to the menu option is displayed when you release the F1 key.

***HW-130
Programmer
User Guide***

Programmer Operations

Chapter 2

Programmer Operations

This chapter describes the programmer procedures available for the HW-130 Programmer. Before attempting any of the programmer operations included in this chapter, verify that the device type and other device-related criteria are correct.

If you saved the settings of a previous programming session, the software uses the last-used communications port, baud rate, and sound options when you execute the hw130.exe program. These settings are stored in the hw130.ini file.

Programming Quickstart

The following figure outlines the steps required to program a device.

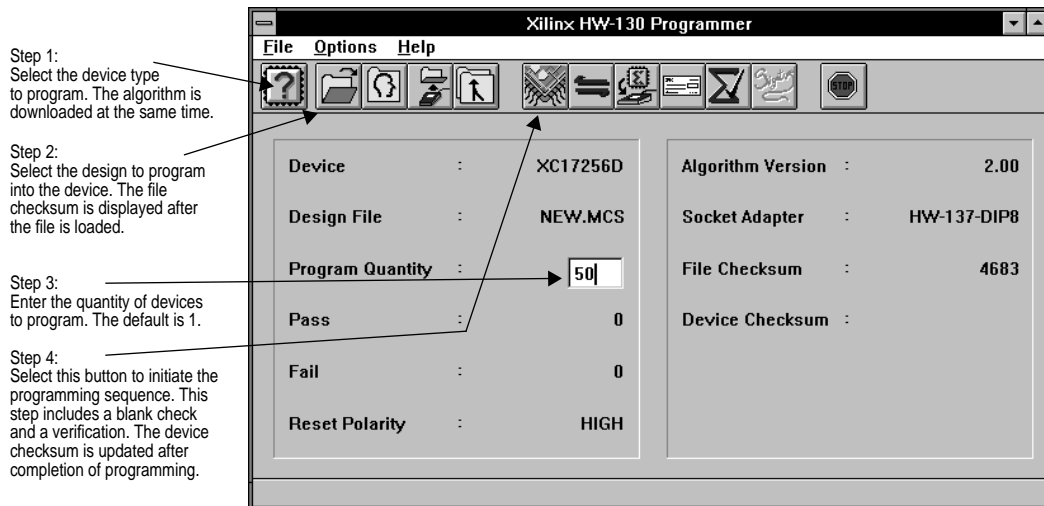
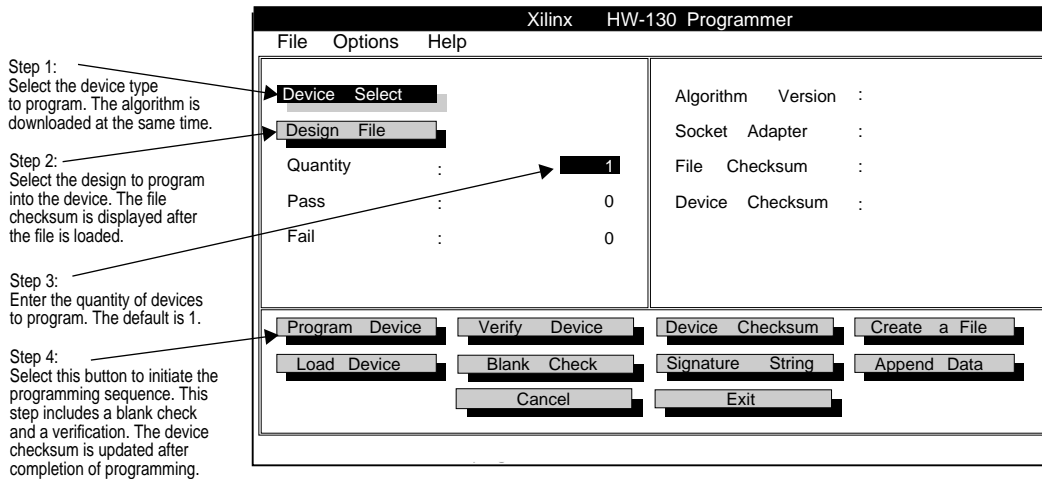


Figure 2-1 Main Screen (Windows and UNIX)



X6034

Figure 2-2 Main Screen (DOS)

Note: Throughout this section, quick keys are indicated next to the programmer operations. A summary of all the quick keys and how to use them is available in the “Keyboard Reference” appendix.

Specifying a Device (Ctrl-D)

To specify a device, use the Select Device command and follow these instructions.

1. Install the appropriate adapter for the device to be selected and programmed. Refer to Figure 1-1 for an illustration showing how to place the adapter on the programmer.

Note: If you have installed the wrong adapter for the selected device, an error message appears when you begin an operation.

2. Select the **Select Device** command from the File menu or click on the **Select Device** toolbar button shown in Figure 2-3.



Figure 2-3 Select Device Toolbar Button

After you select the device, the software automatically downloads the corresponding device algorithm into the memory of the HW-130 Programmer. The status bar marks the progress of the download operation.

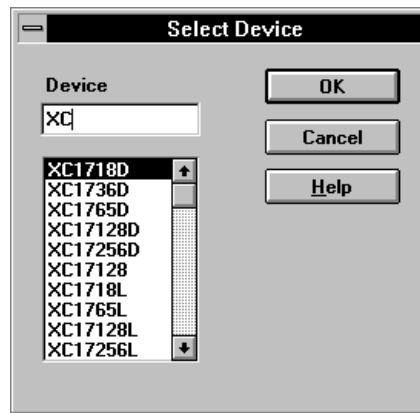


Figure 2-4 Device Selection Dialog Box

Specifying a Design (Ctrl-F)

Before programming a device, you must specify the design file to download to the programmer memory.

1. Select a design by selecting the **Open File** command from the File menu or by clicking on the **Select Design** toolbar button displayed in Figure 2-5.



Figure 2-5 Select Design Toolbar Button

The Open File dialog box is displayed as shown in Figure 2-6.

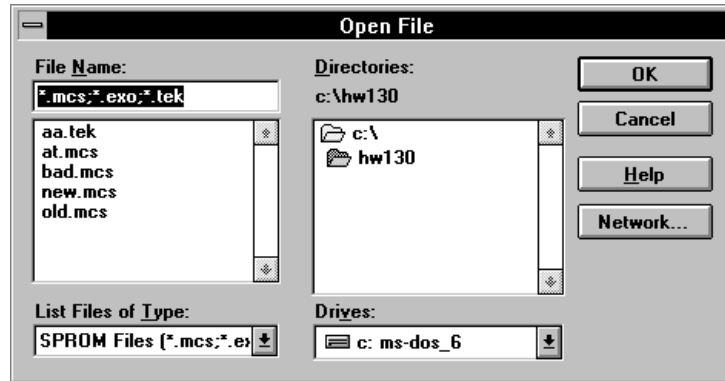


Figure 2-6 Open File Dialog Box

2. Specify the drive, directory, and file name of the design to download. You can specify one or all of the file formats listed in Table 2-1 in the List Files of Type box to locate files of the file type you want.

Table 2-1 Supported File Formats

Format	Description
SPROM	
MCS	Intel MCS-86 format (preferred default)
EXO	Motorola EXORmacs format
TEK	Tektronix TEKHEX format
EPLD/CPLD	
PRG	Extended Intel HEX format
JED	JEDEC format

Note: The HW-130 programmer will automatically give the user the correct format for the device selected. Some formats listed may not be applicable for all devices in a particular family. For information on how to generate these files using the Xilinx tools, refer to the XACT development system documentation.

3. Click on the **OK** button to accept the selections.

The design file that you specify is downloaded to the memory of the HW-130 Programmer when you click on the Design File OK button. The File Checksum field is updated with the checksum of the downloaded file.

Note: If an XC1700 design does not fit the targeted device, a message is displayed, informing you that your design file is too large for the selected device. In this case, you must select a larger device to fit your design.

Specifying a Profile

Use the Profile command to define information for a programming session and save it to a file. You can store setup information for a selected device, such as a specific design file, secure option, or the Reset Polarity. When you select a profile, it automatically sets up the programmer to the desired conditions, with no intervention on your part. Profile is accessible at any time during a programming session from the File menu or from the toolbar, enabling you to load a preset profile.



Figure 2-7 Load Profile Toolbar Button

Creating a Profile

To create a profile, follow these instructions:

1. Select **Profile** → **Create** from the File menu.
2. Select a device from the Device List.
3. Select **Secure Device (s)** or **Reset Polarity Active High,** or **Reset Polarity Active Low,** depending on the device selected.
4. Click on **OK**.
5. Select a design file from the Open File dialog box.
6. Click on **OK** after choosing the correct file.
7. A dialog box appears, displaying the items that you selected to

include in your profile. If everything is correct, click on **OK**. Use the **Change** button to modify any incorrect information.

The software prompts you to choose a profile name. Select a file name and click on **OK**. All profiles have a .pro extension.

Loading a Profile

To load a profile, follow these instructions:

1. Select **Profile** → **Load** from the File menu.
2. Locate the profile you want.
3. Double-click on the profile you wish to load.

Deleting a Profile

To delete a profile, follow these instructions:

1. Select **Profile** → **Delete** from the File menu.
2. Locate the profile you want.
3. Double-click on the profile to delete.

The software prompts you to confirm that this is the file that you wish to delete. If it is, click on **OK**. If it is not the correct file, click on **Cancel** and reselect.

Programming the Device (Ctrl-P)

Use the Program Device command to program one or more devices. This command is available only if you have specified a device. This procedure also assumes you have specified a design file.

1. Specify the number of devices to program in the **Quantity** field of the HW-130 display.
2. Select the **Program Device** command from the Options menu or click on the **Program Device** toolbar button shown in Figure 2-8.



Figure 2-8 Program Device Toolbar Button

3. The software prompts you to input the Reset Polarity or to set the Device Secured field depending on the device selected. Not all options are available for all devices.

- Select **High** or **Low** active Reset. High is the default.
- Select the desired security.

Depending on the device selected, several security options may be available:

1. Select **No** to disable the security feature (the default).
2. Select **Yes** to activate the security feature.
3. Select **Secure Only** to secure a previously programmed device.

Note: For some other devices several other security alternatives can also be selected:

- Read Secure -- This option disables the device from being read, but still permits it to be erased and reprogrammed.
- Write Secure -- This option allows the device to be read, but disables the ability to erase and reprogram.
- Read and Write Secure -- This invokes both types of security as listed above.

Once secured, only the signature string can be read.

Note: You only need to answer these questions once during programming, regardless of the quantity selected. If you configure the programmer by opening a profile, you are not prompted to answer these questions since these settings are part of the profile.

4. If the specified device quantity is more than 1, the message "Please Insert Device N of M in the Socket" is displayed, where N is the current device and M is the maximum quantity selected. Place the first device you wish to program in the socket adapter. To program the next devices, you can also initiate the program command by pressing the programmer push-button.

Check the status bar to view the progress of the programming operation. After programming the device, the software updates the Pass/Fail and Device Checksum fields on the display.

5. Repeat the previous step until you have programmed all the devices.

When you program a device, the software completes the following operations: Blank Check, Program, Verify, and Checksum calculation.

Loading the Device (Ctrl-L)

Use the Load Master Device command to load the contents of a master device into the programmer memory.

1. Place the device you wish to load in the socket adapter.
2. After inserting the device in the socket, select the **Load Master Device** command from the Options menu or click on the **Load Master** toolbar button shown in Figure 2-9.



Figure 2-9 Load Master Toolbar Button

The software reads the device and copies its contents into the programmer memory. The device checksum field and the device reset polarity field for certain devices are updated. You can use the data to program other devices or to verify other programmed devices against it.

Verifying the Device (Ctrl-V)

Use the Verify Device command to compare a programmed device to the data pattern that has already been loaded into the programmer memory.



Figure 2-10 Verify Device Toolbar Button

Comparing a Device to a File

You can compare a programmed device against a file.

1. After programming a device, select the **Verify Device** command from the Options menu or click on the **Verify Device** toolbar button.

The software compares the device to the file that you loaded into the programmer memory.

Note: If the programmer memory is empty, you are prompted to select a file to be downloaded into the programmer memory before the software can verify the device.

If the device matches the file, the software updates the Device Checksum and Pass display.

If there are differences, an error message is displayed.

2. Repeat the previous step until you have verified all the copies of the specified device type either by clicking on the **Verify Device** toolbar button or by pressing the programmer push-button.

Comparing One Device to Another

You can load a device pattern in the programmer memory ready for the software to compare it to another device. Use the Load Master toolbar button to do this.

1. After inserting a programmed device in the socket, select **Load Master** to load that device pattern into the programmer memory.
2. Remove the device from the socket and insert the device against which you want to verify the RAM data.
3. Select the **Verify Device** command from the Options menu or click on the **Verify Device** toolbar button shown in Figure 2-10.

Checking for Blank Device (Ctrl-B)

Use the Blank Check command to ensure that the device in the socket is blank.

1. After inserting the device in the socket, select the **Blank Check Device** command from the Options menu or click on the **Blank**

Check toolbar button shown in Figure 2-11.



Figure 2-11 Blank Check Toolbar Button

The software executes the Blank Check command.

If the device is not blank, the message “Failed Blank Check” is displayed. Otherwise, the software updates the display.

2. Repeat the previous step until you have checked all the devices either by clicking on the **Blank Check** toolbar button or by pressing the programmer push-button.

Calculating the Device Checksum (Ctrl-K)

Use the Device Checksum command to calculate the checksum of the contents of the device in the socket. The method used to calculate the checksum ignores non-data bits, such as manufacturer ID, device ID, and reset polarity.

1. After inserting the device in the socket, select the **Device Checksum** command from the Options menu or click on the **Device Checksum** toolbar button.



Figure 2-12 Device Checksum Toolbar Button

The software executes the Device Checksum command and updates the display.

2. Repeat the previous step until you have calculated the checksum of all the devices either by clicking on the **Device Checksum** toolbar button or by pressing the programmer push-button.

Viewing the Signature String (Ctrl-S)

Use the Signature String command to retrieve the signature of the device. The signature string consists of eight alphanumeric characters

used to identify designs or devices. You can specify this string into the design file when the file is compiled.

1. After inserting the device in the socket, select the **Signature String** command from the Options menu or click on the **Signature String** toolbar button shown in Figure 2-13.



Figure 2-13 Signature String Toolbar Button

The Device Signature message box is displayed, indicating the signature of the device.

2. Repeat the previous step until you have read the signatures of all the devices either by clicking on the **Signature String** toolbar button or by pressing the programmer push-button.

Saving the Programmer Memory Contents to a File (Ctrl-C)

Use the Save RAM to File command to save the programmer memory contents to an output file.

Note: The DOS command equivalent to this function is the Create a File button.

1. Select the **Save RAM to File** command from the File menu or click on the **Save RAM to File** toolbar button.



Figure 2-14 Save RAM to File Toolbar Button

2. The software displays the Save RAM to File dialog box for you to specify the file name and location that will store the file.

The format of the output file can be one of the programming file formats. Ensure you specify a file extension when you enter a file name.

Appending Data (Ctrl-A)

Use the Append Data command to create a new file from two existing files and download the new combined file into the programmer memory. Thereafter, you can use the file to program a device. The Append Data button is available only if you have specified a device with this feature.

1. Select the **Append Data** command from the File menu or click on the **Append Data** toolbar button.



Figure 2-15 Append Data Toolbar Button

2. The Original Design File dialog box is displayed for you to specify the original file to which you will add another file. Specify the design as explained at the beginning of this chapter.
3. The software then displays the Design to be Appended dialog box for you to specify the design file to be added to the original design file.

The software appends the data to the original file and downloads the combined design file to the programmer memory.

At this point, a dialog box is displayed prompting you to select one of three options: Program, Save RAM to File, or Cancel.

4. Select the option corresponding to the task you want to perform. For information on the Program and Save RAM to File options, refer to the procedures “Programming the Device” and “Saving the Programmer Memory Contents to a File,” also covered in this chapter.

The software updates the display with the file checksum of the new combined design file.

HW-130 Programmer User Guide

Command Reference

Chapter 3

Command Reference

This chapter presents the commands available for the HW-130 Programmer. The commands are listed in alphabetical order. When applicable, the corresponding toolbar button is included in the command description.

Menus

The HW-130 Programmer has three menus, which are described in the following sections.

File Menu

The File menu contains commands to select the device type and the design file. It also includes commands to create files, save the programmer settings, set the profile, and exit the program.

To access the File menu with the keyboard on a PC, press the letter **F**, underlined in the menu name, while holding down the Alt key. Press the underlined letter corresponding to the menu option you want. The commands on the File menu are the following:

Select <u>D</u> evice	Selects a device type.
<u>O</u> pen File	Opens a design file.
Save RAM to <u>F</u> ile	Saves the contents of the programmer memory to a file.
<u>A</u> ppend Data	Adds a file to another file.
<u>S</u> ave Settings	Saves the programmer communications port and baud rate settings and sound options.
<u>P</u> rofile	Loads an existing profile, creates or deletes a profile.
<u>L</u> ot Summary	Prints lot specific information.

Exit Exits the HW-130 software.

Options Menu

The Options menu includes commands to execute programmer commands and commands to configure and diagnose the programmer. To access this menu with the keyboard on a PC, press the letter O, underlined in the menu name, while holding down the Alt key. Press the underlined letter corresponding to the menu option you want.

<u>P</u> rogram Device	Programs the selected device with the selected design.
<u>V</u> erify Device	Compares the programmed device to the file currently loaded in the programmer memory.
<u>L</u> oad Master	Loads the contents of a programmed device into the programmer memory.
<u>B</u> lank Check Device	Checks that the device is blank.
<u>S</u> ignature String	Retrieves the signature of devices.
<u>D</u> evice Checksum	Checks the device checksum.
<u>A</u> uto-Calibration	Measures the voltage and current for each power supply.
<u>D</u> iagnostics	Provides several diagnostics loops to check the port, memory, pin drivers, and supply voltage.
<u>R</u> eset Programmer	Resets the programmer.
<u>A</u> utohandler Mode	Turns the autohandler mode on or off.
<u>C</u> ommunications	Sets the port and baud rate of the HW-130 Programmer.
<u>S</u> ound	Sets the sound on or off.

Help Menu

The Help menu contains commands that enable you to access online help for the HW-130 Programmer. To access this menu with the keyboard on a PC, press the letter H, underlined in the menu name, while holding down the Alt key. Press the underlined letter corresponding to the menu option you want.

<u>C</u> ontents	Lists online help topics.
<u>A</u> bout HW-130	Displays the program version.

Alphabetical Listing of Commands

This section lists the menu commands of the HW-130 software program.

About HW-130 (Help Menu)

Use this command to display the program version, as shown in Figure 3-1.



Figure 3-1 About HW-130 Dialog Box

Append Data (File Menu)

Use this command to combine two files and download them into the programmer memory. You can then save the RAM data into a file or use that data to program devices. This command is available after you have specified a device type.



Figure 3-2 Append Data Toolbar Button

Auto-Calibration (Options Menu)

Use this command to measure the voltage and current for each power supply. When you select this command, the Auto-Calibration dialog box is opened showing the status of the available supplies of the programmer. You must use the calibration adapter for this operation.

Autohandler Mode (Options Menu)

Use this command to turn the autohandler mode on or off. When you turn on the autohandler mode, a Handler Mode field is added to the bottom right-hand side of the display. If you have not installed an auto-handler, this command should be set to off.

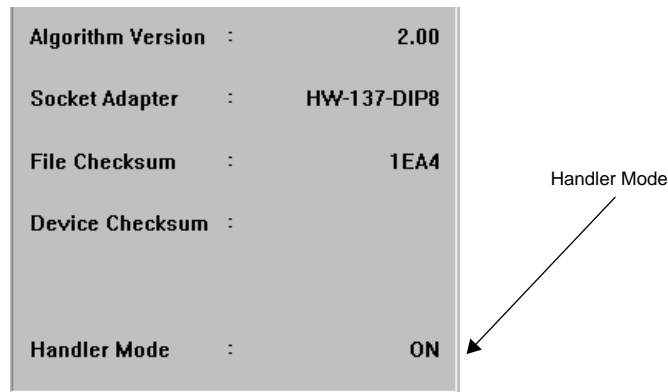


Figure 3-3 Handler Mode Set to On

Blank Check Device (Options Menu)

Use this command to check that the device is blank. This command is available after you have specified a device type.



Figure 3-4 Blank Check Toolbar Button

Communications (Options Menu)

Use this command to set the port and baud rate of the HW-130

Programmer, if necessary.

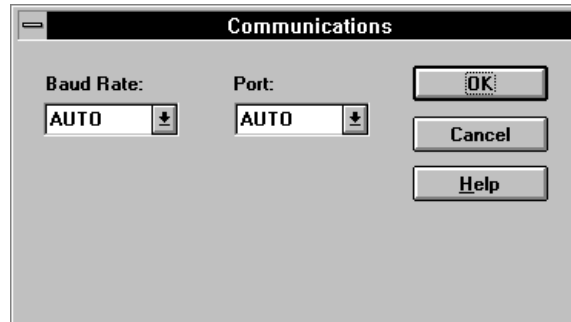


Figure 3-5 Communications Dialog Box

Contents (Help Menu)

Use this command to bring up a list of help topics in the online help window.

Device Checksum (Options Menu)

Use this command to check the device checksum. This command is available after you have specified a device type.

After calculating the device checksum, the program updates the appropriate field on the display: Pass if the operation was successful, and Fail if the operation failed. In addition, the Device Checksum field on the display reflects the new value.



Figure 3-6 Device Checksum Toolbar Button

The checksum number of a programmed device should match the checksum of the file that was used to program the device. The following figure is a partial view of the display that was updated

with the checksum number of a programmed device.

Algorithm Version	:	2.00
Socket Adapter	:	HW-137-DIP8
File Checksum	:	4683
Device Checksum	:	4683

Device Checksum

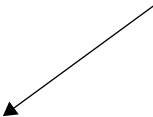


Figure 3-7 Device Checksum of a Programmed Device

Diagnostics (Options Menu)

Use this command to execute the diagnostics loops and check the port, memory, pin drivers, and supply voltage of your programmer. Select a test by clicking on the radio button preceding the test that you want to execute. Then press the Execute button to start the test. For more information, refer to the “Diagnostics Procedures” appendix.

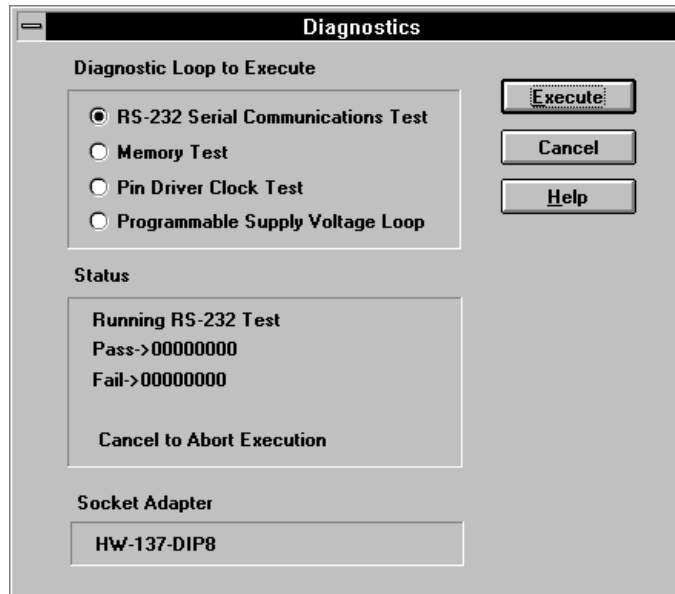


Figure 3-8 Diagnostics Dialog Box

Exit (File Menu)

Use this command to exit the HW-130 Programmer window.

Load Master (Options Menu)

Use this command to load the contents of a programmed device into the programmer memory. You can then use the data to program another device. This command is available after you have specified a device type.



Figure 3-9 Load Master Toolbar Button

After loading the master device, the program updates the appropriate field on the display: Pass if the operation was successful, or Fail if the operation failed.

Lot Summary (File Menu)

Use this command to record lot specific information, such as Lot Number, Operator Name, Operator Number, and any other Lot Information required. When printed, the software automatically appends the Time, Date, Operation Performed, Device Type, Algorithm Version, Profile Name (if applicable), Design File Name, File Checksum, and Pass and Fail Quantities.

Note: This is only applicable to DOS and Windows.

Open File (File Menu)

Use this command to open the file you will use for programming one or more devices.



Figure 3-10 Select Design Toolbar Button

When you open a file, you download it into the programmer memory. This command is available after you have specified a device type.

Profile (File Menu)

A profile consists of a device type, a design file, and the device polarity or security. Use this command to load an existing profile, create or delete a profile. Once you have created a profile, you can invoke it whenever you need to use it. If you load a profile and select the Program command, you will not be prompted to enter the device polarity or security feature anymore.



Figure 3-11 Load Profile Toolbar Button

Program Device (Options Menu)

Use this command to program one or more devices with the selected design. This command is available only if you have selected a device

type.



Figure 3-12 Program Device Toolbar Button

The program executes the following operations: blank check, program, verify, and device checksum. You can use this command after using any one of the following commands that load a design file into the programmer memory: Open File, Load Profile, Append Data, and Load Master.

If programming is successful, the program updates the Pass field; otherwise, it updates the Fail field.

Reset Programmer (Options Menu)

Use this command to reset the programmer. This command is equivalent to turning the programmer off and on again.

Save RAM to File (File Menu)

Use this command to save the contents of the programmer memory to a file.



Figure 3-13 Save RAM to File Toolbar Button

You can use this command after using any of the commands that load data in the programmer memory: Open File, Append Data, and Load Master.

Specify the name of the file in which the RAM data is to be saved as well as the file extension. The file extension can be .tek, .mcs, .exo, .prg or .jed and represents a file format in which to save the file.

Save Settings (File Menu)

Use this command to save the programmer settings, such as the port, baud rate, and sound options. The data is saved to hw130.ini. If you

are using the DOS version of the program, you can also save the color settings that you specified.

Select Device (File Menu)

Use this command to select the type of device you want to program. When you select a device, the program downloads the device algorithm into the programmer memory.



Figure 3-14 Select Device Toolbar Button

Signature String (Options Menu)

Use this command to display the signature of EPLD/CPLD devices.



Figure 3-15 Signature String Toolbar Button

Sound (Options Menu)

Use this command to set the sound on or off. When sound is set to on, the program emits a sound whenever you encounter an error.

Verify Device (Options Menu)

Use this command to compare a programmed device to the file currently loaded in the programmer memory. This command is available only if you have selected a device.



Figure 3-16 Verify Device Toolbar Button

You can use this command to verify that your device was successfully programmed. You can also use this command to compare one device to another. After programming a device, replace the current device

with the device that you want to evaluate and click on Verify.

If the verification is successful, the Pass field is updated on the programmer display; otherwise the program updates the Fail field.

HW-130 Programmer User Guide

Keyboard Reference

Appendix A

Keyboard Reference

This appendix summarizes the keyboard commands you can use to navigate on the programmer display. It also lists all the keyboard commands you can use to activate programmer commands.

Keyboard Commands

Use the following keyboard commands to navigate and select objects on the screen.

Table A-1 Summary of Keyboard Commands

Key	Action
Tab	Traverse objects forward and highlight them.
Shift-Tab	Traverse objects backward and highlight them.
Enter	Activate a selection button or a highlighted item in a list.
Arrow keys	Scroll up or down inside selection boxes and menus. Navigate from one menu to another.
Alt-Character	Select a menu on a PC and Workstation
F10	Select a menu on a workstation.
Ctrl-Character	Select a programming quick key operation.
Esc	Unselect a menu or exit a Help window. Abort the current operation.

Quick-Key Reference

To select command buttons, use the Tab key or press the appropriate quick key from the list displayed in Table A-2. The table lists all the programmer quick keys you can use as an alternative to the command buttons.

1. To select a quick key, locate a programmer operation and its corresponding quick key in Table A-2.
2. Hold down the **Ctrl** key while you press the other key indicated. For example, type Ctrl-P to select the Program Device button.

Table A-2 Programming Quick Keys

Programmer Operation	Quick Key
Device Select	Ctrl-D
Design File	Ctrl-F
Quantity	Ctrl-Q
Program Device	Ctrl-P
Load Device	Ctrl-L
Verify Device	Ctrl-V
Blank Check	Ctrl-B
Device Checksum	Ctrl-K
Signature String	Ctrl-S
Create a File	Ctrl-C
Append Data	Ctrl-A
Cancel	ESC
Exit	Ctrl-X

HW-130 Programmer User Guide

Diagnostics Procedures

Appendix B

Diagnostics Procedures

This appendix explains how to monitor the calibration of the HW-130 Programmer and how to run the diagnostic tests.

Auto-Calibration

The HW-130 Programmer automatically calibrates itself whenever you turn on the power or you use the Reset Programmer command. However, the HW-130 provides the capability to monitor the operation of the calibration circuitry. The calibration adapter shown in the following figure is required.

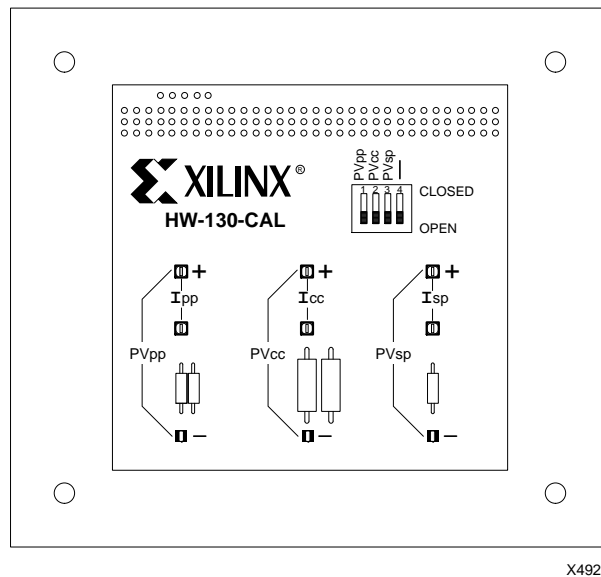


Figure B-1 Calibration Adapter

To start the auto-calibration, follow these steps after turning on the power on your programmer:

1. Install the HW-130-CAL calibration adapter, shown in Figure B-1.

The calibration adapter includes test points for measuring the voltage and current levels of the programmable power supplies.

2. Select **Options** → **Auto-Calibration**.

A dialog box is opened showing the status of the available supplies.

Note: Depending on the version of the hardware, PV_{sp} may or may not be displayed.

3. To measure the voltage and current for each power supply, use the provided switches (see Figure B-2).

In the closed position, the switches on the adapter connect load resistors to their respective power supplies. Open the switch to measure current that corresponds to the supply being measured.

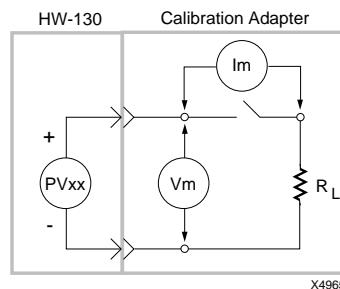


Figure B-2 Measuring Voltage and Current

4. To measure current, open the switch that corresponds to the supply being measured and connect the external current measuring equipment to the adapter, as shown in the preceding figure. The HW-130 results that are displayed in the Auto-Calibration dialog box should agree with the value measured by the current measuring equipment by the following percentages:

- PV_{cc} should be $\pm 1\%$
- I_{cc} should be $\pm 10\%$

- PV_{pp} should be $\pm 1\%$
- I_{pp} should be $\pm 10\%$
- PV_{sp} should be $\pm 1\%$
- I_{sp} should be $\pm 10\%$

Note: The results are only as good as the equipment used to measure the programmer's results. Ensure that your meters are calibrated and accurate.

Note: PV_{sp} and I_{sp} may not be available for your version of the hardware.

5. Click on the **Execute** button.

The programmer firmware executes the calibration routines. The results are displayed in the Auto-Calibration dialog box.

Diagnostics

The diagnostics routines consist of software loops that exercise various functional blocks within the programmer, allowing you to verify that the blocks are operating properly.

Use the following guidelines to select and run a test:

1. Select **Options** → **Diagnostics** to display the Diagnostics dialog box.
2. Select a diagnostic loop to run.
3. Click on the **Execute** button to start the test.
4. Check the Diagnostics Status box to view the results of the test.

Note: Once you select and execute a diagnostic loop, the test

continues to run until you cancel it by clicking on the **Cancel** button.

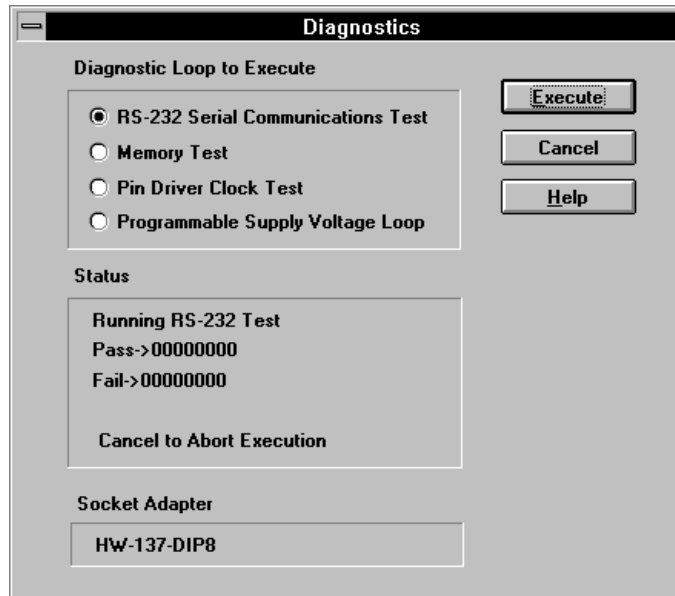


Figure B-3 Diagnostics Dialog Box

RS-232 Serial Communications Test

This test allows you to verify the RS-232 port on the host system at various baud rates.

1. Select **RS-232 Serial Communications** from the Diagnostics dialog box.

The Communications dialog box is opened.

2. Specify the baud rate and the communications port.
3. Click on **OK** to close the Communications dialog box and start the test.

The host and the HW-130 Programmer transmit and receive data at the set baud rate until you cancel the test.

Each time you complete a test, you are informed whether the test was successful or not. A message is displayed if a communication error occurs.

Memory Test

This test writes a non-repeating data pattern to the HW-130 Programmer data memory to ensure that every bit location can be accessed and that both a logic “1” and “0” can be written and read.

Each time you complete a test, you are informed whether the test was successful or not. If the test fails, the Diagnostics Status box also displays which memory bank failed.

Pin Driver Clock Test

The Pin Driver test exercises every address, data, and clock signal that connects to the socket adapter interface connector.

1. To use this test, install a socket adapter with no device in the socket.
2. Select **Pin Driver Clock Test** from the Options Diagnostics menu.
3. Click on **Execute**.

Note: To stop the test, click on Cancel.

The address, data, and clock signals are driven between a CMOS logic “0” and “1” at approximately 36 kHz. You can view them using an oscilloscope to probe the appropriate pins of the adapter socket. Refer to the device data sheet for pin-out information. There are no Pass/Fail conditions for this test.

Warning: Exercise caution when probing the socket pins to avoid damaging them.

When you use the calibration adapter shown in Figure B-1, signals are connected such that the HW-130 Programmer is able to test all the pins as both input and output signals. The programmer will display any errors that occur and continuously toggle all the signals at the approximate rate of 36 KHz.

Programmable Supply Voltage Loop

The HW-130 Programmer has two programmable power supplies called PVcc and PVpp, which are used to program devices.

1. To use this test, install a socket adapter with no device in the

socket.

2. Select **Programmable Supply Voltage** from the Options Diagnostics menu.
3. Click on **Execute**.

The loop causes the supplies to step between the four voltage levels shown in Figure B-4.

You can view the waveforms by using an oscilloscope to probe the appropriate pins of the adapter socket. Refer to the device data sheet for pin-out information. There are no Pass/Fail conditions for this test.

Warning: Exercise caution when probing the socket pins to avoid damaging them.

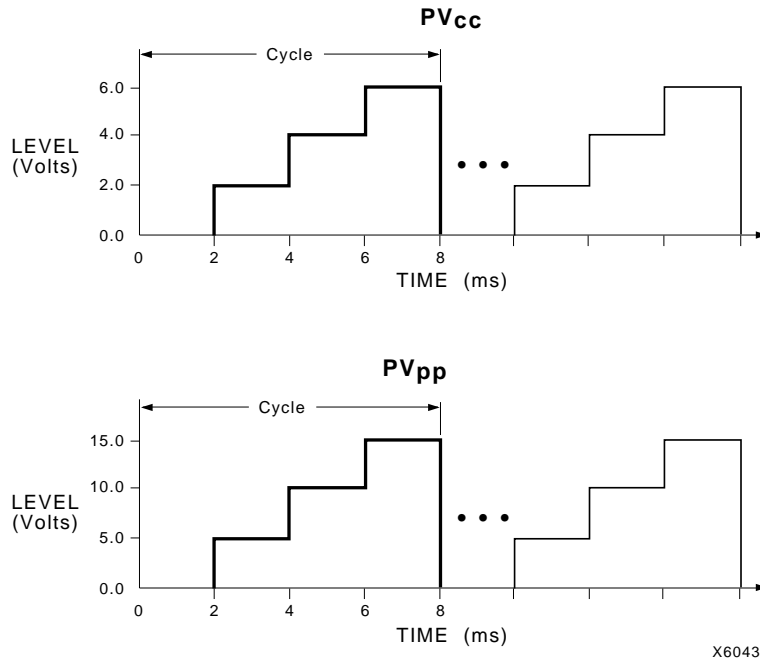


Figure B-4 Programmable Supply Test Levels

***HW-130
Programmer
User Guide***

Automation

Automation

This chapter describes the setup and operation of the HW-130 programmer in conjunction with autohandling equipment.

Selecting the Autohandler Mode

To select the autohandler mode of operation, follow these instructions.

1. Connect the HW-130 programmer to the autohandler.

Refer to Figure C-1 for the appropriate interface timing and Figure C-2 for signal locations.

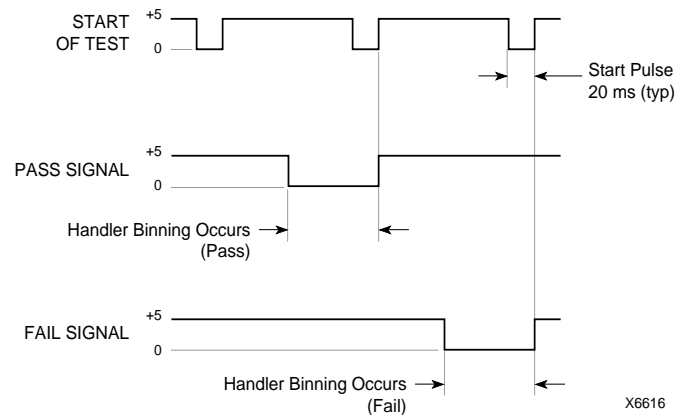


Figure C-1 Handler Timing for HW-130 Programmer

Request assistance from the autohandler manufacturer for proper connection (both mechanical as well as electrical).

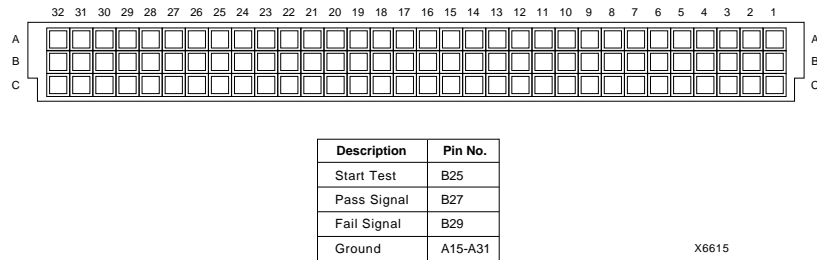


Figure C-2 HW-130 96-Pin DIN Connector (Top View)

2. Select **Options** → **Autohandler** → **On**.

The main screen now indicates that the autohandler is on.

Programmer Operation

This section summarizes the instructions for using the programmer in conjunction with an autohandler. Please refer to the “Programming Operations” chapter for details on the individual procedures.

1. Specify a device by pressing the **Device Select** button on the main screen.

Alternatively, you can select a profile. The profile loads a device type, its polarity or security feature, and a design into the programmer memory.

2. Click on the **Select Design** toolbar button to open a design.

Note: If you wish to load a master device, do so before selecting the autohandler mode.

3. Specify the device quantity to program in the **Quantity** field.

The quantity only needs to be specified for programming.

4. Select the desired programmer operation, **Program Device**, **Verify Device**, or **Blank Check** by pressing the appropriate toolbar button on the HW-130 Programmer main screen.

Note: While you are in autohandler mode, only the Program Device, Verify Device, and Blank Check commands are functional. To use the other commands, you must not be in autohandler mode.

The programmer is now in the ready-state, waiting for the Start-of-Test signal from the autohandler. Follow the instructions from the autohandler manufacturer to operate the autohandler properly.

HW-130 Programmer User Guide

Wiring Conventions

Appendix D

Wiring Conventions

This appendix includes wiring information that you can use for hardware purposes.

Power Cord

The following illustration indicates the wiring of the HW-130 Programmer power cord. The following illustration shows the commonly used wiring convention for the U.S.A. power cord. Use the wire colors as a wiring guide.

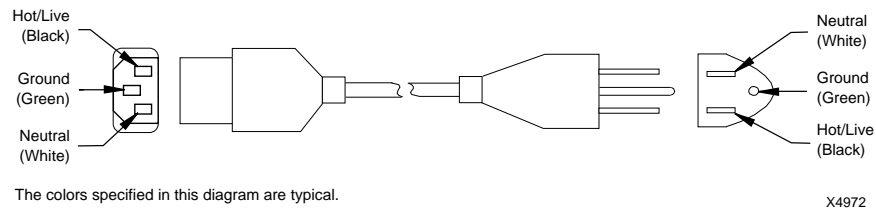


Figure D-1 Typical U.S.A. Power Cord

Serial Connector

The following illustration shows the serial port connections.

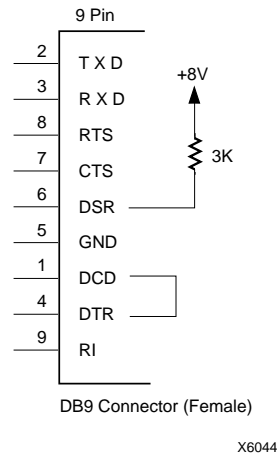


Figure D-2 HW-130 Serial Connector

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